

# AZ410

## Broadcast Satellite Modem

### Azimuth Product Family

# AZIMUTH SERIES

#### Description

The AZ410 is a state-of-the-art satellite modem designed for broadcast contribution and DSNG applications over satellite. The AZ410 allows transmitting and receiving simultaneously transport stream(s) and/or IP services in full compliance with the DVB standards.

To simplify the migration towards IP, the AZ410 features DualFlow (combined ASI+Ethernet interface), providing broadcasters the following capabilities:

- The ability to transmit up to two transport streams and receive up to two transport streams simultaneously in DVB-S2 Multistream mode via two ASI input and two ASI output interfaces.
- The ability to interface (via the GbE input/output) with equipment or networks that carry transport streams over IP with the UDP/RTP protocol (the IP layer is removed by the modulator before transmission).
- The ability to transmit and receive IP services (file transfers, VoIP, TCP services...) and transport stream(s) simultaneously. In this case the modulator performs the encapsulation of the IP data in XPE mode.
- The ability to transmit and receive IP services or transport stream(s) alternatively. In this case the modulator performs the encapsulation of the IP data in XPE or MPE mode.
- The ability to configure Quality of Service (QoS) of the IP traffic, while keeping absolute priority to the ASI streams

When several transport streams and/or IP services are transmitted simultaneously, the Variable Coding and Modulation (VCM) option allows each service or stream to be modulated with its own parameters.

At the output of the modulator, the signal is available on an L-band interface. Extended L-Band, IF band as well as HPA power supply and reference frequency are available as configuration options. When activated, the unique linear and non-linear predistortion option Equalink™ provides an additional link margin improvement of up to 2,5dB.

On the receive side, the AZ410 has a dual L-band input( 950-2150 MHz). The active input is selected by the user and can provide DC power and frequency band selection signals compatible with most professional and commercial LNBs. Optionally, one L-band input can be replaced by an IF (50-180MHz) input. An adaptive equalizer compensates linear distortion of the transmission channel.

The integrated Noise and Distortion Estimator (NoDE) tool provides an accurate reading of the satellite link margin even in presence of non-linear distortion and allows the user to find the optimum input back-off setting very easily for 16APSK or 32APSK operation, whether or not non-linear predistortion is applied.

#### Key features

- DVB-S2 and DVB-DSNG/S compliant
- QPSK, 8PSK, 16APSK and 32APSK
- Data rates up to 216 Mbit/s
- DualFlow: Combined ASI+GbE interfaces
- Integrated IP encapsulator
- Configurable Quality of Service (QoS)
- L-band monitoring output
- Programmable amplitude slope equalizer
- Adaptive Equaliser (demodulator input)
- Noise and Distortion Estimator tool (NoDE)
- Optional Extended L-Band (950 - 2150 MHz)
- Optional Multistream and optional VCM operation
- Optional 10 MHz reference input/output
- Optional Linear and non-linear predistortion (Equalink™)
- Featured-based pricing and software upgradability

#### Main advantages

- Lower operational costs thanks to highest bandwidth efficiency
- Future-proof design combining video and IP technologies
- High versatility and flexibility
- High compactness

#### Applications

- DSNG combined with IP services
- TV Contribution

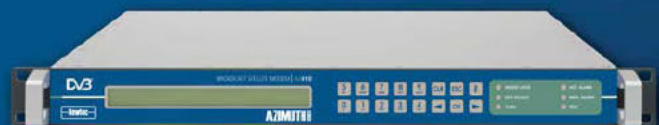
#### Related products

AZ110 Broadcast Satellite Modulator  
AZ910 DSNG and Contribution Demodulator

AZ7x0 Frequency converters  
AZ200 Universal Switching System

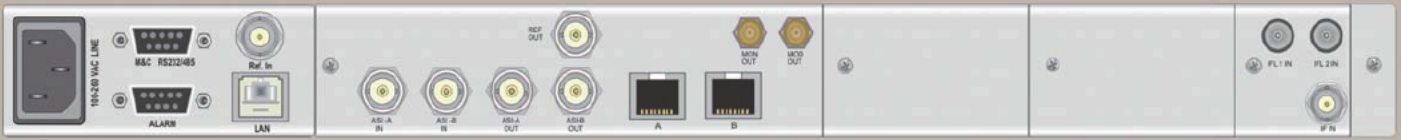
#### Related documents

White Paper Equalink™  
Care Pack Brochure



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# Specifications - AZ410(R7)



## Input/output interface

### DualFlow: Combined ASI + Ethernet

- 2 x ASI input on BNC (F) - 75 ohms (coax)
- 2 x ASI output on BNC (F) - 75 ohms (coax)
- 188 byte mode
- Auto switching 10/100/1000 Base-T Ethernet interface:
  - transport stream on IP interface (UDP/RTP)
  - Ethernet/IP QoS:
    - 4 queue priorities
    - 8 traffic classification rules
    - Configurable queue size
  - Layer 2 bridge mode: Ethernet frames over satellite (data piping)
  - Layer 3 bridge or router mode: IP packets over satellite using Multi Protocol (MPE) or Extended Performance (XPE) Encapsulation
  - Maximum 16 routes/destinations addresses
  - Processing of up to 40 000 IP packets per second - maximum 50 Mbit/s
- DVB-S2 Multistream support
- VCM support (optional)

## Modulation and demodulation

### Supported modulation schemes and FEC

- DVB-S/DSNG:
  - Outer/Inner FEC: Reed Solomon /Viterbi
  - MODCODS:
    - QPSK: 1/2, 2/3, 3/4, 5/6, 7/8
    - 8PSK: 2/3, 5/6, 8/9
    - 16QAM: 3/4, 7/8
- DVB-S2:
  - Outer/Inner FEC: BCH/ LDPC
  - MODCODS:
    - QPSK: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
    - 8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10
    - 16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
    - 32APSK: 3/4, 4/5, 5/6, 8/9, 9/10

### Baud rate range

- |              | mod       | demod         |
|--------------|-----------|---------------|
| • DVB-S2     | 0,05 - 45 | 0,256 - 45/33 |
| • DVB-S/DSNG | 0,05 - 45 | 1 - 45        |

### Frame length

- DVB-S/DSNG 188 bytes
- DVB-S2 Short Frames 16200 bits
- DVB-S2 Normal Frames 64800 bits

### Roll-off factor

- 20% - 25% - 35%

## Modulator interface

### L-band output (default):

- Connector SMA (F), 50 ohms
- Return loss > 14 dB
- Level -35/+5 dBm (+/- 2 dB)
- Frequency 950 - 1750 MHz (50 Hz steps)
- spurious: better than -65 dBc/4 kHz @ +5 dBm level and > 256 kbaud

### Extended L-band output (optional)

- Connector SMA (F), 50 ohms
- Return loss > 14 dB
- Level -35/+5 dBm (+/- 2dB)
- Frequency 950 - 2150 MHz (50 Hz steps)
- spurious: better than -65 dBc/4 kHz @ +5 dBm level and > 256 kbaud

### IF-band (optional)

- Connector BNC (F) - 75 ohms (intermateable with 50 ohms)
- Return loss 50 ohms: > 14 dB  
75 ohms: > 20 dB
- Frequency 50 - 180 MHz (50 Hz steps)
- Level -30/+5 dBm (± 3 dB)
- spurious: better than -65 dBc/4 kHz @ -10 dBm level and > 256 kbaud

### L-band monitoring output (default)

- Connector SMA (F), 50 ohms
- Return loss > 7 dB
- Frequency default: identical to L-band output with option AA-02: 1080 MHz
- Level -45 dBm

### BUc power and reference frequency (optional)

- Max. current 1,5 A
- Voltage 24V
- Frequency 10MHz
- Stability ±5x10<sup>-8</sup> over 0°C to 65°C

### 10 MHz reference input / output (optional)

- Connector BNC (F) - 50 ohms
- Input level -3dbm up to 7dBm
- Output level +7dBm

## Demodulator interface

### Dual L-band input (default)

- Connector 2 x F-type (F), 75 ohms
- Return loss > 7 dB
- Frequency 950 - 2150 MHz
- Level -65/-25dBm
- Adjacent signal < (Co+7) dBm/Hz with Co = signal level density

### IF-band input (optional, replaces one L-band input)

- Connector BNC (F) - 75 ohms
- Return loss > 15 dB
- Frequency 50 - 180 MHz
- Level -55 to -15 dBm
- Adjacent signal < (Co+7) dBm/Hz with Co = signal level density

### LNB power and control

- Max. current 350 mA (on selected IFL input)
- Voltage 11,5 - 14V (Vertical polarization)  
16 - 19V (Horizontal polarization) & selection according to universal LNB for Astra satellites )
- 10 MHz reference

DVB-S2 performances at PER 1E-5

Config	Short Frames		Normal Frames
	< 15 Mbaud	< 45 Mbaud	
QPSK-1/3	-0,6	-0,7	
QPSK-2/5	0,4	0,2	
QPSK-1/2	1	1,4	
QPSK-3/5	3,1	2,8	
QPSK-2/3	3,8	3,6	
QPSK-3/4	4,5	4,3	
QPSK-4/5	5,1	5,1	
QPSK-5/6	5,8	5,5	
QPSK-8/9	6,7	6,6	
QPSK-9/10	-	6,7	
8PSK-3/5	6,5	6,3	
8PSK-2/3	7,4	7,1	
8PSK-3/4	8,6	8,4	
8PSK-5/6	10,2	9,7	
8PSK-8/9	11,4	11,1	
8PSK-9/10	-	11,3	
16APSK-2/3	9,9	9,6	
16APSK-3/4	10,9	10,5	
16APSK-4/5	11,6	11,5	
16APSK-5/6	12,4	12,1	
16APSK-8/9	13,6	13,3	
16APSK-9/10	-	13,6	
32APSK-3/4	-	13,6	
32APSK-4/5	-	14,5	
32APSK-5/6	-	14,9	
32APSK-8/9	-	16,1	
32APSK-9/10	-	16,5	

DVB DSNG/S performances at BER 1E-7 after RS

Config	< 20 Mbaud		> 20 Mbaud	
	Eb/No	Eb/No	Eb/No	Eb/No
QPSK-1/2	3,9	3,9		
QPSK-2/3	4,4	4,5		
QPSK-3/4	4,9	5,1		
QPSK-5/6	5,4	5,8		
QPSK-7/8	5,8	6,4		
8PSK-2/3	6,3	6,5		
8PSK-5/6	8,3	8,8		
8PSK-8/9	8,8	9,8		
16QAM-3/4	8,4	8,6		
16QAM-7/8	10,1	11,1		

## Internal Reference frequency

- High Stability (optional)
  - Stability ±5x10<sup>-8</sup> over 0°C to 70°C
  - Ageing: ± 15 ppb/day
  - ± 300 ppb/year
- Very High Stability (optional)
  - Stability ±2x10<sup>-9</sup> over 0°C to 65°C
  - Ageing: ± 0,5 ppb/day
  - ± 500 ppb/10 year

## Generic

### Monitor and control interfaces

- Web server GUI (HTTP) via web browser
- Diagnostics report, alarm log (HTTP)
- RMCP over TCP-IP/UDP and RS232/RS485
- SNMP v.2c/MIB

## Alarm interface

- Electrical dual contact closure alarm contacts
- Connector 9-pin sub-D (F)
- Logical interface and general device alarm

## Physical

- 1RU, width: 19", depth 51 cm, 6 kg
- Power supply: 90-130 & 180-260 Vac, 105 VA, 47-63 Hz
- Temperature
  - Operational: 0°C to 40°C
  - Storage: -40 to +70°C
- Humidity: 5% to 85% non-condensing
- CE label

## Ordering information

AZ 410 Broadcast Satellite Modem		Order n°	
<b>Default Configuration</b>			
DVB modem with Dualflow, ASI+Ethernet data interface, L-band (950-2150 MHz) input, SNMP Modulation & Baud rate Modulator: DVB-S Q/8PSK, DVB-S2 Q/8PSK, 5Mbaud Modulation & Baud rate Demodulator: DVB-S Q/8PSK, DVB-S2 Q/8PSK, 45Mbaud Output interface Modulator : L-band (950-1750 MHz)		AZ410	
<b>Configuration options</b>			
Category Max. 1 option per category			
Input interface Demod	L-band (950-2150 MHz)	Default	
	L-band + 10 MHz	AJ-02	
	IF + L-band (only with IF mod output)	AJ-03	
Output interface Mod	L-band (950-1750 MHz)	Default	
	IF (50-180 MHz)	AA-02	
	L-band + 10MHz for BUC	AA-03	
	L-band + 10MHz + 24Vdc for BUC	AA-04	
	Extended L-band (950-2150 MHz)	AA-18	
Modulation & Baud rate Modulator	DVB-S/S2 Q/8PSK 5Mbaud	Default	
	DVB-S/S2 Q/8PSK 15Mbaud *	AB-06	
	DVB-S/S2 Q/8PSK 30Mbaud *	AB-07	
	DVB-S/S2 Q/8PSK 45Mbaud *	AB-08	
	DVB-S/S2 Q/8PSK, 16QAM, 16APSK 5Mbaud *	AB-09	
	DVB-S/S2 Q/8PSK, 16QAM, 16APSK 15Mbaud *	AB-10	
	DVB-S/S2 Q/8PSK, 16QAM, 16APSK 30Mbaud *	AB-11	
	DVB-S/S2 Q/8PSK, 16QAM, 16APSK 45Mbaud *	AB-12	
	DVB-S/S2 Q/8PSK, 16QAM, 16/32APSK 5Mbaud *	AB-13	
	DVB-S/S2 Q/8PSK, 16QAM, 16/32APSK 15Mbaud *	AB-14	
	DVB-S/S2 Q/8PSK, 16QAM, 16/32APSK 30Mbaud *	AB-15	
	DVB-S/S2 Q/8PSK, 16QAM, 16/32APSK 45Mbaud *	AB-16	
	Modulation & Baud rate Demodulator	DVB-S/S2 Q/8PSK 45Mbaud	Default
		DVB-S/S2 Q/8PSK, 16QAM, 16APSK 45Mbaud *	AL-12
		DVB-S/S2 Q/8PSK, 16QAM, 16/32APSK 45/33Mbaud *	AL-16
	<b>Additional options</b>		
Category Max. 1 option per category			
10MHz reference In/Out	High stability	GR-01	
	Very high stability	GR-02	
Predistortion	Equalink *	AC-01	
Coding & Modulation mode	VCM*	AO-02	
<b>Services</b>			
Category			
Assistance	Care Pack Basic	GA-06	
	Care Pack Extended	GA-07	

(\*) upgradeable via license key