

# Intercom Gemini

Combining full access  
programme quality  
intercom with IP  
connectivity



# trilogy

**T**rilogy's pioneering Gemini 'Distributed Matrix' Intercom addresses the demanding needs of today's broadcast and professional media industries for an expandable structure to cope as requirements change, a wide choice of operator panels to suit both application and user, simple installation over any distance and absolute reliability. In meeting these needs, Gemini provides a unique intercom solution that also combines a programme quality audio network with IP connectivity.

Gemini's architecture is built on the concept of a de-centralised, scalable matrix platform with the significant advantages of IP capability, to deliver real time, high quality voice solutions across local or global networks. Combining intuitive user panel operation for IP-enabled, as well as traditional panels, Gemini is undoubtedly the most flexible intercom system available today.

Gemini's unique design is suited to any Broadcast application ranging from a single studio to the largest media complex. By using Gemini's seamless IP interface, the intercom network can be expanded almost limitlessly both in terms of system size and geographic location via LAN, WAN or Satellite.

A single Gemini matrix accommodates up to 32 ports, each freely assignable for use with control panels or 4 wires, whilst the IP gateway adds provision to stream bi-directional audio traffic over a further 32 IP channels.

## Gemini Audio Networks

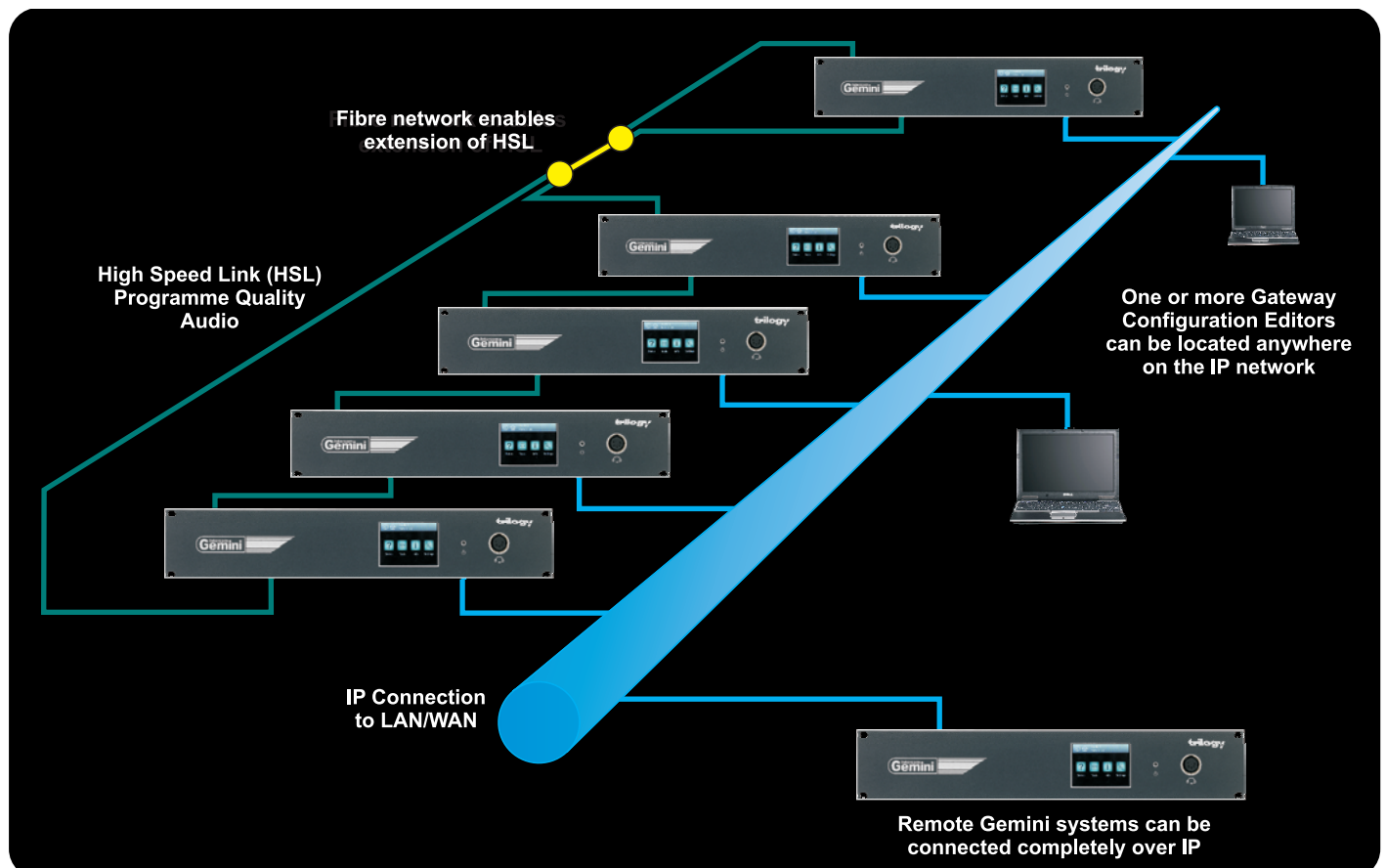
Up to eight Gemini frames may be networked in any local or remote combination to create a full access matrix of up to 256 ports, with programme quality audio transported across the system's High Speed Link (HSL), via standard Cat 5 cable or fibre.

This 'distributed' approach eliminates any single point of failure, which combined with the use of both a dual redundant audio ring and IP failsafe routing, ensures that Gemini delivers ultra resilient performance.

The HSL uses 270 Mbit/s LVDS/ASI, allowing the signal to be routed over an existing cable infrastructure and to make use of commercially available fibre interfaces for greater distances, or where electrical isolation is required between locations.

The ring carries 238 channels of uncompressed 48 kHz-sampled programme quality audio with negligible latency between units. This currently allows a single matrix size of up to 256 x 256 ports to be built. The system is fully non-blocking, allowing any combination of sources to be mixed and routed to all destinations.

Whilst all matrix audio is carried over the HSL links, configuration and control data is routed between frames over IP, which may be a specific network segment allocated to the communications system or shared with other services.



## Gemini IP Networks

For further system expansion beyond 256 x 256, multiple Gemini 'rings' may be interconnected over an IP network, without loss of functionality or any practical limit to overall system size.

Gemini is designed to directly connect to any 10/100base-TX Ethernet network with provision to support both static and DHCP IP addresses.

Frames can be scaled over LAN, WAN, Internet and Satellite on standards based IP architecture. Typically, the system operates on networks and WAN segments that include other video, data and voice traffic. It uses 'heartbeats' to ensure network robustness and supports IEEE 802.1p prioritised packet switching, IEEE 802.1q VLAN 12 bit identifiers and RFC2474 Differentiated Services to allow precise network control of traffic.

Gemini networks using IP audio connectivity between matrices can select from a range of coding profiles based on industry standard CODECs to provide the best compromise between quality, latency and available bandwidth.

These bandwidth profiles allow selection of a variety of CODECs including G722, G711, G726, G729 and G723. Each profile carries a specific IP payload, ranging from 10 kbps to 100 kbps, allowing audio quality and latency performance to be optimised for any given network.

These range from the 7 kHz audio bandwidth G.722.1 CODEC to the highly efficient G.723 providing speech quality audio at less than 10 kbps.

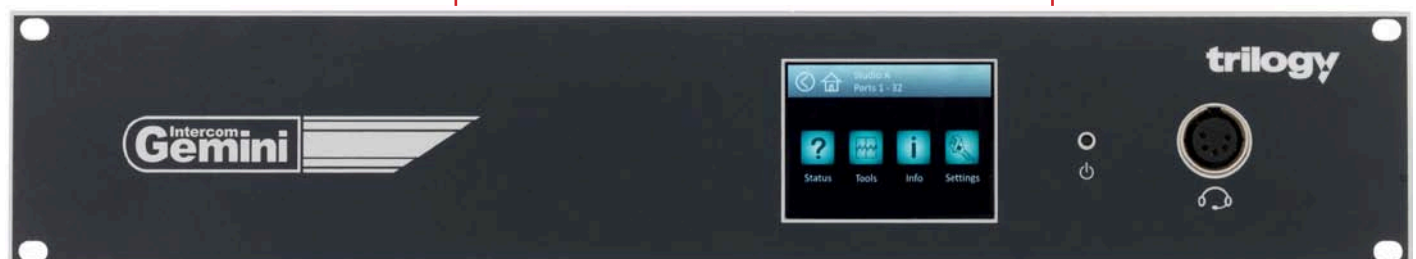
The availability of efficient low bit-rate CODECs means that Gemini is extremely well suited to the demands of IP-over-satellite, where bandwidth available for audio communications is often limited to less than 32 kbps.

## Gemini Front Panel

A unique feature of the Gemini matrix is the addition of a Touchscreen display that allows the user to set up basic network parameters, and provides an easily accessible means of verifying system status. In conjunction with the front panel headset connector, audio monitoring and communication functions can also be performed, avoiding the need for a dedicated engineering control panel or separate monitoring unit.

Unique Touchscreen providing access for system settings, status and diagnostics

QVGA display and headset enable audio monitoring and communications



## Key Benefits and Features

- Distributed matrix architecture improves resilience and reduces installation costs
- 256 x 256 port full access audio network with full programme quality audio performance
- Dual redundant ring system for ultimate system dependability
- Integrated IP capability provides almost limitless expansion both in terms of system size and geographic location
- Optional IP panel connectivity allows for flexibility in any installation
- Gateway Configuration Editor allows multiple users to implement on or off-line system changes over an IP network
- Touchscreen front panel and browser access allow for set-up, monitoring and verification of system status
- Seamless integration with SIP/VoIP networks
- A wide range of lever key, pushbutton and Touchscreen control panels is available to suit any application
- Fully compatible with Trilogy's Commander, Orator and Mercury intercom systems

In addition to the bandwidth restriction, the inherent satellite delay would normally affect any control messaging required to make and break audio routes at each location. However, Gemini addresses this by allowing selected channels to be pre-opened, and retained for a pre-determined period after first use.

## Telephony and SIP

Extensive connectivity to traditional telephony systems is provided through plug-in multi-channel I/O modules. In addition, Gemini includes H.323 and SIP protocol stacks to allow connection to external VoIP systems.

Incoming calls may be auto-answered and routed to the desired user(s). Callers may also take advantage of powerful functionality to deliver IFB feeds for remote 'talent' or SNG vehicles directly back to the incoming caller. Additionally, any control panel can make a remote PSTN call at local rate via Gemini's IP network, significantly reducing the operating costs for multi-site organisations.

SIP is fast becoming the de facto modern telephony standard, and the inclusion of SIP in Gemini extends its comprehensive connectivity still further. Although a SIP server can be used – particularly useful when interfacing to an existing PBX or intercom system – in keeping with Gemini's distributed approach, peer-to-peer SIP calls are of course supported.

A typical application is to use a SIP-enabled wireless device to provide one-button calling to any device connected to the Gemini network, such as intercom panels or conferences, as well as to other telephony devices. Many modern mobile phones can also be configured with a SIP client further enhancing the reach of Gemini.

## Virtual Panels

In a growing number of applications it may be more appropriate to provide an operator with a PC based 'soft' panel facility rather than a conventional unit. Gemini supports an unlimited number of virtual panels connected over IP, including the ability to customise the panel size and shape and to allow 100 or more keys to be configured. As well as their prime application as intercom workstations, virtual panels are particularly useful for performing audio routing functions, and to build IFBs, Groups and Conferences.

As a further enhancement to the Virtual panel, the Patch panel provides fast x-y assignment and display of uni and bi-directional routing – a perfect solution for MCR operations.

## General Purpose Interfaces

Gemini's control system contains a powerful routing engine which is extended to manage logical interaction of GPI inputs and outputs, both at the matrix, and at all control panels. These may be connected to other ancillary systems for 'On Air' conditions, microphone / speaker muting, tallies and IFB operation.

## Portable Devices

Duplex wireless beltpack systems for all studio and external applications either using UHF or DECT may be connected directly to standard Gemini matrix ports, as can the UHF In-Ear Monitoring system, with its choice of base stations for internal or external aerial operation.

Where a wired solution is preferred, Trilogy can offer both 4 wire and 2 wire systems, each with a range of available beltacks and headset options.

## Mixer / DA

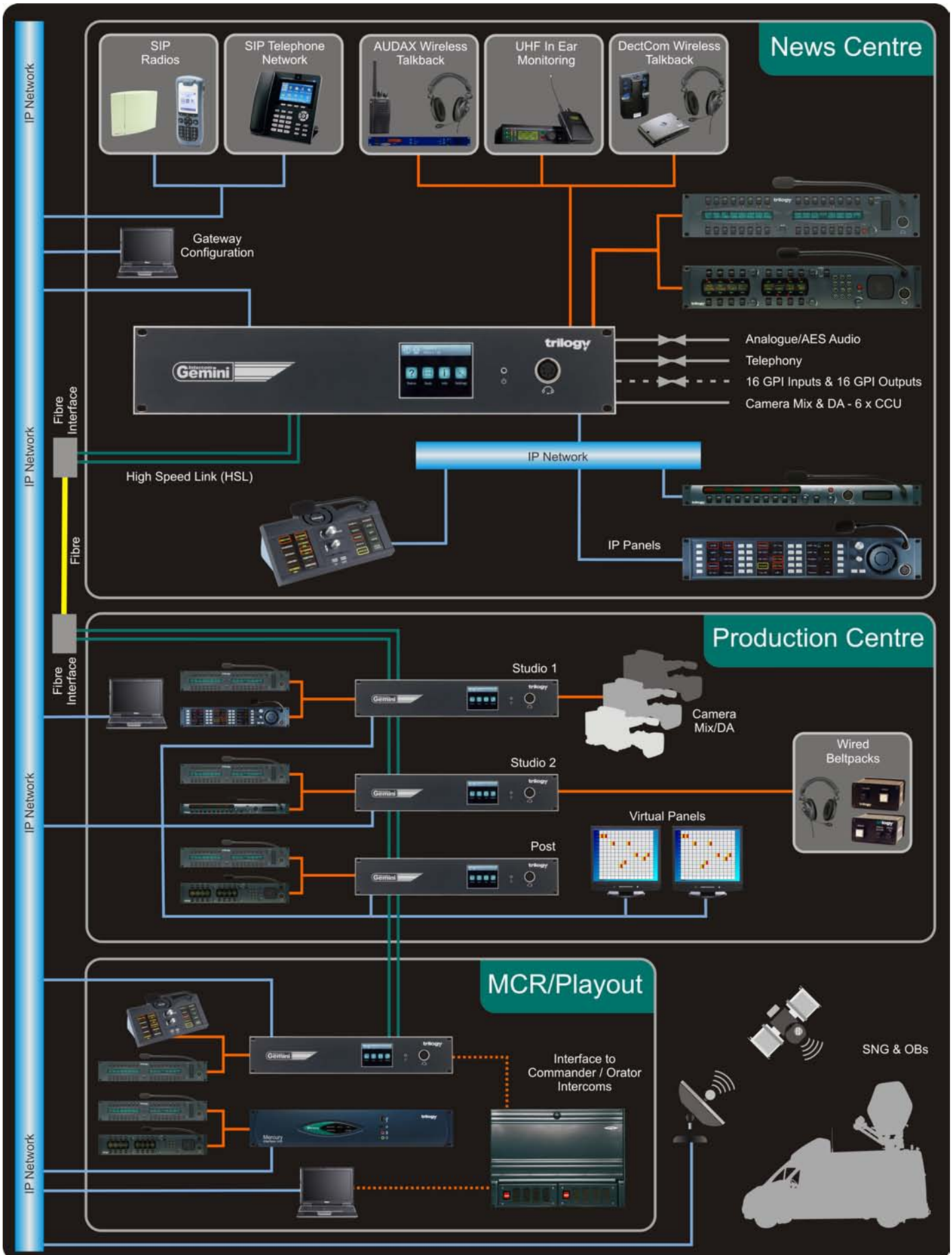
In addition to the 32 audio expansion ports a 6 channel audio mixer / DA is provided as standard on each Gemini matrix. Normally used for camera intercom, where only a single shared communications channel is required, this dedicated facility avoids the need to use any of the frames 32 main ports.

## Extensive Compatibility

Interfacing Gemini to Commander and Orator matrix systems uses a combination of audio 'trunk lines' and a serial data link to carry control messages, audio routing commands and signalling. For optimal use, these trunk lines are dynamically allocated according to operator demands, and may be configured as freely available, 4 wire only, or reserved for priority users.

Interfacing to Trilogy's established Mercury IP communication systems is purely at the IP network level and Mercury systems may be transparently integrated within a Gemini configuration database.





## Gateway Configuration Editor

Gemini system configuration is performed using Trilogy's Gateway software which operates in a simple Windows environment. This provides limitless ability for users to build, modify and save multiple databases to suit any operational requirement. Gateway may be set up on several workstations, allowing selected users to have independent control over specific Gemini matrices or networks. Although normally connected to a master database on the network, each Gemini frame can store up to 4 configurations, and is therefore not reliant on a central server.

Gateway is compatible with Windows XP or later operating systems, for either on or off-line configuration. Taking full advantage of some of the latest Windows 7 features, plus simple drag and drop functionality, the GUI manages all panel functionality as well as Groups, Conferences, IFBs, Telephony and logic functions.

Gateway has configurable access protection allowing users to log on with their own unique password, to view only, change key assignments and labels, or to have complete control over all hardware and software features. Non-intrusive changes can be made, without disruption to system operation, and configurations may be uploaded from Gemini matrices for storage, editing and re-load.

Presentation is based on an industry standard "tree" structure, with customised views enabling users to navigate the software quickly and easily. In addition to this, multiple tabs located at the top of the screen permit the user to quickly revert back to pre-programmed sections of the configuration.

The enhanced mode allows full configuration of all system parameters, such as audio settings and IP addresses, while for day to day tasks, the user can select a more simplified view for IFB, label and panel key assignments.

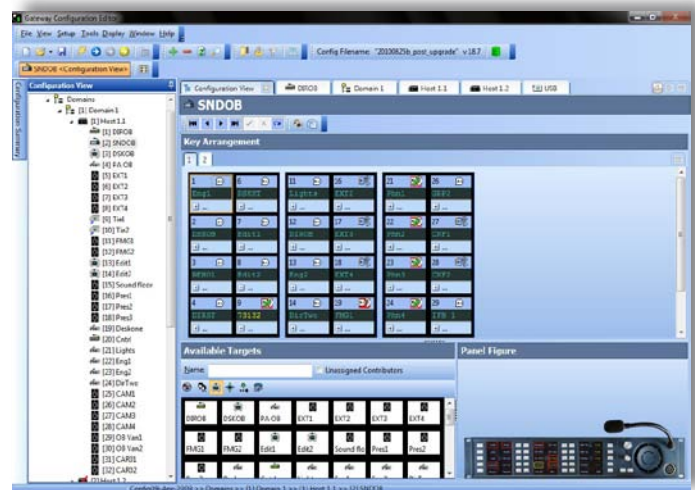
The panel editor displays an image of the control panel being edited and features drag and drop programming for rapid key assignment. The 'available targets' list can be switched between Groups, Conferences, Panels, IFBs, Routes and SIP phones by simply selecting the appropriate icon. The software automatically prompts the user with the correct key types, although these are also manually selectable from a drop down list.

## Browser System Maintenance Tool

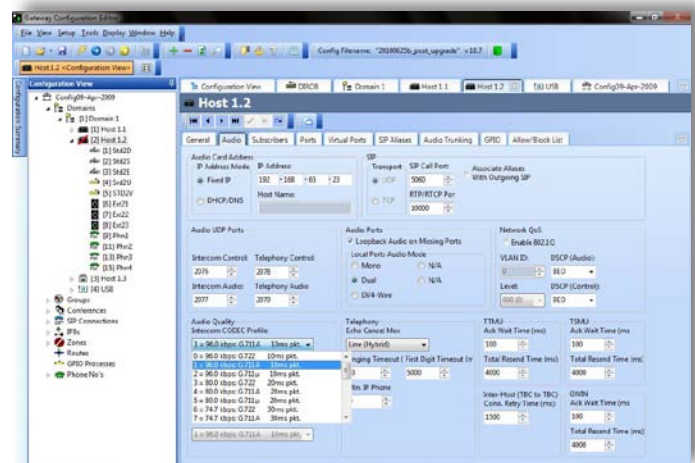
Management of the Gemini system has been taken to a new level by the introduction of a browser based utility that performs all engineering and maintenance functions. This application enables users to verify the entire system status including control panel connections, audio routes, IP network parameters, diagnostics and logging as well as facilitating software upgrades.

## Gateway Key Features

- On and off-line configuration
- Multiple user access with password protection
- Drag and drop operation for fast assignment and ease of use
- Matrix configuration upload and download
- Graphical panel representation
- Extensive system status monitoring and log files
- Standard, enhanced and customised views



*A typical view of the panel configuration editor showing targets available for assignment*



*An advanced administration view for establishing core system parameters and settings*

## Operator Panels

All of Trilogy's control panels, including the latest Touch range, are suitable for use with Gemini systems. With choices including lever key, pushbutton and QVGA Touchscreen, they are all manufactured to the same demanding standards and assure reliability, flexibility of operation and ease of use. The extensive range of key types including latch / non-latch and speak / listen, enables users to precisely select their preferred method of communicating with other panels, wireless devices and audio systems.

Panels are available in 2RU format with 16, 16 plus dialpad, 24 and 32 lever keys, in addition to the 30 button Touchscreen version, and 1RU with 10 keys, or 8 pushbuttons. Completing the range are Trilogy's iconic desktop units including both 8 lever key and 20 button Touchscreen variants, ideally suited to studio, edit suite and office applications.

Panels are interchangeable and can be hot-plugged, taking all of their configuration information from the Gemini matrix. Local key assignment and audio level adjustments are carried out using a single rotary encoder, avoiding the need for a separate keypad or individual volume controls.

To quickly accommodate differing programme needs, or to directly access any user in a large system, each panel can have up to 8 pages of key assignments available via the extended Shift Page function.

## Touch Panels

Complementing Trilogy's lever key and pushbutton panels, Trilogy's latest Touch range features high-resolution 2.8" QVGA colour Touchscreens and introduce a host of operator features beyond the capabilities of any existing conventional intercom panel, anywhere. The 2RU rack-mount panel boasts 30 Touchscreen buttons, with 20 provided on the elegant desktop version.

## IP Panel Connectivity

Not only does Gemini allow multiple matrices to be connected over IP networks, it also supports a family of control panels that may be optionally connected via a LAN, whilst retaining high quality audio performance and zero latency. This allows panels to be freely positioned without the need for specific cabling to the matrix, using a standard LAN infrastructure. Gemini's modular construction enables up to 32 panels in multiples of 8 to be connected over IP.

## Panel Features

- Standard 19" (483mm) rack mounting in either 1RU or 2RU as well as innovative desktop options – all with RJ45 matrix connector and AC supply
- Multi-function, configurable pushbuttons and lever keys for talk/listen etc
- 5 Character alpha-numeric displays for each key assignment on all lever key panels
- Built-in electret microphone and loudspeaker plus headset connector with volume control and programmable CUT switch
- Rotary encoder for local key assignment and level control
- Operator ability to adjust individual matrix input, output and cross-point levels
- Standard footswitch connector, GPI in and out connector, audio facilities connector and RJ45 matrix connector
- Panels operate with the entire range of Trilogy Intercom systems

## Touch Panel Features

- Intuitive Touchscreen functionality and graphics
- 8 character alpha numeric displays
- Large button area for ease of use
- Individual level control of all sources
- Pop-up telephone dialpad
- Audio replay feature



## Gemini Option Boards

A Gemini matrix frame supports up to 4 interface / expansion boards, each handling 8 ports of audio and / or data in various signal formats to suit installation requirements. These option boards are hot-pluggable and may be used in any combination.

The audio expansion board is used for connection of control panels over Cat 5 / 6 cabling and for 4 wire audio connections to other devices, including wired and wireless beltacks , In Ear

Monitoring systems, CCUs and audio consoles.

Where interconnection of control panels over a network is desired, an IP interface board supports up to 8 IP enabled panels via any conventional LAN infrastructure.

As an alternative to analogue 4 wire connectivity, an AES interface board provides bi-directional links to digital audio equipment such as audio consoles and routing matrices.



High Speed Link (HSL) + and - connections providing the option for a fully redundant, bi-directional ring of programme quality audio

RJ45 Connection to LAN/WAN for all non-audio traffic and connection to remote resources

Option board, shown here configured for 32 panel connections

Single power supply fitted as standard with option for 'peace of mind' redundant power supply

## Specifications

Ports & IO	Number of Ports	8 – 32 per Gemini matrix, depending on configuration
	Camera Mix/DA	6 channel, 4 wire
	Front Panel Headset	XLR5 socket. Microphone type: dynamic.
	Gemini Network	Up to 8 matrices per ring, giving a maximum of 256 ports
	IP Channels	32 channels when DSP option is fitted
Audio Performance	GPI – Inputs (per matrix) / GPI – Outputs (per matrix)	16 closure to ground / 16 opto-isolated
	Port Type	4 wire electronically balanced
	Frequency Response	-3 dB @ 20 Hz and 20 kHz
	Input Gain Control	+12 dBu to -12 dBu (1db step resolution) via Gateway
	Output Gain Control	+12 dBu to -40dBu (1db step resolution) via Gateway
	Maximum Input Level / Maximum Output Level	+20 dBu / +20 dBu
	Crosstalk	<-95 dBu @ 1 kHz
	Noise	< -62 dBu ITU-R-468 weighted / < -69 dBu ITU-R-468 unweighted
	Distortion	<0.025%, 0 dBu at 1 kHz
	Input Impedance / Output Impedance	24 kΩ / 50 Ω
HSL	Sample Rate	48 kHz
	HSL Data Rate	270 Mb/s
	Audio Delay	1.2 ms (typical)
Mechanical	Maximum Cable Run	100 m between Gemini matrices
	Dimensions	483(w) x 89(h) x 375(d) mm (19 inch x 2RU)
	Operating Temperature	0°C to +50°C
	Approvals	Emissions - EN55022, Immunity - EN55024, Safety - EN60950 CSA UL
	Power (single or optional dual)	Auto sensing 90 - 264 V AC, 47-63 Hz
Power Consumption	< 65 W	

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