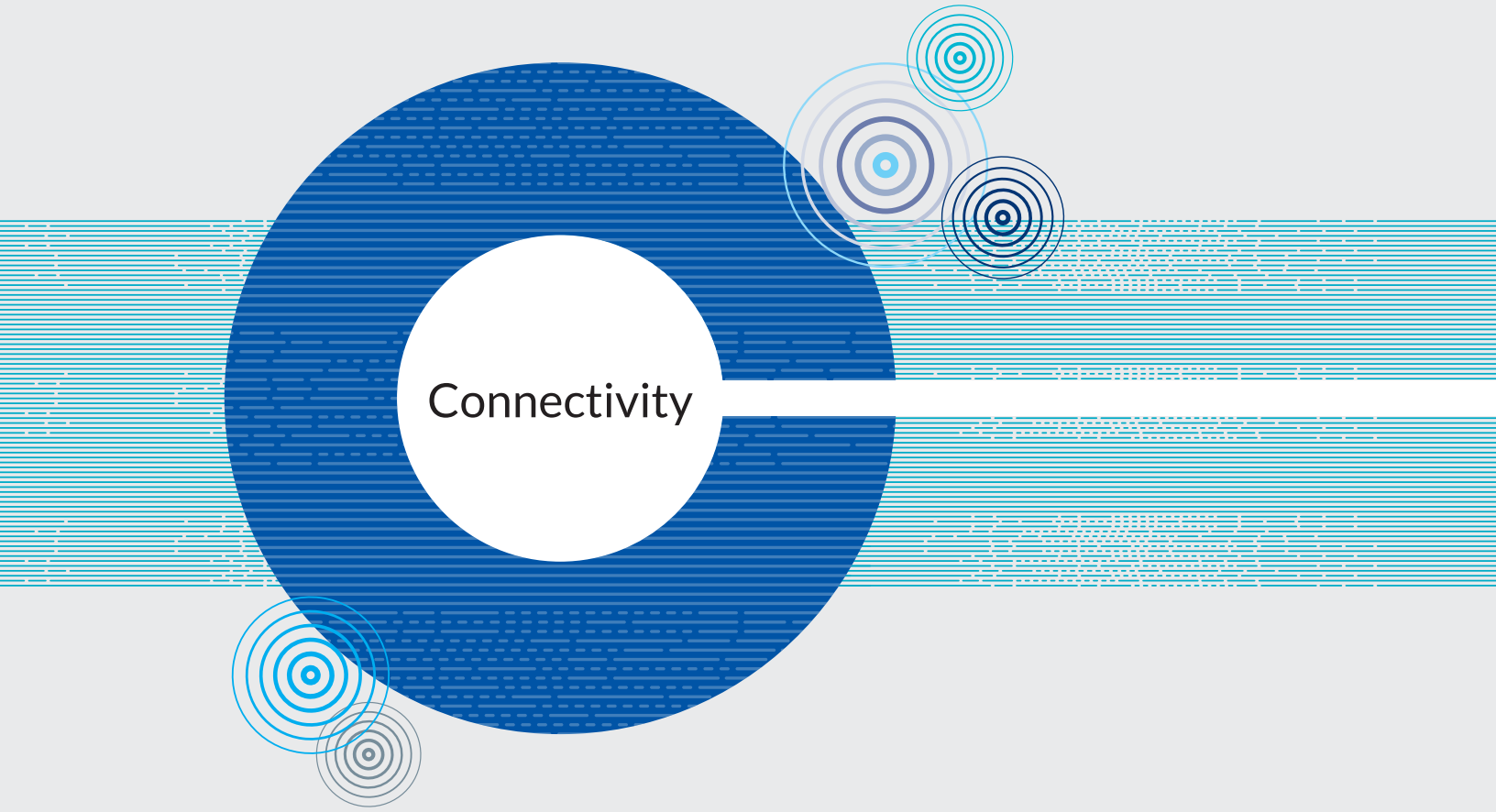
Clear-Com®
AN HME COMPANY

PRODUCT BROCHURE



Intercom Connectivity (ICON) Solutions

Interoperability Solutions

About Intercom Technology

An intercom (intercommunication system) is a standalone, closed-circuit system for one-way “simplex” and/or two-way “duplex” communication. The general purpose of a professional intercom system is to facilitate simple to complex communication setups for a few to thousands of users who need to be continuously on talk and/or listen mode. Two-way communication systems can operate in half-duplex or full-duplex. With half-duplex systems, one party talks while the other party listens. With full-duplex systems, both parties can talk and listen at the same time as if they are in a natural conversation in person.

Users, who have different roles in a particular operation, can be in a conference or partyline together. Or they can be sub-divided into a matrix of independent groups in any one or many private intercom channels. In addition to establishing communication points, intercom can also interface with third-party devices such as 2-way radios, 4-wire audios, telephone, TV cameras, AES3 digital audio, relay control (for signal light activation or door control), etc. Coordinating activities via voice or through third-party devices such as relay controls require low-latency (delays measured in milliseconds).

The core technology of an intercom system could be based on one of the following platforms: 2-wire/analog, 4-wire/digital, wireless, and IP networks. The decision to deploy one platform over the other will greatly depend on requirements, environment and budget. These intercom platforms operate independently or can be integrated to form a larger system in order to address specific unique communication workflow needs. Moreover, intercom systems can be bridged together with different communication systems as part of a multi-platform solution.

In certain applications, intercom systems need to be geographically distributed to support the various communication positions in a given workflow. Therefore, they can be connected over 2-wire or 4-wire; MADI for close-distance connections such as floor-to-floor; optical fiber for short to long distances within a building; E1/T1 for inner-city connections; and IP networks (LAN, WAN, or Internet) for connections across a wide area, across town, and across the country.

Table of Contents

For decades, Clear-Com intercom solutions have delivered significant improvements to the way people collaborate in professional settings. Today, we expand on this legacy with solutions designed for linking multiple intercom systems together over IP networks, routing and distributing audio and video signals over optical fiber networks, and interfacing communication solutions with SIP protocols and 2-way radios.

INTERCOM CONNECTIVITY (ICON) SOLUTIONS

ICON is a collection of communications products that link local or geographically distributed intercom systems and end-points together. ICON Solutions operate over Ethernet/IP networks and/or optical fiber links.

> LQ Series
> ProGrid
> FIM-S222

LQ™ Series

LQ Series devices provide intercom connectivity for linking multiple intercom systems together and/or extending the capabilities and intercom channels of a single system to one or more remote locations over IP networks. LQ eliminates the need for costly audio cable and technically complex cable runs.

With either the two, four or eight-port, in 2-wire, 4-wire or 4-wire with GPIO options, LQ can route audio and call signaling between any industry-standard partyline intercom and 4-wire devices such as Clear-Com's Eclipse HX matrix intercom systems, 2-way radios and audio consoles over LAN, WAN or IP networks. A maximum of six LQ Series interfaces can be linked together to form a unified system.

LQ-2W2 (2-wire)

LQ-4W2 (2-wire)

LQ-4WG2 (4-wire with GPIO)

LQ

2- or 4-port IP interfaces for linking 2-wire, 4-wire and 4-wire with GPIO audio over IP networks. The 2-wire option is both Clear-Com and RTS TW compatible.

LQ-R

4- or 8-port IP interfaces for linking 2-wire, 4-wire and 4-wire with GPIO audio over IP networks. The 2-wire option is both Clear-Com and RTS TW compatible.

LQ-R2W4 (2-wire)

LQ-R2W4-4W4 (2-wire, 4-wire)

LQ-R4W8 (4-wire)

LQ-R-2W4-4WG4 (2-wire, 4-wire with GPIO)

LQ-R4WG8 (4-wire with GPIO)

Partyline Power Supply

The 2-wire LQ Series devices can power the partyline, allowing the user to connect a beltpack without the need of a power supply to locally power the line. The LQ partyline options can locally power up to five beltpacks or one beltpack powered using PoE. The LQ-R partyline options supply more power and can support up to 10 beltpacks per channel (20 per device).

Network Friendly CODEC

The LQ devices use the low-latency OPUS codec. The OPUS adjustable audio codec meets various data rate, bandwidth and quality requirements.

Core Configuration Manager

LQ Series devices are configured by free browser-based Core Configuration Manager (CCM). Quick setup and configuration editing can be achieved in matter of minutes. LQ devices can be added and removed from the network by editing the configuration via CCM. CCM is supported by the latest versions of all major browsers on the Mac, PC and tablet platforms.

Features:

- Two, four or eight ports of audio
- Rugged and light-weight 2-port units
- Compact box devices or professional 19" rackmount devices
- Up to six devices can be linked together
- Multi-unicast one-to-many routing
- Power either by 12V DC power supply or PoE (2 port units only)
- Remote connectivity to Eclipse HX frame via IVC-32-HX card using G.722 codec
- 2-wire powering, termination and auto-nulling
- Low-latency OPUS codec
- All LQ 2-wire ports are both Clear-Com and RTS TW compatible
- Browser-based configurator on PC, Mac and Tablet
- Powered by the I.V.Core technology

Port Configuration Screen

Devices Screen

About I.V.Core Technology

Clear-Com's Instant Voice Core (I.V.Core) is a suite of Internet Protocol (IP) technologies at the heart of LQ interfaces. I.V.Core employs an intelligent decision engine that routes only the audio packets containing needed voice information at low latency. It delivers superb audio quality through the use of wideband CODECS, enabled thanks to a highly optimized design that eliminates multiple encode/decode cycles. I.V.Core offers encryption, noise- reduction, and error-recovery through proprietary algorithms optimized for human voice characteristics.

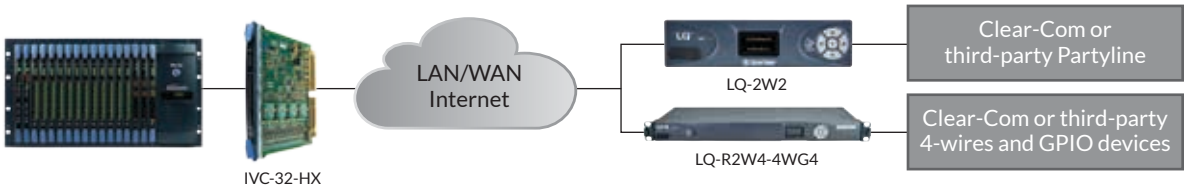
Linking Multiple Systems

Connect any combination of two or more intercom systems with call signaling or audio over IP networks.

Linking 2-wire with third-party partyline

Linking 2-wire with 4-wire intercom system

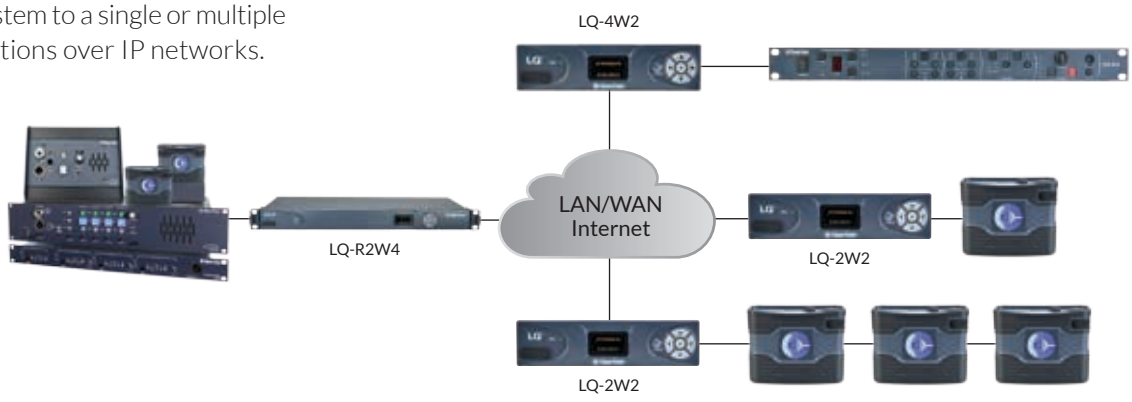
Linking 2-wire intercom system to GPIO



Linking matrix to GPIO, 2-wire or 4-wire intercom system

Extending an Existing System

Cost-effectively extend an existing intercom system to a single or multiple remote locations over IP networks.



To multiple sites

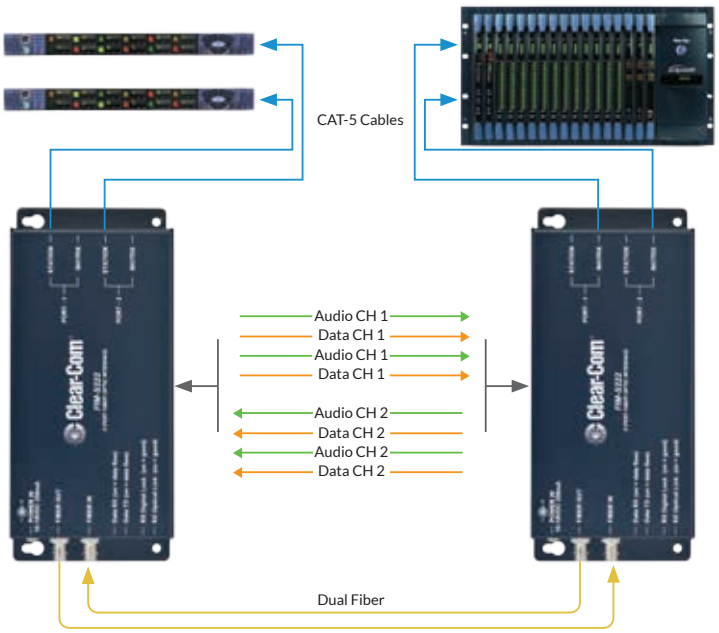
FIM-S222 Optical Fiber Interface

The FIM-S222 bi-directional optical fiber interface converts analog audio and digital data associated with an intercom channel to-and-from an optical format for transmission over fiber.

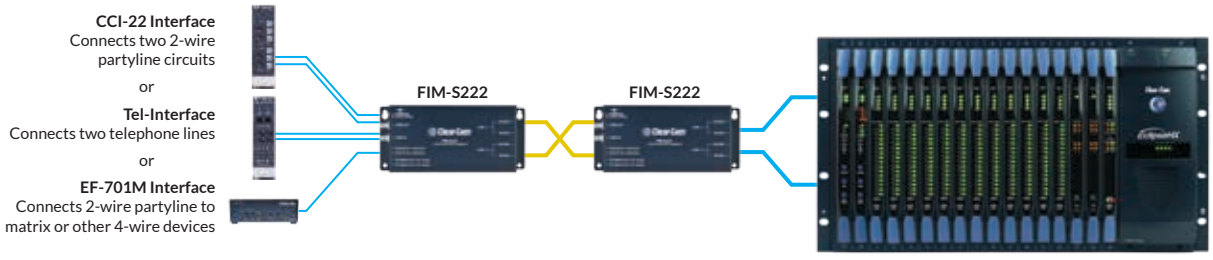
The FIM-S222 optical fiber interface allows one or two digital matrix intercom panels, interface modules, or 4-wire sources to be remotely connected to Eclipse HX Matrix intercom systems via optical fiber. A pair of FIM-S222s is required for each fiber link, one at the matrix-frame end of the link, and the other at the matrix-panel end.

Features:

- 24-bit digital DEMUX
- 48kHz audio sampling rate; flat frequency response up to 20kHz, S/N >80dB
- Sends and receives RS-422 control data
- Up to 20km (12 miles) range with fiber using single mode
- Up to 5km (3 miles) using multi-mode fiber
- RJ-45 connectors for direct connection with matrix panels, frames and interfaces
- Compatible with FIM-202D



Connecting Intercom Panels to a Central Matrix



Connecting Interface Modules to a Central Matrix

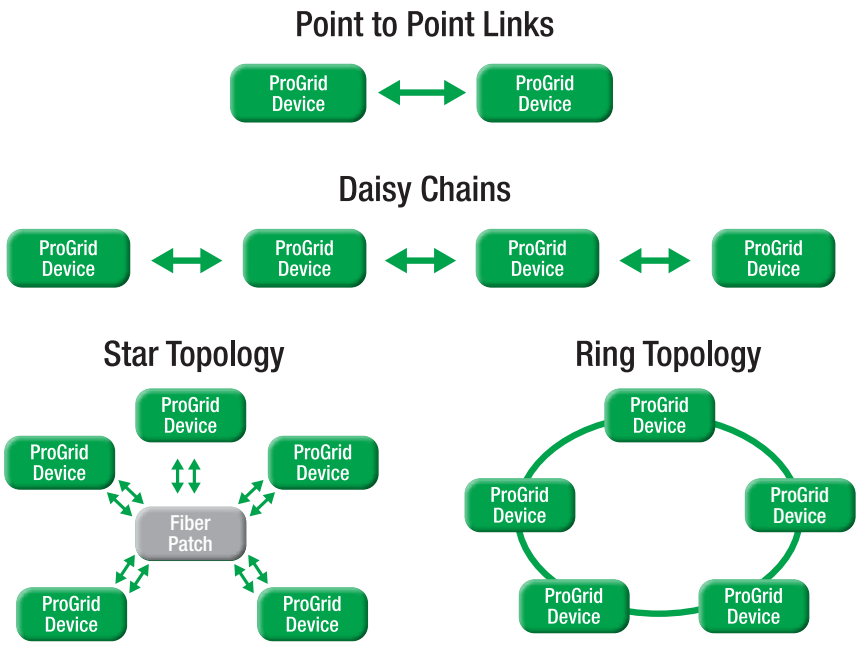
ProGrid® Signal Transport Solution

Signal Transport Solutions deliver signals from intercom, audio, video equipment—independent of manufacturer or brand—fast, cost-effective and easy to deploy. The ProGrid family consists of several categories of devices: Analog Audio Converter Devices, Intercom Interface Devices, Digital MADI Interface Devices, AES/EBU Connectivity Devices, and Yamaha Interface Cards.

Based on the open AES3 and AES10 (MADI) standards, ProGrid is designed for ultra-fast transport, distribution, and routing of audio, intercom, video signals* and control data over the OPTOCORE® (Optical Fiber) and SANE (Synchronous Audio Network + Ethernet) platforms.

ProGrid offers redundancy, robustness and reliability for small to very large infrastructural requirements. ProGrid is capable of matrixing up to 1024 channels across short or long distances. Any incoming signal is capable of being routed to any output or multiple outputs as a continuous stream of data, without buffering, packaging or compression.

Routing Topology and Connection Options



ProGrid Platform Technology

All ProGrid devices are powered by the OPTOCORE® and SANE (Synchronous Audio Network + Ethernet) network technologies.

OPTOCORE (Optical Fiber Network) transmits MADI, AES/EBU, Ethernet and Serial data such as DMX, MIDI, RS485/422 synchronously and seamlessly through the network. Its open platform cooperates with different ProAV manufactures of consoles and pro-audio devices.

- Up to 1024 audio input channels and unlimited number of outputs
- Synchronous data transmission
- Up to 24 ProGrid devices, expandable to 215 devices using SANE
- Extremely low latency – System latency of two samples is at 41.6µs
- Dual redundant ring topology and auto-reroute providing maximum resiliency

SANE (Ethernet) streams and transmits data fully synchronously in real time. The non-proprietary open standard transport platform is the perfect medium for transporting AES/EBU, MADI as well as Ethernet.

- Up to 64 audio input and output channels
- Extremely low latency at a lower cost

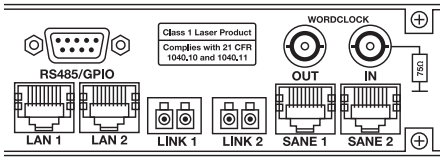
* Composite video is available over the Optocore network using the PG2-MADI-FX and PG32-AES-FX units. HD SDI video is available through the use of the MUX-22-CC.

ProGrid Analog Audio Converter Devices

The PG-AUDIO devices are digital audio I/O interface devices transporting analog audio and data signals in a variety of ways that can be customized to fit user needs.

PG16-AUDIO

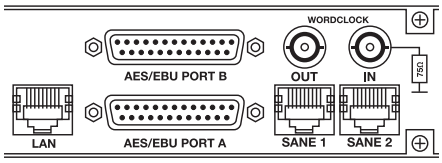
16 Ports PG-AUDIO Product Models		Types of Connectivity Options	Network & Digital Connectivity Options
PG16-16MI	PG16-8DMPRE	MI-Microphone Inputs DMPRE-Dual Microphone Inputs (with 2 independent adjustable gains) LI-Line Level Inputs LO-Line Level Outputs AE-AES3 I/O Devices include dual power supplies with automatic switchover.	FXS, FXM, and TP connectivity modules are available with all PG16- and PG8-AUDIO models Every PG-AUDIO-FX device can add and/or extract up to 1024 audio channels from the ProGrid Signal Transport Solution and 64 audio channels to/from the SANE network A PG-AUDIO-TP device can exchange up to 64 audio channels for the SANE Network and two AES/EBU ports, each capable of 16 channels
PG16-16LI	PG16-8AE		
PG16-16LO	PG16-8AE-SRC		
PG16-8MI-8LI	PG16-4AE-8MI		
PG16-8MI-8LO	PG16-4AE-8LI		
PG16-8LI-8LO	PG16-4AE-8LO		
8 Ports PG8-AUDIO Product Models			
PG8-8MI	PG8-8LO		
PG8-8LI			



FX – The Optocore Fiber Network Module allows the converter to be used as a part of a 24 device ProGrid system.

- 4 Serial ports
- Sync
- 2 LAN ports
- 2 SANE/LAN ports

FX device can operate on either Single mode or multi mode fiber optic cables. Fiber transceivers ordered separately.



TP – The SANE CAT5 Module allows the converter to be used as a stand alone converter or expansion device for ProGrid FX devices.

- 16 AES3 I/O
- Word Clock I/O
- 1 LAN port
- 2 SANE/LAN ports

ProGrid Intercom Interfaces

The PG-INTERCOMs are digital intercom audio and data control I/O interface devices for seamless integration of intercom audio and control data from Clear-Com and RTS/Telex intercom panels, interfaces and matrices.

The PG4-INTERCOM devices offer four RJ45 4-wire intercom ports while the PG8-INTERCOM devices offer eight RJ45 4-wire intercom ports. The RJ45 ports are duplicated with reverse wiring so that half the ports are wired for connection to intercom panels or interfaces and half the ports are wired for connection to the intercom matrices. The devices can be used as a generic networked audio line level input and output converter.

PG8-INTERCOM

PG8-INTERCOM Product Models 8-Port Intercom Inputs	Connectivity Options	Network & Digital Connectivity Options
PG8-INTERCOM-CC PG8-INTERCOM-485 PG8-INTERCOM-444	CC – Clear-Com 4-wire matrix ports with serial control, four 4-wire Clear-Com matrix ports with line level and RS422 serial inputs and outputs for Clear-Com key panels, matrices and interfaces 485 – RTS 4-wire intercom ports with serial control, four 4-wire RTS matrix ports with line level and RS485 serial inputs and outputs for RTS key panels, matrices and interfaces 444 – Line level inputs and outputs, GPIO and DC output, 4 line level inputs and outputs with optically isolated general purpose inputs and relay switched general purpose outputs. Auxiliary DC outputs to power external circuits Devices include dual power supplies with automatic switchover	FXS and FXM are available with these models. FSM=Single mode FXM=Multi-mode
PG4-INTERCOM Product Models 4-Port Intercom Inputs		
PG4-INTERCOM-CC PG4-INTERCOM-485 PG4-INTERCOM-444		

ProGrid AES/EBU Audio Interface

The PG32-AES is a digital audio interface with AES/EBU ports for the ProGrid Signal Transport Solution. The PG32-AES can be used as an interface to all microphone preamps with AES3 outputs, and serves as I/O to the converter devices to PG-AUDIO FX devices or via SANE to PG-AUDIO TP devices. Using ProGrid microphone preamps, the PG32-AES enables direct gain control of the preamps from most digital consoles.

PG32-AES

PG32-AES Product Models 4x 8 AES3 channels ports 32 AES3 (64 mono channels)	Connectivity Options	Network & Digital Connectivity Options
PG32-AES	AES pairs, switchable as I/O in blocks of 4 pairs	FXS and FXM are available with these models. FSM=Single mode FXM=Multi-mode

ProGrid Digital MADI Interfaces

The PG2-MADI-C and PG2-MADI–F are digital audio I/O interface devices for transmitting of up to 128 input and 128 output digital audio channels. Each MADI port can be adjusted to handle different formats according to AES10 standards. It is possible to control ProGrid microphone preamps directly from Soundcraft, Studer, Lawo, SSL or AVID digital console surfaces using PG2-MADI devices as an interface.

PG2-MADI-C

PG2-MADI Product Models 2x 64 MADI In + 2x 64 MADI Out	Connectivity Options	Network & Digital Connectivity Options
PG2-MADI-F PG2-MADI-C	MADI-F – 2 Optical 64 Channel MADI Ports (duplex SC multi-mode) MADI-C – 2 Coaxial 64 Channel MADI Ports (BNC connector) Devices include dual power supplies with automatic switchover	FXS and FXM are available with these models. FSM=Single-mode FXM=Multi-mode

ProGrid Interface Cards

The ProGrid YG2 Interface Card allows direct connection of Yamaha consoles to the fiber links of any ProGrid Signal Transport Solution. The YG2 conforms to the Yamaha Mini-YGDAI standard of 16 IN/16 OUT audio channels through the console slot. The front panel offers two fiber connections, one 10/100MBit Ethernet transport, RS232/USB for ProGrid Software and 2x RS422 for transporting of Yamaha Remote Protocol to Yamaha AD8HR micro-phone devices. Additional ProGrid YS2 daughter boards can be connected via CAT5 cables using the RJ45 SUB Port to enlarge the number of audio channels, up to 64 IN / 64 OUT (32 IN / 32 OUT at 96kHz). Maximum of 3 YS2 cards can be installed.

Product Models		
PG-YG2		PG-YG2 – 64/64 Yamaha Master Card / PG-YS2 – 16/16 Yamaha Slave Card The PG-YG2 and PG-YS2 Yamaha cards allow a redundant fiber connection of a Yamaha mixing console to a 1Gbit ProGrid network. The YG2 card is capable of 64 inputs and outputs and connection to multiple YS2 slave cards. Also capable of transporting and converting the Yamaha HA remote protocol and fast Ethernet.
PG-YS2		
PG-Y3R-TP		Yamaha General Digital Audio Interface I/O Card for SANE The PG-Y3R-TP card is capable of 16 inputs and outputs. Multiple cards can be daisy chained from a 64 channel input/ 64 channel output SANE port on a ProGrid FX device or used in a SANE network. Also capable of transporting and converting the Yamaha HA remote protocol and fast Ethernet.

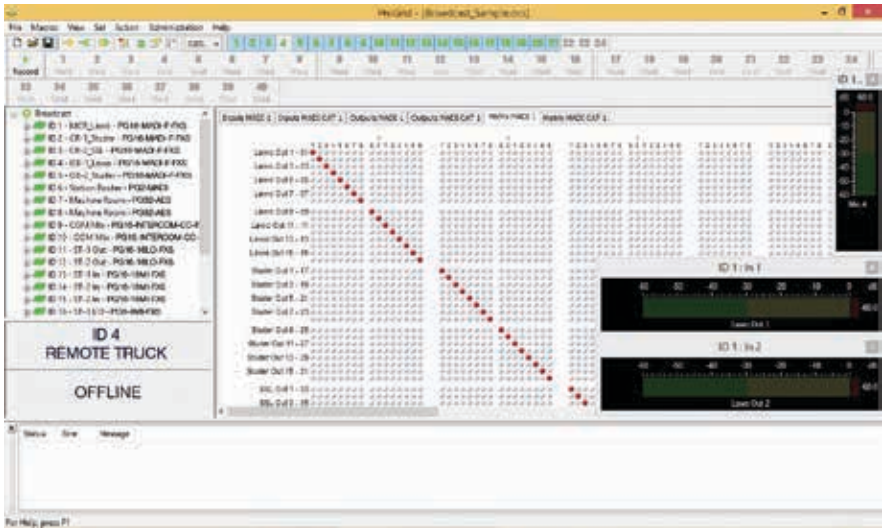
ProGrid Control Software

All ProGrid devices are controlled by the CONTROL SOFTWARE. The software allows the configuration of and access to the:

- Complete audio/data network MATRIX
- Naming and gain setting of all inputs
- Configuration of the word clock settings
- Provision of phantom power for all mic inputs
- Storage and recall of the configuration setup
- Real time level display of the individual channels

Input-output, Matrix and Patch

Any input of the system can be routed to any output by means of the Matrix tab. One input can be routed to more than one output.



Supervising the Network

Working in ON-LINE mode, it is possible to have the complete network under control. The software advises the system manager of every significant event, such as input clipping, fiber/CAT5 disconnection, RS232/USB/LAN connection status. A log window will automatically pop up on event, if desired.

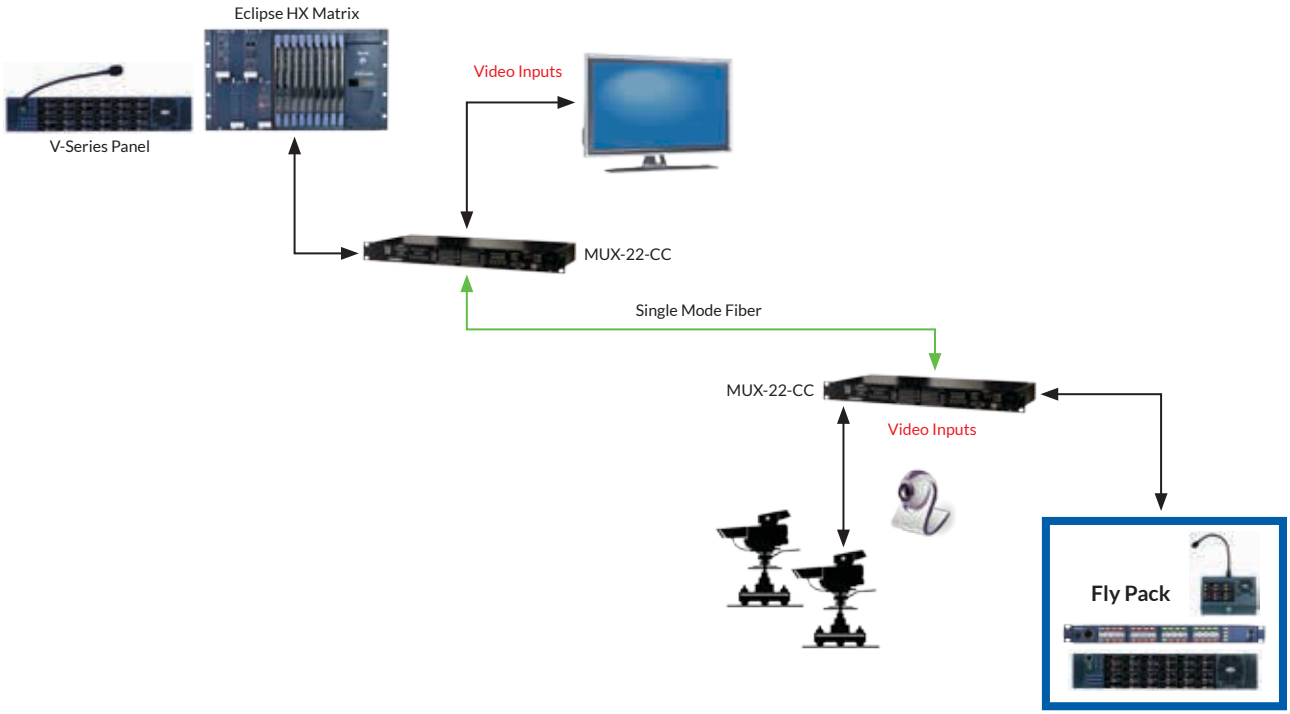
MUX-22-CC

The MUX-22-CC is a video audio network device for transporting, and distributing professional video signals such as SD/HD/3G-SDI over the same optical fiber. In addition, it can also transport audio, intercom and control data on the same platform. The device can be used as a standalone or operates with the ProGrid platform devices.

The ProGrid audio and data transport seamlessly multiplexes with the MUX-22-CC. Audio and control data from Clear-Com user panels or matrices are sent transparently through the optical network. Each intercom channel can be routed to and from every device on the network using the OPTOCORE control software.

MUX-22 units can be used in multiple different applications, starting from very simple point-to-point links between OB trucks and remote locations. The MUX-22-CC can also be used with other Broaman units as part of a larger routing solution.

The MUX-22-CC offers 8 SD/HD/3G-SDI coaxial video inputs or outputs that are converted to and from single- mode DiViNe optical fiber links. It is equipped with four video inputs and four outputs, and four 4-wire RJ45 matrix ports and with a CWDM (Coarse Wavelength Division Multiplexing) module with auxiliary fiber ports to allow for connection of external fiber systems, to the CWDM module. Built-in redundant power supply with an automatic switchover.



INTEROPERABILITY SOLUTIONS

Interoperability is the ability to communicate across multiple different systems in order to facilitate coordination of actions at an event at every level. Clear-Com's Interoperability Solutions address the communication challenges with gateway solutions that link and bridge a myriad of communication systems such as radios, intercoms, telephones and IP networks in order to deliver advanced radio bridging, radio interfacing and IP connectivity on a single platform.

> Clear-Com Gateway

Clear-Com® Gateway

The Clear-Com Gateway platform consists of the compact CG-X1 and CG-X4 devices for connecting 2-way radios, intercoms, telephones and IP networks. The CG-X1 is the 2-port option for remote sites and single-channel bridging. The CG-X4 carries a higher port density of 8 ports in a small form factor. Up to 16 ports can be housed in a single, standard 19" 1RU space with optional rack mount kit.

CG-X1
2-Port Option
For remote sites and single-channel bridging

CG-X4
8-Port Option
For larger communication operation

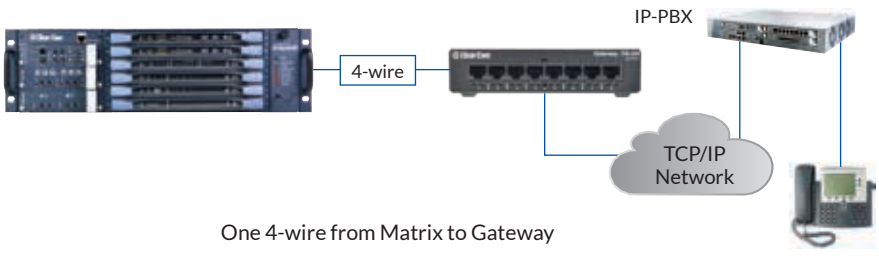
Radio Bridging

Clear-Com Gateway bridges radio channels across different radio platforms, port-to-port, port-to-multi-port and Radio-over-IP (RoIP). The digital radio module allows analog-to-digital and digital-to-digital bridging and conferencing on one platform.

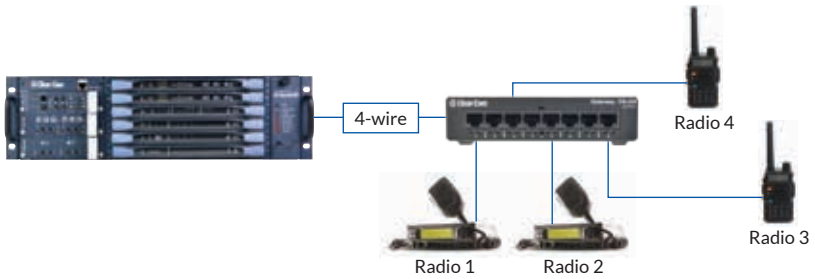
IP Interfacing

Clear-Com Gateway supports standards based IP interfacing for Voice-over-IP (VoIP), SIP and RoIP. Each IP module comes with eight SIP accounts. When connected to Clear-Com intercom systems, Clear-Com Gateway provides a SIP interface that can connect to SIP servers and IP phone interfaces.

When connected to a 4-wire port on Clear-Com digital intercom systems, the Clear-Com Gateway provides radio bridging, RoIP and custom radio integrations.



One 4-wire from Matrix to Gateway



One 4-wire from Matrix to Gateway Four ports 4-wire from Gateway to radios

Radio Interfacing

Gateway devices offer advanced radio interfacing for analog and digital radios with a suite of programmable features to meet the most demanding radio and Land Mobile Radio (LMR) applications. When connected to Clear-Com intercom systems, 4-wire port signaling is provided to activate features and trigger radios.

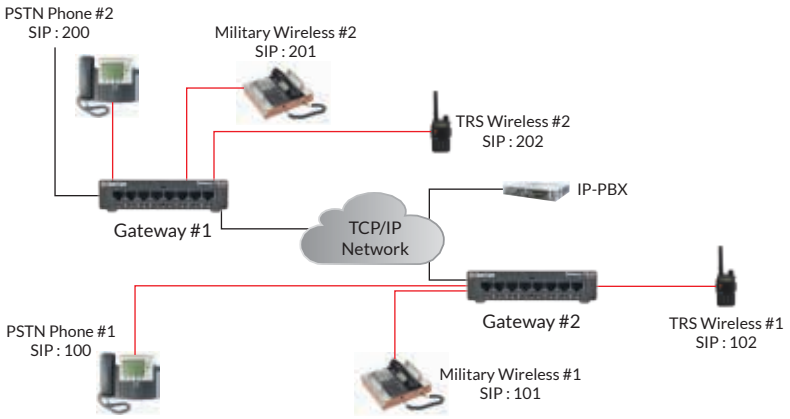
Clear-Com gateway provides integration with 2-way radios and LMR systems offering the following applications:

(1) Radio over IP (RoIP) – Connecting radios via IP networks offers flexibility when designing a radio system and allows for SIP interfacing to other communication systems.

(2) Radio Bridging – Bridging different radio types and radio channels is the most common application for a radio gateway. 4-wire ports on the gateway are connected to each radio and bridged in a partyline. Clear-Com Gateway can scale up to 180 bridges in one platform.

(3) SIP Interfacing – Clear-Com Gateway supports SIP protocol for connecting to IP phone systems. SIP extensions are assigned to 4-wire intercom ports, providing telephone and IFB connections.

(1)

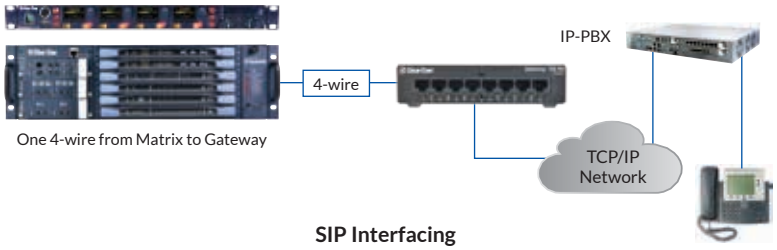


Radio over IP (RoIP)

(2)

Radio Bridging

(3)



SIP Interfacing

When connected to a 4-wire port on the Eclipse Matrix, or HelixNet, the Clear-Com Gateway provides a SIP interface that can connect to IP telephone systems.

Corporate Description

Clear-Com, an HME company, is a trusted global provider of professional real-time communications solutions and services since 1968. We innovate market proven technologies that link people together through wired and wireless systems.

Clear-Com was first to market portable wired and wireless intercom systems for live performances. Since then, our history of technological advancements and innovations has delivered significant improvements to the way people collaborate in professional settings where real-time communication matters.

For the markets we serve – broadcast, live performance, live events, sports, military, aerospace and government – our communication products have consistently met the demands for high quality audio, reliability, scalability and low latency, while addressing communication requirements of varying size and complexity.

Our reputation in the industry is not only based on our product achievements, but also on our consistent level of customer engagement and dedication to delivering the right solutions for specialized applications, with the expertise to make it work. Around the globe and across markets, Clear-Com's innovations and solutions have received numerous awards and recognitions for ingenuity and impact to customers.

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