



VISLINK
Technologies

IP Link 3.0

February 21, 2020

Iplink 3.0 Contents

- Features and Application
- Models Supported
- Connections
- Configurations
- Technical Benefits
- Set-up
- ATSC 3.0 Conversion

Key Features and Applications

- Features

- All-indoor, space-efficient 2RU x 19" (48cm) rack mount
- Ultra-high linear broadband RF power amplifiers
- Exceptional System Gain Performance
- High capacity ASI & Gigabit Ethernet IP data transport
- Automatic Transmitter Power Control
- Adaptive Code Modulation
- User selectable asymmetrical modulations from QPSK to 1024QAM
- XPIC cross-polarization interference cancellation
- ANSI and ETSI channel bandwidths selections
- Intuitive Web based GUI for remote monitoring and control

- Applications

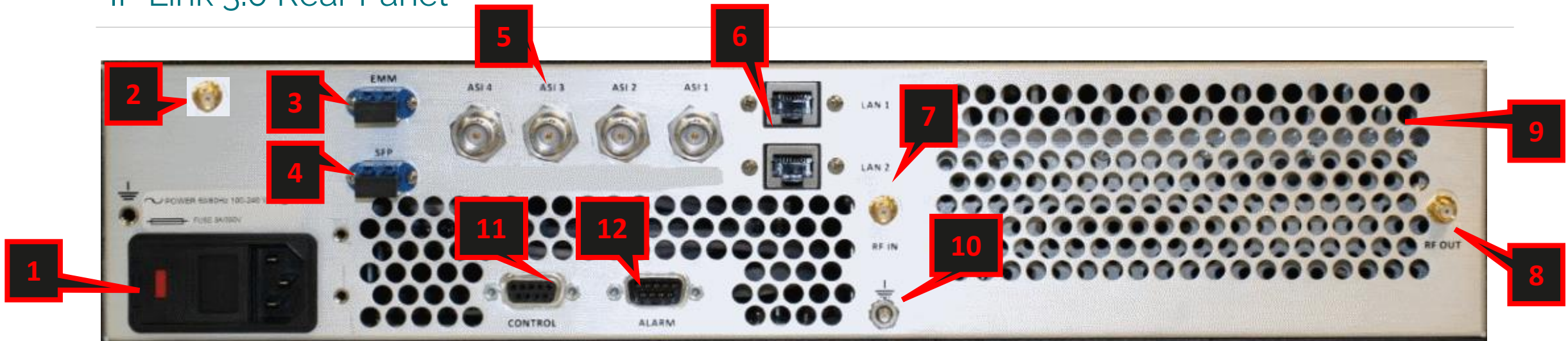
- Studio-to-Transmitter Links (STL)
- Transmitter-to-Studio Links (TSL)
- Inter-city Relay Backhaul (ICR)
- Multi-hop Microwave Relay Systems
- High capacity IP Microwave Systems
- Ideal for ATSC1.0/3.0 Lighthouse applications

Front Panel



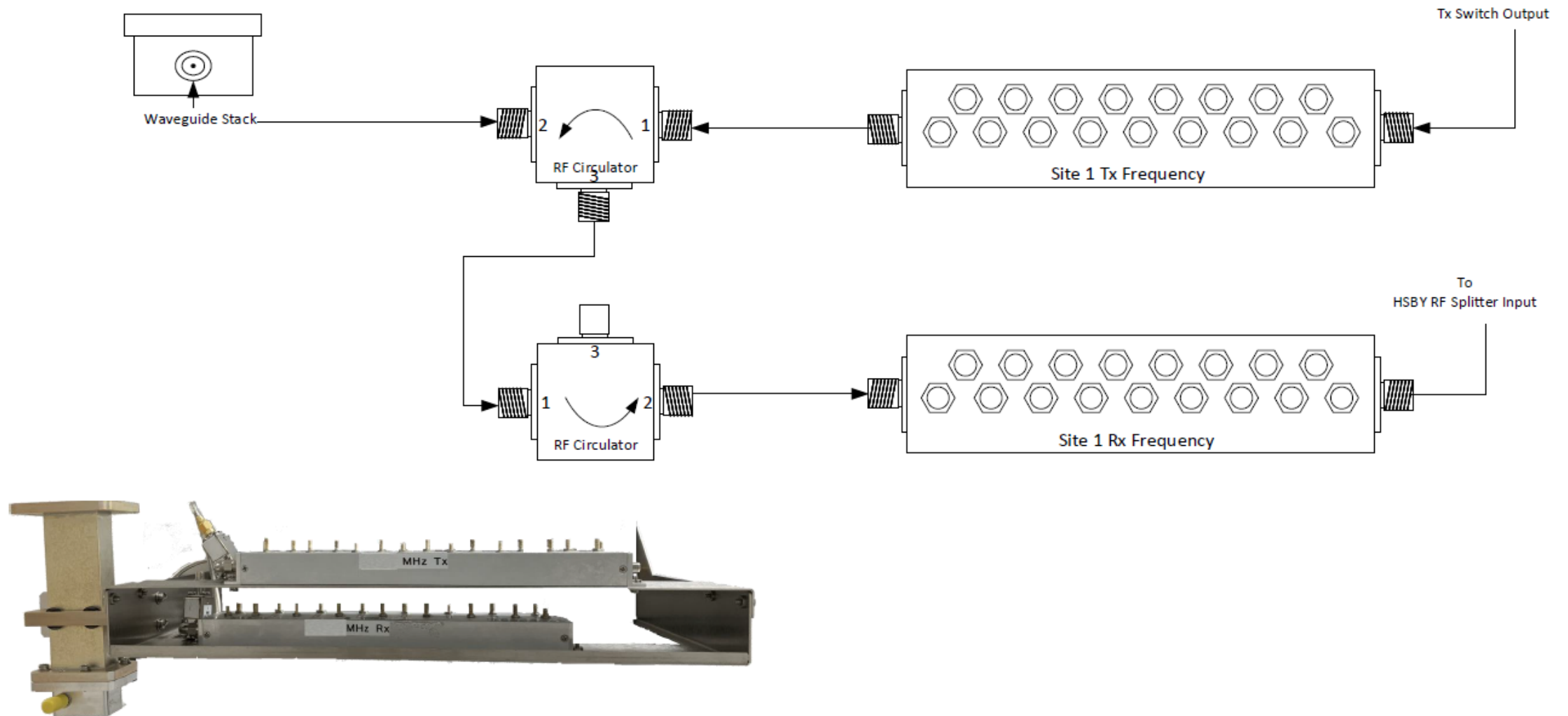
Reference	Action	Decription
1	Management Port	RJ45 10/100/1000 Base-T to PC or Network
2	Local User Interface - Control/Alarms	LCD Touch Screen
3	Link Alarm	Green/Red LED
4	Local Lock Alarm -	Green/Amber/Red LED

IP Link 3.0 Rear Panel



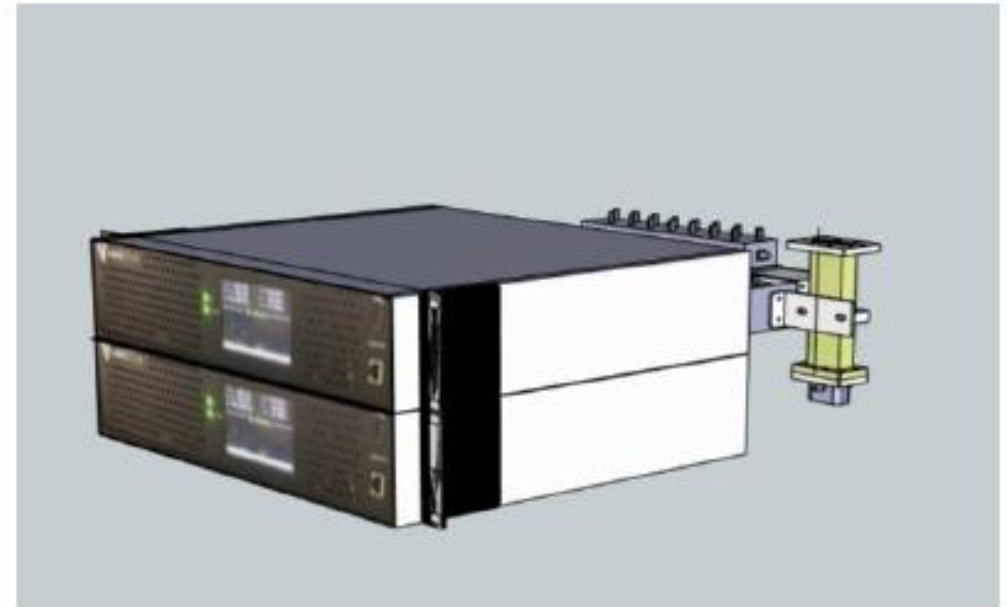
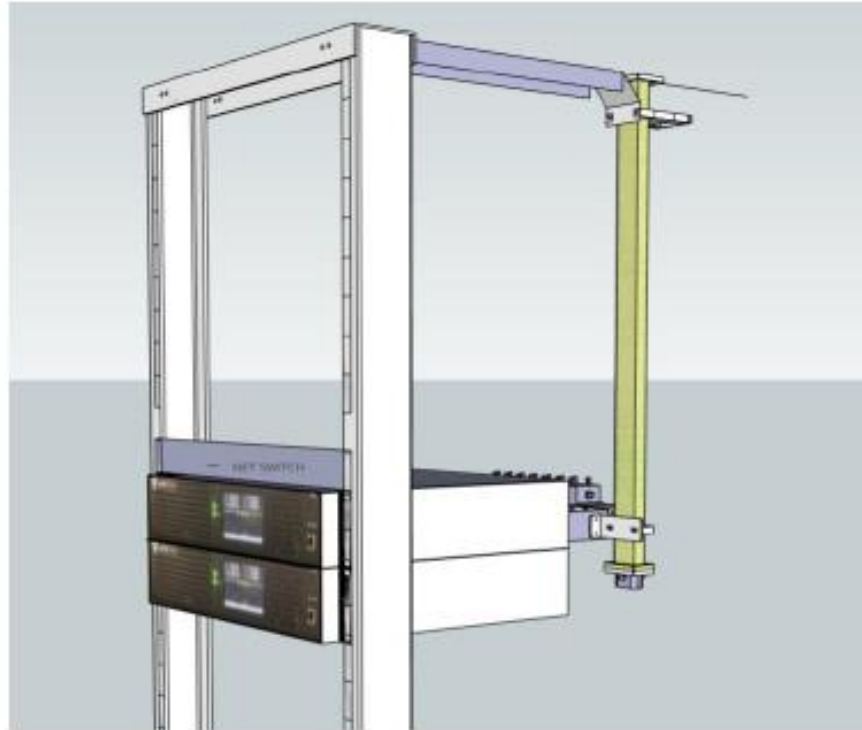
Reference	Type	Description
1	AC/DC Receptical	Power Receptacle (AC Shown)
2	SMA Female	XPIC I/O RF ODU
3	SFP	Expansion Module Connects
4	SFP	1+1 Protection Ports
5	BNC	4 x ASI Input/Output
6	RJ45	LAN Ports x 2
7	SMA Female	RX Input
8	SMA Female	TX Output
9	Type N for Split Mount	Type N (not shown)
10	Ground Lug	Chassis Ground
11	DB9 Male	Serial Control Port
12	DB9 Male	Summary Alarm / Hot Standby Shelf

Typical RF Channel bracketry that mounts directly on back of IPL 3.0



Typical RF Channel bracketry 1+1 Configuraton on back of IPL 3.0

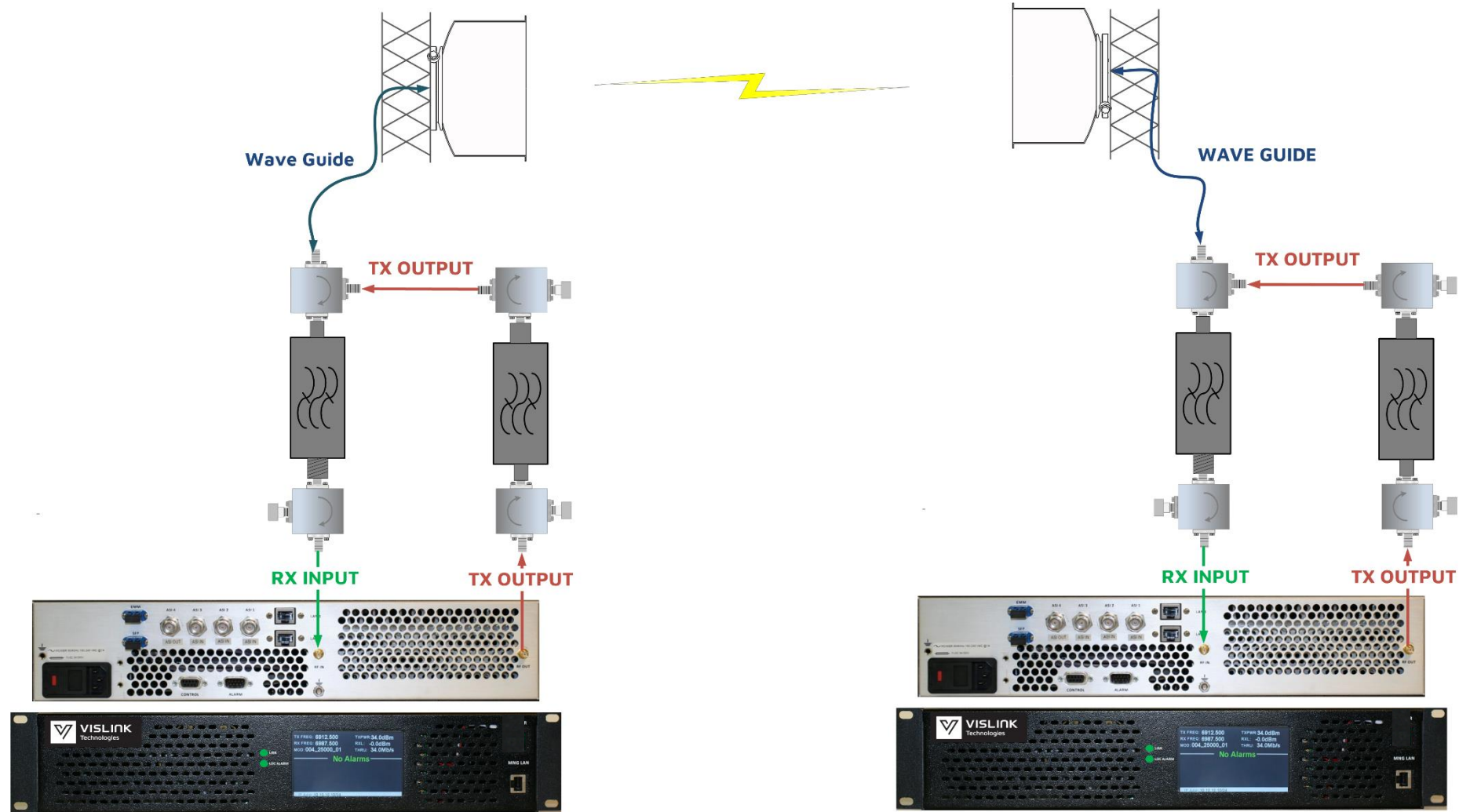
TERMINAL UNITS WITH
RACKS DEPICTED
WG CPR137~25
CHIMNEY



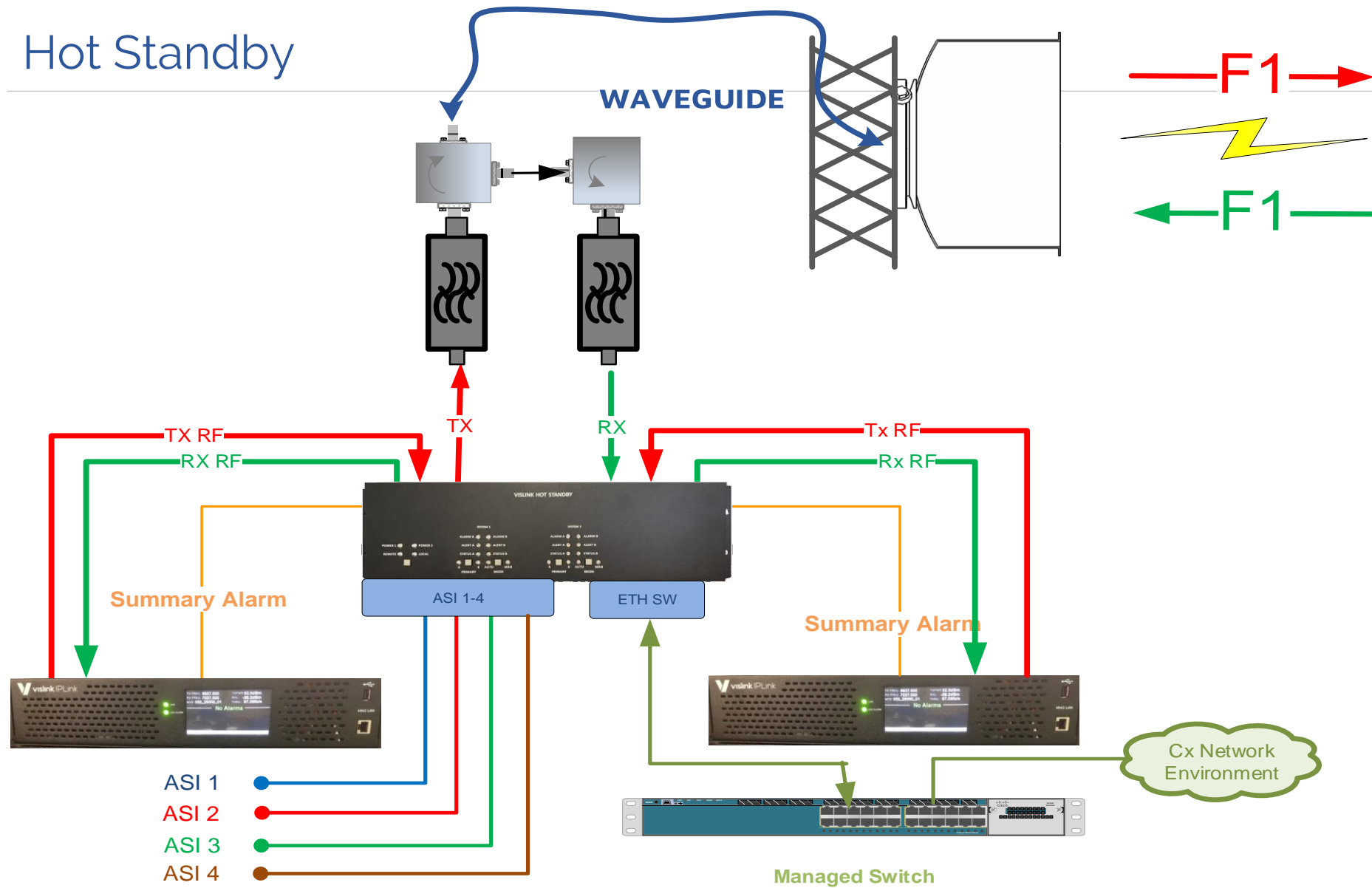
IP Link 3.0 Configuration Features

- IP Link configurations:
 - 1+0 configurations (Single and Duplex design)
 - HS with HS Shelves and protected inputs and outputs
 - 1+1 configurations (SD, HSB)
- Expansion modules:*
 - ASI: up to 16 ASI ports (4x 4xASI extension modules)*

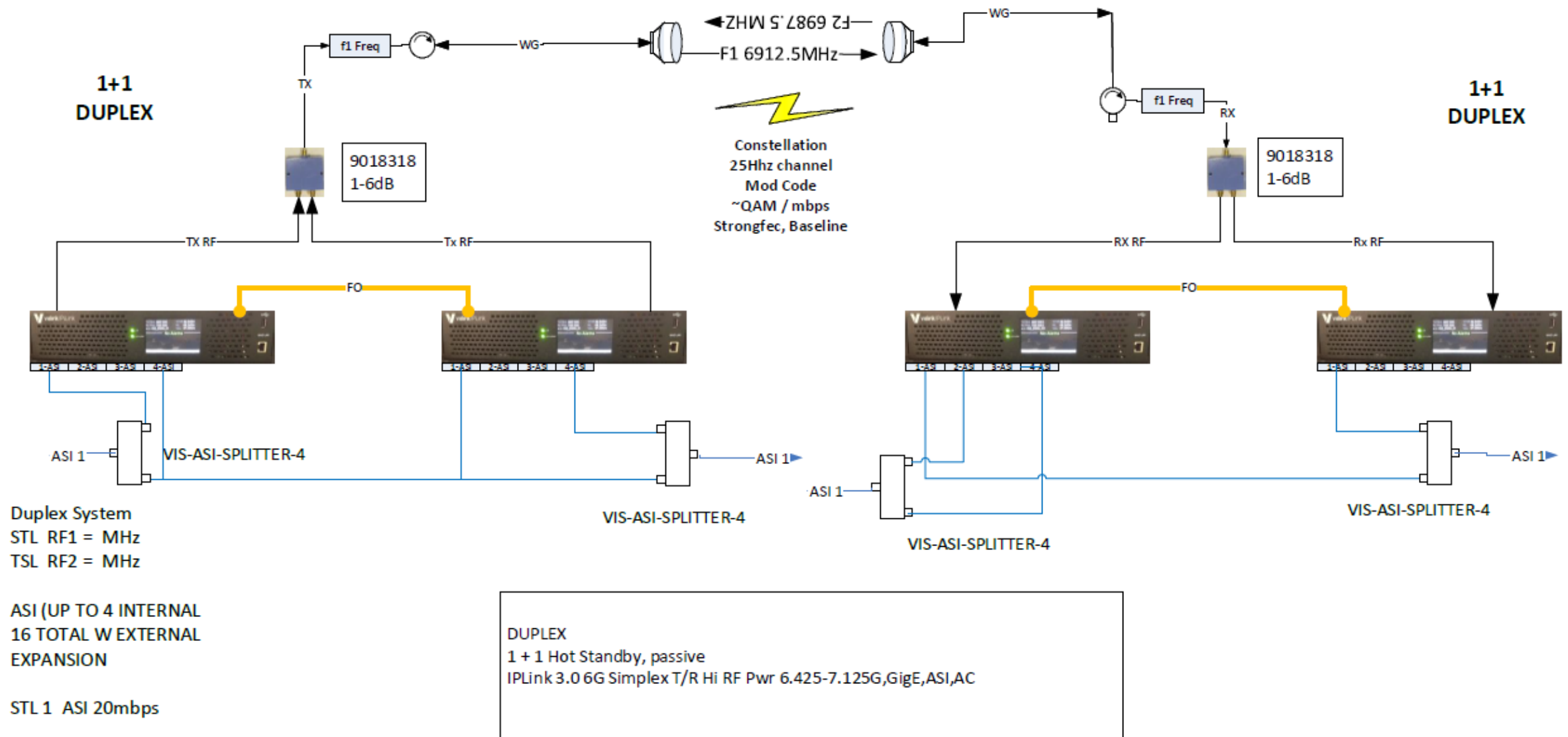
IP Link 3.0 Duplex



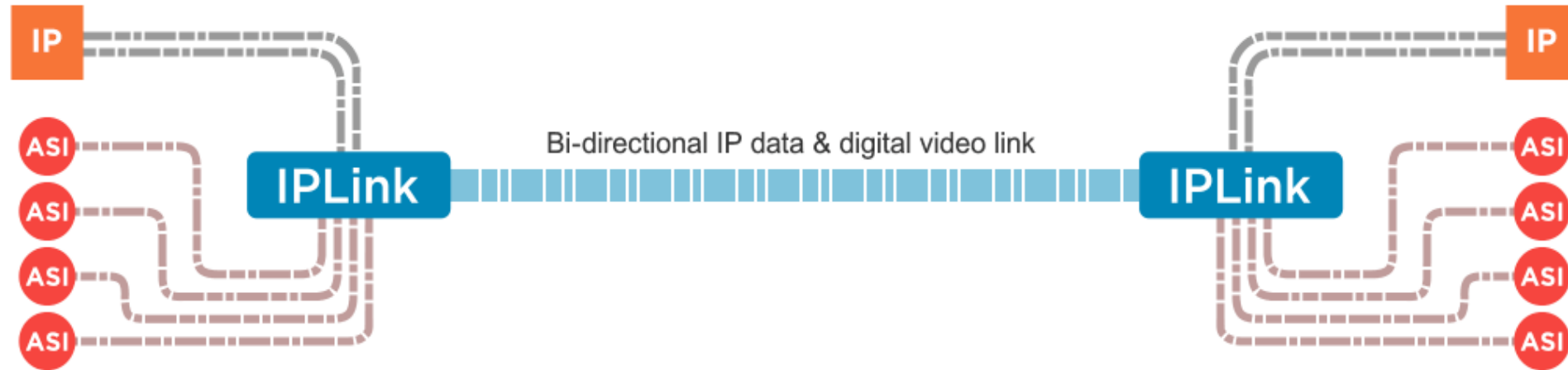
Hot Standby



IPLINK 3.0 1+1 Redundancy DUPLEX



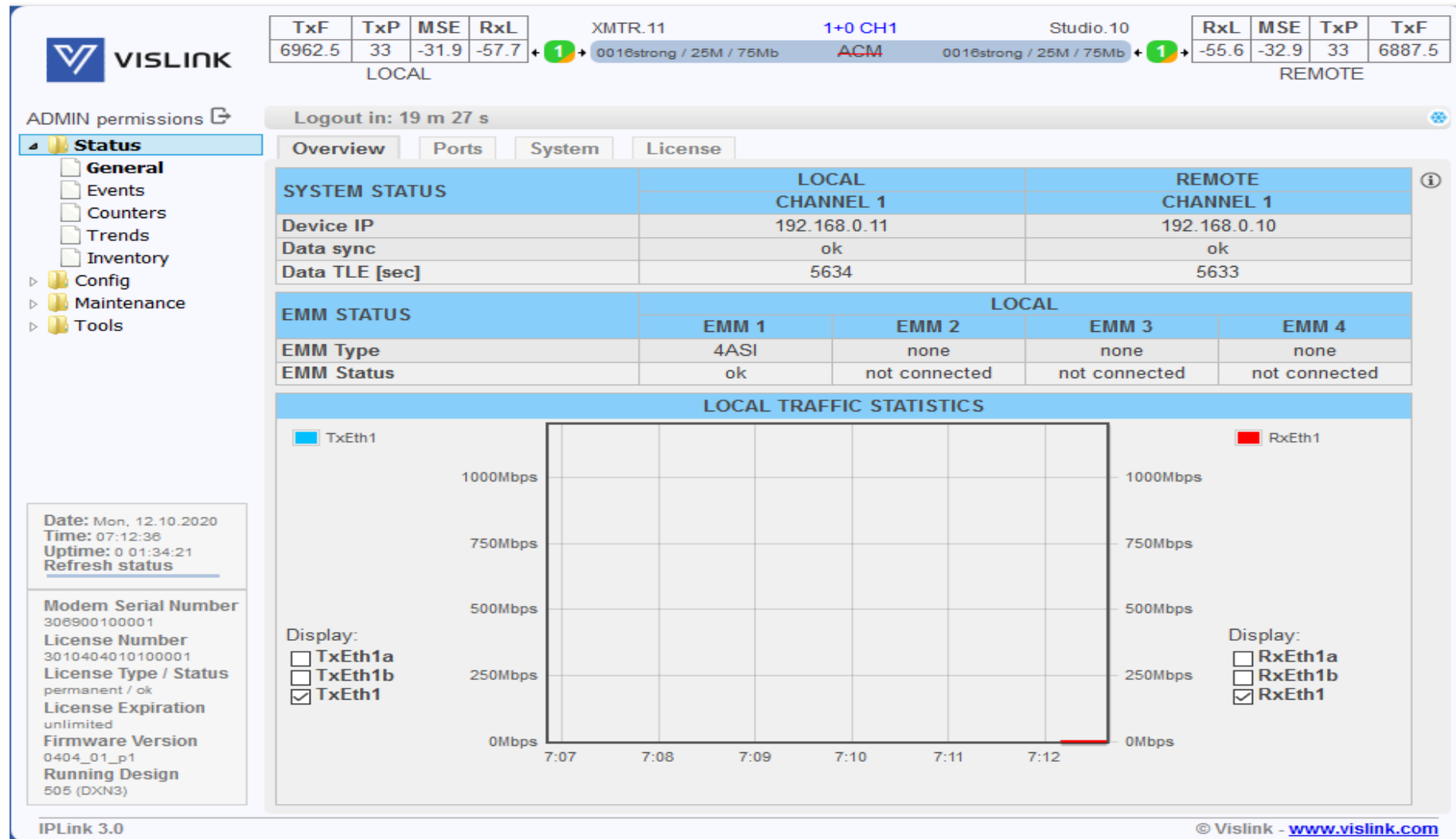
Hybrid ASI/Ethernet Microwave Link Configurations



- ASI & IP different protocols
- ASI to IP (embedding) & IP to ASI (de-embedding) complex, costly, inefficient
- Vislink “Multiplex” Native ASI on top of the IP transport layer, efficient & cost effective**
- ATSC 3.0 & 1.0 may be simulcast

Note: Public Media Company (PMC) petitioned FCC (GN Docket No. 16-142) allow PBS TV stations from FCC multicast ruling (referred to as flash-cutting)

Sample Web Page User Interface Layout (Status Page Shown)



Modulation and Coding (FEC)

- FEC – Forward Error Correction.
- Additional data sent over user traffic for correcting demodulation errors. The more overhead data are sent, the better Rx threshold level
- For higher modulation there is always needed some amount of FEC as otherwise would not be possible to achieve no BER at 10^{-6}
 - Weak FEC: optimized for more user traffic data rates (less overhead data, lower Rx threshold)
 - Strong FEC: optimized for Rx threshold level (more overhead traffic, less user traffic)
- IP Link 3.0 uses LDPC algorithm (Low Density Parity Check)

Web Page - Status

•**ODU Status** The RF unit within IP Link 3.0's chassis (labelled ODU) is monitored for the following parameters:

- TX Frequency – shows the Local and Remote transmitting frequency.
- TX Power – displays the current transmitting power.
- RX Level – shows the current level of received signal.
- Temperature – presents the internal temperature of the RFU module in degrees Celsius

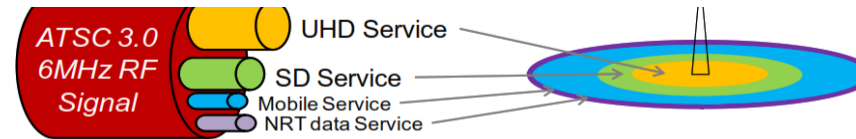
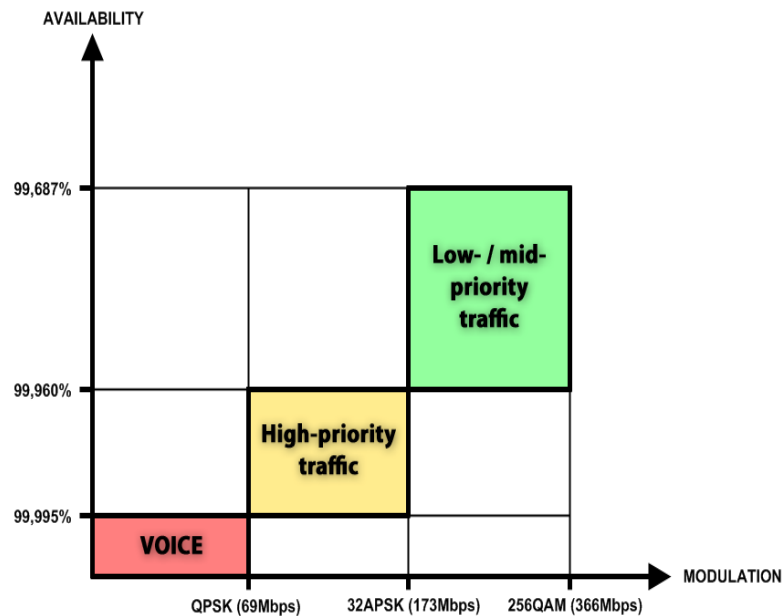
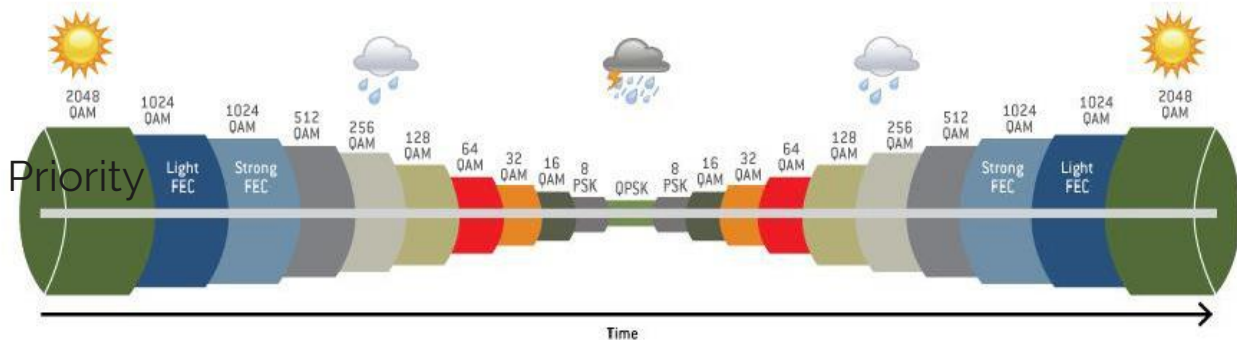
•**IDU STATUS** - The IP Link 3.0 control modules (labelled IDU) are monitored for the following parameters:

- Mode – shows the current mode of IP Link 3.0. This value depends on selected design and configuration.
- Modulation Level – displays the current modulation level.
- Modulation BW – this field displays the current bandwidth
- Modulation Type – modulation is either 01 or 03. For the IP Link 3.0 system, the system should always be configured as a 03 type under the Radio tab.
- Modem Sync – shows the status of synchronization between the local and remote radio- possible values are ok and loss.

STL/TSL Considerations for ATSC 3.0 Transmissions

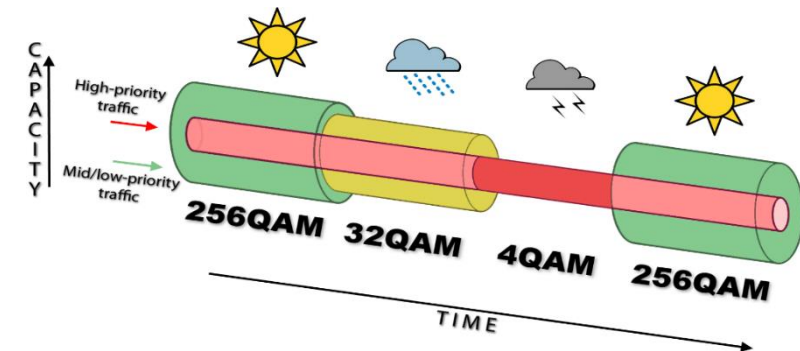
Technology Advantages - Quality of Service and Adaptive Code Modulation (ACM)

- Adaptive Coding and Modulation
- Hitless switching between modem profiles
- Using in combination with QoS for defining High Priority traffic versus Low Priority traffic
- Addressable Priority of Services
- Auto Quality of Service



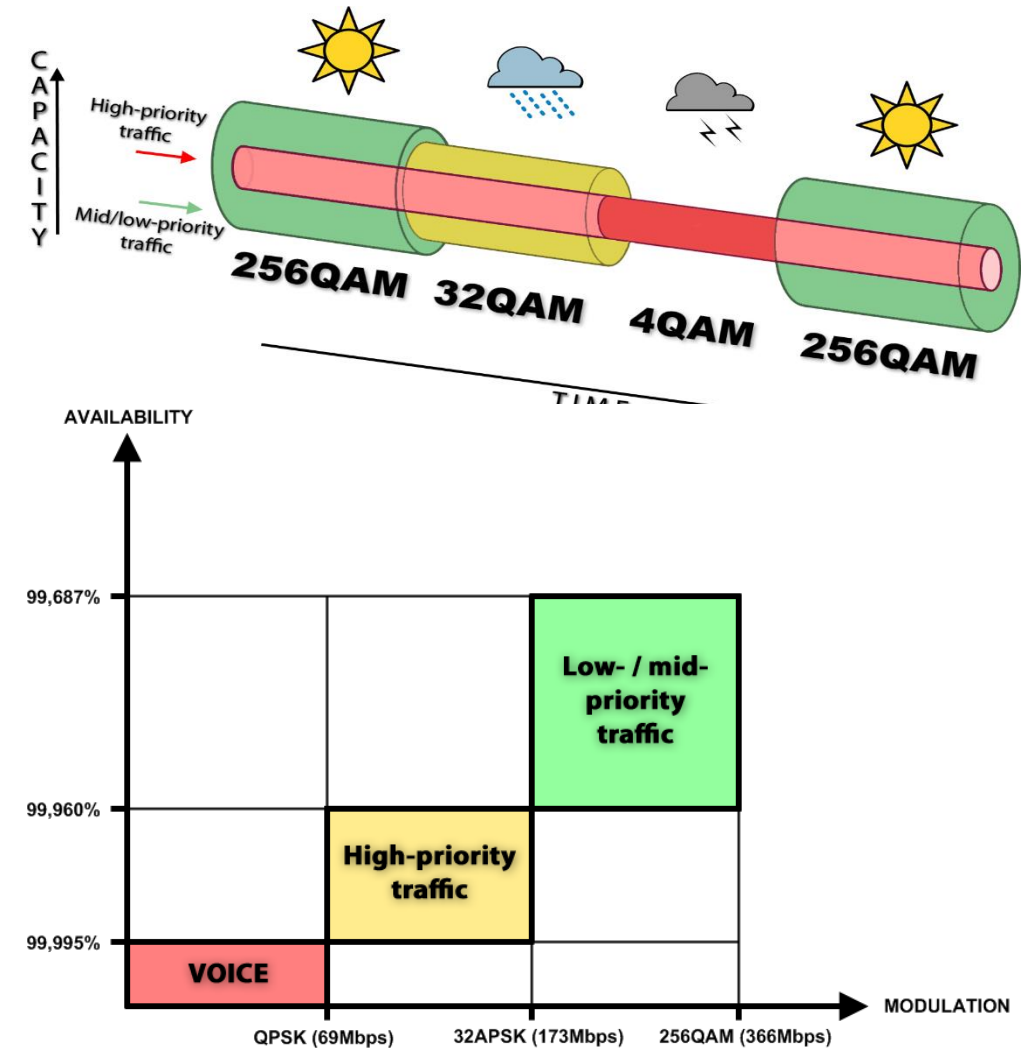
Example of multiple services carried within individual Physical Layer Pipe

Source: Hitachi Comex



Adaptive Coding and Modulation

- Adaptive Coding and Modulation
- Hitless switching between modem profiles
- Using in combination with QoS for defining High Priority traffic versus Low Priority traffic



ATSC 3.0 – What is it?

- Major OTA Video and Audio Upgrade from ATSC 1.0 1080i/p
 - Ultra-high Definition 4K resolution
 - High Dynamic Range (HDR) picture quality
- Increased audio quality – from Dolby AC-3 (5.1) to AC-4 (7.1.4)
 - Interactive audio - ability to control audio elements and personalization
- Enhanced OTA reception – more channels and higher quality
- MPEG2 Transport Streams (ATSC 1.0) to pure IP (ATSC 3.0)

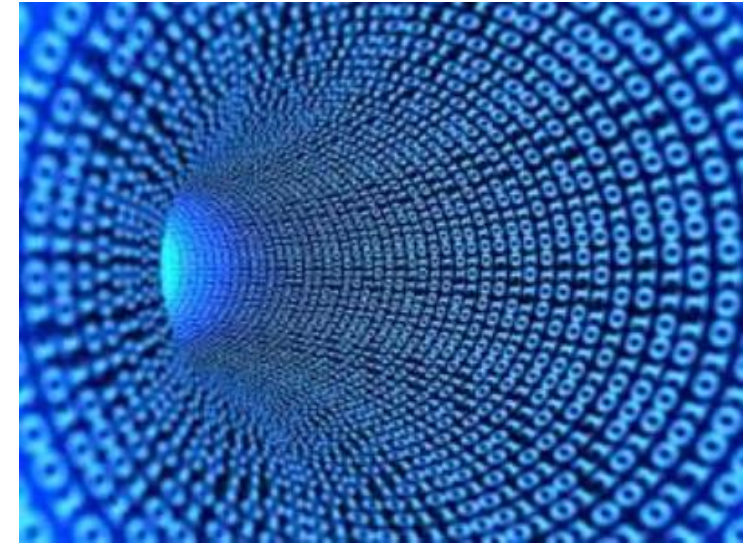
ATSC 3.0 Monetization Opportunities

- Advanced Emergency Alerting, low latency for alerts.
- Targeted Viewer Advertising/Content
- Subscription Services – free and monetized
- More Channels - by a factor of 3 or greater in the same amount of OTA spectrum
- Mobile Services - delivery of programs/data services targeted to portable and mobile devices
- Greater Capacity - efficiently move content (video, data, SW updates)
- Second Screen - OTA and/or (OTT) interactive services
- Pause and Play of Programming

How much data throughput? aka “Link Budget”

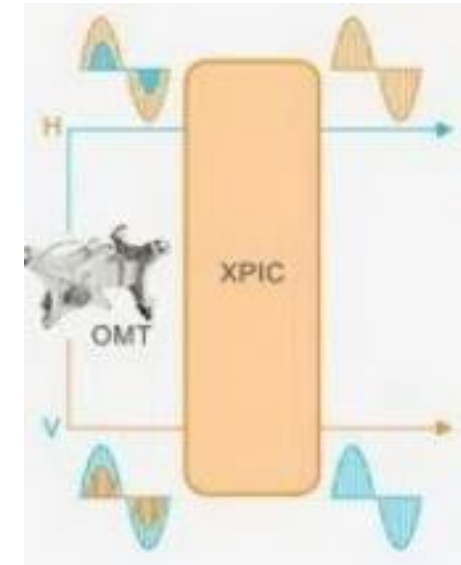
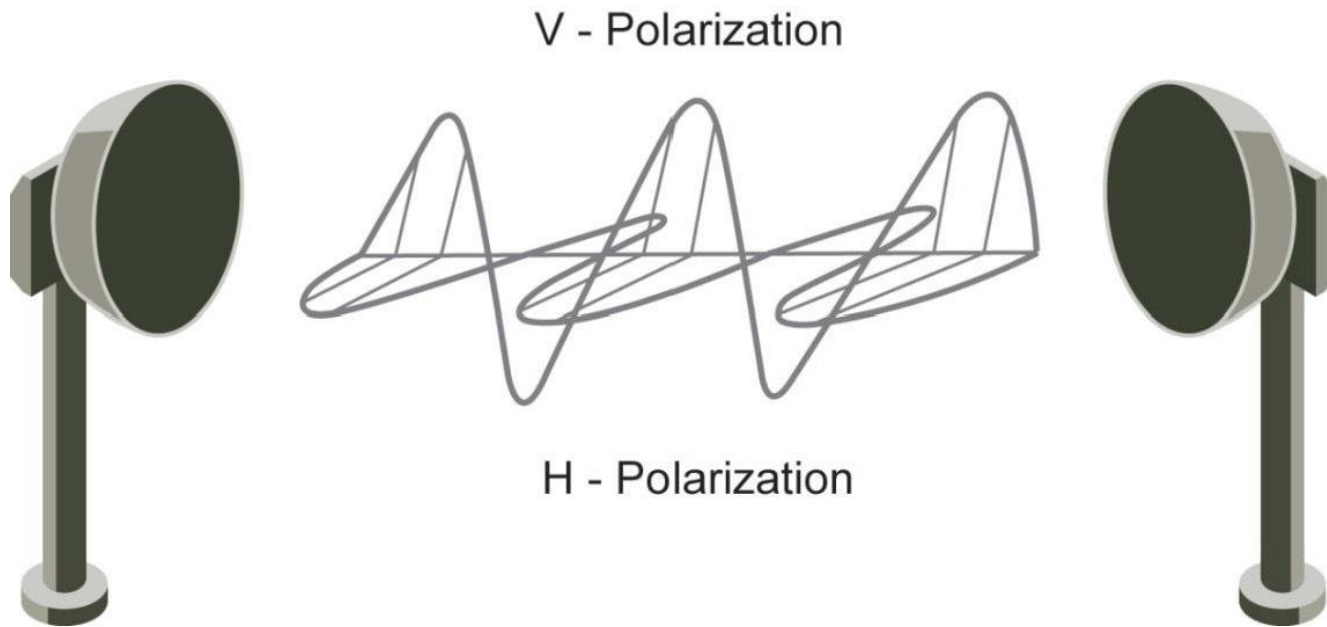
6.875 - 7.125 GHz Power Table – Threshold & Throughput Values

Modulation	25 MHz Channel BW		TX power, before branching networks
	Throughput, Mbit/s	Measured RSL threshold	
QPSK	34 Mbit/s	-90.0 dBm	+34 dBm
8PSK	51 Mbit/s	-84.9 dBm	+33 dBm
16 QAM	67 Mbit/s	-83.0 dBm	+33 dBm
32 QAM	83 Mbit/s	-79.7 dBm	+33 dBm
64 QAM	106 Mbit/s	-77.4 dBm	+30 dBm
128 QAM	127 Mbit/s	-74.4 dBm	+30 dBm
256 QAM	147 Mbit/s	-72.2 dBm	+27 dBm
256h QAM	161 Mbit/s	-68.2 dBm	



- 40 - 60 Mbit/s ATSC 3.0
- 20 Mbit/s ATSC 1.0
- Ancillary Services = ? Mbit/s
- PBS Earth Station return (? Mbit/s)

XPIC - Need even Higher Throughput Capacity?



- Link aggregation now- doubles data capacity - *Requires different RF frequencies not allowed (FCC) for TV STLs*
- **XPIC** (Cross-Polarization Interference Cancellation) - Provides link aggregation capacity using one frequency

Immersive Audio Supported by ATSC 3.0

