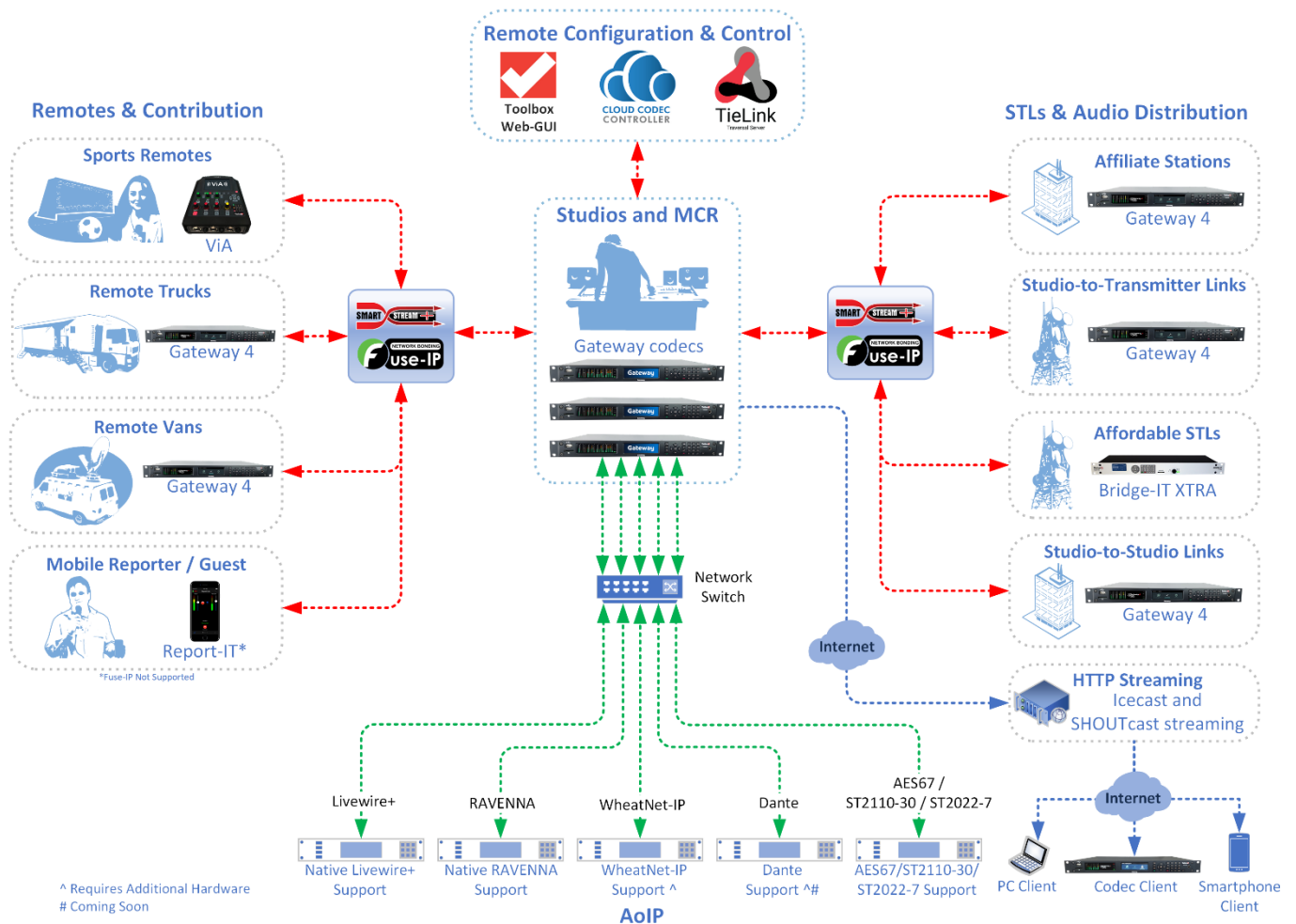


# Codec Applications and Solutions



## TABLE OF CONTENTS

|  |    |
|--|----|
| Inter-Studio Links and Studio To Transmitter Links .....                     | 4  |
| Gateway 4 IP Audio Codec .....   | 4  |
| Audio Distribution .....   | 6  |
| Gateway Multichannel IP codec (TLR6200).....                                 | 6  |
| Gateway IP audio Distribution Solutions.....                                 | 9  |
| Gateway: Multi-Unicasting Options .....                                      | 10 |
| Gateway Multicasting .....   | 11 |
| Simultaneous Multicasts with Gateway .....                                   | 11 |
| Gateway 4 IP Audio Distribution Solutions .....                              | 12 |
| Gateway 4 Multi-Unicasting .....   | 12 |
| Gateway 4 Multicasting .....   | 12 |
| Remotes .....  | 13 |
| ViA Codec: Mono/Stereo Connections Plus IFB over Lan, Cellular & Wi-Fi ..... | 13 |
| Triple Mono with ViA .....   | 15 |
| Broadcast from Home and Podcast with ViA .....                               | 15 |
| Gateway IP Audio Codec: Mono/Stereo Connections Plus IFB .....               | 16 |
| HTTP Streaming with Icecast or Shoutcast.....                                | 17 |
| Discrete Television IFB Feeds .....  | 17 |
| Gateway 4.....   | 18 |
| Gateway 4 Audio Codec: 4 Simultaneous Mono Remotes.....                      | 18 |
| Gateway 4 and ViA for Remotes .....  | 18 |
| Gateway 4 Encoding Flexibility.....  | 19 |
| Gateway IP Audio Codec: 16 Simultaneous Mono Remotes .....                   | 20 |
| Report-IT Enterprise Smartphone Application Remotes.....                     | 20 |
| How Report-IT Enterprise Works .....   | 21 |
| SmartStream PLUS: The Industry Standard for Internet Broadcasting.....       | 22 |

Redundant IP Streaming..... 22

WheatNet-IP Options..... 23

    Gateway, Gateway 4, and WheatNet-IP ..... 23

Native Livewire+ and Ravenna Support..... 24

    Livewire+ ..... 24

    RAVENNA..... 24

## INTER-STUDIO LINKS AND STUDIO TO TRANSMITTER LINKS

Tieline Studio-to-Transmitter Link (STL) codecs are designed for continuous operation over mission critical point-to-point audio paths throughout broadcast IP networks. Tieline has a range of codecs to suit every budget designed for STL use, or studio-to-studio (SSL) links.

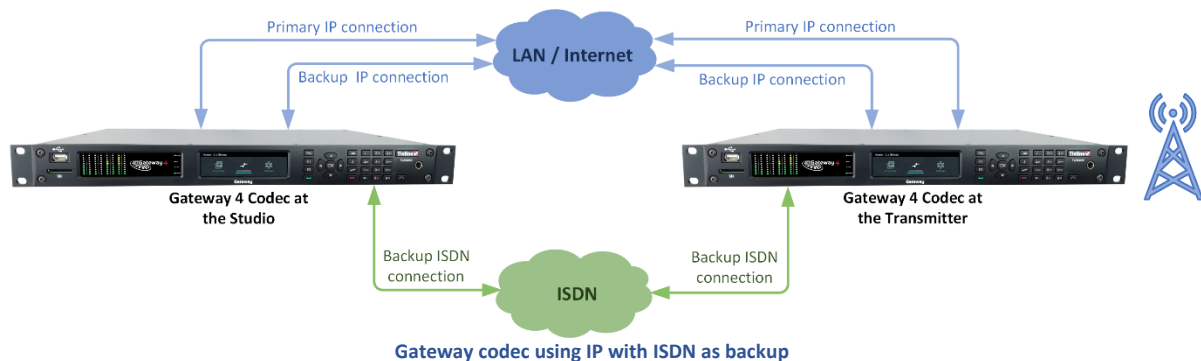
### GATEWAY 4 IP AUDIO CODEC

The Gateway 4 delivers superior quality over wired and wireless IP networks. The Gateway 4 also features a module slot supporting an optional Euro ISDN module for backup connections, or to interface with existing infrastructure as your network transitions to IP. The Gateway 4 includes native support for AES67, ST 2110-30, ST 2022-7, RAVENNA, Livewire+, NMOS IS-4 and IS-5, Ember+, AES3 and analog I/O as standard. Order an optional WheatNet-IP card at purchase for interoperability with Wheatstone's WheatNet-IP Environment. This allows sources and destinations to be controlled using Navigator software. An optional Dante[1] card installed at purchase supports Dante networking.

This means the Gateway 4 can operate as a media converter with support for more proprietary and open AoIP protocols than other codec manufacturers.

. The Gateway 4 supports:

1. Bidirectional mono, stereo, and dual mono connections, or
2. Bidirectional stereo plus 2 bidirectional mono connections, or
3. 2 bidirectional stereo connections, or
4. 4 bidirectional mono connections.
5. HTTP Icecast or Shoutcast streaming



#### Key features:

- Up to 4 bidirectional mono or 2 bidirectional stereo IP streams
- Bidirectional stereo plus dual mono IP streams
- 8 assignable GPIOs, plus SLIOs (Tieline and WheatNet-IP)
- Ideal for contribution/remotes, STL, and Studio-to-Studio Link applications
- Stream IP audio over WANs using dual Ethernet ports
- AES67, ST 2110-30 and ST 2022-7 compliant for AoIP streaming
- WheatNet-IP card option available at purchase

- Dante AoIP card option available at purchase [1]
- Compliant with AMWA NMOS IS-04 and IS-05 standards (discovery, registration and control)
- Support for the Ember+ control protocol
- Supports multicasting and multi-unicasting to 20 endpoints
- Dual DSP based platform with dual internal power supplies, dual Ethernet ports, dual AoIP ports, and dual USB ports; USB 2.0 port supports firmware upgrades, Wi-Fi modems and USB memory sticks. USB 3.0 will support record and playback [1]
- Supports uncompressed audio or a huge range of encoding options
- Supports 4 channels of phase-aligned audio streaming
- Dynamic range compressor and EQ on all inputs
- SD card slot for firmware upgrades and memory options
- Fully SIP EBU N/ACIP 3326, 3368 and 3347 compliant to operate with 3rd party codecs
- Module slot for optional ISDN module, future technologies, and hardware upgrades
- Fully remote control using the Toolbox HTML5 Web-GUI, or the Cloud Codec Controller, plus SNMP support
- Connect simply using the TieLink Traversal Server [1]

[1] Future Release

## AUDIO DISTRIBUTION

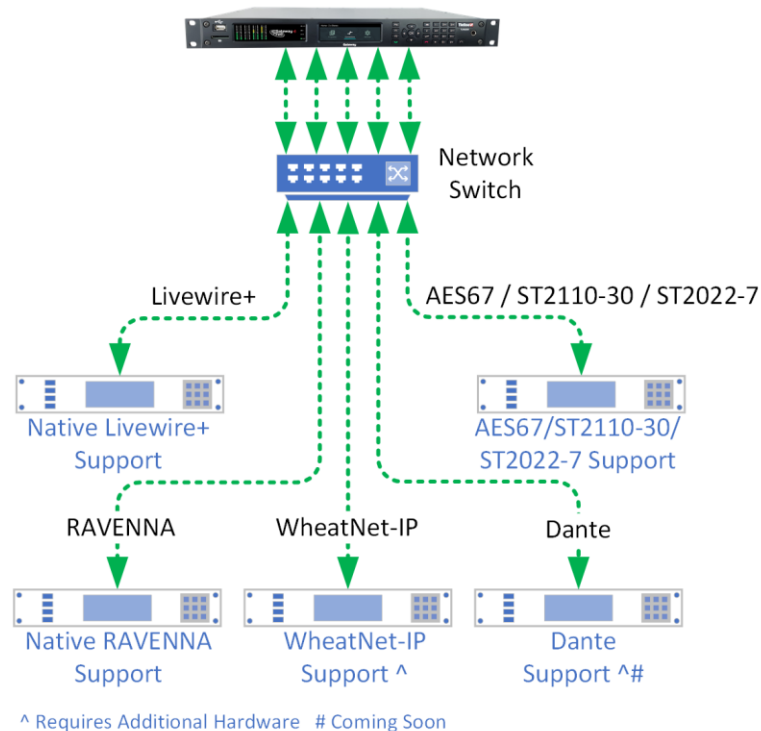
Tieline has a comprehensive range of IP audio codecs designed for a range of audio distribution solutions over broadcast networks. Options include:

1. Gateway (8-16 channel IP codec)
2. Gateway 4 (4 channel IP codec)

### GATEWAY MULTICHANNEL IP CODEC (TLR6200)

The Tieline Gateway is the most powerful DSP-based 1RU IP codec enabling transport of multiple channels of mono or stereo audio across any QoS-enabled IP network, including T1 and T3 connections and private WANs with MPLS. The Gateway streams up to 16 IP audio channels with native support for AES67, ST 2110-30, ST 2022-7, RAVENNA, Livewire+, NMOS IS-4 and IS-5, Ember+, AES3 and analog I/O as standard. Order an optional WheatNet-IP card at purchase for interoperability with Wheatstone's WheatNet-IP Environment. This allows sources and destinations to be controlled using Navigator software. An optional Dante[1] card installed at purchase supports Dante networking.

This means the Gateway can operate as a media converter with support for more proprietary and open AoIP protocols than other codec manufacturers.



The Gateway AoIP codec supports connecting with a variety of AoIP protocols

## Applications

It is perfect for large-scale audio distribution to single or multiple locations, as well as managing multiple incoming remotes at the studio using SmartStream PLUS and Fuse-IP technologies over internet connections. It supports 16 bidirectional mono or 8 bidirectional stereo streams of IP audio in 1RU to increase channel density and reduce rack space requirements. Its feature-rich and compact design is interoperable with all Tieline IP codecs and compatible over SIP with all EBU N/ACIP Tech 3326 and 3368 compliant codecs and devices. The Gateway is ideal for:

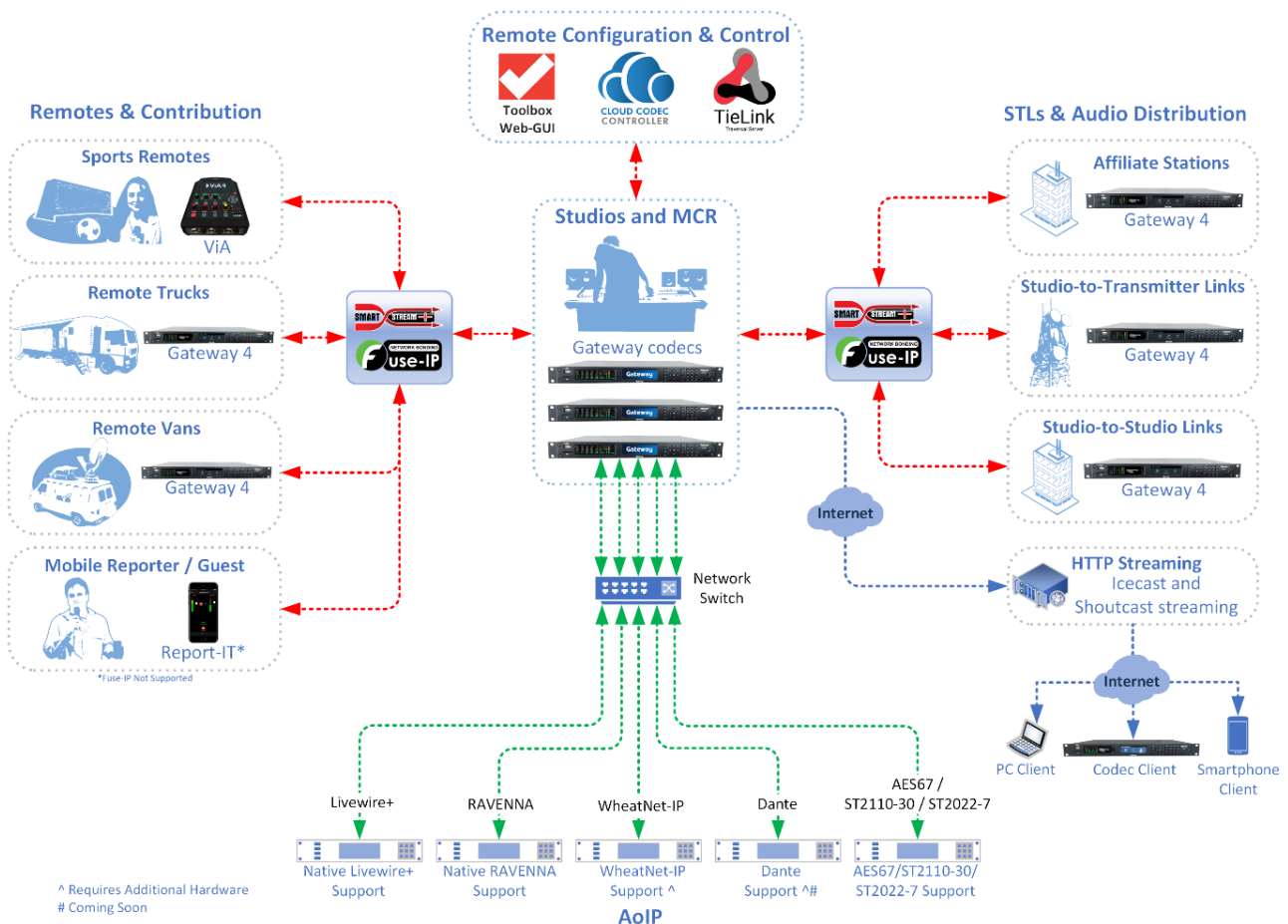
- Audio contribution and managing multiple incoming remotes.
- Studio-to-Transmitter Links.
- Network syndication of programming.
- Multi-channel links to remote studios.
- HTTP Icecast or Shoutcast streaming.

## A Flexible Upgrade Path

The Gateway has two standard versions:

- Gateway supporting 8 Channels in/out (8 Mono or 4 Stereo)
- Gateway supporting 16 Channels in/out (16 Mono or 8 Stereo)

The codec also supports a flexible upgrade path that allows you to buy a Gateway with 8 channels and upgrade the codec over time as needs change or your network expands.



## **Order 8 Channels Now and Upgrade Later...**

Order a Gateway with 8 channels and immediately have access to 8 input and output channels and stream up to 8 mono or 4 stereo streams of IP audio. If you need to expand channel and stream capacity, simply purchase an upgrade license and expand capacity in pairs up to 16 channels in total.

A Gateway with 8 channels in/out features the following licence options:

- 2 Channel Upgrade: TLR6200-LIC1ST
- 4 Channel Upgrade: TLR6200-LIC2ST
- 8 Channel Upgrade: TLR6200-LIC4ST

Contact Tieline or your favorite dealer for pricing and to purchase an upgrade license.

### **Key Features:**

- High channel density with 16 bidirectional mono or 8 bidirectional stereo IP streams
- 16 assignable GPIOs, plus SLIOs (Tieline, WheatNet-IP, Livewire)
- Ideal for contribution/remotes and audio distribution applications
- Stream IP audio over WANs using dual Ethernet ports
- AES67, ST 2110-30 and ST 2022-7 compliant for AoIP streaming
- WheatNet-IP card option available at purchase
- Dante AoIP card option available at purchase [1]
- Native support for RAVENNA and Livewire+
- Compliant with AMWA NMOS IS-04 and IS-05 standards
- Support for the Ember+ control protocol
- Supports multicasting and multi-unicasting, multi-multicasting & multiple multi-unicasts
- Internal Solid-State Drive for record and playback [1]
- Dual DSP based platform with dual internal power supplies
- Dual Ethernet and AoIP ports, dual USB ports; USB 2.0 port supports firmware upgrades, Wi-Fi modems and USB memory sticks. USB 3.0 will support record and Playback [1]
- Supports uncompressed audio and a huge range of encoding options
- Supports streaming up to 8 channels of digital phase-aligned multichannel and surround sound audio: 6 channel (5.1 or 6.0), 8 channel (7.1 or 8.0), or 4 channel streams
- Dynamic range compressor and EQ on all inputs
- SD card slot for firmware upgrades and memory options
- Fully SIP EBU N/ACIP 3326, 3368 and 3347 compliant to operate with 3rd party codecs
- Module slot for future technologies and hardware upgrades
- Fully remote control using the Toolbox HTML5 Web-GUI, or the
- Cloud Codec Controller, plus SNMP support
- Connect simply using the TieLink Traversal Server [1]

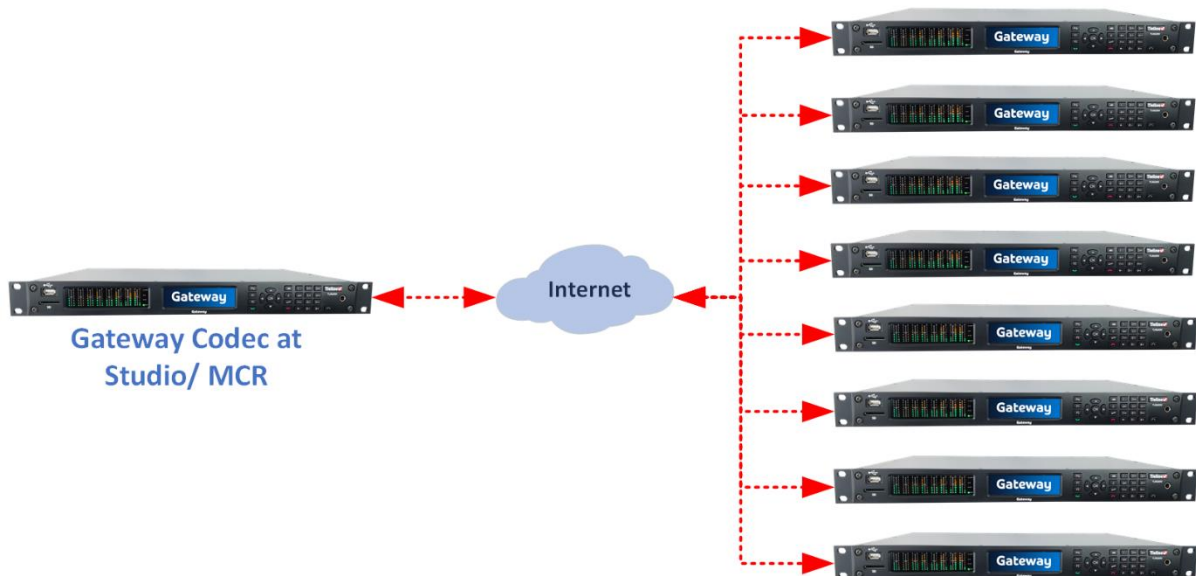
[1] Future Release

## GATEWAY IP AUDIO DISTRIBUTION SOLUTIONS

The Gateway is ideally suited to network audio syndication and perfect for STL, studio-to-studio, and audio distribution applications, with support for multicasting and multiple unicasting technologies. It is also perfect for managing multiple incoming remotes at the studio. Gateway seamlessly integrates with AES67 studio LANs and is ideal for:

- Studio-to-Transmitter Links.
- Network syndication of programming.
- Multi-channel links to remote studios.
- HTTP Icecast or Shoutcast streaming

The Gateway 16 supports up to 8 stereo studio-to-transmitter link connections.

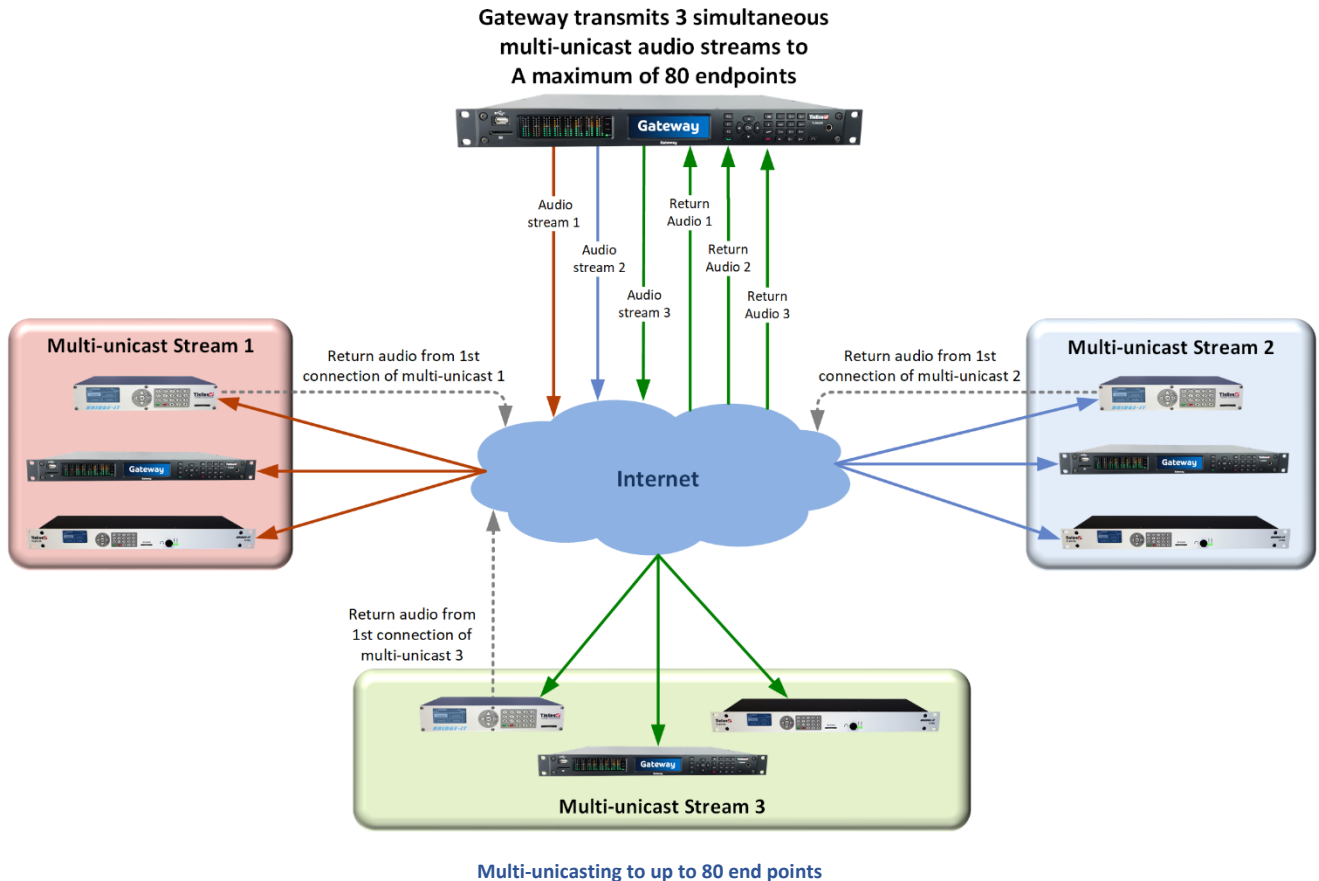


An optional Euro ISDN module can be used to create a backup connection, or to interface with existing infrastructure as your network transitions to IP.

The Gateway supports encoding 16 simultaneous streams of Opus. The codec is also capable of streaming multiple algorithms simultaneously at different sample rates and bit-rates.

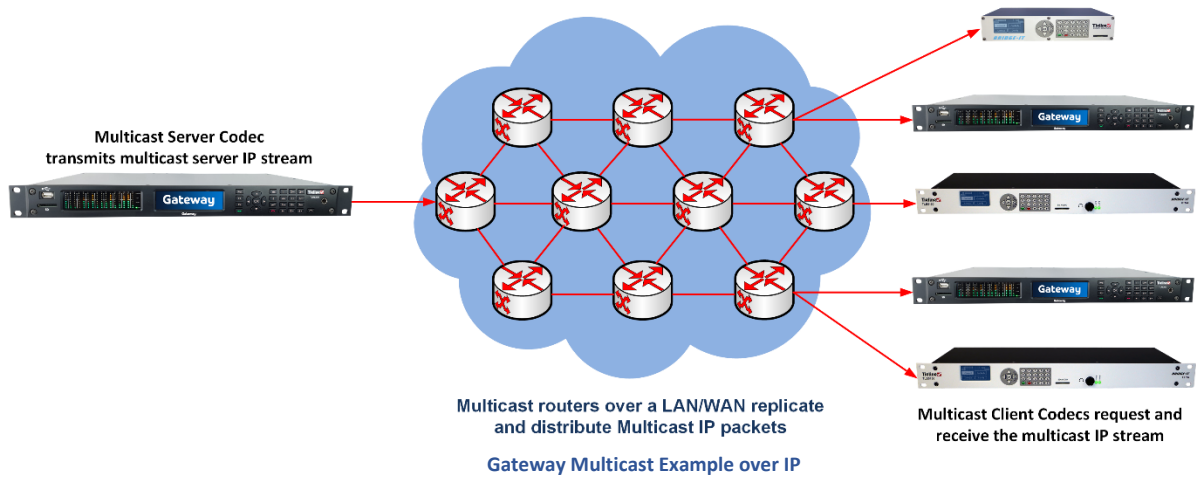
## GATEWAY: MULTI-UNICASTING OPTIONS

The Gateway is capable of distributing a stereo IP audio stream to up to 80 individual multi-unicast endpoints. The Gateway 16-channel codec can also simultaneously send up to 16 different multi-unicast audio streams to a maximum of 80 endpoints in total. In a 3 x stereo multi-unicast example, the first stream could be sent to 40 endpoints, the second stream to 15 endpoints and the last stream could be sent to 25 endpoints.



## GATEWAY MULTICASTING

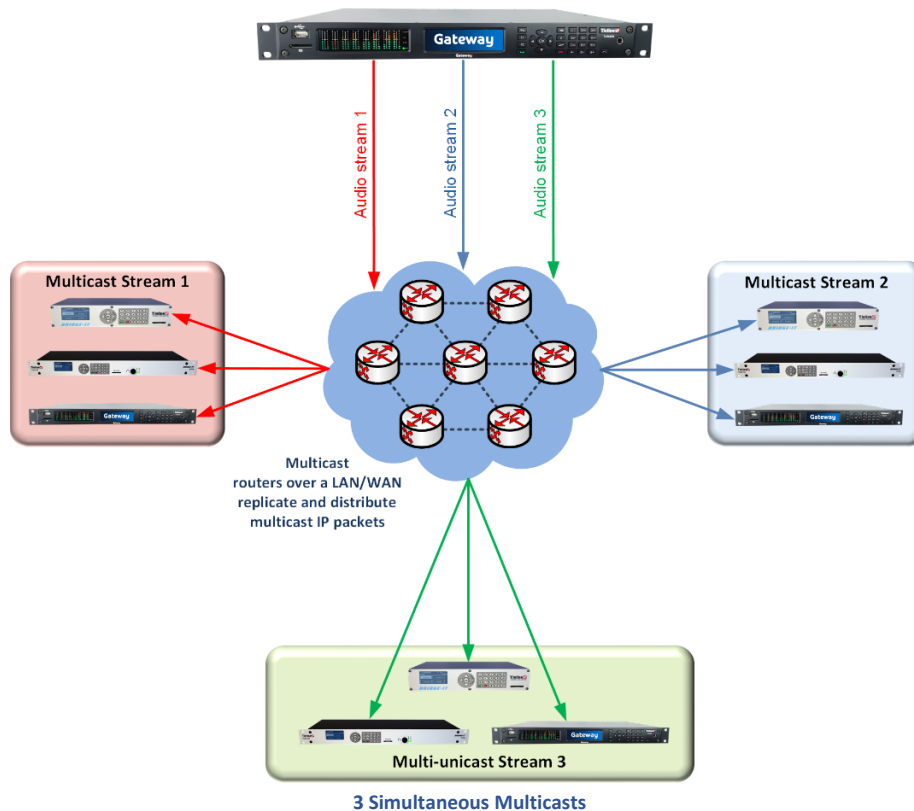
The Gateway can operate in multicast server and client modes. In multicast server mode it can distribute stereo audio to unlimited endpoints over compatible IP networks.



## SIMULTANEOUS MULTICASTS WITH GATEWAY

The Gateway can simultaneously broadcast separate streams in multicast server mode and distribute each stream to unlimited endpoints. The Gateway 16 supports:

- Up to 16 mono multicasts (server or client mode).
- Up to 8 stereo multicasts (server or client mode).

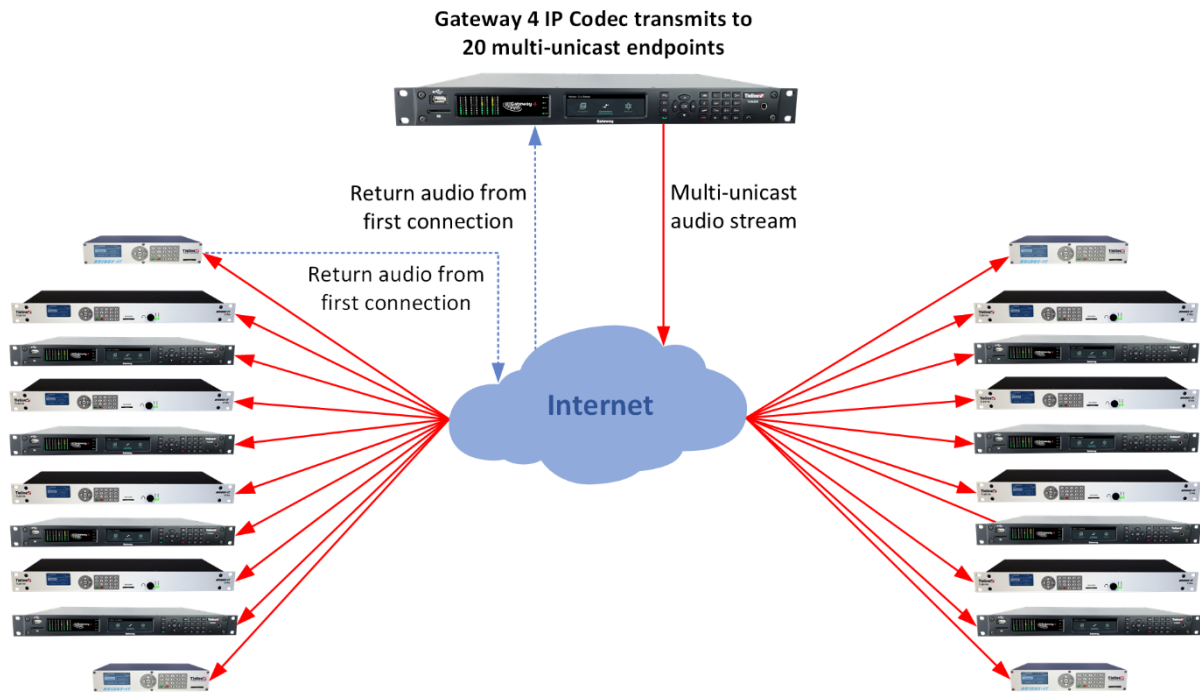


Note: Gateway 8 codecs support up to 8 mono multicasts or up to 4 stereo multicasts in server or client mode.

## GATEWAY 4 IP AUDIO DISTRIBUTION SOLUTIONS

### GATEWAY 4 MULTI-UNICASTING

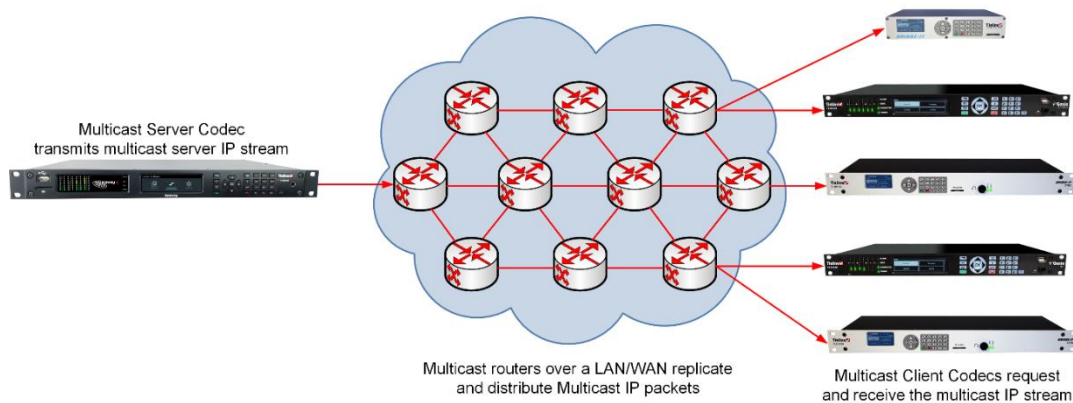
The Gateway 4 is capable of distributing a single stereo IP multi-unicast to up to 20 multi-unicast endpoints in total. Two IP multi-unicast streams can also be configured (20 endpoints total, e.g. 10 endpoints in each multi-unicast).



20 Multi-unicast connections with Gateway 4

### GATEWAY 4 MULTICASTING

Multicast server mode in the Gateway 4 allows you to multicast in mono or stereo to unlimited numbers of IP codecs over compatible IP networks.



Gateway 4 Broadcasts in Multicast Server Mode

## REMOTES

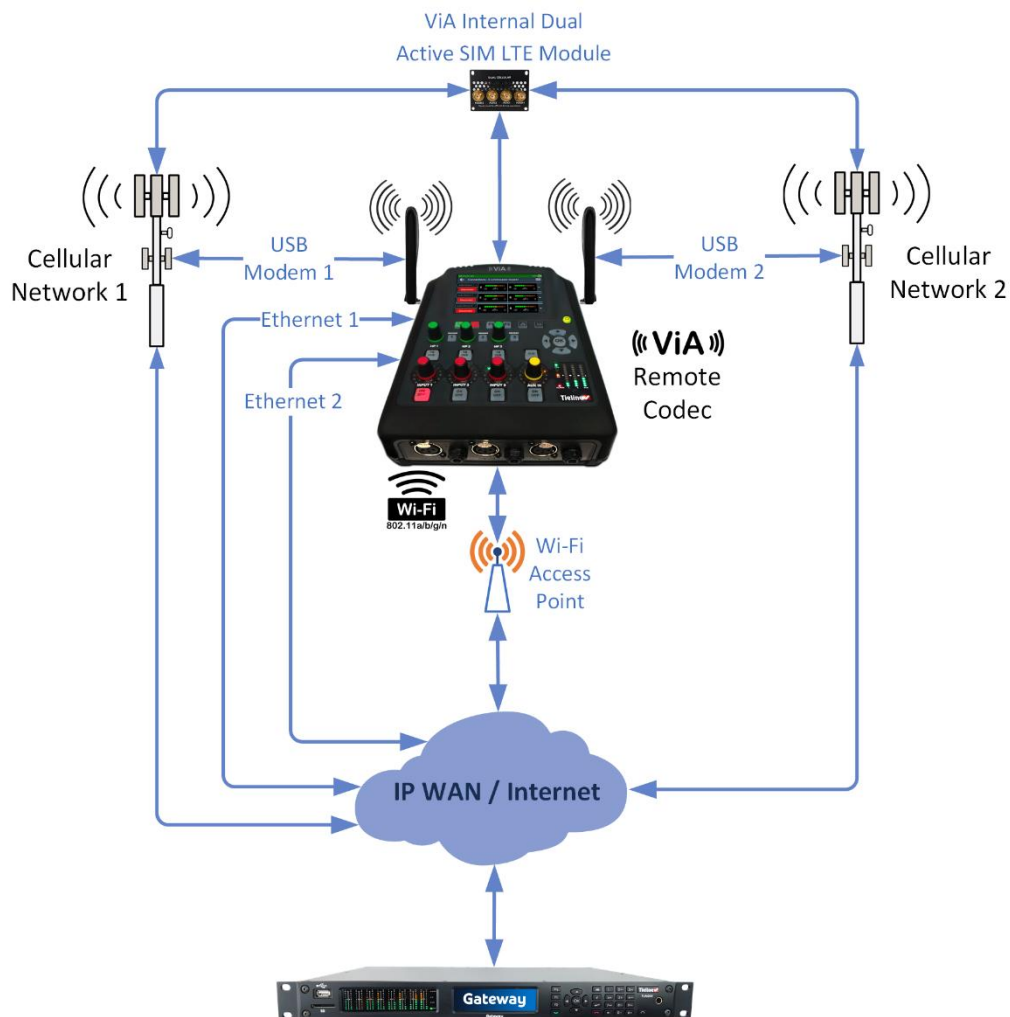
Tieline offers a wide range of codec and smartphone app solutions for remotes. Codecs offering optional USB, cellular, Wi-Fi, and ISDN network options offer connectivity over the full spectrum of wireless and wired connection transports. Tieline remote codecs include:

1. ViA Remote Codec
2. Gateway 4 (Studio codec to receive up to 4 remote feeds; rack mounted remote solutions)
3. Gateway (Studio codec to receive up to 16 remote feeds)
4. Report-IT Enterprise app for iOS or Android

### VIA CODEC: MONO/STEREO CONNECTIONS PLUS IFB OVER LAN, CELLULAR & WI-FI

The ViA portable remote codec delivers more IP choices and backup options than ever before with up to 7 IP interface options available. Connect using:

- Dual Ethernet LAN ports, or
- 2 USB modems, or
- Use built-in Wi-Fi (no external modem required), or
- Use an optional dual active SIM LTE module.



Use the touch screen to add Wi-Fi access points in seconds. Stream using a cell-phone Wi-Fi hotspot or connect to hotels and other public Wi-Fi access points using the touch screen web-browser in a snap!



ViA with a Dual Active SIM Module supporting 2 different cellular networks for live streaming

### Key Features:

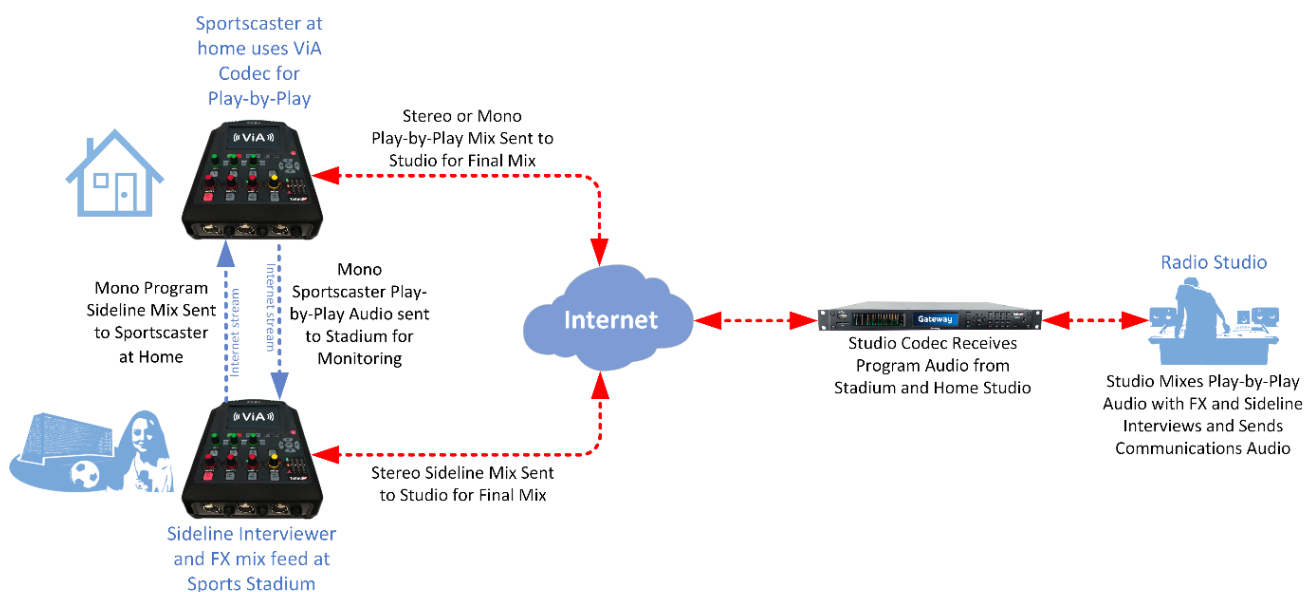
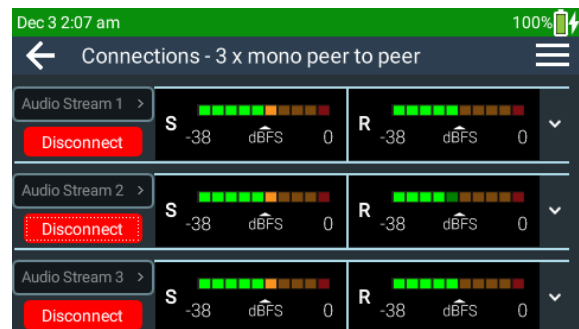
- Intuitive, simple to connect LCD touch screen
- Supports 2 mono connections, 3 mono connections, stereo, or stereo plus a separate IFB circuit (all connections bidirectional)
- Support for simultaneous record and playback and FTP uploads for voice tracking/podcasts
- Dual Gigabit LAN ports
- Optional ViA Dual Active SIM LTE module, or ISDN module
- Built-in Wi-Fi (no modem required) and 2 x USB cellular options
- Bonding of multiple IP interfaces with Fuse-IP data aggregation
- Includes SmartStream PLUS as standard; supports primary and 3 redundant streams per connection
- Automated backup over IP and ISDN
- Touch screen matrix editor routes any input to any output: includes customized cue/talkback routing for all announcers; save, rename, and recall custom matrices.
- Customize headphone mixes via the touch screen for 3 headphone outputs.
- EQ, compressor and limiting on all inputs.
- Touch screen adjustments to digital and XLR output routing, audio levels, send/return balance, plus output mute buttons
- Linear audio: encoding options Opus, Tieline Music & Music PLUS, aptX Enhanced, MPEG1 Layer 2, MPEG 3, LC-AAC, HE-AACv1 & v2, AAC-LD, AAC-ELD, G.711 & G.722
- Features added with periodic updates
- Ships with a road case, battery, and power supply as standard



## TRIPLE MONO WITH VIA

The ViA codec supports streaming 3 separate bidirectional mono connections to different endpoints. This delivers flexibility to distribute audio to multiple studios or incorporate multiple external sources into a broadcast.

This also provides the flexibility to support remote work from home situations. For example, a broadcaster can call play-by-play sports coverage while also integrating with sideline commentary teams, or even other announcers calling the game from elsewhere for the same broadcast.

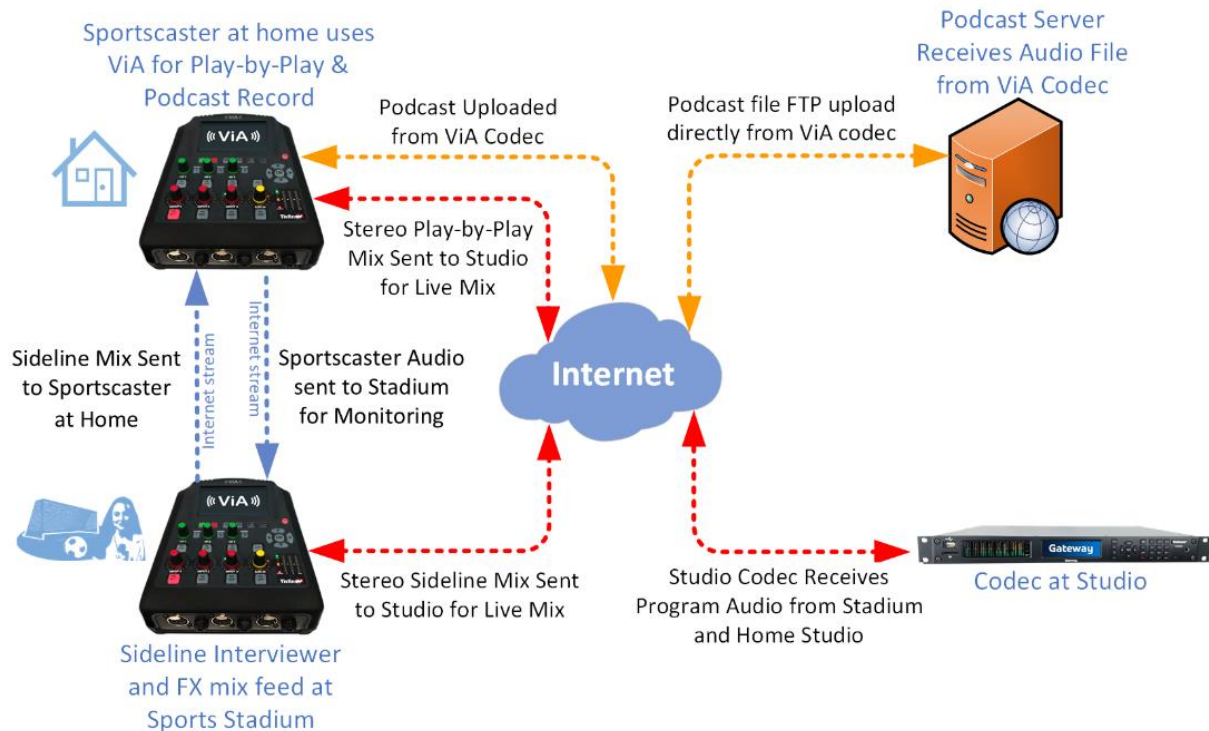


## BROADCAST FROM HOME AND PODCAST WITH VIA

The Tieline ViA supports voice tracking, FTP, and podcasting capability directly from the codec in the field. This revolutionizes live streaming with record and playback capability, so the codec can be a fully integrated podcast production studio!

With the Tieline ViA you can simultaneously record and play back audio files. This means you can create a podcast on the go while broadcasting live from home or a remote site, or even record a post-game show, complete with post-game interviews and sponsors' messages – all without entering the studio!

Flexibility is assured as a second and third announcer can even dial in using another codec or SIP device and go live, and at the same time be integrated and recorded as part of the podcast.



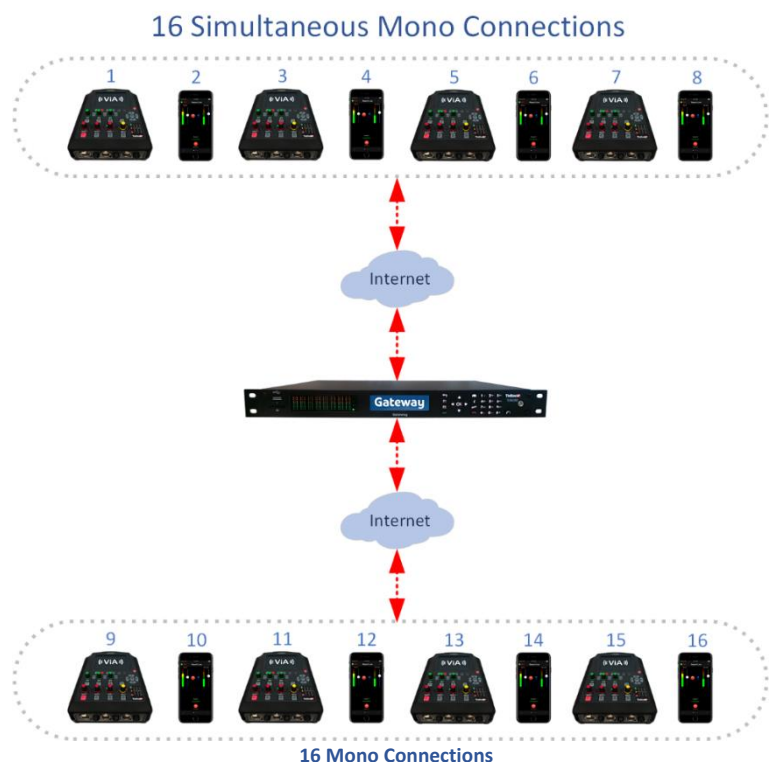
ViA used for live play-by-play with simultaneous podcast recording

## GATEWAY IP AUDIO CODEC: MONO/STEREO CONNECTIONS PLUS IFB

The Gateway is perfect for managing incoming remote broadcast audio contribution streams at the studio. It is capable of rock-solid, high-fidelity mono or stereo IP audio connections, as well as managing separate bidirectional communications circuits.

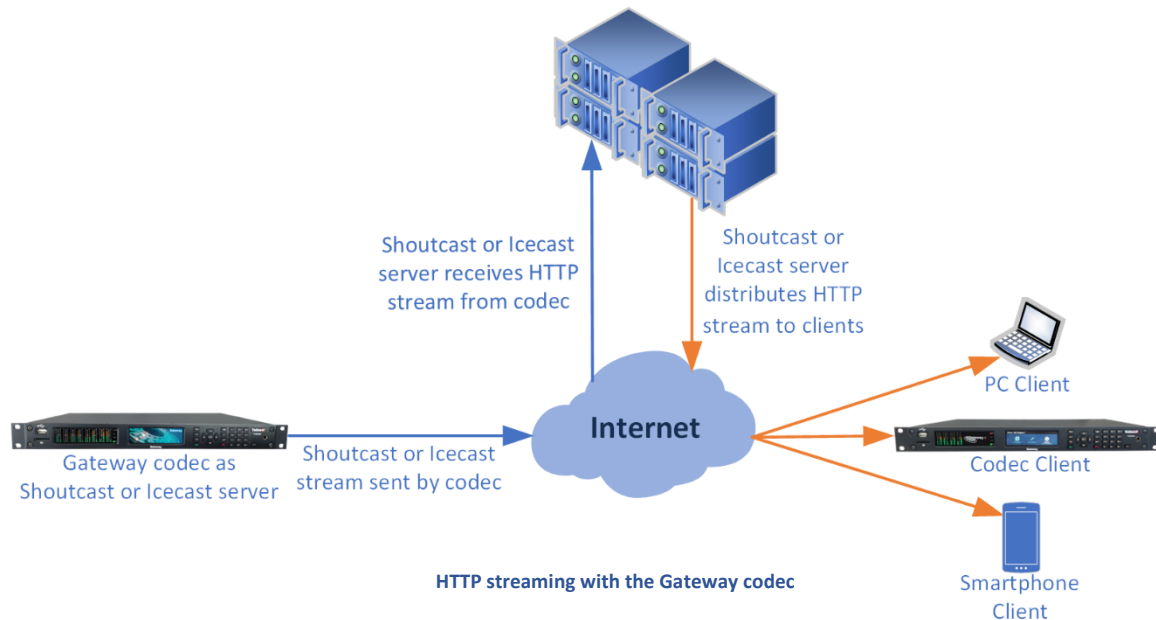
The Gateway can receive and manage up to 16 bidirectional mono remote connections. It's like having 16 codecs in one box!

Gateway supports encoding 16 simultaneous streams of Opus. The codec is also capable of streaming multiple algorithms simultaneously at different sample rates and bit-rates.



## HTTP STREAMING WITH ICECAST OR SHOUTCAST

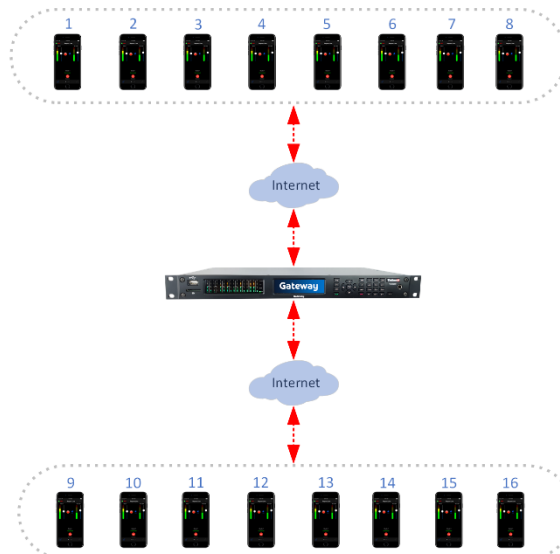
Gateway and Gateway 4 support a single Icecast or Shoutcast HTTP server encode stream which is configured as a connection within a program. As displayed in the following image, two major components are involved: an Icecast or Shoutcast streaming server and source client/s.



## DISCRETE TELEVISION IFB FEEDS

Replace your old POTS couplers with the Tieline Gateway and discover how television networks can configure up to 16 discrete mono IFB mixes to replace your old POTS and ISDN lines. Up to 16 talent in the field can simultaneously use Tieline's Report-IT Enterprise app on their cell-phones to receive discrete IFB audio feeds from a Gateway codec at the studio. Gateway codecs also have a Matrix Editor allowing the creation of mix-minus feeds from within the unit.

### 16 Simultaneous Mono IFB Connections using Report-IT



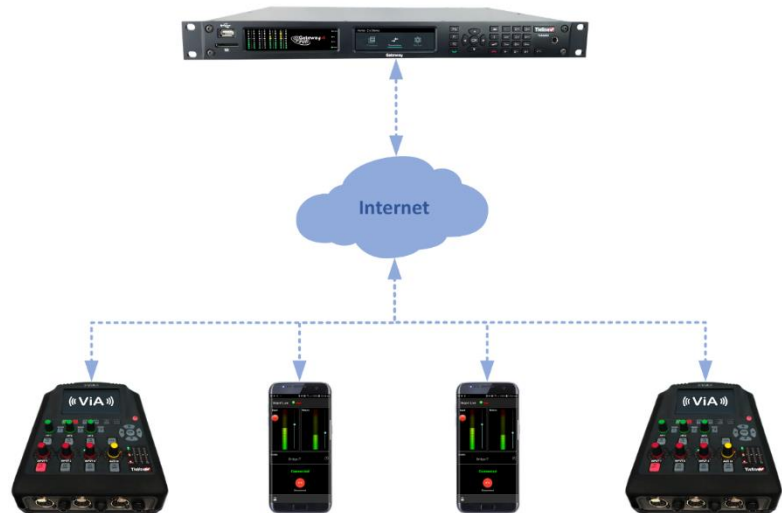
Gateway codec delivers 16 discrete mono IFB feeds using the Report-IT app.

## GATEWAY 4

The Gateway 4 is designed for solutions requiring up to 4 audio streaming channels with advanced redundancy features and remote configuration and control. It is ideal for remote trucks, rack mounted remote kits, or for receiving multiple remote audio streams at the studio.

### GATEWAY 4 AUDIO CODEC: 4 SIMULTANEOUS MONO REMOTES

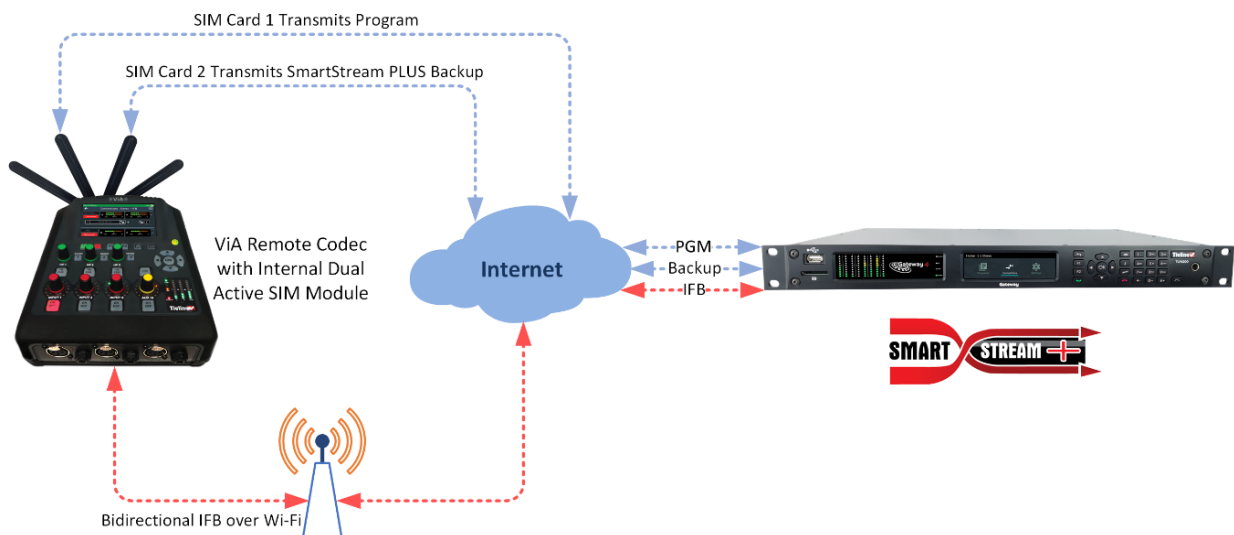
The Gateway 4 supports 4 simultaneous mono peer-to-peer bidirectional audio stream connections with codecs or smartphones using the Report-IT app.



Gateway 4 Supports 4 Bidirectional Mono Peer-to-Peer Connections

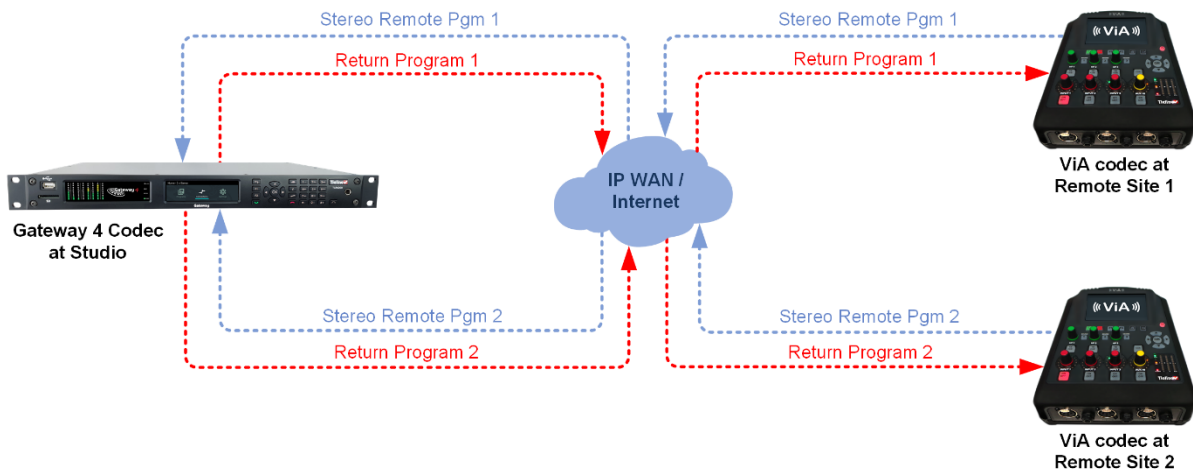
### GATEWAY 4 AND VIA FOR REMOTES

The Gateway 4 has 4 inputs and outputs, so it is ideal to pair with a ViA remote codec featuring 3 inputs/outputs. This allows the ViA to stream in mono or stereo back to the studio and incorporate a separate bidirectional IFB communications channel into the broadcast.



ViA connecting using SmartStream PLUS Redundant Streaming with a Separate IFB Circuit

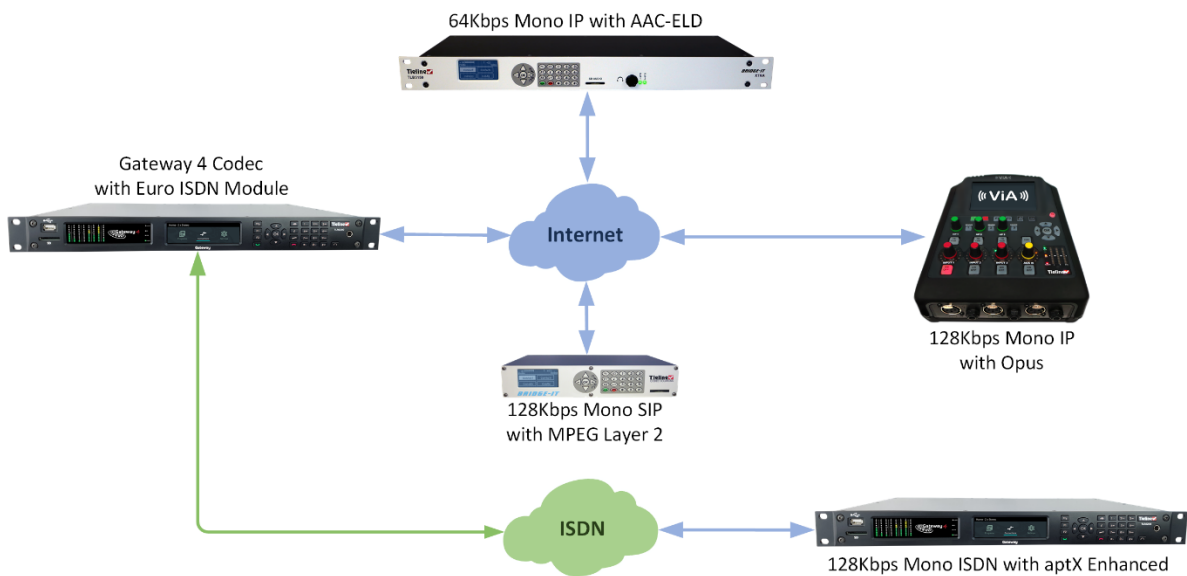
The Gateway 4 is also capable of connecting two bidirectional stereo remote audio streams.



Gateway 4 Supports 2 Bidirectional Stereo Peer-to-Peer Connections

## GATEWAY 4 ENCODING FLEXIBILITY

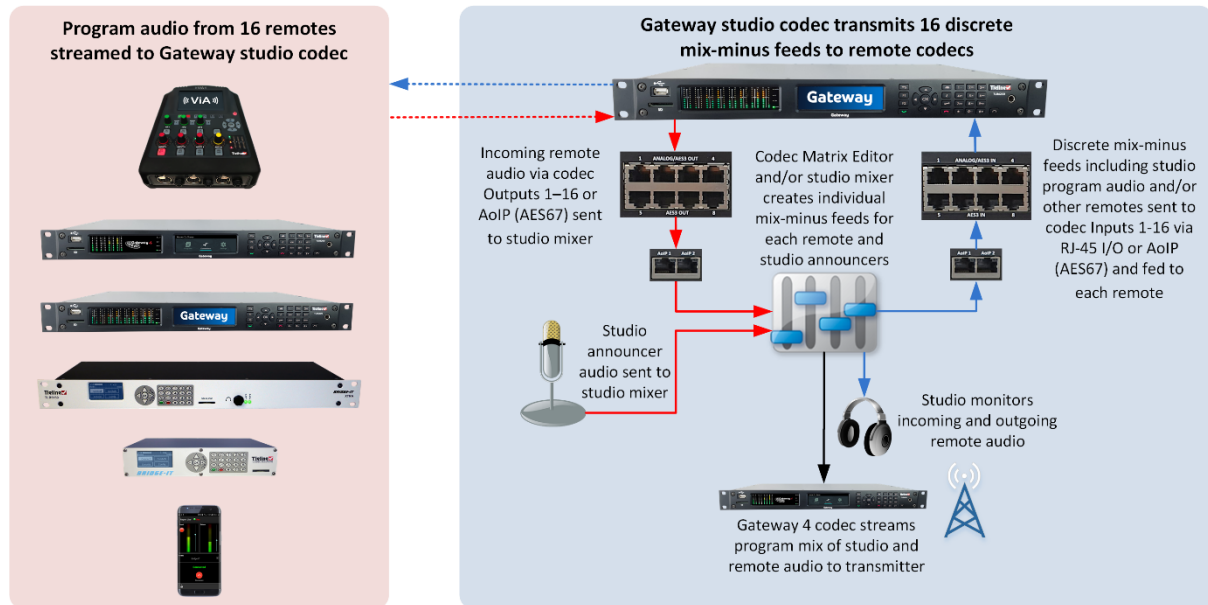
The Gateway 4 supports encoding multiple simultaneous streams of Opus and can stream multiple algorithms simultaneously at different sample rates and bitrates. Plus, Gateway 4 supports two Euro ISDN B-Channels when an optional Gateway Euro ISDN module is installed.



Gateway 4 codec connecting with different algorithms and bit-rates

## GATEWAY IP AUDIO CODEC: 16 SIMULTANEOUS MONO REMOTES

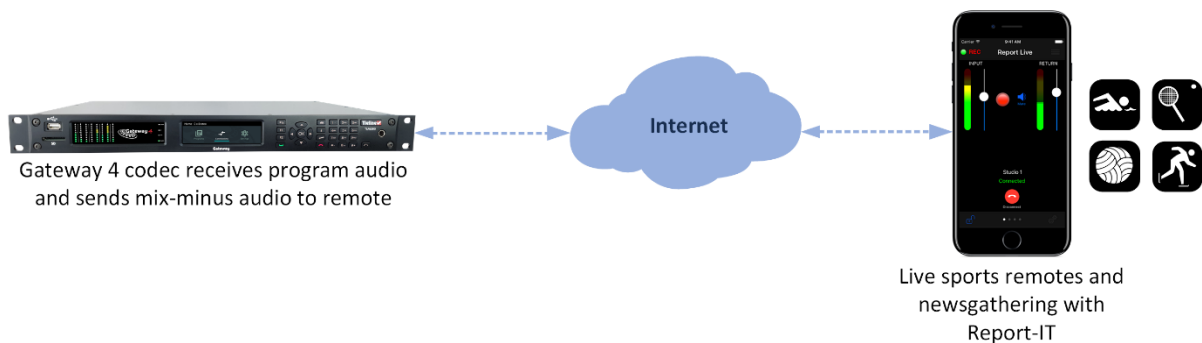
A Gateway 16 codec at the studio can facilitate 16 simultaneous bidirectional mono audio stream connections with different remote codecs or smartphones using the Report-IT application.



Gateway supports 16 simultaneous mono remotes

## REPORT-IT ENTERPRISE SMARTPHONE APPLICATION REMOTES

The multi award-winning Report-IT Enterprise app turns your iPhone® or Android™ smartphone into a pocket-sized portable 15kHz live IP audio codec and ultra-slim high fidelity 20kHz audio recorder. The app connects to all Tieline IP audio codecs and is available for iPhone and Android smartphones.



Report-IT Connects Live to Gateway 4 Codec

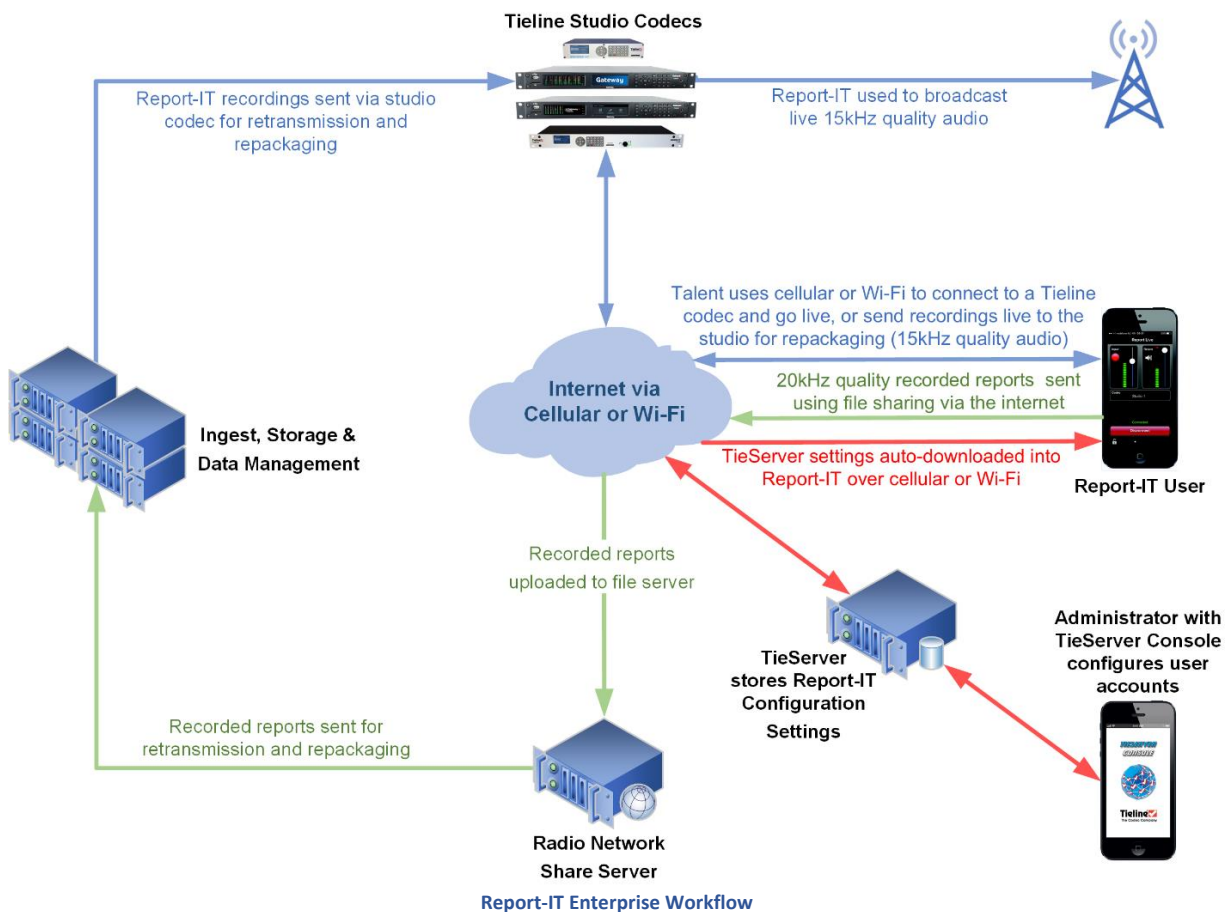
Key features:

- Cloud-based solution with an emphasis on simplicity for users
- Manage all users in the cloud from anywhere using the free iPhone or Android TieServer Console apps
- PC/Mac TieServer Console available for an additional low annual subscription fee
- Reporters and contributors install the free app from the App Store or Google Play; enter a username and password and go live in seconds!

- Scalable to suit the specific needs of small, medium, or large organisations
- A one-time establishment fee which includes the first year's subscription for 10 users, without device restrictions. Users can install and use Report-IT on multiple devices (subject to fair usage policy)
- SmartStream PLUS dual redundant IP streaming
- Two relay GPIOs on Report Live screen for showing when GPIOs are activated/deactivated; plus activate and deactivate GPIOs using the smartphone touchscreen
- Purchase additional user subscriptions in blocks of 10 to suit requirements
- Powered by Tieline's globally redundant TieServer network
- VIP-Connect (with PC/Mac TieServer Console subscription)
- SIP for Report-IT Enterprise (upgrade option allows connections with non-Tieline N/ACIP compatible codecs)

\*iPhone and App Store are trademarks and/or registered trademarks of Apple Inc., registered in the U.S. and other countries.

## HOW REPORT-IT ENTERPRISE WORKS

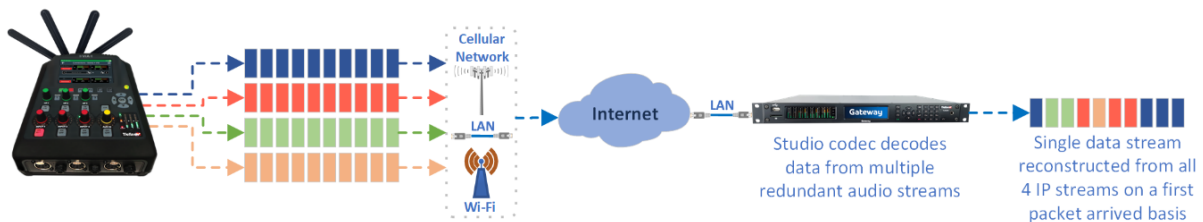


## SMARTSTREAM PLUS: THE INDUSTRY STANDARD FOR INTERNET BROADCASTING

### REDUNDANT IP STREAMING

Redundancy is critical for studio-to-transmitter links and other mission critical broadcast connections. Tieline's SmartStream PLUS has revolutionised IP broadcasting by delivering the rock solid and reliable STL-grade audio quality you would expect over a T1/E1 link, by using inexpensive unmanaged IP networks like the internet for STLs, audio distribution and remotes.

Tieline codecs incorporate hitless packet switching using Tieline's renowned SmartStream PLUS redundant streaming. Up to 4 identical packet streams can be transmitted for each IP connection. Packets are realigned at the receiving codec using an adaptive jitter buffer to maintain error-free streaming and minimise latency.



Example of hitless packet switching with ViA codec streaming 4 identical IP streams to the Gateway codec

SmartStream PLUS saves money for broadcasters as they can use inexpensive IP links with SmartStream PLUS to deliver seamless redundancy when streaming over IP. Some other manufacturers charge thousands of dollars for IP software like SmartStream PLUS as if it's an optional extra. Tieline believes high performance and rock-solid reliability is an essential part of each and every broadcast and delivers SmartStream PLUS IP streaming software for free.

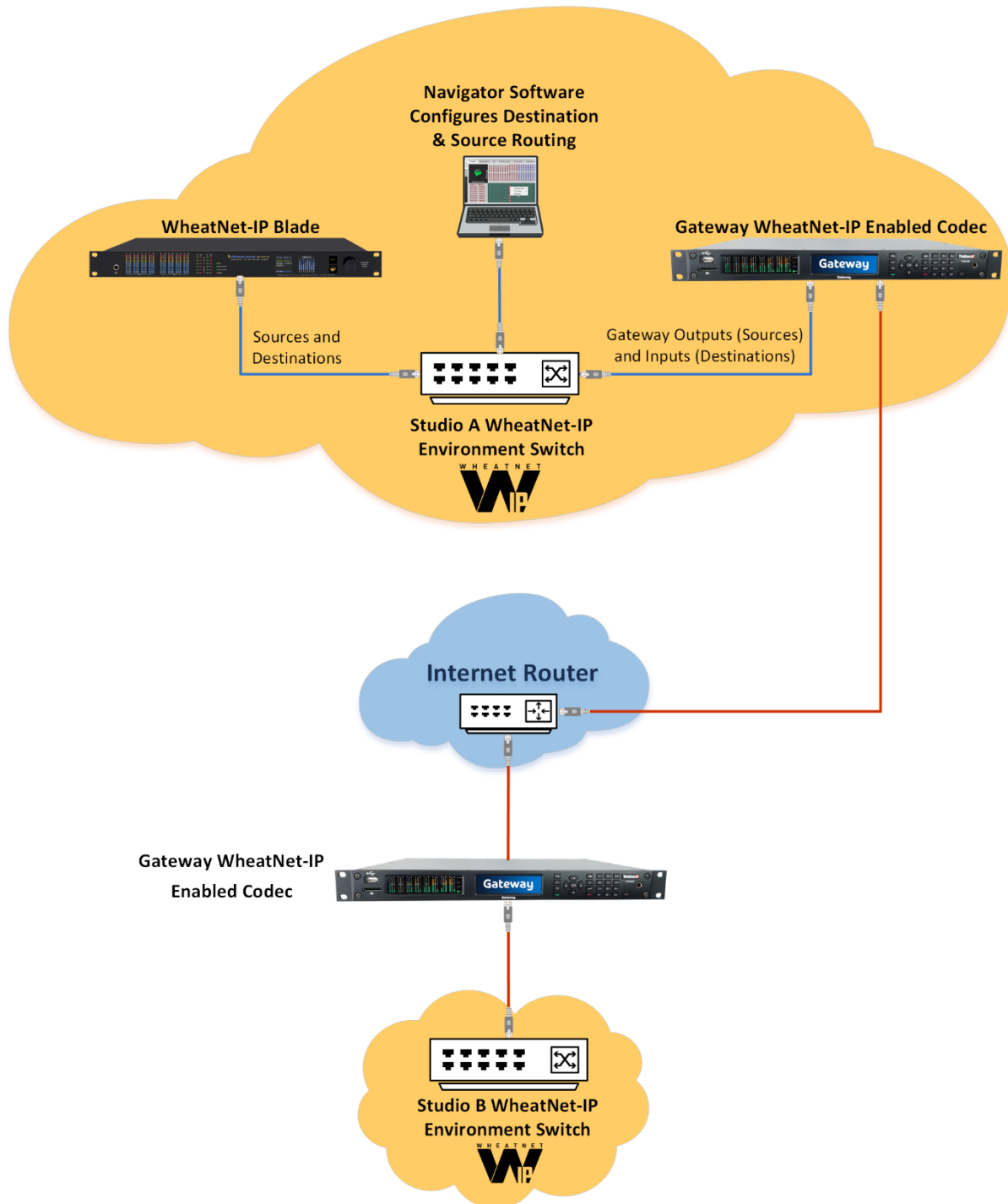
1. Huge cost savings: use SmartStream PLUS over inexpensive IP links to transport rock solid, high fidelity audio at a fraction of the cost of satellite links or synchronous leased lines.
2. Continuous rock-solid reliability: stream simultaneous redundant data streams and deliver seamless redundancy if packets are lost.
3. High fidelity audio: Tieline's renowned suite of high-quality algorithms will all work using SmartStream PLUS.



## WHEATNET-IP OPTIONS

### GATEWAY, GATEWAY 4, AND WHEATNET-IP

Order an optional WheatNet-IP card when you purchase Gateway and Gateway 4 codecs to seamlessly integrate IP audio streams between external IP networks and the WheatNet-IP environment. Codecs with WheatNet-IP cards appear as Blades and seamlessly support stream discovery, advertisement and control using Wheatstone's Navigator software. Codec sources and destinations can be easily configured and monitored using Navigator software.



## NATIVE LIVEWIRE+ AND RAVENNA SUPPORT

Native RAVENNA and Livewire+ AoIP support is included free in Gateway and Gateway 4 codecs.

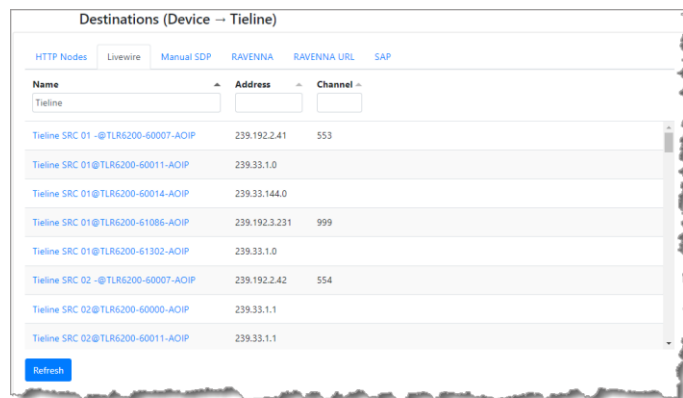
### LIVEWIRE+

Native support for Livewire+ facilitates both the Gateway and Gateway 4 being integrated seamlessly into the large number of networks that have deployed Livewire networks and that use Axia consoles and Pathfinder for routing control.



Tieline Gateway and Gateway 4 codecs with Livewire+ include features such as:

- Creation of Livewire+ compliant Sources and Destinations.
- Simple discovery of advertised Livewire+ sources across an AoIP network.
- Configuration and activation of Livewire GPIOs (64 Livewire GPIO ports supported).



Codec Destinations panel displaying Livewire+ source streams

### RAVENNA

RAVENNA is used widely by broadcasters around the world for discovery and advertisement when streaming real-time IP audio. RAVENNA support facilitates interfacing easily between Gateway and Gateway 4 codecs and RAVENNA devices over AoIP networks.

