CODONICS®
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# Infinity® LX Medical Image Server

# User's Manual

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# Preface

## Conventions Used in This Manual

### Bulleted Lists

Bullets are used to display a list of nonprocedural items. For example:

This chapter includes information you will need to set up Infinity LX's software:

- Setting up user accounts
- Setting the system date and time
- Setting up access for DICOM stations

### Numbered Steps

The icon indicates the beginning of a procedure. The steps in a procedure are numbered. For example:

**To configure the system information**

1. Remove the SmartDrive from the chassis.
2. Connect the SmartDrive to a PC.
3. In Windows, navigate to and run the **Configurator.exe** file, which is stored at the root level of the SmartDrive.

## Notes and Tips

Notes contain additional information related to a topic or procedure. For example:

***NOTE:*** *To shut down Infinity LX, refer to "Shutting Down and Rebooting" on page 4-28.*

Tips provide additional insights about a topic or procedure (such as why you may want to do something or a faster way to perform an operation). For example:

***TIP: Basing a new DICOM station on an existing one***
*To create new DICOM station entry that is based on one of the existing entries, select the desired existing entry in the* ***DICOM Stations*** *dialog box and then click the* ***OK*** *button. The new station's property settings in the* ***DICOM Station's Properties*** *dialog box will match the station entry that you selected.*

## Cautions and Warnings

Cautions alert you to actions or situations that could cause harm to equipment or data. For example:

**CAUTION** Adequate ventilation is required for proper operation of the Infinity LX.

Warnings alert you to actions or situations that could result in personal injury. For example:

**WARNING The two power cords connected to the uniterruptible power supply (UPS) or a wall outlet are the main disconnect for Infinity LX.**

## Important Information and Filenames

**Bold type** is used for emphasis, command names, and paths or filenames. For example:

- When you have completed entering the system configuration parameters, click the **Save** button and close the window.
- In Windows, navigate to and run the **Configurator.exe** file, which is stored at the root level of the SmartDrive.

# Purpose and Scope

Refer to this user manual for procedures on how to perform the Infinity LX user operations, including:

- Setting up the hardware and software
- Performing system administration functions
- Sending studies from DICOM stations
- Retrieving studies to DICOM stations
- Managing stored studies
- Maintaining Infinity LX
- Monitoring system status and troubleshooting common problems

# Product Information

For technical assistance with Infinity LX, call the Codonics Technical Support System at the following number:

**Phone:** **+1-440-243-1198**
**Toll Free:** **800-444-1198 (USA only)**

The Customer Service System is available weekdays from 8:30 AM to 5:30 PM EST (U.S. holidays excluded). Technical Support is also available online via email and the Codonics web site:

**Email:** **support@codonics.com**
**Web Site:** **www.codonics.com**

General product information can also be requested by sending email to:

**Email:** **info@codonics.com**

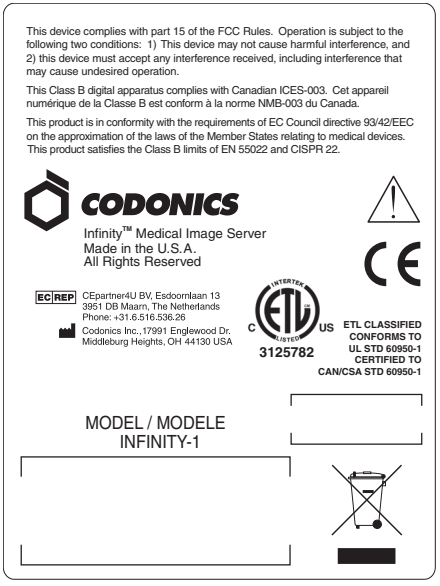
Please include your postal mailing address and telephone number in the email message. Basic product information is returned via email. Complete product literature is sent by postal mail.

# Warnings and Limitations of Use

## Safety and Compliance Labels

Codonics is in compliance with various regulations, details of which are listed in Appendix B.

The Infinity LX safety and compliance label, shown below, is located on the right side of the chassis (shown on the following page).




***Infinity LX safety and compliance label***

***Infinity LX safety and compliance label, on right side of chassis***

## Voltage Warning

The exclamation point within a triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying this device.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL. REMOVAL OF LABELS, COVERS, OR ENCASEMENT FASTENERS MAY VOID THE WARRANTY.

THIS APPARATUS MUST BE ELECTRICALLY GROUNDED.

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS DEVICE TO RAIN OR MOISTURE.

EQUIPMENT IS NOT TO BE USED AS A COMPONENT OF A LIFE SUPPORT SYSTEM. Life support devices or systems are devices or systems that support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury or death to a person. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

**WARNING The two power cords connected to the uniterruptible power supply (UPS) or a wall outlet are the main disconnect for Infinity LX.**

**WARNING To disconnect overall power to Infinity LX prior to servicing it, shut down the system (refer to "Shutting Down and Rebooting" on page 4-28), and then power down the device (refer to "Removing Power to Infinity LX" on page 4-32).**

## Dangers Électriques

*Le point d'exclamation situé à l'intérieur d'un triangle équilatéral représente un point d'instruction important dans l'utilisation de cette appareil.*

*ADRESSEZ-VOUS AU PERSONNEL QUALIFIE. LE FAIT DE RETIRER LES ETIQUETTES OU DE DEMONTER LE CAPOT ANNULENT LA GARANTIE.*

*CET APPAREIL DOIT ETRE RELIE A LA TERRE.*

*N'EXPOSEZ PAS CET APPAREIL À LA PLUIE OU L'HUMIDITÉ, EN RAISON DU RISQUE DE FEU OU DE DÉCHARGES ÉLECTRIQUES.*

*Cet appareil ne doit pas être utilisé comme composant d'un système d'assistance vitale. Cet appareil ne doit pas être utilisé dans des conditions où la défaillance de l'appareil pourrait entrainer blessure ou mort d'homme.*

**WARNING Les deux cordons d'alimentation sont le système de coupure principal de l'appareil.**

**WARNING Avant d'intervenir sur l'appareil, veuillez à toujours l'éteindre et n'oubliez de débrancher le câble.**

## Laser Warning

Infinity LX contains a laser diode of a higher class than 1. To ensure continued safety, do not remove any covers or attempt to gain access to the inside of this product. Refer all servicing to qualified personnel. The following label appears inside your unit: Class 1 Laser Product Laser Klasse 1.

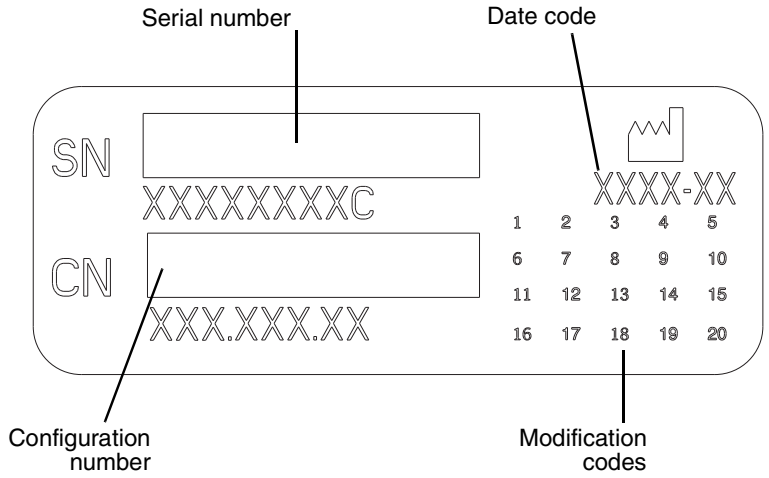
## Danger du Faisceau Laser

*Le système "Codonics Infinity LX Medical Image Server" contient un lecteur de CD dont la diode laser est de classe supérieur à 1. Pour votre sécurité, n'enlevez pas les caches, n'essayez pas d'ouvrir l'appareil. Adressez-vous au personnel qualifié en cas de panne.*

## *Serial Number, Configuration Number, Date Code, and Modification Codes*

The serial number, configuration number, date code, and modification codes are located on the safety and compliance label, which is on the left side of the chassis.

- The serial number (SN) uniquely identifies the unit.
- The configuration number (CN) details the build configuration.
- The modifications codes are to the right of the CN number and are a series of 20 numbers. When any of these numbers are blocked out, that identifies a modification that was made to the unit.
- The date code is in YYYY-MM format below the factory date code symbol.




***Serial number, configuration number, date code, and modification codes***

## Potential for Radio Frequency Interference on Device Operation

Both portable and mobile RF communications equipment can affect medical electrical equipment, including the Codonics Infinity LX Medical Image Server. Keep such RF communications equipment out of the immediate area.

## Potential for Radio and Television Interference

The Codonics Infinity LX Medical Image Server generates and uses radio frequency energy, and, if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. The device has been type tested and found to comply with Class B emission limits for a computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operating in a commercial environment. Operation of the equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be appropriate to correct the interference. If your device does cause interference to radio or television reception, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the device with respect to the receiver

If necessary, you should consult Codonics Technical Support or an experienced radio/television technician for additional suggestions. You may find the following booklet prepared by the Federal Communications Commission helpful: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

This product is in conformity with the protection requirements of EC Council directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. This product satisfies the Class B limits of EN55022. A declaration of conformity with the requirements of the Directive has been signed by the Director of Quality Assurance and Regulatory Affairs.

This product is in conformity with the requirements of EC Council directive 93/42/EEC on the approximation of the laws of the Member States relating to medical devices. This product satisfies the Class B limits of EN 55022 and CISPR 22.

*Le présent appareil numérique n'émet pas de bruits radio-électriques dépassant les limites applicables aux appareils numériques de la Classe B prescrites dans le Réglement sur le brouillage radioélectrique édicté par le ministére des Communications du Canada.*



## Safety Precautions

- Never connect Infinity LX to any outlet or power supply that has a voltage or frequency different than that specified (100 – 240 VAC, 50/60 Hz).
- Use only the power supplies provided with Infinity LX (Codonics part number SP-00437).
- When replacing power supplies or the chassis, always disconnect overall power to Infinity LX prior to servicing it: shut down the system (refer to "Shutting Down and Rebooting" on page 4-28), and then power down the device (refer to "Removing Power to Infinity LX" on page 4-32).
- Damage to a power cord may cause fire or shock hazard. When unplugging a power cord, hold it by the plug only and remove the plug carefully.
- If a power cord or power supply needs to be replaced, replace it only with another Codonics power cord or Codonics power supply. Alternatively, replace it with a power cord or power supply manufactured specifically for your power configuration.

- If the device is smoking or making unusual sounds, power off and unplug the device immediately.
- Do not insert foreign objects of any kind into the device; doing so can constitute a safety hazard and cause extensive damage.
- Do not place any liquid containers on the device. If, for some reason, liquid seeps into the device, power off the device and unplug the power cord from the source outlet. If used without taking corrective measures, the device may be damaged.
- Do not use the device near flammable gases.

## *Précaution d'Emploi*

- *Ne jamais brancher cet appareil sur une source d'alimentation électrique dont la tension ou la fréquence diffèrent des valeurs indiquées (100 – 240 VAC, 50/60 Hz).*
- *Utiliser uniquement le bloc d'alimentation fourni avec l'appareil (numero de piéce Codonics SP-00437).*
- *Avant de remplacer le bloc d'alimentation ou le châssis principal, veuillez à toujours arrêter le système et aussi l'appareil.*
- *Un cordon d'alimentation endommagé est une cause d'incendie ou de décharge électrique. En déconnectant le cordon d'alimentation, tenez-le seulement par la prise et retirez la prise soigneusement.*
- *Si un cordon d'alimentation ou un bloc d'alimentation doit être remplacé, utilisez un cordon d'alimentation ou un bloc d'alimentation Codonics fabriqué spécifiquement pour votre appareil.*
- *Si l'appareil fume ou émet des bruits inhabituels arrêtez-le immédiatement et débranchez le câble secteur.*
- *N'introduisez aucun objet étranger dans l'appareil, cela peut être une source de danger et peut causer de graves dommages.*

- *Ne déposez aucun récipient à coté de l'appareil. Si pour une raison quelconque un liquide est renversé à l'intérieur, arrêtez immédiatement l'appareil et débranchez le câble secteur. Toute nouvelle utilisation de l'appareil sans intervention peut causer de graves dommages.*

- *Ne pas utiliser l'appareil à coté d'une source de gaz inflammable.*

## Location Precautions

- Because Infinity LX is over 90 lbs (40 kg) with the drives installed, use caution when lifting or moving the chassis.
- The device's operating ambient temperature range is 15–30°C (59–86°F), with a relative humidity of 20%–80%.
- If the device is moved quickly from an extremely cold place to a warmer one, condensation is likely to form. Do not use the device if condensation has formed. Wait until the condensation has evaporated. You can speed up the evaporation time by moving the device to a drier location.
- Ventilation slots and holes are provided on the front and rear of the device. Place the device on a level, stable surface and locate it at least 10 cm (4 in.) from walls to ensure proper ventilation.

**CAUTION** Adequate ventilation is required for proper operation of the device.

- Do not place objects on top of the device.
- Infinity LX is designed and tested to meet product certification requirements for use in general administrative and information processing environments within medical facilities. Infinity LX is **not** designed or certified for direct patient contact or for use within 1.83 m (6 ft) of a patient or in explosive environments where flammable gases such as anesthesia or oxygen might be present.

**WARNING Grounding reliability can be achieved only when Infinity LX or its uninterruptable power supply (UPS) is connected to an equivalent receptacle marked "Hospital Only" (that is, "Hospital Grade").**

**WARNING Customers might consider using an appropriate isolation transformer or a medical grade UPS in environments that require less than 300 μA chassis leakage. Please check local/regional and hospital-specific ordinances to determine the applicability of any/all standards based on the intended use and placement of Infinity LX.**

- Do not place device in a high humidity or high dust area. Airborne dirt particles can cause interference with the operation of the device. Avoid placing the device in areas where ventilation ducts, open doors, or frequent passers-by might expose the device and media to high levels of debris.
- Do not locate the device in hot-springs areas where hydrogen sulfide and acidic ions are likely to be generated.
- Do not locate the device where there are oily fumes and vapors.
- Do not locate the device in direct sunlight.
- Do not locate device near sources of high RF energy, high magnetic fields, or ionizing radiation.

## *Environnement de Fonctionnement*

- *Infinity LX pèse plus de 90 lbs (40 kg), y compris les disques dur. Il est important d'exercer prudence en déplacant la machine.*
- *Les conditions normales d'utilisation de l'appareil sont : une température de 15 à 30°C (59 à 86°F) et une humidité relative de 20 % à 80 %.*
- *En cas de variation rapide de la température, de la condensation peut se former. Dans ce cas n'utilisez pas l'appareil, attendez que la condensation se soit évaporée. Vous pouvez accélère cette évaporation en déplacent l'appareil dans un endroit sec.*

- *Les fentes de ventilation se trouvent à l'avant et à l'arrière de l'appareil. Placez l'appareil sur une surface stable et au moins 10 cm (4 in.) à des murs pour assurer une ventilation correcte.*

**ATTENTION** ***Une ventilation correcte est nécessaire au bon fonctionnement de l'appareil.***

- *Ne pas poser d'objets sur l'appareil. Ils risqueraient de bloquer la ventilation ou de fendre le capot.*
- *Les Serveurs d'images Médical Codonics Infinity LX sont fabriques et testes pour être conforme a la certification et être utilise dans un environnement administrative dans une structure hospitaliere. L' Infinity LX n'est pas conçu ou certifier pour un contact direct patient ou être utilisé dans une limite de 1.83m du patient ou dans un environnement explosif ou des gaz inflammable comme en anesthésie ou de l'oxygène peuvent êtres présent.*

***WARNING Une mise à la terre fiable est possible seulement pendant que Infinity LX ou son onduleur (UPS) s'est connecté aux appareils marqué "Hospital Only" (de qualité hositalière).***

***WARNING L'utilisateur doit considérer l'utilisation d'un transformateur d'isolement ou un UPS médical dans un environnement qui nécessite un courant de fuite de moins de 300 μA. Merci de vérifier les ordonnance spécifiques locale/régionale et hôpitaux afin de déterminer l'application de n'importe quel/touts standard lie au placement et a l'utilisation du produit Infinity LX.***

- *Ne placez pas l'appareil dans une zone propre et non-humide. Des particules de poussières peuvent causer des disfonctionnements. Évitez de placer l'appareil à proximité d'une bouche de ventilation, d'une porte, ou d'un lieu très fréquenté car cela pourrait exposer l'appareil ainsi que les médias à la poussière.*
- *Ne placez pas l'appareil à proximité d'une source de chaleur ou de substances acides.*

- *Ne placez pas l'appareil dans une pièce où il y a des vapeurs huileuses et grasses.*
- *N'exposez pas l'appareil à la lumière directe du soleil.*
- *Ne placez pas l'appareil près des sources d'énergie RF, des champs hauts-magnetiques, ou du rayonnement ionisant.*

## Cleaning Precautions

- Plastic components are used in the device's construction. Coat flecking and deformation are likely to occur if the device is wiped with chemical dusters, benzene, thinners, insecticides, or other solvents. Rubber and PVC materials left in contact with the device for extended times will cause damage. Never use petroleum-based solutions or abrasive cleaners.
- To clean the chassis enclosure, first disconnect overall power to Infinity LX: shut down the system (refer to "Shutting Down and Rebooting" on page 4-28), and then power down the device (refer to "Removing Power to Infinity LX" on page 4-32). Clean the enclosure with a soft cloth **slightly** moistened with a mild soap and water solution. Allow the enclosure to completely dry before operating the device again.

## Précautions d'Entretien

- *Cet appareil comporte plusieurs pièces en plastique. Des taches et des déformations peuvent être provoquées par l'utilisation de chiffon imbibé de benzène, d'essences, d'insecticides, ou d'autres solvants. N'utilisez jamais solution à base de pétrole.*
- *Pour nettoyer la baie de chassîs principale, l'éteindre en utilisant le bouton d'arrêt, puis l'interrupteur situé à l'arrière, et n'oubliez pas de débrancher le câble secteur. Nettoyez la baie avec un tissu doux légèrement humidifié avec une solution à base d'eau et de savon non corrosif. Laissez sécher avant de remettre en fonction le système.*

## Maintenance Precaution

Infinity LX includes several redundant systems and a robust user warning system to decrease the likelihood of permanent data loss. It is imperative that users act to prevent permanent data loss when Infinity LX indicates that there is a problem. Failure to do so may invalidate the system warranty and will jeopardize system data.

## Précaution d'Entretien

*L'appareil Infinity LX comprend plusieurs systèmes de redondance et un système d'utilisateur renforcé avec des avertissements afin de réduire le risque de la perte des données. L'inactivité en cas d'avertissement risque d'endommager la base de données.*



## Image Formats Supported

Infinity LX supports the following image formats:

- DICOM 3.0
- All standard Storage SOP classes
- Private Storage SOP classes

## Formats d'Image Acceptés

*Infinity LX accepte les formats d'image suivants:*

- *DICOM 3.0*
- *Tous les standards SOP-classes*
- *Adaptation du Stockage des SOP-classes spécifiques aux constructeurs*

## Medical and Patient Information

Infinity LX log files might contain patient information. Use caution when distributing log files.

# Disposal Requirements

Disposal of this product and consumables shall be in accordance with all applicable laws and regulations in effect at the locality at the time of disposal. For additional information, refer to Appendix A, Hazardous Material Information.

## Conditions et Règles d'Utilisation

*L'utilisation de ce produit doit être conforme à toutes les lois et règlements applicables sur le lieu d'utilisation.*

## European Disposal Requirements

Codonics products and electronic accessory devices are not to be discarded or recycled; rather they are to be returned to the manufacturer. Contact Codonics directly or by the email link provided for the latest information concerning:

- Identification of the country-specific Importer/Distributor/Producer
- Product return and treatment of our electronic products

Manufacturer: Codonics Incorporated
17991 Englewood Drive
Middleburg Heights, OH 44130 USA
Phone: +1-440-243-1198
Fax: +1-440-243-1334
Email: WEEE@codonics.com
www.codonics.com/weee

Codonics products and electronic accessory devices bearing the following symbol are subject to European Directive on Waste Electrical and Electronic Equipment (WEEE) 2002/96/EC, amended by Directive 2003/108/EC. The EN 50419 symbol indicates separate collection and return required.

***EN 50419 symbol***



# Indications for Use

The Infinity Series of Medical Image Servers are Class 1 FDA 892.2020 medical image communications and storage appliances. The Infinity product integrates software and server hardware to provide DICOM digital images and data storage and retrieval from various sources including but not limited to CT, MR, US, NM/PET, CR/DR, secondary capture, film digitizers, workstations, and import gateways. Data can be stored, managed, and forwarded via software provided on the appliance, including non-primary interpretation review/management of images on the server, and via optional web-enabled JPEG and web DICOM image delivery.

Users of this system are trained medical professionals, including but not limited to physicians, nurses, and radiological technicians. Those users responsible for the setup, operation, and maintenance of the system may include radiology technologists, PACS administrators and IT personnel. Primary applications include temporary and quarantine storage of large DICOM data sets directly from any modality and permanent storage of digital images in a pre-PACS environment with security and transaction logs to support patient confidentiality audit compliance.

# 1 Introduction

## Welcome and Congratulations

Congratulations on your purchase of the Codonics® Infinity® LX Medical Image Server!

We are pleased you chose Infinity LX. We are confident that it will provide fast, reliable storage of medical images for your demanding data storage and distribution applications.

# Product Features

Infinity LX is an expandable DICOM storage appliance that provides a simple solution for storing and retrieving medical images. Applications such as direct modality storage of large DICOM data sets or storage of digital images in an environment without a centralized image server are ideal for Infinity LX.

Infinity LX makes the power of complicated, rack-mounted servers available to users without special IT skills. With an intuitive interface and many preconfigured features, users can set up and maintain their own Infinity LX image servers. Infinity LX can also grow as your business grows. The high-reliability RAID based architecture allows storage and capabilities to be added incrementally.

Infinity LX is backed by Codonics global service and support network to provide years of worry-free operation.

## Temporary Modality Storage

The Infinity LX unique design delivers performance and reliability in an easy to use package. This makes Infinity LX an ideal storage solution for large, temporary datasets from CT, MR, and other DICOM modalities. Thin slices, raw data (optional based on proprietary configurations), 3D reconstructions, and multi-frame studies can be quickly saved and retrieved for future reconstruction or review. Automatic image management removes older studies tagged for temporary storage when space is needed. Infinity LX provides radiology departments with a simple solution that saves time and money when storing data not requiring long term archive on centralized servers.

## Quarantined Storage

The increased use of CDs and DVDs for image distribution is changing the way medical facilities manage studies brought in by patients. Often, the unknown nature of the data on the disc combined with the cost of storing them permanently on a central PACS makes institutions reluctant to import them into their own networks. When combined with the Codonics Integrity Medical Image Server, Infinity LX provides a low cost alternative for storing studies from CD or DVD, eliminating concerns about lost discs, storage costs, and foreign data mixing on the hospital network. Infinity LX simplifies disc management and viewing.

## Ease of Setup and Use

Infinity LX includes many preconfigured settings for common applications so users can begin utilizing the system quickly. While the Infinity LX default configuration can be up and running within minutes, it is also highly customizable with a rich set of features, including DICOM store, query/retrieve, storage commit, on-the-fly image compression, workstation access control, and temporary or permanent storage of images. Infinity LX provides a comprehensive set of system notifications and warnings using web, email, RSS, and visual/audible alerts built into the system.

## Features and Benefits

Infinity LX provides the following features and benefits:

- Compact, all-in-one design provides an affordable solution for DICOM image storage
- High performance architecture for fast DICOM file transfers
- Optimized for large DICOM data sets, including DICOM files over 2 GB
- Highly redundant hardware design, including RAID, power supplies, and cooling fans
- Simple system setup with preconfigured settings for non-technical personnel
- Optional JPEG Lossless image compression increases storage capacity up to 2.5x
- Configurable access control with audit trails to assist with patient confidentiality compliance
- System Status tool provides a web-based, user-friendly interface for remote monitoring of the Infinity LX operating status

# 2

# Terms and Concepts

This chapter explains important terms and concepts that users need to understand when using Infinity LX.

### *Terabyte*

1 TB = 1 trillion bytes = 1,000 gigabytes (GB).

Note that there is a difference between the total storage capacity of a hard drive and the usable capacity after the drive has been initialized for use in a RAID. If a system uses 5 1-TB hard drives in a RAID 5 configuration, there is typically only 4 TB of usable storage. The storage capacities that Codonics specifies for Infinity LX refer to **usable** storage, not the total storage available prior to RAID initialization.

Infinity LX currently supports up to 8 TB of usable storage capacity in its RAID configuration. Table 2-1 lists how many typical studies can be stored in 1 TB of storage.

**Table 2-1. Storage Capacity of 1 TB**

| Type of Study | Typical Number of Images/Study | Typical Image Size | Total Study Size | Max. Studies Stored on 1 TB |
|---|---|---|---|---|
| CR/DR Chest | 2 | 20 MB | 40 MB | 25,000 |
| MR Brain | 200 | 0.5 MB | 100 MB | 10,000 |
| CT Abdomen | 400 | 0.5 MB | 200 MB | 5,000 |
| PET/CT Body | 1500 CT + 1000 PET | 0.5 MB | 1250 MB | 1,600 |
| CT Raw Data | 1 | 5 GB | 5 GB | 200 |

***NOTE:*** *The storage capacity of 1 TB referred to in Table 2-1 on page 2-1 is a base-10 value (decimal number system), but the CT image sizes are base-2 values (binary number system), so the actual image capacity might be slightly less than what is shown in the table.*

### Hard Drives

Infinity LX uses hard drives that are designed for continuous, 24/7 operation for five years in demanding applications such as corporate file servers. The Infinity LX hard drives provide better performance than entry-level PC drives.

### Fault-Tolerant

A computer with self-contained backup systems that allows continued operation when major components fail is said to be *fault-tolerant*. Fault tolerance is used to improve system uptime. Electro-mechanical devices such as hard drives, fans, and power supplies are the most likely components to fail. Designing a system with redundant components is the most common method of implementing fault tolerance.

Infinity LX includes redundant hard drives, cooling fans, and power supplies.

### RAID

*RAID* (Redundant Array of Independent Drives) refers to multiple hard drives configured as a set to increase either the performance or fault tolerance of the system, or both. (Since hard drives are electro-mechanical devices that can fail over time, RAID is typically used to minimize the risk of data loss by including extra drives in the RAID set that provide one or two drives of fault tolerance.)

Infinity LX uses RAID primarily for fault tolerance. It also improves performance.

Infinity LX uses RAID 1 for the operating system and database, and RAID 5 for storing study data. For more information about these configurations, see their descriptions later in this chapter.

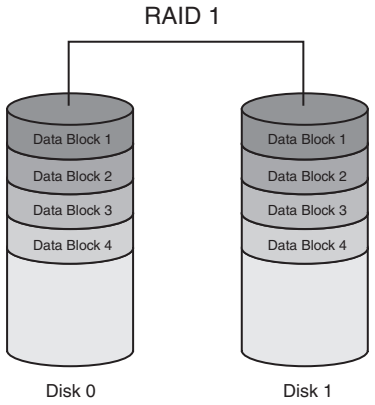
### RAID Controller

A *RAID controller* is dedicated hardware inside a computer system that performs all the functions necessary to set up, operate, and monitor a set of hard drives configured for RAID operation. Typically, RAID controllers are third-party boards added to the system.

### RAID 1

*RAID 1* provides *mirroring*, which is 100% duplication of the data on two hard drives. A RAID 1 configuration provides one drive of fault tolerance. This means that if either drive fails, the system will continue to run. When the failed drive is replaced, the RAID controller automatically rebuilds data onto the new drive. If both drives fail at the same time, all data is lost.

The following diagram illustrates how the same data blocks are stored on both of the RAID 1 drives.

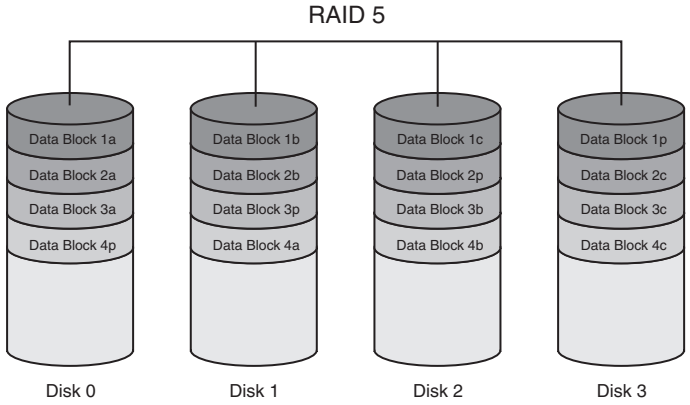



Infinity LX uses mirrored hard drives to store the operating system, application software, and database. When a RAID 1 drive fails, the failed drive's status light turns red, an audible alarm sounds, the System Status user interface status indicators are updated, an email is sent to the administrator, and an RSS article is posted.

### *RAID 5*

A *RAID 5* configuration always uses three or more hard drives that are the same size (e.g., all 1 TB). Data is distributed evenly across the hard drives to improve performance using a technique known as *striping*. Also, extra information is recorded for fault tolerance, called *parity*. The parity information always requires one drive out of the RAID set (e.g., a RAID 5 drive set with four 1-TB drives will provide approximately 3 TB of usable data storage). If more than one drive fails, all data in that RAID set is lost.

The following diagram illustrates how the stripes (i.e., parity blocks), indicated by the data blocks of the same color, are distributed across the RAID 5 drives.




Infinity LX uses RAID 5 to store DICOM study data. The Infinity LX is available with two banks of RAID 5 drives (in drive slots 1 through 5 and 6 through 10). Each bank of drives contains 5x1-TB drives and yields 4 TB of usable image storage (remember that one drive is used for parity). With both banks installed, Infinity LX provides 8 TB of usable image storage. When a RAID 5 drive fails, the failed drive's status light turns red, an audible alarm sounds, the System Status user interface status indicators are updated, an email is sent to the administrator, and an RSS article is posted.

### *RAID Operating Modes*

Table 2-2 describes the four modes in which a set of RAID drives can operate.

**Table 2-2. RAID Operating Modes**

| Mode | Description | Action Required |
|---|---|---|
| Optimal | The RAID 1 or RAID 5 drive set is operating normally. All drives are good. | No user action is required. |
| Critical | The RAID 1 or RAID 5 drive set has one failed drive.<br><br>The failed drive's status light turns red, an audible alarm sounds, the System Status user interface status indicators are updated, an email is sent to the administrator, and an RSS article is posted. | The failed drive must be replaced immediately. If a hot spare drive is installed, Infinity LX will automatically use this drive and enter Rebuild mode.<br><br>For complete replacement instructions, refer to "Replacing a Hard Drive" on page 7-2. |
| Rebuild | A new drive has been installed to replace a failed drive. The system is rebuilding information on the new drive. This takes approximately 8 hours for a 1-TB drive.<br><br>The system is still vulnerable to another drive failure during the rebuild. | No user action is required. |
| Failed | The RAID 1 or RAID 5 set has two or more failed drives. All data on the RAID drive set is lost. | Contact Codonics Technical Support for assistance. |

### Hot Swap

A *hot swap* is a replacement of a hardware component, such as a hard drive, fan or power supply module, that can be performed while the system is operating. Hot-swappable components are usually part of a fault-tolerant sub-system, such as a RAID array. The components are designed to be safely removed and replaced to minimize system downtime. Hot-swappable hard drives are usually mounted in special *carriers* that allow them to be easily slid into the chassis and removed when needed.

Infinity LX has hot-swappable hard drives in special carriers, internal cooling fans, and a redundant power supply with dual modules that allows either power supply module to be replaced without the need for tools.

### Cold Swap

A *cold swap* is a replacement of a hardware component that can be performed only when the system is powered off. A system that uses cold swap components usually requires opening the chassis and changing the failed component by disconnecting cables and removing screws.

Infinity LX has very few cold-swap parts. Only the motherboard, CPU fan, and internal chassis electronics are cold-swap components. These require a chassis swap.

### Hot Spare Drive with Automatic Copyback

Infinity LX supports one optional *hot spare drive* with Automatic Copyback to protect all three RAID sets in the Infinity LX chassis. Drive slot 13 in the chassis is permanently allocated for the Hot Spare Drive.

The hot spare drive is an extra hard drive installed in the system that is automatically used to build the array when any other RAID hard drive fails. This reduces the amount of time a system is vulnerable to a second drive failure that will result in total data loss on a RAID set. *Automatic Copyback* is a feature that waits for the failed drive to be replaced, then automatically copies the data from the hot spare drive back to the replaced drive. The process takes about four hours. Once Automatic Copyback is complete, the hot spare drive is available again.

### SATA and SATA II

*SATA* (Serial Advanced Technology Attachment) is a standard for connecting individual hard drives inside a computer with a small, flexible cable. The original SATA standard supported interface speeds up to 1.5 Gigabits/sec. *SATA II* is an improved version that is faster (up to 3 Gigabits/sec). SATA and SATA II drives have been adopted by every major PC manufacturer because they improve performance and are easier to connect than older IDE hard drives that use wide ribbon cables.

Infinity LX uses SATA II hard drives.

### SAS

*SAS* [Serial Attached SCSI (Small Computer System Interface)] is a standard for connecting many hard drives to a system. A single SAS port provides transfer speeds up to 12 Gigabits/sec and can control up to 256 SATA hard drives. External SAS ports can be used to connect one or more storage expansion chassis each with multiple hard drives installed.

Infinity LX includes a SAS port on the rear panel for adding future expansion chassis for more storage. A special locking SAS cable connects the main and expansion chassis together to prevent accidental disconnect.

### *RSS*

*RSS* (Rich Site Summary) is a format for delivering regularly changing web content. Many news-related sites, weblogs, and other online publishers syndicate their content as an RSS feed. Infinity LX provides an RSS feed for delivering updates to the system status information that is also made available in the System Status tool. Each RSS feed update is represented as an *article*. The title and description of the article indicate the nature of the Infinity LX status change. Many RSS feed readers are available, and are built in to most current web browsers, such as Internet Explorer 7 and Firefox 3.

For information about how to access the Infinity LX RSS feed, refer to "Accessing the Infinity LX RSS Feed" on page 4-12.

# 3 Setting Up the Hardware

## Finding a Location

When finding a suitable location for Infinity LX, use the following guidelines:

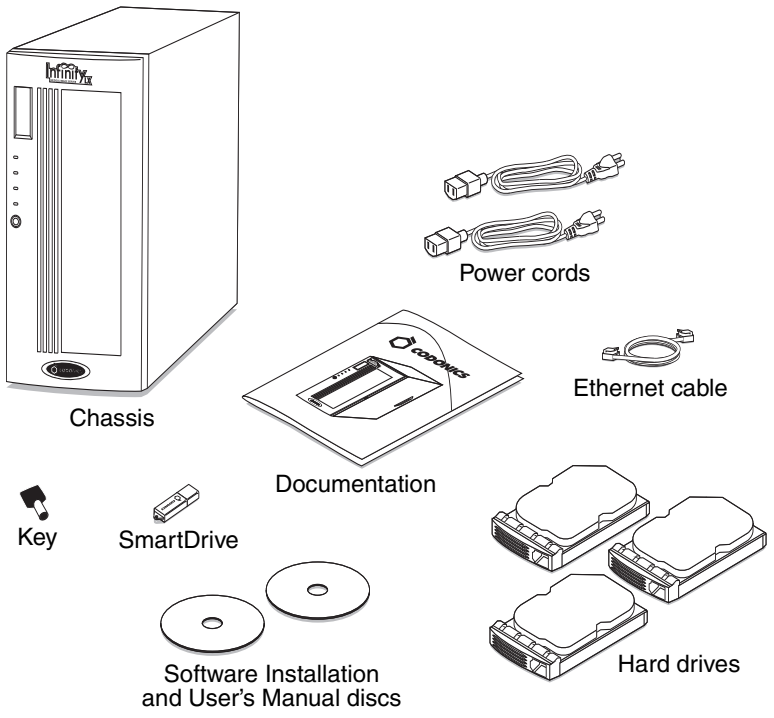
- Place Infinity LX on a flat, hard surface and in a location with adequate air circulation to prevent internal heat build up.
- Do not place Infinity LX near heat sources such as radiators or air ducts, or in a location subject to direct sunlight, excessive dust, mechanical vibration, or shock.
- Do not block ventilation on the sides or rear of Infinity LX.
- Make sure that the countertop or work surface will not vibrate or shake when Infinity LX is operating.

For additional location precautions, refer to “Location Precautions” on page xxi.

# Components

## Unpacked Components

Infinity LX is shipped in several cartons, which contain the components shown in the following illustration.




***Unpacked Infinity LX components***

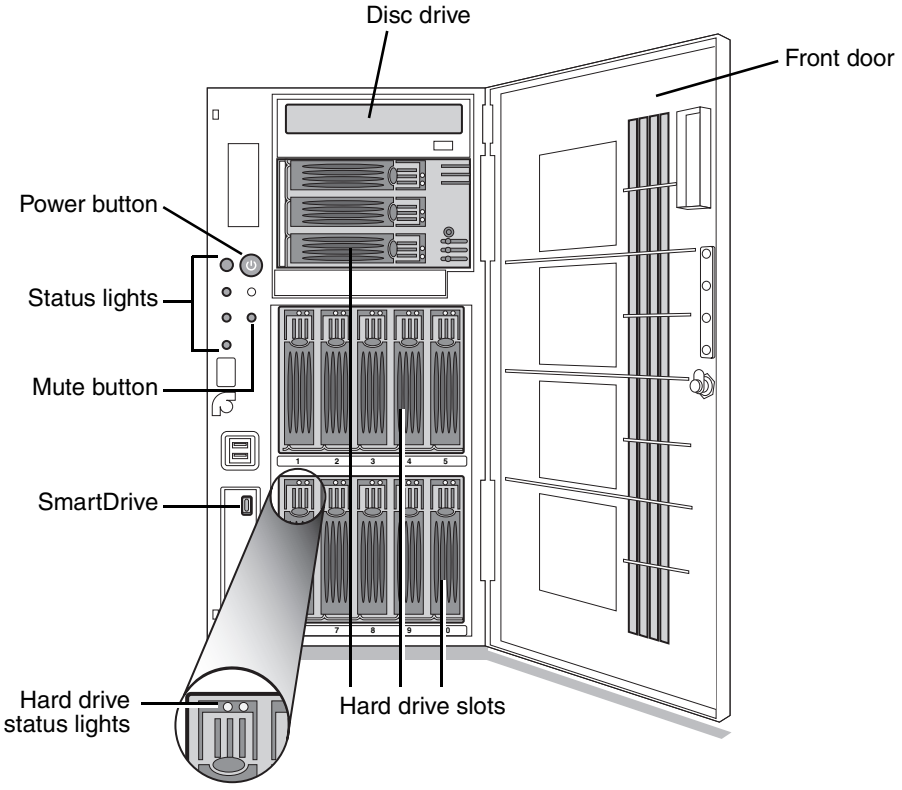
Inspect the carton for damage that might have occurred during shipping. Report any damage to the shipping company.

Save the carton and packing materials, in case you ever need to transport Infinity LX later.

**CAUTION** Use care when unpacking and handling hard drives. You should be properly grounded and observe anti-static procedures before removing the hard drive from its anti-static bag. Do not drop the hard drive. Handle only the front, side edges, and face with the label. Do not handle the underside or the backplane of the drive. Do not touch any exposed electronics.

## *Infinity LX Front Components*

The following illustration shows the components at the front of Infinity LX, with the hard drives installed.




***Infinity LX front panel components***

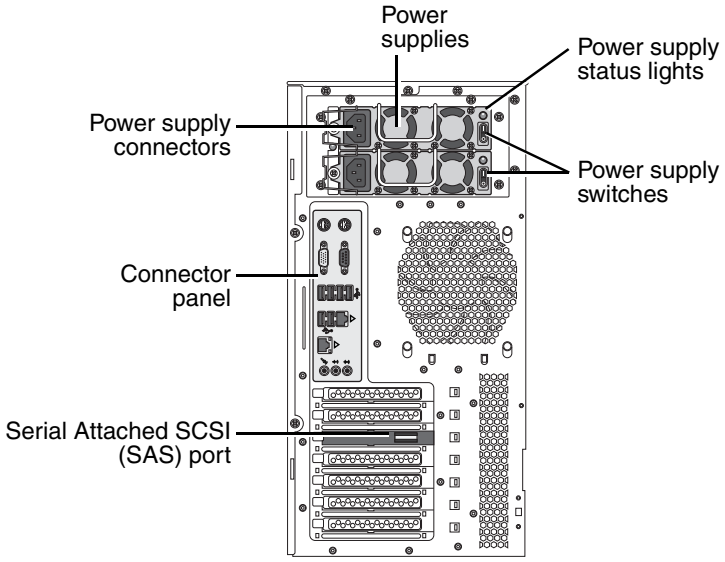
- Opening the **Front door** provides access to the front panel components.
- The **Power button** is used to power Infinity LX on and off.
- The **Status lights** indicate system status.
- The **Mute button** stops the audible status alarm if it is on.

***NOTE:*** *After pressing the Mute button, it might take up to ten seconds for the audible alarm to stop.*

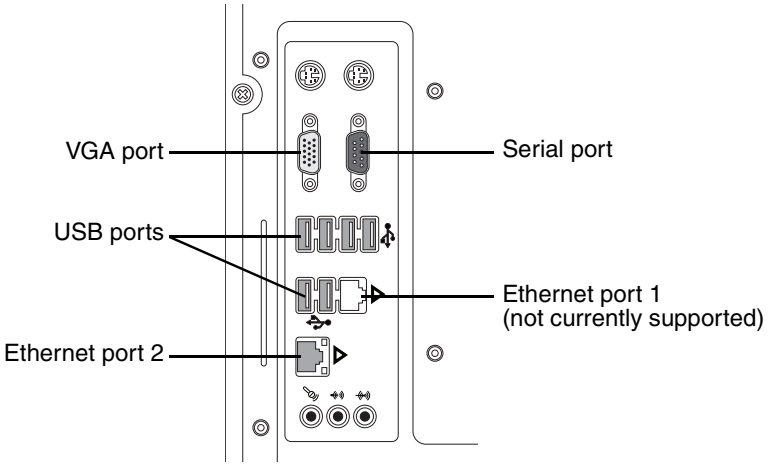
- The hard drives are housed in the **Hard drive slots**.
- System configuration information and utilities are stored on the **SmartDrive**, which is inserted into the front panel USB port.
- CD/DVD discs can be loaded in the **Disc drive**.

## *Infinity LX Rear Components*

The following illustrations show the components and input/output ports at the rear of Infinity LX.




***Infinity LX rear panel components***




***Infinity LX connector panel ports***

# Installing the Hardware

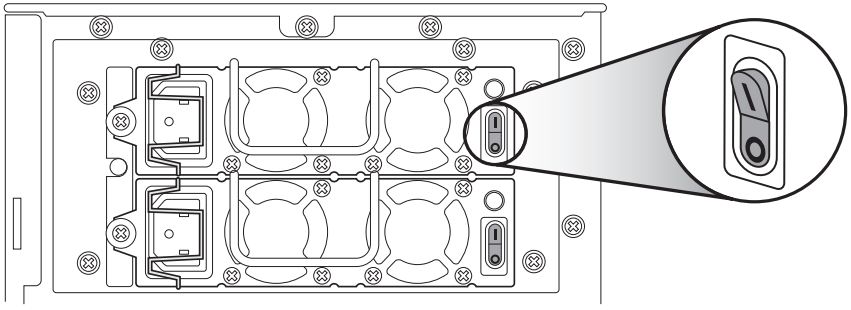
**CAUTION** Only trained users should install and configure the system.

**WARNING Because Infinity LX is over 81 lbs (36 kg) without the drives and over 90 lbs (40 kg) with the drives installed, use caution when lifting or moving the chassis.**

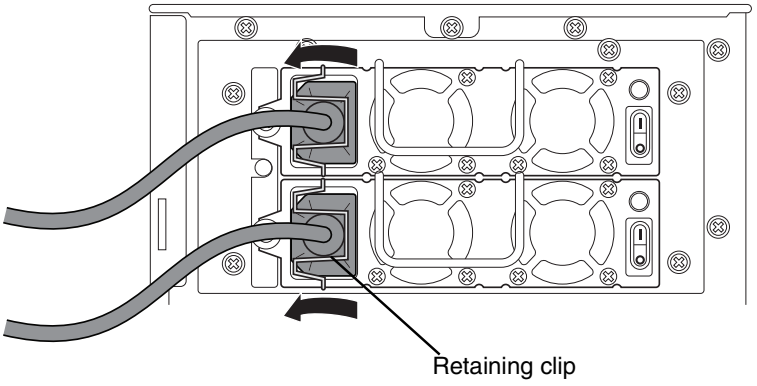
## Installing Power Cords, Ethernet Cable, and SmartDrive

**To install the power cords, Ethernet cable, and SmartDrive**

1. Unpack the hardware and remove any packing material.
2. Place Infinity LX on a solid level surface.
3. Ensure that the power supply switches are turned off.

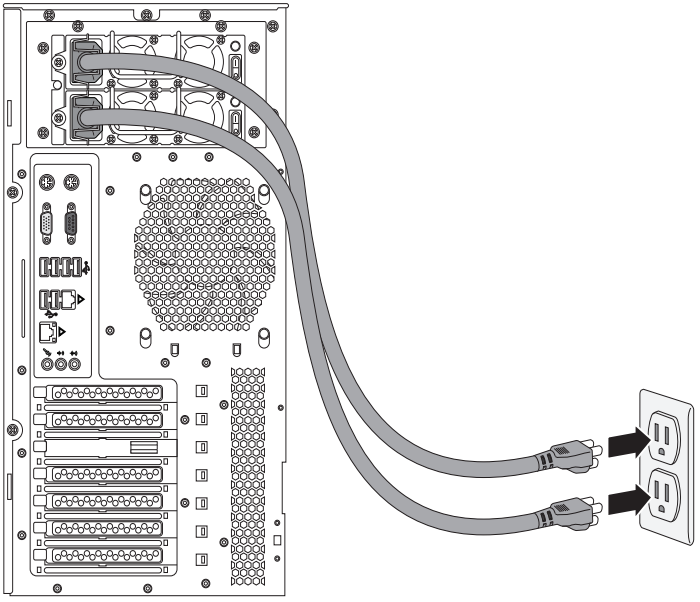


4. Connect the power cords. Secure the power cords with the attached clips.




***NOTE:*** *It is highly recommended that a UPS be used with Infinity LX.*

5. If a UPS is not being used, connect the power cords to a wall outlet.



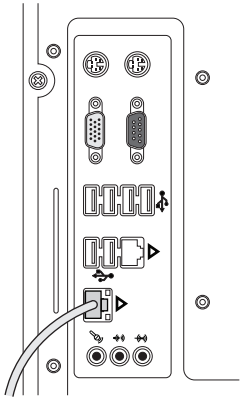
If the UPS is being used, then refer to "Installing the UPS (Accessory)" on page 3-14.

**CAUTION** Connect Infinity LX to only high-quality electrical power. Do not expose Infinity LX to suboptimal power conditions, including but not limited to potential loss of power, power spikes, or over- or under-voltage conditions.

**WARNING The two power cords connected to the UPS or a wall outlet are the main disconnect for Infinity LX.**

**WARNING To disconnect overall power to Infinity LX prior to servicing it, shut down the system (refer to "Shutting Down and Rebooting" on page 4-28), and then power down the device (refer to "Removing Power to Infinity LX" on page 4-32).**

6. Connect the Ethernet cable to Ethernet port 2.



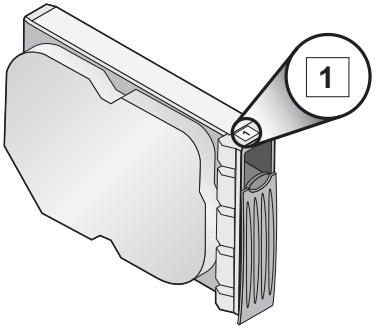
# Installing Hard Drives

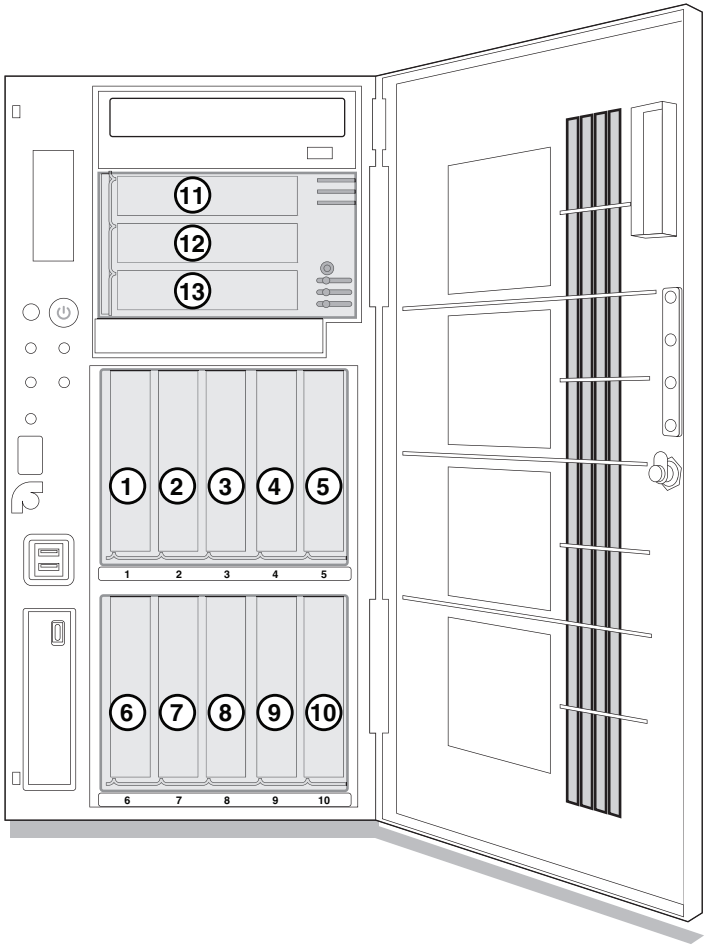
**To install the hard drives**

1. To install a hard drive, unpack the hard drive.

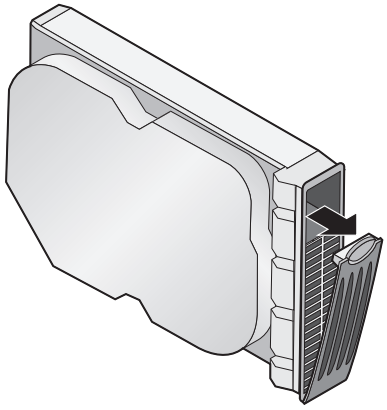
**CAUTION** Use care when unpacking and handling hard drives. You should be properly grounded and observe anti-static procedures before removing the hard drive from its anti-static bag. Do not drop the hard drive. Handle only the front, side edges, and face with the label. Do not handle the underside or the backplane of the drive. Do not touch any exposed electronics.

2. Match the number on the top of each hard drive to the number on the slot.

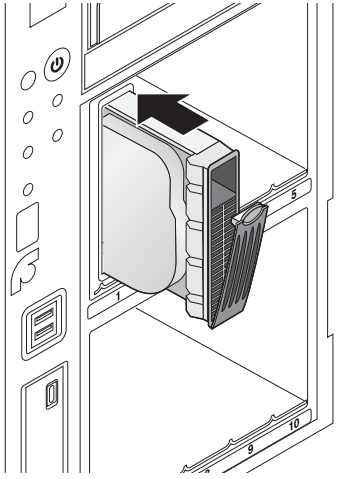


3. Open the hard drive lever by pulling down on the blue tab to about 45°.

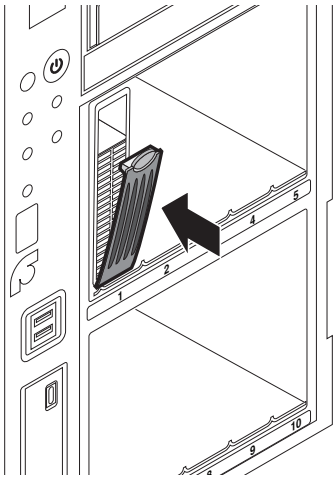


4. Insert the hard drive fully into its slot in the chassis.



**CAUTION** When installing the hard drive, it is important to install it all the way into its slot. Push the drive as far into the slot as it will go (it should be flush with the neighboring drives). There is some resistance as the back of the drive is seated in the cage, and it is possible to latch the lever without having the drive fully installed. It is critical that all drives are properly installed prior to the initial system startup.

5. Close the hard drive lever.

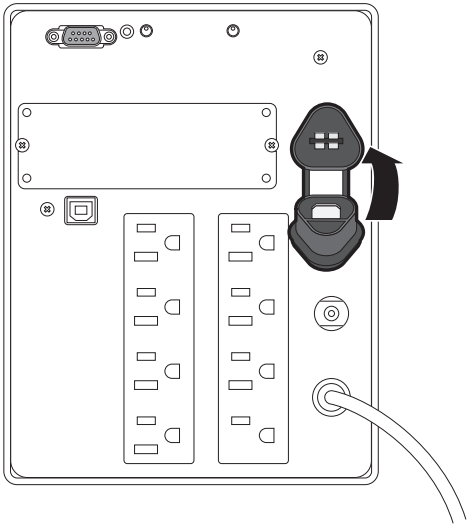


# Installing the UPS (Accessory)

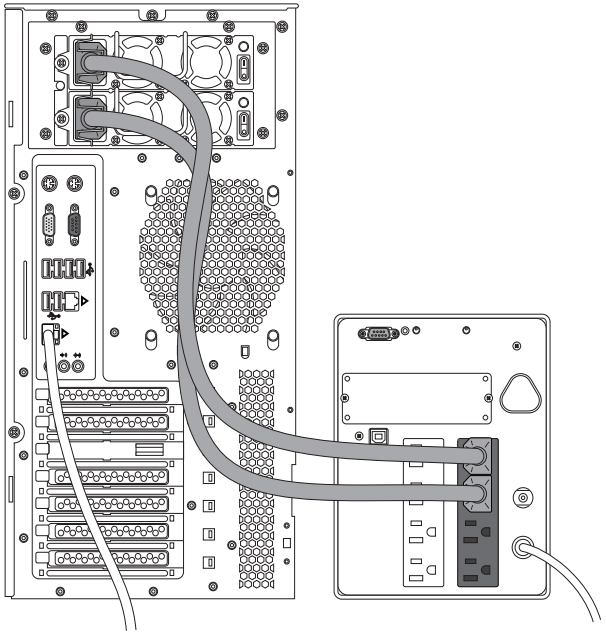
**CAUTION** A UPS is highly recommended to reduce the risk of data loss due to power failures. A standard UPS is not suitable for installation in a patient care area. Please check local/regional and hospital-specific ordinances to determine the applicability of any/all standards based on the intended use and placement of Infinity LX.

**To install the UPS**

1. Place the uninterruptible power supply (UPS) near the chassis and the power outlet.
2. At the rear of the UPS, insert the battery plug.



3. Connect the chassis power cords to the UPS.

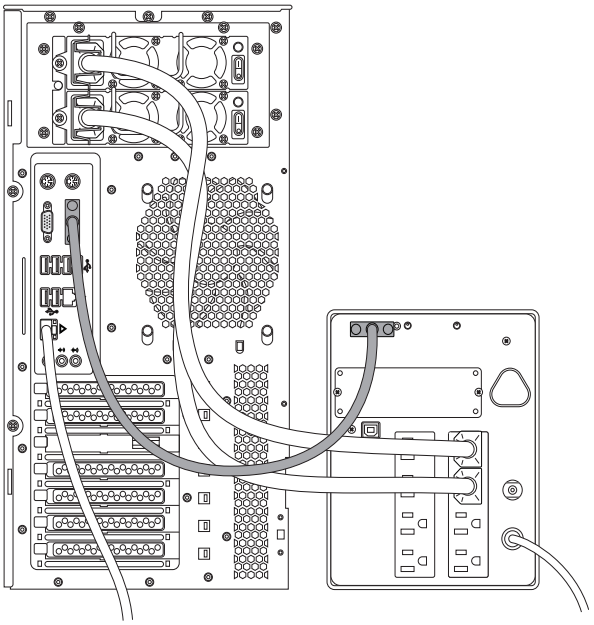


**CAUTION** Connect Infinity LX to only high-quality electrical power. Do not expose Infinity LX to suboptimal power conditions, including but not limited to potential loss of power, power spikes, or over- or under-voltage conditions.

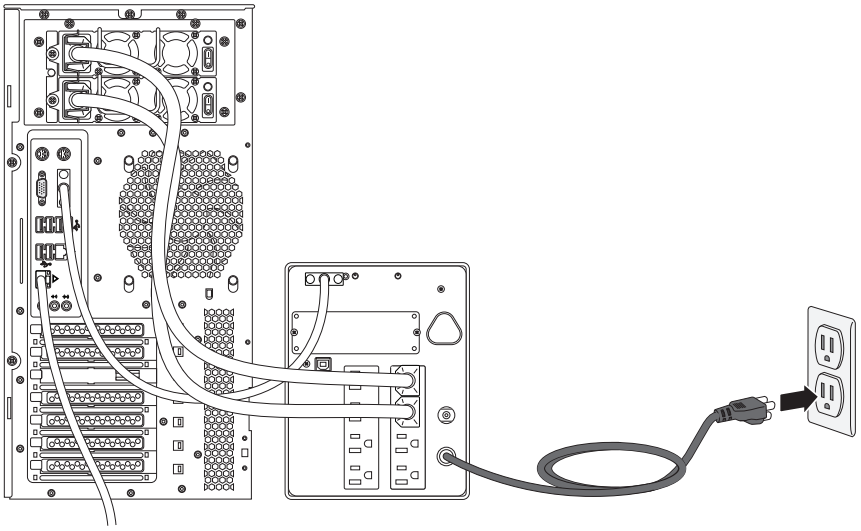
**WARNING The two power cords connected to the UPS or a wall outlet are the main disconnect for Infinity LX.**

**WARNING To disconnect overall power to Infinity LX prior to servicing it, shut down the system (refer to "Shutting Down and Rebooting" on page 4-28), and then power down the device (refer to "Removing Power to Infinity LX" on page 4-32).**

4. Connect the serial cable (supplied with the UPS) to the UPS and to the serial port on the chassis rear.



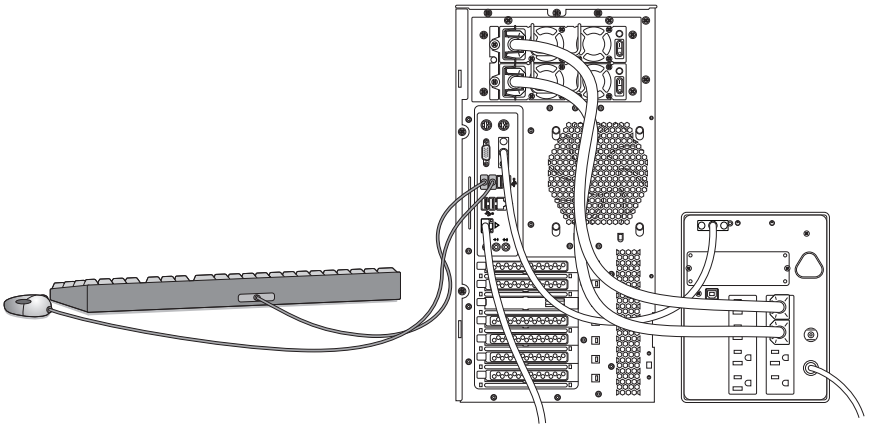
5. For the UPS model outside of North America, connect the UPS AC power cord to the power connector on the UPS rear panel.
6. Connect the UPS power cord to a power outlet.



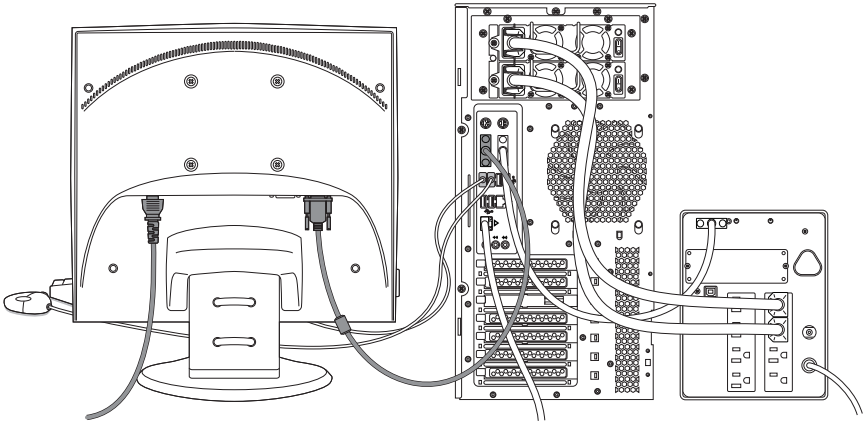
## *Monitor, Keyboard, and Mouse (Optional)*

**To connect a monitor, keyboard, and mouse**

1. Connect the keyboard and mouse to USB ports on the chassis connector panel.



2. Connect the VGA cable between the monitor and the VGA port on the chassis connector panel.



3. Connect the monitor power cord to a power outlet (preferably the same outlet as the chassis or UPS power cord).

# Configuring System Information

Before using Infinity LX for the first time, system information must be configured on the SmartDrive.

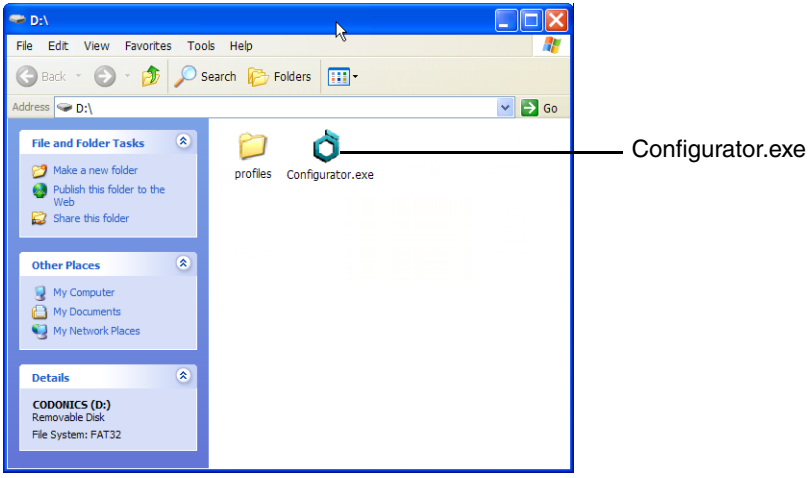
**CAUTION** Do not reconfigure or modify the software except as described in configuration tasks documented in this manual.

**To configure the system information**

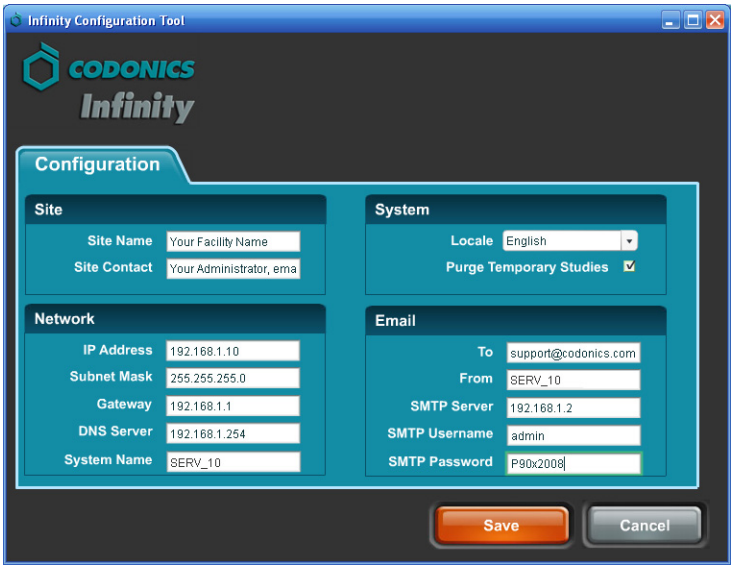
1. Insert the SmartDrive into a USB port on a PC.

   The SmartDrive will appear as a standard USB flash drive.

2. In Windows, navigate to and run the **Configurator.exe** file, which is stored at the root level of the SmartDrive.



The Configurator application opens.




3. Enter the configuration parameters for your site. In the **Site** panel, enter the site name and site contact.
4. In the **Network** panel, enter the Infinity LX IP address and other network parameters. For a description of these parameters, refer to Table 3-1.
5. When you have completed entering the system configuration parameters, click the **Save** button and close the window.
6. Unmount and remove the SmartDrive from the PC.
7. Insert the SmartDrive into its Infinity LX USB port.

**Table 3-1. Configuration Parameters**

| Parameter | Description |
|---|---|
| ***Site Parameters*** | |
| Site Name | The name to be used to identify your site. |
| Site Contact | The name of the Infinity LX administrator. |

**Table 3-1. Configuration Parameters**

| Parameter | Description |
|---|---|
| ***Network Parameters*** | |
| IP Address | The device's IP address is entered (Static) through the Configurator. |
| Subnet Mask | Subnet mask being used for the subnetwork to which Infinity LX is connected. This defines which part of the IP address is the subnetwork and which part is the device address. |
| Gateway | IP address of the gateway for the subnetwork to which Infinity LX is connected. |
| DNS Server | DNS server host name or IP address. |
| System Name | Specifies the network name by which Infinity LX will be identified on the network. |
| ***System Parameters*** | |
| Locale | The language to use for Windows and the Infinity LX applications. |
| Purge Temporary Studies | Select this option to have Infinity LX automatically remove studies marked as "temporary." Studies are purged when storage exceeds 95%. |
| ***Email Parameters*** | |
| To | The email addresses that should receive the automated email status messages from Infinity LX.<br><br>Multiple email addresses can be set up by separating them with a semicolon and a space. For example:<br><br>`email1@sample.com;`<br>`email2@sample.com;`<br>`email3@sample.com`<br><br>***NOTE:*** *Specifying less than ten* email *addresses will provide faster notification.* |

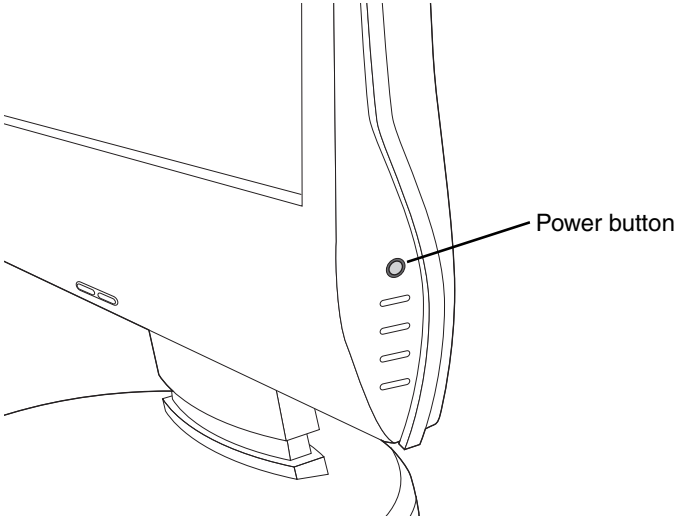
**Table 3-1. Configuration Parameters**

| Parameter | Description |
|---|---|
| From | The email sender name used in the automated emails that will be sent by Infinity LX. |
| SMTP Server | The host name or IP address of the outgoing email server to be used by Infinity LX. |
| SMTP Username | The username for Infinity LX to use for authentication by the SMTP server. |
| SMTP Password | The password for Infinity LX to use for authentication by the SMTP server. |

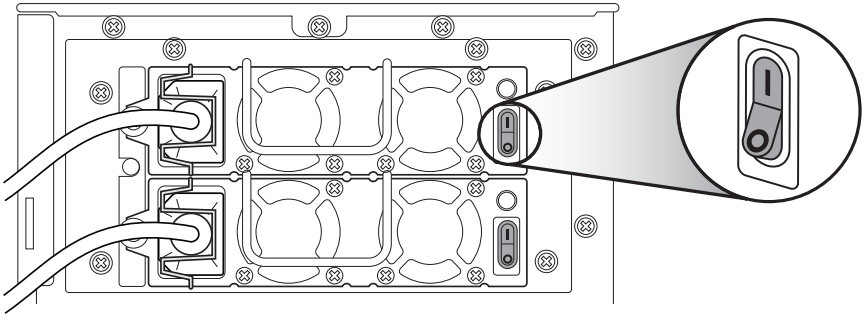
# Starting Up Infinity LX

**To start up Infinity LX**

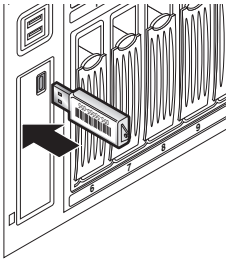
1. If a monitor is installed, press the monitor power button.



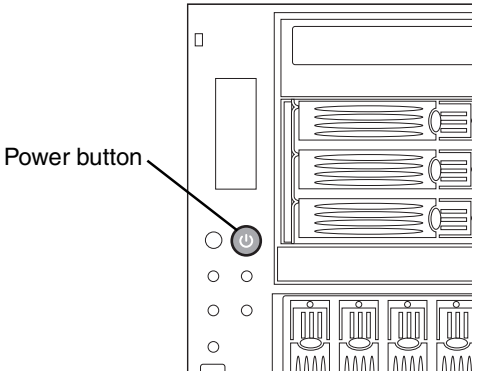

2. If there is a UPS, power on the UPS.
3. Turn on the power supply switches at the rear of the chassis.



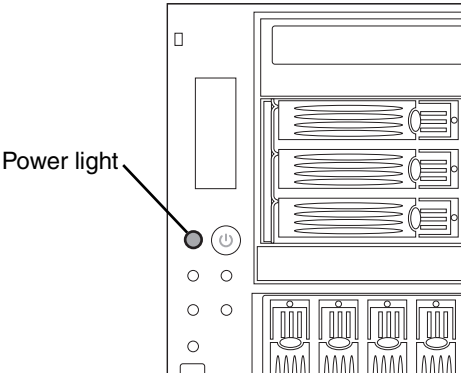
4. Insert the SmartDrive into its USB slot at the front of the chassis.



5. Press the Infinity LX power button at the front of the chassis.




6. Wait approximately 5 minutes for startup to complete.
   There are six audible beeps when startup is complete.



***NOTE:*** *To shut down and power down Infinity LX, refer to “Shutting Down and Rebooting” on page 4-28 and “Removing Power to Infinity LX” on page 4-32.*

# 4

# Setting Up the Software



This chapter includes the information you will need to set up Infinity LX software:

- Changing the password for the preconfigured user accounts
- Setting the system date and time
- Accessing the Infinity LX RSS feed
- Setting up access to Infinity LX for DICOM stations

**CAUTION** Only trained users should install and configure the system.

**CAUTION** Do not reconfigure or modify the software except as described in configuration tasks documented in this manual.

The chapter also includes:

- Logging in and logging out of a Windows user session on Infinity LX
- Shutting down and rebooting the system software
- A description of the SmartDrive

# Logging In

Logins can be performed from remote PCs using the Remote Desktop Connection application.

Logins can also be performed from a local monitor, keyboard, and mouse, if the Infinity LX configuration includes them.

## Logging In Using Remote Desktop Connection

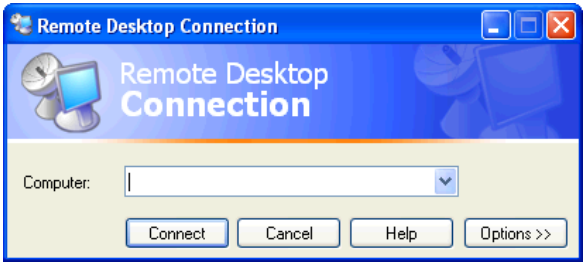
Infinity LX includes support for Remote Desktop Connection, allowing remote access to a Windows session on Infinity LX.

***NOTE:*** *Infinity LX supports only one Remote Desktop Connection at a time.*

**To log in using Remote Desktop Connection from a remote PC**

1. From a PC on the network or a PC connected to Infinity LX using an Ethernet crossover cable, start the Windows Remote Desktop Connection application: open the **Start** menu and select **All Programs > Accessories > Communications > Remote Desktop Connection**.

   The main **Remote Desktop Connection** dialog box displays.

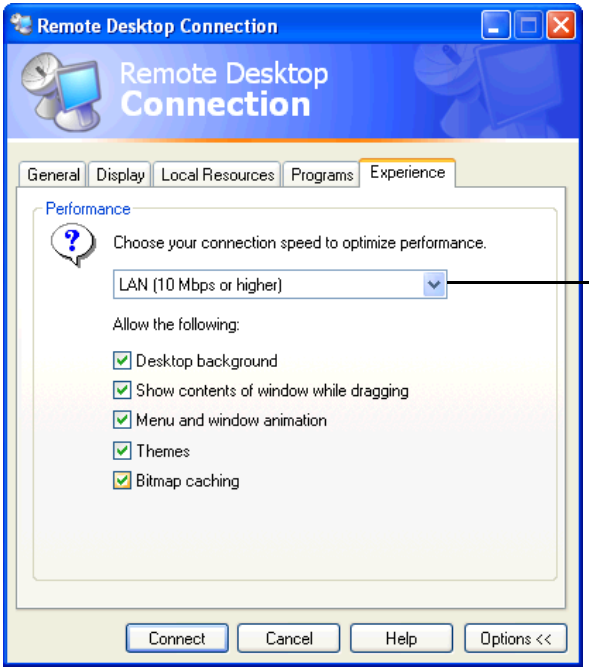



***NOTE:*** *If the PC does not have the Remote Desktop Connection application, download the application from the Microsoft Windows website.*

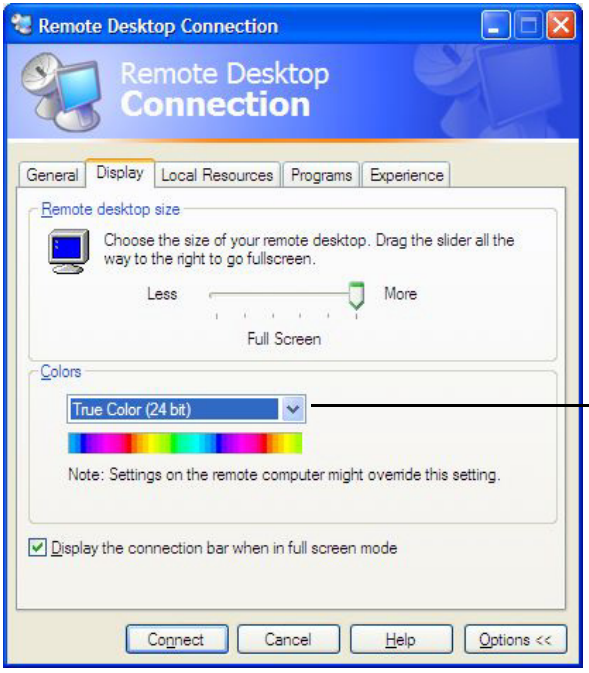
2. Click the **Options** button.

The Remote Desktop Connection options dialog box displays.

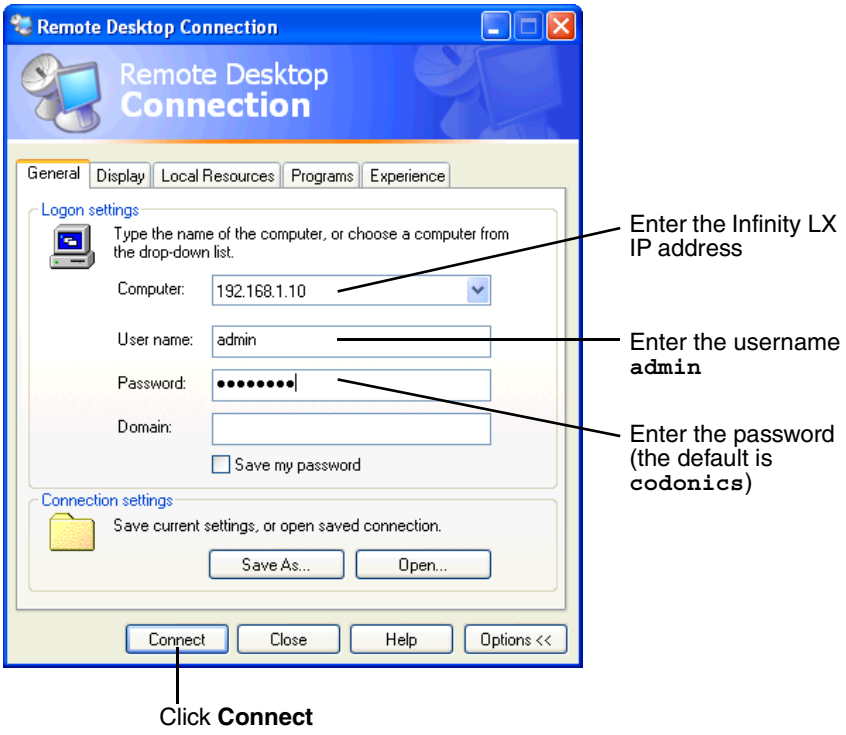
3. On the **Experience** tab, change the connection speed to **LAN (10Mbps or higher)**.



4. On the **Display** tab, change the **Color** to **True Color 24-bit or True Color 32-bit**.



5. On the **General** tab, enter the Infinity LX IP address.




6. Enter the administrator user name — **admin**.
7. Enter the administrator password (the default is **codonics**).
8. Click the **Connect** button.

   A Windows session is started and the Windows desktop displays.

For information about how to log out, shut down the system, or reboot the system, refer to "Logging Out" on page 4-28 and "Shutting Down and Rebooting" on page 4-28.

**CAUTION** When shutting down a PC, make sure that you are actually shutting down the PC and not Infinity LX from an open Remote Desktop Connection session. Doing so could inadvertently disconnect other Infinity LX users or interrupt drive recovery operations, resulting in data loss.

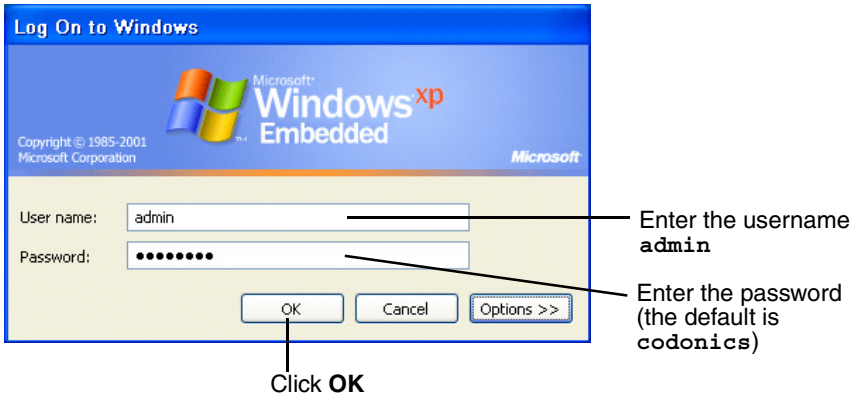
## Logging In Using a Local Monitor, Keyboard, and Mouse

If your Infinity LX includes a locally connected monitor, keyboard, and mouse, you can log in from the local user interface.

**To log in using a local monitor, keyboard, and mouse**

1. Make sure that Infinity LX and the monitor are powered on (refer to "Starting Up Infinity LX" on page 3-23).

   The Windows login should be displayed on the monitor.




2. Enter the administrator user name — **admin**.
3. Enter the administrator password (the default is **codonics**).
4. Click the **OK** button.

   A Windows session is started and the Windows desktop displays.

For information about how to log out, shut down the system, or reboot the system, refer to "Logging Out" on page 4-28 and "Shutting Down and Rebooting" on page 4-28.

# Setting Up User Accounts

User accounts define the login names and passwords that can be used to login to a Windows session on Infinity LX and to access the Infinity LX applications, along with the function privileges that the user has within those applications.

## Preconfigured User Accounts

The following user accounts are preconfigured to allow access to the Infinity LX applications:

- **admin**, which provides full access to all functions
- **manager,** which provides access to view, modify, and delete studies in the database using the Study Manager tool
- **operator**, which provides access to view and store studies in the database using the Study Manager tool

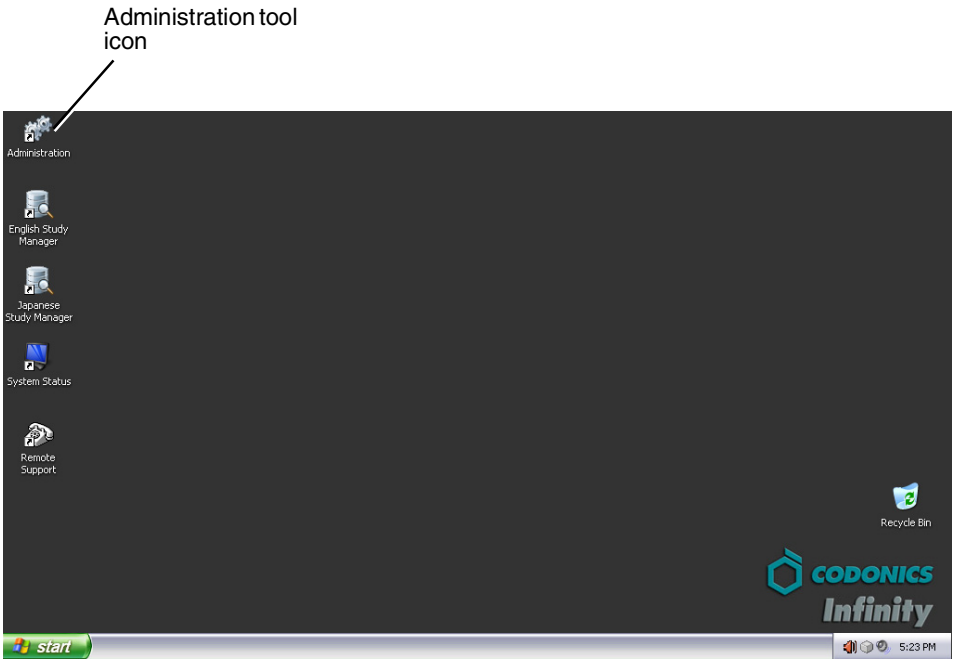
The default password for the preconfigured user accounts is **codonics**.

**CAUTION** To prevent unauthorized access to the application, you should change the password for these user accounts the first time you log in. For more information, refer to "Changing a User's Password" on page 4-8.

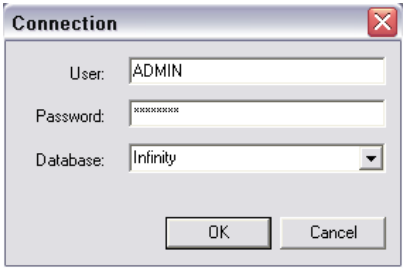
## Changing a User's Password

**To change a user's password**

1. Locate the Administration tool icon on the Infinity LX desktop.




2. Open the Administration tool.
3. At the login, enter the administrator user name — **`admin`**.




***NOTE:*** *Entries in the* ***User*** *field are converted to uppercase automatically.*

4. Enter the administrator password (the default is **`codonics`**).

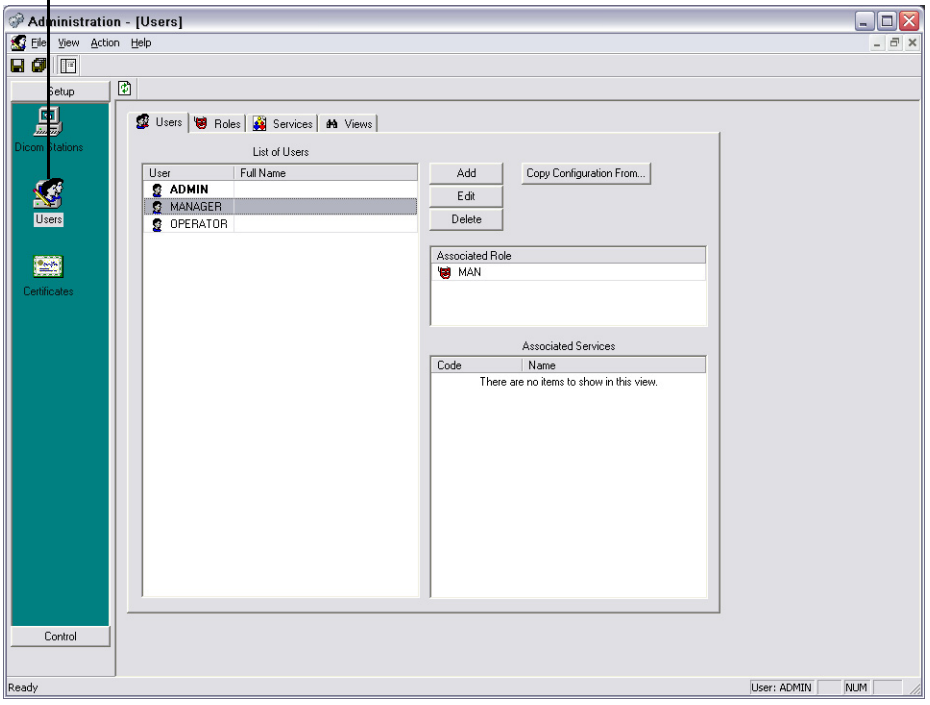
5. Click the **OK** button.

   The Administration tool displays.

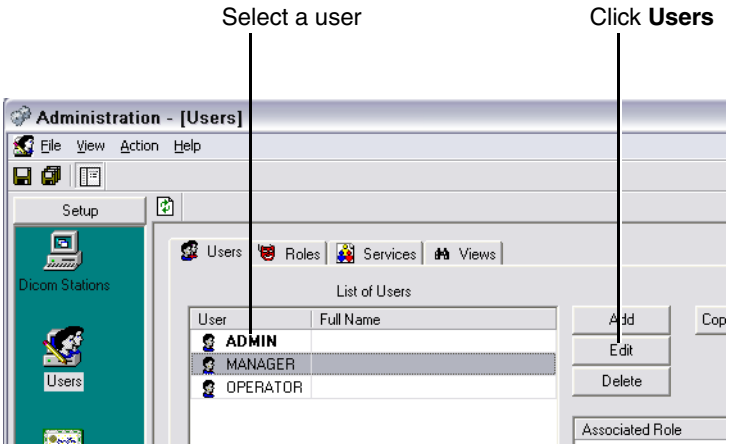
6. Click **Users**.

   The **Users** configuration window displays.

Click **Users**

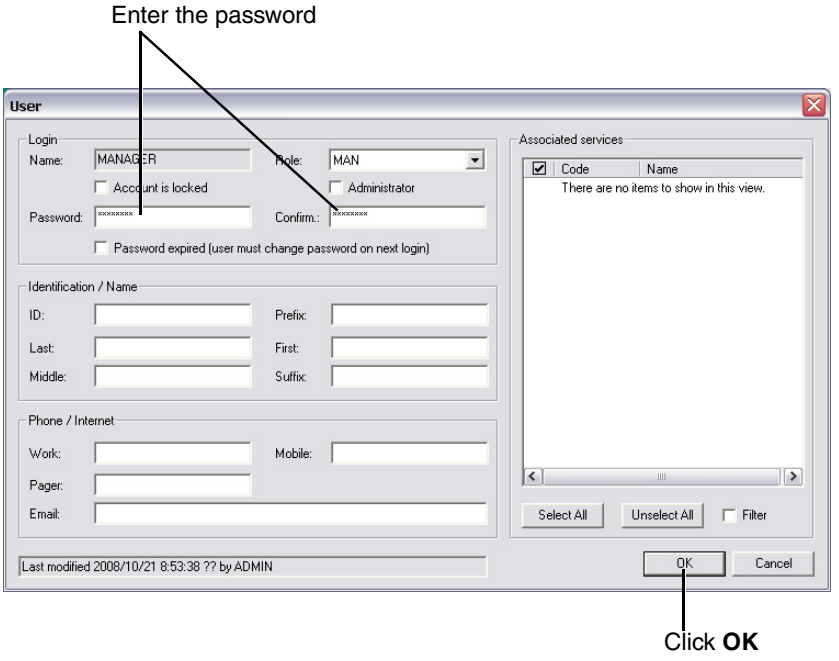


7. Select the user to change and click the **Edit** button.



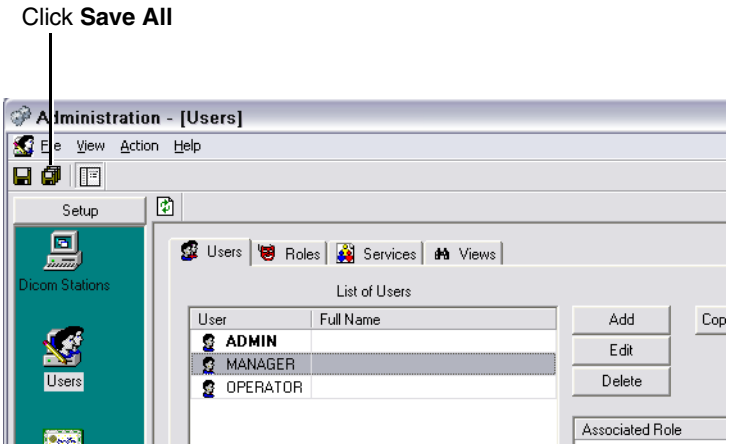

The **User** dialog box displays.

8. Enter and confirm the new password.




9. Click the **OK** button.

10. Click the **Save All** button.




11. When prompted to confirm saving the users, click the **Yes** button.

    Next, you have to change the Windows passwords for the corresponding user accounts.

12. On the **Start** menu, click **Control Panel**.

13. Double-click the **User Accounts** tool.

    The **User Accounts** window displays.

14. For each Windows user account, change the password so that it matches the password that you set for that user in the Administration tool.

# Setting the Date and Time

Use the **Date and Time** function in the Windows Control Panel to set the date and time for the system.

# Accessing the Infinity LX RSS Feed

The Infinity LX RSS feed can be accessed using a web-based or desktop RSS reader (also called a "feed reader").

Use the following URL to access the Infinity LX RSS feed:

http://*infinity_ip_address*/status/rss

where, for example, the Infinity LX IP address is 10.1.44.100. If the IP address is unknown, check the Configurator to see the IP address setting.

Infinity LX includes a desktop RSS reader — Feedreader — that displays a message box on the Infinity LX desktop when an alert, critical, or fault condition occurs. For more information about using Feedreader, refer to "Viewing RSS Status Information from Feedreader" on page 8-13.

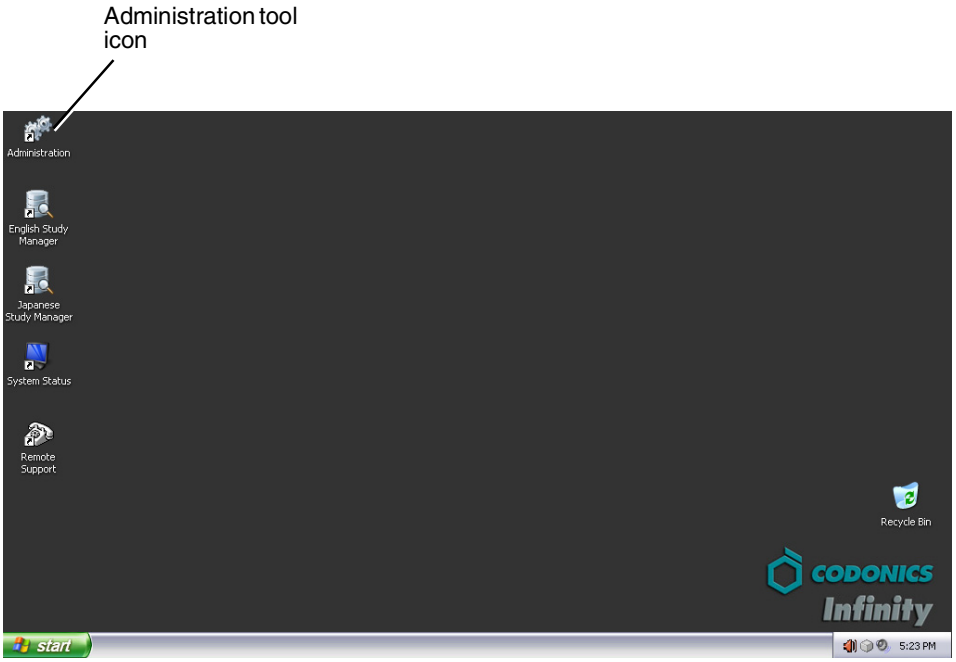
# Allowing DICOM Station Access

Each DICOM station that requires store or retrieve access to studies on Infinity LX must be defined on Infinity LX using the Administration tool. Typical DICOM stations that would connect to Infinity LX include:

- Modality workstations
- PACS workstations
- Primary and secondary image acquisition systems

**To allow DICOM station access to Infinity LX**

1. Locate the Administration tool icon on the Infinity LX desktop.




2. Open the Administration tool.

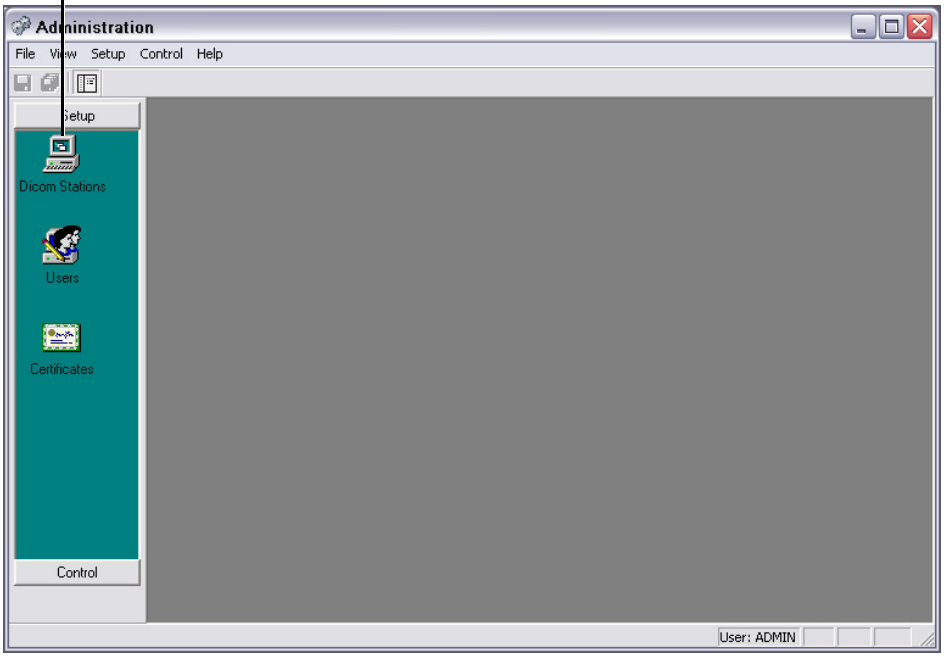
3. At the login, enter the administrator user name — **admin**.

***NOTE:** Entries in the **User** field are converted to uppercase automatically.*

4. Enter the administrator password (the default is **codonics**).
5. Click the **OK** button.

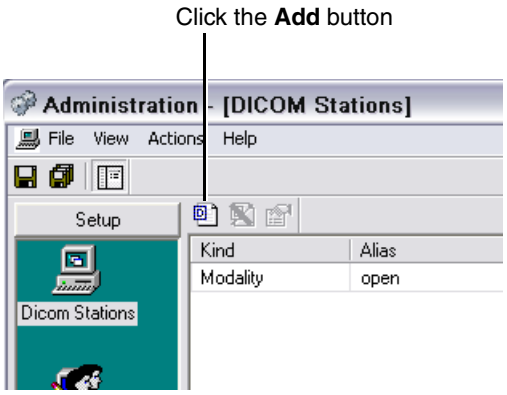
   The Administration tool displays.
6. Click **DICOM Stations**.

Click **DICOM Stations**



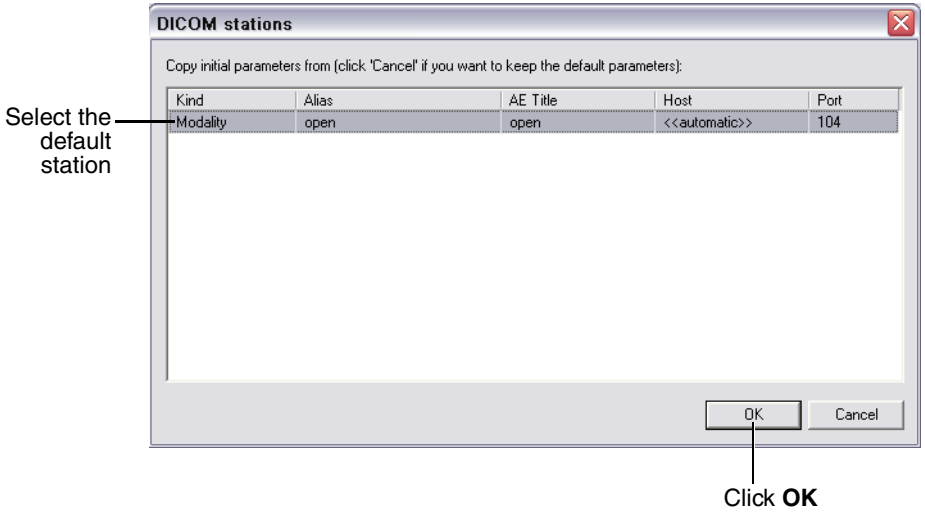
The DICOM Stations list and toolbar display.

7. Click the **Add** button.



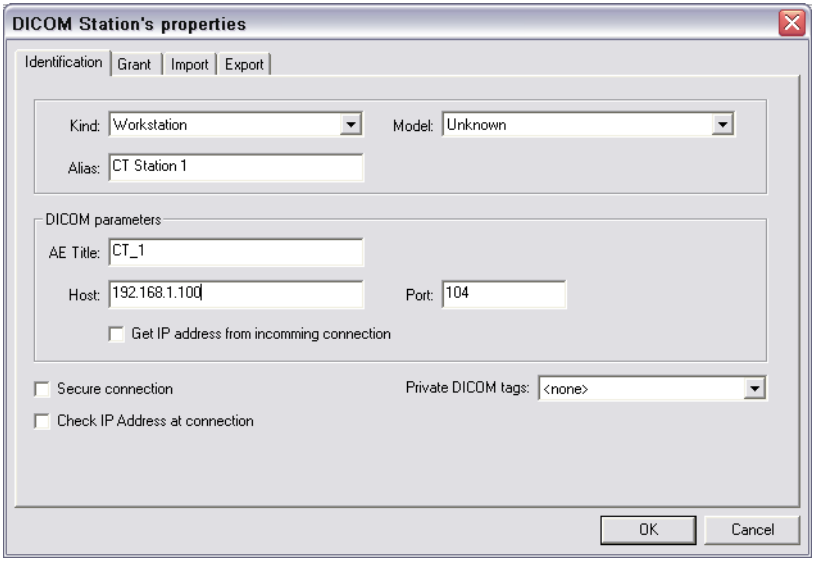

The **DICOM Stations** dialog box displays.

8. Select the preconfigured station.



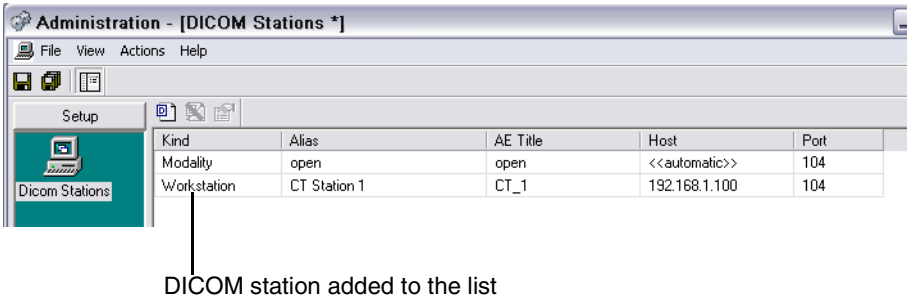

9. Click the **OK** button.

The **DICOM Station's Properties** dialog box displays.




10. Configure the station properties. The topics that follow describe the properties on each of the tabs in this window.
11. When you have finished configuring the properties, click the **OK** button.

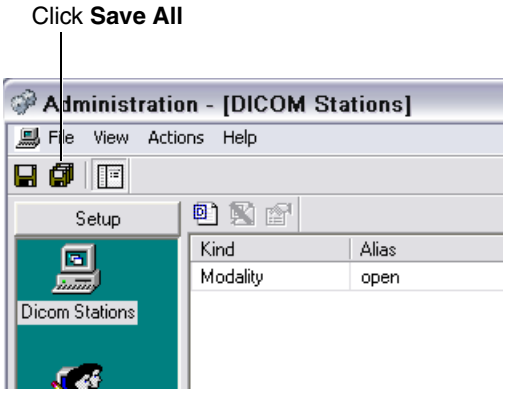
    The station is added to the DICOM Stations list.




12. Add other stations as needed.

***TIP: Using an existing DICOM station as a template for a new station***
*To create a new DICOM station entry that is based on one of the existing station entries, click the **Add** button on the **DICOM Stations** list screen, select the desired existing entry in the **DICOM Stations** dialog box, and click the **OK** button. The new station's property settings in the **DICOM Station's Properties** dialog box will match the station entry that you selected.*

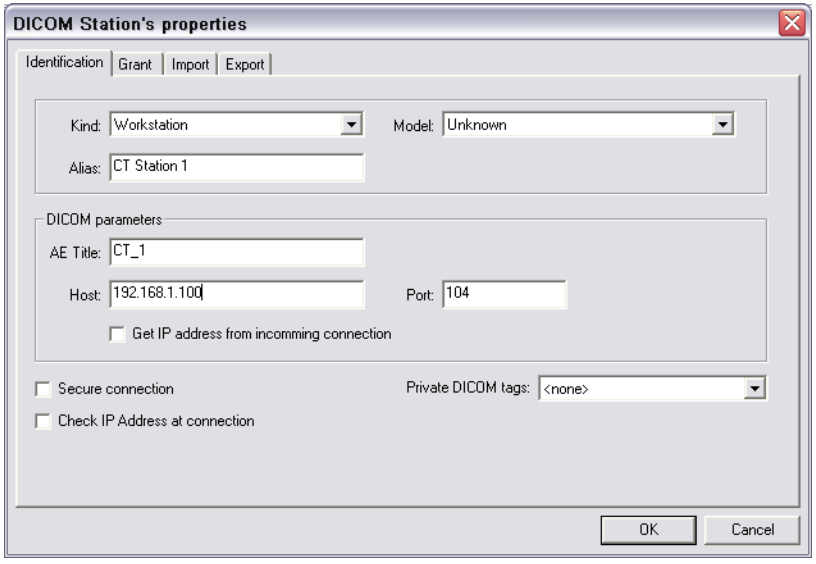
13. When all stations have been added, click the **Save All** button.




14. When prompted to confirm saving the DICOM stations, click the **Yes** button.

## DICOM Station Properties — Identification Tab

Table 4-1 describes the station properties that can be set on the **Identification** tab, shown below.




***NOTE:*** *The default settings indicated in the following table are the application defaults. If a profile has been copied from an existing one, the settings will match the source profile and not the application defaults.*

**Table 4-1. DICOM Station Properties — Identification Tab**

| Property | Description |
|---|---|
| Kind | This field is for reference only at this time.<br><br>Choices are: Unknown (the default), Modality, Workstation, PACS, HIS/RIS, Archive, Archive for key data.<br><br>Modality or Workstation are most commonly used. |

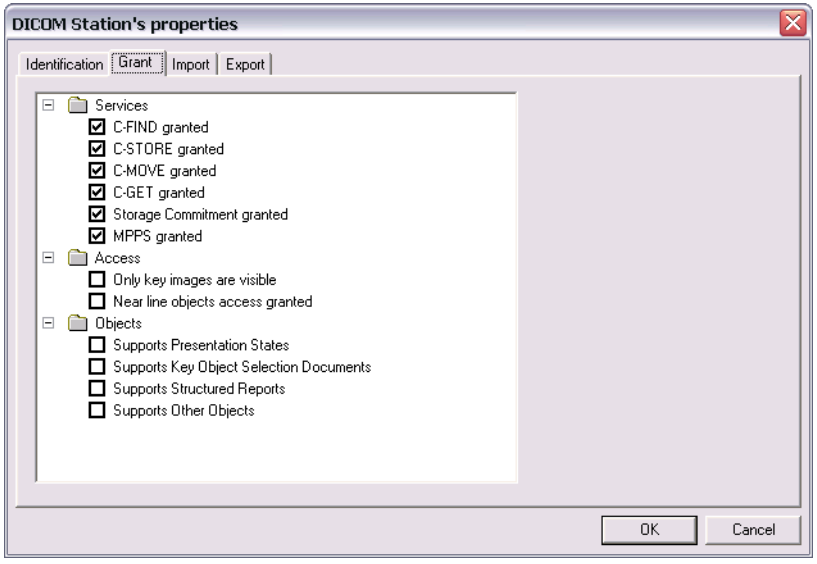
**Table 4-1. DICOM Station Properties — Identification Tab**

| Property | Description |
|---|---|
| Alias | A user-defined name for this DICOM station.<br><br>This name is used for descriptive purposes only, and is not used in DICOM communications. |
| Model | This option is not currently supported; leave the default selection **Unknown**. |
| AE Title | The AE Title of the DICOM station. Two DICOM stations cannot have the same AE Title and host name in this field. |
| Host | Host name or IP address of the DICOM station. |
| Port | TCP port number where the DICOM station is waiting for images.<br><br>The TCP port number must be 104.<br><br>This field is mandatory when the host field is specified. |
| Get IP address from incoming connection | This option is not currently supported and should **not** be selected. |
| Secure connection | This option is not currently supported and should **not** be selected. |
| Check IP Address at connection | This option is not currently supported and should **not** be selected. |
| Private DICOM tags | This option is not currently supported; leave the default selection **<none>**. |

## DICOM Station Properties — Grant Tab

The Infinity LX DICOM server supports different DICOM services. When defining a new DICOM station, various DICOM services can be revoked or granted for this station. For instance, for a modality that will store images in Infinity DICOM Server, only the C-STORE is mandatory.

Table 4-2 describes the station properties that can be set on the **Grant** tab, shown below.




***NOTE:*** *The default settings indicated in the following table are the application defaults. If a profile has been copied from an existing one, the settings will match the source profile and not the application defaults.*

**Table 4-2. DICOM Station Properties — Grant Tab**

| Property | Description |
|---|---|
| C-FIND granted | Select this option (the default) to allow the DICOM station to browse the Infinity DICOM Server's database. |
| C-STORE granted | Select this option (the default) to allow the DICOM station to push images to Infinity DICOM Server. It is the minimum grant for a modality. |

**Table 4-2. DICOM Station Properties — Grant Tab**

| Property | Description |
|---|---|
| C-MOVE granted | Select this option (the default) to allow the DICOM station to retrieve images from Infinity DICOM Server. Host and port must be defined. |
| C-GET granted | Select this option (the default) to allow the DICOM station to retrieve images from Infinity DICOM Server. Host and port must be defined since the query and the transfer is done on the same association (refer to the DICOM standard for more information). |
| Storage Commitment granted | Select this option (the default) to allow the DICOM station to send a storage commitment N-ACTION. |
| MPPS granted | This option is not currently supported. It should be selected by default. |
| Only key images are visible | This option is not supported at this time. (By default, this option is not selected.) |
| Near line objects access granted | This option is not supported at this time. (By default, this option is not selected.) |
| Supports Presentation States | If this option is not selected (the default), then Infinity LX will not return a series with 'PR' modality in a DICOM C-FIND query or DICOM C-MOVE Retrieve. Additionally, if this option is not selected, the ‘PR’ modality will not be exported from Infinity LX. |
| Supports Key Object Selection Documents | If this option is not selected (the default), then Infinity LX will not return a series with 'KO' modality in a DICOM C-FIND query or DICOM C-MOVE Retrieve. Additionally, if this option is not selected, the ‘KO’ modality will not be exported from Infinity LX. |
| Supports Structured Reports | Selecting this option indicates that Infinity LX will support the following operations for DICOM structured reports:<br>• Accept DICOM structured reports<br>• Export DICOM structured reports to a destination<br>• Allow a DICOM host to Query/Retrieve a DICOM structured report that resides on Infinity LX. |

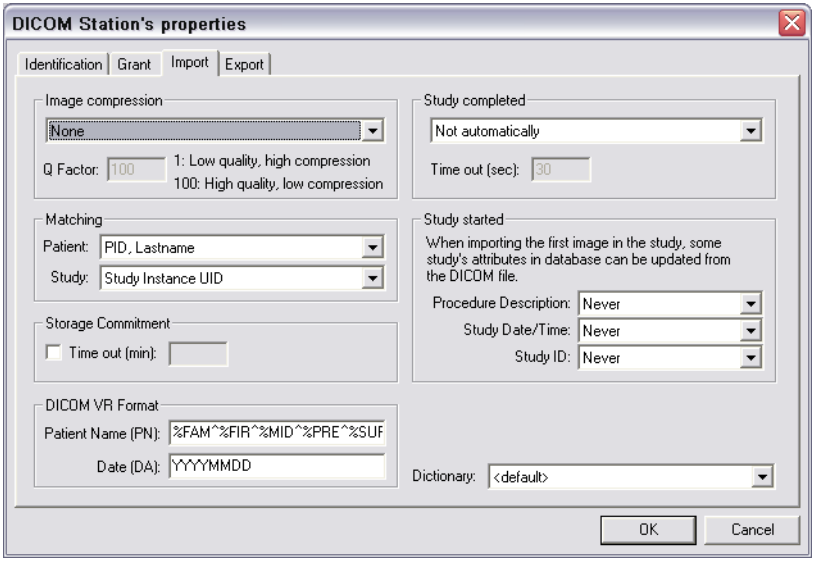
**Table 4-2. DICOM Station Properties — Grant Tab**

| Property | Description |
|---|---|
| Supports Other Objects | Selecting this option indicates that Infinity LX will support the following operations for non-image DICOM objects:<br>• Accept the objects<br>• Export the objects to a destination<br>• Allow a DICOM host to Query/Retrieve an object that resides on Infinity LX. |

## DICOM Station Properties — Import Tab

The **Import** tab is used to configure how images are stored to Infinity LX using DICOM Store.

Table 4-3 describes the station properties that can be set on the **Import** tab, shown below.



***NOTE:*** *The default settings indicated in the following table are the application defaults. If a profile has been copied from an existing one, the settings will match the source profile and not the application defaults.*

**Table 4-3. DICOM Station Properties — Import Tab**

| Property | Description |
|---|---|
| Image compression | Infinity LX can compress images as they are being stored.<br><br>The following algorithms are available:<br><br>• None (the default). The DICOM image is stored in Infinity LX with no modification.<br><br>• JPEG Lossless. The DICOM image is compressed without loss. This data compression is fully reversible and retains full image fidelity. The transfer syntax is modified. If the image is already lossless compressed (RLE or JPEG Lossless), or if the image is palette color, then no compression is performed.<br><br>• JPEG Lossy. The DICOM image is compressed with some loss of detail. Use care when enabling this option.<br><br>The Q Factor specifies a trade-off between image size and image quality. Values range from 0 (lowest quality, highest compression) to 100 (highest quality, lowest compression).<br><br>If the image is already lossy compressed, or if the image is palette color, then no compression is performed.<br><br>**CAUTION: JPEG Lossy images are not intended for diagnostic use.**<br><br>• JPEG Lossy or Lossless if lossy impossible. If the DICOM image has less than 13 bits per pixel stored, then it is the same as JPEG Lossy. The JPEG Lossy algorithm cannot be run on images with more than 12 bits per pixel. If this is the case, the format is switched to JPEG Lossless. |

**Table 4-3. DICOM Station Properties — Import Tab (Continued)**

| Property | Description |
|---|---|
| Matching | Use the **Patient** and **Study** lists to specify the data fields that will be examined to determine if the study being stored matches a study already in the Infinity DICOM Server's database.<br><br>**Recommended:**<br><br>By default, **PID, Lastname** is selected in the **Patient** list and **Study Instance UID** is selected in the **Study** list.<br><br>There are other options in the Patient list: **Accession Number**, **Date of Birth**, and **Patient Full Name**. |
| Storage Commitment | Select this option to specify a timeout for storage commitment. If all the instances listed in a storage commitment request are not stored before the timeout (started upon reception of storage commitment N-ACTION), Infinity LX returns a storage commitment response with a failure status. (By default, this option is not selected.) |
| DICOM VR format | Some modalities do not correctly format PN (Person Name) and DA (Date) value representations. These two fields allow modifying the parsing of these VR to correctly decode them, even if they do not follow the DICOM standard. Most modalities conform to the DICOM standard, and these two parameters should not need to be modified. |

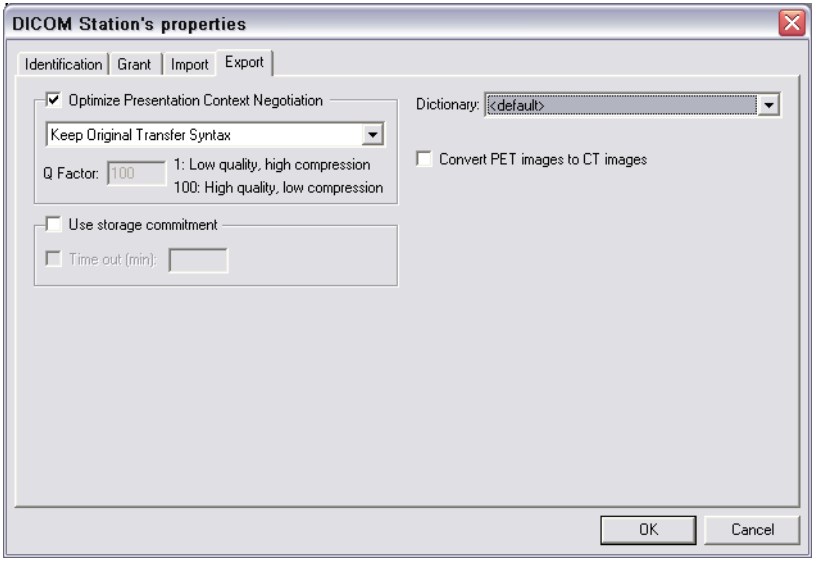
**Table 4-3. DICOM Station Properties — Import Tab (Continued)**

| Property | Description |
|---|---|
| Study Completed | Infinity LX is able to determine when all images in a study have been received from the sending DICOM station, and the study is completed. When a study is complete, thumbnail JPEG images are generated for users with a web viewer.<br><br>The following methods can be selected to define when a study is completed:<br><br>• Not Automatically (the default). Infinity LX will leave the study in an "open" state. To mark a study as complete and have JPEGs generated, manually mark the study as Completed in the Study Manager: right-click on the specific study and, in the pop-up menu, select **Status** and then select **Completed**.<br><br>• After a timeout. The time out is started upon reception of the first image in the study. Recommended for generating thumbnail JPEG images (30 seconds).<br><br>• When the association is closed. This method can be used when the DICOM station sends all of the images for a study in one DICOM association.<br><br>• Using storage commitment. This method can be used only when the DICOM station uses storage commitment. |
| Study Started | If the study being stored already exists in the Infinity DICOM Server's database, the Procedure Description, Study Date/Time, and Study ID can be updated with the incoming study's DICOM information, depending on these settings. The default for all three settings is Never. |
| Dictionary | The storage process uses a dictionary to decode DICOM tags and insert them in the database. Contact Codonics Technical Support for assistance with advanced DICOM configurations. |

## DICOM Station Properties — Export Tab

The **Export** tab is used to configure how images are exported from Infinity LX to a DICOM station using C-STORE, C-MOVE, or C-GET. The Infinity LX DICOM Server exports images via a C-MOVE or C-GET, and performs manual exporting using C-STORE to a DICOM station.

Table 4-4 describes the station properties that can be set on the **Export** tab, shown below.



***NOTE:*** *The default settings indicated in the following table are the application defaults. If a profile has been copied from an existing one, the settings will match the source profile and not the application defaults.*

**Table 4-4. DICOM Station Properties — Export Tab**

| Property | Description |
|---|---|
| Optimize Presentation Context Negotiation | Select this option (the default) to have Infinity LX use the transfer syntax selected in the accompanying list (if supported by the server) when exporting images. Otherwise, no preference is defined and Infinity LX will determine the appropriate transfer syntax.<br><br>If this option is selected, the transfer syntax choices are:<br><br>Choices are:<br><br>• Keep Original Transfer Syntax (the default). If selected, Infinity LX tries to send DICOM files with no transfer syntax conversion.<br><br>• No Compression Transfer Syntax. If selected, all DICOM files with compressed transfer syntax (lossless or lossy) are converted to Explicit or Implicit Little Endian.<br><br>• JPEG Lossless. If selected, all uncompressed DICOM files are converted to JPEG Lossless.<br><br>• JPEG Lossy. If selected, all non-lossy images with the Bits Stored field set less than or equal to 12 are compressed with JPEG Lossy.<br><br>**CAUTION: JPEG Lossy images are not intended for diagnostic use.**<br><br>• JPEG Lossy or Lossless if lossy impossible. If selected, the operation is the same as JPEG Lossy unless lossy is impossible, in which case JPEG Lossless is used. |
| Use Storage Commitment | Select this option to have Infinity LX send a storage commitment request when storing instances to the DICOM station. If the storage commitment response is not received before an optionally specified timeout has expired, the store is set to failed. (By default, this option is not selected.) |
| Dictionary | Contact Codonics Technical Support for assistance with this or other advanced DICOM configurations. |

**Table 4-4. DICOM Station Properties — Export Tab (Continued)**

| Property | Description |
|---|---|
| Convert PET images to CT images | Contact Codonics Technical Support for assistance with this or other advanced DICOM configurations. |

# Logging Out

**To log out of a Windows session**

On the **Start** menu, click **Log Off**.

After closing the current user session, the Windows login screen displays.

# Shutting Down and Rebooting

There are three ways to shut down or reboot Infinity LX:

- From a Remote Desktop Connection
- Locally, from the optional monitor, keyboard, and mouse
- Using the Power button at the front of the chassis

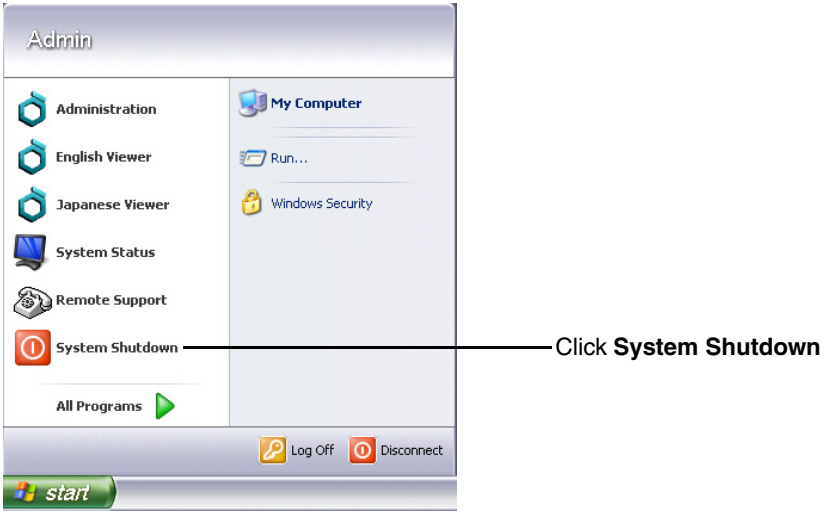
The following topics describe each of these procedures.

## Shutting Down or Rebooting from a Remote Desktop Connection or Locally

Use the following procedure to shut down or reboot Infinity LX from a Remote Desktop Connection or from a monitor, keyboard, and mouse connected directly to Infinity LX.

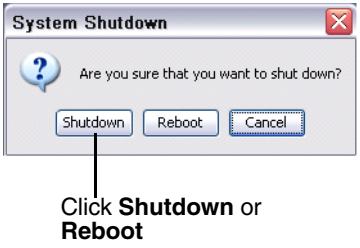
**To shut down or reboot the system from a Remote Desktop Connection or locally**

1. Before attempting to shut down or reboot the system, make sure that all jobs have finished and all applications (for example, the Administration tool or Study Manager) are closed.
2. On the **Start** menu, click **System Shutdown**.

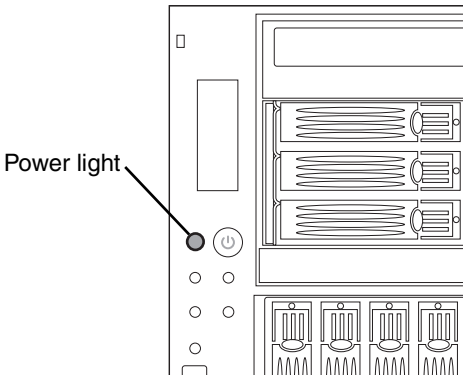



You are prompted to confirm the shutdown.

3. Click the **Shutdown** or **Reboot** button.



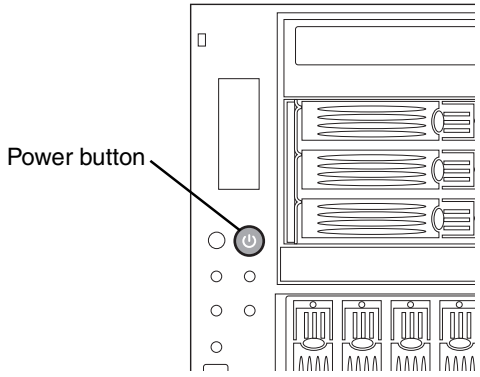
The Power light at the front of the chassis turns off when shutdown is complete.



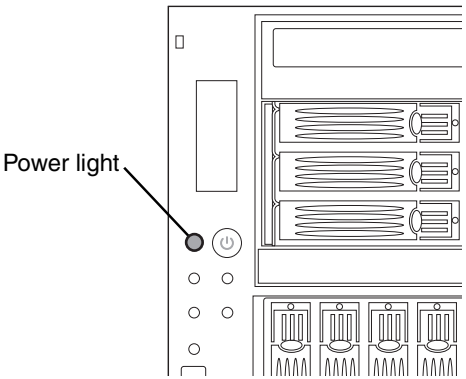

## Shutting Down Using the Chassis Power Button

**To shut down using the chassis power button**

1. Before attempting to shut down the system, make sure that all jobs have finished, all applications are closed, and no user is logged in via the Remote Desktop Connection.
2. Momentarily press the Infinity LX Power button at the front of the chassis.



The chassis Power light turns off when shutdown is complete.

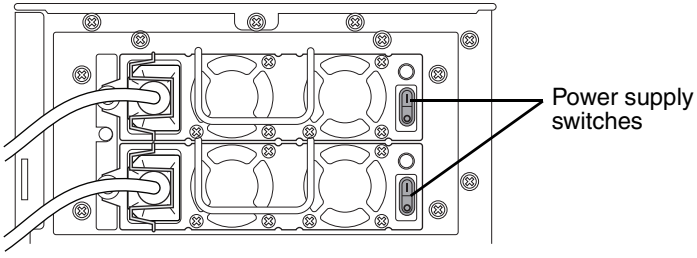


# Removing Power to Infinity LX

**CAUTION** Improperly removing power to Infinity LX could cause data loss.

**To remove power to Infinity LX**

1. Shut down the system, as described in "Shutting Down and Rebooting" on page 4-28.
2. Turn the Infinity LX power supply switches at the rear of the chassis to Off.




3. If the system includes a UPS, turn the UPS power supply switch to Off.
4. Disconnect the two Infinity LX power cords from the UPS or the wall outlet.

# Infinity LX SmartDrive

The SmartDrive allows a device's configuration to be moved to another device. This feature is especially helpful when swapping devices for service purposes.

**CAUTION** If the SmartDrive is not inserted, Infinity LX can start up but configuration settings such as email addresses, locale, and a static IP address (if used) will not be available. Also, no temporary studies will be removed from the system until the SmartDrive is replaced and Infinity LX is rebooted.

Note that a SmartDrive cannot be duplicated. That is, it cannot be used in two devices at the same time.

The SmartDrive stores the following information:

- **Software license code.** This is the license code for the Infinity LX software. This code is also printed on the SmartDrive's label.
- **System configuration information.** This includes site, network, locale, and email notification information.

# 5 Storing and Retrieving

## Configuring a Typical DICOM Host

Infinity LX is a DICOM Storage Class SCP (Service Class Provider) that can accept incoming DICOM Store associations.

Any system that supports DICOM Store should work with Infinity LX. Typical DICOM stations that would connect to Infinity LX include:

- Modality workstations
- PACS workstations
- Primary and secondary image acquisition systems

Configuring a DICOM station to send images to Infinity LX requires the following settings:

- **The Infinity LX host name or IP address.**
- **The Infinity LX DICOM TCP port.** The Infinity LX TCP port is 104.
- **DICOM AE Title.** Infinity LX uses the Called AE Titles listed in Table 5-1 on page 5-2.

Most DICOM stations require these settings to successfully connect to the device. Specific details about how to configure a DICOM station are usually found in the product's documentation.

Also, the DICOM station must be configured on Infinity LX to allow access to that station. For more information, refer to “Allowing DICOM Station Access” on page 4-13.

# Storing and Retrieving Studies

DICOM Store and DICOM Retrieve are the primary methods used to send studies to and retrieve them from Infinity LX.

***NOTE:*** *When sending studies to Infinity LX, it is recommended that you use Storage Commit. This method causes Infinity LX to send a confirmation message back to the DICOM station when the studies have been successfully stored in the Infinity LX database.*

Infinity LX supports the standard Called AE Titles described in the following table.

**Table 5-1. Infinity LX AE Titles**

| Called AE Title | TCP Port | Description |
|---|---|---|
| temp | 104 | Place studies in temporary storage. |
| perm | 104 | Place studies in permanent storage. |

**CAUTION** Infinity LX is a Class 1 Medical Image Storage Device and is not intended for primary diagnostic interpretation. While providing tools for display and data management, the Study Manager is not a diagnostic workstation.

# Testing DICOM Store and Retrieve

Infinity LX is a DICOM Storage Class SCP (Service Class Provider) and a DICOM Query SCU (Storage Class User)/C-Move SCP. As such, Infinity LX can be configured to accept incoming DICOM Store associations as well as incoming DICOM Query/Retrieve requests.

Any system that supports DICOM Store and/or Query/Retrieve should work with the Infinity LX. Typical DICOM stations that would connect to the Infinity LX include:

- Modality workstations
- PACS workstations
- Primary and secondary image acquisition systems

For configuration of a typical DICOM station for connection with Infinity LX, refer to "Configuring a Typical DICOM Host" on page 5-1. In addition, Infinity LX must be configured to allow the DICOM station access. For access setup information, refer to "Allowing DICOM Station Access" on page 4-13.

Once configuration is complete, the Infinity LX should successfully accept DICOM Store requests along with DICOM Query/Retrieve requests. To ensure that the Infinity LX and DICOM station are configured properly, perform the following test steps:

1. Select a sample DICOM dataset from the DICOM station (that is, modality workstation, PACS workstation, etc.) and store the data to Infinity LX. Specific details about how to perform a DICOM Store operation from the DICOM station are usually found in the product's documentation.
2. Go to any Windows XP/Vista computer on the same network as the Infinity LX.

3. Establish a Windows Remote Desktop Connection to Infinity LX. For instructions on how to establish this connection, refer to “Logging In Using Remote Desktop Connection” on page 4-2.
4. Open and log into the Study Manager from the Remote Desktop Connection. For more information, refer to “Starting a Study Manager Session” on page 6-2.

***NOTE:*** *The Study Manager can be displayed in either the English or Japanese locale.*

5. Search the Infinity LX database for the DICOM dataset sent from the DICOM station by entering appropriate patient information. For information about how to perform a search, refer to “Searching for Data” on page 6-9.
6. Ensure that the DICOM dataset sent from the DICOM station appears in the search results list. A successful search indicates that the dataset sent from the DICOM station was properly stored to the Infinity LX database.
7. Right-click on the DICOM dataset sent from the DICOM station and select **Send to Desktop** from the pop-up menu. For more information on the Study Manager, refer to “Understanding the User Interface” on page 6-4.
8. Expand the tree view and ensure that the DICOM dataset has all expected data. For instance, if the study sent from the DICOM station contained 100 patient images, Study Manager should display 100 images in the tree view. For more information on managing study information, refer to “Study Manager Desktop Tab” on page 6-8.
9. Return to the DICOM station to test Query/Retrieve capabilities if this functionality was configured on the DICOM station.
10. Perform a DICOM Query/Retrieve on the DICOM station. Query a study that has already been stored to the Infinity LX database. Specific details about how to perform a DICOM Query/Retrieve operation from the DICOM station are usually found in the product’s documentation.

11. Ensure that the DICOM dataset Query/Retrieved from the Infinity LX database now resides on the DICOM station. Specific details about how to search the database on the DICOM station are usually found in the product's documentation.

# 6

# Managing Studies

This chapter describes the Study Manager tool and includes information needed to:

- Start and end a user session
- Search for data
- Select and browse data
- View images
- View reports
- View and edit records
- Export records
- Delete records

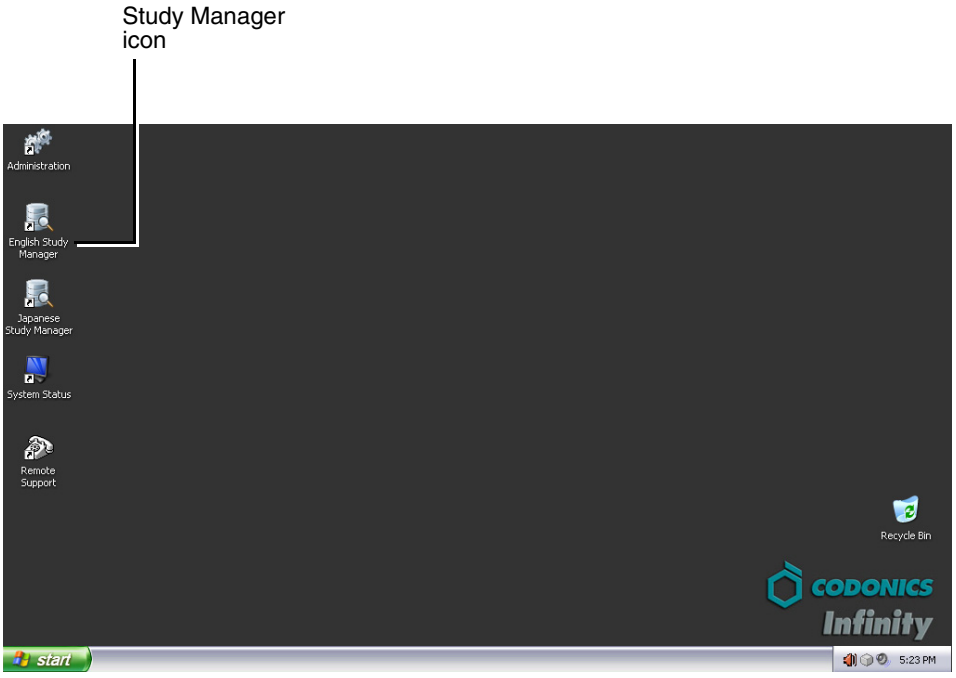
## Study Manager Overview

Study Manager is a full service DICOM client provided for image management and Quality Assurance. Study Manager enables you to connect to the Infinity LX database and search for data related to patients, studies, series, images, and reports. Once a search is performed, you can select and view a record's data, edit its database information, or delete it. Viewing tools, while comprehensive, are not intended for primary interpretation purposes.

# Starting a Study Manager Session

**To start a Study Manager session**

1. Locate the Study Manager icon on the Infinity LX desktop.




2. Open Study Manager.

   You are prompted to connect to the Infinity LX database.

3. Enter an Infinity LX user name and password, then click the **OK** button.

   The preconfigured logins provide different levels of access to the Study Manager:

   - **admin**, which provides full access to all functions
   - **manager,** which provides access to view, modify, and delete studies in the database using the Study Manager tool
   - **operator**, which provides access to view and store studies in the database using the Study Manager tool

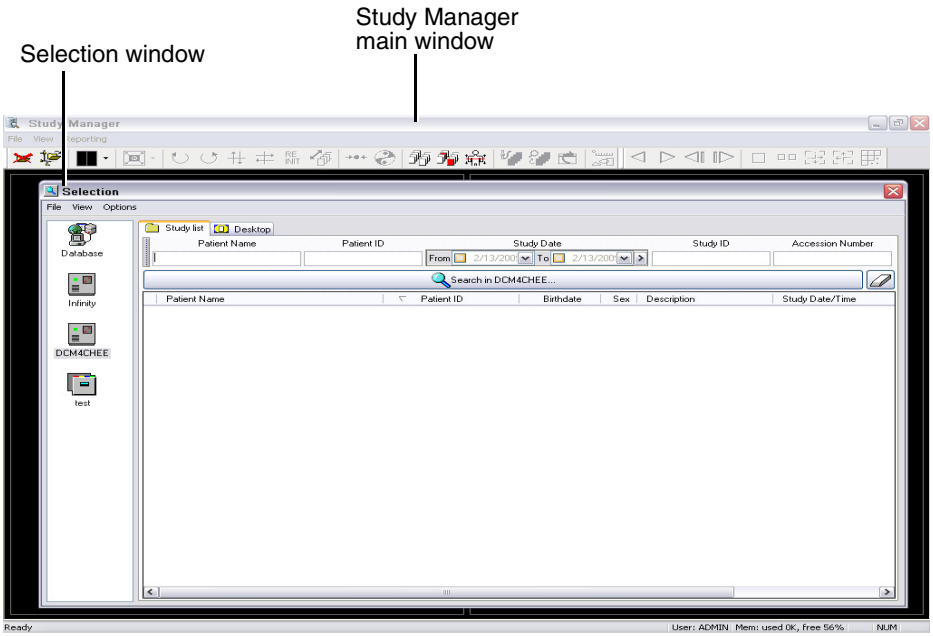
   After logging in, Study Manager starts and the **Selection** window displays.

For information about how to end a Study Manager session, refer to "Exiting Study Manager" on page 6-49.

# Understanding the User Interface

You will see the following windows during a Study Manager session:

- **Selection window.** Used to select a data source, search for and select patients or studies, and then browse through their related records.
- **Study Manager main window.** Used to view selected data and images using the window's menus and toolbar.

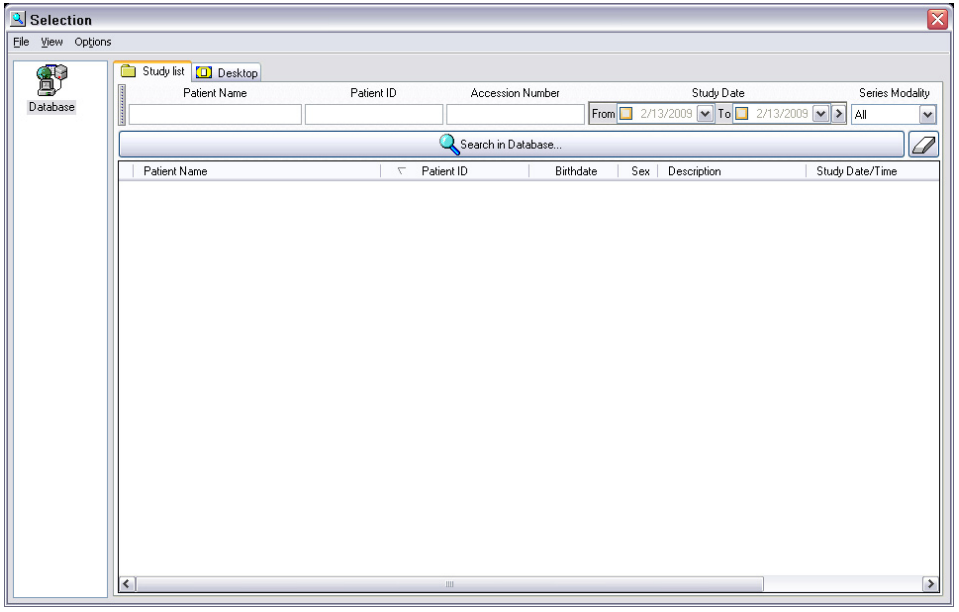


## Selection Window

The **Selection** window opens automatically when you start a Study Manager session, or by clicking the button or button in the Study Manager window toolbar.

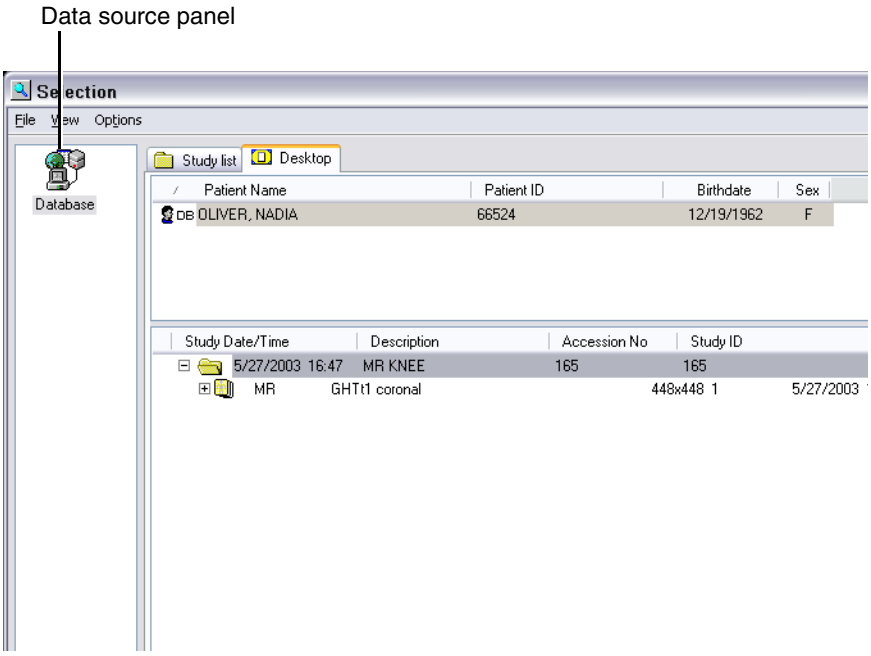
From the **Selection** window, you can:

- Search for patients or studies.
- Select patients or studies, and then browse their related records — studies (if a patient is selected), series, images, and reports.



### Data Sources

The data that you manage using Study Manager is in the Infinity LX database. This is the **Database** connection in the data source panel.

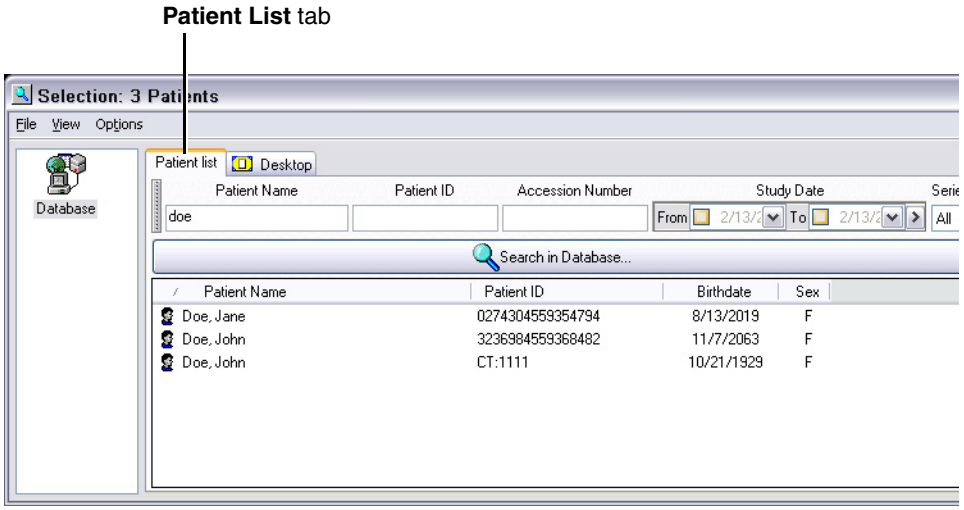



*Panel listing data sources*

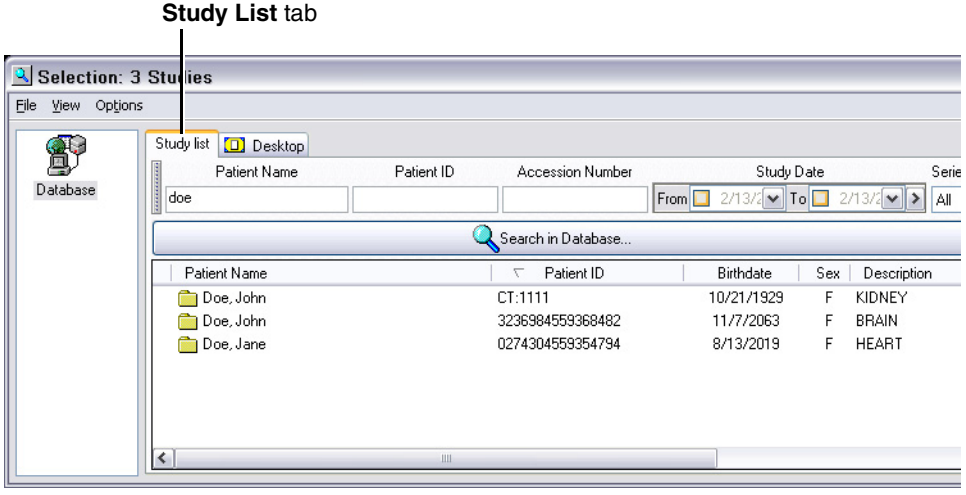
### Patient List and Study List Tabs

Depending on how Study Manager has been configured for your site, you can list search results by patient or study. Study Manager can be configured to display either the **Patient List** or **Study List** tab, or both, in the **Selection** window.

In the **Patient List** tab, a list of patients is displayed.

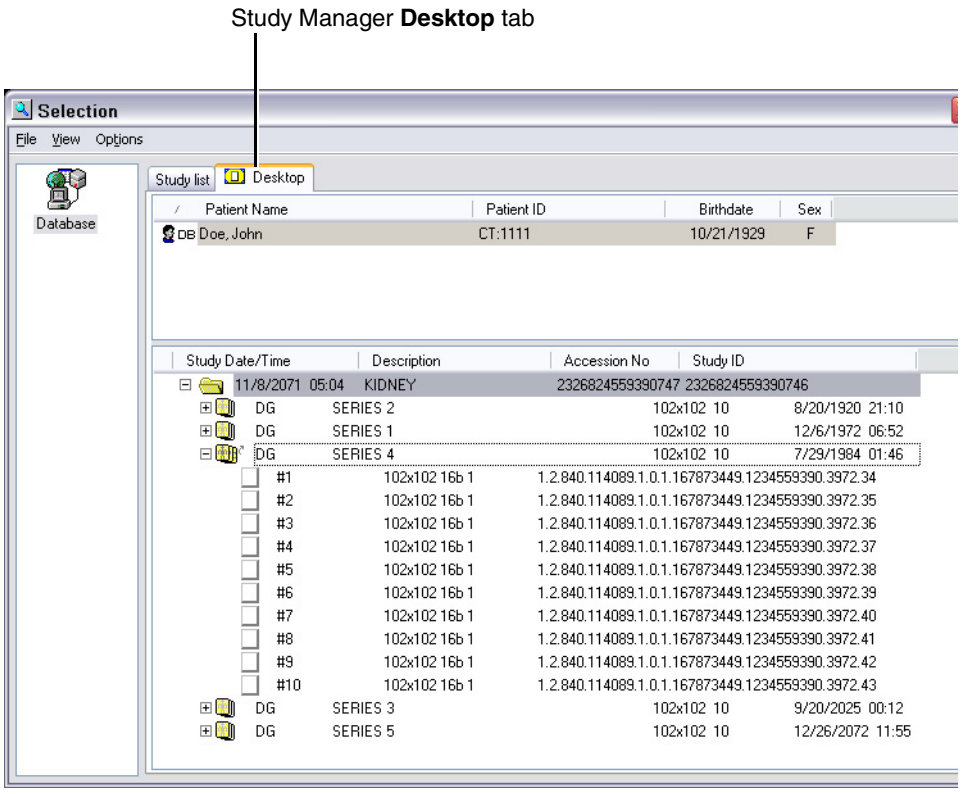



In the **Study List** tab, a list of studies is displayed. Note that there might be more than one study belonging to the same patient.



## Study Manager Desktop Tab

The Study Manager **Desktop** tab lists the records related to the patients or studies that are selected in the **Patient List** or **Study List** tabs. From the Study Manager **Desktop** tab, you can browse a patient's studies, series, images, and reports, and select the data you want to view or work with.



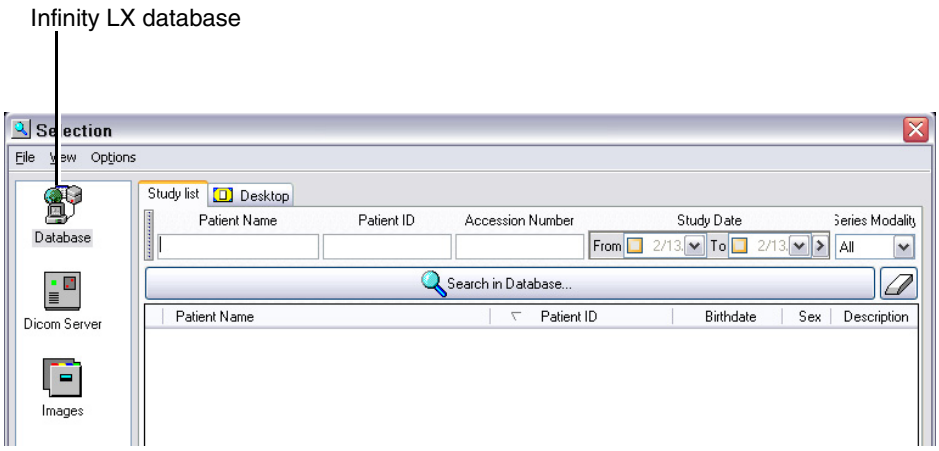

### Sorting Data in the Selection Window

To sort data listed in the **Selection** window by a column, click the column heading. Click the column heading again to reverse the sort order.

# Searching for Data

**To search for data**

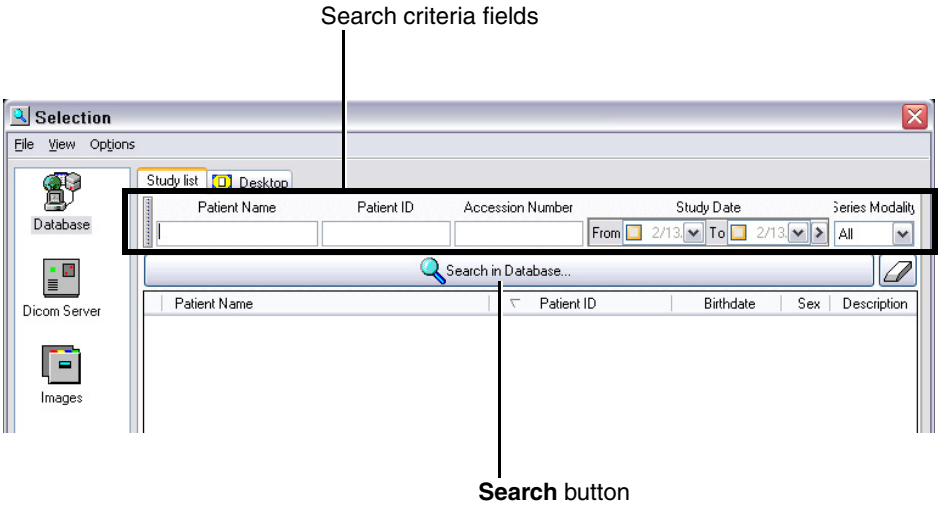
1. From the **Selection** window, select the Infinity LX database (that is, **Database** in the data source panel) where the data is stored.




***Selection window with a data source panel for selecting the data source***

2. Enter search criteria for the data you want to find.

In the **Patient Name**, **Patient ID**, and **Accession Number** fields, enter all the search criteria to be matched or only the first one or more characters. For example, entering `D` in the **Patient Name** field will search for all last names beginning with D.

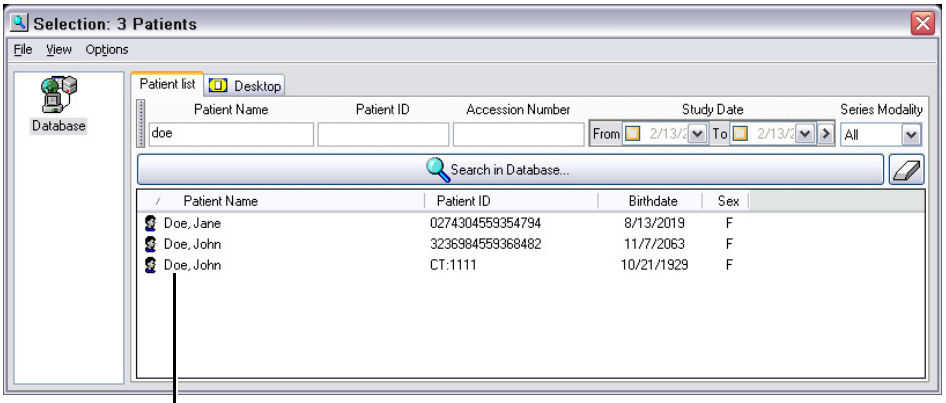



***NOTE:*** *If no search criteria is entered, all patients or studies from the data source will be listed. Searching without criteria is not recommended, as the data retrieval can require a large amount of time.*

3. Click the **Search** button.

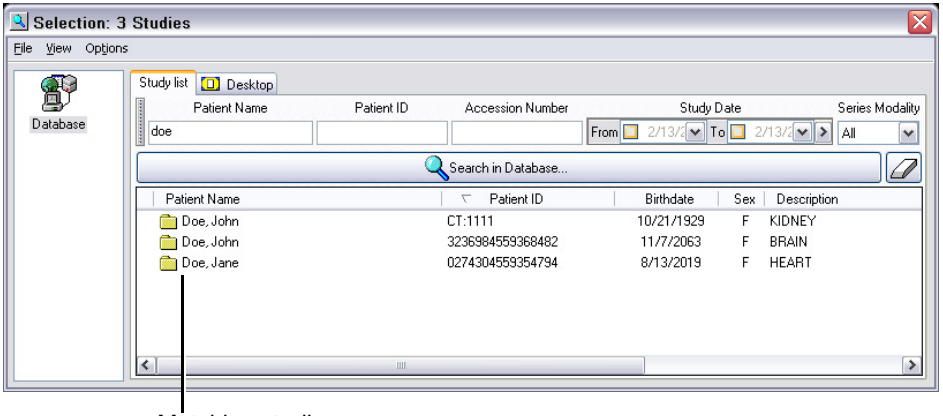
   Matching patients or studies from the data source are listed in the lower portion of the tab.

In the **Patient List** tab, a list of matching patients is displayed.




Matching patients

In the **Study List** tab, a list of matching studies is displayed. You might see more than one study belonging to the same patient.




Matching studies

If only one matching patient or study is found, it is automatically selected and displayed in the Study Manager **Desktop** tab.

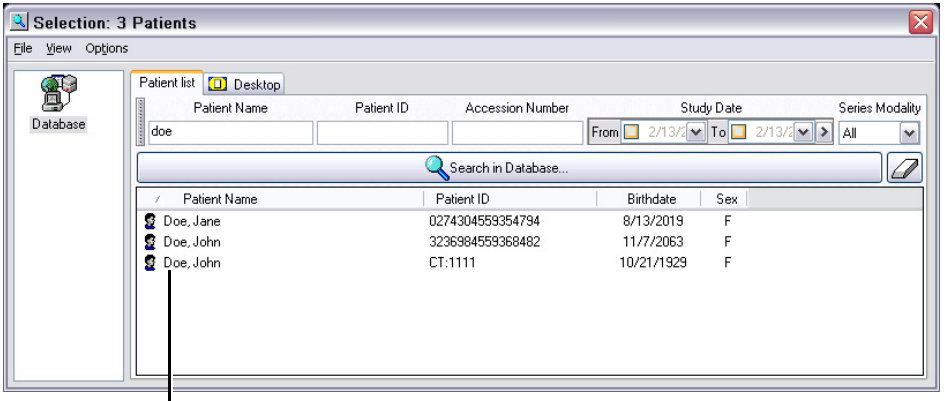
# Selecting Patients or Studies to View

With the matching patients or studies displayed in the **Patient List** or **Study List** tab, you can select one or more entries and then browse their records in the Study Manager **Desktop** tab.

**To select a patient or study to view in the Display tab**

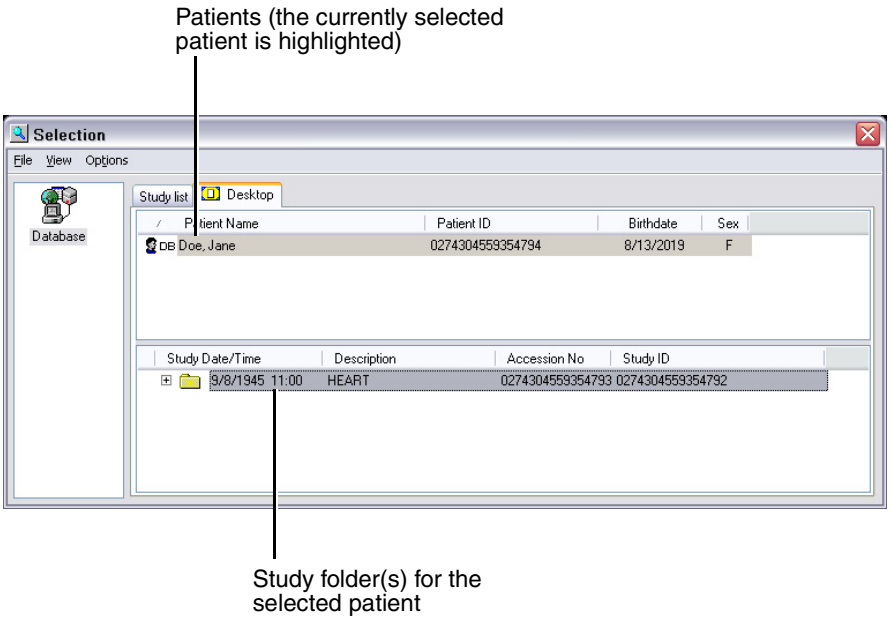
From the **Patient List** or **Study List** tab, double-click an entry.

You can also select the entry (Ctrl+click to select multiple entries), open the **File** menu and click **Open**.




Double-click an entry to open its records in the Study Manager **Desktop** tab

The Study Manager **Desktop** tab displays. The patients that correspond to the selected patients or studies in the **Patient List** or **Study List** tab are displayed in the top portion of the tab.




Note that the patient folder icon indicates the current data source.

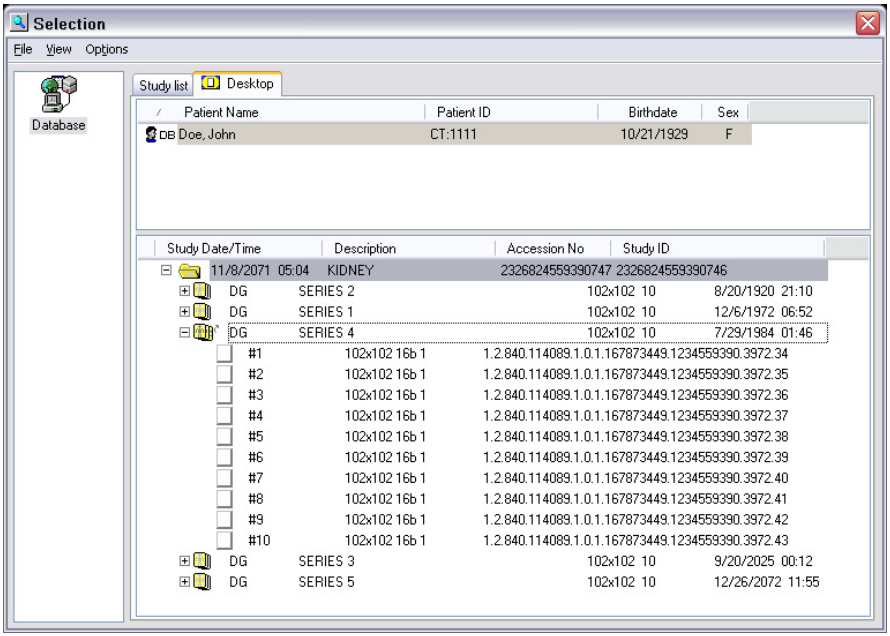
**Table 6-1. Patient Folder Icons**

| Icon | Description |
|---|---|
| | Infinity LX database. |
| | DICOM server. |
| | DICOMDIR (CD or DVD disc). |

Studies for the currently selected patient are displayed in the lower portion of the tab. You can browse the studies, series, images, and reports for the selected patient.

**To view the selected patient's records**

Expand or collapse a study or series by clicking its + or – sign. Or simply double-click the folder.




***Study and its contents expanded***

An icon is used to identify each record, as described in the following table.

**Table 6-2. Record Icons**

| Icon | Record | Information Listed |
|---|---|---|
| | Patient | Last name, First name, Date of birth, Patient ID |
| | Study | Creation date, Creation time, Study ID, Procedure description |
| | Series | Modality, Series description, <Number of columns> x <Number of lines>, Number of frames, Creation date, Creation time |
| | Image | Image number, <Number of columns> x <Number of lines>, Number of bits for one pixel if the image is in grayscale, Number of frames, DICOM instance UID |

**Table 6-2. Record Icons**

| Icon | Record | Information Listed |
|---|---|---|
| | Report | A report |

Record icons can also include status indicators. These indicators are described in Table 6-3.

**Table 6-3. Record Icon Status Indicators**

| Icon | Description |
|---|---|
| | The series is currently displayed. |
| | The series is partially displayed (not all the images have been loaded). |
| | The series is not displayed (the images have not been loaded). |

# Viewing Images

**To view images**

- From the Study Manager **Studies List** tab, right-click the record and select **Display** from the menu.
- From the **Desktop** tab, double-click the record.

  Or

- Drag the record onto the workspace area in the Study Manager main window.

According to the display configuration and current settings, one or more images in the study or series are displayed.

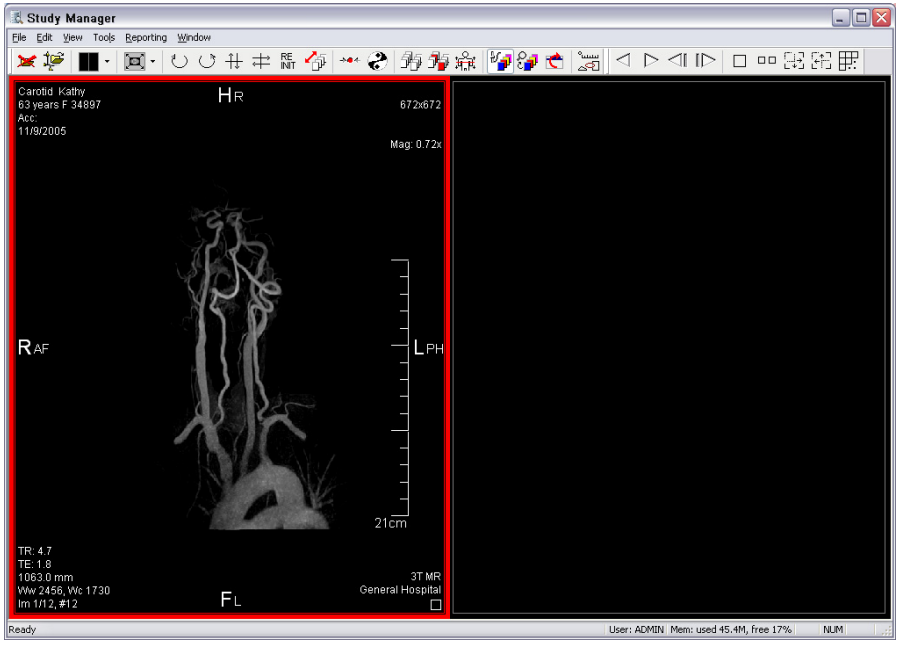



Image viewing functions are available using the menus and toolbar in the Study Manager window. Viewing functions include adjusting the lookup table (LUT), adjusting the image window level, color table mapping, resizing, displaying of patient annotation, and more.

# Basic Toolbar Commands

**Table 6-4. Basic Toolbar Commands**

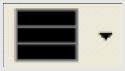
| Icon | | Description |
|---|---|---|
| New/Clear Selection | | Close all open series and return to the selection window. |
| Select/Browse | | Go back to the selection window to select an additional series or patient. The current series remains open. |
| Print | | Send the current image window to a Windows printer. The Codonics Horizon™ Imager configured with the PostScript option can be used to create high quality color and grayscale prints. |
| Tile Mode |  | Display multiple images from the same series. |
| Magnifying Glass | | Magnify a portion of the active image. Select zoom factor by right-clicking in the magnified area (from x2 to x8). |
| Reset Window Level | | Resets window levels to the original values. |
| Polarity | | Changes the polarity of the active series; black becomes white, white becomes black. |
| Synchronize Slices | | In this mode, the frames displayed that are in the same orientation will be synchronized. |
| Hide/Display Graphics | | Toggle the display of graphics (drawing and measurement tools). |
| Distance Measurement | | Determine the distance between two points in the active image. |
| Angle Measurement | | Determine an angle within the active image. |
| Pixel Measurement | | Display the pixel value of a point within the active image. |

**Table 6-4. Basic Toolbar Commands (Continued)**

| Icon | | Description |
|---|---|---|
| Calibration | | Calibrate the active image pixel size. Allows for measurement of a known size element within an image and allows for input of the known size. |
| Mosaic Mode | | Split the current display window so that multiple series may be displayed. |
| Cine Loop | | Allows display of multiple images from a series, one after the other. Clicking on the forward or reverse buttons allows the increase or decrease of the display rate. |
| Left Mouse controls Window Level | | The default action for the left mouse button; adjusts the window level of the active image. |
| Left Mouse controls Image Position | | Allows movement of the active image within the display window. |
| Left Mouse controls Zoom Level | | Allows for zooming in and out. |
| Left Mouse controls Stack Navigation | | Move through the images of the selected series. |
| Left Mouse controls Drag and Drop | | Move the series to another display section (used in Mosaic Mode). |

## MPR Mode

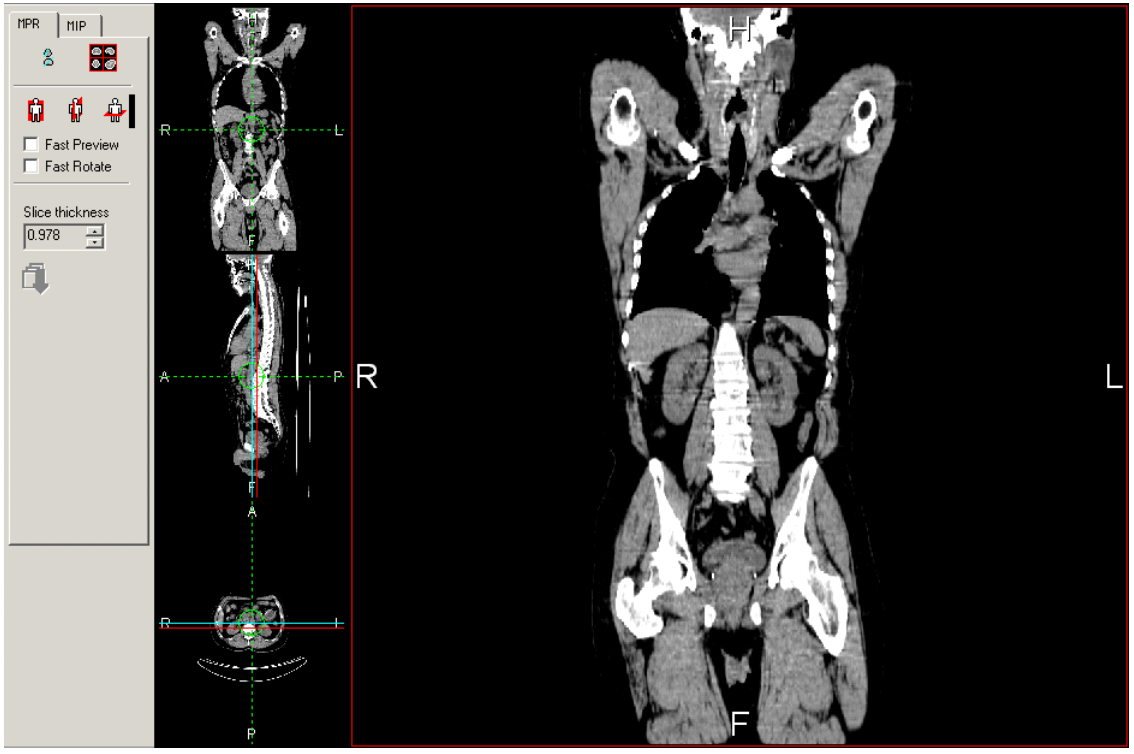
**To enable MPR mode**

Click the 3D MPR MIP button. Then click on the **MPR** tab to activate the MPR mode.

The MPR screen features a dockable toolbar, an orthogonal viewer, and a reconstructed series display.

The orthogonal viewer shows the input image along three orthogonal views. In addition, it also shows the MPR cut-plane intersection (blue line), the current frame displayed on the reconstructed series (solid red line), and the reconstructed volume limits (red dotted lines).

The reconstructed series view behaves like the regular mosaic views in the general display. It shows the reconstructed series along the direction of the blue line.



### *Dockable Toolbar Options*

#### *Reslice Mode*

To toggle the reslice mode, click the button.

- **Single oblique (button not pressed):** reslice the volume in a single oblique orientation:
  - Click on one of the blue lines and wait until the cursor turns into a rotation arrow.
  - Drag the line to the desired angle.

  The intersection of the new slices with the two other views will automatically be updated and reset to an orthogonal angle. The reconstructed series will display the center slice of the new series.

- **Double oblique (button pressed):** reslice the volume into any oblique orientation:
  - Click on one of the blue lines and wait until the cursor turns into a rotation arrow.
  - Drag the line to the desired angle.

  The intersection of the new slices with the two other views will automatically be updated.
  - Set the orientation on the other views (by rotating the blue line).

  The reconstructed series will display the center slice of the new series.

### *Layouts*

To toggle between a 2x2 layout or a 3x1 + 1 layout, click the or button, respectively.

In the 2x2 layout, the orthogonal views are arranged in a 2x2 mosaic, and the reconstructed series is displayed in the lower right image box.

In the 3x1 + 1 layout, the orthogonal views are arranged in a 3x1 column, and the reconstructed view is displayed to the right of that column.

### *Default Orientation*

By selecting a default orientation (coronal, sagittal, or transaxial), the resliced series is reset to one of the three basic orientations.

### *Fast Preview Option*

When the **Fast Preview** option is checked, the resliced series is displayed without interpolation, and only one pixel out of two is computed. However, the full quality is always applied when saving the new series. Uncheck this option for a view of the actual reconstructed series.

### *Fast Rotate Option*

When the **Fast Rotate** option is checked, the MPR display is not updated while rotating or dragging the reference cross lines. The MPR display is updated upon release of the left mouse button.

When this option is unchecked, the MPR display is updated in real time while rotating or dragging the reference cross. However, for performance reasons, the reconstructed series is always displayed in fast preview mode, regardless of the status of the **Fast Preview** check box.

### *Slice Thickness*

Select the number of slices used to construct the 3D model. A higher number here can improve response time but may reduce the detail of the reconstruction.

To view the result in the reconstructed volume frame, click the button.

***NOTE:*** *Slice thickness is always an integer multiple of the pixel size.*

## MIP Mode

**To enable MIP mode**

Click the 3D MPR MIP button. Then click on the **MIP** tab to activate the MIP mode.

The MIP is a 3D post-process that features three orthogonal views—coronal, sagittal, and transaxial. It also features a free angle view and a clipping box to isolate the organs you want to display. Every image is visualized with a Maximum Intensity Projection.

### Dockable Toolbar Options

#### *Reinitializing the Volume*

To reinitialize the volume as it appeared at the first launch, click the button.

Be aware that the window level is not reinitialized.

#### *Enabling Volume Rotation*

To enable the volume rotation, click the button, then press the left mouse button while dragging the mouse. The button is enabled only on the fourth view (free angle view). The cube moves like the volume and on each face gives the orientation of the volume:

- A: anterior
- P: posterior
- L: left
- R: right
- H: head
- F: feet

Alternatively, you can also press ALT+ left button while dragging the mouse to rotate the image.

#### *Switching Views*

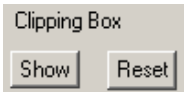
To switch the free angle view from mosaic view (four views) to full screen view, click the button.

Refer to “Cine Control” on page 6-26 for an example of the full screen view.

### *Displaying Orthogonal Views*

To display on the free angle view, click one of the three orthogonal view buttons.

### *Displaying the Clipping Box*

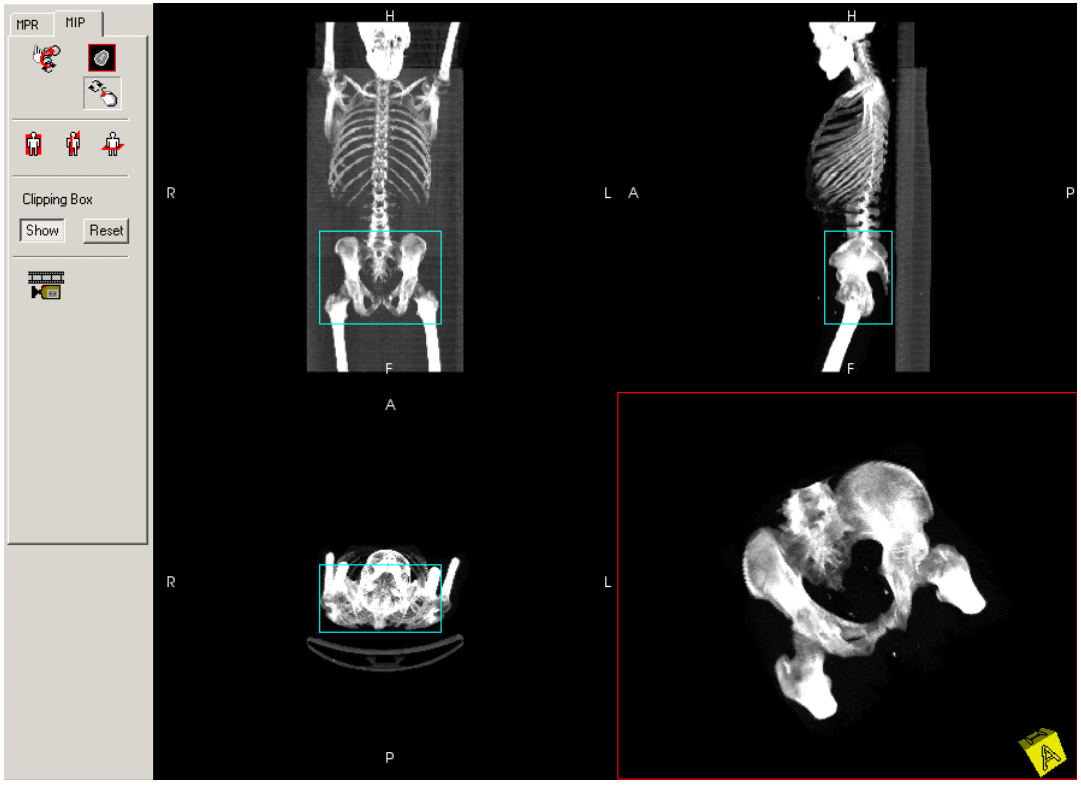



To display the clipping box, click the **Show** button.

The clipping box is displayed only on the orthogonal views. Use these three views to isolate the region to view; the result is displayed on the free angle view.

To clear the clipping, click the **Reset** button.

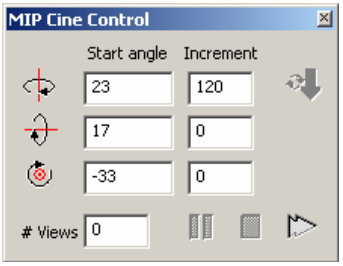
Below is an example of clipping.



### *Cine Control*

To access cine control, click the button.

The **MIP Cine Control** window displays.



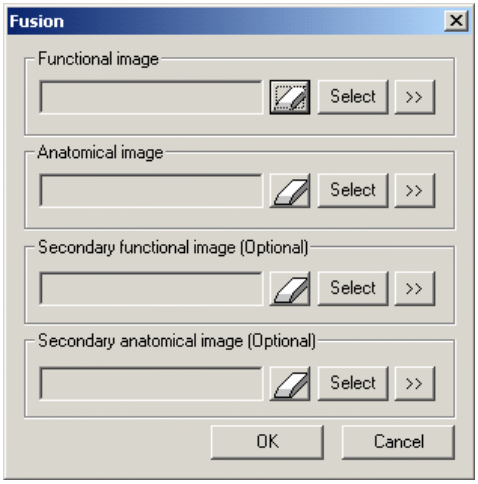

The cine control has to be used like a table. For the three axes of rotation, specify a start angle. The button applies the angles specified.

With a **# Views** value and **Increment** angles entered, click the button to start a cine with **# Views** frames, each one separated by **Increment** angles.

The cine can be controlled with the **Pause** button, **Stop** button, or **Start/Increase Cine Speed** button. There is also a **Stop** button in the MIP toolbar.

## Fusion Mode

When selecting the **Fusion** icon in the main application, the Viewer application automatically browses the loaded series. If it does not find suitable series, the **Series Selection** dialog box displays. Otherwise, the Fusion protocol starts with the loaded series.




In the **Series Selection** dialog box, there are two ways of selecting the input images for Fusion:

- By activating the requested image in the general display, then pressing the corresponding **Select** button on the selection dialog box.
- By navigating through the patient/study/series in the menu tree that pops up by clicking the corresponding >> button.

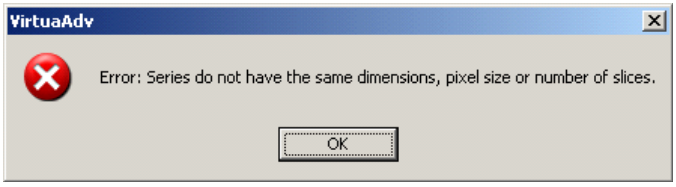
Using one of those methods, select a functional image and repeat the operation for the anatomical image, if needed.

A second functional image can be selected for use in the dual-orthogonal mode (it can be selected later when switching to dual-ortho mode).

To clear the selection, click the corresponding button.

### *Notes About the Fusion Module*

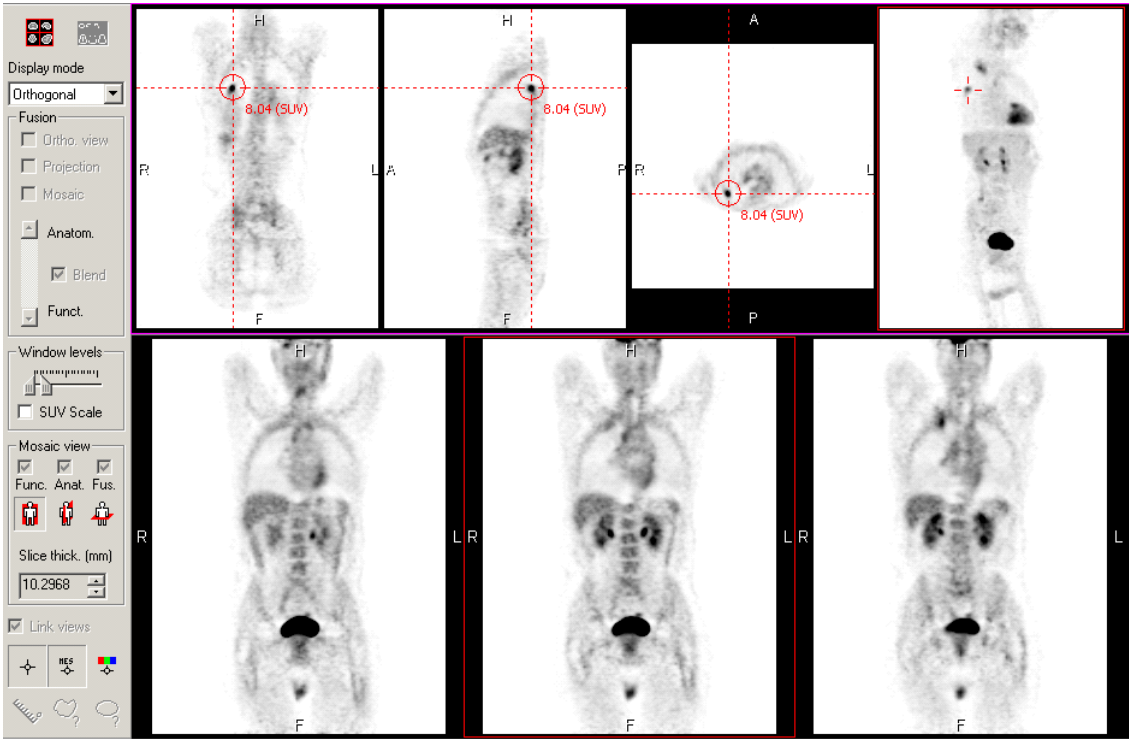
- The Fusion module works only with images for which the image orientation and image position data has been coded by the modality.
- All the images of the input series must have the same slice thickness and regular spacing between slices. If this is not the case, an error message displays and the module aborts.



### *Display Modes*

Five display modes are available: Orthogonal, Dual-orthogonal, Triple-orthogonal, Horizontal mosaic, and Vertical mosaic. Switch between those modes using the **Display Mode** list box.

### *Orthogonal Mode*




Fusion shows a transparency fusion of both image volumes along the three basic orthogonal directions, a MIP of the functional or fusion image, and a reconstructed series displayed in mosaic mode.

### *Orthogonal Display*

To toggle the display of the cross target and reference lines, click the button.

To toggle the display of the pixel value, click the button.

To change the color of the cross-target and reference lines, click the button.

To use the orthogonal view full screen to hide the reconstructed slices, click the button.

### *MIP Display*

A MIP is automatically computed from the transverse slices of the functional image. 32 projections are computed with an angular shift of 22.5 degrees.

The MIP is computed in the background. A green progress bar shows the computation status upon program startup and after activating the fusion option for the Projection.

The MIP runs in cine-loop mode. It can be stopped and restarted using the regular cine-loop buttons in the general display of the application. A small cross on the MIP display materializes the cross-target center on the fusion display.

### *Reconstructed Slices*

Reconstructed slices can be computed from either the functional image or the fusion image. These slices are displayed in the lower pane of the Fusion window.

- Select the orientation of the slices (coronal, sagittal, transverse) to recompute the slices in the requested orientation.
- Change the slice thickness using the corresponding control. Slice thickness is always an integer multiple of the original slice thickness.

### *Fusion Options*

Use the dialog bar to choose which views are to be displayed in transparency fusion mode. Check the following boxes accordingly:

- Ortho view: the fusion is activated on the three orthogonal planes.
- Projection: the fusion is activated on the MIP display. Selecting this option automatically activates the fusion on the ortho view.
- Mosaic: the fusion is activated on the reconstructed images (bottom view).

Select the transparency level using the vertical slider in the dialog bar. This slider goes from fully anatomical to fully functional. Depending on the **Blend** check box status, the transparency is computed as follows:

- **Blend** check box not selected: the anatomical image is always displayed. The functional image is displayed as a transparency overlay [intensity varying from 0% to 100% depending on the position of the slider (anatomical to functional)].
- **Blend** check box selected: the anatomical image is displayed with an intensity varying from 100% to 0%, depending on the position of the slider (anatomical to functional). The functional image is displayed with an intensity varying from 0% to 100%, depending on the same slider setting.

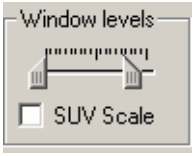
These settings are common to all views displayed in Fusion mode. Note that the following actions are not allowed in fusion mode:

- Inverse video
- B&W color palette

***NOTE:*** *When the orthogonal and mosaic views are both in the same mode (fusion or not), the window levels and color palette are set to be the same on both views. The Projection view remains independent.*

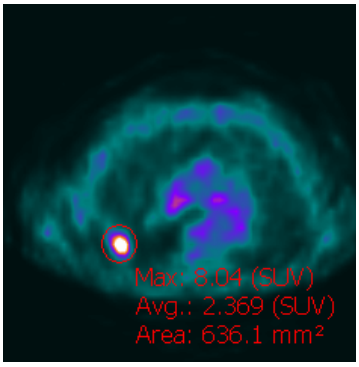
***NOTE:*** *When changing the window levels on a fusion view, only the functional image is updated. To change the window levels on the anatomical image, use the same mouse key combination and hold the ALT key down while moving the mouse.*

### *Window Levels Options*




- Use the sliders to set the activity window min and max on the active view.
- Select the **SUV Scale** option to display a color bar coded in SUV values on each functional view.

### *Measurements*




The following measurement buttons are at the bottom of the toolbar:

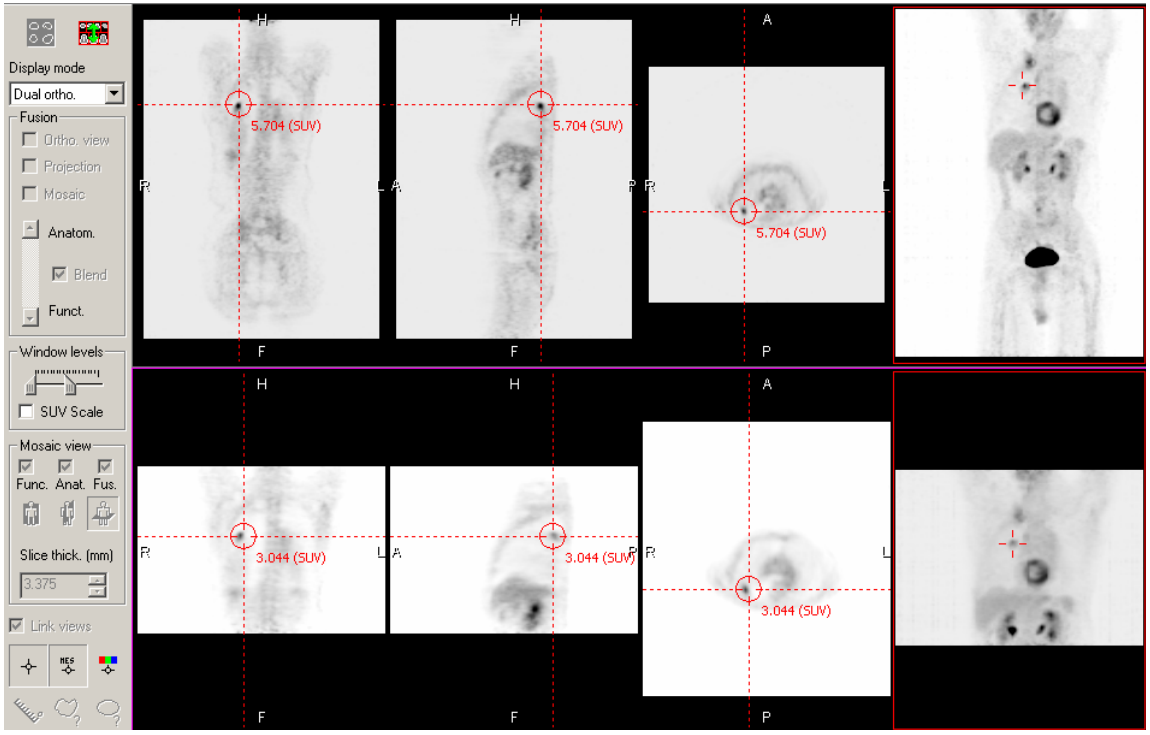
- Distance: measure the distance on a straight line.

- Free-hand: compute statistics on a free-form region of interest (after drawing the region, double-click to close the region and display the statistics).

- Ellipse: compute statistics on an elliptical region of interest.

These features are available only on mosaic views, not on orthogonal or MIP views.

### *Dual-Orthogonal Mode*

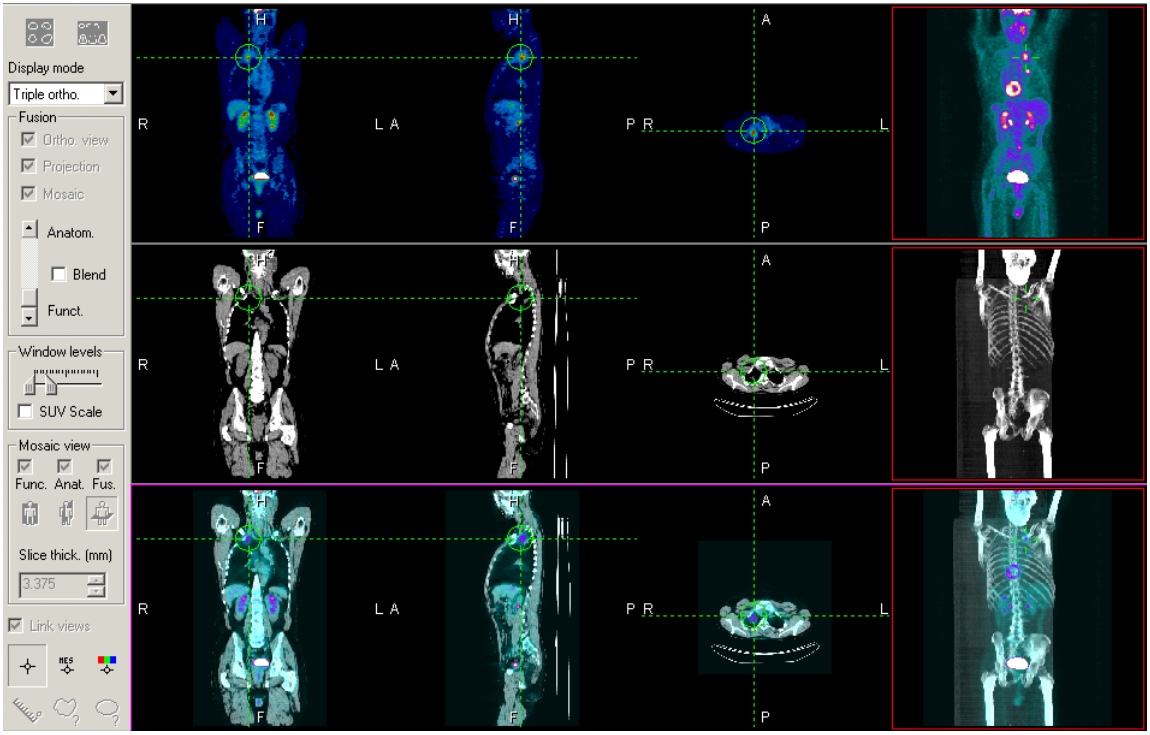



The Dual-Orthogonal mode features two orthogonal views for synchronized display of two functional images registered over the same anatomical image, or two sets of functional and anatomical images.

The cross target position is not synchronized on both views; they both work independently.

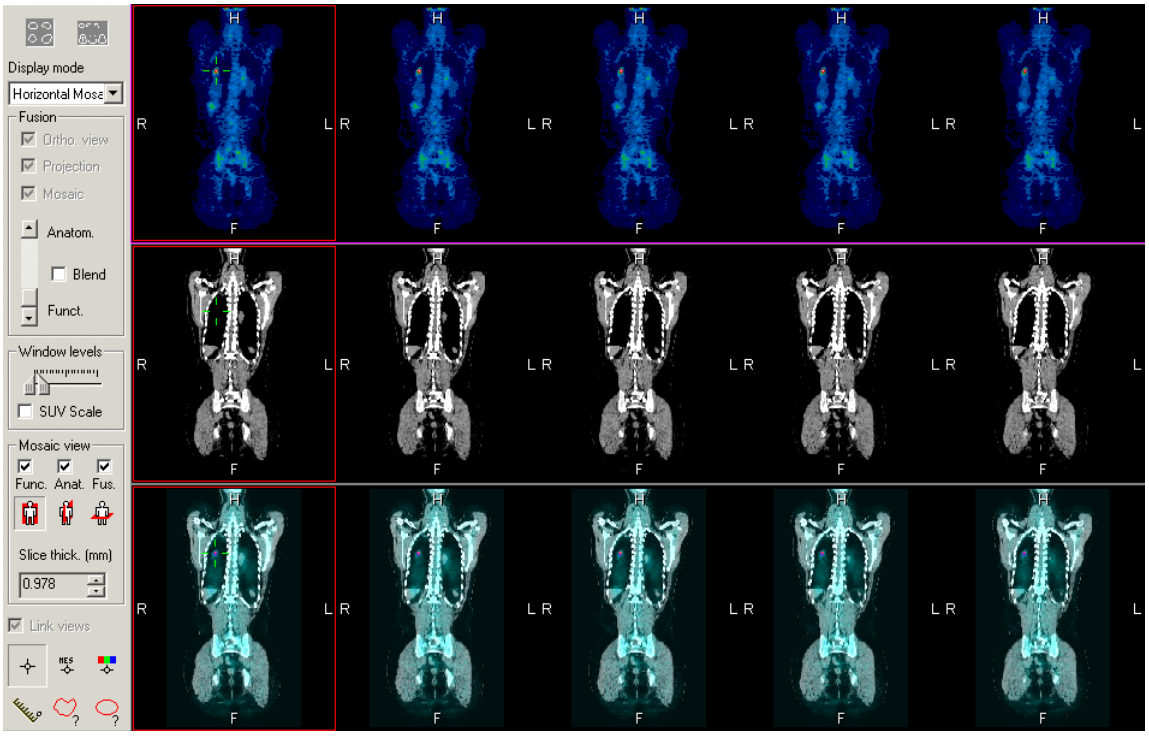
The two studies can be switched by pressing the button. This is especially useful since only the top study can be displayed in other modes, such as mosaic or triple orthogonal.

### *Triple-Orthogonal Mode*




The Triple-Orthogonal mode features three orthogonal views for synchronized display of the anatomical, functional, and fusion images. The cross target position and the projection cine are synchronized on all views.

### *Mosaic-Only Mode*

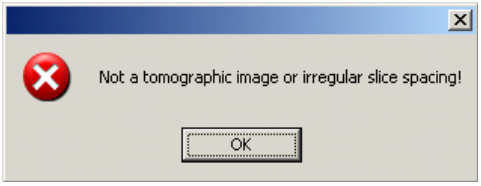



The Mosaic-Only mode features three views in a synchronized mosaic display: Functional, Anatomical, and Transparency fusion.

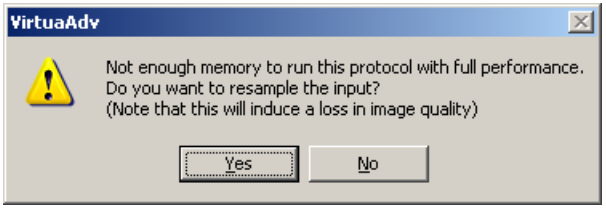
A synchronized cross-target is displayed over the views to help localize the same anatomical point on the three views.

## Advanced Viewing Considerations

Advanced viewing modules work only on images for which orientation and image position data has been coded by the modality. Also, all the images of the input series must have the same slice thickness and regular spacing between slices. If this is not the case, the following error message displays.

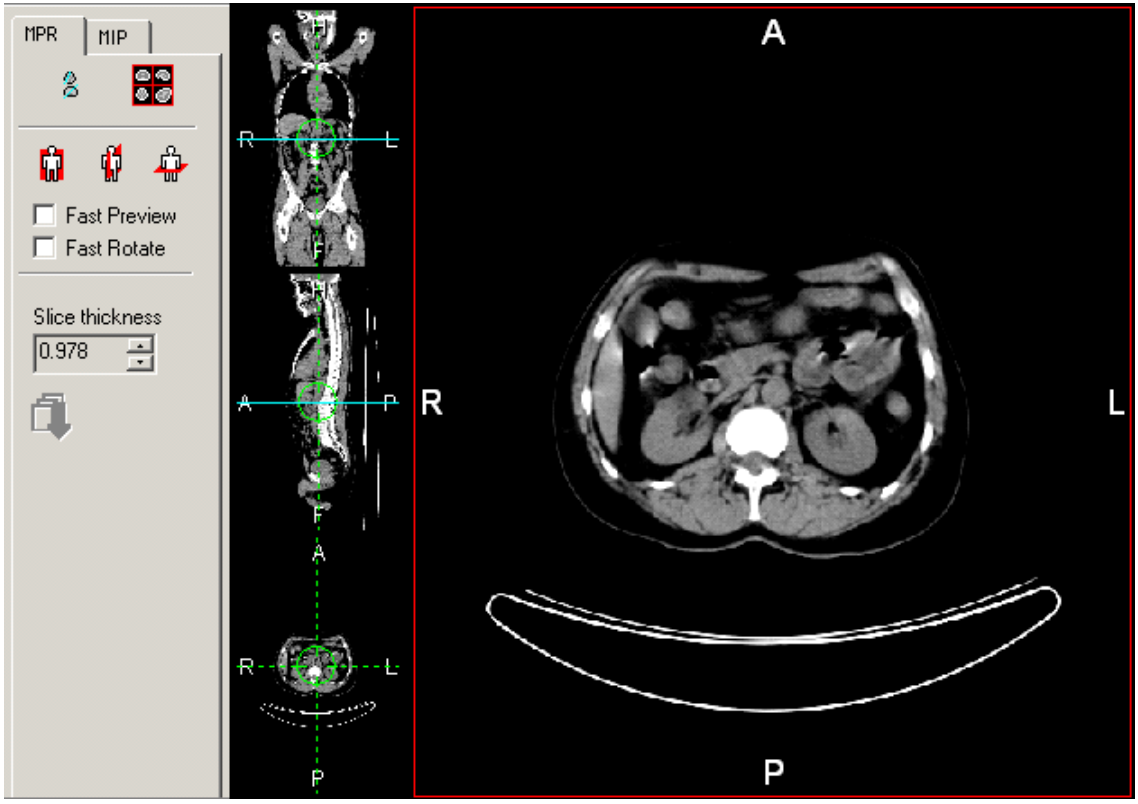



Note that when Orthogonal View or MPR/MIP protocols are launched, if the application detects that there is not enough memory on the PC to run such protocols with full performance, the user is prompted with the following message asking if a resampling is permitted.

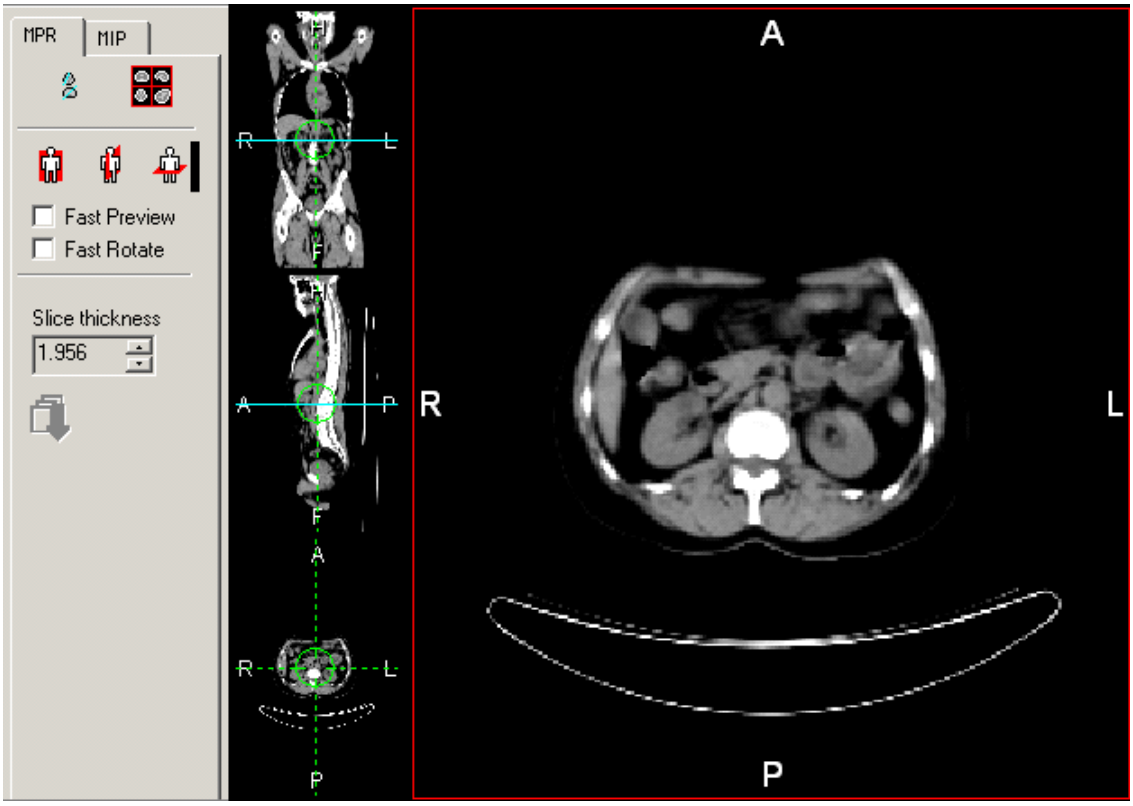



If the user accepts to resample, the image quality will be altered by displaying only one pixel out of two on the X, Y, and Z axis. The user may nevertheless decide to continue without resampling the image size, but this will affect the performance of the protocol.

Refer to the following examples to see how rescaling affects the image.




*Original Image Size*




***Resampled Image Size***

## SUV Calculations

With the Study Manager, SUV Body Weight is computed using the following values:

- D, injected dose (Becquerels)
- t1, time span between injection and acquisition (seconds)
- T, half life period of the radio isotope used (seconds)
- W, weight of the patient (kilograms)

All these values ought to be imported from the original CTI and the pixel data (counts) have to be in Bq/ml. If one is missing, the SUV will not be proposed to the user.

The injected dose is decay-corrected to correspond to the existing dose at the time the image is acquired:

$$D1 = D \bullet e^{-\left(\ln 2 \bullet \frac{t1}{T}\right)}$$

Then SUV values are obtained using the formula:

$$SUV = counts \bullet W \bullet \frac{1000}{D1}$$

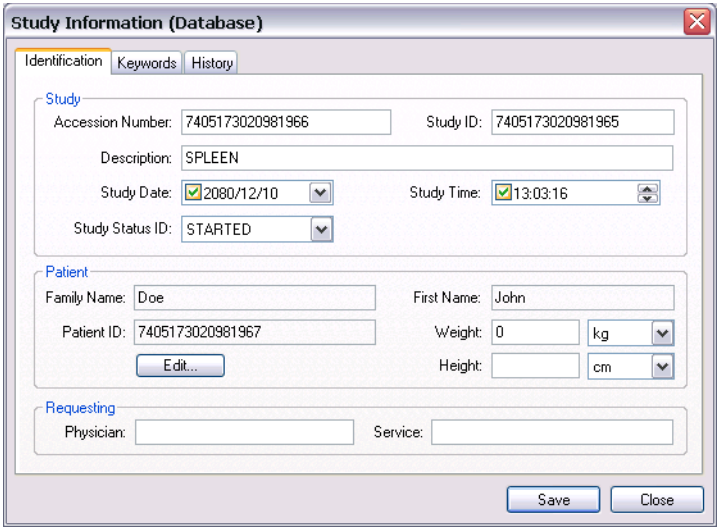
# Viewing/Editing Record Information

**To view a record's information**

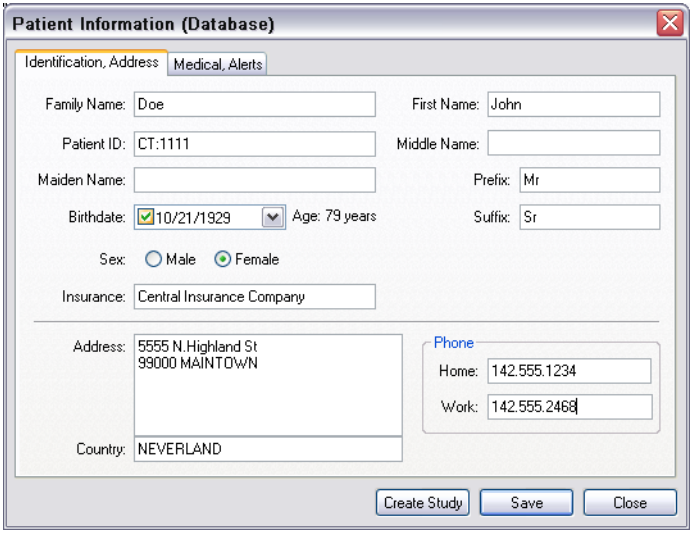
From the Study Manager **Studies List** tab or **Desktop** tab, right-click the record (patient, study, series, image, or report) whose information you want to view, then click **Properties** in the pop-up menu.

An **Information** dialog box displays for the record you selected.

A sample **Study Information** dialog box is shown below.



You can access patient information by clicking the **Edit** button in the **Study Information** dialog box, which opens the **Patient Information** dialog box.




Information data in either the **Study** or **Patient Information** dialog box is view-only unless it comes from a database. In this case, editable fields are shown in white and the **Save** button is enabled.

**To edit record information**

1. Edit the information in the **Information** dialog box, as needed.
2. Click the **Save** button to save your changes.

# Exporting Records

Studies, series, or images can be exported from the Infinity database to DICOM destination servers that are configured in Study Manager.

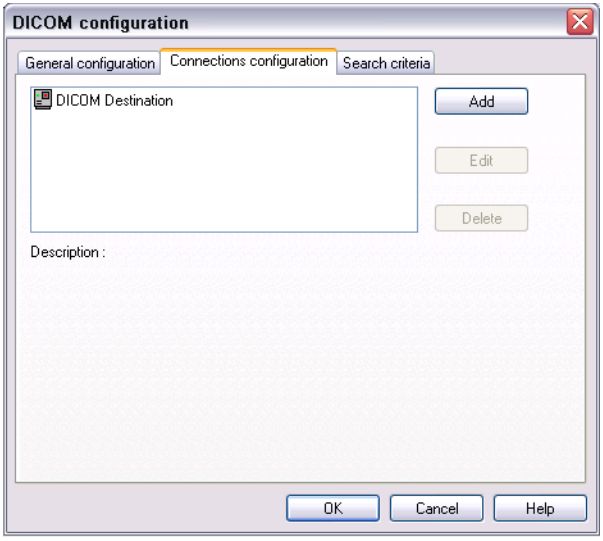
Only the **admin** user can export records.

## Configuring a DICOM Destination Server

**To configure a DICOM destination server**

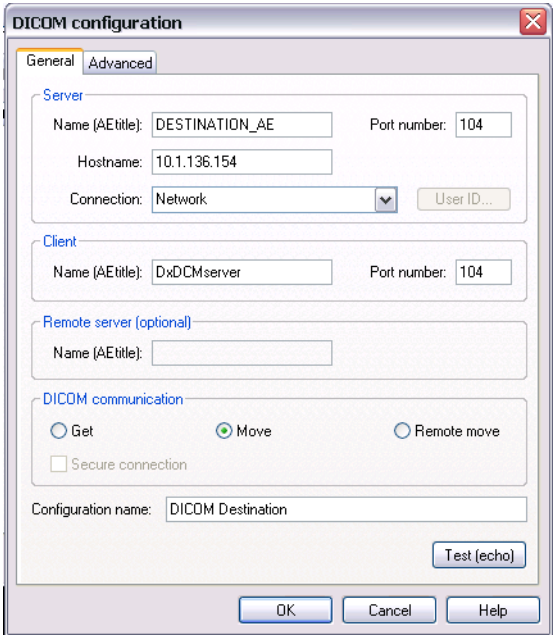
1. Log in to Study Manager as the **admin** user.
2. Open the **Options** menu and click **DICOM Settings**.

   The **DICOM Configuration** dialog box displays.
3. Go to the **Connections configuration** tab.




4. Click the **Add** button.

Another **DICOM Configuration** dialog box displays, for configuring a DICOM destination server.




5. Configure the parameters on the **General** tab; refer to Table 6-4 for a description of the parameters.

**Table 6-5. DICOM Destination Server Parameters — General Tab**

| Property | Description |
|---|---|
| ***Server Settings:*** | |
| Name (AE Title) | Enter the Called AE Title of the destination server (e.g., DESTINATION_AE). |
| Hostname | Enter the IP address of the destination server. |
| Port number | Enter `104`. |
| ***Client Settings:*** | |
| Name (AE Title) | Enter `DxDCMserver` as the Calling AE Title for Infinity. |
| ***Remote server: Name (AE Title)*** | Not used. |

**Table 6-5. DICOM Destination Server Parameters — General Tab**

| Property | Description |
|---|---|
| ***DICOM communication*** | Select the **Move** option. |
| Configuration name | Enter a name for the DICOM destination server. This name appears in the Study Manager destination selection list. |

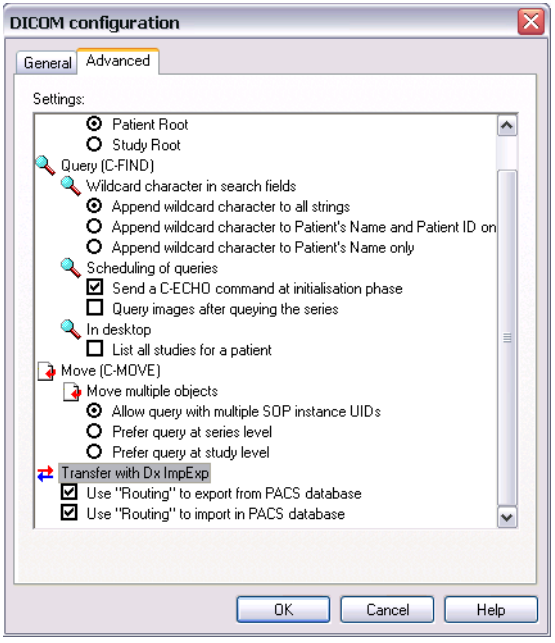
6. At the DICOM destination server, configure support for Infinity LX as a DICOM source.

   You will have to define **DxDCMserver** as the Calling AE Title, the Infinity LX IP address, and **104** as the port number.

7. After configuring Infinity LX as a DICOM source on the destination source, click the **Test (echo)** button on the **General** tab to test communication with the destination server.

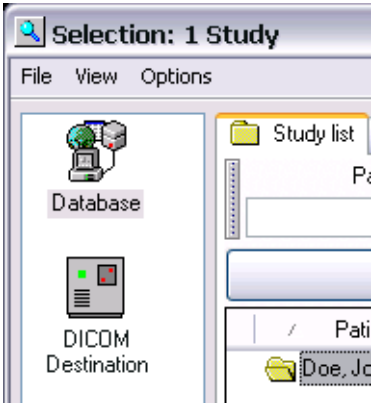
   You should receive a confirmation that the destination server successfully replied to the test message.

8. Go to the **Advanced** tab.



9. Under **Transfer with DxImpExp**, select the following options:
   - **Use “Routing” to export from PACS database**
   - **Use “Routing” to import in PACS database**
10. Click the **OK** button to save your changes and close the dialog box.
11. On the **Connections configuration** tab, click the **OK** button to close the **DICOM Configuration** dialog box.

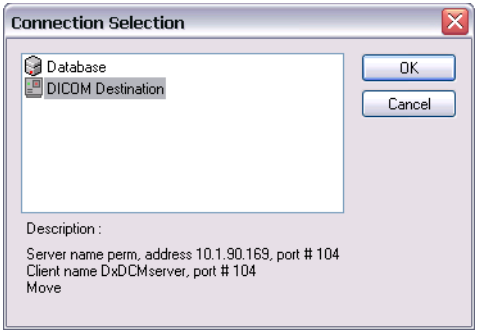
    The destination server’s icon is added to the Study Manager left sidebar.



## *Exporting a Record*

**To export a record**

1. Log in to Study Manager as the **admin** user.
2. Right-click on the study, series, or image to be exported.
3. In the pop-up menu, click **Export study**.
4. The **Connection Selection** dialog box displays.

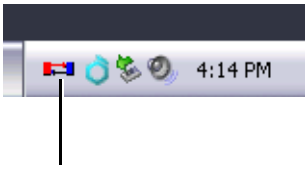



5. Select the destination server, then click the **OK** button.
6. You are prompted to confirm the export operation.

7. Click the **OK** button to proceed with the export.

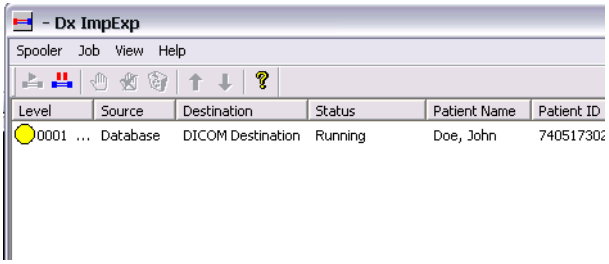
   The Study Manager import/export activity icon displays in the Windows taskbar tray to indicate the status of the record transfer.

8. To manually open the import/export status dialog box, click the icon in the Windows taskbar tray.




Click the **Study Manager import/export activity** icon

The status dialog box displays. The yellow indicator shown below indicates that the transfer is still running.




When the transfer completes, the import/export status dialog box automatically opens to show the transfer status: a green indicator if successful, and a red indicator if unsuccessful.

# Deleting Records

To manage storage space, you can delete selected records, or delete all records at or above the selected records (for example, delete the study in which the selected image is contained).

**To delete a selected record**

1. From the Study Manager **Desktop** tab, click to select the record (patient, study, series, image, or report) to be deleted.
2. Press the **Delete** key.

   You are prompted to confirm the deletion.
3. Click **Yes**.

   The record and its sub-records are deleted. For example, deleting a study also deletes all of its series.

**To delete records and their parent records**

1. From the Study Manager **Desktop** tab, Ctrl+click to select the records (patient, study, series, image, or report) to be deleted.
2. Open the **File** menu and click **Delete**. Then, click the parent record level at which you want to perform the deletion. For example, if a series is selected, you can click **Patient(s)** or **Study(ies)** to delete the entire patient or study in which the series is contained.

   You are prompted to confirm the deletion.
3. Click the **Yes** button.

   The record, its sub-records, and its selected parent records are deleted.

# Exiting Study Manager

**To exit Study Manager**

In the **File** menu, click **Exit**.

If there were edits made to any of the images, you will be prompted to save any unsaved changes.

# 7 Maintenance

## Backing Up Study Data

To prevent loss of the study data, it is strongly recommended that this data be backed up to another device on a regular basis. For information on data backup options (for example, sending studies to Virtua and burning discs), contact Codonics Technical Support (+1 440-243-1198).

## Cleaning the Chassis Enclosure

To clean the Infinity LX chassis enclosure, log out, shut down, and power down the system (refer to "Logging Out" on page 4-28, "Shutting Down and Rebooting" on page 4-28, and "Removing Power to Infinity LX" on page 4-32). When it is powered off, turn off the two power supply switches on the rear panel and unplug the Infinity LX power cords.

Clean the enclosure with a clean soft cloth or towel **slightly** moistened with a mild soap and water solution. Allow the enclosure to completely dry before operating Infinity LX again.

**CAUTION** Always power off Infinity LX and disconnect its power cords before cleaning. Resume operation only after the surfaces are completely dry.

# Replacement Procedures

**CAUTION** Infinity LX includes several redundant systems and a robust user warning system to decrease the likelihood of permanent data loss. It is imperative that users act to prevent permanent data loss when Infinity LX indicates that there is a problem. Failure to do so may invalidate the system warranty and will jeopardize system data.

## Replacing a Hard Drive

If a hard drive fails, it should be replaced immediately.

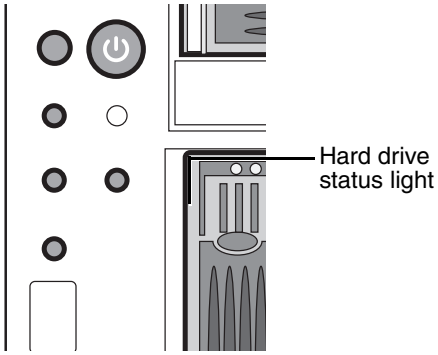
**CAUTION** Do not remove more than one hard drive at a time. This could cause permanent data loss. Failure to comply with this caution may void the Infinity LX warranty.

**CAUTION** To avoid data loss, make sure that you are replacing the failed drive. To identify the failed drive, the drive's status light will be red.

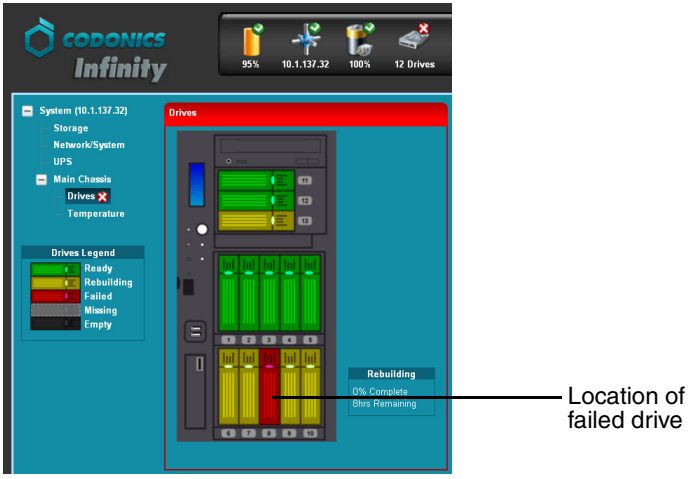
**To replace a failed hard drive**

1. Do not shut down Infinity LX.
2. Open the chassis door.

3. Make sure that you properly identify the failed hard drive. Its status light will be red.



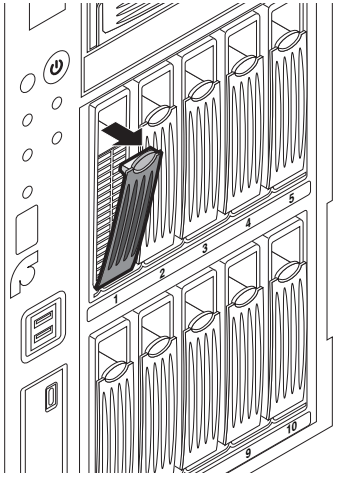

If you cannot find the hard drive with a red LED, use the System Status tool to locate the failed hard drive.



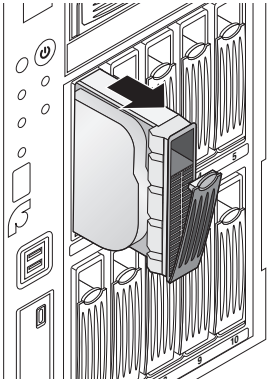

**CAUTION** If it is not apparent which hard drive has failed, DO NOT remove any hard drives. Removing the wrong drive may result in data loss. Contact Codonics Technical Support for assistance (+1 440-243-1198).

4. Open the failed hard drive's lever by pulling out on the blue tab to about 45°.

This disconnects the hard drive from the internal connector.



5. Wait 10 seconds for the hard drive to spin down.
6. Slide the failed hard drive out of the chassis.



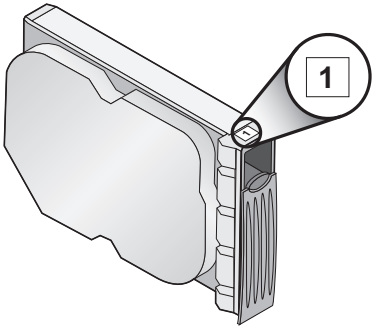
7. Mark the word FAILED on the failed hard drive to prevent accidental reuse.

**CAUTION** Electronic patient health care information may still be accessible on failed hard drives. Dispose of failed hard drives in an appropriate manner to protect patient health care information.

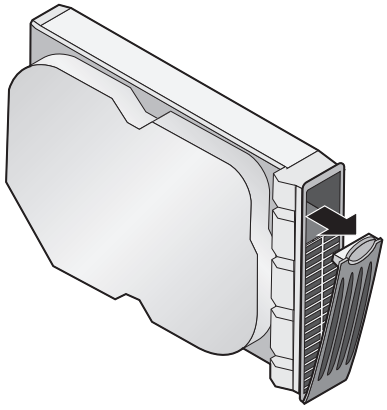
8. The replacement hard drive is shipped in a protective anti-static bag. Open the anti-static bag and carefully remove the replacement hard drive.

**CAUTION** Use care when unpacking and handling hard drives. You should be properly grounded and observe anti-static procedures before removing the replacement hard drive from the anti-static bag. Do not drop the hard drive. Handle only the front, side edges, and face with the label. Do not handle the underside or the backplane of the drive. Do not touch any exposed electronics.

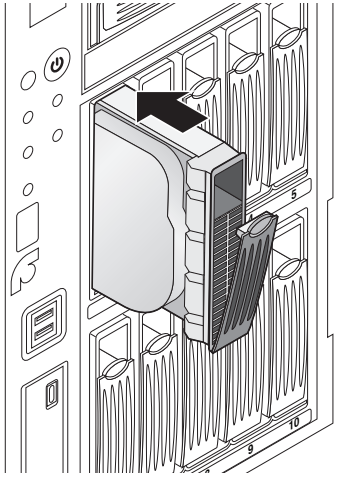
9. Locate the drive number labels in the replacement hard drive kit. Peel off the number that corresponds to the failed hard drive and attach the label to the new hard drive.



10. Pull down on the blue tab to open the replacement drive lever to about 45°.

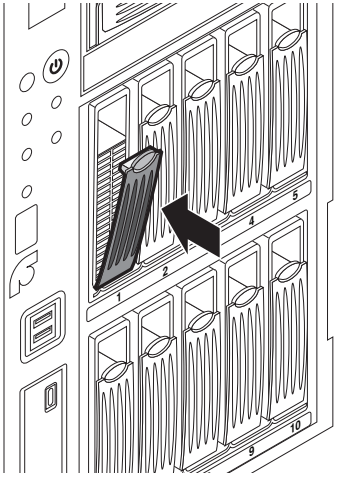


11. Insert the hard drive fully into its slot in the chassis.



**CAUTION** When installing the hard drive, it is important to install it all the way into its slot. Push the drive as far into the slot as it will go (it should be flush with the neighboring drives). There is some resistance when the back of the drive is seated in the cage. It is possible to latch the lever without having the drive fully installed.

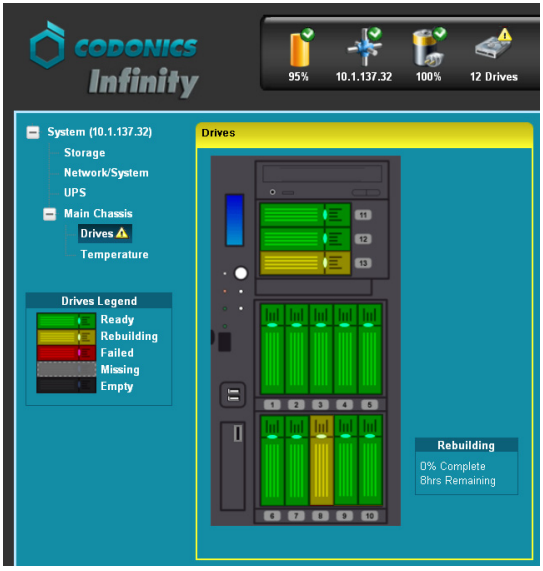
12. Close the hard drive lever to lock the drive in place. The lever will click into position when it is fully closed and locked.



***NOTE:*** *After installing a new hard drive, its status light might be red for about a minute. This is because it takes some time for the RAID controller to recognize the new drive.*

The RAID controller will begin to rebuild the new hard drive with the data from the hot spare drive. Infinity LX is fully functional during this process, which takes approximately 8 hours.

The System Status tool will show the progress of the rebuild operation.




If the system is in the middle of rebuilding with the hot spare drive, that process will finish even if you replace the failed drive. Once that is complete and the failed drive has been replaced, the Automatic Copyback to the replacement drive will start; that process takes approximately 4 hours.

## Replacing a Power Supply Module

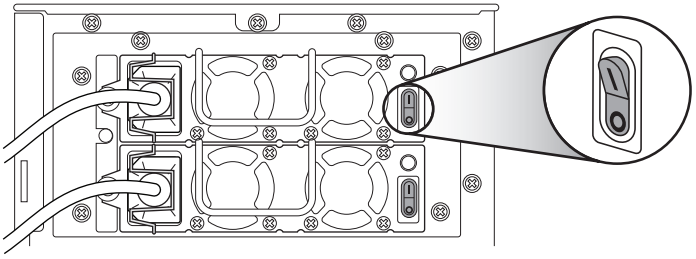
Infinity LX features two hot-swappable power supply modules. If one module fails, Infinity LX will continue to function normally for 24 hours. After 24 hours without replacement of the failed power supply module, DICOM services will shut down as a safety precaution. The system will beep and the System Status user interface will provide a message to indicate this condition.

***NOTE:*** *When replacing a single power supply module, there is no need to power down Infinity LX. It will continue to be powered by the second power supply.*

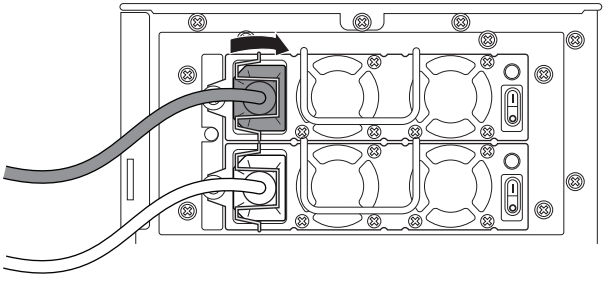
***NOTE:*** *The illustrations in this procedure depict the top power supply module being replaced.*

**To replace a power supply module**

1. Locate the failed power supply module and turn its power switch to Off.

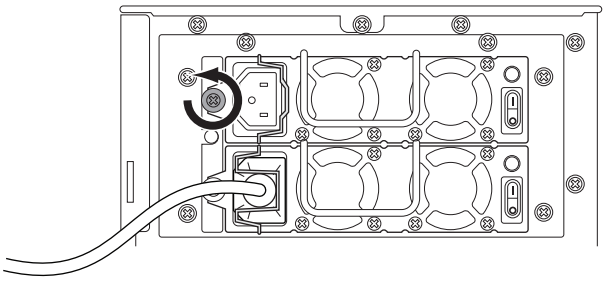


2. Move the power cord retaining clip to the right.

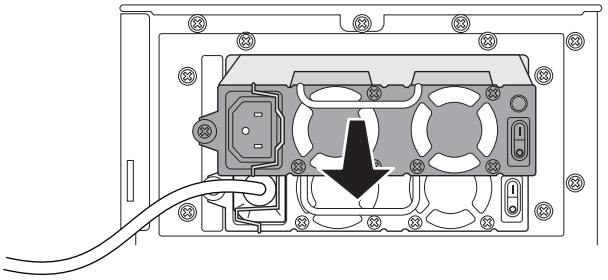


3. Disconnect the power cord from the power supply module.

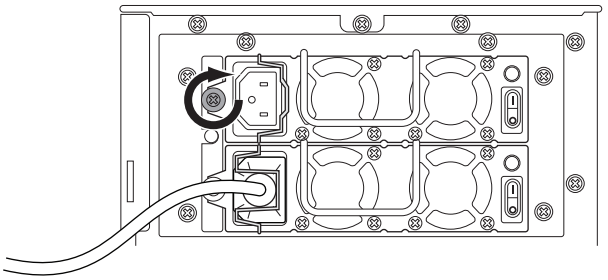
4. Loosen the power supply module thumbscrew completely.



5. Pull the failed power supply module from its slot using the attached handle.

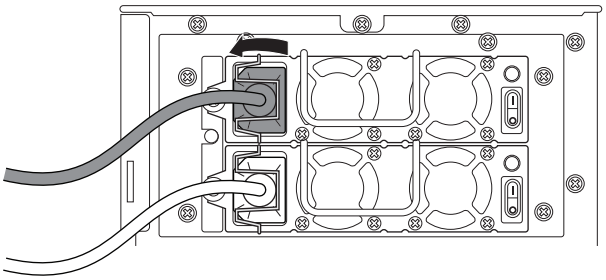


6. Mark the failed power supply module as “failed.”
7. Insert the new power supply module into the empty slot.
8. Tighten the power supply module thumbscrew completely.

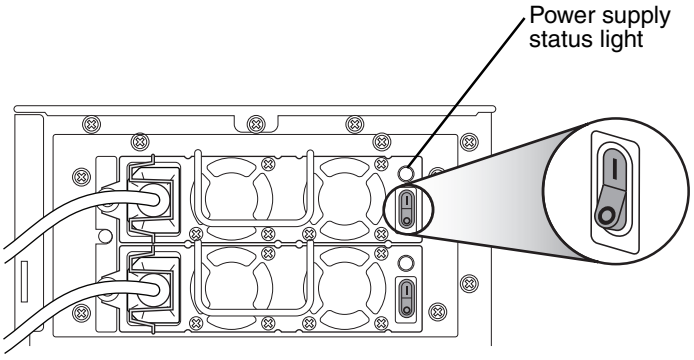


9. Reconnect the power cord to the new power supply.

10. Secure the power cord with the retaining clip.



11. Turn the power supply switch of the new power supply module to On.



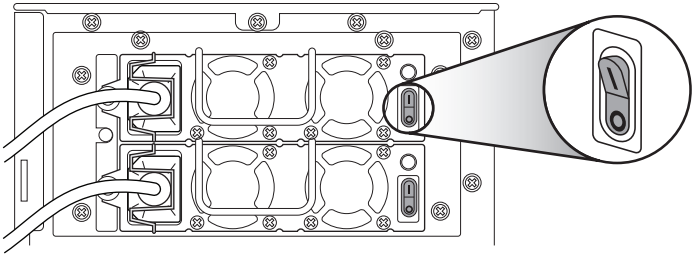

The power supply status light should be illuminated green.

## Replacing the Chassis

**To replace the chassis**

1. Unpack the Infinity LX replacement chassis.
2. Place the replacement chassis on a flat, solid surface near the original Infinity LX.
3. Remove the tape securing the front cover.

   The interior of the replacement chassis has empty hard drive and power supply module slots. The hard drives, the power supply modules, and the SmartDrive will be transferred from the failed Infinity LX chassis.
4. Shut down the failed chassis. Refer to “Shutting Down and Rebooting” on page 4-28.
5. When shutdown is complete, turn the two Infinity LX power supply module switches at the rear of the chassis to Off.

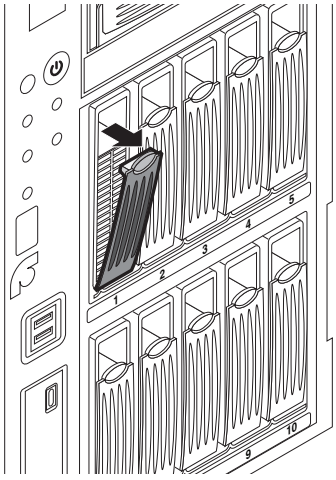


6. If there is a UPS, power it off.
7. Disconnect the power cords from the power outlet or UPS.
8. Open the front door of the failed chassis.

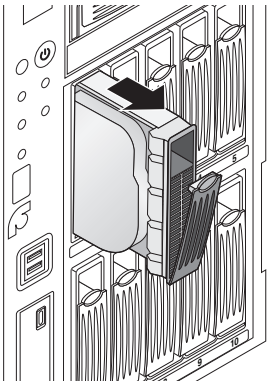
9. For each hard drive in the failed chassis:

   a. Open the hard drive's lever by pulling down on the blue tab to open the lever to about 45°.

      This disconnects the hard drive from the internal connector.

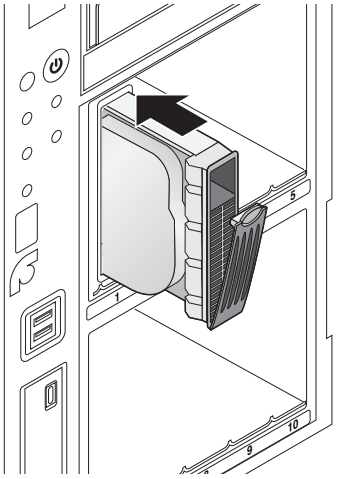


b. Slide the hard drive out of the failed chassis.



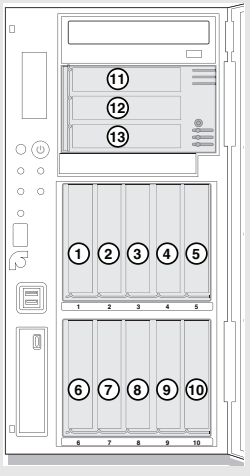
**CAUTION** Use care when handling hard drives. Do not drop the hard drive. Handle only the front, side edges, and face with the label. Do not handle the underside or the backplane of the drive. Do not touch any exposed electronics.

c. Slide the hard drive fully into the corresponding slot in the replacement chassis.

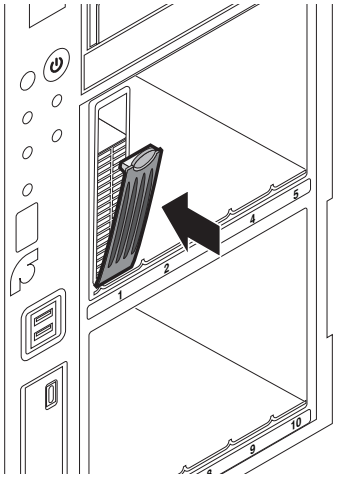


**CAUTION** When installing the hard drive, it is important to insert it all the way into its slot. Push the drive as far into the slot as it will go (it should be flush with the neighboring drives). There is some resistance when the back of the drive is seated in the cage. It is possible to latch the lever without having the drive fully installed. It is critical that all drives are properly installed prior to the initial system startup of the replacement chassis.

**CAUTION** Make sure that each hard drive is installed in the corresponding slot in the replacement chassis.

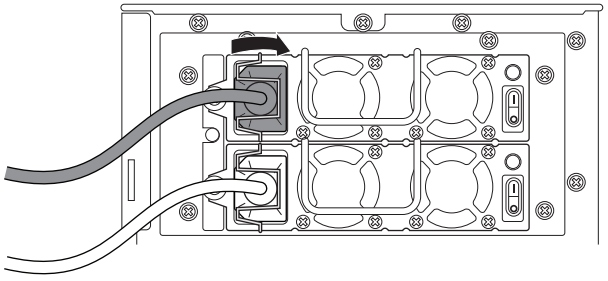


d. Close the hard drive lever to lock the drive in place. The lever will click into position when it is fully closed and locked.



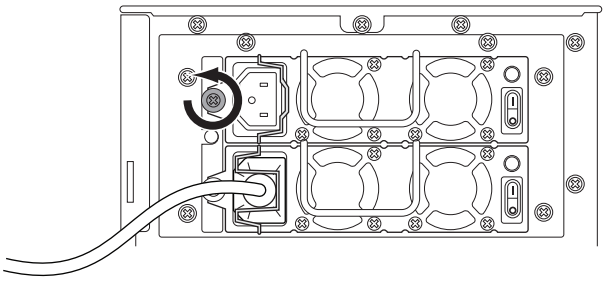
10. For both power supply modules:

a. Release the power cord connector retaining clip.

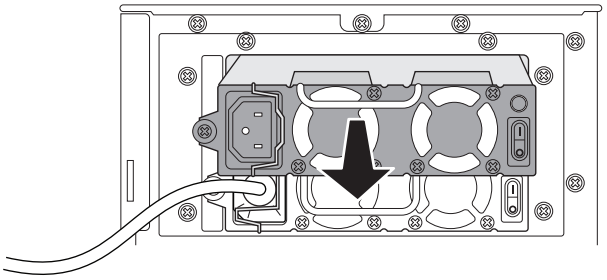


b. Disconnect the power cord from the power supply module.

c. Loosen the power supply module thumbscrew completely.



d. Pull the power supply from its slot using the attached handle.



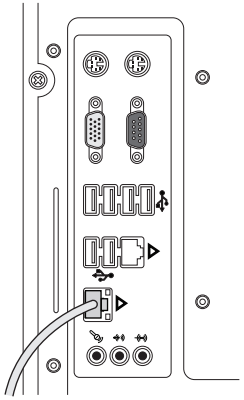
e. Insert the power supply into an empty slot in the replacement chassis.

f. Tighten the power supply thumbscrew completely.

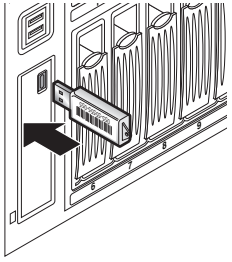
g. Connect the power cord to the power supply.

h. Secure the power cord with the retaining clip.

11. Disconnect the Ethernet cable from the rear of the failed chassis and connect it to Ethernet port 2 of the replacement chassis.



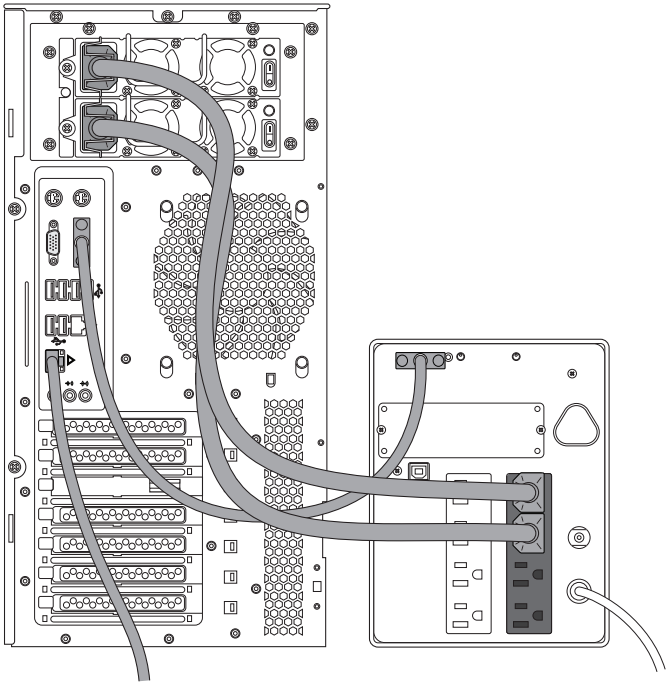
12. Remove the SmartDrive from the failed chassis and insert it into its USB slot in the front panel of the replacement chassis.



13. Plug the power cords into the power outlet or UPS.

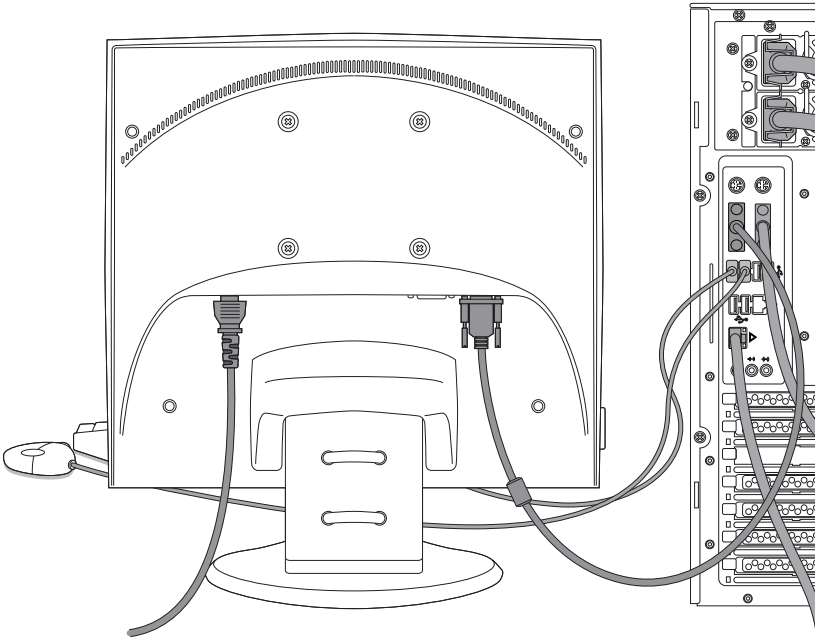
14. If there is a UPS, disconnect the UPS serial cable from the rear of the failed chassis and connect it to serial port of the replacement chassis

    The following illustration shows the cable connections for Infinity LX with a UPS.



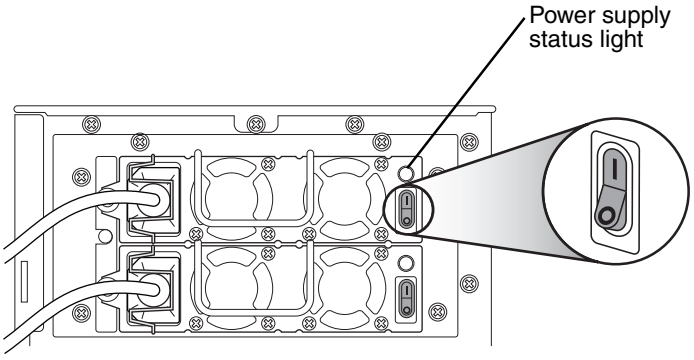
15. If there is a monitor, keyboard, and mouse, power off the monitor, then move their connectors from the failed chassis to the corresponding connectors on the replacement chassis.

    The following illustration shows the cable connections for Infinity LX with a monitor, keyboard, and mouse.



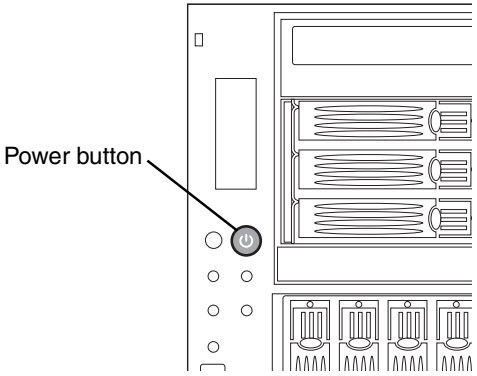
16. If a monitor is installed, press the monitor power button.
17. If there is a UPS, power on the UPS.

18. Turn the power supply switches on the two power supplies to On.




Both power supply status lights should be illuminated green.

19. Momentarily press the power button at the front of the replacement chassis to start up Infinity LX.



# Ordering Parts

The following table lists the replacement parts that can be ordered from Codonics:

| Supplies | Catalog Number |
|---|---|
| **Infinity LX hard drive (1 TB)** | SP-00436 |
| **Infinity LX power supply** | SP-00437 |
| **Infinity LX chassis** | SP-00438 |

To order parts in the U.S.A., contact Codonics Customer Service at:

**Phone:** **440-243-1198**
**Fax:** **440-243-1334**
**Toll Free:** **800-444-1198**
**Web:** **www.codonics.com**

To order parts outside of the U.S.A., contact your Codonics representative.

# Installing Infinity LX Software

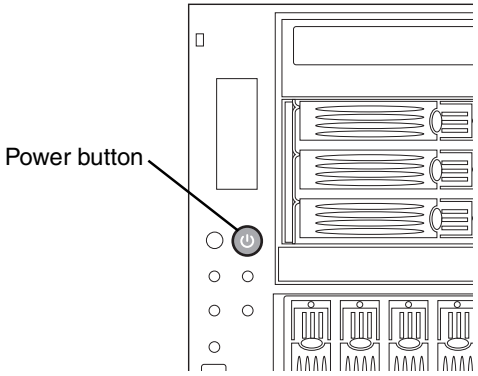
If you have to reinstall Infinity LX software due to a system problem, or are installing a software upgrade, use the following general procedure.

**CAUTION** Infinity LX is designed to run only authorized Infinity LX software. Do not install other software applications. This includes unauthorized anti-virus software. Installation of unauthorized software applications can affect system performance or interfere with system operation.

**CAUTION** Do not perform a full Infinity LX software installation or reinstallation unless directed to do so by Codonics Technical Support (+1 440-243-1198). A full installation removes all files, including all Windows files, all Infinity LX application files (except the Infinity LX configuration files), and the studies database.

**To install Infinity LX software**

1. Load the Operating Software disc in the disc drive on the front panel.
2. Shut down Infinity LX, as described in "Shutting Down and Rebooting" on page 4-28.
3. Wait a few seconds, then momentarily press the Infinity LX Power button to restart the system.



The Operating System disc will eject after approximately 20 minutes.

4. Wait 30 to 60 minutes for the installation to complete.

   Six audible beeps indicate when software installation is complete.

# Preparing Infinity LX for Shipping

If you have to ship Infinity LX for any reason (for example, to return it to Codonics for service), you must use the original box and packing materials. If you do not have the original box and packing materials, contact your Codonics representative for instructions on how to return it.

# 8

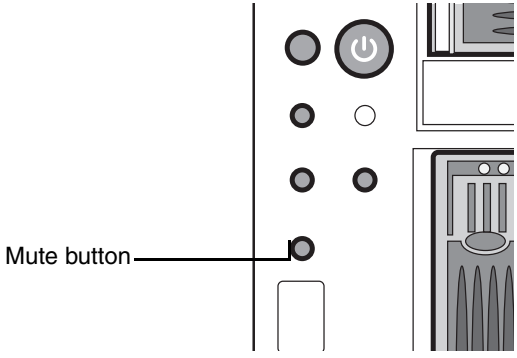
# Status Indicators and Troubleshooting

**CAUTION** Infinity LX includes several redundant systems and a robust user warning system to decrease the likelihood of permanent data loss. It is imperative that users act to prevent permanent data loss when Infinity LX indicates that there is a problem. Failure to do so may invalidate the system warranty and will jeopardize system data.

# Audible Status Alarm

When Infinity LX detects an alert, critical, or fault condition, it sounds a continuous audible beep as a status alarm. If this occurs, you should check the other status indicators described in this chapter to determine what is causing the condition. (Infinity LX also sounds six beeps upon a successful startup.)

To turn off the audible alarm, press and momentarily hold the Mute button on the front panel.

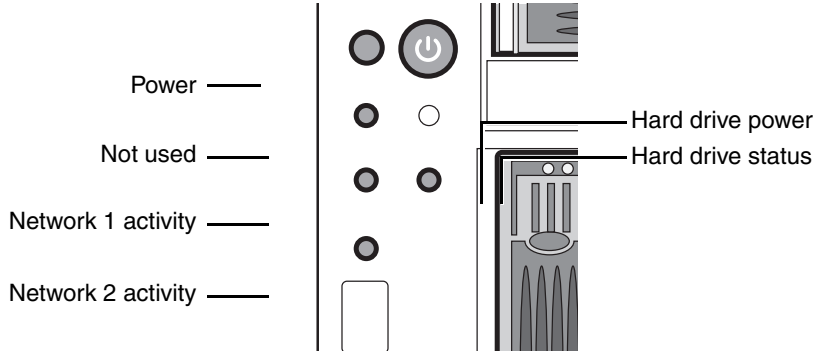



***NOTE:*** *After pressing the Mute button, it might take up to ten seconds for the audible alarm to stop.*

***NOTE:*** *Pressing the Mute button mutes only the current alarm. It does not mute future alarms.*

# Front Panel Status Lights

LED status lights are located on the chassis front panel.




The following table explains how to interpret the state of the front panel status lights.

**Table 8-1. Front Panel Status Light Indications**

| Status Light | Indications |
|---|---|
| Power | Blue: Power on. |
| Network activity | Green: There is activity over the network connection. |
| Hard drive power | Blue: Power on. |
| Hard drive status | Off: No disk activity<br>Green: Disk activity<br>Red: Hard drive fault |

# System Status User Interface

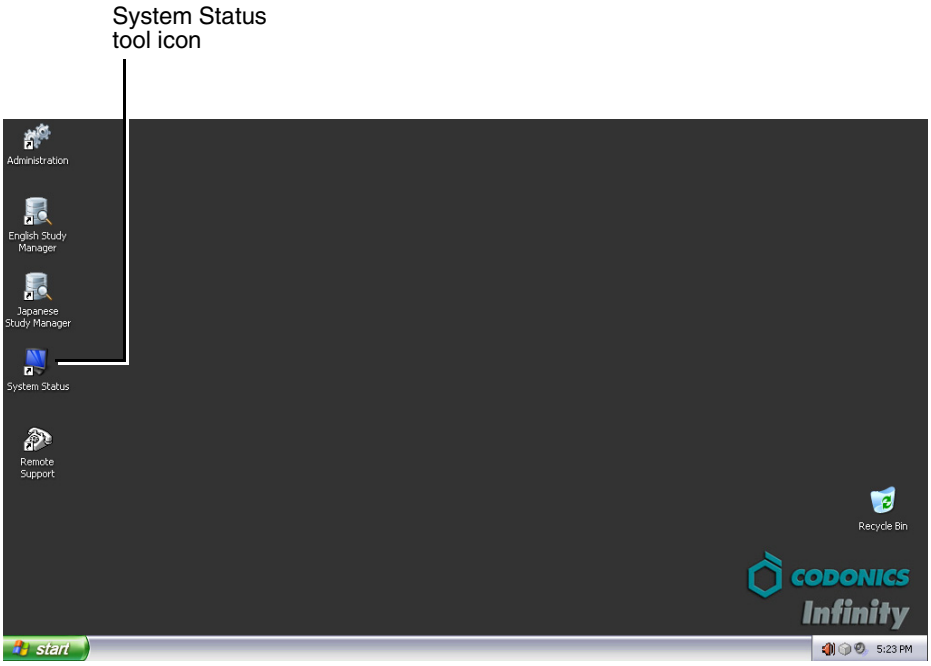
Detailed status information about Infinity LX is available in the System Status user interface.

**To view status information using the System Status user interface**

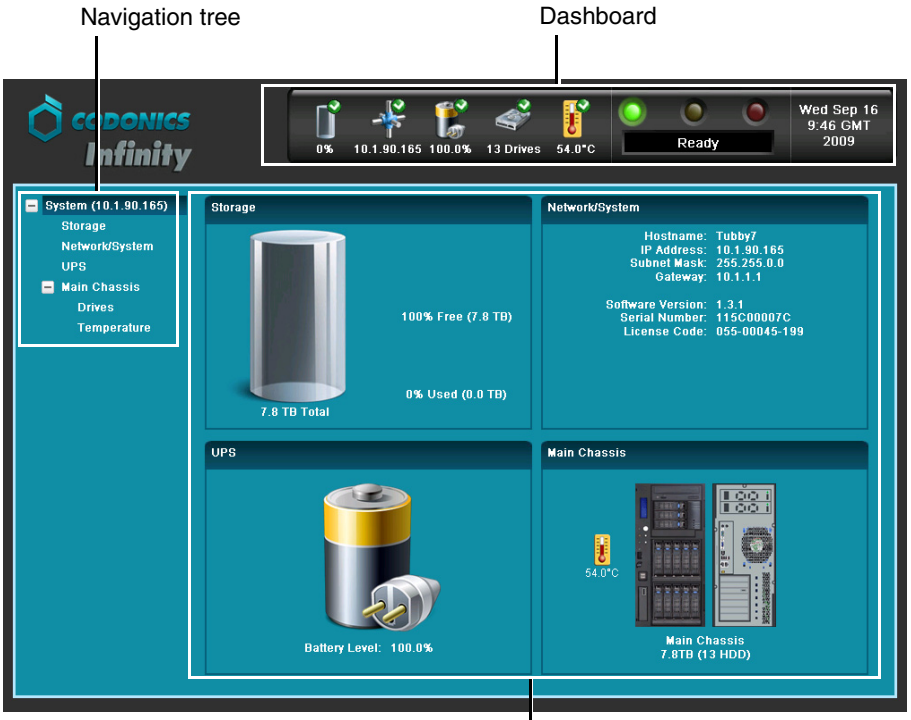
From a web browser running on a PC in the same network as Infinity LX, enter the Infinity LX IP address or host name as the URL address.

OR

If connected to Infinity LX by a Remote Desktop Connection or a local monitor, keyboard, and mouse, locate and open the System Status user interface icon on the Infinity LX desktop.



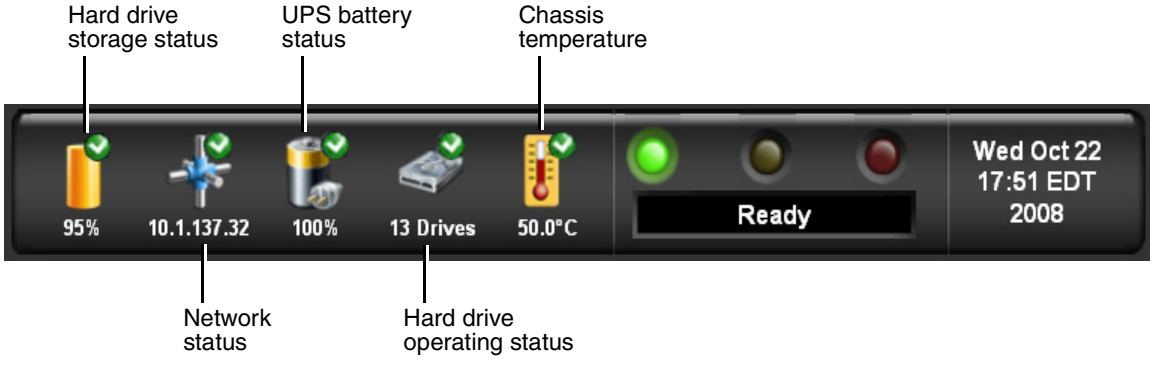
The System Status user interface's main screen displays. The following figure identifies the major areas of the tool. The following topics provide information about using each of these areas.



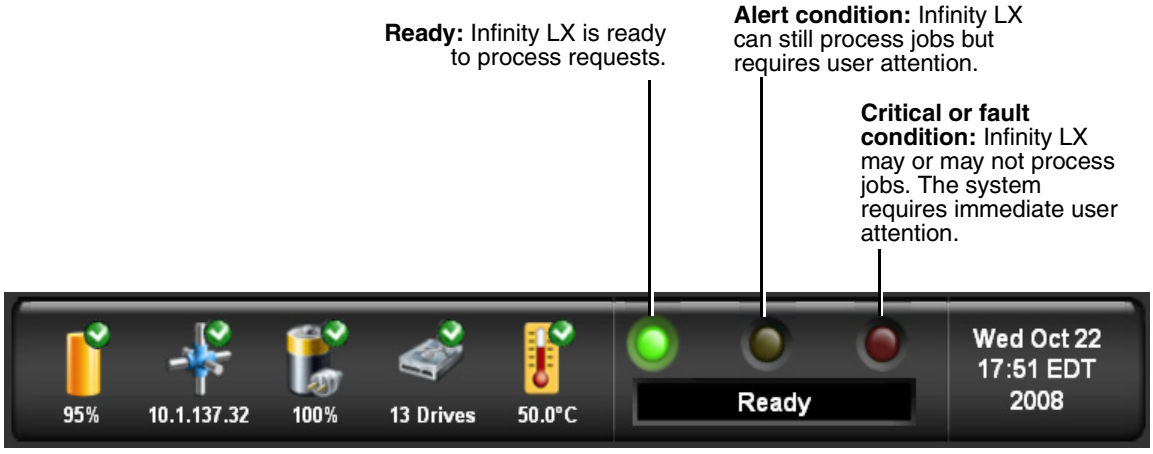
## Status Indicators

The Dashboard and navigation tree include the following status indicators:

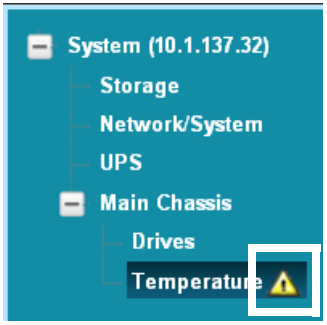
- **Status icons.** Icons that provide basic information about the Infinity LX's operating state.




- **LED status indicators.** The three LED-style lights indicate the overall status of Infinity LX.



- **Navigation tree icons.** Icons that provide basic information about Infinity LX's operating state.




The following tables explain how to interpret the state of the status and navigation tree icons and of the LED indicators.

**Table 8-2. Status and Navigation Tree Icons**

| Status Icon | Description |
|---|---|
| | A green checkmark in a status icon indicates a normal operating condition. |
| <br> | A yellow triangle in a status icon and next to a navigation tree entry indicates an alert condition. An alert condition occurs when Infinity LX requires user attention but can still process storage and retrieval requests. The specific alert condition is displayed in the Dashboard status message area and in the information panel area.<br><br>Examples include the internal temperature of the chassis exceeding the alert threshold, a hard drive being rebuilt, or storage space is nearly full. |
| <br> | The combination of a red cross in a status icon and a red cross flashing next to a navigation tree entry indicates a critical condition. A critical condition occurs when Infinity LX is at risk of entering a fault condition. The specific critical condition is displayed in the Dashboard status message area and in the information panel area.<br><br>Examples include that Infinity LX is running on UPS battery power, one hard drive in a RAID array has failed, or one of the power supplies has failed. |

**Table 8-2. Status and Navigation Tree Icons**

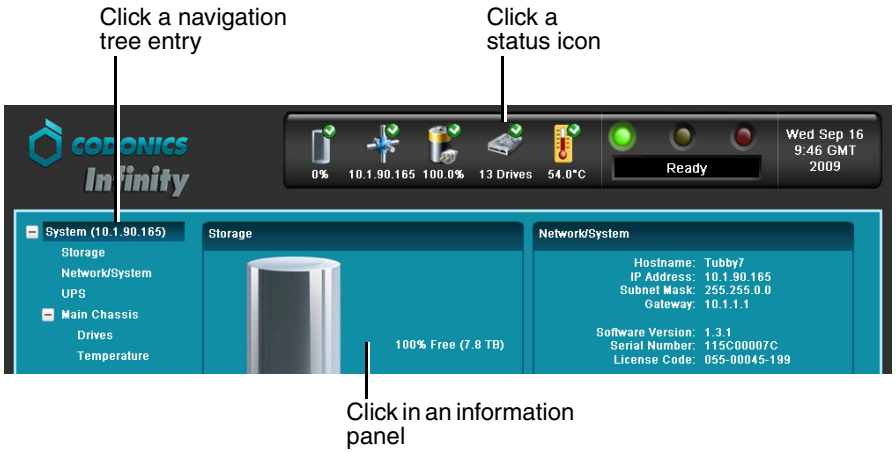
| Status Icon | Description |
|---|---|
| <br> | The combination of a red cross in a status icon and a steady red cross next to a navigation tree entry indicates a fault condition. A fault condition occurs when Infinity LX requires immediate attention due to hardware failure and/or cannot process storage and retrieval requests. The specific fault condition is displayed in the Dashboard status message area and in the information panel area.<br><br>Examples are two hard drive failures in a RAID array or no network connection. |

**Table 8-3. LED Status Indicators**

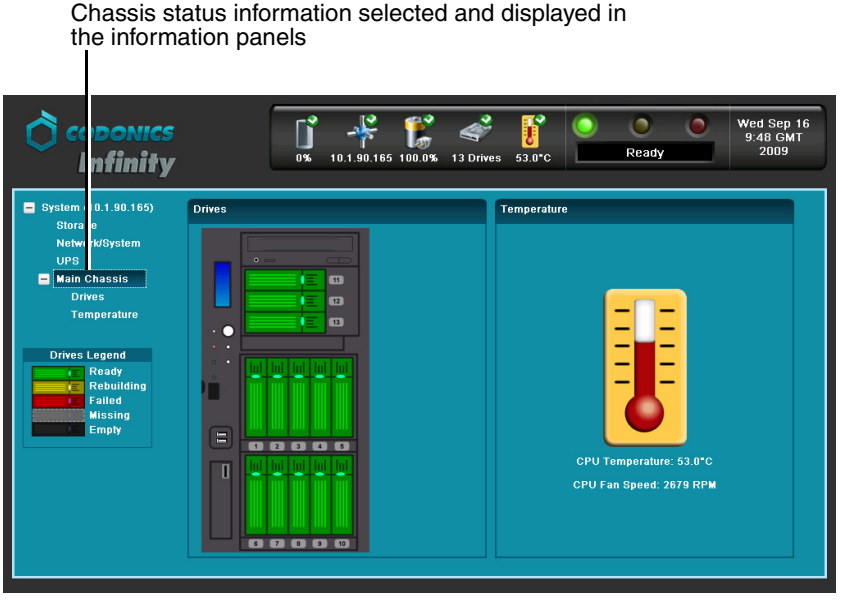
| Status Icon | Description |
|---|---|
| Green: On | Ready condition.<br><br>The ready condition indicates that Infinity LX is properly configured and can process storage and retrieval requests. The message “Ready” also displays in the Dashboard status message area. |
| Yellow: On | Alert condition.<br><br>An alert condition occurs when Infinity LX requires user attention but can still process storage and retrieval requests. The specific alert condition is displayed in the Dashboard status message area and in the information panel area. |
| Red: On | Critical or fault condition.<br><br>A critical condition occurs when Infinity LX is at risk of entering a fault condition.<br><br>A fault condition occurs when Infinity LX requires immediate attention due to hardware failure and/or cannot process storage and retrieval requests.<br><br>The specific critical or fault condition is displayed in the Dashboard status message area and in the information panel area. |

# Navigating Detailed Status Information

To view detailed status information, click on an entry in the navigation tree, on one of the status icons in the Dashboard, or in an information panel.

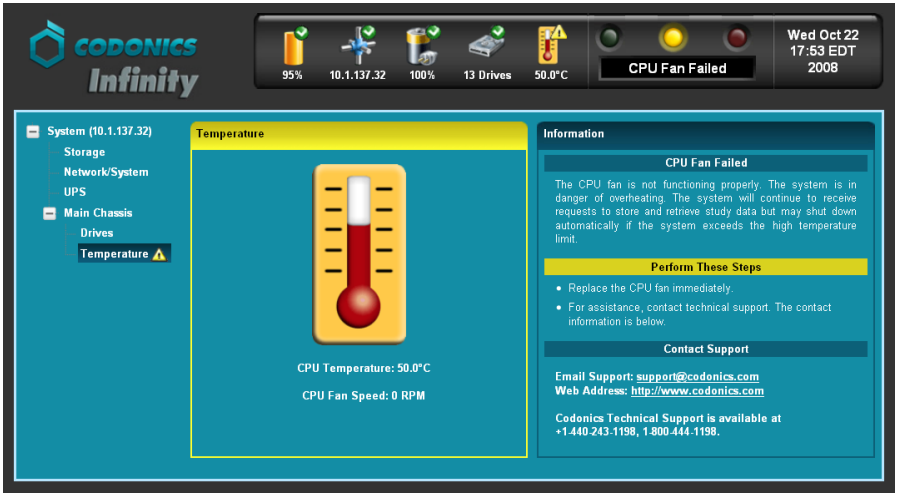



The following sample screen shows the Chassis information selected.

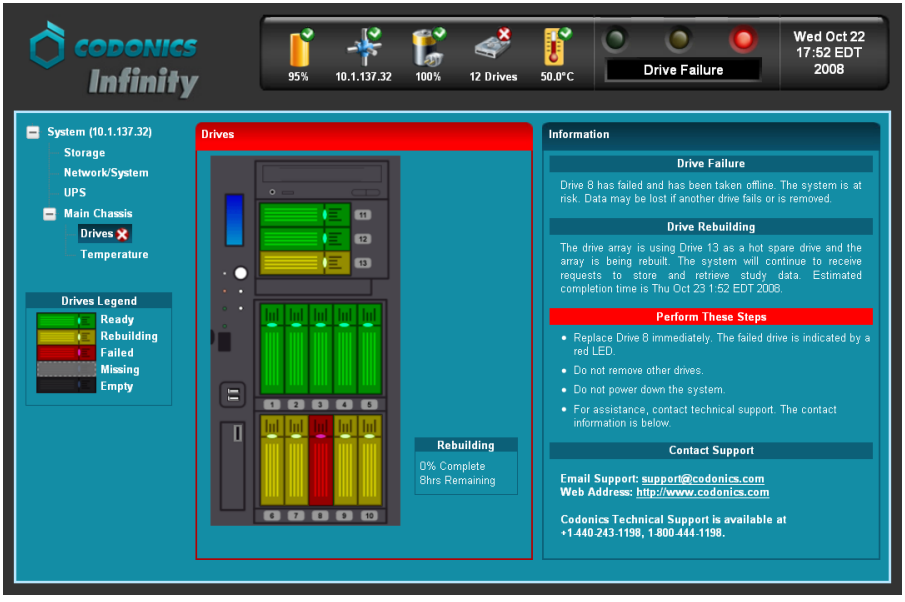


## Detailed Status in Information Panels

Detailed information is displayed in the information panels.




Note that, when in an alert, critical, or fault state, the panel border color indicates the status of the related area: yellow for alert and red for critical or fault.



When the **Chassis** or **Drives** navigation tree entry is selected, a **Drives Legend** displays in the navigation panel. The legend describes what drive states are indicated by the drive slot colors.

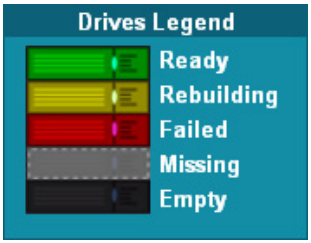



Table 8-4 describes the drive states listed in the **Drives Legend**.

**Table 8-4. RAID Operating Modes**

| Drive State | Description | Action Required |
|---|---|---|
| Ready | The drive is operating normally. | No user action is required. |
| Rebuilding | The system is rebuilding information on the drive. The rebuild operation can take up to 12 hours. | No user action is required specific to this drive. However, if the drive being rebuilt is the hot spare, another drive in a RAID array has failed. |
| Failed | The drive has failed. | The failed drive must be replaced immediately. If a hot spare drive is installed, Infinity LX will automatically use this drive and enter Rebuild mode.<br><br>For complete replacement instructions, refer to “Replacing a Hard Drive” on page 7-2. |
| Missing | The slot contained an installed drive that was in use, but is now missing. | Insert a working drive immediately.<br><br>For complete replacement instructions, refer to “Replacing a Hard Drive” on page 7-2. |
| Empty | The slot is not being used. | No user action is required. |

For more information about the hard drive concepts and operating states, refer to Chapter 2.

# Receiving Status via Email

In addition to using the front panel or System Status user interface, Infinity LX can automatically send an email to the system administrator when alert, critical, or fault conditions occur.

For information on how to configure the email addresses that will receive alert, critical, and fault notifications, refer to "Configuring System Information" on page 3-19.

# Receiving Status via RSS

Infinity LX posts an article to its RSS feed when alert, critical, or fault conditions occur.

RSS feeds can be read using a web browser that includes an RSS reader extension or plug-in.

Infinity LX also includes a desktop RSS reader — Feedreader — that displays a message box on the Infinity LX desktop when an alert, critical, or fault condition occurs.

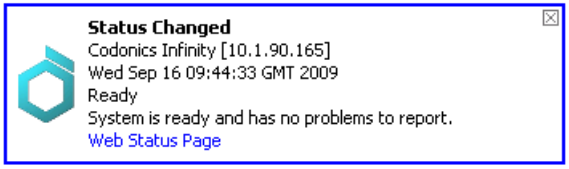
## Receiving Infinity LX RSS Feeds in a Web Browser

Use the following URL to access the Infinity LX RSS feed from a web browser:

http://*infinity_ip_address*/status/rss

## Viewing RSS Status Information from Feedreader

When an alert, critical, or fault condition occurs, Feedreader displays a message on the Infinity LX Windows desktop.




To close the message and then display the Feedreader application to see details about the condition, click anywhere inside the message box. To close the message box, click its Close button at the upper right corner of the box.

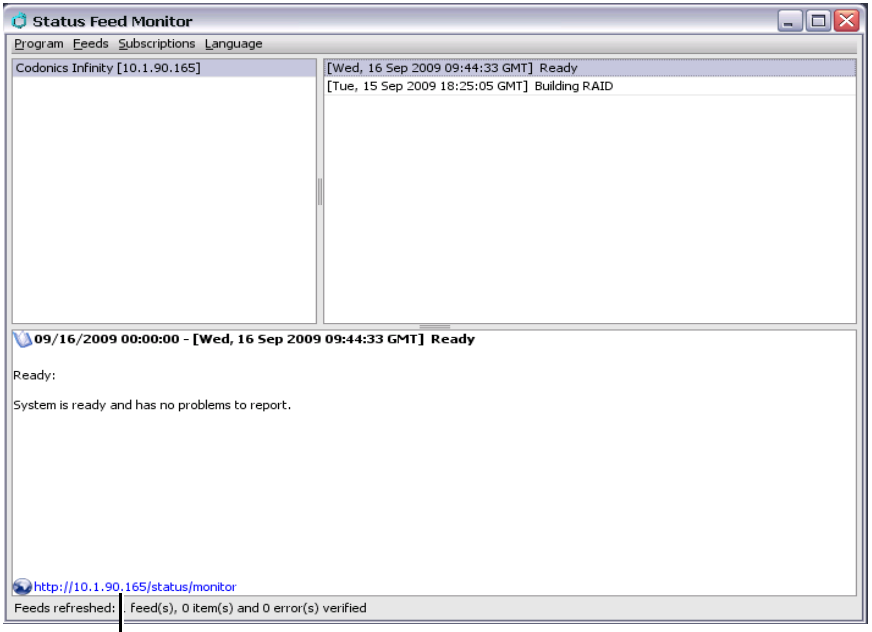
## Using the Feedreader Application

The Feedreader application is run automatically as part of the Infinity LX startup. Typically, it should always be left running so that conditions can be reported to the Windows desktop.

- ***To open the Feedreader application,*** click its icon in the Windows taskbar tray.

Click the **Feedreader** icon

The **Feedreader** window displays the most recent condition, and includes a list of previous condition messages.




To open the **System Status user interface**, click its link

- ***To open the System Status user interface*** from the **Feedreader** window to view detailed status information about the most recently reported condition, click the link shown above.
- ***To minimize Feedreader*** back to the Windows taskbar tray, click the window's Close button (at the upper right). Feedreader will continue to report on status conditions.
- ***To exit Feedreader,*** open the **File** menu and click **Exit**. Feedreader closes, and will no longer report on status conditions.

# Troubleshooting Common Problems

The following table lists common problems, their possible causes, and how to solve them.

**Table 8-5. Troubleshooting**

| Problem | Possible Causes | Solutions |
|---|---|---|
| ***General System*** | | |
| Infinity LX startup fails. | Infinity LX does not have power. | Check the power cables. Check the power supply switches on the rear panel. |
| | The SmartDrive has been removed. | Verify that the SmartDrive is connected. |
| The network is not responding. | The network settings are not configured properly. | Check the Infinity LX IP address and the other network settings. |
| | The network cable is not connected. | Verify that the network cable is connected to Ethernet port 2. |
| | The SmartDrive has been removed. | Verify that the SmartDrive is connected. |
| Infinity LX is not responding. | Infinity LX does not have power. | Check the power cables. Check the power supply switches on the rear panel. |
| | | Cycle power to Infinity LX. |
| A DICOM station cannot connect with Infinity LX. | The network settings are not configured properly. | Check all IP addresses and other network settings. Ping Infinity LX from the DICOM station. |
| | The DICOM station is not properly configured on Infinity LX. | Check the AE Title and DICOM port in the Administration tool. |
| | The network cable is not connected. | Verify that the network cable is connected to Ethernet port 2. |
| | The SmartDrive has been removed. | Verify that the SmartDrive is connected. |
| Infinity LX is not receiving requests to store or retrieve data. | A failed hard drive or failed power supply has not been replaced within 24 hours, or there is no more storage capacity. | Contact Codonics Technical Support (+1 440-243-1198). |

**Table 8-5. Troubleshooting (Continued)**

| Problem | Possible Causes | Solutions |
|---|---|---|
| An audible tone is not being sounded when errors occur or when Infinity LX successfully starts up. | The Mute button was pressed, disabling the audible alert tone. | Press the Mute button to enable the audible alert tone. |
| The default usernames **admin**, **manager**, or **operator** do not work. | An incorrect username or password is being used.<br><br>Caps Lock is on when entering the password. | Verify the entry of the username and password.<br><br>Turn the keyboard's Caps Lock off and reenter the password |
| System performance is slow. | Many store and retrieve requests are being processed.<br><br>There is an alert, critical, or fault condition.<br><br>The PDU size needs to be increased. | Wait for the jobs to complete.<br><br>Check the system status indications.<br><br>Set the PDU size to the maximum of 128 KB on the Query/Retrieve client and Store client. |
| When accessing Infinity LX via Remote Desktop Connection, the Windows graphics appear grainy. | The Remote Desktop Connection Display Colors setting is not set high enough. | Click the **Options** button in the **Remote Desktop Connection** dialog box. On the **Display** tab, open the **Color** list and click **True Color (24bit)**. |
| A specific Windows application cannot be found. | A remote user who is logged in from the Remote Desktop Connection application is looking at the Infinity LX file system when they think they are looking at their local file system. | Make sure that the user is searching in their local Windows file system and not from the remote desktop. |
| A virus has been detected. | The system software has been infected with a software virus. | Contact Codonics Technical Support (+1 440-243-1198). |
| Infinity LX does not shut down within 2 minutes of the initiation of the shutdown. | The software did not shut down properly. | From a Remote Desktop Connection, make sure that all applications are closed.<br><br>Try shutting down Infinity LX again.<br><br>If the problem persists, contact Codonics Technical Support (+1 440-243-1198). |

**Table 8-5. Troubleshooting (Continued)**

| Problem | Possible Causes | Solutions |
|---|---|---|
| Temperature alert condition. | There is an obstruction preventing the flow of air through the chassis, causing the CPU temperature to exceed 176°F (80°C). (The system is in danger of overheating. The system will continue to receive requests to store and retrieve studies, but will shutdown automatically if the system exceeds the high temperature limit.) | Remove any obstructions that prevent the free flow of air from entering the front and exiting the back of the chassis. |
| | The CPU fan is not working. | Replace the CPU fan. For assistance, contact Codonics Technical Support (+1 440-243-1198). |
| Infinity LX shuts down unexpectedly. | Someone has inadvertently shut down Infinity LX from the Remote Desktop Connection application. | Make sure that users who are logged into the system from the Remote Desktop Connection application do not inadvertently shut down Infinity LX when they mean to shut down their local PC. |
| | There is an obstruction preventing the flow of air through the chassis, causing the CPU temperature to exceed 187°F (86°C). (The system is shut down automatically to prevent damage to the CPU.) | Remove any obstructions that prevent the free flow of air from entering the front and exiting the back of the chassis. |
| | The CPU fan is not working. | Replace the CPU fan. For assistance, contact Codonics Technical Support (+1 440-243-1198). |
| CPU fan fault condition. | The CPU fan is not working. (The system is in danger of overheating. The system will continue to receive requests to store and retrieve studies, but will shutdown automatically if the system exceeds the high temperature limit.) | Replace the CPU fan. For assistance, contact Codonics Technical Support (+1 440-243-1198). |
| Email status notifications are not being sent. | The SmartDrive has been removed. | Make sure that the SmartDrive is inserted. |

**Table 8-5. Troubleshooting (Continued)**

| Problem | Possible Causes | Solutions |
|---|---|---|
| ***Power*** | | |
| A power supply failed. | One of the two power supplies failed. | Replace the failed power supply; refer to “Replacing a Power Supply Module” on page 7-9. |
| Infinity LX indicates that a UPS is not connected. | The serial cable between Infinity LX and the UPS is disconnected.<br><br>Infinity LX is connected directly to a power outlet and not to a UPS. | Make sure that the serial cable is connected.<br><br>It is strongly recommended that Infinity LX be connected to an approved UPS. |
| The UPS is running on battery power. | The UPS is not receiving power. | Verify that the UPS is plugged in and receiving power.<br><br>For additional information or assistance, contact Codonics Technical Support (+1 440-243-1198). |
| The UPS is overloaded. | The devices connected to the UPS are drawing more power than it is intended to supply. | Make sure that only Infinity LX is connected to the UPS. |
| The UPS battery needs to be replaced. | The UPS battery has exceeded its rated lifespan. A power outage may cause the UPS to fail if the battery is not replaced. | Follow the manufacturer’s instructions for replacing the UPS battery. |
| ***Hard Drives/RAID*** | | |
| Storage capacity alert. | Storage use is at 96 – 98%. | Remove unnecessary studies or increase storage capacity.<br><br>For additional information or assistance, contact Codonics Technical Support (+1 440-243-1198). |
| Storage capacity fault. | Storage use is at 99%, so Infinity LX is no longer accepting storage requests. | Remove unnecessary studies or increase storage capacity.<br><br>For additional information or assistance, contact Codonics Technical Support (+1 440-243-1198). |

**Table 8-5. Troubleshooting (Continued)**

| Problem | Possible Causes | Solutions |
|---|---|---|
| Data is being restored to a hard drive. | An Automatic Copyback from the hot spare drive is being performed on a newly installed hard drive. | No action is required.<br><br>**CAUTION: Do not remove any hard drives or shut down Infinity LX until the restore operation is completed.** |
| An array is being built. | The initial build of a RAID array is being performed (either during a full system install or because a new bank of hard drives was installed). | No action is required.<br><br>**CAUTION: Do not send studies, remove any hard drives, or shut down Infinity LX until the build operation is completed.** |
| The hot spare drive is in a fault state. | The hot spare drive has either failed or is not installed. | Replace or reinstall the hard drive in slot 13; refer to "Replacing a Hard Drive" on page 7-2.<br><br>**CAUTION: Do not remove any other hard drives or shut down Infinity LX until the hot spare drive has been replaced or reinstalled.** |
| A hard drive in an array is in a fault state. | The drive has either failed or is not installed properly. | Replace or reinstall the hard drive; refer to "Replacing a Hard Drive" on page 7-2.<br><br>**CAUTION: Do not remove any other hard drives or shut down Infinity LX until the hard drive has been replaced or reinstalled.** |
| A hard drive in an array is in a fault state, and the hot spare drive is not available. | The drive has either failed or is not installed, and the hot spare drive is currently rebuilding in response to another failed or removed drive, or performing an Automatic Copyback to a newly installed hard drive. | Replace or reinstall the other hard drive; refer to "Replacing a Hard Drive" on page 7-2. Wait for the rebuild/Automatic Copyback operation to complete on that hard drive before replacing or reinstalling the second failed hard drive.<br><br>**CAUTION: Do not send studies, remove any other hard drives, or shut down Infinity LX until the hard drive has been replaced or reinstalled.** |

**Table 8-5. Troubleshooting (Continued)**

| Problem | Possible Causes | Solutions |
|---|---|---|
| A hard drive in an array is in a fault state, and the hot spare drive is not installed. | The drive has either failed or is not installed, and the hot spare drive has been removed. | Install a hard drive in slot 13 (refer to "Replacing a Hard Drive" on page 7-2), wait for the rebuild operation to complete, then replace or reinstall the hard drive in the array.<br><br>**CAUTION: Do not remove any other hard drives or shut down Infinity LX until the hard drive in the array has been replaced or reinstalled.** |
| An entire RAID array is in a fault state. | Multiple hard drives in the array have failed or are missing, or data corruption in the array has occurred. | Stop sending studies to Infinity LX, and contact Codonics Technical Support (+1 440-243-1198). |
| One of the system hard drives (slots 11 and 12) is in a fault state. | The system hard drive has failed or has been removed. | Replace or reinstall the hard drive; refer to "Replacing a Hard Drive" on page 7-2. |
| Infinity LX indicates that the RAID battery needs to be replaced. | The RAID battery has exceeded its rated lifespan. If a power outage occurs, data on the RAID array could become corrupted. | The RAID battery needs to be replaced. Contact Codonics Technical Support (+1 440-243-1198). |

# Allowing Remote Access

Infinity LX provides a Remote Support tool, called LogMeIn Rescue®, that allows Codonics Technical Support personnel to access Infinity LX remotely and help users with configuration, troubleshooting, and general product usage questions.

You must be logged in as a user with administrator privileges to run this utility.

***NOTE:*** *Only a user at the site can initiate the remote access connection to Codonics Technical Support. This prevents unauthorized access to Infinity LX.*

**CAUTION** Initiate a remote access connection to Codonics only when requested by Codonics Technical Support personnel.

Infinity LX must be connected to a LAN that has Internet access for this utility to work.

When a connection is made, Codonics Technical Support personnel can see the same screens as you and have the same control over Infinity LX as you do. This allows you and Codonics to work cooperatively to solve problems.

You can disconnect the session at anytime. If either Codonics or a user at the site disconnects, only a user at the site can initiate a new connection.

For more information, refer to the Codonics LogMeIn Feature Technical Brief.

# System Logs

If your Infinity LX is experiencing problems, Codonics Technical Support might ask you to access the system log files that are maintained by Infinity LX.

Technical Support might also ask you to send copies of the system log files to them. This can be done by copying the log files to a CD/DVD or USB flash drive, and then copying them to and emailing them from another system or sending the disc by mail.

# A

# Hazardous Material Information

## Materials of Construction

The Infinity LX unit is RoHS compliant.

Codonics has set very stringent standards for evaluating products to ensure the marketing of regulatory compliant products worldwide.

We do not intentionally add, nor are we aware, that the products or packaging contain the following materials:

- Bioavailable arsenic (small amounts of arsenic used in glass, LEDs, and semiconductors are not considered to be bioavailable)
- Bioavailable crystalline silica (small amounts of crystalline silica are used in certain paints, coatings, and filler materials)
- Polychlorinated biphenyls (PCBs)
- Asbestos
- Organic tin (not used in tin lead solder applications)
- Ozone-depleting substances such as chlorofluorocarbons, methyl chloroform, and carbon tetrachloride

## *Matériaux de Construction*

*L'appareil Infinity LX est conforme à la norme RoHS et par conséquent ne contient aucun des composants suivants:*

*Afin d'obtenir les certificats de conformité de ses produits dans le monde entier, Codonics utilise les standards d'évaluation les plus contraignants pour tester ses produits.*

*Codonics assure notamment n'avoir ajouté ou avoir été informé que soit ajouté les composants suivants dans son produit et son emballage:*

- *Arsenic (de très faible quantité d'arsénic sont présents dans le verre, les leds et les semi-conducteurs sans portée atteinte à l'organisme)*
- *Cristaux de silicium*
- *Biphenyls polychlorés*
- *Amiante*
- *Matières organiques*
- *Substances portant atteinte à la couche d'ozone tels que des carbones chlorofluorés du chloroforme et des tétrachlorures de carbone*

# Manufacturing

During manufacturing operations that produce Codonics products (including packaging), no ozone depleting substances (such as chlorofluorocarbons, methyl chloroform, and carbon tetrachloride) are used.

## Fabrication

*Aucun composant susceptible de détruire la couche d'ozone ne sont utilisés lors de la fabrication (emballage inclus) des produits Codonics.*

# B

# Specifications

## Specifications (English)

| | |
|---|---|
| User Interface: | Remote access via the web and Windows Remote Desktop Connection application<br>Optional: local monitor, keyboard, and mouse |
| Web Browsers Supported: | Internet Explorer 7, FireFox 3 |
| DICOM Server Protocols: | DICOM 3.0 (Store, Storage Commit, Query/Retrieve) |
| Storage: | 1– 8 TB, using SATA II 3.5-in. hard drives |
| Performance: | 50 MB/sec (DICOM Store) |
| Redundancy: | RAID 1 (mirroring) for operating system and database<br>RAID 5 for study data<br>Hot swap hard drives<br>Hot swap power supply modules (1+1)<br>Hot swap internal cooling fans<br>Hot spare online hard drive with Automatic Copyback (optional) |
| Compression: | JPEG Lossless and Lossy compression of DICOM images (optional) |
| Alarms: | Drive failure, cooling fan failure, power supply failure, over-temperature warning, UPS status |
| Status Notifications: | Web, email, RSS, built-in visual and audible alarms |
| Support: | Remote diagnostic/support via Internet (LogMeIn Rescue) |
| UPS: | Fully integrated UPS support with auto-shutdown (optional) |
| Anti-Virus: | Factory installed |

| | |
|---|---|
| Operating System: | Windows XPe |
| Processor: | Intel® Core™ 2 Duo processor |
| Memory: | 2 GB |
| Optical Drive: | CD/DVD |
| Ethernet Interface: | 2 10/100/1000Base-T Auto Sensing Ethernet (RJ-45) |
| Serial Interfaces: | 2 USB-2.0 host-side ports in front panel<br>1 USB port in front panel dedicated to the SmartDrive<br>6 USB-2.0 host-side ports in rear panel<br>1 RS-232 serial port |
| Power: | Universal Input: 100–240 Vac, 50/60 Hz, 650 W |
| Temperature: | Operating: 15 – 30°C (59 – 86°F)<br>Storage: -22.2 – 51°C (-8 – 123.8°F) |
| Humidity: | Operating: 20% – 80% noncondensing<br>Storage: 85% maximum, noncondensing |
| Dimensions: | Height: 16.9 in. (42.9 cm)<br>Length: 26 in. (66 cm)<br>Width: 8.7 in. (22.1 cm) |
| Weight: | Chassis, shipped: 81 lbs (36.7 kg)<br>Hard drives, shipped: 28 lbs (12.7 kg)<br>Chassis + hard drives, installed: 92 lbs (41.7 kg) |
| Medical Compliance: | FDA: Medical Device Class 1 manufactured in compliance with FDA GMP/QSR, ISO13485:2003. CE MDD 93/42/EEC compliance for Healthcare Facilities subject to installation guidelines |
| Electrical Safety, Emissions and Immunity: | Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1, Second Edition, Dated March 27, 2007<br><br>Information Technology Equipment – Safety – Part 1: General Requirements, CAN/CSA-C22.2 No. 60950-1-07, Second Edition (IEC 60950-1: 2005 (2nd Edition) and/or EN 60950-1:2006 Information technology equipment<br><br>EMC/EMI:<br><br>EN 55022:2006, Class B, EN 61000-3-2:2006, EN 61000-3-3:1995 +A1:2001 +A2:2006, EN 55024:1998 + A1:2001 + A2:2003, 47 CFR, Part 15:2005, §15.107 and §15.109, Class B |

# Spécifications (Français)

| | |
|---|---|
| *Interface Utilisateur* | *Acces à distance sur l'internet et avec Windows Remote Desktop* |
| | *Accessoires en option : moniteur, clavier, souris,* |
| *Navigateurs soutenus:* | *Internet Explorer 7, FireFox 3* |
| *Protocols de Serveur DICOM* | *DICOM 3.0 (Store, Storage Commit, Query/Retrieve)* |
| *Stockage* | *1– 8 TB, en utilisant des disques durs SATA II 3.5-in.* |
| *Performance:* | *50 MB/sec (DICOM Store)* |
| *Redondance*: | *Raid 1 (mode mirroir) pour le système d'opération et la base des données*<br>*Raid 5 données principales*<br>*Remplacement à chaud des disques durs*<br>*Remplacement à chaud des pièces d'alimentation (1 + 1)*<br>*Remplacement à chaud des ventilateurs refroidissement*<br>*Remplacement à chaud de la disque dur en ligne avec une répétition automatique (optionnel)* |
| *Compression d'image* | *Compression sans perte au format JPEG (Lossless )et compression avec perte au format JPEG (Lossy); (optionelle)* |
| *Alertes*: | *Echec de disque, échec de ventilateur refroidissement, échec de bloc d'alimentation, alerte de surchauffe, état d'onduleur* |
| *Status Notifications:* | *Web, email, RSS, d'alertes visuelles et audibles* |
| *Assistance technique:* | *Assistance technique à distance sur l'internet (service LogMeIn Rescue)* |
| *Ondulateur* | *Ondulateur d'assistance tout intégré avec une fermeture automatique (optionnel).* |
| *Antivirus* | *Factory installed* |
| *Système d'operation* | *Windows XPe* |
| *Processeur* | *Processeur Intel Core 2 Duo* |
| *Memoire* | *2 GB* |
| *Disque Optique* | *CD/DVD* |
| *Interface Ethernet* | *2 100/1000Base-T Ethernet à detection automatique (RJ-45)* |

| | |
|---|---|
| *Interface Serie* | *2 ports USB-2.0 host-side du panneau avant*<br>*1 port USB du panneau avant réservé au disque dur SMART*<br>*6 ports USB-2.0 host-side du panneau arrière*<br>*1 port série RS-232* |
| *Alimentation* | *Global d'entrée: 100-240 Vac, 50/60 Hz, 650 W* |
| *Temperature* | *Opération : 15 – 30°C (59 – 86°F)* |
| | *Stockage : -22.2 – 51°C (-8 – 123.8°F)* |
| *Humidité* | *Opération : 20% – 80% sans condensation* |
| | *Stockage : 85% maximum, sans condensation* |
| *Dimensions* | *Hauteur: 42.9 cm*<br>*Largeur: 66 cm*<br>*Profondeur: 22.1 cm* |
| *Poids* | *Châssis principal, shipped : 36.7 kg*<br>*Disques durs, shipped : 12.7 kg*<br>*Châssis principal + disques durs, installed : 41.7 kg* |
| *Conformité médical* | FDA: Medical Device Class 1 manufactured in compliance with FDA GMP/QSR, ISO13485:2003. CE MDD 93/42/EEC compliance for Healthcare Facilities subject to installation guidelines. |
| *La sûreté, les émissions, et l'immunité électrique:* | Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1, Second Edition, Dated March 27, 2007 |
| | Information Technology Equipment – Safety – Part 1: General Requirements, CAN/CSA-C22.2 No. 60950-1-07, Second Edition (IEC 60950-1: 2005 (2nd Edition) and/or EN 60950-1:2006 Information technology equipment |
| | EMC/EMI: |
| | EN 55022:2006, Class B, EN 61000-3-2:2006, EN 61000-3-3:1995 +A1:2001 +A2:2006, EN 55024:1998 + A1:2001 + A2:2003, 47 CFR, Part 15:2005, §15.107 and §15.109, Class B |

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