

inSORS[®]

**Installation Guide
3/7/2005**

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1 Introduction

1.1 Overview

Thank you for your interest in the inSORS Video Collaboration system.

This document will assist you in planning the installation of your inSORS Collaboration system. This document is intended for customers with intent to install an IGCube system purchased from inSORS, or set up a conference room using their own equipment.

This document does not detail the specifics of any installation procedure, as that will vary based on a variety of factors.

Please review the information carefully and collect information as requested. Your attention to detail will help ensure the success of your installation.

Other people in your organization may have a role in the installation of your node. Involving them in the planning process may be necessary.

Some people who may be involved in the planning process include:

- LAN/WAN staff
- Facilities Management
- Safety/Compliance Officers
- Contracted Electricians/Carpenters

inSORS offers planning and installation services; contact your inSORS account representative for more details.

1.2 Gathering Essential Information

To ensure that the installation is completed in a timely and accurate manner, the equipment installer needs information on the room being used for the installation.

Room Dimensions

If a floor plan is available, please provide a copy to the installer. Note which surface you would like to use for projection. The installer will need to know:

- Length of the room
- Width
- Dimensions of alcoves (if any)
- Door and window locations and sizes
- Height from the floor to the visible ceiling
- Height from the visible ceiling to the physical ceiling (if using a drop ceiling)

These dimensions will impact cable lengths and projector mounting.

If possible, include the positions of furniture, lighting, air ducts... anything that could impact the placement of equipment mounts.

Photos

Send hi resolution photos of each wall in the room, with enough photos to provide a clear picture from

the audience area to the projection surface and vice versa. Some details may be seen by a technician in these photos that could change equipment placement. Photos of the ceiling interior are especially useful, as they reveal ducts and other obstacles that must be worked around.

Hiding cables

What means are in place for hiding the cables, or at least getting them out of the way? Can cables be run in the walls? Through the floor? Inside a wall/floor cable raceway? In most installations, exposed cabling is very undesirable.

A rug, mat or other means to prevent tripping should cover all cables run along the floor.

Building Regulations/Safety

Your facilities manager or local fire marshal may require the installation to conform to certain standards. This may include the use of plenum grade cabling, conduit installation and/or placing equipment in certain locations.

Existing equipment

Does any AV equipment exist in the room already that you want to tie in to the node? You may need to communicate your intentions to inSORS to ensure compatibility.

2 Designing the room

2.1 Room Criteria

If you have options available for where to install your inSORS system, here are the elements for the ideal room installation:

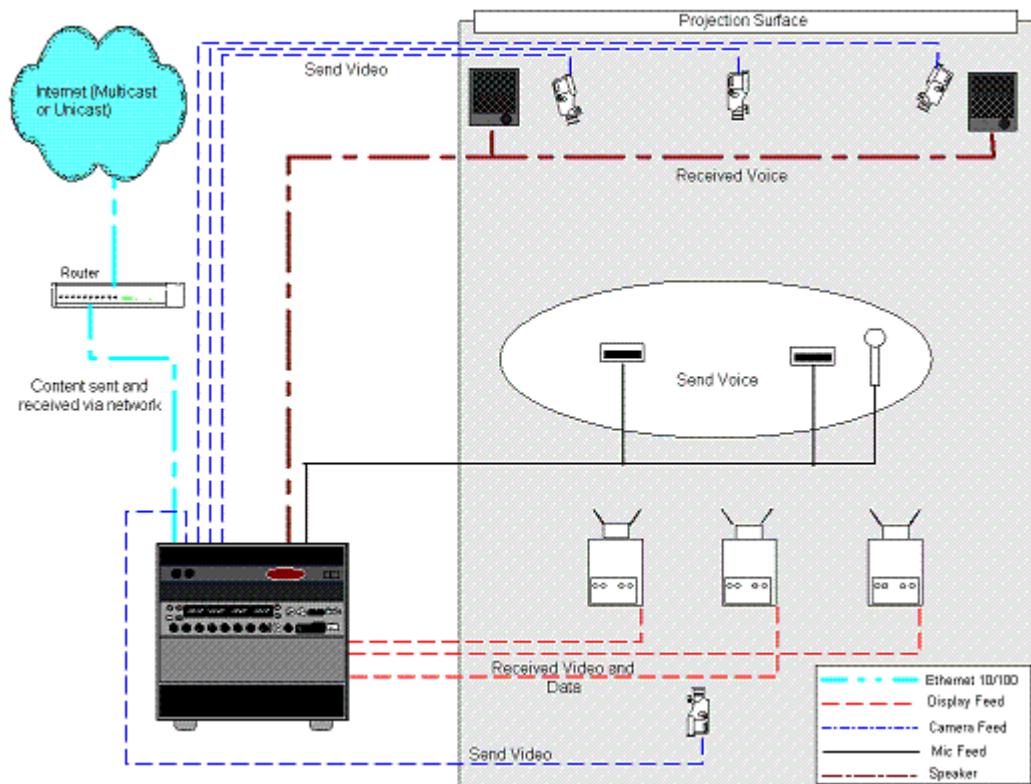
1. A large, uninterrupted, flat display area with a 6' wide space per projector
2. No obstacles (pillars, overhangs) from projector mounting area to the display surface
3. Little to no ambient noise from vents or electrical systems
4. Room lights should not shine on the display surface
5. Display surface is white/near white, smooth and not glossy
6. Ability to install mounts for equipment into the ceiling and walls, ideally running cables behind the surface.
7. Available power at all mounting points (cameras, speakers, projectors)

2.2 Room Layout

Room Layout

During the planning and ordering process, the dimensions and layout of the room must be determined.

Below is a sample of a basic conference room layout. Your specific layout needs are likely to vary.



If you have specific plans on where equipment will be located, these must be communicated to the equipment provider and installer.

3 Audio

3.1 Echo Cancellation

Echo is caused by outputs (speakers) being directed back through inputs (microphones). When echo is present, the people you communicate with will hear their audio streams duplicated and played back to them with a slight delay. This causes disorientation and will detract from the quality of your conference session.

An echo-cancelling audio processor eliminates the speaker sound from the signals received by the microphones. These can be integrated into existing AV systems. The best solution for conference

room and classroom environments. inSORS can provide echo cancelling equipment for your site; please contact your inSORS account representative for more information.

3.2 Selecting Microphones

There are several different microphone types you may elect to use.

Ceiling Microphones

Ceiling Microphones are typically installed above the ceiling, with only 2-3 inches of cabling exposed to the tip. Most often, the microphone tip is installed through existing holes or gaps. The microphone captures sound in a cone area; persons seated outside of the cone area may not be heard as well.

Ceiling microphones are susceptible to vent, electrical and mechanical noise being generated in the ceiling near or above it. Additionally, airflows across the microphone surface caused by vents or fans will cause audio noise. Consider the environmental factors when selecting and installing ceiling microphones.

Ceiling microphones are typically used in circumstances where the user does not want to see visible cables or needs to avoid tripping hazards. However, the quality of sound is not as good as other mic solutions since the user is further away from the microphone and much of the sound it captures is indirect (reflected off walls and other surfaces).

Tabletop/Stalk Microphones

Tabletop Microphones are unidirectional. Some have "push to mute" functions that allow users to converse with each other while audio is being transmitted, without interrupting the current speaker. The audio captured tends to have a better quality than the ceiling microphone because the talker is talking in the direction of the microphone. They will pick up other talkers as the audio reflects off the walls and other surfaces in a room.

The only real drawback of using tabletop microphones is the cabling. Cables must be run out to the tables/desks where the microphones are placed, and create a tripping hazard if not properly covered. If possible, install the cables in a conduit under the floor.

Lapel/Wireless Microphones

Typically used in a presentation scenario, where a single speaker is addressing a local audience and also needs to be heard via the inSORS system. These solutions are not appropriate for gathering audio from an area, only from individual people.

When using a wireless solution, the receiver and transmitter should be turned off when not in use.

If using multiple wireless microphones, use a model that has multiple user-selectable frequencies. Two microphones on the same frequency will conflict with each other.

3.3 Selecting Speakers

Having high quality playback of audio streams is essential for a successful conference. The following options are available:

Powered speakers

Speakers with a built-in powered supply. Easier installation and some portability. Somewhat heavy, and require an available power outlet.

When installing powered speakers, reduce the volume to minimum on the speaker itself. The speakers are amplifying the signal they receive from the AV system, and at a high volume they will tend to produce a noticeable hiss. Determine a proper level for the speaker volume after starting the system, ideally by increasing the output levels from your other sources and keeping the speaker level low.

Unpowered speakers with amplifier

All audio output levels to the speakers are controlled from the amplifier, and the speakers have less weight as they do not need their own power supplies. The advantages include better sound quality and professional appearance of installation. This system is not very portable.

3.4 Other Audio Sources

As the inSORS system is using off-the-shelf components, it is possible to use other devices for audio input and output.

CD Players
Tape Recorders
VCR/DVD Players

inSORS Conference room systems come equipped with a patch panel to allow for easy integration of these devices.

4 Display

4.1 Projectors

4.1.1 Selecting Projectors

Image quality may vary from projector to projector. The services of an AV specialist are recommended to ensure that the projectors selected are appropriate for your needs.

Brightness

Projector brightness is measured in lumens. If the inSORS node will be installed in a room with bright light sources, or if the distance from the projection area to the audience is great, then a projector with a high lumen level is strongly recommended. 1500 lumens should be adequate for a projector 10' away from the projection surface in a room with well-controlled lighting conditions. Use higher lumen levels for brighter rooms or greater distances.

Interface

Will you be using the projectors for functions other than the grid? Make sure that the projector has the appropriate inputs for what you want it to do. Some projectors have multiple computer inputs for switching between systems, allowing you to connect a laptop and the inSORS system to it simultaneously and toggle between them using a remote control.

Distance

Different projector models have different throw ranges to display the same size image. Make sure you select a model that shows the proper size image from its mounting position.

Resolution

XGA is the minimum desirable resolution for the inSORS Grid, displaying at 1024x768.

Some projectors are capable of higher resolutions. Higher resolutions will not increase the amount of wall space the image occupies; it will instead decrease the size of your images and text. However, this will increase the amount of content (video streams and otherwise) which can be displayed. For example, 2 projectors displaying in SXGA resolution (1280x1024) will actually have more available desktop space than 3 projectors displaying in XGA resolution. Depending on your specific needs, you may find it more effective to use fewer projectors with a larger display size and a higher resolution.

Please note, some projectors will approximate higher resolutions but are really only "native" in XGA or SVGA. Setting to these higher resolutions can produce a fuzzy image quality. For best results, base your purchasing decision on the projector's native resolution.

Purpose

In many cases, projectors are being installed with the intent of being used for functions in addition to the inSORS system.

- Will the projectors be used for video playback from a VCR or DVD Player? If so, S-Video or Composite cables should be run as well as VGA during the projector installation.
- Will laptop users want to run presentations on it? If so, you may want a projector with an extra VGA input, and run an additional cable from it to the area where laptops will be connected.
- Will the projectors be removed from the room for other purposes or security? You may wish to utilize an AV cart or place them on a flat surface.

4.1.2 Display Surface

When using multiple projectors, the ideal configuration is to have them all pointing at the same uninterrupted flat surface.

The surface should be non-reflective; pointing a projector at a whiteboard will send glare back at the audience and obscure the images.

The color of the surface should generally be white or slightly off-white.

Projection screens may be necessary in some circumstances, if the projection area does not meet the criteria above.

4.1.3 Mounting

Projectors will display images at an upward angle rather than straight forward; this is intended in the

design, allowing the user to place a projector at table height. For this reason, projectors may be mounted upside down to avoid catching shadows of the audience in the image.

The following table illustrates the pros and cons of several different types of projector mounting.

Mount Type	Advantages	Disadvantages
CEILING - projectors are hung upside down.	<ul style="list-style-type: none"> • Gets projector out of field of view • More secure/hard to remove • Better appearance • Easier to prevent audience shadows 	<ul style="list-style-type: none"> • Can be difficult to install • Requires additional cabling • May require the assistance of an electrician or facility engineer • Limitations in adjustment range.
WALL/SHELF - Projectors may be mounted upside down or on top.	<ul style="list-style-type: none"> • Gets projector out of field of view • Easier to install • Reduced cabling 	<ul style="list-style-type: none"> • May need an external track to hide wires • Limited choice of projectors • More likely to have audience shadows • Projectors may still need to be secured to shelf to avoid image shifting
TABLE/CART - Projectors are placed on a flat surface	<ul style="list-style-type: none"> • No installation required • More placement options • Can use projectors for other purposes easily 	<ul style="list-style-type: none"> • Requires adjustment/alignment before each conference • Exposed cabling • Possible damage/security risks • Possibly blocking audience view
REAR - Projectors are mounted behind a dark rear projection surface.	<ul style="list-style-type: none"> • Excellent image quality • Projectors not exposed 	<ul style="list-style-type: none"> • Requires purchase and installation of rear projection screen. • Requires space behind the screen (usually a second room) for the projectors.

We generally suggest ceiling mounts, but the needs and ability of your space may differ. Feel free to contact your inSORS representative for more assistance in selecting a mount type.

4.2 Other displays

There are circumstances where a projection system may not be suitable for you.

- You are using a desktop system, or located in a small office.
- The room available has many windows, or is brightly lit
- No suitable projection surface available or installable.

For these situations, you may consider using large scale CRT, LCD or Plasma displays.

CRT

- Least expensive for the size
- Brightest display
- large and heavy

LCD

- Larger sizes available than CRT
- High detail
- wall mountable
- Better image quality in larger sizes

Plasma

- Largest sizes available
- Susceptable to screen burn-in; cannot leave non-moving images on screen for prolonged periods

5 Video capture

5.1 Selecting Video Capture Devices

In order to deliver video to other members of a conference, it is first necessary to install devices capable of capturing video content. Examine the following features when considering the purchase of a video capture device:

FPS (Frames Per Second)

30fps is the common standard for full motion video. Many inSORS parameters will default the FPS to a cap of 25 to reduce the bandwidth consumption without significantly impacting quality.

Interface type

PCI -

PCI interfaces are internal to desktop computers, and are the most common interface type for video capture cards.

PCI slots are white in color. 2 different PCI slot types exist on the market today; 33Mhz and 66Mhz. The 66Mhz slot is longer, and has a plastic divider in it which prevents the installation of incompatible 33Mhz cards. A 33Mhz slot will generally accept a card designed for a 66Mhz slot.

USB -

USB is the most common interface type for consumer-grade webcams. USB interfaces are the easiest to install, simply plug them into the USB port on your computer and load the drivers for the device. Some desktops and many laptops only have USB connection options. Virtually all computers capable of running the inSORS system have at least 1 USB port. USB is very processor intensive; adding more than one USB capture device may impact the performance of your system.

Supported Resolutions

The inSORS System captures video at 352x288. Capturing at higher resolutions with inSORS is not

available yet, and capturing in lower resolutions will create a grey border around your images.

Input Types

Be certain that the video capture device you are using has the appropriate video input ports. These ports may be SVideo, RCA/Composite, BNC or other types. If the device input doesn't match your video source output, you might be able to purchase adapters for a compatible connection.

5.2 Cameras

There are 2 different types of cameras you can use with your inSORS product.

Manual adjust cameras

Cameras that require a user to manually focus and position them.

PTZ (Pan/Tilt/Zoom) cameras

Cameras that are remotely controlled. By connecting these cameras to the computer via a visca cable, it is possible to control them via IGCam.

While the PTZ cameras are more expensive, they provide more versatility in a conference. Users can easily reposition cameras to focus on objects of interest. If working between multiple inSORS sites, it is possible for remote users to control the cameras in your room and vice versa.

Placement

When placing cameras, your primary goal is to provide the remote sites with an angle that approximates eye contact. This helps provide the sense that the user is "in the same room" as the other people, seated across from them. For desktop/laptop units, place the camera directly above the display if possible. For room installations, place cameras directly below the center of each display. Cameras placed high and/or to the side will not provide good eye contact.

Your secondary goal is to provide a complete view of the room. While placing more cameras in front may provide better views of the audience, placing a camera in the rear provides the remote sites with a sense of what you are seeing. This can be invaluable as a coordinating and diagnostic tool.

Cameras placed to the side don't provide as good a view of the projection surface as a centered rear camera, but their range of motion allows them to focus in on objects mounted on the opposing wall (such as a whiteboard).

Mounting

Cameras can be mounted in several ways:

- Tripod

Tripods are easy to setup, position and remove. They are a good choice for a temporary installation. For a permanent installation, however, they may prove inadequate. A tripod occupies a lot of floor space; the larger the tripod the more floor space it requires for stability.

- External wall mount

External wall mounts stick out from the wall about 7", and should not be placed in an area of high

traffic if it can be avoided. If they are located near a door, they should be placed near or above the top of the frame.

- Recessed wall mount

Recessed wall mounts are more difficult to install, as they require significant clearance behind the wall surface. However, they will prevent the cameras from being damaged by someone passing close to the wall.

- Shelf

Cameras mounted on a shelf may need to be secured.

- Ceiling

Ceiling mounts can be utilized in some instances for rear cameras, but are inappropriate for audience cameras since the viewing angle is far too high.

5.3 Other Video Sources

As the inSORS solution is using off-the-shelf devices, it is possible to use other video sources in place of cameras.

Some adapters may be required to connect these devices to your video capture interface. Separate connections must be made for the audio capture.

Keep in mind that the video sources will still be constrained by the capacity of the video capture device. High-motion video will utilize more bandwidth, and some frames may be dropped as it approaches peak utilization.

6 Cabling

6.1 Required Cables

The actual cables required for your particular installation may differ; what follows is a listing of different cables that may be used for connecting equipment to your node system.

Device	Possible connections
Projector	<ul style="list-style-type: none"> • DVI • RGB (Analog VGA) • Composite (RCA) (for other video sources) • S-Video (for other video sources)
Microphones	<ul style="list-style-type: none"> • XLR Female
Other audio sources	<ul style="list-style-type: none"> • RCA • XLR Female
WebCam	<ul style="list-style-type: none"> • USB
Video Camera	<ul style="list-style-type: none"> • Composite (RCA) (requires adapter) • S-Video (requires adapter) • BNC • Visca (RS-232 serial 8-pin mini-din, 9-pin serial on the patch panel)
Speakers	<ul style="list-style-type: none"> • RCA • Wiring posts (for use with an amplifier) • XLR Male
Network	<ul style="list-style-type: none"> • RJ-45
Telephone	<ul style="list-style-type: none"> • RJ-11 (Analog)
Keyboard/Mouse	<ul style="list-style-type: none"> • USB • PS/2

The possible connections will vary by device; some connection types are unavailable. Confirm the connections available prior to ordering extension cables or wall plates.

If connectors must pass through a conduit or channel, use a minimum of 1.5" wide channel for projector cables (VGA, DVI), 1" wide for other kinds.

6.2 Cable Installation

Before installing cables in walls or ceiling, the following should be considered:

Access

If trying to run the cables inside the ceiling and wall, make sure that no cross-beams or other obstacles exist in the wall to block the cables. Cable raceways may be surface-mounted on the walls to obscure most cables and avoid the difficulties of installing inside walls.

Cabling sequence

Label your cables on both ends before installing to make them easier to trace later.

If utilizing PTZ cameras with RS-232 visca cables, remember that the visca cables connect to the cameras in a chain; you will run the RS-232 output from camera 1 to the RS-232 input on camera 2 and so on.

Cable length

Cables have a maximum distance over which they will transmit a signal before you must utilize a signal amplifier/repeater. The maximum length is determined by the type of cable and the type of signal it needs to carry. If you are trying to run a cable more than 6 feet / 2 meters in distance, check with the cable supplier on the maximum length for that type of cabling.

6.3 Connecting to the inSORS Patch Panel

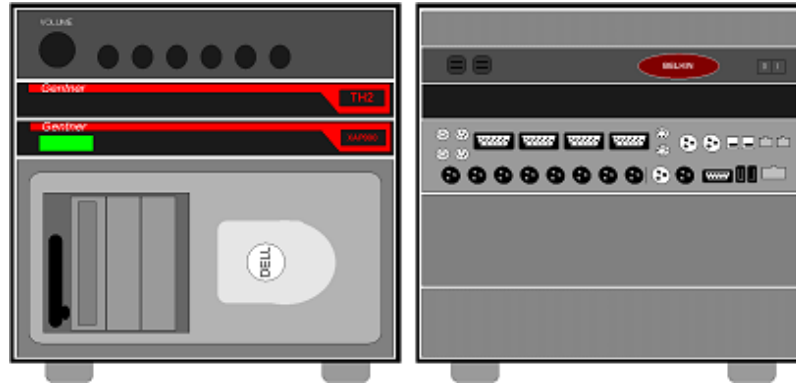


1. Monitors/Projectors should be connected left to right. Connect your primary display to monitor output 1.
2. Connect the Microphones to the Microphone inputs, using XLR cables as extensions where necessary. Labeling microphones by number is recommended, since it will help you tune your audio settings later.
3. The Camera Control port connects to PTZ cameras with a visca RS-232 port. Connect the RS-232 In port on the first camera you wish to display to the Camera Control port on the patch panel using the Visca control cable (DB9 to MiniDin 8). Connect the first camera to the second camera using a Visca chain cable (MiniDin 8) from the First Camera's RS-232 Out port to the RS-232 In port on the second camera. Repeat for each additional camera.
4. Connect the first camera to the first camera port on the patch panel using BNC cable. Repeat in sequence for the remaining cameras. Signal Adapters may be required.
5. Connect standard speaker wire to the clips on the patch panel for un-powered speakers. If using powered speakers, connect to the XLR ports using XLR cable instead.
6. If connecting to an external amplifier or mixing panel, connect to the Line Level Input and Output ports.
7. Connect the Line jack of the phone interface to an analog phone line. The phone jack is provided in the event you wish to connect a local analog handset.
8. Connect the Ethernet jack to the LAN.
9. If using a wireless keyboard and mouse, connect the receiving station to the USB port.

7 Equipment Installation

7.1 Placing the Equipment

IGCube



Place the IGCube in a location that allows all cables to connect to it with enough slack to allow for proper cable dressing and to prevent strain on the connectors. This is of particular concern when it comes to camera placement, since the cameras utilize 2 different cables when connecting to the patch panel. Extra distance for ceiling, wall and floor cable runs should be taken into consideration. The node should be in an area that allows for proper ventilation, as the components do generate heat.

If you are using the Gyration wireless keyboard and mouse combination, the node should be located no more than 75 feet from the area where the grid session will be controlled, and less is recommended. It may be necessary to place the USB base station in the conference room if signal interference exists.

Cameras

Cables used: *Visca control, Visca Chain, BNC cables, signal adapters*

The forward cameras are ideally mounted directly in front of the audience below the projected surface. Typically they will be elevated 30-36" above the floor level so they look out on the audience at roughly chair height while leaving ample space above for the projection surface. This provides a better sense of eye contact to other conference participants.

The rear camera should be placed above head level so it has a clear view of the projection surface.

In some cases, the rear camera or one of the forward cameras may be mounted on a side wall. This is done to allow for shots of a whiteboard or other writing surface mounted on the opposing wall, and typically only in a classroom that is fairly wide or deep.

Visca cables control the cameras in order of connection. The BNC cables should follow the

same sequence when connecting to the video capture ports (i.e. the first camera in the Visca chain is also connected to the first Camera port).

The cameras come with AC adapters. Power outlets must be installed near the cameras to allow the adapters to be connected. Additional design measures must be taken if you wish the AC adapters to be hidden.

Microphones

Cables used: *XLR*

Microphones should be at least 2 to 2.5 feet away from the head of the participant. Getting too close to a microphone can cause the audio to become distorted and garbled.

Tabletop microphones should be placed with the logo facing the participants. Place them along the far edge of the table if possible.

Ceiling microphones should be placed away from ventilation ducts, equipment fans and other sources of ambient noise. You should mount them out of the path of the projector beam.

Space the microphones evenly and as close to the audience area as possible.

Speakers

Cables used: *XLR or Speaker wire*

Speakers should be placed facing out from the projection surface, as close to the edge of the surface as possible. This provides a better sense of the audio source (other participants) during a session.

If using a ceiling speaker system, distribute the speakers throughout the room for proper coverage.

Projectors

Cables used: *Analog VGA DB-15 Extension M-M. DVI connections may be required by some projectors.*

Ceiling mounted projectors should be installed and positioned by an AV technician.

Different projector models require different mounting distances to achieve a given image size. You should discuss your needs with an AV specialist prior to making decisions on projector placement.

Projectors will require power outlets and/or extension cables.

The leftmost display will be considered the primary display for applications and devices that

require it. The reason that the displays are ordered in this sequence is a function of the windows operating system and how it interacts with the video cards installed in the system.

8 Network Setup

8.1 Requirements

A minimum of a dedicated T1 (1.5mbps in both directions) is necessary to participate in a full-featured conference.

Each audio stream can require 128kbps of bandwidth, and each video stream can require 800kbps (most will average 250-400kbps, and a single 4 camera site will average 800-1000kbps in combined video). If your site has less than 1.5mbps in both directions, contact your inSORS representative or inSORS support to discuss low bandwidth options for participating in a conference.

Unicast vs Multicast

The inSORS Video Collaboration supports both Unicast and Multicast.

Unicast mode is accessible to all Internet connections. In order to participate in a conference via Unicast mode, a Unicast bridge must be utilized as a hub for conference traffic. For more information on Unicast bridging options, contact your inSORS sales representative.

Multicast mode is accessible to networks connecting to a Multicast-enabled backbone network. Multicast foregoes the need for a bridge by routing network traffic between computers utilizing the network itself.

InSORS does not provide technical support for configuring your network for Multicast or diagnosing problems with Multicast as part of a standard node purchase. Please contact your inSORS representative for more information on obtaining Multicast support.

For additional information on running the inSORS Video Collaboration software on your network, refer to the inSORS Network Administrator guide.

9 Testing

9.1 Testing the Cameras

During the construction of your node, your cameras were labeled numerically in the software to coincide with the ports on the back of the node system. Be sure that the camera images are displayed in the same order in which they are cabled. The first of your node's cameras in the thumbnail display should be camera 1.

Verify that each of your video windows is displaying a video image. If you are using fewer than 4 cameras, you may see black images in place where the additional cameras would be. You can disable unused capture ports in IGConfig by unchecking the boxes to the left of each camera line that you wish to disable.

Testing the Camera Controls

This section is only necessary when using the standard PTZ cameras connected to your node via Visca cables.

If you have not connected the cameras, or if the cameras do not support PTZ, you will not be able to perform the test outlined below.

1. Locate IGApp on the taskbar and click on it to display the interface.
2. Click on IGCam
3. In the IGCam window, select Camera 1.
4. Use the Pan / Tilt controls in the lower right and the zoom controls in the lower left to make sure that Camera 1 is being moved. If a different Camera moves in response to these controls, you did not cable in the correct sequence. You will need to swap the RCA video cable for the camera currently being controlled to the first video capture port on the patch panel.
5. Repeat steps 1-4 until you have tested all connected cameras.

If the camera being controlled in IGCam doesn't match the camera label of the video image being controlled, you will need to change the camera index value in IGConfig.

9.2 Testing Audio

Since the function of the system is to communicate with others, all audio tests must be conducted with another site over the network. There is no other way to properly obtain feedback on your audio quality.

The primary concern is echo; you do not want the audio from other sites to be returned to them. Refer to the [echo cancellation](#) section for more information.

The next issue is ambient noise. Equipment fans and ventilation are a common source of ambient noise. Reduce the noise at its source if possible by turning equipment off when not in use. Some echo cancellers can reduce the amount of ambient noise passed through the microphones.

If a buffeting sound is heard on one of the microphones, its often due to an air current across its surface. This is common with ceiling microphones, and can be reduced by placing a foam baffle over the microphone tip and/or aiming the microphone away from the airflow.

Static, clicking and popping sounds can be generated by a high input level. Reduce the level on your recording device (line-in or microphone) using the Windows audio mixer until this goes away.

Choppy audio may be caused by network loss or echo canceller settings. Check the node list in IGAudio for indications of network loss. If network indicators are green in both directions, then your echo canceller may be overcompensating for the room's environment. Alternately, microphone gating may need to be adjusted to keep microphones on for a longer period of time during silences before gating off.

