

# 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.

To protect the satellite transmission, the AES option can be activated. AES allows to encrypt/decrypt with a high security level the content of all DVB-S2 streams. When activated, the per stream mode allows to encrypt/decrypt up to four S2 streams with individual keys.

At the output of the modulator, the signal is available on an L-band interface. Extended L-Band, IF band as well as BUC 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 .

Clean Channel Technology™ is available on the modulator as an option. Clean Channel Technology™ further improves satellite efficiency by up to 15% compared to the current DVB-S2 standard. Newtec's customers will be able to immediately benefit from Clean Channel Technology, as it is available as a software field upgrade for existing Newtec equipment.

#### 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 switchable BUC power supply on L-band output
- Optional Multistream and optional VCM operation
- Optional AES encryption/decryption
- Optional 10 MHz reference input/output
- Optional Linear and non-linear predistortion (Equalink™)
- Featured-based pricing and software upgradability
- Optional Clean Channel Technology™

#### 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  
AZ2xx Universal Switching System

#### Related documents

White paper Equalink®  
Care Pack Brochure



SHAPING THE FUTURE OF SATELLITE COMMUNICATIONS

[www.newtec.eu](http://www.newtec.eu)

Rev. 7/03.2012

# Specifications – AZ410(R9)



## 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)
- AES 64 bit encryption/decryption (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%

### Clean Channel Technology™

- Roll-Off: 5%-10%-15%-20%-25%-35%
- Optimum carrier spacing
- Advanced filter technology

## Modulator interface

### L-band output (default):

- Connector SMA (F), 50 ohms  
N(F), 50 ohms with option AA-12 and AA-13
- 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  
-45 dBm
- Level

### BUC power and reference frequency (optional)

- Max. current 3A
- Voltage 24V, 48V
- Frequency 10MHz
- Stability ±5x10-8 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 450 mA (on selected IFL input)
- Voltage 11,5 -14V (Vertical polarization)  
16 -19V (Horizontal polarization) & additional 22 kHz +/- 4KHz (band 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	Es/No	Es/No
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	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 ±5x10-8 over 0°C to 70°C  
Ageing: ± 15 ppb/day  
± 300 ppb/year
- Very High Stability (optional)  
Stability ±2x10-9 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 AZ410 Modulation & baud rate demodulator: DVB-S Q/8PSK, DVB-S2 Q/8PSK, 45 Mbaud Output interface Modulator: L-band (950 - 1750 MHz)	AZ410

### Configuration options

Category	Max. 1 option per category	Default
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-12
	L-band + 10MHz + 48Vdc for BUC	AA-13
Modulation & Baud rate Modulator	Extended L-band (950-2150 MHz)	AA-18
	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
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

### Additional options

Category	Max. 1 option per category	
10MHz reference In/Out	High stability	GR-01
	Very high stability	GR-02
Clean Channel Technology™	Clean Channel Technology for 5 Mbaud* AI-01	AI-01
	Clean Channel Technology for 15 Mbaud* AI-02	AI-02
	Clean Channel Technology for 30 Mbaud* AI-03	AI-03
	Clean Channel Technology for 45 Mbaud* AI-04	AI-04
Predistortion	Equalink *	AC-01
Coding & Modulation mode	VCM*	AQ-02
Security	AES 64 bit encryption/decryption*	AD-01

### Services

Category		
Assistance	Care Pack Basic	GA-06
	Care Pack Extended	GA-07

(\* upgradeable via license key)

### Europe

Tel: +32 3 780 65 00  
Fax: +32 3 780 65 49

### North-America

Tel: +1 203 323-0042  
Fax: +1 203 323-8406

### South-America

Tel: +55 11 2092 6220  
Fax: +55 11 2093 3756

### Asia-Pacific

Tel: +65 6777 22 08  
Fax: +65 6777 08 87

### China

Tel: +86 10-823 18 730  
Fax: +86 10-823 18 731

### MENA

Tel: +971 4 390 18 78  
Fax: +971 4 368 67 68