The Intraplex® IP Link family of IP audio codecs provides high-end features at an affordable price

Offering an array of audio coding options along with IPConnect technology for data tunneling, the IP Link codecs are suitable for use in Studio to Transmitter Links (STLs) as well as audio contribution and distribution networks. Support for IP multicast and multiple unicast streams enables one encoder to feed multiple decoders.

By incorporating three IP Interfaces that can be used for streaming and management, the IP Link systems can provide a level of reliability not seen in comparably priced codecs.

As the latest additions to the Intraplex line of data transport products, the IP Link family of audio codecs bring legendary Intraplex reliability to the IP codec market.

Product Features

- IP Link 100/100p: Single bidirectional stereo audio channel
- IP Link 200: Two bidirectional stereo audio channels
- IP Link 200A: Two bidirectional stereo audio channels with one channel being AES67
- Standard: Linear, AAC-LC, Opus and G.722 audio coding
- Optional: AAC-HE, AAC-HEv2, AAC-ELD, MPEG2, MPEG3 and Enhanced aptX audio coding
- Optional: Automatic audio loudness leveling and metering compliant with EBU R-128 and ITU-R
- Optional: IPConnect capability to reliably transport external IP packets
- Other transport modes: Transparent AES up to 192 kbps to support composite FM multiplex signal over AES
- Protocol Encapsulation: RTP, SHOUTcast/Icecast, MPEG-TS
- Three independent IP interfaces for redundant network operation
- Optional redundant power supply: 12VDC or 48VDC
- Built-in silence sensor with optional stream switch over
- Automatic backup to audio playout from USB drive or external audio source
- Multicoding can encode the same audio source in multiple formats for STL, backup, and web streaming
- Optional Dynamic Stream Splicing providing “hitless” operation and T1/E1 circuit like performance on less predictable IP networks
- Prioritized stream sources at the output with automatic switch over and switch back between primary and secondary streams and backup sources (streams, USB, external audio source)
- Programmable RTP level Forward Error Correction (FEC) scheme
- Programmable time diversity and interleaving of streams to combat burst packet losses
- Integrated with Intraplex IP Link Scheduler for automated scheduled program switching
- Integrated with Intraplex LiveLook (network analytics and monitoring software)
- N+1 redundancy with integrated control of external switching equipment
- IP Link 200/200A/100p: SynchroCast™ option provides dynamically managed precision delay for Single Frequency Network (SFN) broadcasting and simulcasting
- Support for IP multicast and multi-unicast
- Web browser user interface and SNMP network management
- Eight multipurpose contact closure inputs and outputs provide:
  - Transport of logic signals with time- alignment to audio
  - Stream control
  - Alarm notification
Product Details

The IP Link family of audio codecs were designed to provide unprecedented level of reliability from ground up. At the hardware level, the N+1 redundancy with built in control for data switches provide automatic synchronization of configuration and switch over capability. This reliability is further enhanced with optional hot-standby power supply.   

At the streaming layer, Dynamic Stream Splicing provides a set of networking tools for reliability, such as redundant streams with network and time diversity. The support of Forward Error Correction (FEC) and interleaving further enhances these capabilities. These tools can be intelligently combined to achieve reliability generally associated with T1/E1 circuit over less robust IP networks. Hitless operation can be achieved when multiple networks are available. The use of time diversity on redundant streams along with FEC and interleaving can provide protection against burst packet losses.   

IP Link audio codecs also offer Multicoding, the ability to simultaneously encode the same audio program using multiple different algorithms. Multicoding can, for example, allow the user to send linear uncompressed audio on a main STL, while sending the same program with AAC coding on a lower-bandwidth backup link and MP3 to feed a streaming Web server such as SHOUTcast.   

A built-in optional Audio Loudness Leveling capability ensures that the loudness of incoming audio is kept at a consistent level based on the EBU R128 and ITU-R standard.   

A built-in silence sensor and alarm enable IP Link codecs to offer a variety of automatic backup options. If the main link is lost, IP Link can switch to a secondary feed from a lower bandwidth link. In the event of total IP connectivity loss, the system can switch to playout from a plug-in USB drive or from any local audio source connected to the audio inputs on the rear panel. A comprehensive Web browser interface makes the IP Link codecs easy to monitor, configure, and operate.   

IPConnect capability enables transport and tunneling of external IP packets protected with Dynamic Stream Splicing and FEC. IP Link 200/200A/100p provides optional SynchroCast capability to dynamically align the playback of audio at geographically dispersed transmitter sites for SFN broadcasting. This capability can be used with compressed or linear audio formats. IP Link 100/100p provides a single bi-directional stereo channel, while the IP Link 200 adds a second bidirectional stereo. IP Link 200A adds AES67 support. VU meters for each channel, and a convenient front panel user interface to access key configuration settings and status information.

Specifications

Specifications and designs are subject to change without notice

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<tr>
<th>Overview</th>
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<tbody>
<tr>
<td>Channels</td>
<td>IP Link 100/100p: One stereo (or two mono) program channels, encode and decode</td>
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<tr>
<td></td>
<td>IP Link 200: Two stereo (or four mono) program channels, encode and decode</td>
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<td></td>
<td>IP Link 200A: Same as IP Link 200 except one stereo channel is AES67 compliant audio</td>
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<tr>
<td>Front Display</td>
<td>IP Link 200/200A/100p: Graphical front panel user interface - 3.2 inch display; 256 x 64 pixel, white monochrome OLED; six-button keypad; VU meters for each audio channel</td>
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<tr>
<td>Audio Coding</td>
<td>Standard: Linear, AAC-LC, Opus, G.722</td>
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<td></td>
<td>Optional: MPEG2, MPEG3, AAC-HE, AAC-HEv2, AAC-ELD, Enhanced aptX and transparent AES</td>
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<tr>
<td>Audio Loudness Leveling</td>
<td>Optional: Leveling, metering with true-peak measurement and brick-wall limiter applied to the input analog and digital audio in conformance with ITU-R BX1770-3 and EBU R 128</td>
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<tr>
<td>Streaming</td>
<td>EBU N/ACIP Tech 3326, SHOUTcast/Icecast, MPEG Transport Stream over IP, Transparent AES, SynchroCast</td>
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<tr>
<td>SynchroCast</td>
<td>Optional: Audio delay programmable up to 1 second with 1 microsecond accuracy</td>
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<tr>
<td>Multicoding</td>
<td>Allows the input to be encoded and streamed out using multiple different algorithms simultaneously</td>
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<tr>
<td>Digital/Analog Operation</td>
<td>Dual domain: AES/EBU and analog</td>
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<td></td>
<td>For audio input, AES/EBU / analog is auto-detected</td>
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<td></td>
<td>For audio output, AES/EBU and analog are simultaneous</td>
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<tr>
<td>Webcasting</td>
<td>Can provide a TCP stream to a SHOUTcast or other Webcasting server</td>
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<tr>
<td>Backup</td>
<td>Configurable for automatic backup to secondary incoming audio stream, playout of audio from USB drive, or playout of audio from a local device connected to the rear panel inputs</td>
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<tr>
<td>Aux Data Channel</td>
<td>RS-232, in- or out-of-band data transport programmable to 2400, 4800 and 9600, and 19200 bps with time-alignment to audio streaming</td>
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<tr>
<td>Contact Closures</td>
<td>Eight input and eight output opto-isolated contact closures, with time-alignment to audio streaming</td>
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<td>Contact inputs can transport state to peer or control stream state</td>
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<td></td>
<td>Contact outputs can receive state from peer or be tied to system alarms</td>
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<tr>
<td>Hardware Redundancy</td>
<td>N+1 with integrated support of external switching equipment</td>
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### Connectors

**Rear panel:**
- Ethernet: Three 10/100 Base-T, RJ-45
- IP Link 100/100p: XLR for analog L&R and digital AES/EBU inputs and outputs
- IP Link 200: XLR for channel 1 analog L&R and digital AES/EBU inputs and outputs, RJ-45 connectors with StudioHub cabling format for channel 2 audio inputs/outputs
- IP Link 200A: Same as IP Link 200 except 10/100 Base-T Ethernet for AES67 replaces RJ-45 StudioHub connectors
- RS-232 data: D-sub, 9 pin male
- Contact Closures: D-sub, 26-pin female
- USB: Type A
- DC Power: Two pin screw terminal
- AC Power: C14 power inlet

**Front panel:**
- Ethernet: One 10/100 Base-T, RJ-45
- Audio Headphone: One ¼” stereo headphone jack

### Digital Audio

**Accepted Audio Sampling Rates**
- Accepts AES/EBU sample rates between 32 and 192 ksp

**Sample Rate Conversion**
- Automatic rate conversion at input with dynamic range of 128 dB

**Digital Gain**
- AES/EBU output has micro adjustable gain between +6 and -6 dB

### AES Transparent Transport

**Sample Rate**
- 32, 44.1, 48, and 192 ksp

### Analog Audio

**Input Impedance**
- Balanced, greater than 10 k Ohms

**Output Impedance**
- Balanced, less than 52 Ohms

**Audio Frequency Response**
- 48 ksp: 10 Hz to 22 kHz
- 44.1 ksp: 10 Hz to 20.5 kHz
- 32 ksp: 10 Hz to 15 kHz

**Audio Level**
- Full scale analog audio input/output:
  - 9 to 24 dBu, user-settable in 1 dB steps

**Total Distortion (THD+N)**
- Less than 0.003% at 1 kHz, -1 dBFS input

**Dynamic Range**
- Greater than 91 dB

**Sample Size**
- 16 or 24 bit

### Ethernet

**Ethernet Data Rate**
- 10/100Base-T (10 or 100 Mbps) full duplex, auto-negotiation

**Network Connections**
- Two WAN ports plus management port. Mirror port on front panel
- Per port 802.1 pq configuration; Three network ports available for both streaming and management

**Network Protocols**
- IPv4, TCP, UDP, RTP, RTCP, SIP, HTTP, FTP Telnet, NTP, SNMPv2C, ARP, ICMP, Ultravox (v1, v2)

**Remote Management**
- Web browser interface
- SNMP

### Streaming

**RTP Streams**
- Total of 12 streams
- Setup: Static or SIP
- Unicast, multi-unicast, multicast
- Standard RFC payload formats, auto configuration
- Source IP address and UDP port verification at the receiver for security

**TCP Streams**
- Total 12 SHOUTcast/Icecast transmit or receive streams with selectable codec and coding rate for each stream

**IPConnect**
- Enables transport of external IP packets as payload of IP Link RTP streams
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<th>Feature</th>
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</table>
| **SIP**                        | Compliant with EBU N/ACIP Tech 3326  
|                                | Works in peer to peer and proxy mode  
|                                | NAT traversal support  
| **Redundancy**                 | Automatic failover mode between Primary, Secondary and Backup streams  
| **Backup Audio Source**        | USB Playlist, Local input channel, Other output channel (IPL 200)  
| **Dynamic Stream Splicing**    | Optional: Enables multiple identical audio streams to be sent across the IP network (or two separate IP paths, if available) and provides for hitless switching at the decoder  
| **Jitter Buffer**              | Programmable jitter buffer depth up to 1024 packets. Static or automatic jitter buffer adjustment  
| **Forward Error Correction**   | Multiple FEC schemes configured per stream with 25%, 50%, 66% and 100% overhead selection  
| **Time Diversity**             | Time delay configured on per stream basis, used with redundant streams for burst packet loss protection  
| **Interleaving**               | Configured per stream for mitigation of consecutive packet losses  

**Diagnostics**

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| **Test Tone Generator**         | 1 kHz test tone at -12 dBFS  
| **Loopbacks**                  | Input to output channel equipment loopback while simultaneously sending streams from the input channel  
| **Network Performance Statistics Tracked** | Burst packet loss statistics based on RFC 3611  
|                                | Per stream and group statistics for packets received, packet lost, packets recovered by FEC and packets sent  
|                                | Send and receive stream bandwidth  

**Status Indicators**

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| **LED Indicators**             | Stream activity and status  
|                                | IP Link 100: Multi-color LED indicators for L&R audio input and output  
|                                | IP Link 100p: Multi-LED bar graph audio level meters for channel 1 input and output  
|                                | IP Link 200/200A: Multi-LED bar graph audio level meters for channel 1 and channel 2 input and output  

**Alarms**

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| **Alarm Reporting**             | Major/minor alarms, normally open relay contacts, SNMP traps  
|                                | Maintains internal and syslog messages alarm log  
|                                | Log files can be sent off to off-site server for storage  
|                                | User configurable per-stream packet loss threshold  
| **Loss-of-Audio-Alarm**         | Built-in silence detection with ability to provide alarm and perform switch over of stream on loss of audio  

**Mechanical and Environmental**

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| **Dimensions (H X W X D)**      | 1RU: 1.75 x 19 x 10.1 in.  
|                                | (4.45 x 48.3 x 25.7 cm)  
| **EIA rack mountable Weight**   | 5 lbs (2.27 kg) typical  
| **Power Supply**                | Main: AC 100-240 VAC, 50/60 Hz with type T2A 250 V AC input fuse  
|                                | Backup: Optional external module, AC to 12 VDC converter or internal module for -48 VDC  
| **Power Consumption**           | 15 watts  
| **Humidity**                    | 10% to 90% non-condensing  
| **Operating Temperature**       | 32° to 122° F (0° to 50° C)  

**Compliance**

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| **Regulatory Compliance**       | CE, FCC Part 15 Class A, UL 60950, RoHS  

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