



**WHITE  
PAPER**

**Integrating Production Intercom  
Systems Using Existing LAN/WAN  
IP Networks within Broadcast and  
Live Event**

## INTRODUCTION

Dependable internal communications for the staff of an event is a necessity. A quality presentation can only be achieved when personnel involved in the production can communicate quickly and reliably. When a variety of different technologies are involved, achieving this can be challenging.

This is particularly true in theaters, opera houses, symphony halls and houses of worship. In all of these locations, increasingly complex productions require the intercom system to be flexible and capable of being expanded to support multi-floor, multi-site or multi-venue operations. Integrating an outside participant, like a video production team, or touring show, frequently adds to the need for expansion.

Similarly, in the broadcast world, the need for good multi-venue intercom communications is especially important during “live” events. These include sports, award ceremonies, pageants, and other programs that are produced away from a controlled studio environment.

This white paper is not a discussion of “native” IP systems that operate only in the IP domain. Its purpose is to explain methods of connection of two-wire “party-line” and four-wire intercom systems by using existing and available LAN and WAN IP network technology.

### **The Problem: Expanding the Intercom System**

An ongoing problem in intercom installations remains a requirement for party line or four-wire system wiring to be run at great distances, and in many different areas throughout a facility or between facilities. This necessitates extra expense during construction of new venues, and also creates problems in existing facilities for either permanent or temporary expansion.

Implementing “party-line”-compliant wiring between venues can be a challenge in many ways. Cabling requirements are exacting. Obtaining approvals and permits can take more time than may be available prior to an event’s opening. Cable termination can be complex, requiring technicians with special audio training, instead of less-expensive low-voltage electrical installers. All these factors make costs of installation and implementation of the extended intercom wiring an expensive proposition.

Additionally, events that take place on an occasional basis within a venue sometimes require considerable amounts of temporary wiring.

This is very common in older venues that were not originally constructed with the needs of modern signal distribution of audio, video, or intercom in mind.

Given the time needed and the expense involved this work, a better method of connecting party line systems together, or extending them, needs to be found.

For all these associated reasons of time, expense, and complexity, better alternatives need to be found for the expansion of intercom systems.

### **The Solution: Use the Existing IT Network**

In most facilities, including entertainment venues, local area networks (LAN's) will be already installed and operational. LAN's are normally wired with CAT5 or CAT6 cabling. The need to have computers functioning as network terminals usually insures the presence of this cabling throughout the facility.

This existing infrastructure provides a unique opportunity to provide for expansion of an intercom system. The ability to use this network connectivity for voice intercom purposes can be a tremendous advantage. Connection to an existing hub, router, or switch with some form of IP intercom interface, and subsequent dedicated cable links to beltpacks and intercom panels is obviously a much better approach than installing further bulky signal wiring.

Additionally, a "smart" IP intercom interface may only take a single cable run to connect multiple intercom channels.

### **Finding Hardware to Accomplish LAN/WAN Connectivity**

Trying to find interface devices that will allow the party-line intercom to be connected to the IT network is the challenge. The "audio" world of intercom systems and the world of "information technology" can be very diverse.

While it's true that audio and video streaming is extremely common in the IT world today, the protocols and software used for this purpose tends to be a proprietary function of a particular network type. In most cases these protocols only allow streaming of audio and video in one direction. They typically are used to send content to workstations for convenience viewing by users.

These protocols do not consider, accept, or even recognize any form of bidirectional audio, video, or intercom call signaling. Digital conversion by some form of interface is required to connect to a network.

To complicate matters even more, many methods of interfacing analog audio over longer lines frequently result in extremely poor quality. The resulting digital version of the original information can be distorted, have narrow frequency response, and be generally unintelligible.

The quality of the audio in any intercommunication system must be as high as possible. If it is not, there will be missed cues, misunderstandings as to the next sequence needed, and other undesirable results. In a multimillion dollar production, these are unacceptable, both for the technicians or artists, and for the audience watching the event. Additionally, the intercom system may be used for vital security and life safety purposes. These critical communications increase the need for high clarity and an equally high certainty of communications.

## **The Requirements for an IP Intercom Connection Product**

Any interface that can allow intercom connection to an IP network should have the following characteristics;

- It must be small and easy to deploy.
- It must be able to be powered by different methods.
- It must provide enough power for a certain number of party line belt packs without adding any additional power supplies.
- It must work directly with party-line belt pack and intercom panels without any need for modifications.
- It must be addressable via computer and Smartphones for quick setup to meet the needs of the specific location.
- It must be easily removable at the conclusion of the event.
- It must have a low-latency codec to eliminate delay issues, and have high audio quality.
- It must have a wide audio bandwidth for good clarity.

Finally, it must be reasonably priced, and readily available from suppliers.

## An Improved Connectivity Method for Four-Wire and Party-Line Extensions

The current state-of-the-art connection devices for extending analog intercom systems using a digital infrastructure are the LQ-Series IP Connectivity interfaces from Clear-Com. The LQ-2W2 and LQ-4W2 are designed to allow rapid reliable connections to IP networks. Each meets all the characteristics as listed above.

The LQ-2W2 is the party-line connections interface device. The LQ4W2 is for use with four-wire systems. Both use standard connectivity, and require no special hardware connections.

The associated software, called Core Configuration Manager, or CCM, allows the units to be quickly configured to meet the requirements of the intercom system. The manager can be put onto a PC, Mac, or tablet platform.

Figure 1 below shows the LQ-2W2 as connected to both intercom systems and a LAN/WAN/Internet environment.

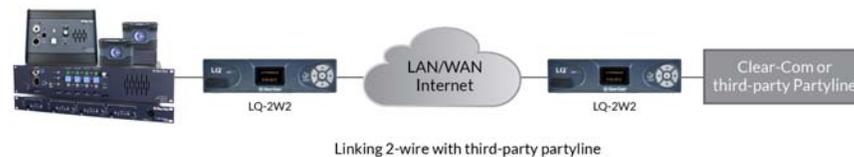


Figure1. LQ-2W2 Connections

Note the ability of the LQ-2W2 to connect to both an intercom system, and also individual belt packs. This allows the interface to support standard beltpack communications without the need to have two complete intercom systems at each end of the network connection.

Figure 2 shows the LQ-2W2 and the LQ-4W2 as used to connect to multiple sites. The ability of the LQ-2W2 to connect directly to beltpacks can be a big advantage when they are at a distant location from the main intercom system. No extra interface is needed to allow these beltpacks to be available for communication across the entire operational area.

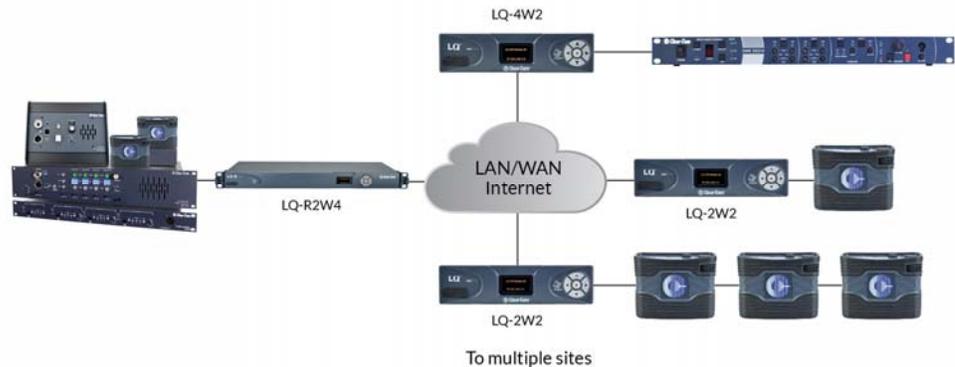


Figure 2. LQ-2W2 and LQ-4W2 Connections to Multiple Sites

Figure 3 show connection capability for the LQ-4W2 four-wire connection interface. Again, connections can be made between four-wire systems directly without the need to have complete matrix intercom systems at both ends of the network path.

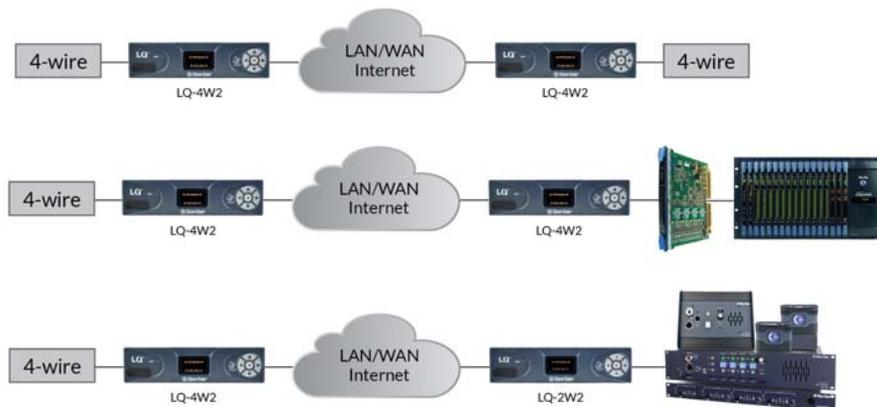


Figure 3. LQ-4W2 Connections

In each case, standard connections from the network (typically via an RJ-45 connector utilizing CAT-approved series cable) can be used for the interface units. If desired, pre-made cables can be purchased from suppliers. With access to the interfaces via the CCM configuration software, changes can easily be made “on the fly” to the LQ units. This means that a “site visit” to a remote area by a technician to change configurations is not required.

## Conclusion

The LQ-Series from Clear-Com combine the capability of easy physical connections, small physical size, rapid setup via computer interface, wide frequency response, multiple powering capabilities, and a low-latency digital codec. Additionally, the units are reasonably priced, and readily available.

## About Clear-Com

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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