



# INTRAPLEX IP<sup>®</sup> LINK MPXP

IP Link Codecs

The Intraplex<sup>®</sup> IP Link MPXp provides robust transport of your FM MPX composite signal over IP networks.

Offering digital and analog MPX FM composite signal support as well as flexible sampling rates and sample sizes options. The IP Link MPXp codec optimizes IP network bandwidth utilization based on FM services being transported. IP Link MPXp codecs are suitable for use in IP based Studio to Transmitter Links (STLs) as well as distribution networks. Support for IP multicast and multiple unicast streams enables one encoder to feed multiple decoders.



## Intraplex IP<sup>®</sup> Link MPXp Product Features

- Single bidirectional FM MPX composite signal
- Support for both analog FM MPX composite and digital MPX over AES with bridging between digital and analog domains
- Redundant input MPX signal ports with automatic failover based on signal activity
- Redundant output MPX signal ports
- Independent signal level setting for each input and output MPX signal port
- Flexible sampling rates and sample size options to tailor IP WAN bandwidth. Can be configured as low as 1.64 Mbps bandwidth
- FM MPX signal port can be configured for audio sampling rates for an audio return path for applications not requiring bi-directional MPX
- Two channels of SCA mixing
- Three independent IP interfaces for redundant network operation
- Optional redundant power supply: 12VDC or 48VDC
- VU meters to indicate input and output MPX signal levels
- GPS support for precision digital timing reference
- Decoding audio and RDS data from input or output MPX signal. Audio is output on headphone jack
- Built-in silence sensor with optional stream switch over
- Optional IPConnect capability to reliably transport external IP packets
- Optional Dynamic Stream Splicing with time and network diversity provides “hitless” packet loss and network loss protection
- Prioritized stream sources at the output with automatic switch over and switch back between primary and secondary
- 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
- 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 MPX signal
  - Stream control
  - Alarm notification

# Product Details

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

As the latest addition to the Intraplex family of audio and data transport products, the IP Link MPXp codec bring legendary Intraplex reliability to the IP codec market.

The IP Link MPXp belongs in the IP Link family of codecs. Now FM MPX composite transport can have an unprecedented level of reliability and performance. At the hardware level, the N+1 redundancy with built in control for both MPX routers and data switches provide automatic synchronization of configuration and switch over capability. This reliability is further enhanced with optional hot-standby power supply.

With support for both digital and analog FM MPX composite signals, IP Link MPXp can bridge between either signal domain for enhanced interoperability with your FM equipment infrastructure.

By offering four bandwidths: 60, 74, 88 and 99 kHz and five sample sizes: 12, 14, 16, 20 and 24 bits, IP Link MPXp enables great flexibility in optimizing the IP WAN bandwidth based on the FM services to be transported.

IP Link MPXp provides monitoring capability to decode the audio and RDS data from either the input or output MPX signals. The analog audio is output on a front panel headphone jack.

Two SCA inputs allow subcarriers generators to be located at the MPX decoder. The SCA mixing function can be enabled per channel and injection gain is digitally controllable.

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.

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, it can switch to a secondary feed.

A convenient graphical front panel user interface and comprehensive Web browser interface makes the IP Link MPXp easy to monitor, configure, and operate.

Optional IPConnect capability enables transport and tunneling of external IP packets protected with Dynamic Stream Splicing and FEC.

Optional SynchroCast capability to dynamically align the playback of the MPX signal at geographically dispersed transmitter sites for SFN broadcasting. VU meters for each MPX signal provides convenient access to signal level information.

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### Specifications

*Specifications and designs are subject to change without notice*

Overview	
Channels	One FM MPX composite signal encode and decode Two input and two output MPX signal ports for redundancy
Front Display	Graphical front panel user interface - 3.2 inch display; 256 x 64 pixel, white monochrome OLED; six-button keypad; VU meters for each MPX signal port
SynchroCast	Optional: MPX delay programmable up to 1 second with 1 microsecond accuracy
Backup	Configurable for automatic backup to secondary incoming MPX stream
Contact Closures	Eight input and eight output opto-isolated contact closures, with time-alignment to MPX streaming Contact inputs can transport state to peer or control stream state Contact outputs can receive state from peer or be tied to system alarms
Hardware Redundancy	N+1 with integrated support of external switching equipment

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Connectors	<p>Rear panel:</p> <p>Ethernet: Three 10/100 Base-T, RJ-45</p> <p>MPX: Two BNC for analog MPX inputs and two BNC for analog MPX outputs</p> <p>MPX: XLR female for digital MPX over AES input and XLR male for digital MPX over AES output (AES output is optional)</p> <p>SCA: Two BNC for SCA inputs</p> <p>(All BNC connectors are 75 ohms, unbalanced)</p> <p>Contact Closures: D-sub, 26-pin female USB: Type A</p> <p>DC Power: Two pin screw terminal AC Power: C14 power inlet</p> <p>Front panel:</p> <p>Ethernet: one 10/100 Base-T, RJ-45</p> <p>Audio Headphone: one ¼" stereo headphone jack</p>
GPS	<p>External GPS: 10 MHz and 1 PPS BNC connectors</p> <p>Optional: GPS receiver plug-in board kit with SMA connector for external GPS antenna (provided with kit)</p>
<b>FM MPX Composite</b>	
Analog Bandwidth	60, 74, 88, or 99 kHz for MPX transport or 15, 22 kHz for audio transport
Frequency Response	<p>60 kHz bandwidth: 0.1 Hz to 60 kHz, -1 dB</p> <p>74 kHz bandwidth: 0.1 Hz to 74 kHz, -1 dB</p> <p>88 kHz bandwidth: 0.1 Hz to 88 kHz, -1 dB</p> <p>99 kHz bandwidth: 0.1 Hz to 100 kHz, -1 dB</p> <p>All MPX bandwidths: 20 Hz to 53 kHz +/- 0.05 dB</p>
Total Distortion	(THD+N) Less than 0.003%
Dynamic Range	Greater than 90 dB
Signal Level	Full scale analog MPX input/output: -6 to 18 dBu, user-settable in 0.5 dBu steps for input and 0.1 dBu steps for output
Sampling Rate	132, 162, 192 or 216 ksps for MPX transport or 32, 48 ksps for audio transport
Sample Size	12, 14, 16, 20, or 24 bit
Input Impedance	Greater than 10 k ohms, jumper settable to 75 ohms
Output Impedance	Less than 10 ohms, jumper settable to 75 ohms
<b>SCA</b>	
Channels	Two BNC inputs for SCA with 600 ohm impedance
Injection Level Control	<p>SCA mixing into MPX composite output. Gain from each SCA input to each MPX output is user settable from 20 to -64 dB in 0.5 dB steps. Maximum injection level is 3 dBu</p> <p>SCA mixing can be independently enabled for each SCA input to each MPX output</p>
<b>Monitoring</b>	
Audio	Demodulation of mono audio from either MPX signal input or output
RDS	RDS decoding from either MPX signal input or output of PI, PS, TA, TP, PTY, RT, and CT data
<b>Ethernet</b>	
Ethernet Data Rate	10/100Base-T (10 or 100 Mbps) full duplex, auto-negotiation
Network Connections	<p>Two WAN ports plus management port. Mirror port on front panel</p> <p>Per port 802.1 pq configuration; Three network ports available for both streaming and management</p>
Network Protocols	IPV4, TCP, UDP, RTP, RTCP, HTTP, FTP Telnet, NTP, SNMPv2C, ARP, and ICMP
Remote Management	<p>Web browser interface</p> <p>SNMP</p>

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Streaming	
RTP Streams	Total of six streams: Unicast, multi unicast, and multicast Source IP address and UDP port verification at the receiver for security
IPConnect	Optional: Enables transport of external IP packets as payload of IP Link RTP streams
Redundancy	Automatic failover mode between Primary, Secondary and Backup streams
Dynamic Stream Splicing	Optional: Enables multiple identical MPX 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	
Test Tone Generator	1 kHz test tone at -12 dBFS
Loopbacks	MPX input to output equipment loopback while simultaneously sending streams from the input MPX signal port
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	
LED Indicators	Stream activity and status Multi-LED bar graph signal level VU meters for MPX input and output signals
Alarms	
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-Signal-Alarm	Built-in silence detection with ability to provide alarm and perform switch over of stream on loss of MPX signal
Mechanical and Environmental	
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	
Regulatory Compliance	CE, FCC Part 15 Class A, IEC 60950, RoHS