# Importer

# Pre-Installation Manual

Document: IMPORTER-PREINST

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The comparisons and other information provided in this document have been prepared in good faith based on publicly available information. The reader is encouraged to consult the respective manufacturer's most recent published data for verification.

# Contents

# About this manual

This manual provides information about preparing for the delivery and installation of an Importer. This manual is intended for use by field technicians, site managers, and installation planners.

## Using this manual

Read the task list provided in Section 2, "Pre-installation tasks" on page 2-1. The task list describes the preparations you must make prior to receiving and installing the Importer.

Later sections of this manual provide reference information regarding physical, cooling, LAN, and synchronization requirements.

## Features of this manual

This manual contains a number of useful features:

### Online (PDF files)

- Click on blue text (hyperlinks) to jump to a related section or get additional information (for example, to view a definition of a term).
- To find keywords, use **Find** in Acrobat Reader's **Edit** menu.
- To quickly find a specific section, click the section in the PDF file's **Bookmarks** list.

### Printed

- To find keywords, go to the Index at the end of the manual.
- To find a specific term, go to Section 8, "List of terms" on page 8-1.

## Importer manuals

The Importer documentation suite contains the following documents:

**Importer Pre-installation Manual, Importer-PREINST.** The Pre-installation Manual provides instructions and reference information needed when planning and preparing for the installation of an Importer.

**Importer Installation Manual, Importer-INST.** The Installation Manual provides instructions and reference information needed when installing an Importer.

**Importer Operating and Maintenance Manual, Importer-OPS-MAINT.** The Operating and Maintenance Manual provides instructions for operating, maintaining and troubleshooting an Importer. It also provides reference information needed when performing diagnostic procedures.

**HD Radio™ Importer Users Guide.** This guide provides detailed instructions for operating the Importer. It was produced by iBiquity and is provided as a supplement to the Operating and Maintenance manual.

The full suite of Importer documents is also provided in Acrobat PDF format on the Nautel website, in the Nautel User Group (NUG) section.

## Online resources

The Nautel website provides useful resources to keep you up to date on your Importer.

### Nautel User Group (NUG)

The website includes a special section that customers can log into in order to access the Nautel customer newsletter, product manuals, frequently asked questions (FAQ), information sheets, and information about field upgrades.

### Online documentation

The website's NUG section provides online access to all the documentation for your Importer. Documentation is provided in Acrobat (PDF) format. You can use the documentation online or print the sections that you need.

# SECTION 1: DESCRIPTION

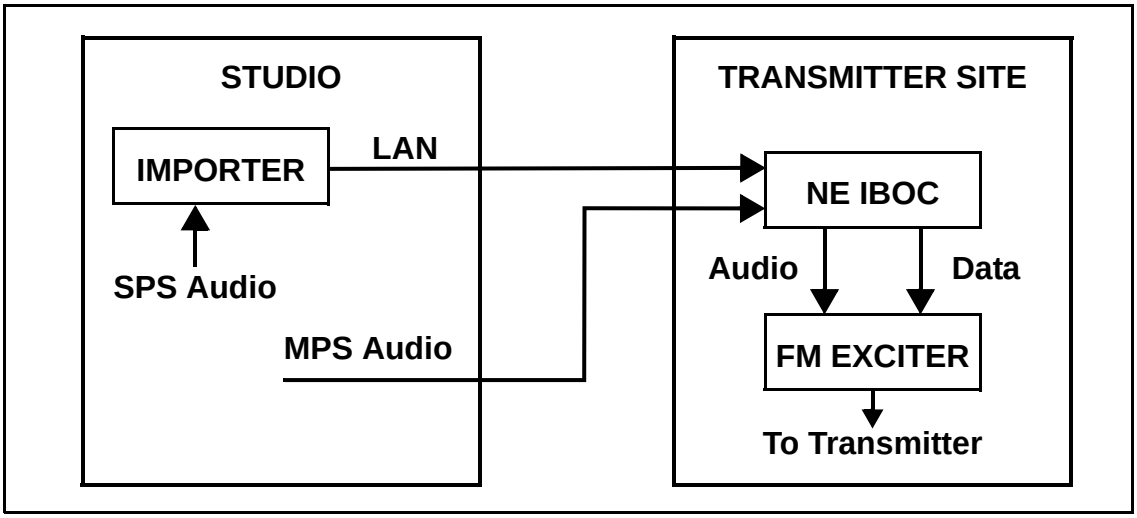
This section provides a description of the Importer and its associated digital radio system.

## IMPORTER OVERVIEW

The Importer is used in digital radio transmission systems (see Figure 1.1) with Nautel's NE IBOC (In-Band-On-Channel) signal generator or Exporter. The Importer allows multiple broadcasts within a single FM channel. It consists of a PC with compatible audio cards to support the secondary program. The Importer's application software enables partitioning of the available transmitted HD (high definition) data bandwidth, between main program service (MPS) audio and other audio and data services, collectively called advanced application services (AAS). Audio AAS are called secondary program services (SPS), and include and program associated data (PAD).

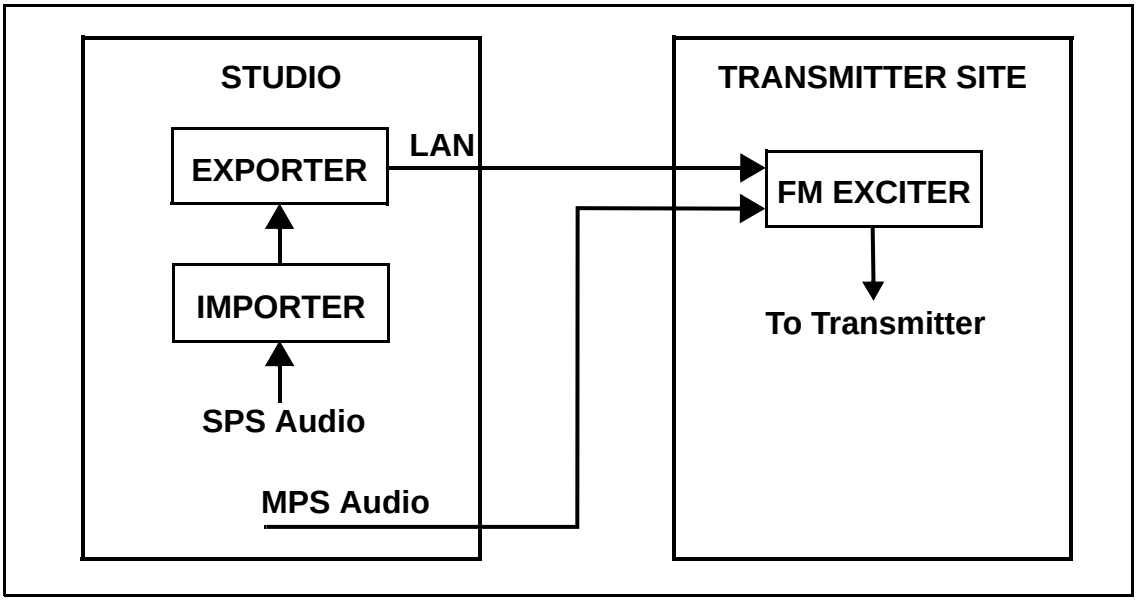
The front panel has a lockable cover and LEDs to indicate hard drive activity (HDD) and power. (Two additional LEDs are unused.) The rear panel has standard PC connections for monitor, mouse, keyboard, parallel port (DB25), one serial port (DB9), and four USB ports – two on the front and two on the back. Installed audio cards include cables and connectors for audio, and synchronizing inputs and outputs (specific to the type of audio card).

**Figure 1.1: Typical system with an Importer and NE IBOC**




*Note: The Importer can also be located at the transmitter site. This requires sending SPS audio to the transmitter site instead of through a LAN connection.*

**Figure 1.2: Typical system with an Importer and Exporter**




*Note: The Importer and Exporter can also be located at the transmitter site. This requires sending SPS audio to the transmitter site instead of through a LAN connection.*

# SECTION 2: PRE-INSTALLATION TASKS

This section provides a list of tasks that you must perform prior to delivery and installation of the Importer.

CAUTION: FAILURE TO COMPLY WITH RECOMMENDATIONS MAY VOID YOUR MANUFACTURER'S WARRANTY. FOR MORE INFORMATION, REVIEW YOUR WARRANTY DOCUMENTS.

## PREPARING FOR INSTALLATION

To prepare for installation of an Importer, perform the following tasks:

1. Ensure the correct Importer configuration is ordered. Consider the audio card, SPS (analog or AES), and equipment requirements. For detailed information, see "Configuring the Importer audio" on page 2-2.

2. Select a location for the Importer in the studio or the transmitter site. For detailed information, see "Selecting a location for the Importer" on page 2-2.

3. Prepare the network (LAN) connection between the Importer and the NE IBOC or Exporter. Consider the Importer's location and the amount of other networked equipment at the transmitter site. For detailed information, see "Planning the LAN connection" on page 5-1.

4. Consult your network manager to obtain IP address information for the Importer, NE IBOC or Exporter, and gateway. For detailed information, see "IP address information" on page 5-2.

5. If you are going to use SPS sample rate synchronization, determine how it can best be implemented.
   For detailed information, see "Synchronizing the SPS sample rate" on page 6-1.

6. Order any accessories or optional equipment that you may need. See "Parts and tools" on page 7-1.

7. Train your station technicians and operators on the use of the Importer. For a list of available technical and user documents, see *Importer manuals* in the *About this manual* section at the beginning of this document. For information about Nautel training courses, go to the Nautel website at http://www.nautel.com/support/training/

## CONFIGURING THE IMPORTER AUDIO

To configure the Importer audio inputs, perform the following tasks:

1. Determine the number of audio cards to be installed in the Importer by the quantity (1 or 2) and type (AES or analog) of audio channels you are using. Select from the following [options a) and b) are available from Nautel]:

   a) A single LynxOne audio card supports one AES/EBU channel (input and output) and one stereo analog channel (input and output).

   b) Two LynxOne audio cards are required if you are using two SPS channels that are both AES/EBU.

2. If you are using AES format audio, the sample rate into the audio cards must be 44.1 kHz.

3. If you are using analog audio, ensure the audio card sample rate is set to 44.1 kHz.

4. For best audio performance, synchronize the 44.1 kHz audio sample rate to the HD system 10 MHz reference. See also "Synchronizing the SPS sample rate" on page 6-1.

## SELECTING A LOCATION FOR THE IMPORTER

To ensure that the desired location for the Importer is suitable, perform the following tasks.

1. Determine whether the Importer and its host cabinet will be located in the studio or the transmitter site. Consider the following choices and associated requirements:

   a) If you install the Importer at the transmitter site with the associated NE IBOC or Exporter, you will ease the connection required between the studio and the transmitter site. In this case you will need to send only SPS audio to the Importer rather than a LAN connection. See also "Planning the LAN connection" on page 5-1.

   b) If you install the Importer at the studio, but have the NE IBOC or Exporter at the transmitter site, you will need to provide a LAN connection over the studio-transmitter link (STL). Ensure the STL can support this capability. See also "Planning the LAN connection" on page 5-1.

c) If the Importer is co-located at the studio with the Exporter, you will need a simple Cat-5 Ethernet cable and suitable Ethernet routing device to connect the equipment. In this case all HD program information must be sent to the transmitter site through an Ethernet enabled STL.

2. Ensure you have a cabinet and room space suitable for installing the Importer. See "Physical requirements" on page 3-1 and "Cooling requirements" on page 4-1.

3. Ensure the Importer is near a standard 120 V ac power outlet.

# Section 3: Physical requirements

This section provides physical specifications for the Importer and its components, and lists physical site requirements. This section includes the following topics:

- Dimensions
- Clearances
- Weight

## Dimensions

The Importer has the following dimensions:

- Height: 3U, or 13.3 cm (5.25 inches)
- Width: 48.3 cm (19 inches)
- Depth: 63.5 cm (25 inches)

## Clearances

Ensure there are minimum clearances of 1.3 m (4.0 feet) at the front and the rear of the Importer's host cabinet to allow room for installation, operation and ventilation. There is no clearance required on either side of the Importer.

## Weight

The Importer weighs 18 kg (40 lbs).

# Section 4: Cooling requirements

This section provides information about heating and cooling requirements for the Importer.

The Importer's maximum chassis temperature must not exceed 38°C (100°F). To satisfy this requirement:

- Do not allow the Importer room ambient air temperature to exceed 30°C (86°F)at sea level. De-rate 3ºC (5.4°F) per 500 m – or 2ºC (3.6°F) per 1,000 feet – above sea level.

  **Example:**
  At 1,600 m (1 mile) above sea level, maximum ambient temperature should not exceed 20.4°C (67°F). Cooler temperatures are recommended, in order to improve the reliability of the Importer.

- Do not install the Importer next to other warm equipment.

# SECTION 5: PLANNING THE LAN CONNECTION

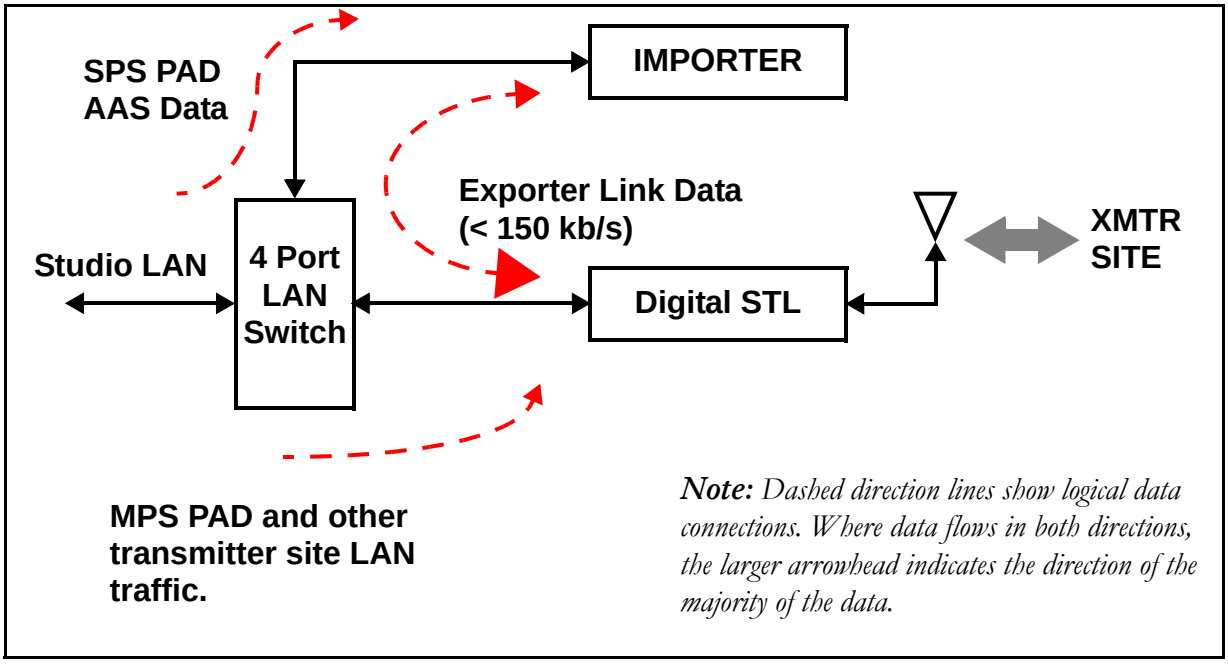
This section provides information about the LAN connection between the Importer and the NE IBOC or Exporter. Assess your existing network's capabilities, or establish a network that meets the requirements of this section. This section includes the following topics:

- Managing network traffic
- STL capacity
- IP address information

## MANAGING NETWORK TRAFFIC

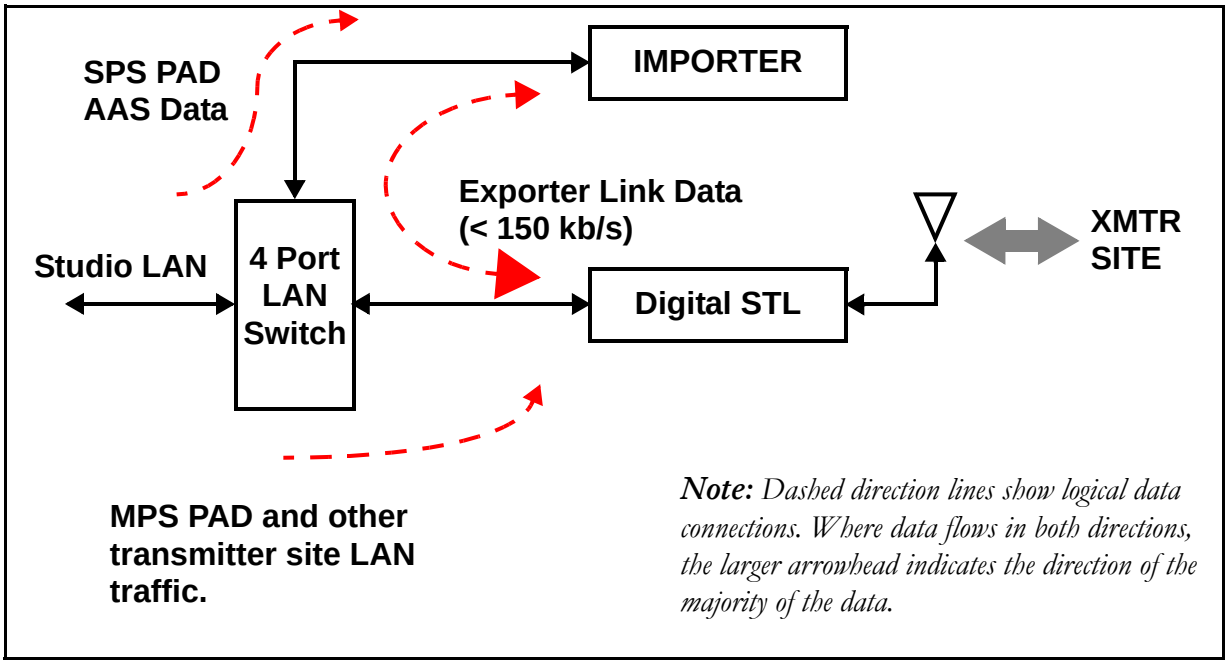
Network traffic between the Importer and NE IBOC or Exporter contains time sensitive information, such as audio, and cannot tolerate variation in transport time. Consider using network devices such as switches to intelligently route the network traffic. If possible, avoid using network hubs, which are slow in nature. The simplest configuration is to place the Importer close to the NE IBOC or Exporter and connect them using a single crossover Cat-5 cable. Figure 5.1 shows an Importer connected to a LAN to allow communication with the NE IBOC at the transmitter site, via the STL. The STL is shared with other LAN traffic between the studio and transmitter site.

**Figure 5.1: Example of a LAN configuration**



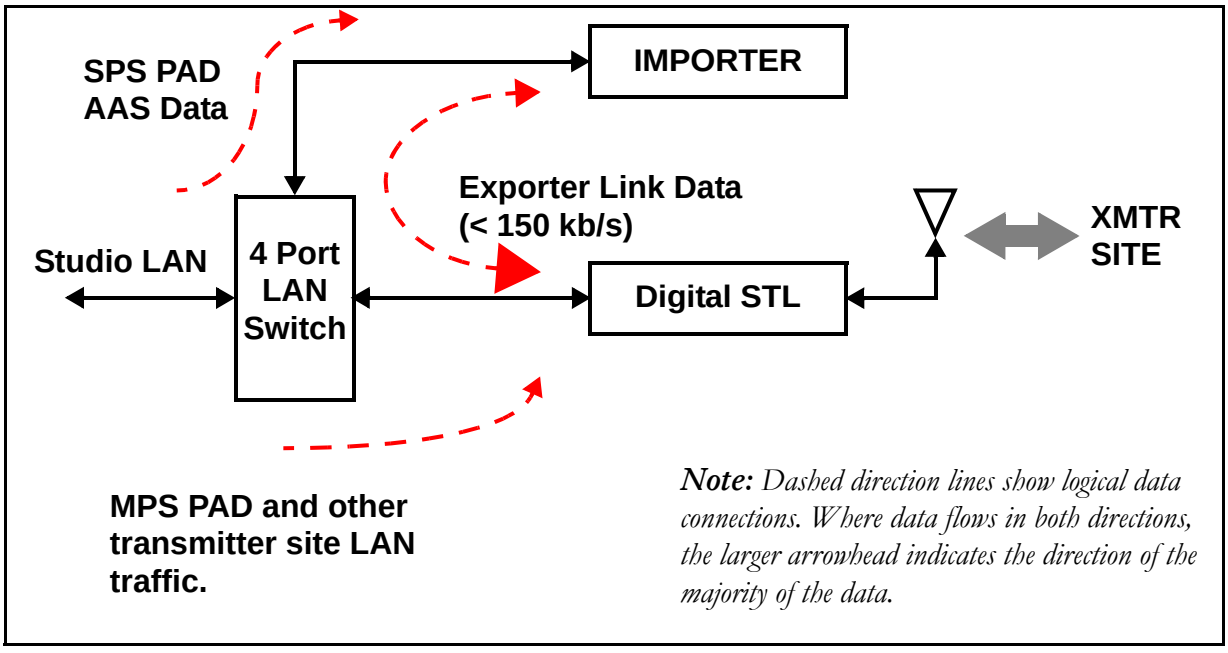

*Note: MPS PAD, SPS PAD, and AAS data are optional HD data services.*

**Figure 5.2: Example of a LAN configuration**




*Note: MPS PAD, SPS PAD, and AAS data are optional HD data services.*

**Figure 5.3: Example of a LAN configuration**




*Note: MPS PAD, SPS PAD, and AAS data are optional HD data services.*

### NETWORK SWITCH

Incorporating a network switch (see Figure 5.1 on page 5-1) ensures that the connection to the Importer carries only SPS PAD and exporter link data, and that the connection to the digital STL carries only exciter link data, MPS PAD (for the NE IBOC or Exporter), and any traffic for other devices at the transmitter site.

### NETWORK BANDWIDTH

It is assumed that the Importer and NE IBOC or Exporter have fixed IP addresses. Because STLs have limited total throughput, the available networking bandwidth depends on how much of the throughput is being used for audio or other services. Determining available bandwidth depends on the type of STL and how it is being used.

## STL CAPACITY

The STL capacity on the LAN channel must be approximately 150 kb/s to send the Importer data to the NE IBOC or Exporter.

## IP ADDRESS INFORMATION

Since the Importer will be connected to the NE IBOC or Exporter over a LAN, you will need to determine the IP addresses for the Importer, the NE IBOC or Exporter, and the gateway. Consult with your network manager for this information. If they are to be connected together directly, the choice of IP address is arbitrary. For example the following could be used:

- NE IBOC or Exporter IP: 10.10.10.10
- Importer IP: 10.10.10.12
- Gateway IP: 10.10.10.2

# Section 6:
# Synchronizing the SPS sample rate

This section aids in assessing the feasibility of synchronizing the SPS sample rate to a 10 MHz reference. This section includes the following topics:

- General considerations
- Methods to achieve synchronization
- Additional equipment

## General considerations

You can achieve the best SPS audio performance if you synchronize the 44.1 kHz audio sample rate to a GPS reference. The difference in audio quality may not be perceptible, or even important, given that SPS channels are typically lower quality audio. To synchronize, you may require considerable equipment infrastructure (see "Additional equipment" on page 6-3) depending on the system configuration.

The station manager should review *Methods to achieve synchronization* in this section and determine whether it is a worthwhile investment.

## Methods to achieve synchronization

There are different ways to synchronize the SPS audio sample rate, based on the number of channels and the location of the Importer. Consider the following:

### Using the EASU for single channel applications

Nautel supplies an Exciter Auxiliary Services Unit (EASU) in an 8.9 cm (3.5 inch or 2U) chassis with each NE IBOC or Exporter. The EASU provides all of the necessary functionality to achieve optimal synchronization for a single channel. When supplied with an NE IBOC or Exporter, the EASU synchronizes the main program AES. However, it does have additional outputs, word clock and spare main program AES that you can use as inputs to a sample rate converter.

## USING AN AUDIO PROCESSOR AS A SAMPLE RATE CONVERTER

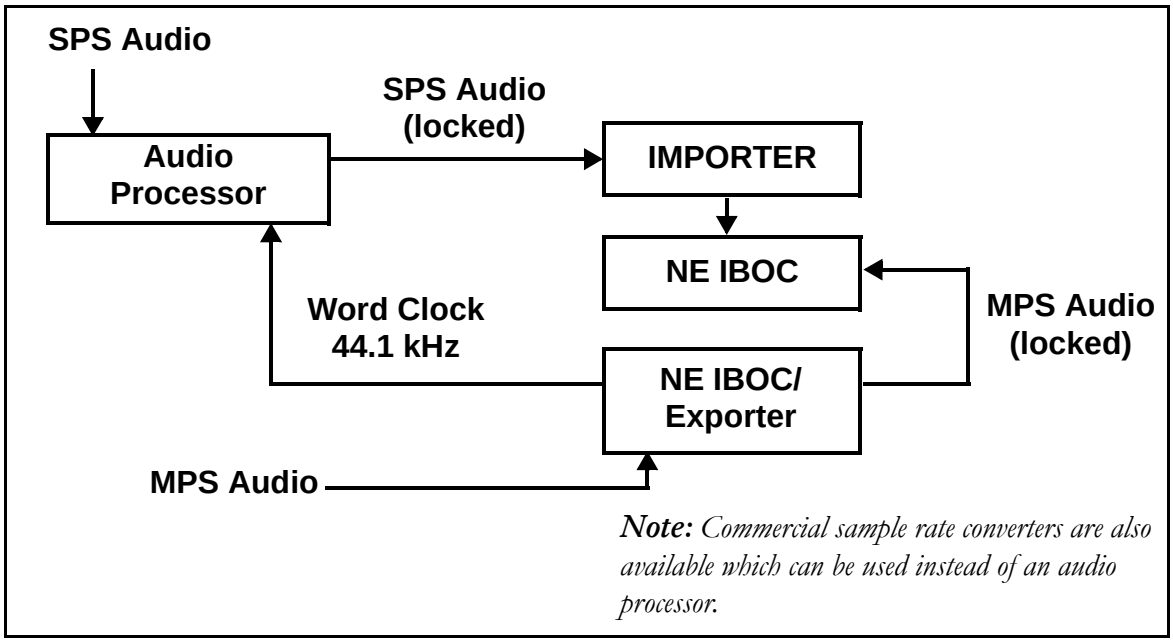
Some audio processors can provide the sample rate conversion function. An audio processor must be able to accept either a word clock or another AES input as a synchronizing signal for its output AES sample rate.

### IMPORTER LOCATION

If the Importer will be co-located with the NE IBOC or Exporter, and a suitable audio processor will be used to condition the SPS audio, the audio processor may be able to perform the synchronization. See Figure 6.1 for a block diagram of this setup.

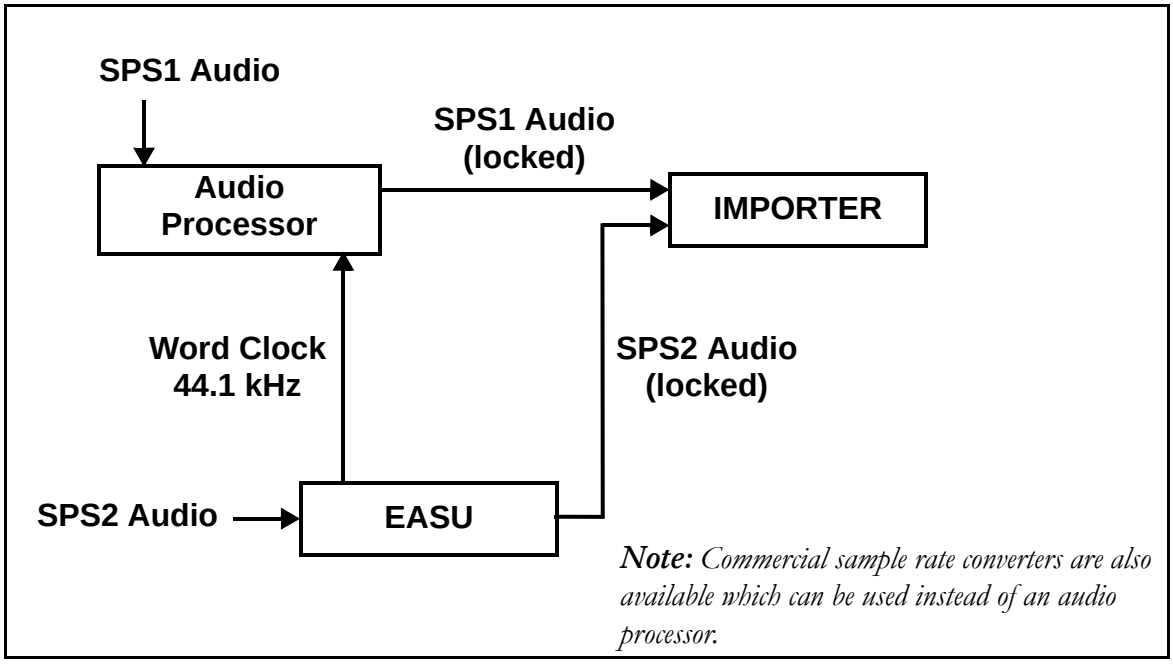
If the Importer will not be co-located with the NE IBOC or Exporter, you can purchase a second EASU to install near the Importer. Since the EASU can only synchronize a single audio source, you will need to use the EASU word clock, or a spare AES output, as an input to a sample rate converter (audio processor) if you are using more than one SPS. See Figure 6.2 on page 6-3 for a block diagram of this setup.

**Figure 6.1: Using an audio processor for SPS synchronization**




**Importer and NE IBOC or Exporter co-located**

**Figure 6.2: Multiple SPS**




**Importer and NE IBOC or Exporter not co-located**

## ADDITIONAL EQUIPMENT

You need the following additional equipment to synchronize the SPS audio sample rate:

- GPS receiver with a 10 MHz output (also part of EASU)
- Word clock generator that accepts a 10 MHz reference (also part of EASU)
- Sample rate converter or suitable audio processor (one per channel) that accepts an external sample rate word clock

# SECTION 7: PARTS AND TOOLS

This section describes parts associated with the Importer, and tools needed during installation and routine operation.

- Parts supplied by Nautel
- Parts not supplied by Nautel – see page 7-2
- Tools for installation – see page 7-2

## PARTS SUPPLIED BY NAUTEL

### AUDIO CARD ANCILLARIES

With each audio card that is purchased, a plastic bag is provided containing audio cables and a *LynxOne Installation and Users Guide*. You may not require all cables for your Importer installation.

### AC POWER CABLE

An ac power cable is included with the Importer.

### SOFTWARE

The CD containing the Microsoft Windows XP Professional software is included with the Importer. Nautel pre-loads the Importer so you do not need to install it initially. It is provided if you need to re-install it at a later date.

### DOCUMENTATION

Nautel includes the following documents with the Importer:

- Importer Pre-installation Manual, IMP-PREINST.

  The *Pre-installation Manual* provides instructions and reference information needed when planning and preparing for the installation of an Importer.

- Importer Installation Manual, IMP-INST.

  The *Installation Manual* provides instructions and reference information needed when installing an Importer.

- Importer Operating and Maintenance Manual, IMP-OPS-MAINT.

  The *Operating and Maintenance Manual* provides instructions for operating and maintaining an Importer. It also provides reference information needed when performing diagnostic procedures.

- HD Radio Importer User's Guide.

  The *HD Radio Importer User's Guide* provides detailed instructions for operating an Importer. It is provided as a supplement to the *Operating and Maintenance Manual*.

## PARTS NOT SUPPLIED BY NAUTEL

Nautel does not supply some parts and materials required to complete installation. The parts you need vary with the installation requirements. The list of parts you normally provide yourself during installation include:

- 19-inch cabinet space
- Standard PC compatible keyboard, mouse and monitor
- Cat-5 cable
- SPS audio sources

## TOOLS FOR INSTALLATION

The tools you need during Importer installation include the following:

- Philips screwdrivers, sizes # 1 and # 2

# SECTION 8: LIST OF TERMS

This section defines some of the terms that are used in Nautel documentation.

**AAS.** Advanced Application Services

**AES-EBU.** Audio Engineering Society/European Broadcasting Union (AES/EBU) is the name of a digital audio transfer standard. The AES/EBU digital interface is usually implemented using 3-pin XLR connectors (the same type of connector used in professional microphones). One cable carries both left- and right-channel audio data to the receiving device.

**CAT-5.** Short for Category 5. Network cabling that consists of four twisted pairs of copper wire terminated by RJ45 connectors.

**EASU.** The Exciter Auxiliary Services Unit accepts the studio feed audio in AES/EBU format and converts it to the 44.1 kHz sampling rate used throughout the system. The EASU also contains the GPS receiver that locks onto the Global Positioning System, and determines the site location and time. This information is then passed onto the NE IBOC to be transmitted as part of the station information. The GPS receiver also provides 10 MHz and 1 PPS signals that are used within the NE IBOC for synchronization purposes.

**EOC.** Ensemble Operations Center.

**EXGINE.** An HD™ Radio component which resides in the exciter. The Exgine decodes the Exciter link data and produces the appropriate I/Q modulation.

**GPS.** The Global Positioning System is a system of satellites and receiving devices used to compute positions on the Earth.

**GUI.** Graphical User Interface

**HD™ RADIO.** High definition (HD) Radio is another term for In Band On Channel (IBOC) technology. HD Radio is a trademark of the Ibiquity Digital Corporation.

**IBOC.** Nautel In-Band-On-Channel technology provides high quality digital audio over existing AM and FM radio channels.

**LAN.** Local Area Network.

**MPS.** Main Program Service

**NE IBOC.** Nautel's In-Band-On-Channel signal generator. See IBOC. Required for XR series IBOC installations.

**PAD.** Program-Associated Data.

**SPS.** Supplemental Program Service. Sometimes called SAC. In initial tests, NPR called this Tomorrow Radio.

**STL.** Studio-transmitter Link. A studio-transmitter link sends a radio station's audio signals from a broadcast studio to a transmitter located some distance away from the studio.

**TSL.** Transmitter-studio Link. A transmitter-studio link returns data (e.g., monitoring information) from a transmitter site to a broadcast studio located some distance away from the transmitter.

**UDP.** User Datagram Protocol. A core internet protocol whereby programs on networked computers can send short messages between one another.

**VNC.** Virtual Network Connection.

**XLR.** A 3-pin connector used for a balanced audio cable. Used in pro-audio equipment and AES/EBU digital audio.

# INDEX

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# Contents

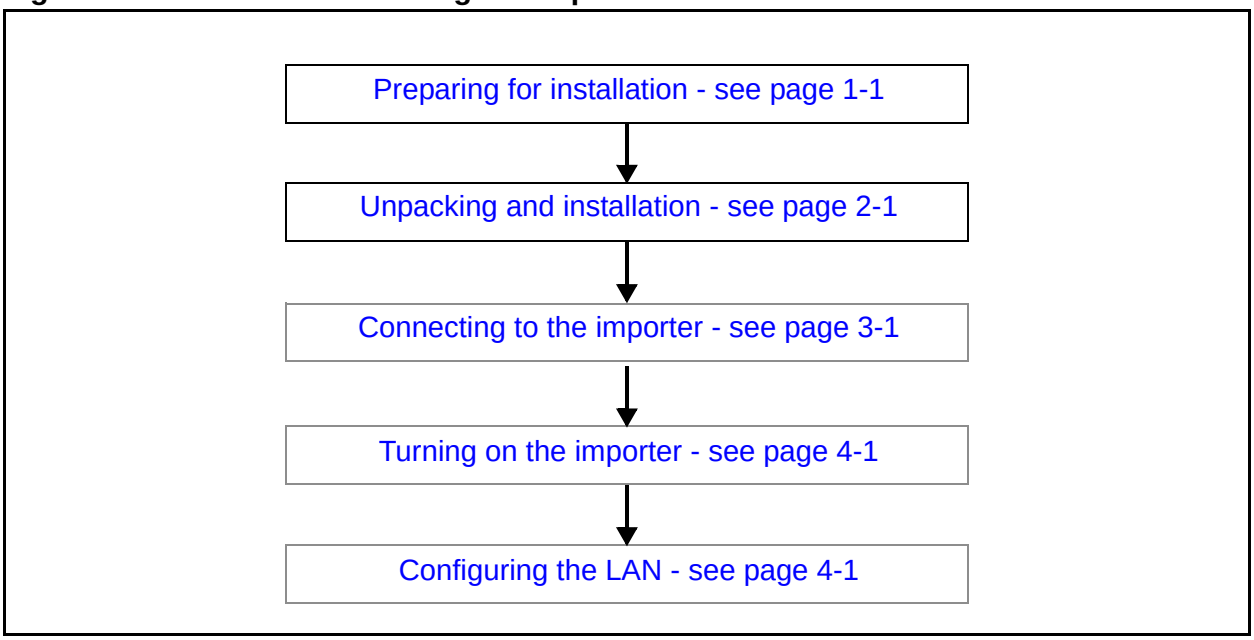
# ABOUT THIS MANUAL

This manual provides information about installing an Importer. This manual is intended for use by qualified, trained installers.

## USING THIS MANUAL

To install the Importer, follow the steps shown below.

**Figure 2.1: Flowchart - Installing the Importer**

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| | |
|---|---|
| **TIP** | When you have completed a task or step, put a check mark beside the step number. |

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## Online documentation

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# About safety

All Nautel transmitters are designed to meet the requirements of *EN60215, Safety Requirements for Radio Transmitters*. Sequenced key interlocks are offered as an option for those customers that require them.

The philosophy of *EN60215* is that the removal of any cover or panel that can only be opened using a tool is a maintenance activity, and that any person performing a maintenance activity is expected to be trained for that activity. Under *EN60215*, it is assumed that trained personnel will be knowledgeable and will take precautions such as removing all power to the transmitter before accessing its components.

## Electrical hazards

To remove power from the transmitter, switch off and lock out the three-phase power and then wait 10 minutes for the capacitor bank to discharge. There are several ultra-brite LEDs that glow inside the rear of the cabinet to remind anyone who has not turned off the power that the system is live and that there is serious danger. Look through the window in the lower rear transmitter panel to see these LEDs.

**WARNING: It is not enough to push the front panel button that removes RF power. The power line and the three phase rectifier are still connected, and the large capacitor bank is still charged: in this condition, they are LETHAL. Even when the three phase power is switched off and "locked out," the capacitor bank is still charged and requires 10 minutes to completely discharge.**

Mount the transmitter disconnect close to the transmitter so that it can be reached quickly in an emergency. Clearly label the disconnect.

After turning off the power, always perform a measurement to confirm that the power is off before touching anything within the transmitter. If the wrong breaker was opened, the equipment will be live.

WARNING: Do not use an ordinary DVM to check for voltage, since it may have been left inadvertently on the AMP range, triggering a short and an arc blast that could result in severe burns and even death.

Use only a non-contact voltage probe or a safety voltmeter (available from vendors such as Fluke, Ideal, and Teagam).

Use a proper lockout procedure to ensure that another worker cannot accidentally reapply power while you are performing maintenance on any part of the transmitter or site.

## Lightning hazards

Before opening the transmitter and touching internal parts, remove and solidly ground the antenna connection.

WARNING: It is not enough to ground the antenna terminal with the antenna still connected. Even a small impedance in the ground strap will result in lethal voltages during a lightning strike.

## RF hazards

A serious RF hazard and very high voltages exist in the vicinity of the antenna and its networks during normal operations.

## Other hazards

Ensure that appropriate fire alarms and fire extinguishers are available. Extinguishers must be suitable for use on electrical fires.

Many other site safety risks exist. It is beyond the scope of this manual to identify all the risks and procedures.

# Safety precautions

This section provides very important information about protecting the safety of personnel and equipment:

- Personal safety - below
- Site safety - see page xiv
- Equipment safety - see page xvi

## Personal safety

### Training

The training of any personnel who will have physical access to the site or the transmitter is very important. Personnel must be familiar with the transmitter, so that they can avoid physical danger, and be aware of hazards to themselves and the equipment.

Nautel offers a number of training courses covering the basic fundamentals of RF systems and transmitters, and the operation and maintenance of the transmitter. For more information about available courses and schedules, go to the Nautel website at http://www.nautel.com/Training.aspx, or ask your Nautel sales representative.

### Site orientation

When you give personnel access to the transmitter site (e.g., hiring new personnel, or giving access keys to personnel), perform a site orientation to ensure that they are familiar with the site, on-site procedures, and on-site hazards. Cover the following topics:

- Securing the site (locking doors and fences) to prevent unauthorized access
- How and when to call for technical support or emergency assistance
- Areas of the site and pieces of equipment that are *off limits*

### Voltage awareness

Ensure that all personnel that are able to access areas with high voltage circuits or high field strengths are aware of the hazards associated with high voltage. Cover the following topics:

- High voltage or high field strength areas where caution is required
- Physical risks of electric shock
- Risks for personnel with pacemakers or other medical implants
- Induced voltages in high field strength areas
- On-site risks during thunderstorms and lightning strikes
- Operation of safety interlocks (if installed)

### First aid

Nautel does not offer first aid training, since the hazards associated with high voltage and RF energy are not specific to the transmitter. However, the customer should provide first aid training to all personnel who have access to the transmitter site. First aid training should include CPR, care of burns, and artificial respiration.

## Site safety

### Controlling access

Transmitters and antennas generate and carry dangerous voltages that can be harmful or fatal. It is very important that you control access to the site and its equipment. To secure your transmitter site, use:

- Locking steel or security doors to prevent casual access
- A perimeter fence to keep trespassers away from the antenna system and feedline
- An alarm system
- No Trespassing signs

## Marking hazards

Place warning signs close to any hazardous areas or systems (e.g., the feedline or the antenna system). Make the signs large enough that they cannot be missed. Provide signage in all languages used in the region. These signs are intended not only for authorized personnel, but also for emergency responders or accidental trespassers.

## Qualifying site personnel

Make sure that personnel who have access to the site are qualified to work around electronics and high voltage systems.

## Ac power protection

You should take steps to protect equipment from surges (over-voltage spikes) on the ac power lines. Surges may occur during thunderstorms, or because of malfunctions in the electrical distribution grid. Surge suppressors and ac power conditioners can prevent serious damage to your on-site equipment, including the transmitter.

## RF protection

Transmitters and their antenna systems create intense radio frequency fields at the transmitter site, particularly near the feedline, antenna and tower. At some sites, these fields may cause biological effects, including the heating of body tissues. Intense fields can also create dangerous high voltages on ungrounded, conductive surfaces and objects. At certain points where high voltage conductors come close to grounded conductors (e.g., at feedline junctions or on the tower), dangerous electrical arcing or flashovers can occur. It is very important that you take the following steps to prevent damage to equipment or personnel due to RF fields:

- Use safety interlocks to de-energize transmitters if personnel open doors or panels accessing high field areas
- Place warning signs in any locations where high fields can occur
- Train personnel about the short-term and long-term hazards of RF radiation
- Physically block access to the area around the antenna system, feedline and tower
- Ground all exposed conductive surfaces or objects in high field areas

The RF connection to the transmitter output can be a serious safety hazard. Connect a 50 Ω test load during installation and commissioning. It is recommended that a switch be used to automatically connect the transmitter to the antenna system without human contact with the transmitting conductors.

### Safety interlocks

Safety interlocks are available as an option on the transmitter. There are two types of safety interlocks:

- The mechanical interlock is a key-controlled access system that locks the access panels and prevents entry to areas with high voltages when ac power is applied.
- One electrical interlock is an external circuit that turns off the RF output if any of its switches are opened.

### Ac disconnect switch

Safe operation of the transmitter requires an ac disconnect switch. Lock the ac disconnect switch in the disconnected (open) position during the installation process.

## Equipment safety

### Electrostatic protection

The transmitter's systems are very rugged and resistant to damage. However, it is possible for damage to occur because of high voltage electrostatic discharges during servicing. Train all service personnel to ground themselves to bleed off any static charge before opening the transmitter or touching any exposed components. Provide a grounding wand or known ground (e.g., a grounded metal table) that personnel can use to discharge themselves.

### Surge protection

Surge protection is recommended for your entire site. However, even if you do not use a surge protector on the service entrance to the site, you should install a surge protector in the transmitter's ac power feed to prevent over-voltage from entering the transmitter.

### Lightning protection

The transmitter is designed to resist lightning strike damage. However, intense or repeated strikes could damage the transmitter. We recommend that you install lightning suppression on the antenna, tower and feedline to reduce the effect of lightning strikes on the transmitter itself (and to protect the rest of your site equipment and your personnel). For detailed information about lightning protection, see the *Nautel Site Preparation Manual*, available from your Nautel sales agent, or online from the Nautel website.

## Physical protection

Consider physical hazards to equipment at your site, including the transmitter. Ensure that equipment is protected from weather (e.g., rain or flooding), even during extreme weather events. Place equipment so that it is not in the path of swinging doors or high-traffic areas. Do not allow wheeled items like office chairs or tables with wheels in the transmitter room, as these may damage equipment if accidentally pushed or knocked over. Do not place the transmitter under water pipes, drains, or sprinklers. Keep any equipment that generates heat, like the transmitter, away from flammable materials like ceiling panels, cubicle dividers, and curtains.

## Earthquake protection

If the transmitter site is in a region that experiences any noticeable earthquake activity, take steps to prevent the transmitter from shifting or rocking during an earthquake. Even during minor earthquakes, rocking or movement of the transmitter is likely to damage the feedline connection, and could even cause a catastrophic failure of the ac power feed into the transmitter. During larger earthquakes, the weight of the transmitter chassis could be hazardous to nearby equipment or personnel.

# SECTION 1: PREPARING FOR INSTALLATION

Before performing the installation of your Importer, perform the following steps:

1. Ensure that you have performed the pre-installation tasks described in the *Importer Pre-Installation Manual* (Importer-PREINST).

2. Make sure that you received all the components – check your packing list.

3. Inspect all crates and packages for damage.

4. Report any damage immediately to your Nautel sales representative.

5. Assemble your parts and tools.
   For a list of required tools, refer to the *Importer Pre-Installation Manual*.

6. When you are ready to proceed with installation, go to Unpacking and installation - see page 2-1.

# Section 2: Unpacking and installation

To install an Importer, perform the following tasks:

1. Unpack the Importer from its shipping box. Make sure that all shipped items are available.

2. Remove the Importer's top cover, then remove any packing material, particularly above the CPU. Make sure that there are no loose components, and that all connectors and audio cards are properly seated.

3. Install the Importer at the studio or transmitter site in the cabinet space you have prepared.

4. **Do not** connect ac power to the Importer at this time.

# SECTION 3: CONNECTING TO THE IMPORTER

To connect the importer's audio cables, perform the following steps:

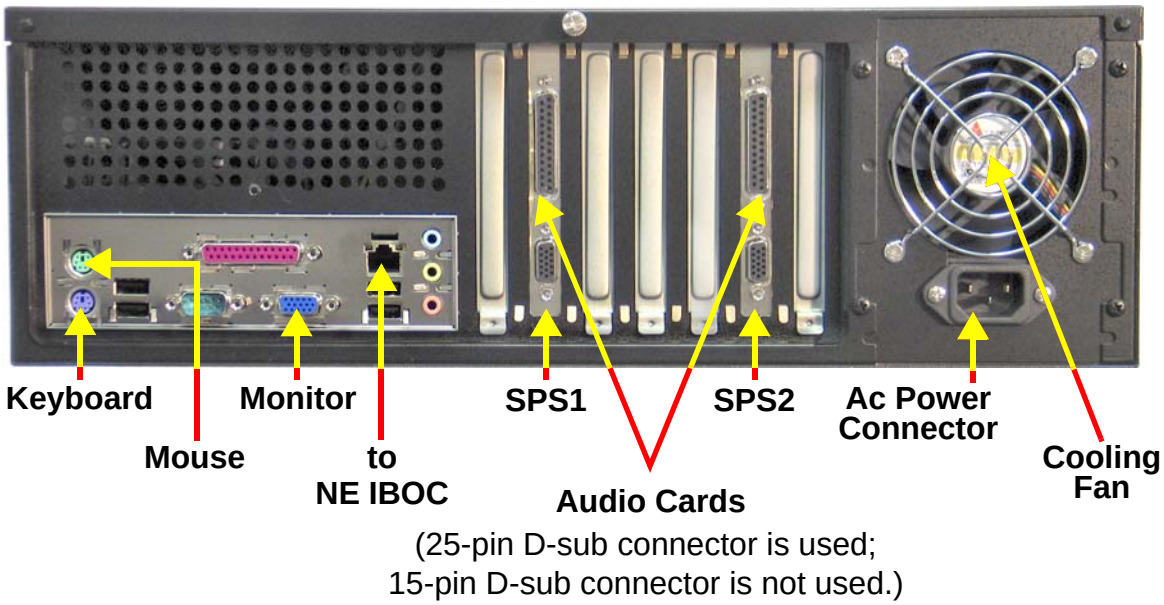
1. Locate the cable harnesses supplied in plastic bags labeled *UA93*. There should be one bag for each audio card ordered.

2. At the back of the importer (see Figure 3.1), attach the cable with six XLR connectors to the 25-pin D-sub connector on the importer's audio card. If there are two audio cards, connect two such cables.

3. If the audio sources are AES/EBU, connect the audio to the XLR connector labeled *Digital In* (from the cable in Step 2). If there are two audio cards, the importer software recognizes the audio card furthest from the cooling fan as the source of SPS1 audio (see Figure 3.1).

4. Connect the keyboard, mouse and monitor to the back of the importer (see Figure 3.1).

**Figure 3.1: Importer rear panel connections**



# SECTION 4: TURNING ON THE IMPORTER

To turn on and boot up the importer, perform the following steps:

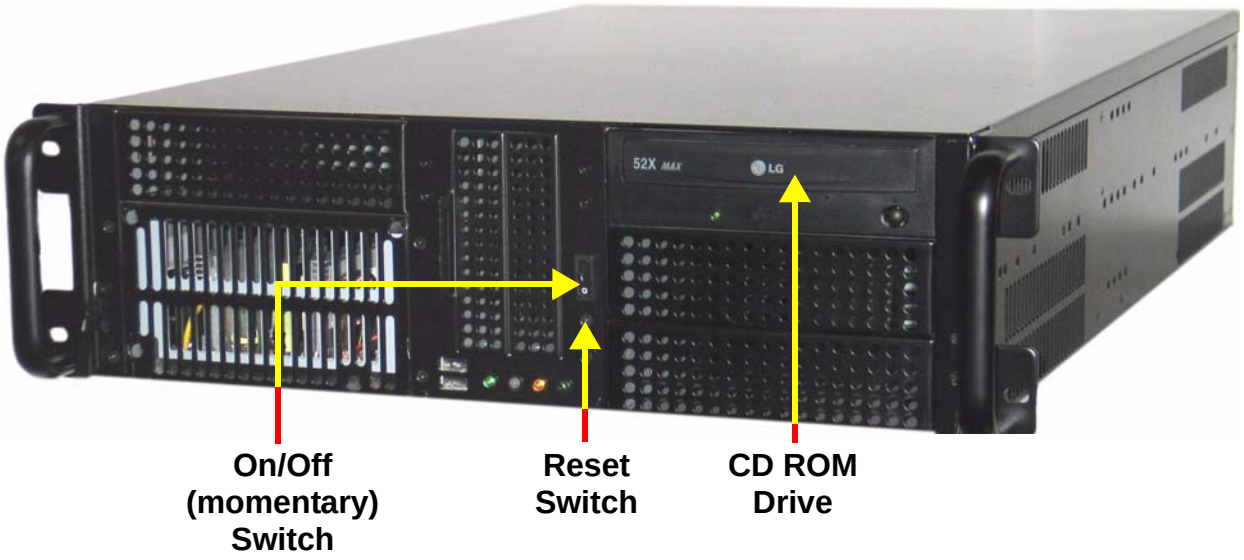
1. Connect ac power to the back of the importer. The importer will begin booting up.

   *Note: There is a momentary I/O switch on the front panel that turns the importer on and off. When the importer is on and the switch is pressed, Windows XP will routinely shut down and turn off the power supply. When the importer has been shut down in this manner and the switch is pressed again, the importer will turn on.*

2. Ensure the monitor is turned on and that Windows XP starts up properly.

3. A login window should appear. Type *importer* (lower case) in both the user name and password fields.

**Figure 4.1: Importer front view (shown without key-locked cover)**



# SECTION 5: CONFIGURING THE LAN

Perform the steps in this section to configure the importer's IP addresses.

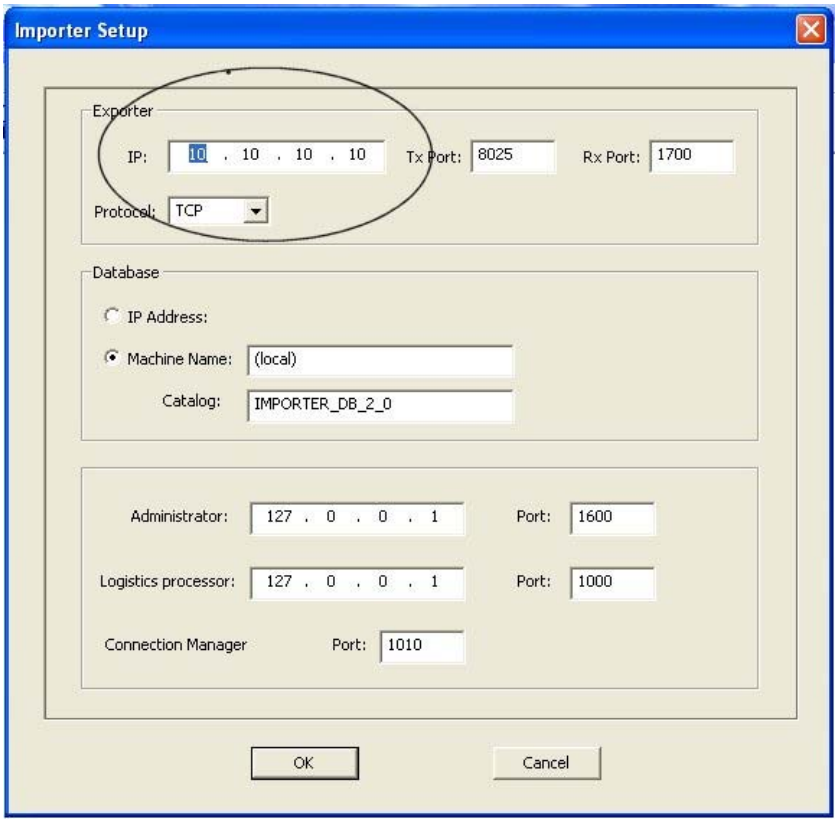
*Note: IP address information for the importer and NE IBOC or exporter, based on LAN configuration, was determined in the Pre-installation Manual. The equipment has been factory pre-configured with a default NE IBOC or Exporter IP address of 10.10.10.10. Even if modifications are not required, you should verify that the IP addresses are correct.*

Modify the importer's IP address for the NE IBOC or Exporter as follows:

1. From the importer's control panel:

    - Select **Setup > Importer**
    - Enter the Exporter IP address in the **Exporter IP** field (see Figure 5.1 ).

**Figure 5.1: Importer Setup screen**



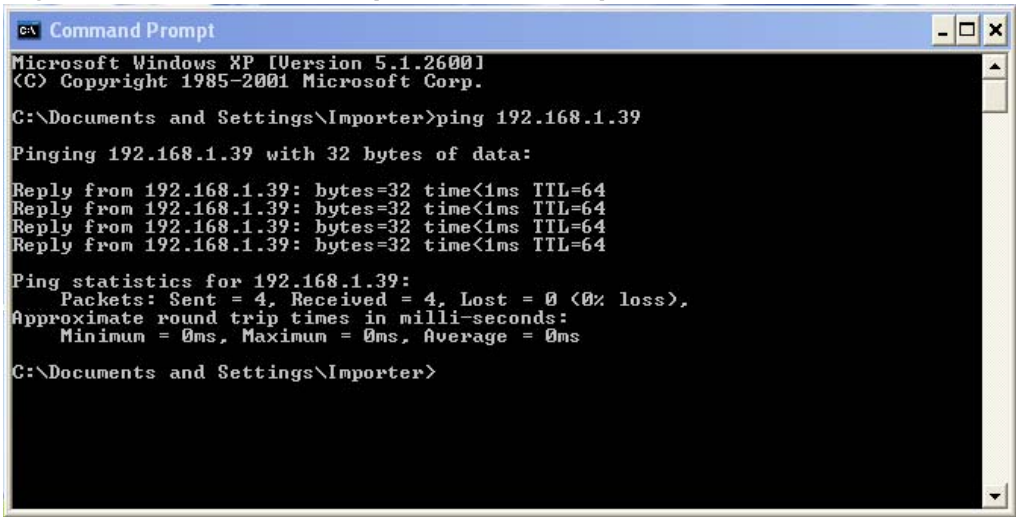
2. Modify the Windows IP address as follows:

   - Select the **Network Connections** icon.
   - Right click on *Local Area Connection*.
   - Select *Properties*.
   - Scroll to and highlight *Internet Protocol*.
   - Click on *Properties*.
   - In the **Properties** window, click the *Use the following IP address* option.
   - Enter the importer's IP address in the **IP address** field (see your network manager).
   - Check the *Subnet mask*. It should be: `255:255:255:0`
   - Enter the gateway IP address in the **Default gateway** field (see your network manager).
   - Click **OK**.
   - Click **OK** again.

3. Verify the IP address of the importer as follows:

   - Using another PC that is directly or indirectly (via a switch) network connected to the importer, select: *Start* > *All Programs* > *Accessories* > *Communications* > *Command Prompt*
   - At the command prompt, type: `ping importer IP address`
   - The *ping* command should show the status of four packets sent to the importer. If the connection is OK, a response similar to Figure 5.2 should appear.
   - Type `exit` to close the **Command Prompt** window.

**Figure 5.2: Successful importer `ping` response**



# Section 6: List of terms

This section defines some of the terms that are used in Nautel documentation.

**AAS.** Advanced Application Services

**AES-EBU.** Audio Engineering Society/European Broadcasting Union (AES/EBU) is the name of a digital audio transfer standard. The AES/EBU digital interface is usually implemented using 3-pin XLR connectors (the same type of connector used in professional microphones). One cable carries both left- and right-channel audio data to the receiving device.

**Cat-5.** Short for Category 5. Network cabling that consists of four twisted pairs of copper wire terminated by RJ45 connectors.

**EASU.** The Exciter Auxiliary Services Unit accepts the studio feed audio in AES/EBU format and converts it to the 44.1 kHz sampling rate used throughout the system. The EASU also contains the GPS receiver that locks onto the Global Positioning System, and determines the site location and time. This information is then passed onto the NE IBOC to be transmitted as part of the station information. The GPS receiver also provides 10 MHz and 1 PPS signals that are used within the NE IBOC for synchronization purposes.

**EOC.** Ensemble Operations Center.

**EXGINE.** An HD™ Radio component which resides in the exciter. The Exgine decodes the Exciter link data and produces the appropriate I/Q modulation.

**GPS.** The Global Positioning System is a system of satellites and receiving devices used to compute positions on the Earth.

**GUI.** Graphical User Interface

**HD™ Radio.** High definition (HD) Radio is another term for In Band On Channel (IBOC) technology. HD Radio is a trademark of the Ibiquity Digital Corporation.

**IBOC.** Nautel In-Band-On-Channel technology provides high quality digital audio over existing AM and FM radio channels.

**LAN.** Local Area Network.

**MPS.** Main Program Service

**NE IBOC.** Nautel's In-Band-On-Channel signal generator. See IBOC. Required for XR series IBOC installations.

**PAD.** Program-Associated Data.

**SPS.** Supplemental Program Service. Sometimes called SAC. In initial tests, NPR called this Tomorrow Radio.

**STL.** Studio-transmitter Link. A studio-transmitter link sends a radio station's audio signals from a broadcast studio to a transmitter located some distance away from the studio.

**TSL.** Transmitter-studio Link. A transmitter-studio link returns data (e.g., monitoring information) from a transmitter site to a broadcast studio located some distance away from the transmitter.

**UDP.** User Datagram Protocol. A core internet protocol whereby programs on networked computers can send short messages between one another.

**VNC.** Virtual Network Connection.

**XLR.** A 3-pin connector used for a balanced audio cable. Used in pro-audio equipment and AES/EBU digital audio.

# INDEX

# Importer

# Installation Manual

Document: IMPORTER-INST

Issue: 2.01 2006-09-19

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# Importer

# Operations and Maintenance Manual

Document: IMPORTER-OPS-MAINT

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The comparisons and other information provided in this document have been prepared in good faith based on publicly available information. The reader is encouraged to consult the respective manufacturer's most recent published data for verification.

# Contents

# ABOUT THIS MANUAL

This manual provides technical information needed when operating, maintaining and troubleshooting an Importer. This manual is intended for use by transmitter operators and field technicians.

## USING THIS MANUAL

If you are responsible for configuring or operating an Importer, see Section 1, "Operating the Importer" on page 1-1.

If you are performing troubleshooting, see Section 2, "Troubleshooting" on page 2-1.

If you are performing scheduled maintenance, or planning your maintenance schedule, see Section 2, "Routine maintenance" on page 2-1.

### PERFORMING PROCEDURES

When using procedures in this manual, perform each step in sequence.

- If you are asked to **see** another section of this manual, or another document, refer to that section or document for additional information, and continue the procedure.
- If you are asked to **go** to another step within the procedure, jump directly to that step without performing the intervening steps.
- If you are asked to **go** to another section or document, stop the procedure and perform the tasks described in the section or document.

CAUTION: FAILURE TO COMPLY WITH RECOMMENDATIONS MAY VOID YOUR MANUFACTURER'S WARRANTY. FOR MORE INFORMATION, REVIEW YOUR WARRANTY DOCUMENTS.

*Note: When you have completed a task or a step, put a checkmark beside the step number.*

# Importer manuals

The Importer documentation suite includes the following documents:

**Importer Pre-installation Manual, Importer-PREINST.** The Pre-installation Manual provides instructions and reference information needed when planning and preparing for the installation of an Importer .

**Importer Installation Manual, Importer-INST.** The Installation Manual provides instructions and reference information needed when installing an Importer .

**Importer Operating and Maintenance Manual, Importer-OPS-MAINT.** The Operating and Maintenance Manual provides instructions for operating, maintaining and troubleshooting an Importer . It also provides reference information needed when performing diagnostic procedures.

**HD Radio™ Importer User's Guide.** The HD Radio™ Importer User's Guide provides detailed instructions for operating an Importer. It is provided as a supplement to the Operating and Maintenance Manual.

# Nautel website / Online resources

The Nautel website provides useful resources to keep you up to date on your Importer.

## Nautel User Group (NUG)

The website includes a special section that customers can log into in order to access the Nautel customer newsletter, product manuals, frequently asked questions (FAQ), information sheets, and information about field upgrades.

## Documentation: online and printed

The website's NUG section provides online access to all the documentation for your Importer. Documentation is provided in Acrobat (PDF) format. You can use the documentation online or print the sections that you need.

When using online documents:

- Click on blue text (hyperlinks) to jump to a related section, or to get additional information (e.g., view a term's definition).
- To search a document to find keywords, use Find in Acrobat Reader's Edit menu.

- To quickly find a specific section, click the section in the PDF file's Bookmarks list.

When using printed documents:

- To find keywords, go to the *Index* section at the end of the manual.
- To find a specific term, go to the *List of Terms* section near the end of the manual.

# SECTION 1: OPERATING THE IMPORTER

This section provides information about operating the importer:



**Note:** *The procedures in this section allow you to quickly configure the importer for standard operation. For detailed procedural and reference information, refer to* Section 8, Operating Procedures *of the* HD Radio™ Importer User's Guide *provided with this documentation.*

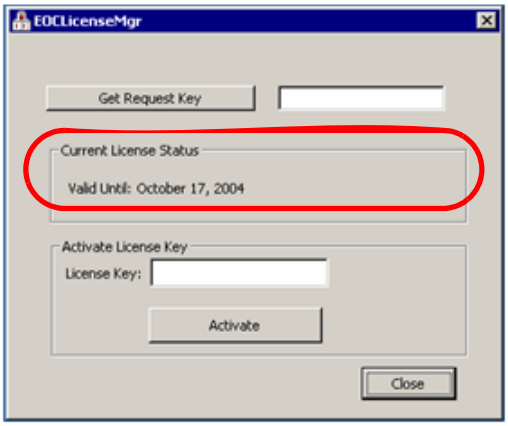
## LICENSE KEY

The importer will not function without a valid license key issued by iBiquity Digital. The following steps describe how to check and renew your license key.

1. You can check the expiry date of the Importer license by opening the LicenseMgr application from either the desktop or the Start menu (on the Task Bar):

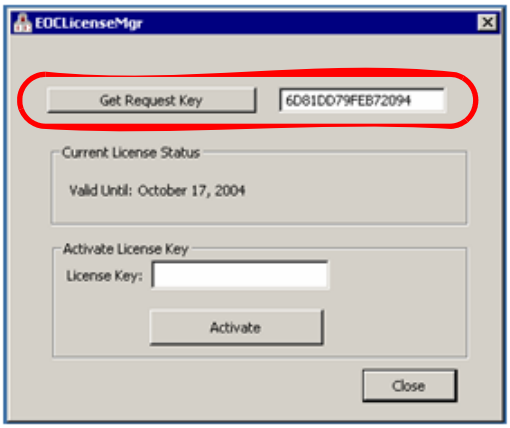
   - From the desktop: Click on the LicenseMgr icon.
   - From the Start menu:
     Click on Start > Programs > iBiquity Digital > Importer > LicenseMgr.

**Figure 1.1: License Manager: Expiry Date**




2. If your license is about to expire, click on the **Get Request Key** button. A 16-character code – the **Request Key** – will appear in the box to the right of the button.

**Figure 1.2: License Manager: Get Request**




3. Email the **Request Key** to importerkey@ibiquity.com. A 16-character activation code – the **License Key** – will be provided via return email.

4. Enter the **License Key** in the **License Key** box, then click on the **Activate** button.

**Note:** *The code for the* **Request Key** *is based on a number of parameters inside the Importer, one of which is the date. Therefore, the* **License Key** *is only valid from midnight to midnight on the day that the* **Request Key** *is emailed to Ibiquity.*

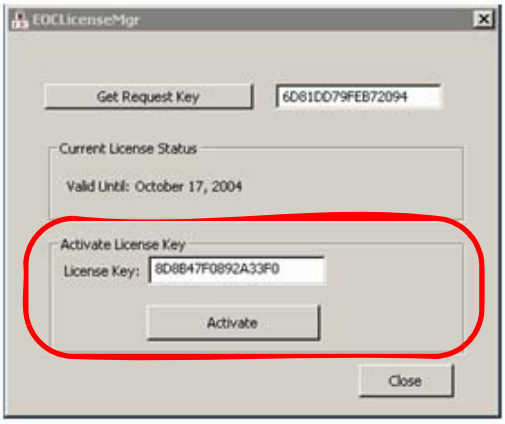
- If the **License Manager** application **is closed** after the **Request Key** is emailed to Ibiquity:

The License Key must be received and entered on the same day that the Request Key is sent to Ibiquity, or else the License Key will not work.

- If the License Manager application **is left open** after the Request Key is emailed to Ibiquity:

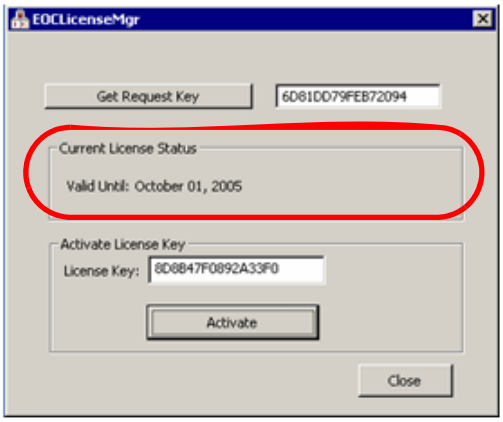
  The License Key will be valid, regardless of when it is entered.

**Figure 1.3: License Manager: Activate License Key**




5. Verify that the date in the Current License Status box has advanced by approximately one year (Figure 1.4 on page 1-3).

**Figure 1.4: License Manager: Current License Status**



## CONTROL PANEL

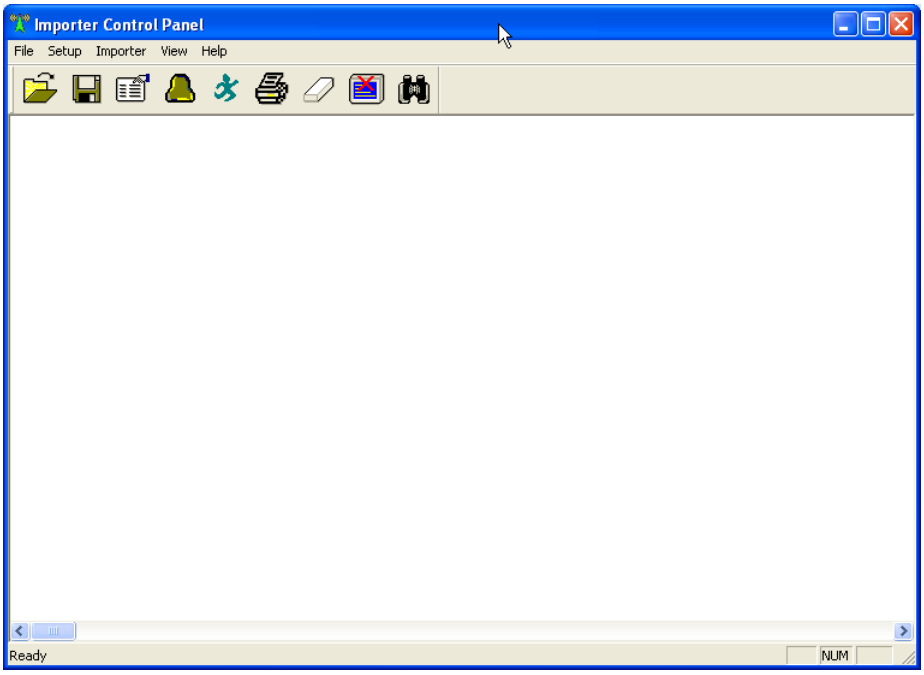
The importer software consists of a number of modules. These modules may be started and run individually or they may all be run through the Importer Control Panel. This manual contains information on running the importer software through the Importer Control Panel. For detailed information on the individual modules, see the *HD Radio Importer User's Manual*.

Start up the Importer Control Panel as follows:

1. Ensure the importer is connected to the NE IBOC or Exporter via Ethernet.

2. From the Windows desktop, double click the Importer Control Panel icon. The control panel application will start. See Figure 1.5

**Figure 1.5: Importer Control Panel**

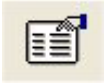



### CONTROL PANEL FUNCTIONS

The Importer Control Panel allows the user to start and stop the importer, set various importer configuration options and control the importer's logging functions..

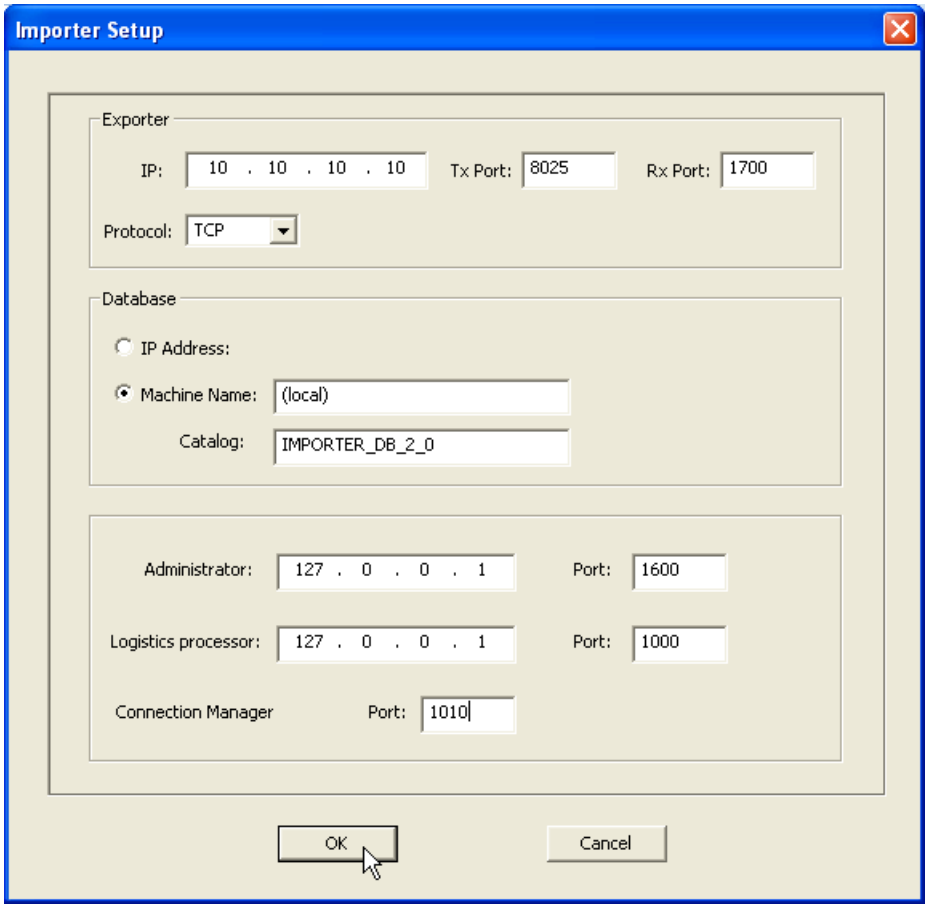
**Starting the importer:** Click the start icon to start the importer. A properly configured and connected importer will display a number of log messages indicating that the various modules have started successfully.


**Stopping the importer:** Click the stop icon to stop the importer. The icon appears in place of the start icon once he importer is started.



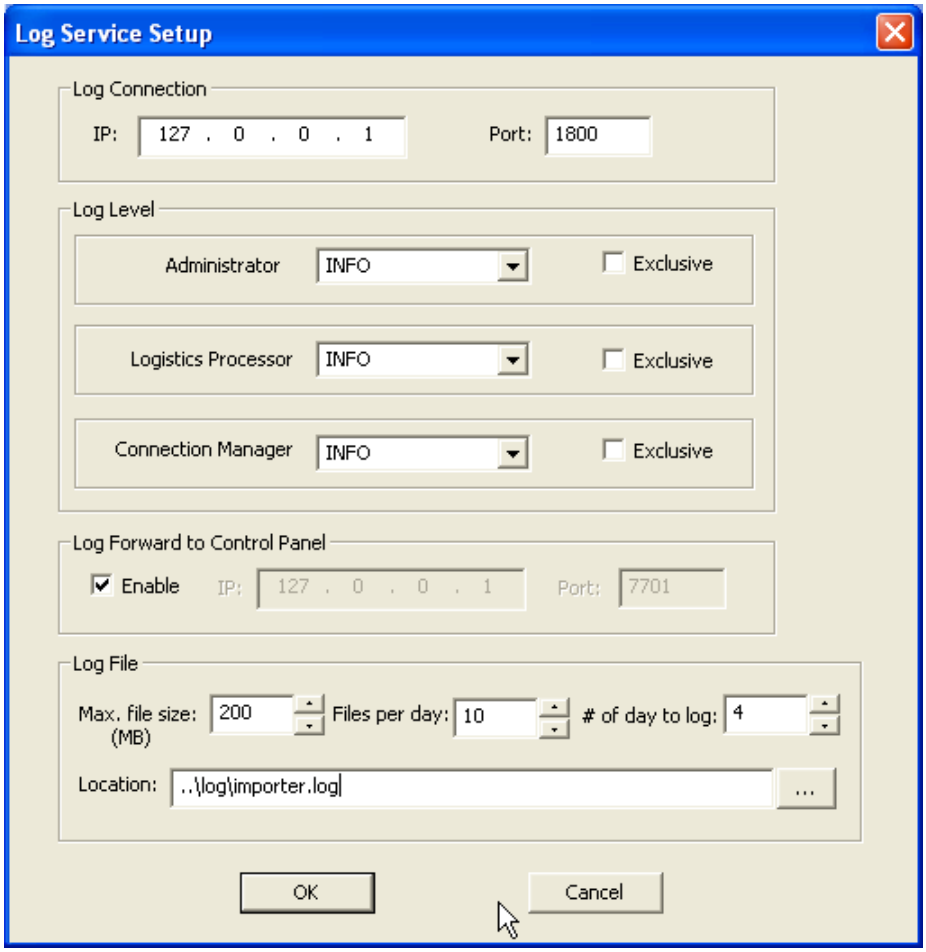
**Importer Setup:** Click the setup icon to enter the Importer Setup screen. See Figure 1.6. Typically the only setting which may be altered on this screen is the Exporter IP address. The TCP Protocol is preferred to UDP, but TCP only functions with v2.2.5 or later Exporters. Port numbers and software module IP addresses should not be changed.

**Figure 1.6: Importer Setup Screen**



**Log Service Setup:** Click the log service icon to set up the event logging parameters of the importer. The screen shown in Figure 1.7 should appear. Log levels, log file sizes and log file locations can be specified from this screen.

**Figure 1.7: Log Service Setup Screenl**




**Disable Log Message Display:** Click the print log icon to enable or disable the printing of log messages on the **Importer Control Panel**. When enabled, normal log messages are displayed in blue text. Error messages are displayed in red text. Warning messages are displayed in yellow text. Debug messages are dispalyed in black text.

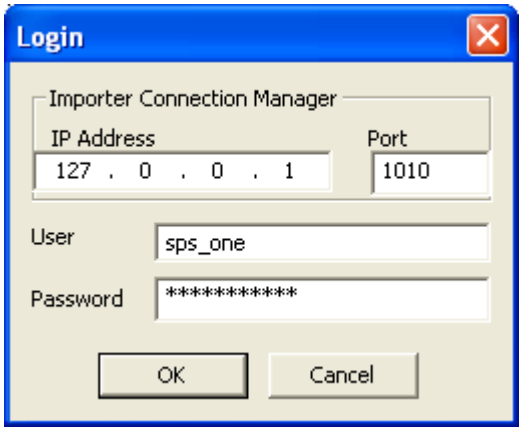
**Other functions:** Additional icons exist which allow for saving, printing, erasing and searching log files.

## SPS PROCESSOR

Use the **SPS Processor** application as follows:

1. From the importer's desktop, double click on the **SPS1** icon. The **SPS Capture** application will start and the screen shown in Figure 1.8 will appear.

**Figure 1.8: SPS Capture screen**

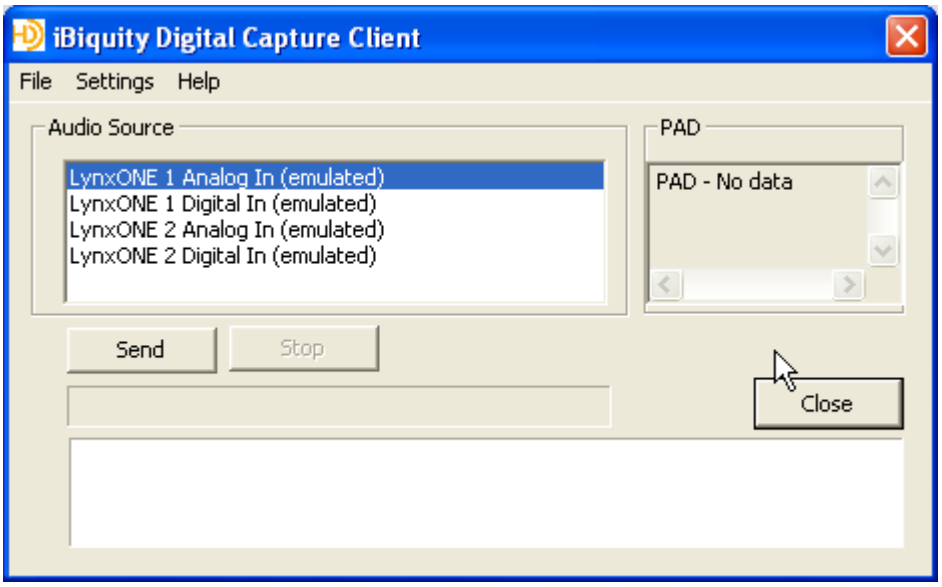



2. Enter the **User name** and **Password** and click **OK**. The screen shown in Figure 1.9 will appear. The **User name** and **Password** are non-volatile and will not need to be entered every time the SPS processor is started up. The default **User names** and **Passwords** for the two secondary channels are shown in Table 1.1.

**Table 1.1: Default User Names and Passwords**

| Channel | User Name | Password |
|---|---|---|
| SPS1 | sps_one | sps_one_pass |
| SPS2 | sps_two | sps_two_pass |

**Figure 1.9: SPS Configuration screen**




3. Depending on whether the input is AES/EBU (digital) or analog, select the appropriate **LynxONE Input**. Normally **LynxONE 1** is used for SPS1.

4. If a second audio card is installed, SPS2 must be run from its desktop icon. SPS2 would normally be mapped to one of the **LynxONE 2** inputs.

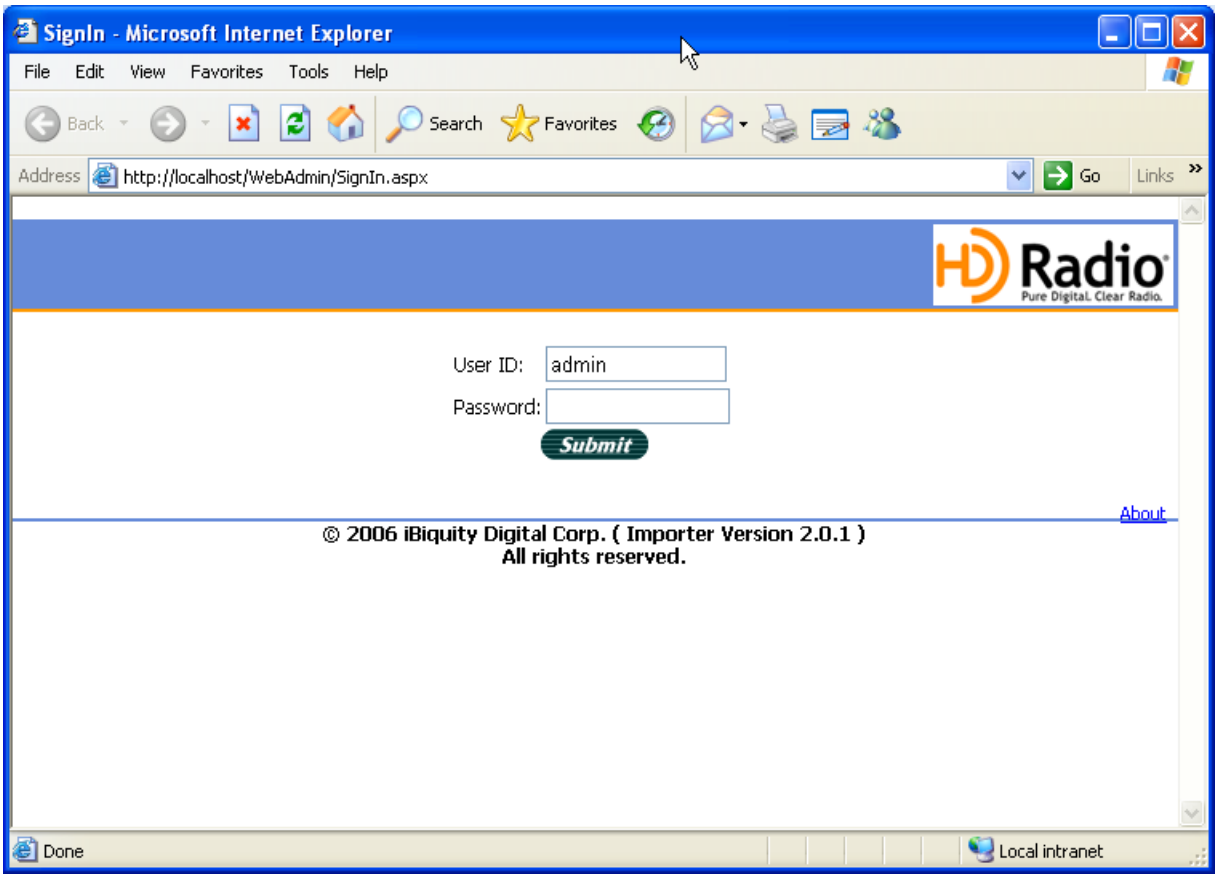
5. Click on the **Send** button to start the process.

# WEBADMIN CLIENT

The importer WebAdmin client is an application used to perform administration functions - such as service provider registration, service definition and configuration management - on the importer.

Figure 1.10 shows the SignIn screen for the WebAdmin client. The importer is shipped with a default User ID ("admin") and a Password ("admin"). You can change the password from within the WebAdmin client.

**Figure 1.10: WebAdmin SigIn screen**




Once you enter the WebAdmin User ID and Password, the page shown in Figure 1.11 will appear. There are five tabs at the top, each of which opens a different WebAdmin page.

## EXPORTER PAGE

The **Exporter** page (see Figure 1.11) displays the current exporter configuration including present service mode as well as the channel configuration. It will also indicate if the importer and exporter are not synchronized.

Take care to ensure that the exporter is synchronized whenever a change is made to an importer configuration. Do this before attempting to broadcast any AAS sevices. If the importer and exporter need synchronization, a message indicating the reason, as well as a **Synchronize** button, will also appear (see Figure 1.12).

**Figure 1.11: Exporter page**

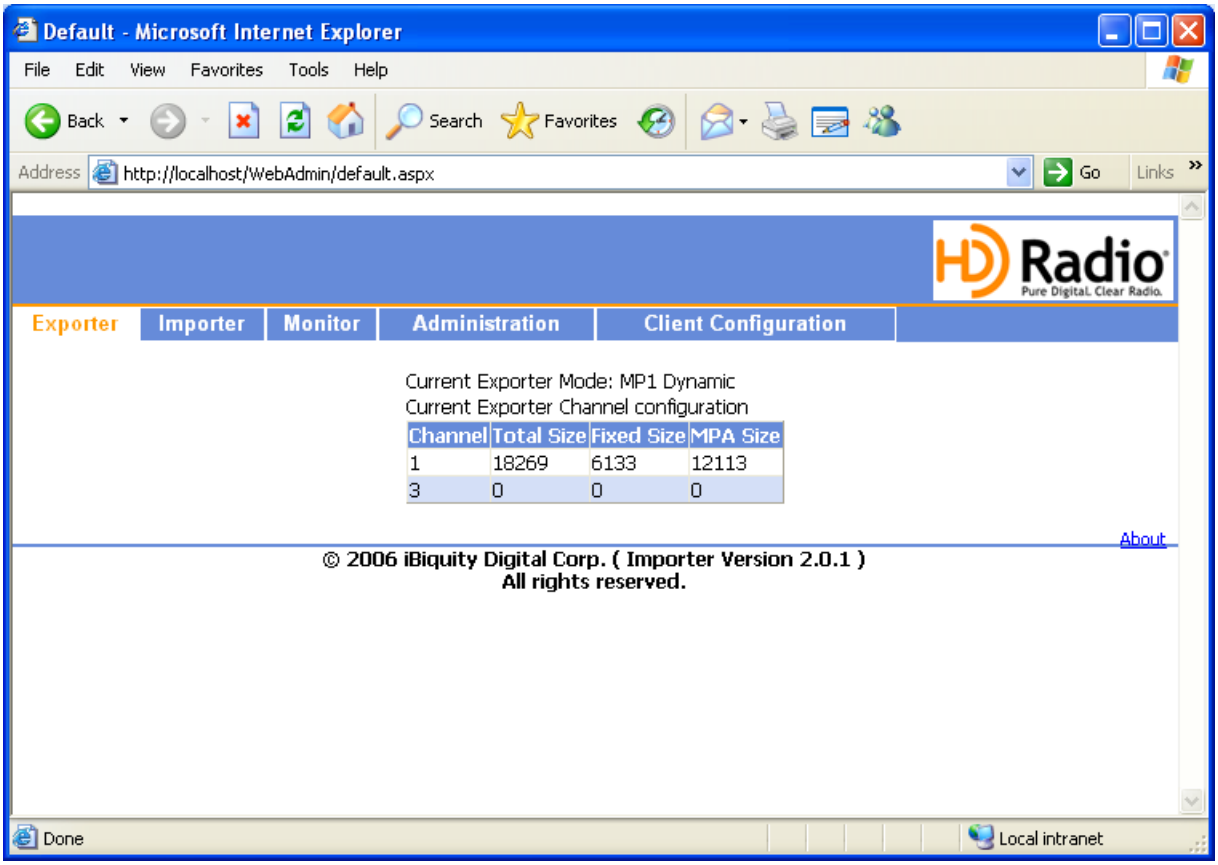
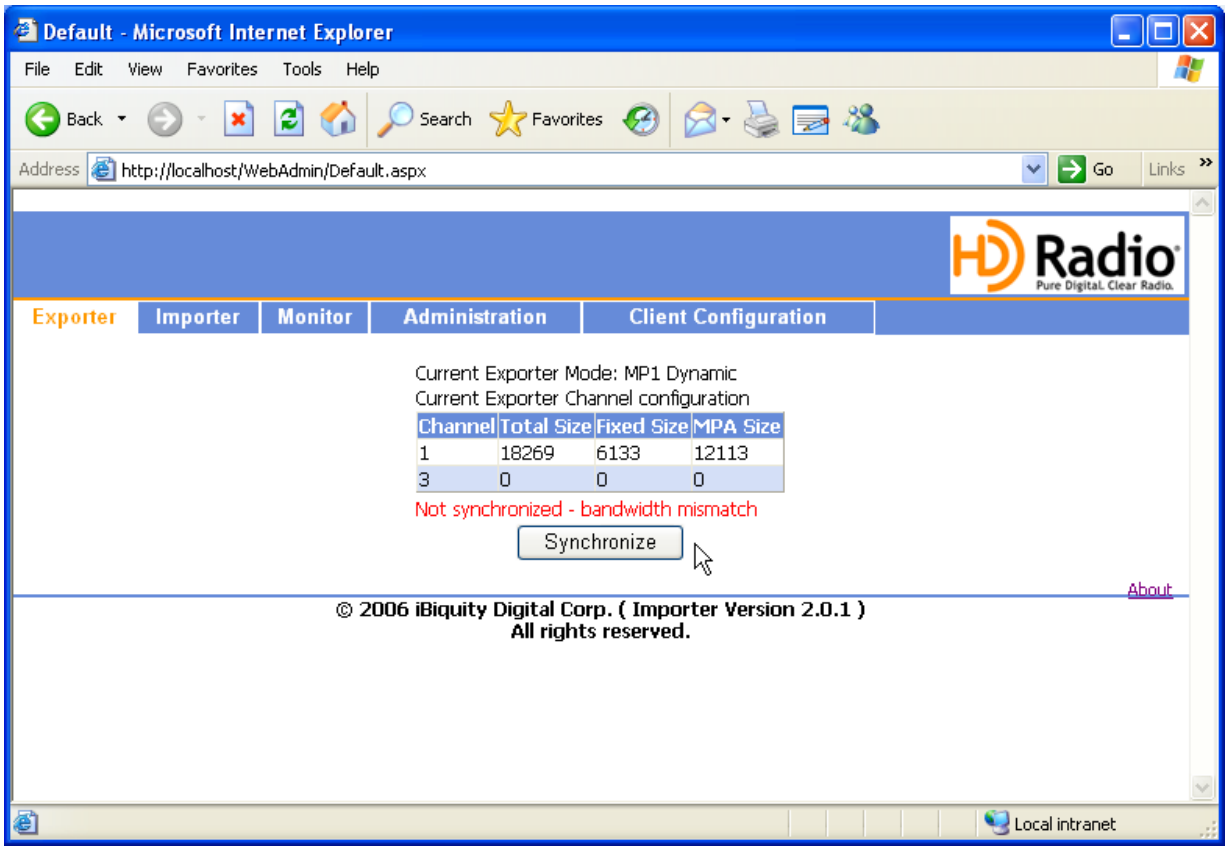


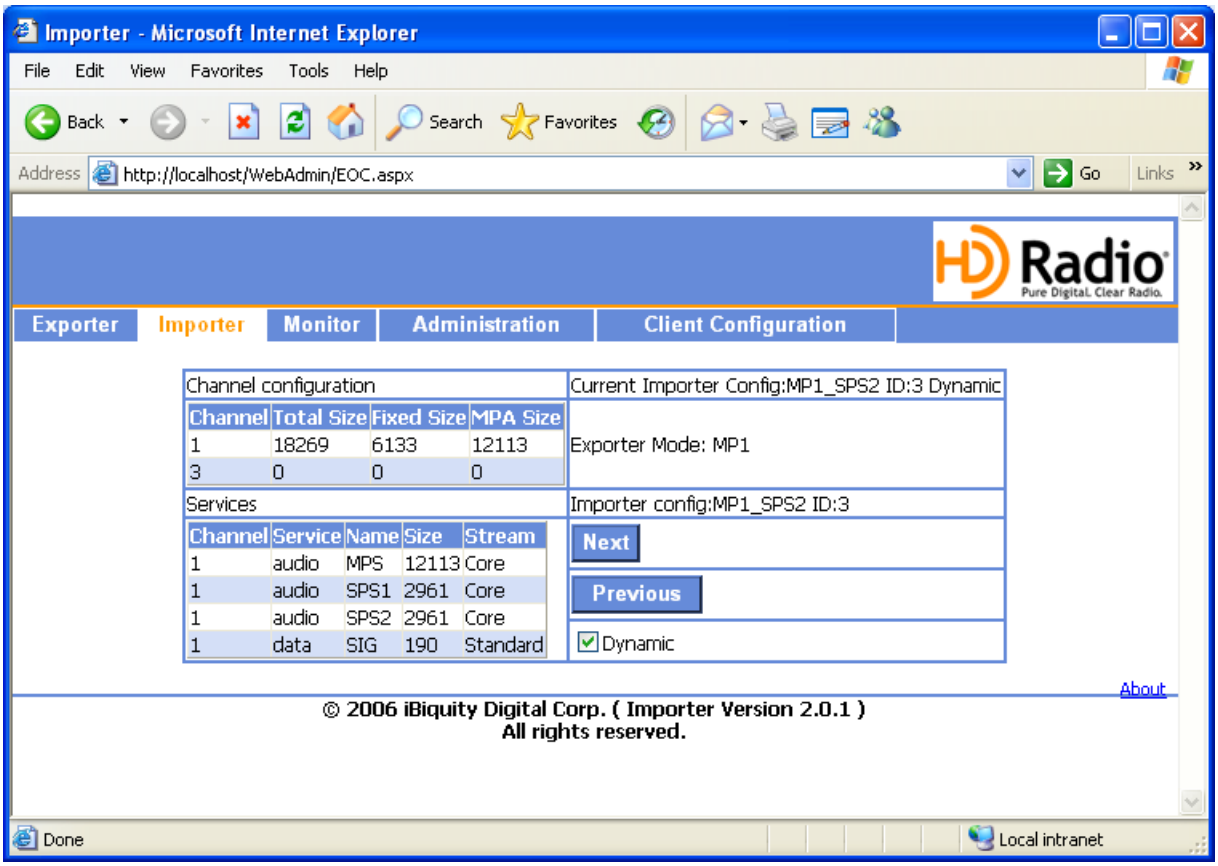
**Figure 1.12: Synchronize page**



## IMPORTER PAGE

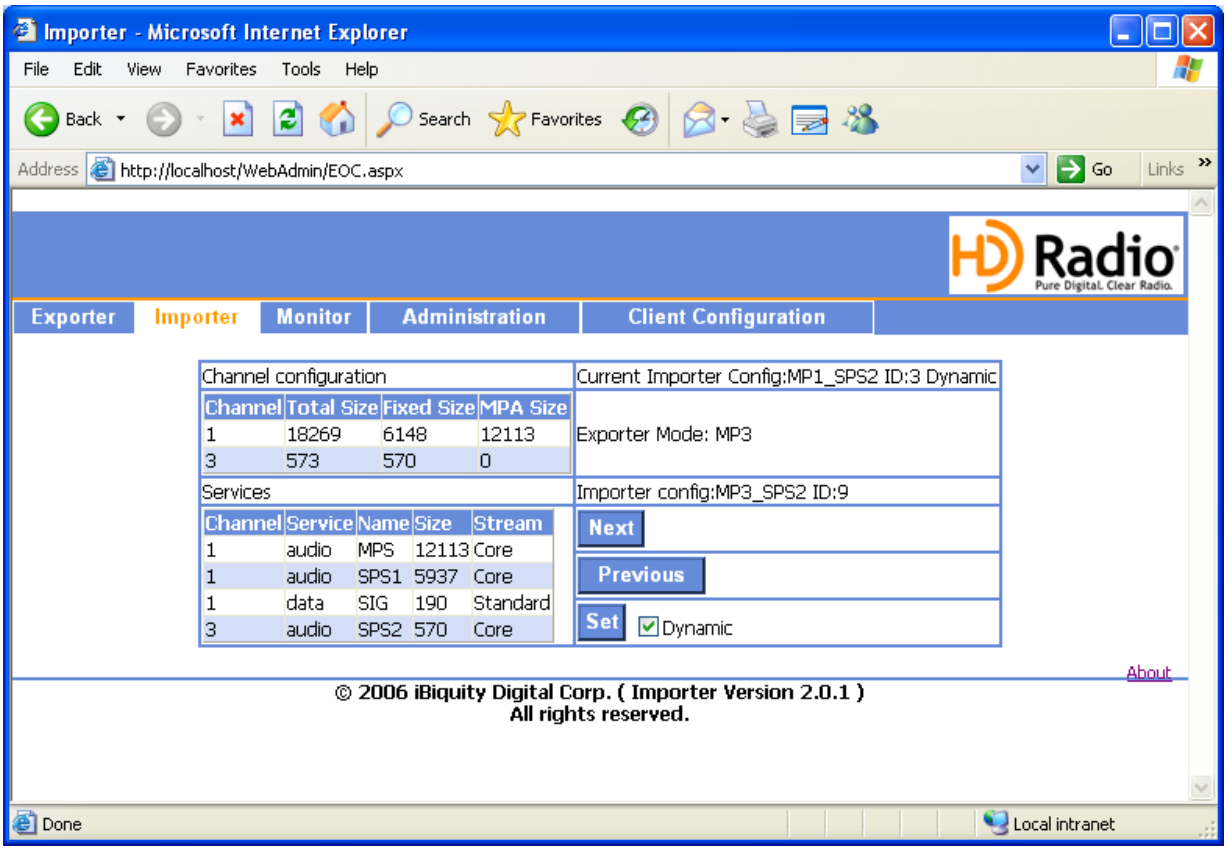
The **Importer** page (see Figure 1.13) displays current configuration and allows the user to change the active configuration.

**Figure 1.13: Importer page (view configurations)**




The **Next** and **Previous** buttons are used to cycle through all of the available configurations. The **Set** button (see Figure 1.14) is used to change the configuration.

**Figure 1.14: Importer page (change configurations)**




## MONITOR PAGE

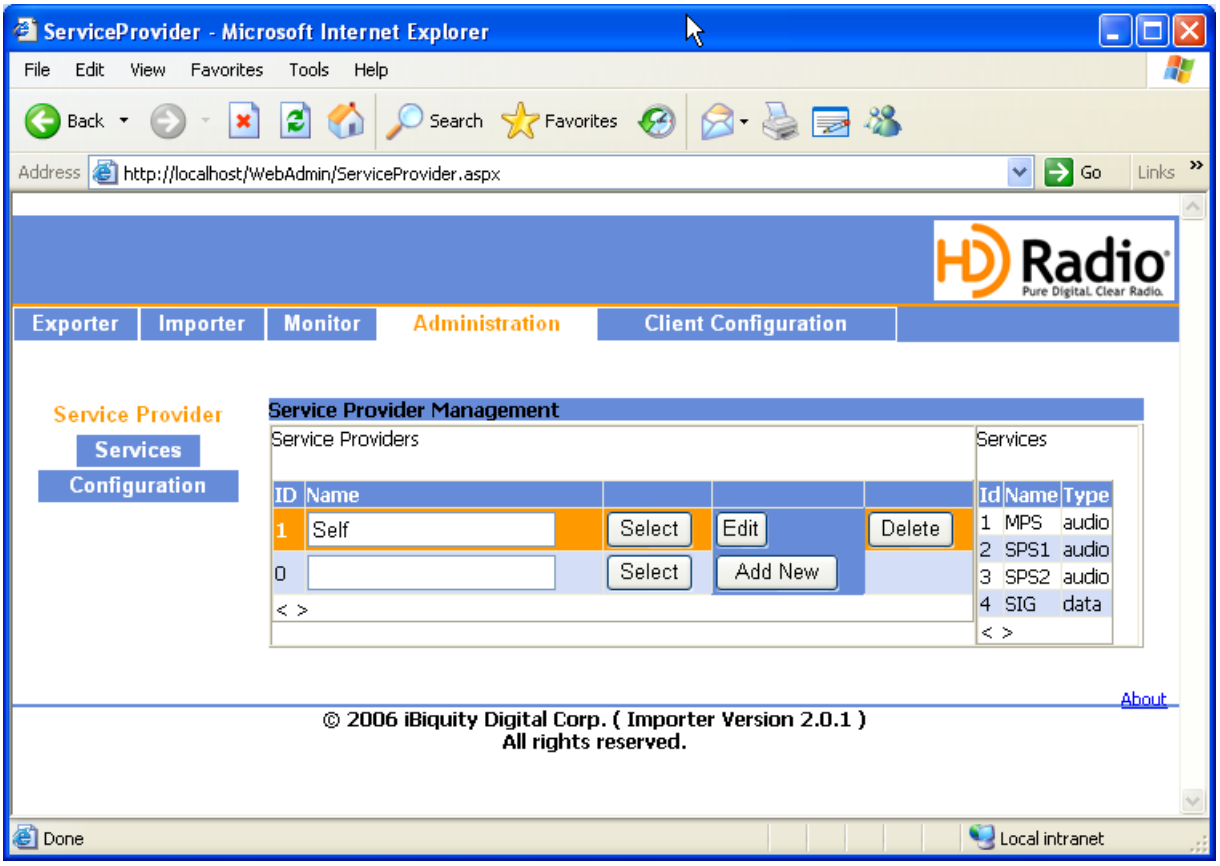
The **Monitor** page is simply a placeholder for future features.

## ADMINISTRATION PAGE

The **Administration** page (see Figure 1.15) provides access to multiple pages - Service Providers, Services and Configuration.

The following section describes how to change audio bandwidth allocation in a configuration. Refer to the *Importer HD User's Guide* to change other parameters such as modifying service provider or services.

**Figure 1.15: Administration page**



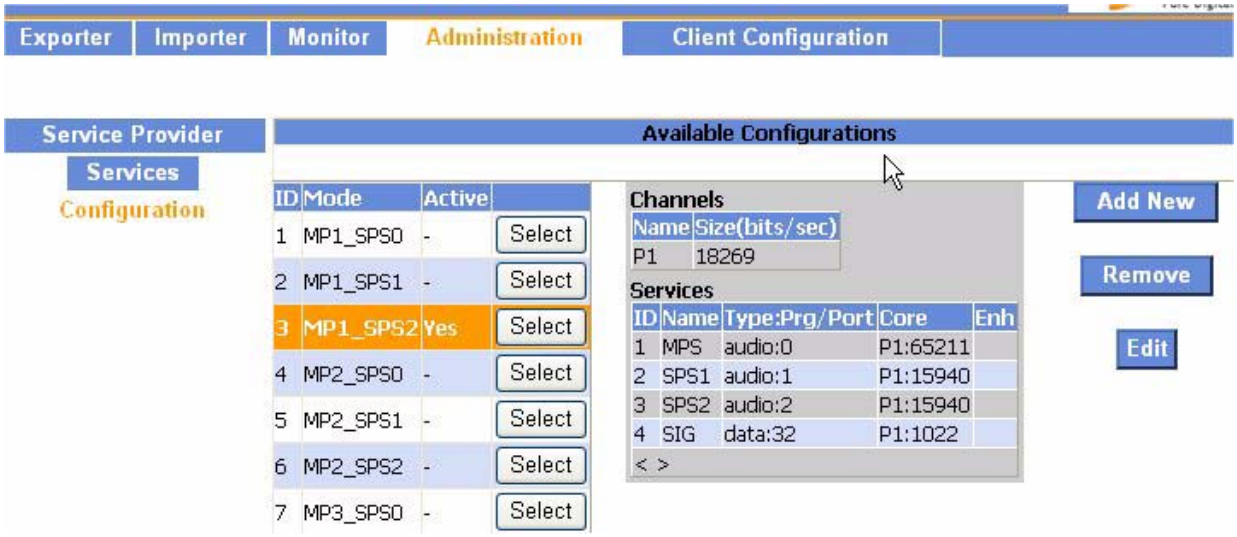
## CHANGING SERVICE BANDWIDTH ALLOCATION

One of the primary functions which can be performed from the **Administration** page (see Figure 1.15) is the allocation of bandwidths for the various services.

Change your bandwidth allocation as follows:

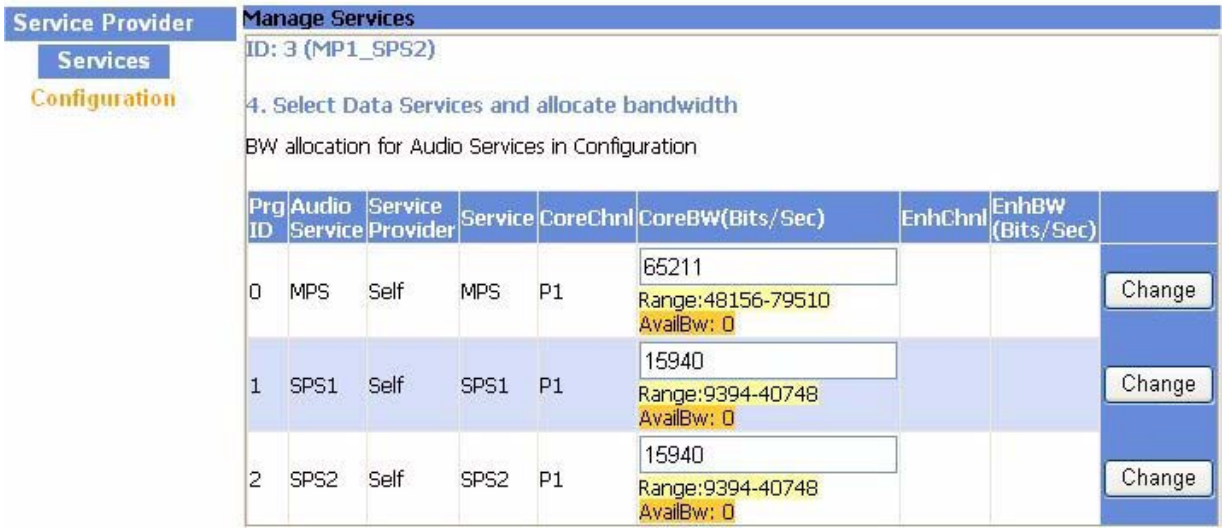
1. From the **Administration** page select a **Configuration**. It will be highlighted orange. The currently active configuration will also be highlighted in orange (see Figure 1.16).

**Figure 1.16: Edit Configuration**



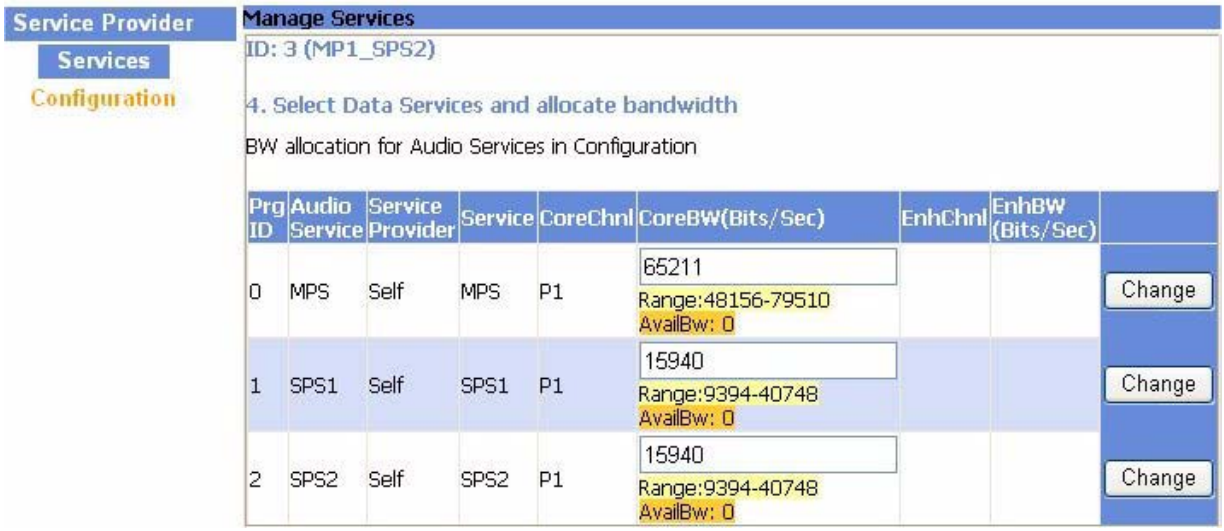

2. Select the blue **Edit** button to move to the next dialog. Each of the audio services is displayed as shown in Figure 1.17. The additional available bandwidth is also indicated.

**Figure 1.17: Bandwidth Allocation for Audio Services**



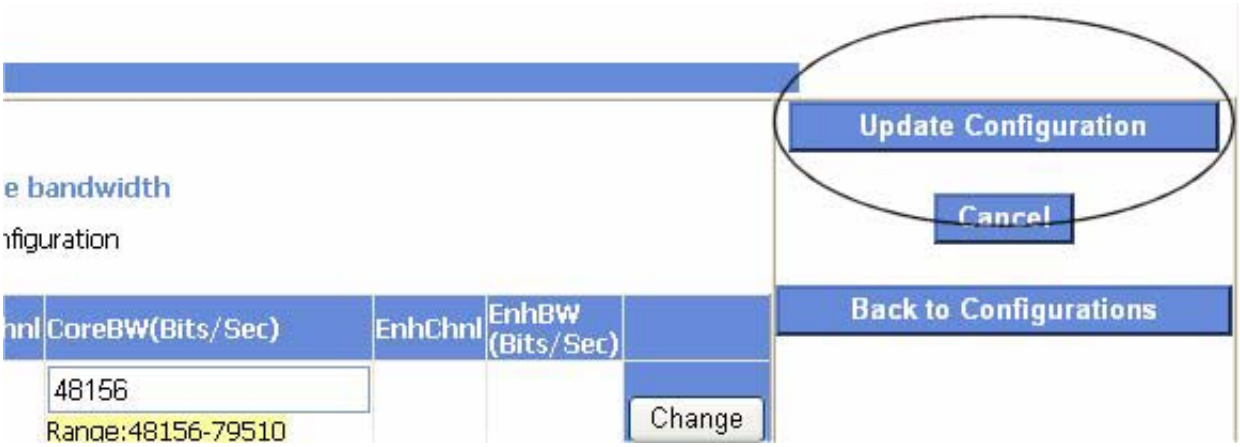

3. Select the **Change** button associated with the service to be changed. Change the bandwidth by editing the value in the **CoreBW (Bits/Sec)** column. Once a new value has been entered, select the **OK** button. The available bandwidth (**AvailBw**) numbers for the various channels will update (see Figure 1.18)

**Figure 1.18: Available Bandwidth after Change**




4. Select the **Update Configuration** button in the upper right portion of the page (see Figure 1.19).

**Figure 1.19: Update Configuration**




5. To implement this changed configuration, return to the Importer page (see Figure 1.13).

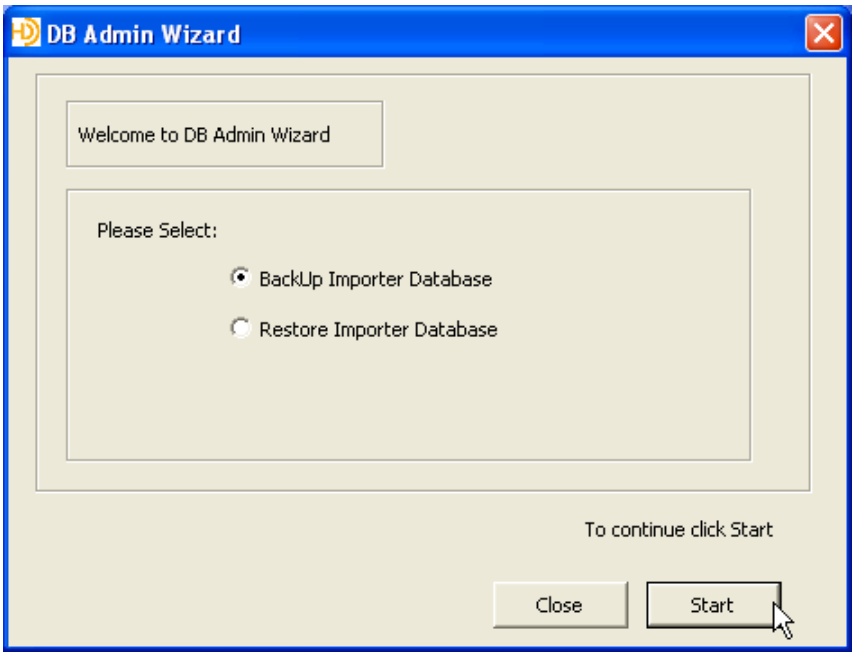
## BACKING UP THE CONFIGURATION DATABASE

It is important that any changes made in the importer configuration (service providers, service bandwidths, contracts, etc.) are saved in a safe location. This will allow system restoration if a hardware failure occurs, or a mistake is made while modifying the configuration.

The importer includes an application, the DB (database) Administration Wizard, for backing up or restoring the database.

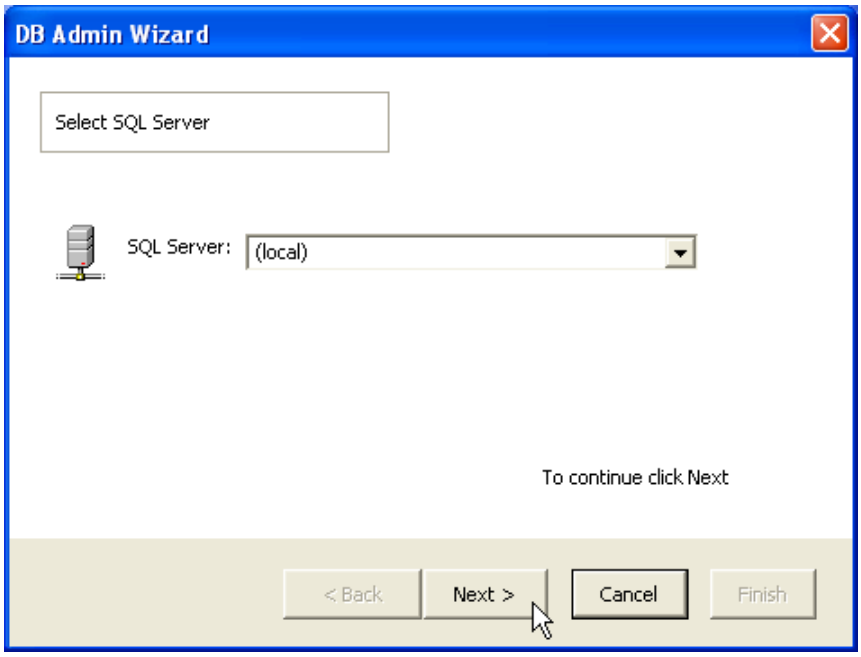
1. Run the application by double clicking the DBAdmin icon on the importer desktop. The screen shown in Figure 1.20 will appear.

**Figure 1.20: DB Administration Wizard Welcome screen**



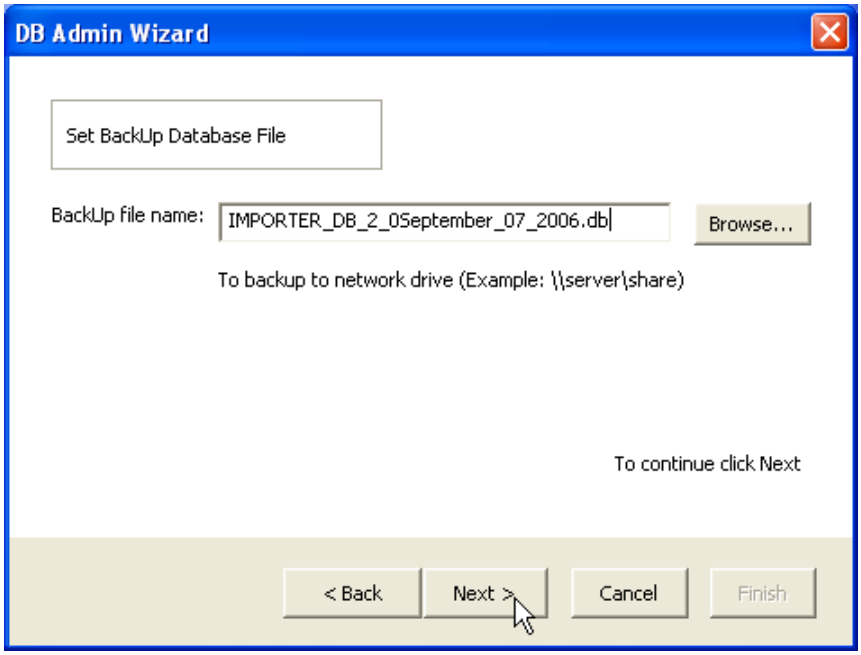

2. Select Backup Importer Database and click on Start. The screen in Figure 1.21 will appear.

**Figure 1.21: DB Administration Wizard SQL Server screen**



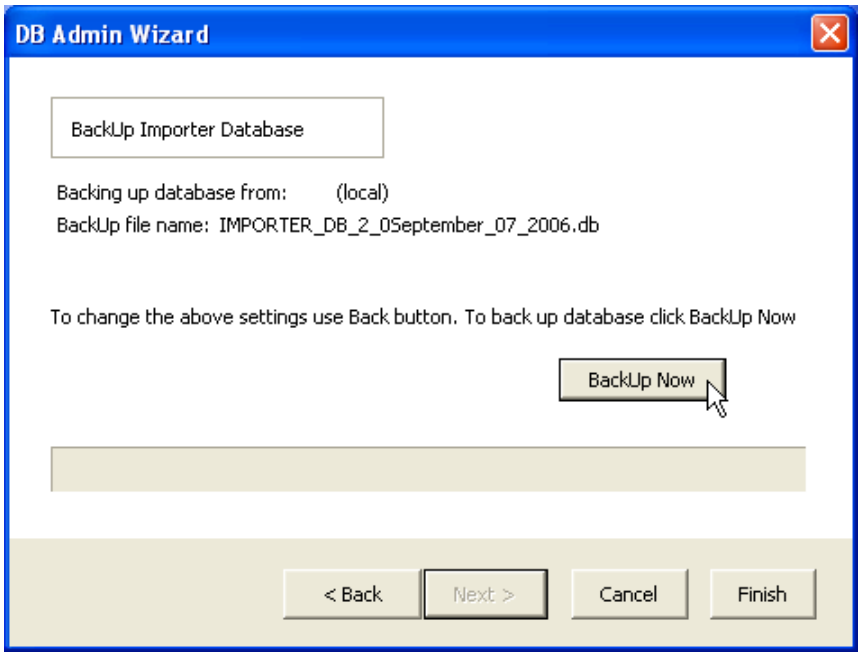

3. Select (local) to connect to the SQL server which is running on the importer. Click Next. The screen in Figure 1.22 will appear.

**Figure 1.22: DB Administration Set Backup Database screen**



4. Enter a path and name for the backup database. Click **Next**. The screen in Figure 1.23 will appear.

**Figure 1.23: DB Administration Backup and Finish screen**




5. Click the **Backup Now** button. When the backup process is complete, click **Finish** to exit.

# SECTION 2: TROUBLESHOOTING

This section provides instructions you need when responding to an importer or system fault. This section includes the following topics:



## CHECKING AUDIO

Use the Windows XP software associated with the audio card to troubleshoot potential audio problems as follows:

1. Click on the icon at the bottom of the **Windows XP** taskbar that displays the **LynxONE Mixer** screen (see Figure 2.1).
2. If the audio card is receiving a proper AES/EBU signal, the channel will indicate a green **Lock** status. The blue **Pro** status indicates AES/EBU.
3. When the SPS application is running, the audio level bars will indicate the audio levels. Ensure that the **Levels** check box is set.
4. If there is more than one audio card, use the **Mixer** pull-down menu to select the desired audio card.
5. If the digital input is not connected, the **LynxONE Mixer** screen will appear as shown in Figure 2.2

**Figure 2.1: LynxOne Mixer Screen**

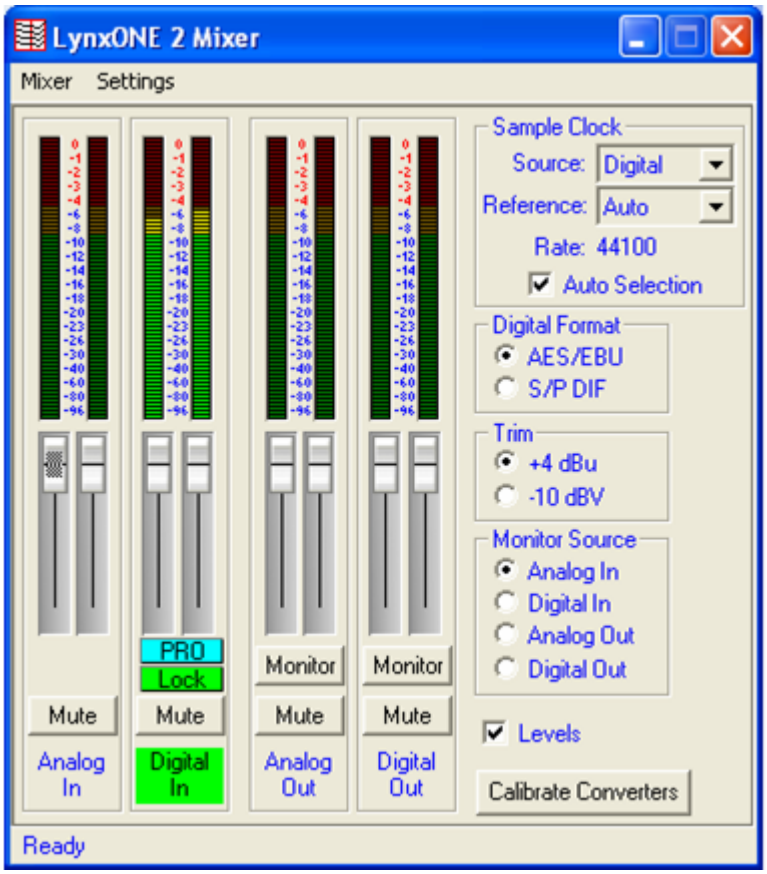
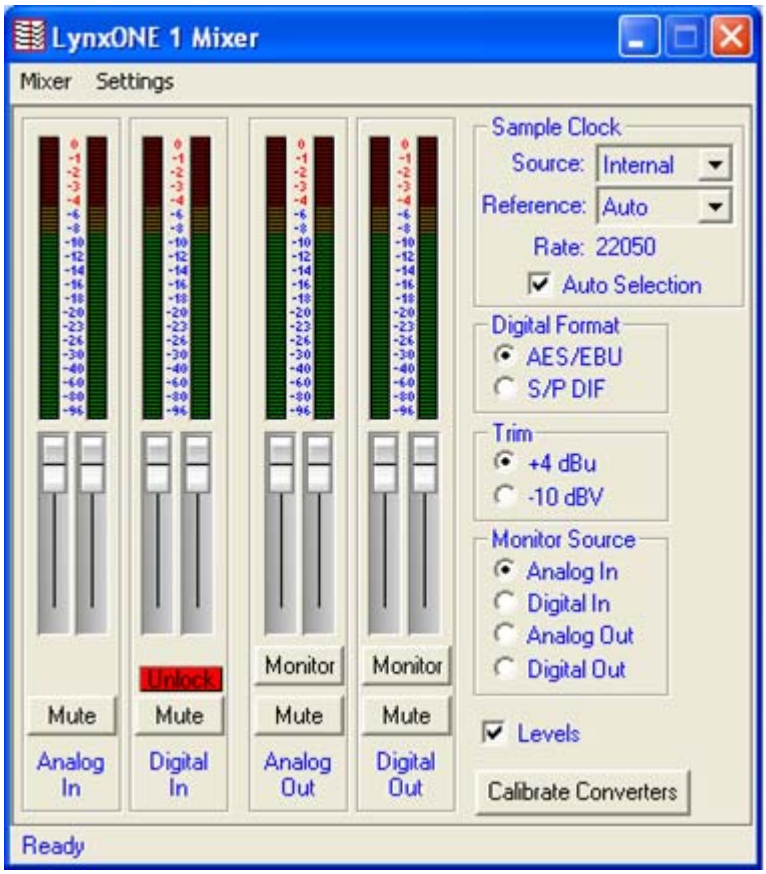


**Figure 2.2: LynxOne Mixer Screen, Digital Input not Connected**




**Note:***Consult the audio card's* LynxOne Installation and Users Guide *for detailed instructions on using this application.*

## CHECKING CABLE CONNECTIONS

Verify that the importer's internal cables are connected properly as follows:

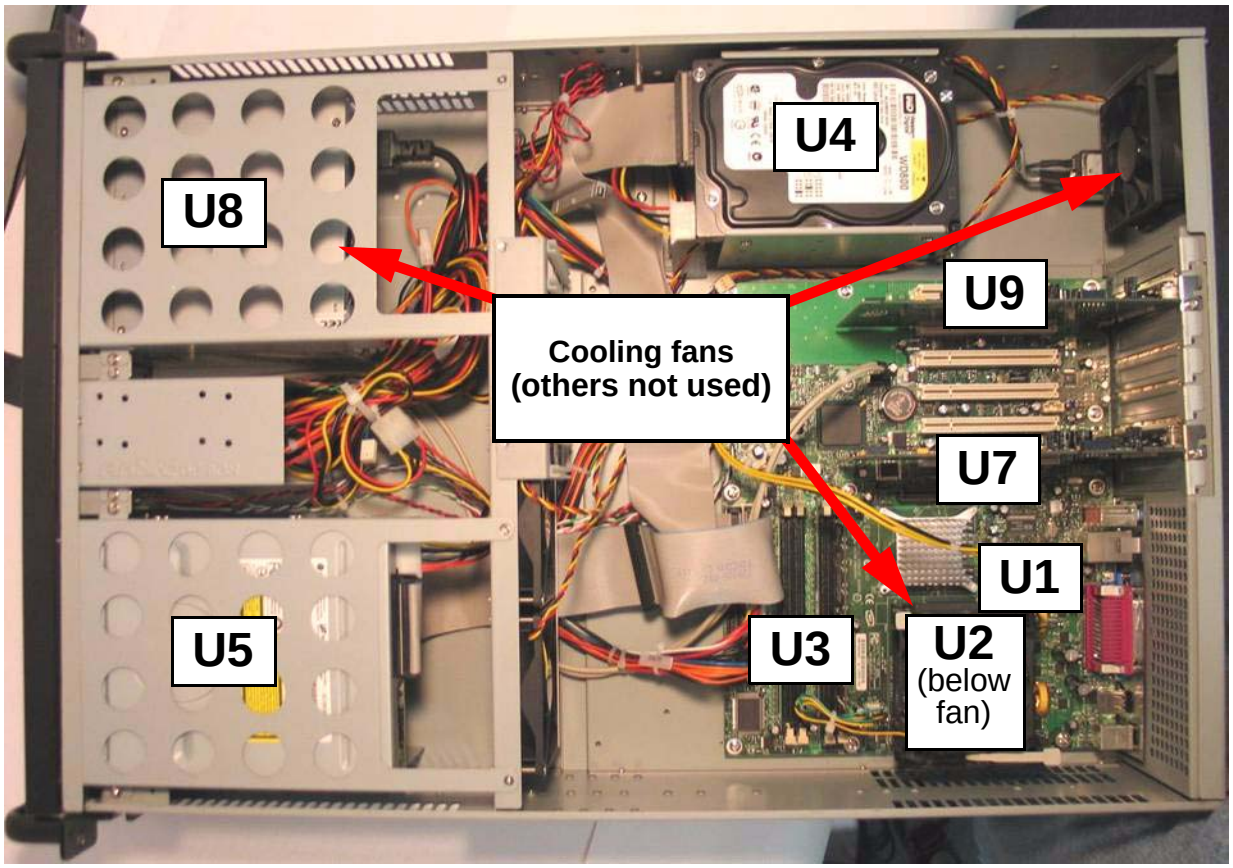
1. Remove the importer's top cover.

2. Inspect the cables and connections. If a connector is unseated or disconnected, ensure it is reconnected to its mate as identified in Table 2.1. If necessary, see Figure 2.3 on page 2-5 to identify the importer's sub-assemblies.

**Table 2.1: Connector Mating Information**

| Connector | Mate | Notes |
|---|---|---|
| P1 | U1J3J1 | Power |
| P2 | U1J5B1 | +12 V |
| P3 | U1J9F1 | FP USB |
| P4 | U1J6J1 | Secondary IDE CD |
| P5 | U1J6J2 | Primary IDE HD |
| P6 | U1J2F1 | CPU Fan |
| P7A | U1J9J1 | Orange 1, White 3 |
| P7B | U1J9J1 | Purple 5, White 7 |
| P7C | U1J9J1 | Red 6, Black 8 |
| P8 | U1J9J3 | Green 1, White 3 |
| P9 | U1J7J3 | Front Fan |
| P10 | U1J7J3 | Hard Drive |
| P11 | U4J2 | P/S |
| P12 | U5J1 | CD-ROM |
| P13 | U5J2 | P/S |

**Figure 2.3: Importer Sub-assemblies**



## PARTS INFORMATION

For the purposes of identifying and possibly ordering replacement parts, the importer's internal assemblies are identified in Table 2.2. The table provides the reference designation, a description, and the Nautel part number for each item.

**Table 2.2: Importer Parts List**

| Reference Designation | Description | Nautel Part # |
|---|---|---|
| U1 | Motherboard, desktop, OEM, LAN, P4, 865G | UA94 |
| U2 | IC, Pentium, 4.3 GHz, 800 MHz FSB, Retail | UR81 |
| U3 | Memory, 512 MB, 400 MHz, DDR, PC3200, DIMM, CL3 | UX80 |
| U4 | Hard drive, WD Caviar SE, Enhanced IDE, 80 GB | UX79 |
| U5 | CD-ROM drive, 52x, Black | UX98 |
| U6 | Software, Microsoft XP Windows PRO | UW65 |
| U7 | Board, audio, 1 digital 2 analog I/O, PCI bus | UA93 |
| U8 | Case, computer, 19" rack, c/w 350 W P/S | UW62 |
| U9** | Board, audio, 1 digital 2 analog I/O, PCI bus | UA93 |
| ** - Used only when a second SPS audio source is required. | | |

# SECTION 3: ROUTINE MAINTENANCE

This section provides instructions for performing routine maintenance on the importer. This section includes the following topics:



## CHECKING THE FANS

The importer contains three operational cooling fans (see Figure 2.4 on page 2-6). In order to maintain your importer warranty and prevent premature component failures, check the fans periodically.

### INTERVAL

- Every six months in typical environments.
- Every three months in dusty, humid or harsh environments.

### PROCEDURE

Take the following steps to check the fans:

1. Remove the importer's top cover. If possible, allow the importer to continue normal operation.
2. Verify that the three cooling fans are turning at an acceptable speed and that there are no visible obstructions.
3. If you need to closely inspect a fan, clear an obstruction, or replace a fan, you must turn off the importer. You should also remove the ac power connection at the back of the importer.

# Cleaning the fan filter

In order to maintain your importer warranty and prevent premature component failures, clean your importer's fan filter periodically.

## Interval

Every six months in typical environments. Every three months in dusty, humid or harsh environments.

## Procedure

Take the following steps to clean the importer's fan filter:

1. Open the importer's front cover using the key provided.
2. Remove the four Philips screws from the back of the front cover and remove the fan filter.
3. Clean the fan filter using soap and warm water. If the fan filter is damaged, replace it immediately.
4. Reinstall the fan filter in the front cover.
5. Restore the locked cover to the front of the importer if desired.

# SECTION 4: LIST OF TERMS

This section defines some of the terms that are used in Nautel documentation.

**AAS.** Advanced Application Services

**AES-EBU.** Audio Engineering Society/European Broadcasting Union (AES/EBU) is the name of a digital audio transfer standard. The AES/EBU digital interface is usually implemented using 3-pin XLR connectors (the same type of connector used in professional microphones). One cable carries both left- and right-channel audio data to the receiving device.

**CAT-5.** Short for Category 5. Network cabling that consists of four twisted pairs of copper wire terminated by RJ45 connectors.

**EASU.** The Exciter Auxiliary Services Unit accepts the studio feed audio in AES/EBU format and converts it to the 44.1 kHz sampling rate used throughout the system. The EASU also contains the GPS receiver that locks onto the Global Positioning System, and determines the site location and time. This information is then passed onto the NE IBOC to be transmitted as part of the station information. The GPS receiver also provides 10 MHz and 1 PPS signals that are used within the NE IBOC for synchronization purposes.

**EOC.** Ensemble Operations Center.

**EXGINE.** An HD™ Radio component which resides in the exciter. The Exgine decodes the Exciter link data and produces the appropriate I/Q modulation.

**GPS.** The Global Positioning System is a system of satellites and receiving devices used to compute positions on the Earth.

**GUI.** Graphical User Interface

**HD™ RADIO.** High definition (HD) Radio is another term for In Band On Channel (IBOC) technology. HD Radio is a trademark of the Ibiquity Digital Corporation.

**IBOC.** Nautel In-Band-On-Channel technology provides high quality digital audio over existing AM and FM radio channels.

**LAN.** Local Area Network.

**MPS.** Main Program Service

**NE IBOC.** Nautel's In-Band-On-Channel signal generator. See IBOC. Required for XR series IBOC installations.

**PAD.** Program-Associated Data.

**SPS.** Supplemental Program Service. Sometimes called SAC. In initial tests, NPR called this Tomorrow Radio.

**STL.** Studio-transmitter Link. A studio-transmitter link sends a radio station's audio signals from a broadcast studio to a transmitter located some distance away from the studio.

**TSL.** Transmitter-studio Link. A transmitter-studio link returns data (e.g., monitoring information) from a transmitter site to a broadcast studio located some distance away from the transmitter.

**UDP.** User Datagram Protocol. A core internet protocol whereby programs on networked computers can send short messages between one another.

**VNC.** Virtual Network Connection.

**XLR.** A 3-pin connector used for a balanced audio cable. Used in pro-audio equipment and AES/EBU digital audio.

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## U



## W

# Importer

# Operations and Maintenance Manual

Document: IMPORTER-OPS-MAINT

Issue: 2.01 2006-09-19

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# HD Radio™ Importer User's Guide

**Software Release 2.0.1**

**August 18, 2006**

**TRADEMARKS**

# Table of Contents

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# List of Figures



# List of Tables

# 1 Scope

## 1.1 System Overview

The iBiquity Digital Corporation broadcasting system is designed to permit a smooth evolution from current analog amplitude modulation (AM) and frequency modulation (FM) radio to a fully digital in-band on-channel (IBOC) system. This system delivers digital audio and data services to mobile, portable, and fixed receivers from terrestrial transmitters in the existing medium frequency (MF) and very high frequency (VHF) radio bands. Broadcasters may continue to transmit analog AM and FM simultaneously with the new, higher-quality and more robust digital signals, allowing themselves and their listeners to convert from analog to digital radio while maintaining their current frequency allocations.

## 1.2 Document Overview

This document provides a description of controls and indicators, system interconnection and operating procedures for the HD Radio Importer. This document contains additional information on the client components included with the generic reference build of the Importer and is intended for end use of that system only.

# 2 Referenced Documents

Not Applicable

# 3 Abbreviations and Conventions

## 3.1 Abbreviations and Acronyms

| | |
|---|---|
| AAS | Advanced Application Services (AAS) |
| AES/EBU | Audio Engineers Society / European Broadcast Union |
| AM | Amplitude Modulation |
| EASU | Exciter Auxiliary Service Unit |
| FM | Frequency Modulation |
| IBOC | In-band On-channel |
| IIS | Internet Information Services |
| MF | Medium Frequency |
| MPA | Main Program Audio |
| MPS | Main Program Service |
| PAD | Program Associated Data |
| PSD | Program Service Data |
| QoS | Quality of Service |
| SIS | Station Information Service |
| SPS | Supplemental Program Service |
| VHF | Very High Frequency |
| WAN | Wide Area Network |

## 3.2 Presentation Conventions

Unless otherwise noted, the following conventions apply to this document:

- Information enclosed in braces { } is either unavailable at the present time or subject to change.
- All vectors are indexed starting with 0.
- The element of a vector with the lowest index is considered to be first.
- In drawings and tables, the leftmost bit is considered to occur first.
- Bit 0 of a byte or word is considered the least significant bit.
- In representations of binary numbers, the least significant bit is on the right.
- When presenting the dimensions of a matrix, the number of rows is given first (e.g., an n x m matrix has n rows and m columns).
- In timing diagrams, earliest time is on the left.

# 4 Overview

## 4.1 AAS Overview

With the advent of HD Radio, broadcast stations can now transmit their programs as a high quality digital signal. In addition to the Main Program Service (MPS) and Station Information Service (SIS), the HD Radio system also provides the capacity to transmit other digital services referred to as Advanced Application Services (AAS). Examples of AAS include multicast programming, electronic program guides, navigation maps, traffic information, multimedia programming and other content.

To meet the demands for AAS, the AAS framework has been created. The AAS framework provides a common infrastructure to: 1) Support the radio station in managing its bandwidth, 2) allow studio automation vendors, or other broadcast equipment manufactures, the ability to incorporate AAS into their product offerings, and 3) support the developers of AAS applications. For a description of the AAS framework see Reference **Error! Reference source not found.**.

Figure 4-1 shows a block diagram of the AAS framework as part of the broadcast infrastructure. The 3 main elements are 1) the clients (e.g. service providers and administrators), 2) the Importer, and 3) the Exporter. This document focuses on the operational use of the Importer.

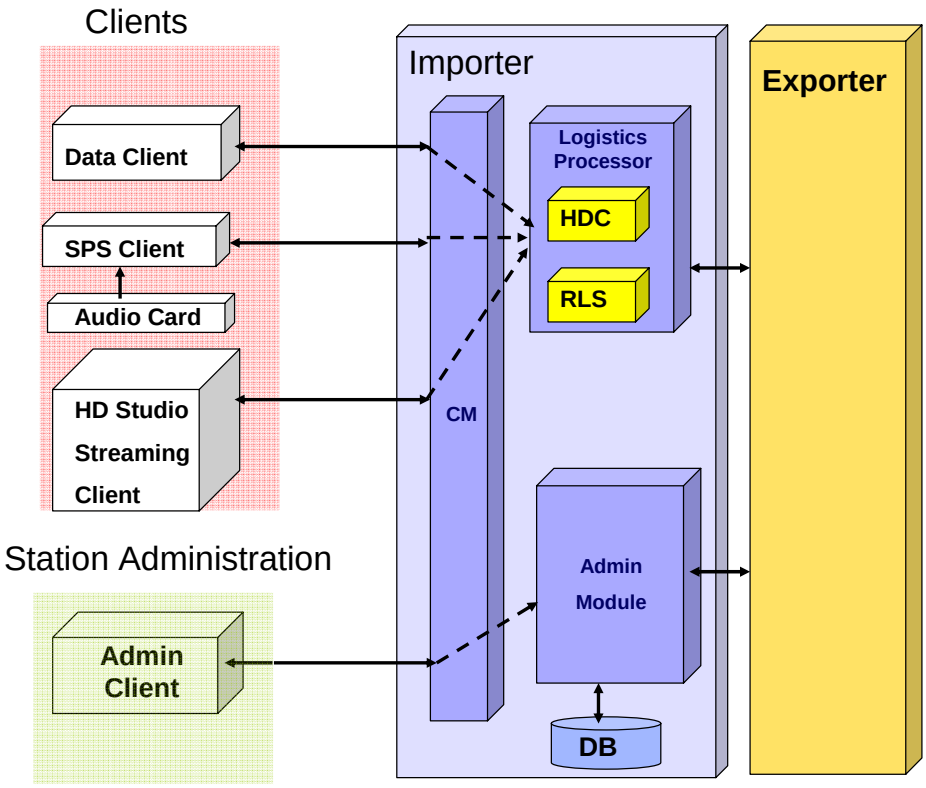


*Figure 4-1 Importer Components and their interconnections.*

## 4.2 Importer Component Overview

The following paragraphs provide a brief description of the various Importer Components.

- *Importer Database:* The persistent data for the functioning of the Importer is stored in the Importer database. All the Administrative functionality is handled by interaction with this database. Importer components like the Connection Manager and the Logistics Processor write data about their functioning into the Importer Database.
- *Administration (Admin Module):* Administration is basically an offline activity to enable broadcast stations to configure the Importer according to their requirements. The Admin Module also communicates with the Exciter or Exporter to configure these sub-systems into the appropriate operational modes based on the desired service mode and bandwidth allocations. Finally, the Admin Module handles all the registration of service providers, services, and Importer configurations.
- *Logistics Processor*: The Logistics Processor is responsible for the data reception from the service providers in accordance with the specific protocol chosen for that particular service. For example, if the service is a multicast audio service, the Logistics Processor is responsible for the HDC encoding of the audio program. For data services, including PSD, the Logistics Processor is responsible for encoding the data using the Radio Link Subsystem (RLS). In addition to encoding data using the proper transmission protocol, the Logistics Processor is also responsible for managing the bandwidth and QoS for each service as defined in the configurations between the service provider and the broadcast station. It communicates with the Connection Manager as well as an Exciter or Exporter. It also communicates with the Importer Database in order to retrieve configuration information and save its performance data.
- *Connection Manager (CM)*: The Connection Manager is responsible for managing the connections from the various services. It authenticates service providers and delivers the specific information regarding the configurations and services for each service provider. It provides the mechanism for service providers to deliver data services to the Importer. It allows multiple service providers to connect to the Importer and multiple services to be delivered by each service provider. The Connection Manager connects to the Importer Database for authentication information as well as to the Logistics Processor for bandwidth and QoS information.
- *Logging Service*: Although not shown in Figure 4-1, the Importer incorporates a logging package that allows the various components to write messages to a file. These messages can be informational (i.e. documenting certain events) or can indicate errors or warnings. This file can be very useful for failure analysis in case the Importer should cease to function properly. This logging package is implemented as a Windows "Service" and hence will start automatically on system start-up.
- *Control Panel*: Although not shown in Figure 4-1, the Importer software includes a module that can be used to control, configure, and monitor the main Importer components.
- *WebAdmin*: This client allows for in-depth administration and configuration of Service Providers, Services, modes and bandwidth via a web accessible HTML interface.
- *Capture Client*: This client allows the capture audio samples from any DirectX compatible audio card and feeds them to the Importer. In addition, this client accepts PSD messages in ID3 format from a specified UDP port and uses the Importer API to send this data along with the SPS audio samples.

- *Streaming Client:* This client is intended to facilitate the testing of MPS, SPS and Data applications without having a complete studio automation system. It connects directly to an Importer, eliminating the need for an audio card dedicated to the SPS service.
- *Generic Data Client:* This Client can be used to transmit any type of discrete data packets formatted in the generic data client format

# 5 Hardware/Software Requirements

Not applicable.

# 6 Exciter Interconnections and Configuration

Not applicable.

# 7 Installation and Configuration

Not applicable.

# 8 Operating Procedures

## 8.1 Introduction

This section describes how to operate the Importer components individually as well as under the management of the Control Panel. It also describes the utilities available for the management (backup and restore) of the Importer database. It also explains the use of the various sample clients included in the Importer tools.

## 8.2 Starting and Running the Importer Components Individually

Once the Importer is configured to run, the various Importer components must be started in the correct order and then the desired service provider clients can be connected. The correct starting order is:

- Administrator
- Logistics Processor
- Connection Manager

The stopping order is the reverse of this, or:

- Connection Manager
- Logistics Processor
- Administrator

### 8.2.1 Administrator

The first component that must be started is the Administrator. This can be started by double-clicking the executable file found at C:\Program Files\iBiquity Digital\Importer\Servers\Administrator.exe. Or alternatively from the start menu select

*Start Menu -> iBiquity Digital -> Importer -> Administrator*

When the application is started, a window similar to Figure 8-1 will appear.

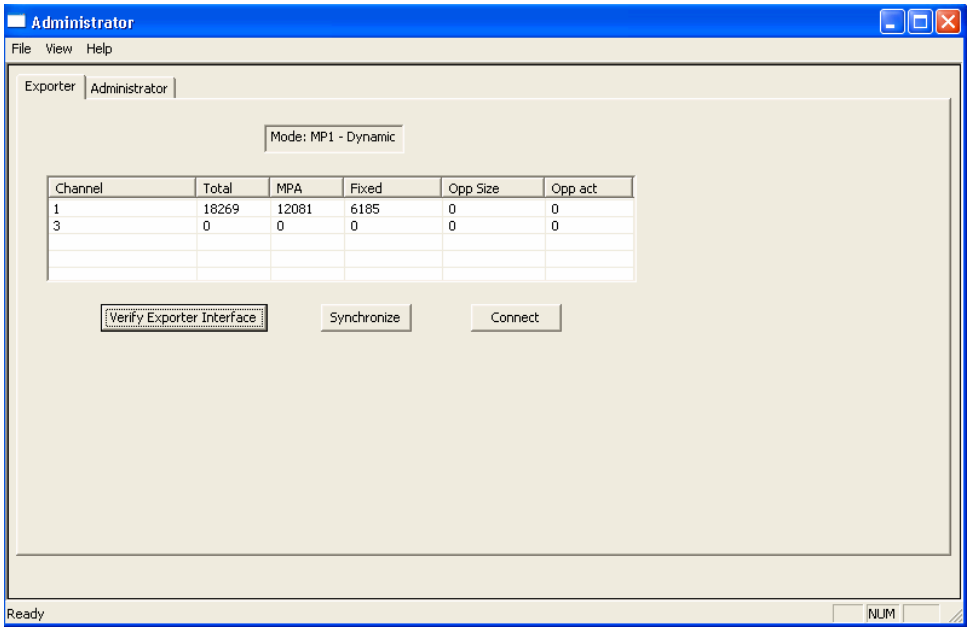


*Figure 8-1 Administrator Main Window*

If the Exciter/Exporter is not in the same configuration as the Importer the pop-up window in Figure 8-2 will appear

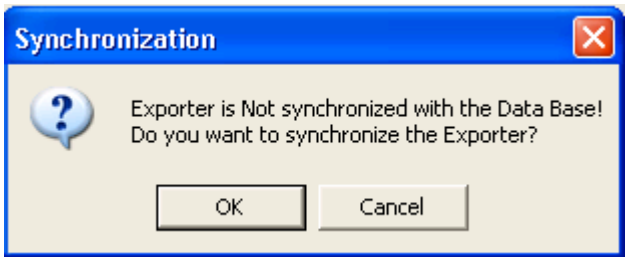


*Figure 8-2 Administrator Synchronization Window*

Press OK to reconfigure the Exciter/Exporter.

The "Verify Exporter Interface" button is used to verify both the Synchronization and Connection to the Exciter/Exporter. The "Synchronize" button is used to manually synchronize the Importer and Exciter/Exporter. The "Connect" is used to manually connect the Importer to the Exporter.

The Administrator can also used to switch between stored configurations. The configurations can only be managed using an external Administrator client. For an example of an Administrator client, "Web Admin," see Reference **Error! Reference source not found.**. To use the Administrator to switch between configurations select the Administrator Tab and a Window similar to Figure 8-3 will be displayed.

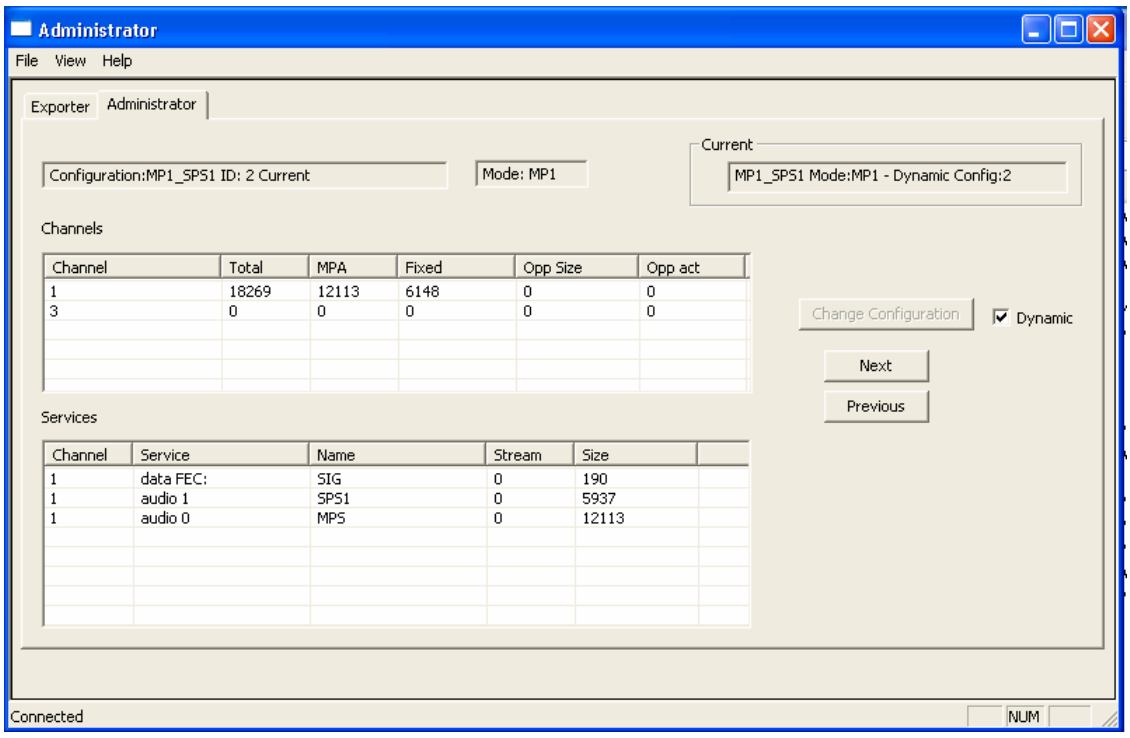


*Figure 8-3 Administrator Window, Administrator Tab*

This window displays the details of the stored configurations, starting with the current configuration. To display the details of the other configurations, press the Next or Previous buttons. To change the Importer

configuration select “Change Configuration.” Checking the Dynamic box puts the Exciter/Exporter in the dynamic scaling and mode changing configurations and is highly recommended.

### 8.2.2 Logistics Processor

The next component that must be started is the Logistics Processor. This can be started by double-clicking the executable file found at C:\Program Files\iBiquity Digital\Importer\Servers\LogisticsProcessor.exe. Or alternatively from the start menu select

*Start Menu -> iBiquity Digital -> Importer -> LogisticsProcessor*

When the application is started, a window similar to Figure 8-4 will appear.

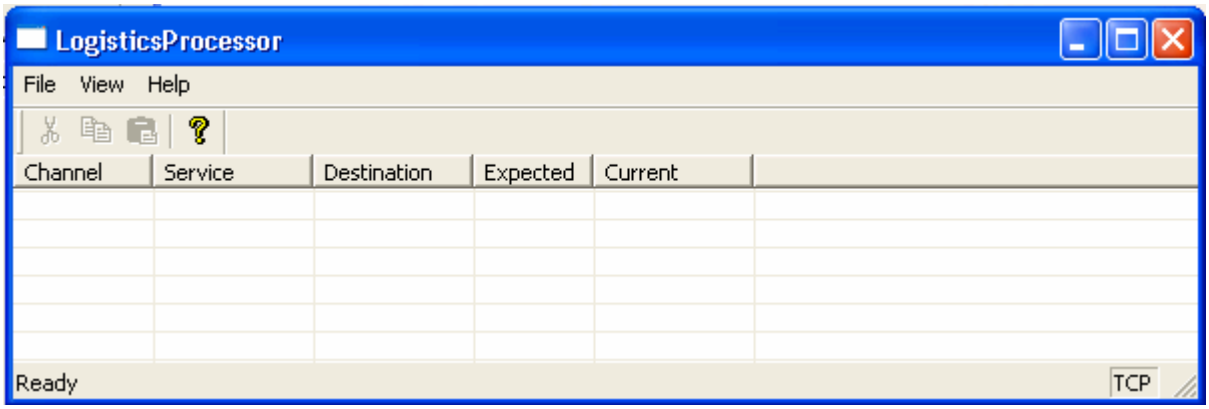


*Figure 8-4 Logistics Processor Main Window*

The Logistics Processor window displays information about the services connected to the Importer. For example, Figure 8-5 show the Logistics Processor display when both a data client and a SPS client are connected and broadcasting content.

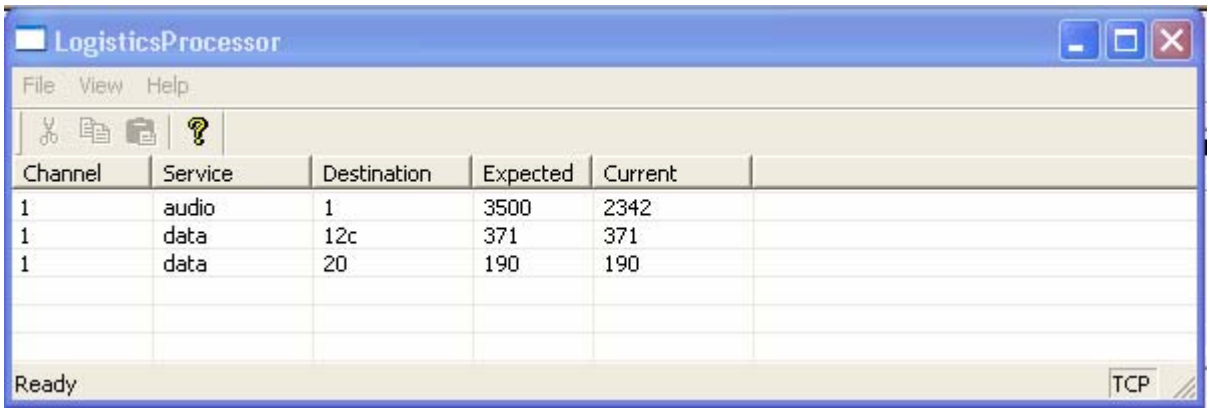


*Figure 8-5 Logistics Processor display with clients broadcasting content.*

The Channel column indicates the Logical Channel the client is broadcasting on. The Service column indicates whether it is an audio or data client. The Destination column indicates the Program number for SPS clients and the Port number for data clients. The Expected Column indicates the bandwidth allocated for that service and the Current column indicates the actual bandwidth being used.

### 8.2.3 Connection Manager

The last component to be started is the Connection Manager. This can be started by double-clicking the executable file found at: C:\Program Files\iBiquity Digital\Importer\Servers\ConnectionManager.exe. Or alternatively from the start menu select

*Start Menu -> iBiquity Digital -> Importer -> Connection Manager*

Once the application is started a Window similar to Figure 8-6 will be displayed.

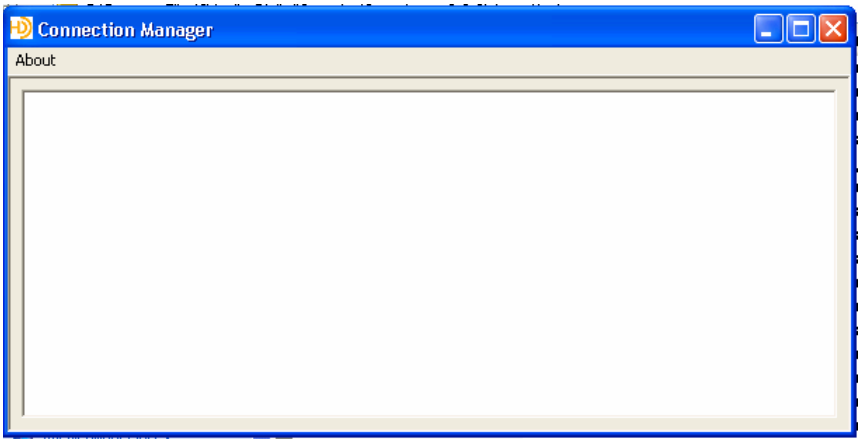


*Figure 8-6 Connection Manager Main Window*

Once client applications connect to the Importer, the Connection Manger window will display the connection information. An example of this is shown in Figure 8-7.

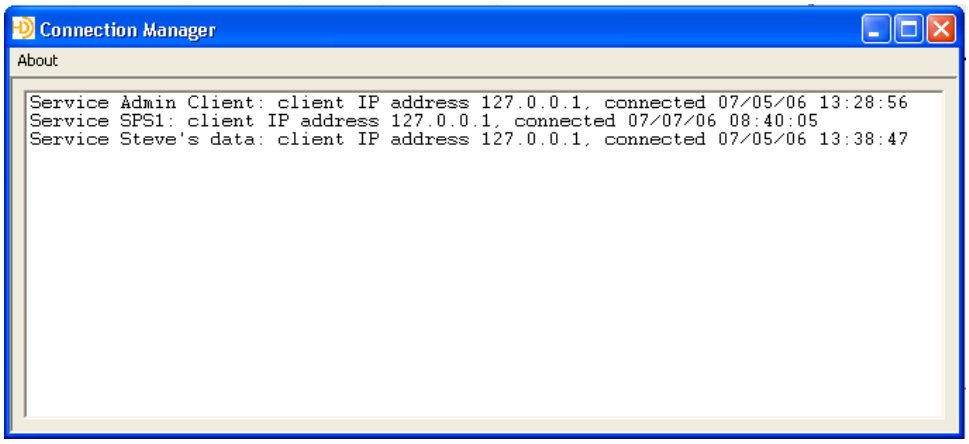


*Figure 8-7 Connection Manger Window, after clients have been connected.*

## 8.3 Control Panel

While each of the Importer components can be started individually, the recommended method to start, configure, and monitor the Importer is through the Control Panel. The Control Panel allows the hiding of the various Importer component windows, reducing the amount of clutter on the desktop. The Control Panel can also be used to set the Importer configuration information, eliminating the need to directly edit the XML configuration files. Finally, the Control Panel can be used to view and manipulate the log files created by the Importer components.

The Control Panel can be started by double-clicking desktop icon or the executable file found at: C:\Program Files\iBiquity Digital\Importer\Servers\ControlPanel.exe, or finally from the start menu select

*Start Menu -> iBiquity Digital -> Importer -> ControlPanel*

Once the application is started a Window similar to Figure 8-8 will be displayed.

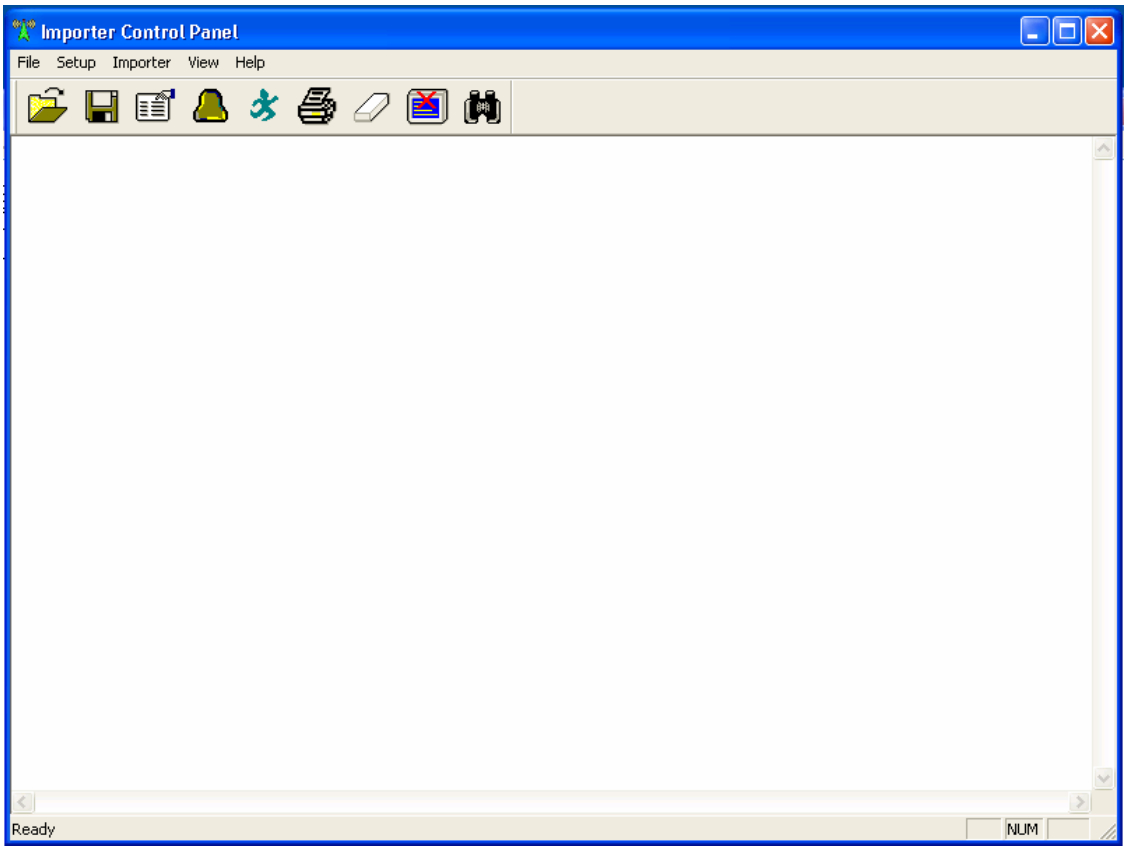


*Figure 8-8 Control Panel Main Window.*

To close this window and only display an icon in the task tray, simply press X in the upper right hand corner. When the icon is green, it means the Importer components are running.

To edit the Importer configurations, press the Importer Setup icon or select Setup->Importer. A display box similar to Figure 8-9 will be displayed. From here all the Importer configuration items described in Section **Error! Reference source not found.** can be edited and saved.

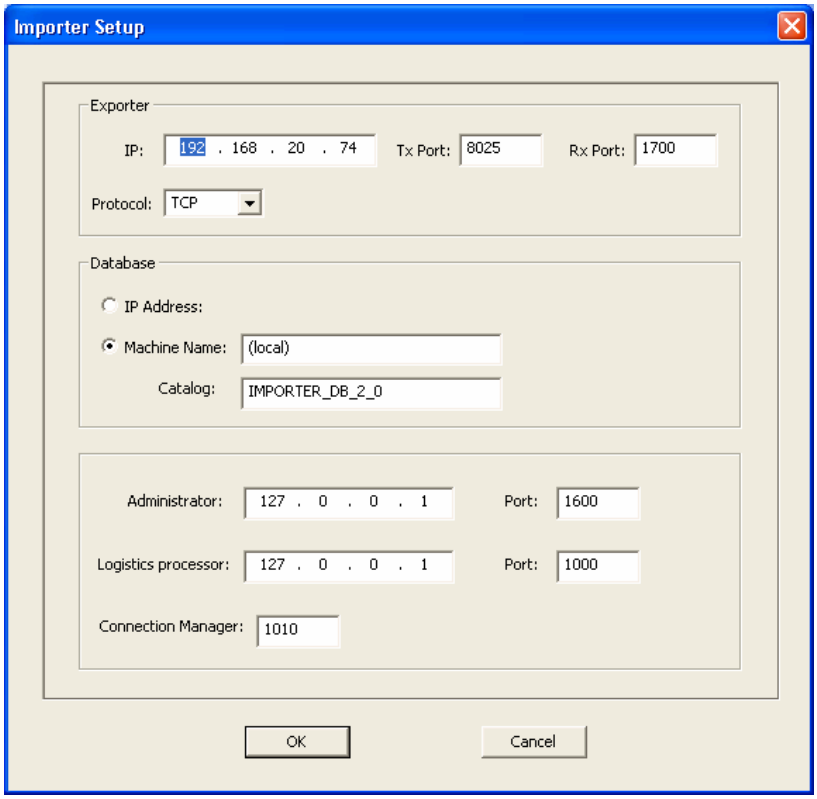


*Figure 8-9 Control Panel Importer Setup*

To edit the logging configurations, press the logging Setup icon or select Setup->Importer. A display box similar to Figure 8-10 will be displayed. From here all the logging configuration items described in Section **Error! Reference source not found.** can be edited and saved.

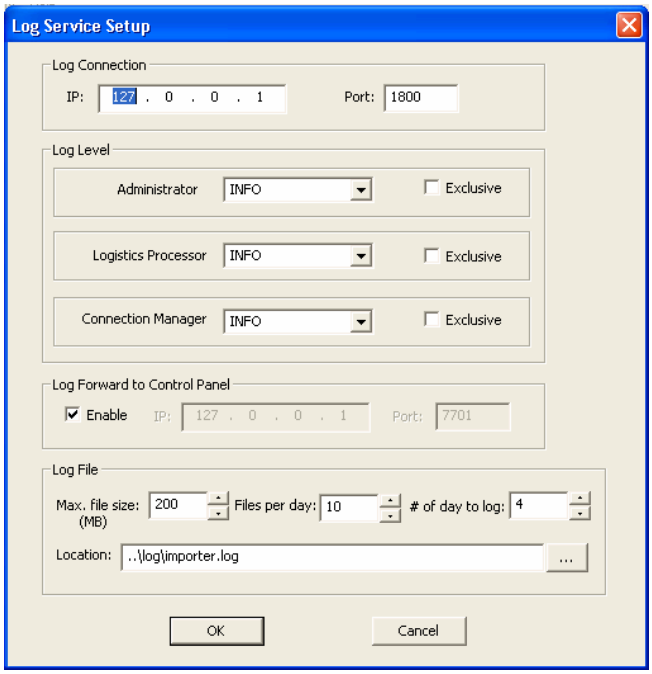


*Figure 8-10 Control Panel Log Service Setup Dialog*

To start the Importer press the start Importer Icon or Importer->Start. To stop the Importer press the Stop Icon or Importer->Stop.

By default the log messages will be displayed in the control panel window. An example is shown in Figure 8-11. Error messages are displayed in Red, warnings in yellow and debug in black.

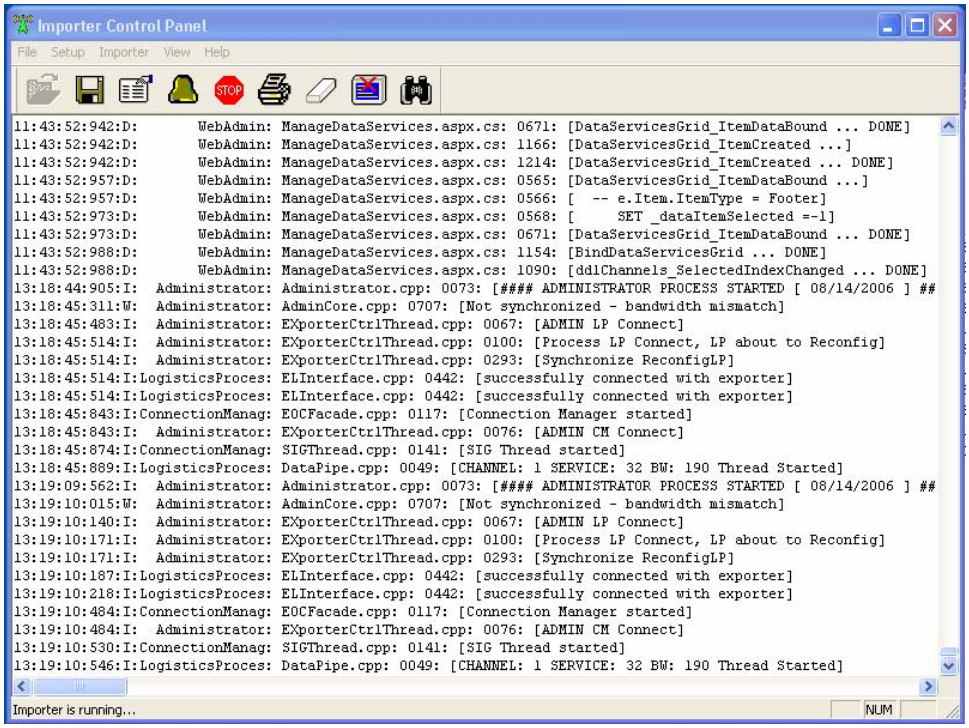


*Figure 8-11 Control Panel with Log messages displayed.*

To erase the contents of this window press the Eraser icon.

To save the contents of the window to a file press the file save icon.

To view a previously stored log file, press the file open icon. **Note: This can only be done when the Importer is not running.**

To enable or disable log messages, use the display icon.

To search for specific strings within a log file use the spyglass icon.

## 8.4 Database Management

The central repository used by the Importer can be backed up using the DBAdmin tool. This backup file can be stored in a secure location and can be used to restore the database if required. The DBAdmin tool can also be used for restoring the central repository.

The Users of the Importer may have customized their installation, added their Service Providers, Contracts and Services and may have setup up their ideal configurations. This information is stored in the Importer database. This tool is provided so that this information is not lost and can be easily restored in situations where the system has crashed and a reinstall is required. The backups created using this tool should be stored in a safe location away from the Importer, so it is available when required. Backups can be taken manually in a scheduled manner like once a month or when major changes have been applied to the Importer configuration.

This tool should be run on the Importer, by a user belonging to the Administrative group on the computer.

To start the *DBAdmin* tool, run the following application:

C:\Program Files\iBiquity Digital\Importer\servers\DBAdmin.exe

Once the application is started a window similar to Figure 8-12 will appear. Follow the instructions presented in the ensuing screens to either backup or restore the Importer database.

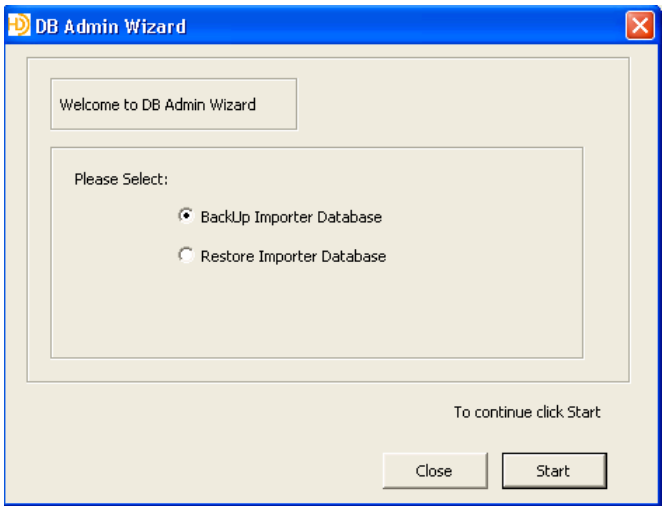


*Figure 8-12 Database Management Wizard Main Window.*

### 8.4.1 Backup the Database:

Select “BackUp Importer Database” to back up the Database and click on “Start” and a dialog box similar to Figure 8-13 will appear. Select “(local) to connect to the SQL Server running on the Importer. Click Next. If the User has administrative access the screen in Figure 8-14 is displayed.

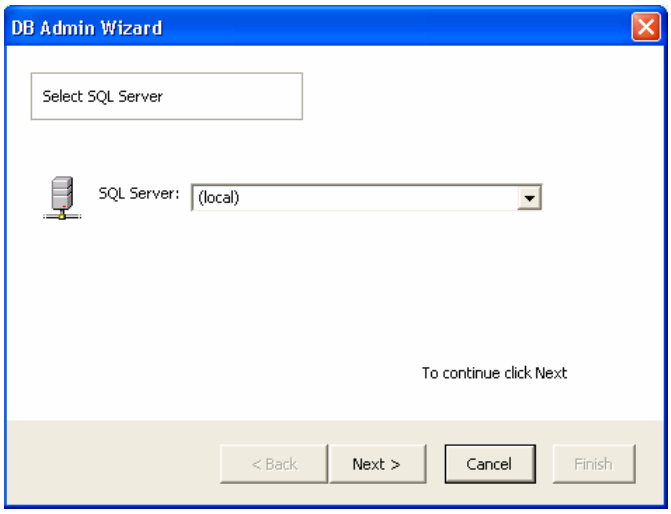


*Figure 8-13 Database Management Wizard Authentication Window.*

Enter and path and filename for the backup file. Make sure that the Backup file location is under the C: directory and not under a specific users directory. In the example shown in Figure 8-14, the location is in the personal folder of the current user and the backup cannot be created there. Instead select a directory directly under the C: drive. Make sure the Directory and the file name do not contain spaces. Alternately, a Network Drive can also be selected, example "\\server\share".Click "Next" and a window similar to Figure 8-15 will appear.

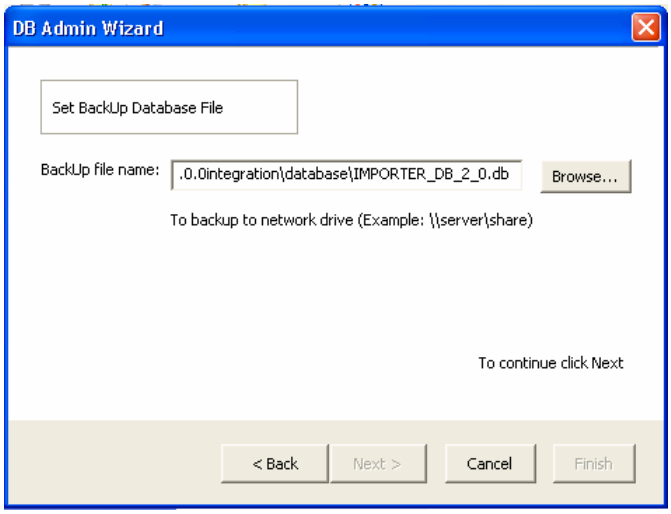


*Figure 8-14 Database Management Wizard Backup Path.*

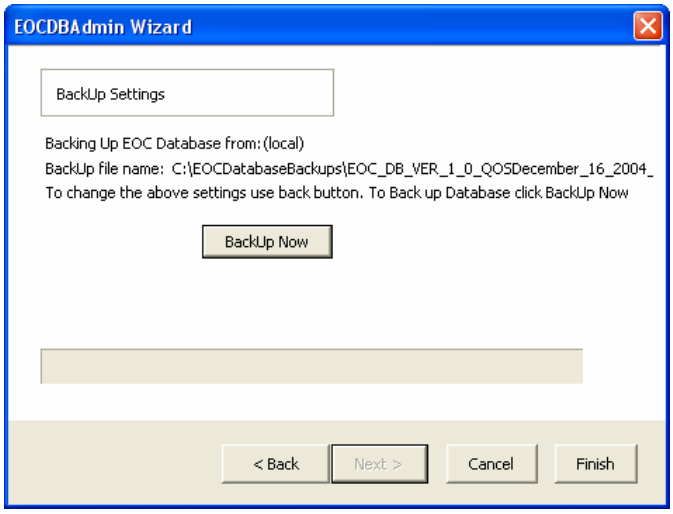


*Figure 8-15 Database Management Wizard Backup Progress Screen.*

Check the Back up Settings and click "BackUp Now" to start the back up of the EOC database. Click Finish when done.

### 8.4.2 Restore the Database:

Shutdown all Importer components. Select Restore Importer Database to restore the Database and click on "Start.". This tool uses Windows authentication to connect to the Database. Therefore the user logged on to Importer should be a **part of the Administrative group** on the Importer. Select "(local) to connect to the SQL Server running on the Importer. Click Next. If the user has administrative access the screen in Figure 8-16 is displayed. Select the backup file to use. Click Next and a window similar to Figure 8-17 will be displayed.

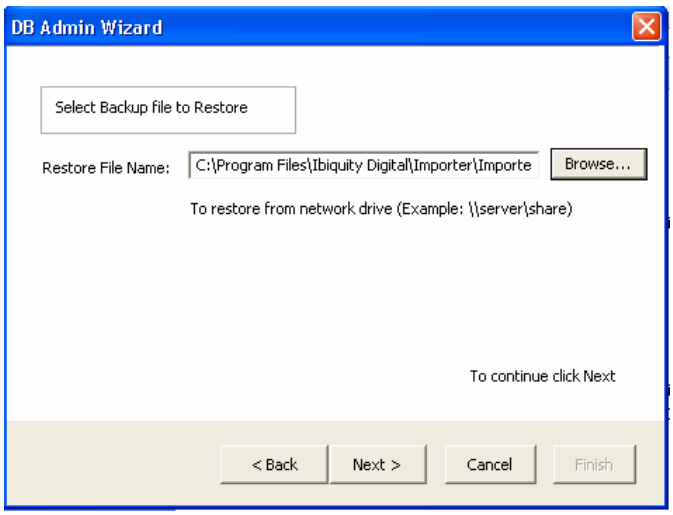


*Figure 8-16 Path to Backup File*

Check to see that the correct Server (local) is selected and the backup file is correct. Click "Restore Now" to start the database restore. On completion click Finish to exit the Wizard.

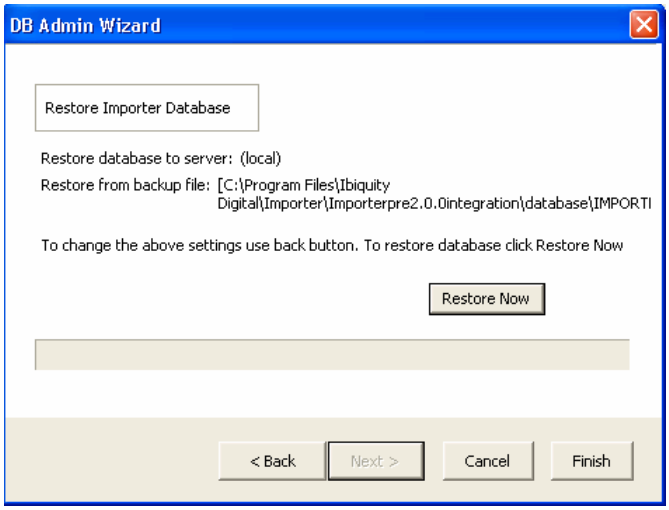


*Figure 8-17 Restore Process Dialog*

## 8.5 Changing Configurations

The Importer now allows Administrators the ability to dynamically change configurations, which may or may not have different services associated with the new configuration. While Importer v2.0 is a vast improvement over previous Importer versions, the dynamic nature of changing configurations is not totally seamless.

This section provides a few rules and guidelines when switching configurations.

1. When switching between any configurations that are not dynamic, all services or clients must be disconnected and reconnected.
2. When switching between hybrid and all-digital dynamic configurations, all services or clients must be disconnected and reconnected.
3. If a service or client is changing logical channels when configurations are being switched, these services or clients must be disconnected and reconnected.
4. If a data service or client's bandwidth is being reduced, be aware that significant latencies can occur as the Importer works to transmit all previously requested data packets at the reduced bandwidth
5. Depending on the type of bandwidth change being requested by an SPS service, outages will occur in the SPS service. These outages may last for up to a minute.

## 8.6 Operating the Client Components

The Importer Clients include the Web Admin, SPS Capture Client, Generic Data Client, and the Streaming Client. These client applications were developed as sample applications as examples of how to use the Importer API but are fully functioning and may be use as they are.

### 8.6.1 WebAdmin Client

Advanced Services such as secondary audio programs and data services that are sent through the Importer are provided by service providers. In order for service providers to connect to the Importer and send their services, service providers must be registered with the Importer. A service provider then defines its service(s) and creates Importer configurations to allow that service to be broadcast.

All of these administrative actions (i.e. service provider registration, service definition, and Importer configuration management) are managed using the Administration portion of the Importer The WebAdmin client is an application that implements this API, demonstrating the aforementioned administrative actions.

#### 8.6.1.1 Sign In

When the WebAdmin application is started the Sign In page is displayed as shown in Figure 8-18.

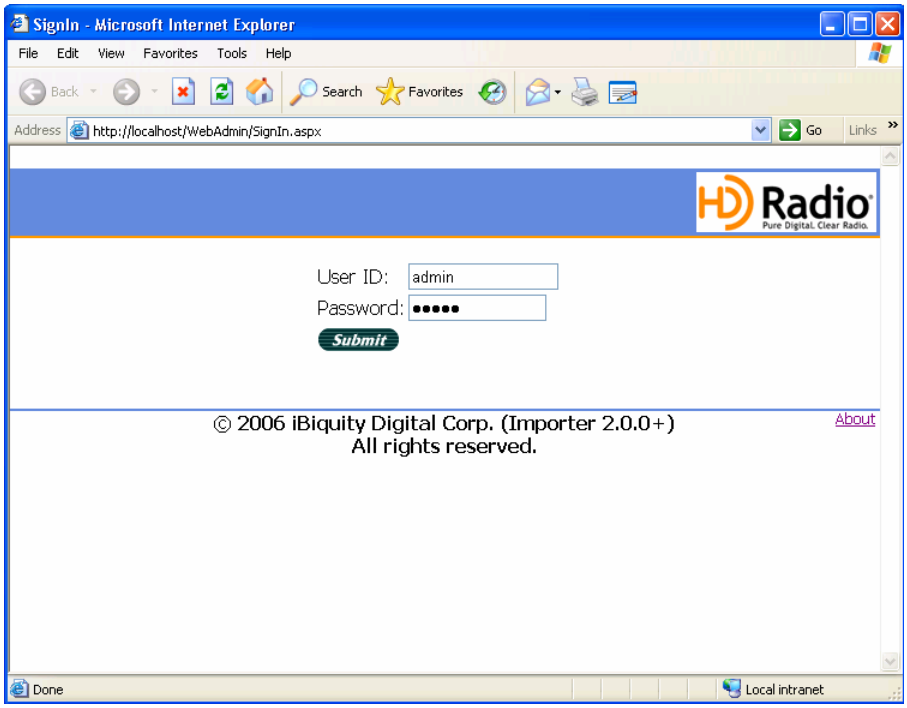


*Figure 8-18: WebAdmin SignIn page*

After the Submit button is pressed a default page, similar to Figure 8-19, is displayed. This page has four main tabs: Exporter, Importer, Monitor, and Administration. Each of these is described in the following subsections.

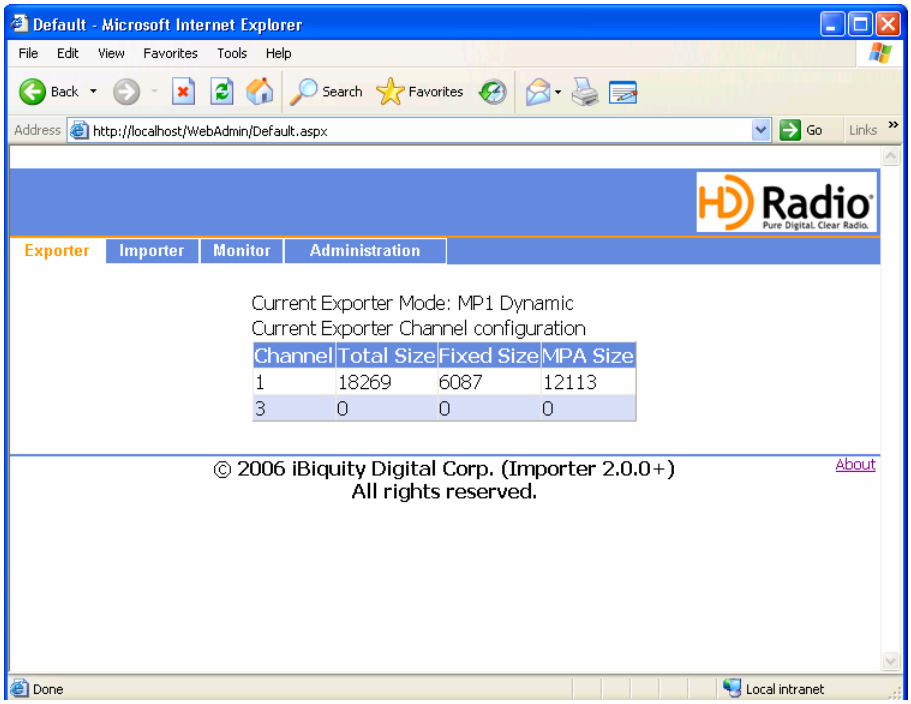


*Figure 8-19: WebAdmin Default Page*

### 8.6.1.2 Exporter

This page displays the current Exporter/Exciter Configuration. It provides information on the Service Mode as well as the channel configuration. It also indicates when the Exporter/Exciter is not synchronized with the current Importer configuration, as shown in Figure 8-20. This message will attempt to provide a clue as to why the Importer is not matching the exporter, such as bandwidth mismatch or service mode mismatch, etc…

Care must be taken to check that the Exporter is synchronized whenever a change is made to an Importer configuration. This should be done before attempting to broadcast any AAS services.

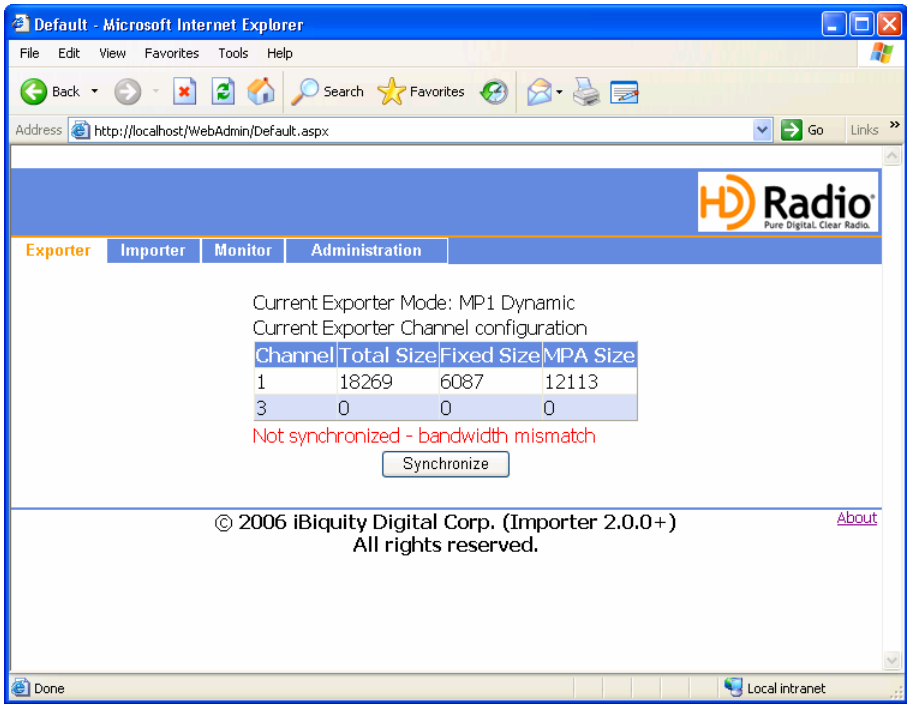


*Figure 8-20: WebAdmin Exporter Page when Exporter is not synchronized with Importer*

#### 8.6.1.3 Importer

The Importer page, shown in Figure 8-21, displays the Importer configurations and allows the user to change configurations. This page displays the channel configuration as well as what services are associated with that configuration. All Importer configurations are viewable by pressing the next or previous buttons. The default page always shows the current configuration. When the next or previous button is pressed to show a configuration that is not the current configuration a "Set" button is displayed to allow the user to change the Importer configuration (see Figure 8-22). Checking the "Dynamic" box puts the exciter into one of the dynamic configurations allowing changes in bandwidth configuration to occur with out an exciter reboot. This option is highly recommended.

Most of the columns in the services group box are self explanatory. "Channel" refers to the logical channel the service is being broadcast on. "Service" defines the service type (i.e. audio or data). "Name" displays the name given to the service. "Size" gives the bandwidth, in terms of bytes/pdu, allocated to that service. The "Stream" column has a dual meaning, depending on the service type. If the type is audio this column displays whether the audio being broadcast on the indicated logical channel is the core or enhanced stream. If the service type is data, this column displays the QoS level for that service.

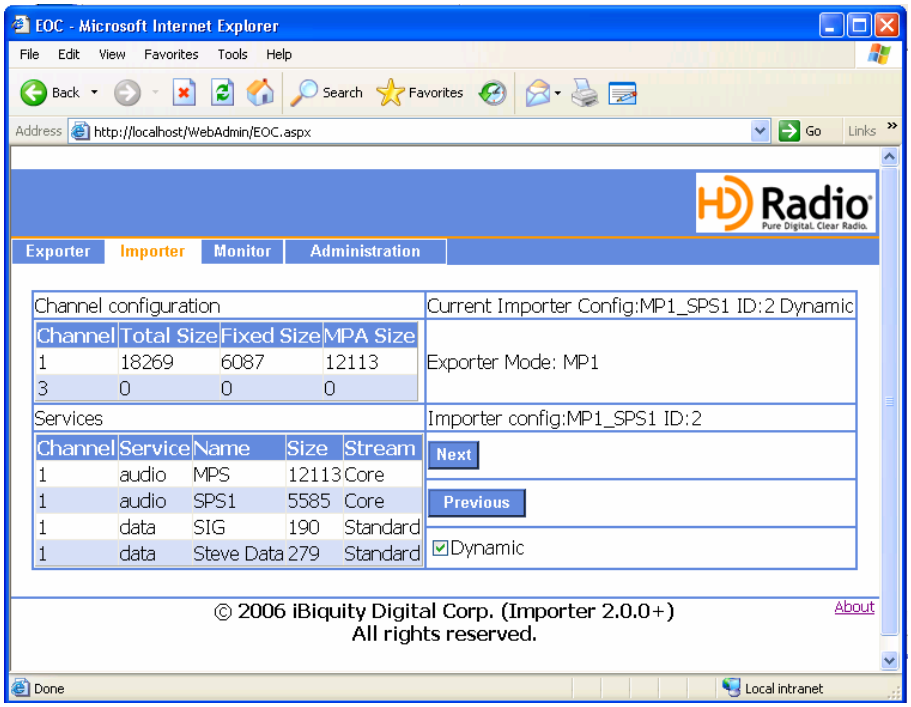


*Figure 8-21: WebAdmin Importer Page*

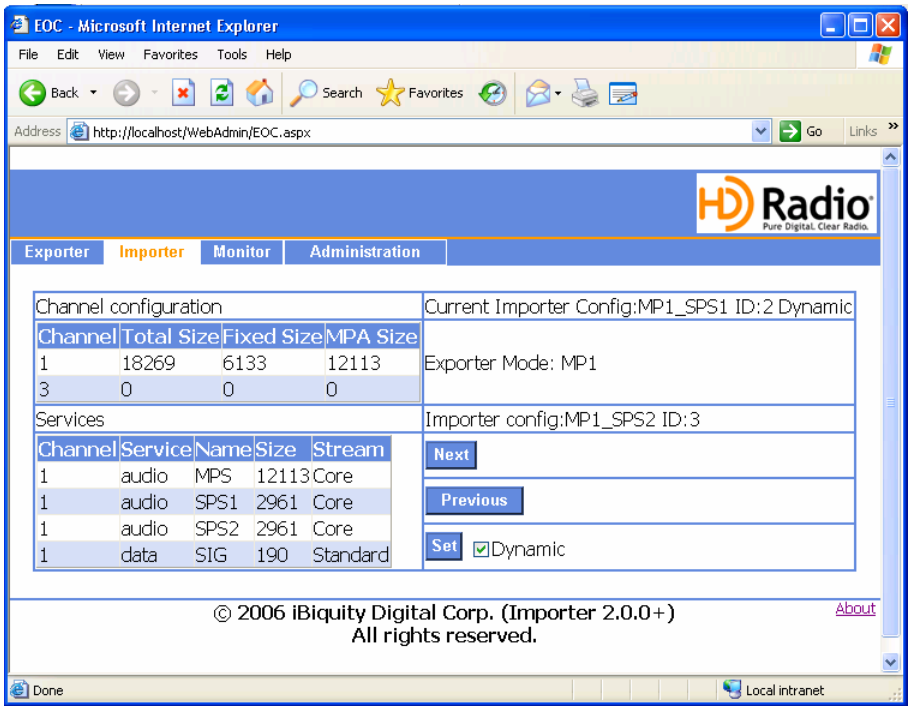


*Figure 8-22: WebAdmin Importer Page when viewing a not current configuration*

#### 8.6.1.4 Monitor

The Monitor page is shown in Figure 8-23. This page is a place holder for future upgrades to the Importer API.

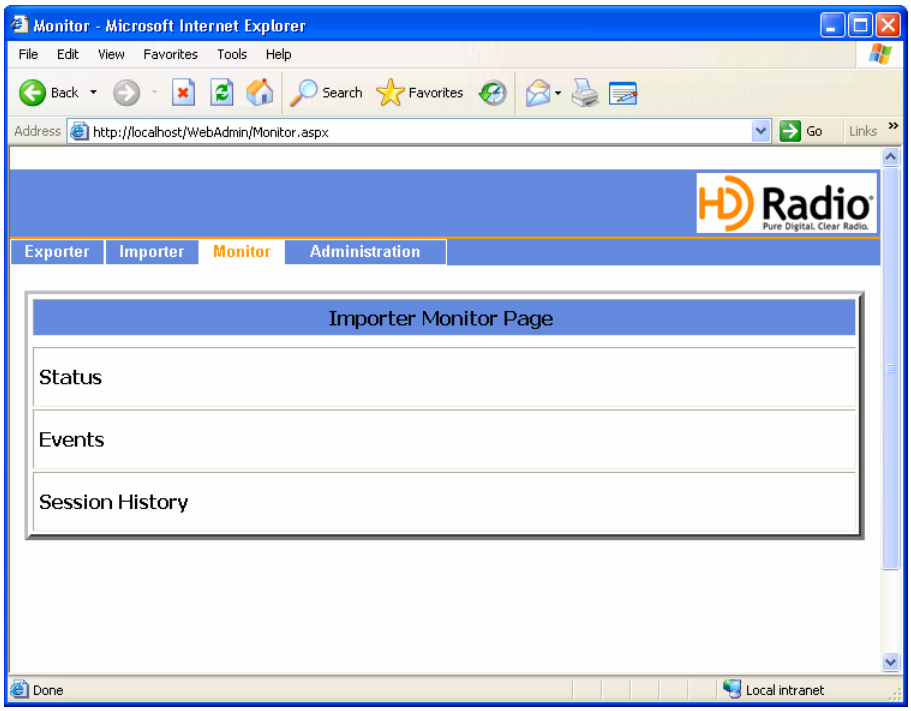


*Figure 8-23: WebAdmin Monitor Page*

### 8.6.1.5 Administration

The Administration page allows the user to manage the service providers, services, and configurations of the Importer.

The Service Providers page is shown in Figure 8-24. This allows the user to view the current service providers and their associated services. It also allows the user to add, update or delete Service Providers.

To edit the Name of a service provider, simply select the desired service provider and press “edit.” Now, enter the new name and press “update.” The default Service Provider “Self” cannot be modified.

To add a service provider, press “Add New” then enter the service provider name and press “Save”.

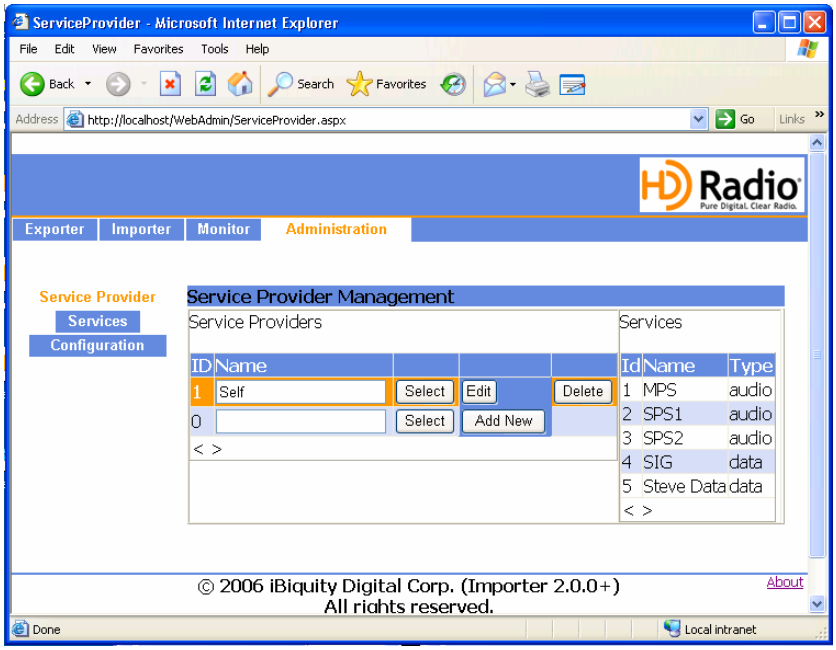


*Figure 8-24: WebAdmin Administration Service Provider Page*

When the “Services” button is pressed a page similar to Figure 8-25 is displayed. From here users can view all the services assigned to a particular service provider. In addition, a user can edit the information for an existing service, add a new service, or delete an existing service. Note, before deleting a service, this service must be deleted from all the stored configurations.

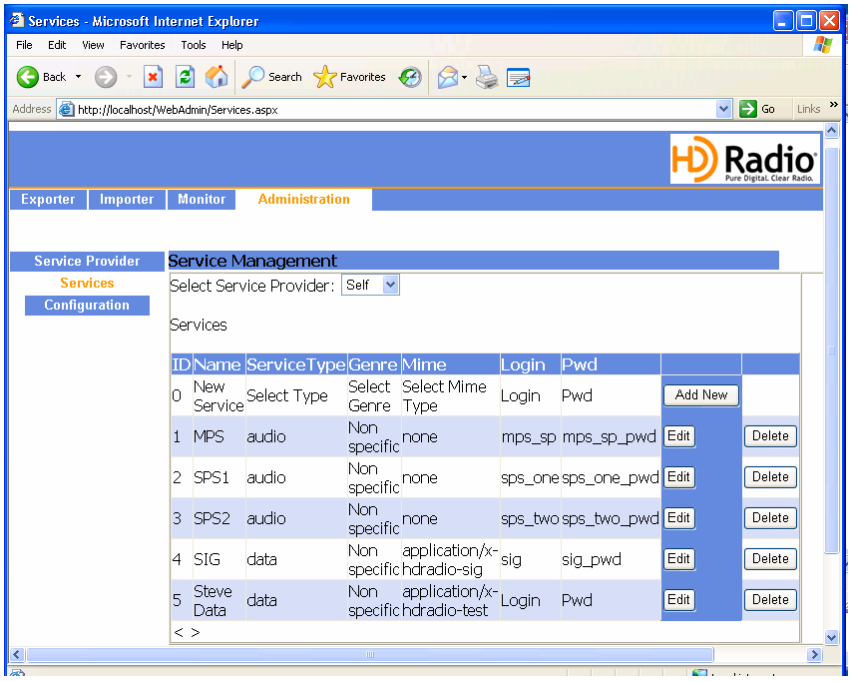


*Figure 8-25: WebAdmin Administration Services Page*

The final page on the Administration tab is the configuration page; an example is shown in Figure 8-26. From this page users can manipulate (add, edit, or remove) the stored Importer configurations.

Every Importer configuration originates with a base Importer configuration **Error! Reference source not found.**. A base Importer configuration essentially determines how many SPS audio services can be supported and on which logical channels they are assigned to. Therefore, when adding a new configuration, the user must first enter the name of the configuration and then select a base Importer configuration. An example of this is shown in Figure 8-27. After entering a name and selecting the base configuration, the User should press "Create New". From here the user can assign service providers and their associated services to the new configuration. In addition, the bandwidth allocation for each service can also be adjusted. Note, before data services can be added, bandwidth must be made available by adjusting the bandwidth of the audio services. Also, before the bandwidth of an audio service can be increased, bandwidth must be made available by reducing the bandwidth from the other services.

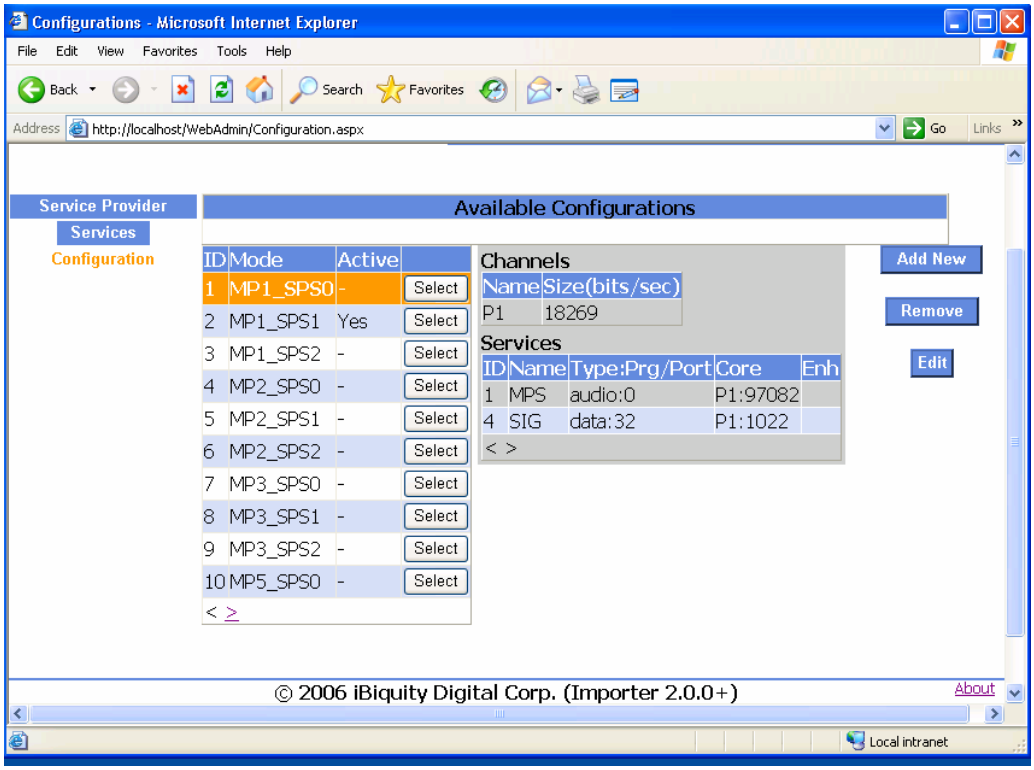


*Figure 8-26: WebAdmin Administration Configurations Page*

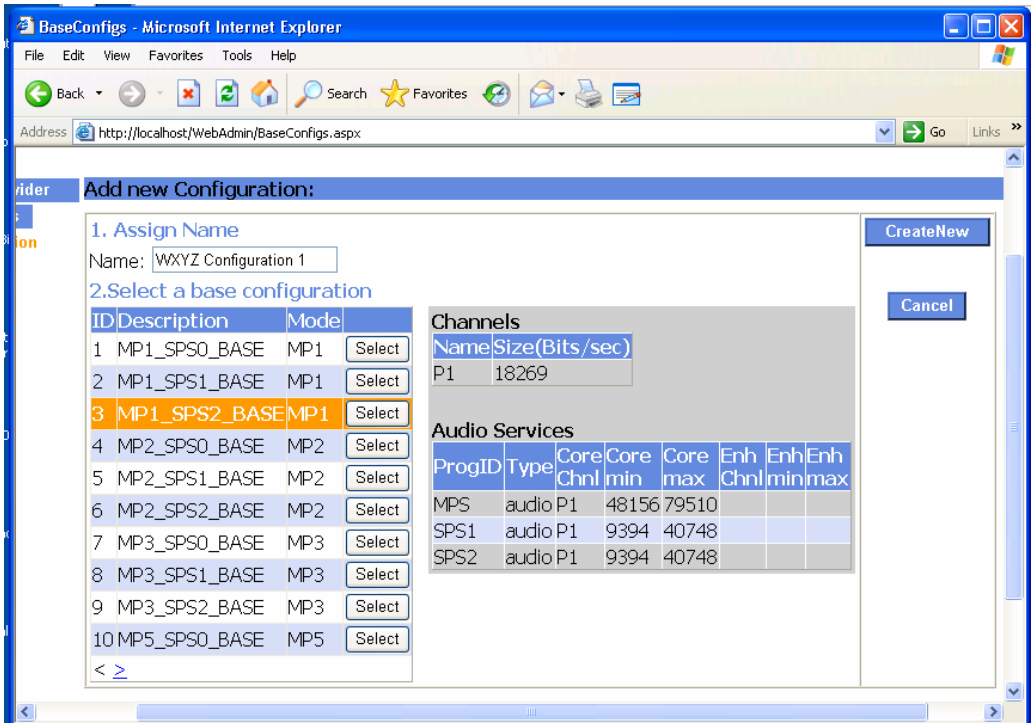


*Figure 8-27: WebAdmin Administration Add New Configuration Page*

### 8.6.2 Capture Client

The Capture Client application is a generic implementation of the Importer Services API for SPS audio and PSD data applications. This client uses the DirectSound component of the DirectX framework **Error! Reference source not found.** to capture audio samples from any DirectX compatible audio card and feeds them to the Importer.

In addition, this client accepts PSD messages in ID3 format from a specified UDP port and uses the Importer API to send this data along with the SPS audio samples.

This client tool allows quick prototyping of SPS applications by relieving the developer from having to write their own SPS clients. It also provides SPS application developers with an example implementation of the Importer API.

#### 8.6.2.1 Operation

When the capture client is started, the dialog box shown in Figure 8-28 is displayed. The application establishes a connection to the Importer at start-up. If this connection fails, a message box indicating the connection failure will appear.

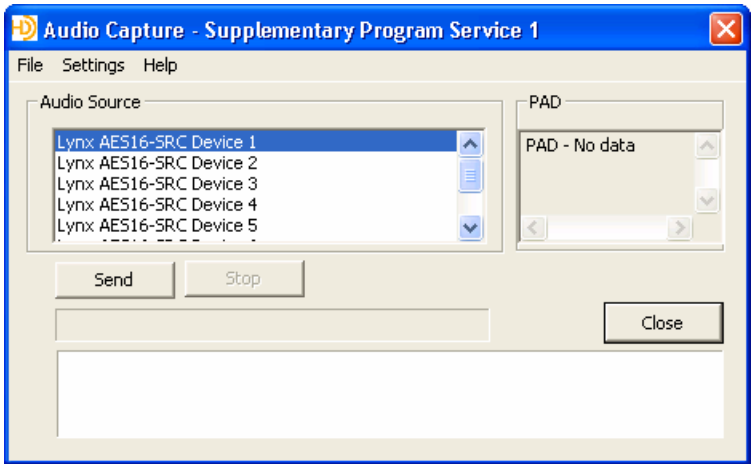


*Figure 8-28: Capture Client Main Dialog Window*

To start transmitting data first select the desired audio card and channel from the Audio Source group box. Next press Send. The progress bar will indicate the amount of audio in the client's audio buffer. The information display box will indicate the time the client started sending data to the Importer. In addition, the information display box will also indicate other events that occur. See Figure 8-29. For example if the TCP connection to the Importer is lost and the internal buffers fill up, a "dropping audio" message will be displayed.

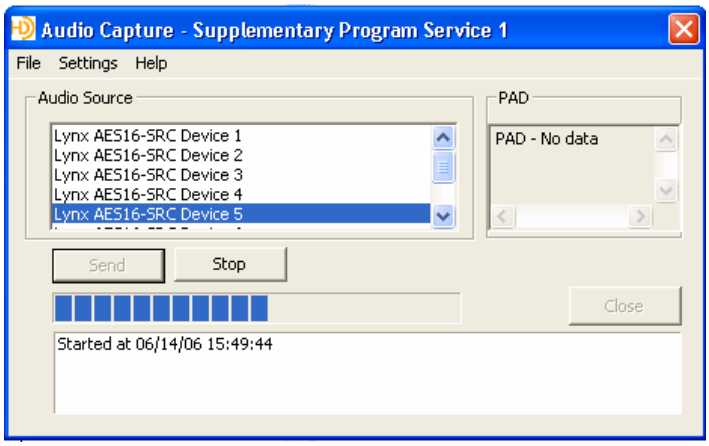


*Figure 8-29: Capture Client Dialog when sending audio*

The File menu allows the user to manually connect or disconnect to the Importer.

The Settings menu gives the user a graphical method of editing information in the configuration file.

#### 8.6.2.2 Installation

A single Capture Client is normally installed with the original Importer Install by running the Importer Tools Install setup.exe. To run a second (or third) Capture Client, copy the folder C:\Program Files\iBiquity Digital\Importer\Importer2.0\Clients to C:\Program Files\iBiquity Digital\Importer\Importer2.0\Clients_SPS1 and C:\Program Files\iBiquity Digital\Importer\Clients_SPS2. Appropriate shortcuts should be created for each service configured.

#### 8.6.2.3 Configuration

The capture client uses an XML configuration file to set certain run-time parameters. The SPSCaptureClient.xml file is shown below:

```
<ClientConfig name="iBiquity Digital Capture Client" portPAD="10010"
autoStart="true" extraBuf="15">
<Connection ipAddress="127.0.0.1" port="1010"/>
<Login>
<uid>sps_one</uid>
<pwd>sps_one_pwd</pwd>
</Login>
<AudioSource index="1"/>
</ClientConfig>
```

The “ClientConfig” Element has the following attributes:

- ClientConfig name: This specifies the label displayed in the Client window. This should be changed to reflect the service; i.e. SPS1, SPS2, etc.
- portPAD: This specifies the UDP port number to listen for PSD data.
- autoStart: If true the application attempts to login into the Importer using the information stored in this config file. If false the application will prompt the user with a dialog box before connecting to the Importer. The dialog box is shown in Figure 8-30.
- extraBuf: The attribute allows the user to buffer more audio data in the client queue. This allows the client to be more tolerant of network jitter. This is especially useful when the client is running remotely across a network link. The units are in 1.48 second chunks. The nominal size is

15 buffers or 22.3 seconds worth of audio samples. The client will send audio samples from this buffer unless an overflow condition is detected at which time it will drop approximately ¼ of the data in the buffer and attempt to continue operation. If the buffer ever becomes empty, it will re-establish the buffering to an approximately ¾ full level before responding to any "`GetData`" commands.

The "Connection" element sets the IP address and port number to communicate to the Importer. If the client is not on the same platform as the Importer software, the 'ipAddress' attribute is used to identify the Importer IP address otherwise it should be 127.0.0.1. The 'port' attribute value should match the CM port element value in the importerCfg.xml file.

The 'Login' element is used to set the user name and password, as shown in Figure 8-30. These should be the same values used when the service is registered with the Importer.

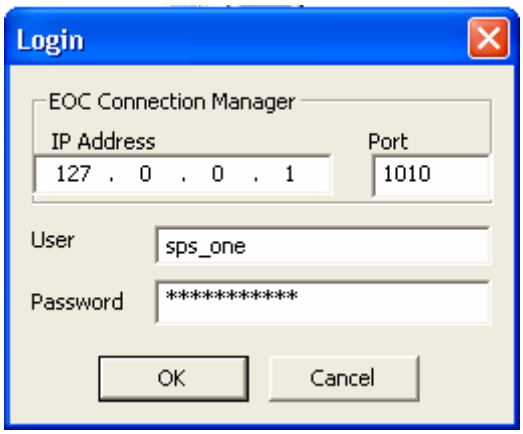


*Figure 8-30: Capture Client Login Dialog*

The "AudioSource" element is used to store the selected audio source; see Figure 8-28. The number starts at zero.

#### 8.6.2.4 PAD Data

The capture client has the ability to accept PSD as ID3 tags (Reference **Error! Reference source not found.**) through a UDP connection.

If an external application is sending PSD information to the Capture Client, the PAD display box will show the last PSD message received, similar to Figure 8-31.

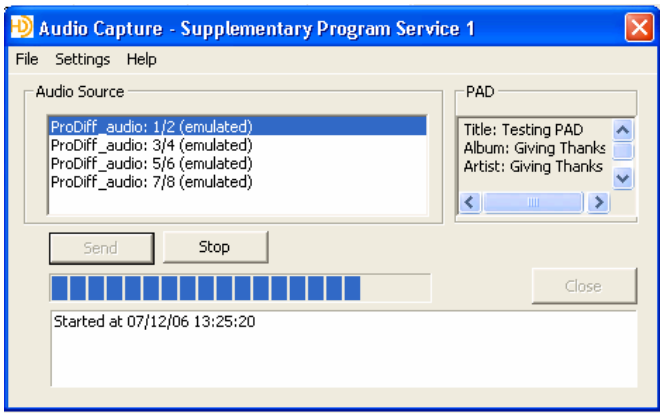


*Figure 8-31: Capture Client dialog box with an external PSD source connected*

### 8.6.3 Streaming Client

The Streaming Client is an application that is intended to facilitate the testing of MPS, SPS and Data applications without having a complete studio automation system. The Streaming Client can be used to create play lists with PSD. The Streaming Client is used as SPS or MPS audio sources. It connects directly to an Importer, eliminating the need for an audio card dedicated to the SPS service. This section describes how to use the Streaming Client.

#### 8.6.3.1 Operation

To start the Streaming Client use one of the following methods; which may or may not be available depending on how the client was installed

- Double click the Icon on the desktop
- From the Start menu select
  *Start->Programs->iBiquity Digital->Importer->ImporterTools->StreamingClient*
- Double-clicking the executable file found at
  C:\Program Files\Ibiquity Digital\Importer\Importer2.0\Clients\StreamingClient.exe

Once the StreamingClient has started a dialog similar to Figure 8-32 will appear.

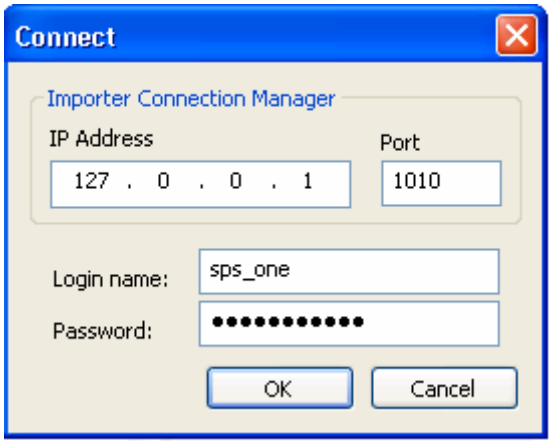


*Figure 8-32: Streaming Client Connection Dialog*

Here the user can alter the Information from the Streaming Client Configuration file discussed in Section 8.6.3.8. Once this information is correct, press OK and a dialog box similar to Figure 8-33 will appear.

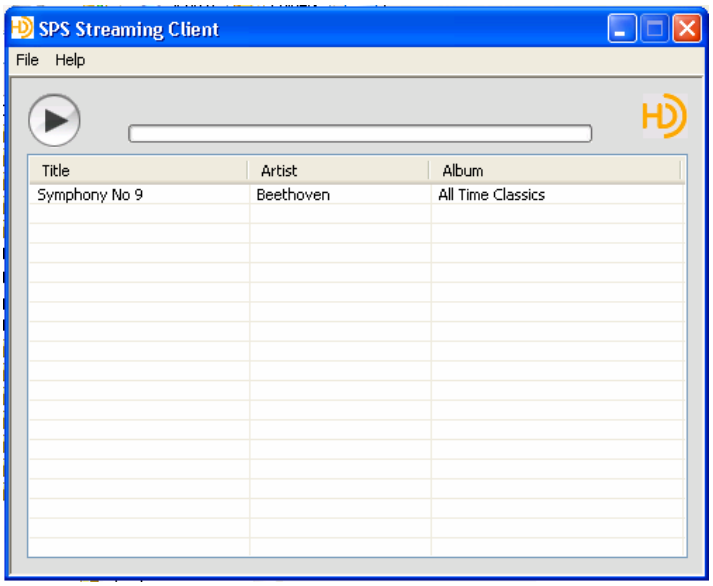


*Figure 8-33: SPS Streaming Client Main Window*

### 8.6.3.2 Playlist setup

Playlist setup includes adding/removing audio files from the list and setting up PSD data associated with the audio, such as title, artist, album information. Audio files of type mp3, wma and wav can be used with this tool.

### 8.6.3.3 Adding files to the playlist

Select “File/Add file to playlist” menu item or use the “Add file to playlist” context menu item displayed with the mouse right-click on the playlist area of the application, as shown in Figure 8-34. Files of type Mp3, wave and wma can be added to the playlist.

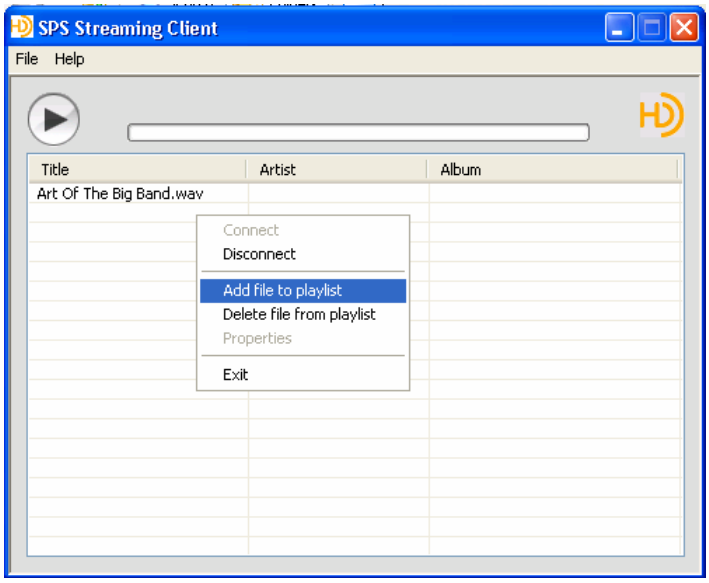


*Figure 8-34: Adding files to the playlist*

A Windows “Open” file dialog will be displayed. Navigate to the audio source folder containing your audio file, select the audio file and click Open. The file should appear in the playlist area of the application.

#### 8.6.3.4 Removing files from the playlist

Select the item to be removed in the playlist area of the application. Select “File/Delete file from playlist” menu item or use the “Delete file from playlist” context menu item displayed with the mouse right-click on the selected item, as shown in Figure 8-35.

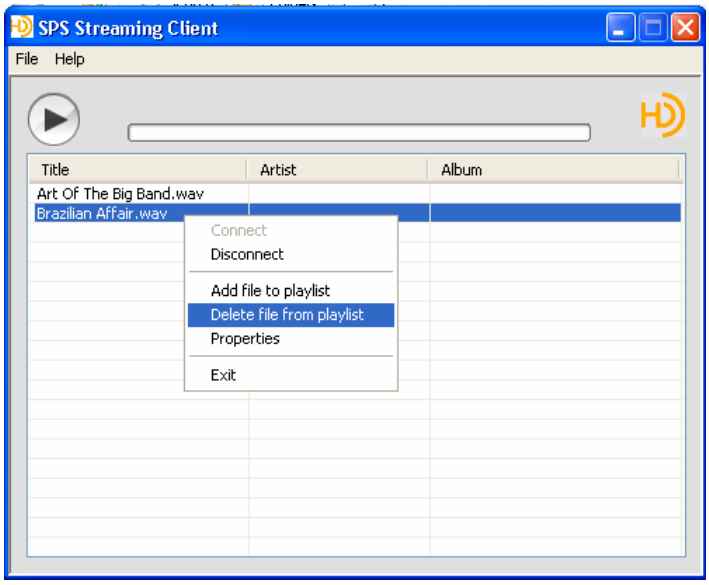


*Figure 8-35: Removing files from playlist*

The item should disappear from the playlist displayed by the application.

#### 8.6.3.5 Setting up PSD data associated with audio

The data associated with the selected play list item can be setup either by selecting “File/Properties” dialog menu item or “Properties” dialog of the context menu, or simply by mouse double clicking on a play list item. Figure 8-36 shows the dialog the will appear:

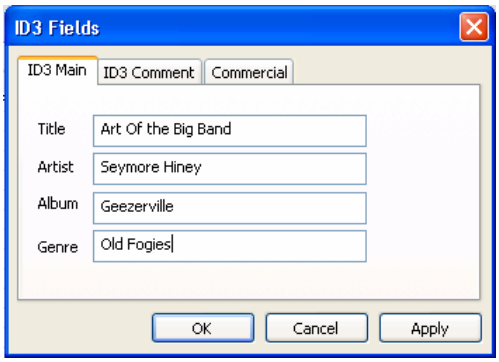


*Figure 8-36: Adding PSD information*

The dialog displays fields supported by the current implementation of the HD Radio Program Service Data application. Enter information and click OK button to save it.

The Streaming Client application configuration and play list information is saved upon application exit.

#### 8.6.3.6 Running the Streaming Client

Once the Streaming Client application is configured and the play list is set up, the application is ready to play. Click the “Play” button on the left at the top of the play list. Once the playing starts, the button changes to “Stop”. The SPS Streaming Client displays a progress bar as well as song duration and current position at the top of the progress bar.

#### 8.6.3.7 Installation

The Streaming Client is installed with the Importer Install. However, if the Streaming Client was not installed or needs to be installed on a separate machine then copy the files included in this package to the folder:

C:\Program Files\Ibiquity Digital\Importer\Importer2.0\Clients

The files are:
AudioRender.ax
SPSStreamingClient.exe
SPSStreamingClient.xml
playlist.xml

Next register the SPSStreamingClient application with windows by going to the “Start/Run” Windows menu and enter the command:

regsvr32 " C:\Program Files\Ibiquity Digital\Importer\Importer2.0\Clients\AudioRender.ax"

#### 8.6.3.8 Configuration

The SPSStreamingClient gets its run-time configurations from the SPSStreamingClient.xml file, shown below.

```
<HDStudio uid="sps_one" pwd="sps_one_pwd">
   <Connection ipAddress="127.0.0.1" port="1010"/>
</HDStudio>
```

The attributes “uid” and “pwd” are used to set the service login and password information into the Importer **Error! Reference source not found.**. The Connection attribute is used to set the ipAddress and port number of the Importer.

### 8.6.4 Generic Data Client

The Data Client application is a generic implementation of the Importer Services API for discrete object data applications. It can be used to transmit any type of discrete data packets as long as the data is formatted in the generic data client format, described in Section 8.6.4.1. The tool allows quick prototyping of data applications by relieving the developers from having to write their own data clients. It also provides data application developers with an example implementation of the Importer API.

#### 8.6.4.1 Generic Data Format

A generic data file consists of a series of generic messages. A generic message consists of a message header and a message body. The message header is four bytes long and has the following structure:

- First 2 bytes – sync byte sequence: 1st byte = 0xFA, 2nd byte = 0xFB
- Next 2 bytes – data length in bytes (should not be more that 8192 bytes) in little-endian format.

The message body starts at the fifth byte and contains actual data to be transmitted.

When the client reads the data, it performs synchronization by reading the message header and verifying that the message body is either:

- Followed by the next message header with its own sync byte sequence, or
- Confirmed that it is the last message in a file which is verified by the "`end of file`" check.

#### 8.6.4.2 Operation

When the generic data client is started, the GUI shown in Figure 8-37 appears.

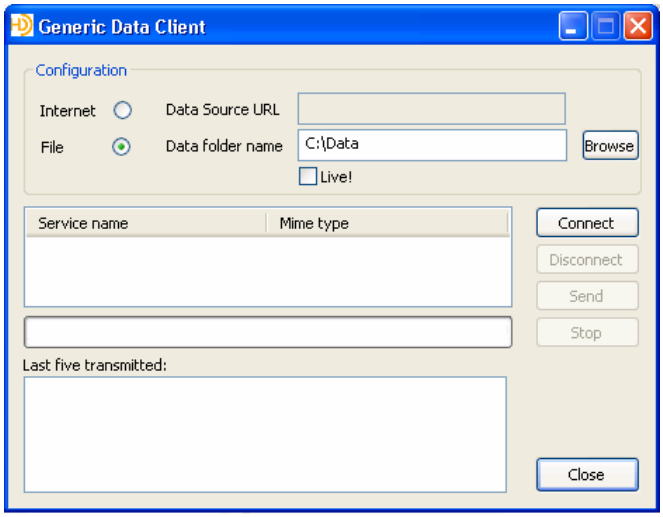


*Figure 8-37: Generic Data Client GUI*

To start transmitting data, perform the following actions in the generic data client GUI:

1. Select the "File" radio button: the "Internet" option is not yet available.
2. Enter the path to where the data files are stored using the "Data folder name" text box, or use the "Browse" button.

   If the "Live!" box is checked, the Data Client picks the latest file in the folder. If no newer file arrives after the Data Client is done sending the data in the file, it sends the same file again.

   If the "Live!" is not checked, the Data Client goes through all the files in the folder, starting with the oldest file and finishing with the newest file.
3. Click the "Connect" button.
4. Click the "Send" button.

   When all files have been transmitted, the Data Client starts the cycle over.

#### 8.6.4.3 Configuration

The Data Client uses an XML configuration file to set certain run-time parameters. The "*`DataClient.xml`*" file is shown below:

```
<ClientConfig name="Generic Data Client" queueSize="10"
                                         timeInterval_f="0"
```

```
                                        timeInterval_m="0">
        <Host>
              <EOCIPAddr>127.0.0.1</EOCIPAddr>
              <EOCCmdPort>1010</EOCCmdPort>
        </Host>
        <Login>
              <uid>data_sp</uid>
              <pwd>data_sp</pwd>
        </Login>
        <DataPath>C:\Traffic_Data\HD</DataPath>
  </ClientConfig>
```

Table 8-1 lists and describes the attributes for the "<ClientConfig>" element:

*Table 8-1: Attributes for the <ClientConfig> Element*

| ATTRIBUTE | ATTRIBUTE FUNCTION |
|---|---|
| `name` | Sets the banner on the Data Client GUI. |
| `queueSize` | Sets the level of internal buffering in units of generic messages. |
| `timeInterval_f` | Sets the time interval between opening new files in seconds.<br>If the client finishes sending a file before the time interval expires, the equivalent of zeros are sent.<br>This attribute is useful in "Live!" mode to prevent the client from re-sending old data. |
| `timeInterval_m` | Sets the minimum time the client will wait before placing a new message into the message queue.<br>This attribute is useful to regulate how often messages are sent. |

The "<Host>" element sets the IP address and port number to communicate to the Importer.

- If the client is not on the same platform as the Importer software, the "<EOCIPAddr>" element is used to identify the Importer IP address, otherwise it should be 127.0.0.1.
- The "<EOCCmdPort>" element value should match the CM port element value in the "*importerCfg.xml*" file.

The "<Login>" element is used to set the user name and password.

- These should be the same values used when the service is registered with the Importer.

The "<DataPath>" element is used to set/store the default path to the generic data files.