



Introduction

Advantech's **AMT 70** Universal modem is a versatile and effective solution for any environment. The AMT70 can provide full open network satellite interoperability, through compliance with IESS-308/9/10/and 15, or can be used in closed network mode providing effective solution with speeds ranging from 16kbps to 140Mbps.

The AMT-70 Series modems is designed using "Software Defined Radio" techniques to ensure unrivalled flexibility, and upgrade paths to meet the increasingly demanding requirements now and in the future.

Features

- Available as Modulator or Demodulator only options
- Forward Error Correction (FEC) choices compliant with IESS 308/309/310/315 (Viterbi, Reed-Solomon, Pragmatic Trellis Code Modulation (PTCM) and enhanced Turbo Product Code (eTPC).
- First eTPC Turbo code to 140Mbps (data Rates 16kbps to 140Mbps in 1bps steps)
- Symbol Rates 16ksp to 40Msp
- Software Upgrade (soft key)
- Excellent spurious performance
- L Band: 950 to 1750 MHZ IF ranges
- L Band+: 950 to 2000 Mhz IF ranges
- 70+/-18Mhz or 140+/-36Mhz IF ranges
- Wide range of Network Interface Cards (NIC):
 - EIA530/RS422
 - HSSI
 - 10/100Mbps Ethernet (IP routing or bridging support)
 - G.703 interfaces
 - Multi G703 interfaces
 - Intermediate Data Rate (IDR)
 - Intelsat Business Services (IBS)
- 1:1 and 1:10 redundancy switches available.
- Monitoring and control via Ethernet using Web Server, HTTP, Telnet or SNMP, or via terminal mode RS232.

Forward Error Correction (FEC)

The AMT70 provides traditional FEC methods based on Viterbi and Reed Solomon, to improve the performance in satellite conditions. Optionally, the AMT70 provides enhanced Turbo Product Code (eTPC) providing superior error detection and correction as well as offers gains up to 3.0 dB Eb/No @10⁻⁷ BER over previous generation of concatenated Viterbi and Reed-Solomon.

FEC options are available as "soft keys" so every modem is eTPC ready, eliminating the cumbersome prospect of dealing with hardware upgrades in the field.

- eTPC Rates from 0.5 to 0.92 with all modulation types

Advanced Modulation modes

The AMT70 provides supports BPSK, QPSK, OQPSK, 8PSK, and 16QAM modulation types. Again, modulation options are all "soft key" controlled allowing modem capability to upgraded in the field without cumbersome hardware or firmware changes.

Performance

The AMT70 performance gain realized by the combination of advanced modulation and FEC can be translated directly into higher data throughput, reduced antenna size or reduced satellite bandwidth, which significantly reduces transponder costs; provides more link margin or decrease antenna cost.

Coupled with wide range of NIC, the AMT70 can perform virtually any function under any environment.

The AMT70. Versatile. Effective. Affordable.

Interface options

EIA530/RS422: traditional interfaces supporting mixed traffic loads. Can either be transported transparently or can interface and interoperate with Frame relay or HDLC.

HSSI: High-Speed Serial Interface (HSSI) is a serial interface that supports transmission rates up to 52 mbps. It is traditionally used to connect routers on local area networks over VSAT or over wide area networks (WAN).

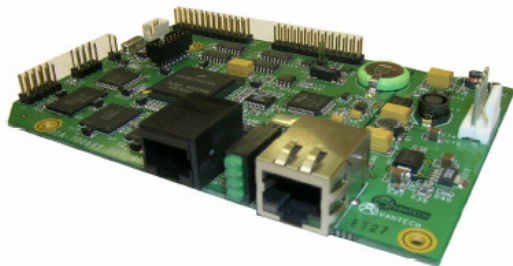
10/100Mbps Ethernet (IP router/Bridge): A powerful IP router/Bridge interface supporting numerous IP connectivity options:

IP options:

- Static and Dynamic IP routing (RIPv1&2)
- DHCP Server
- Network Address Translation
- Packet Filtering (Firewall)
- Quality of Service support to Level 3
- Command line interface (Industry Standard)
- SNMP v.1 & v.3, MIB II
- DHCP Server
- DNS Client
- FTP/TFTP Client
- AAA (Authentication, Authorisation & Accounting)
- Local AAA (Access Rights Table)
- PAP, CHAP, MS-CHAP (Client/Server Authentication)
- RADIUS, TACACS+ (Client, Remote server authentication)
- Ping, Traceroute, Discovery Protocol
- IP, TCP, UDP, ICMP Protocol Statistics
- Interface Statistics
- IPSec (up to 256bit AES)

Bridging options:

- Spanning Tree Protocol (STP)
- Rapid STP (RSTP)
- MAC filtering



G.703 interfaces (IBS/IDR)

A powerful interface card providing both 10/100BaseT Ethernet (IP Gateway) and up to eight E1/T1 G703 interfaces. The versatility and capabilities provided by the interfaces make the TG ideal for applications such as Cellular backhaul, point-to-point and point-to-multipoint transmission for voice, video and data services.

This interface allows for the deployment of a single G.703 interface respecting IBS/IDR or can operate in closed networks mode to provide up to 8 G.703 interfaces and IP together over an optimized framing format (Advanced Packet over Carrier – APOC).

Available options include the following:

- Option 1: Default 1 G.703 support (APOC)
- Option 2: 1 G.703 + IP/Bridge support
- Option 3: 1 G.703 with IBS/IDR (IBS/IDR support is limited to a single G703 interface)
- Option 4: 2 G.703 support (APOC)
- Option 5: 2 G.703 + IP/Bridge support (APOC)
- Option 6: 3 G.703 support (APOC)
- Option 7: 3 G.703 + IP/Bridge support (APOC)
- Option 8: 4 G.703 + IP/Bridge support (APOC)
- Option 9: 8 G.703 + IP/Bridge support (APOC)

Advantech Redundancy Modules:

ARM-71x: 1:1 redundancy for EIA530 or HSSI and IF.

ARM-72x: 1:1 redundancy supporting 8 G703 and IP and IF.

ARM-81x: 1:10 redundancy for EI530 or HSSI.

ARM-82x: 1:4 redundancy for octal G703/IP.

AMT 70 Series Universal Modem



DESCRIPTION	SPECIFICATION		
PERFORMANCE SPECIFICATIONS			
Data Rate	16 kbps to 140 Mbps	Rates Options	16kbps to 10Mbps 16kbps to 20Mbps 16kbps to 52Mbps 16kbps to 140Mbps
Symbol Rate	16 ksps to 40 Msps		
Data Interfaces	RS-530/422	Optional 10/100BaseT IP Gateway	Optional G.703 Optional Octal G.703 Optional ASI Optional HSSI or Triple HSSI
Scrambling, Descrambling	IESS-308; IESS-309; IESS-310, DVB (and no scrambling for BPSK, QPSK and OQPSK)		
Data Connectors	25-pin D connector for RS-530/422 Interface; 15-pin D (f) connector, 120 Ohm balanced for G.703 Interface BNC (f), 75 Ohms for ASI, G.703 unbalanced, or DS-3 per ANSI T1.404 50-pin SCSI-2 type connector for HSSI and RJ-45 for Ethernet option		
Monitoring and Control (M&C) Interface	External M&C Interface:	RS-232 Terminal mode, RS-485 Packet mode, 10/100BaseT for Web Server, SNMP, Telnet or HTTP	
	Configuration Parameter Storage:	NVRAM	
MODULATOR SPECIFICATIONS			
Data Rates	Viterbi with Reed Solomon		
	BPSK: 16 kbps to 36 Mbps	QPSK:	16 kbps to 70 Mbps
	Enhanced Turbo Product Code		
	BPSK: 16 kbps to 36 Mbps	8PSK:	128 kbps to 110 Mbps
	QPSK: 64 kbps to 73 Mbps	16QAM:	128 kbps to 140 Mbps
	OQPSK: 64 kbps to 72 Mbps		
Modulator Roll-Off Factor	12% to 35% in 1% steps		
Forward Error Correction (FEC) Code Rates	Rate $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{7}{8}$ Viterbi encoding with K=7 Selectable Reed-Solomon outer codec based on IESS 308/309/310 standards Or Enhanced Turbo code rate from 0.5 to 0.92 (interoperable at $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{7}{8}$ rates) Or DVB-S/DVB-DSNG Coding		
IF Output Connector	Type N (f) 50 Ohms for L band, BNC (f) for 70/140 MHz Impedance: 50 Ohms; Return Loss: ≥ 12 dB		
RF Output Frequency	L Band: 950-1750 MHz variable in 1Hz steps Optional: 950-2000 MHz variable in 1Hz steps IF Band 70 +/-18 MHz or 950-2000MHz 140 +/-36 MHz or 950-2000MHz		
RF Output Power	Range: +0 to -25 dBm, adjustable in 0.10 dB increments Accuracy: ± 0.5 dB; Temp Stability: ± 0.25 dB		
BUC Reference Frequency and Stability	Frequency: 10 MHz, 0 dBm, +2 dB Stability: 1×10^{-9} /per day; 1×10^{-7} long term, no frequency/phase hits for external ref.		
BUC 10 MHz Reference Frequency Phase Noise	Phase Noise (1 Hz bandwidth) -115 dBc/Hz maximum @ 10 Hz -135 dBc/Hz maximum @ 100 Hz; -148 dBc/Hz maximum @ 1 kHz		-150 dBc/Hz maximum @ 10 kHz -160 dBc/Hz maximum @ 100 kHz
Eb/No Performance, Viterbi 1×10^{-4} 1×10^{-7}	<u>$\frac{1}{2}$ Rate</u>	<u>$\frac{3}{4}$ Rate</u>	<u>$\frac{7}{8}$ Rate</u>
	5.1 dB 6.8 dB	6.3 dB 8.4 dB	7.4 dB 9.4 dB
Eb/No Performance, Viterbi + R/S (QPSK) 1×10^{-5} 1×10^{-6} 1×10^{-7} 1×10^{-8}	<u>$\frac{1}{2}$ Rate</u>	<u>$\frac{3}{4}$ Rate</u>	<u>$\frac{7}{8}$ Rate</u>
	4.1 dB 4.3 dB 4.4 dB 4.6 dB	5.5 dB 5.7 dB 5.9 dB 6.2 dB	6.5 dB 6.7 dB 6.9 dB 7.1 dB
	<u>$\frac{3}{4}$ Rate</u>	<u>0.87 Rate</u>	<u>0.92 Rate</u>
	3.7 dB 3.8 dB 4.0 dB 4.1 dB	4.4 dB 4.5 dB 4.6 dB 4.6 dB	5.4 dB 5.5 dB 5.6 dB 5.7 dB
Eb/No Performance, eTPC (8PSK@20Mb) 1×10^{-8}	<u>0.79 Rate</u>	<u>0.87 Rate</u>	<u>0.92 Rate</u>
	7.1 dB	7.3 dB	8.8 dB
Eb/No Performance, eTPC (16QAM@20Mb) 1×10^{-8}			

AMT 70 Series

Universal Modem



DEMODULATOR SPECIFICATIONS

IF Input Frequency	L band 950-2150 MHz, variable in 100 Hz steps	
Demodulator Roll-Off Factor	25% or 35%	
Front-End BPF	Tuneable Filter:	950 MHz < f _o < 2150 MHz;
	Flatness:	< 0.8 dB in any 54 MHz bandwidth;
	Power at Input:	< 0 dBm
Nominal Input Level	-45 dBm - 10log(400/R) dBm, where R = Symbol Rate in kSymbols	
AGC Range	+20 dB	
Maximum Input Signal Level	±10 dBm	
IF Input Connector	Type F (f) for L Band	
	Impedance:	75 Ohms;
	Option: Type BNC (f) for 70/140MHz	50 Ohms
	Return Loss:	> 10 dB;
	LNB Alarm for Short Circuit	-
Noise Figure	9 dB typical, 12 dB at maximum AGC gain	
LNB Power Supply Output and Control	Selectable LNB Supply Voltage:	ON/OFF, 18 VDC (Horizontal Pol.) or 13 VDC (Vertical Pol.)
	LNB Control:	22 +4 kHz single tone burst, amplitude = 0.6 +0.2 V p-p
Symbol Rate Acquisition Range	+200 ppm	
Synchronization and Acquisition Time	Depends on data rate, frequency uncertainty, and operating Eb/No. Following is a sample: Average Acquisition Time: <10.0 sec, 32 kbps @ +/-30 kHz sweep range	

INTERFACE SPECIFICATIONS

Data Interface

	25-pin D connector for RS-530/422 Interface;	
	15-pin D (f) connector, 120 Ohm balanced for G.703 Interface	
	BNC (f), 75 Ohms for ASI, G.703 unbalanced, or DS-3 per ANSI T1.404	
	50-pin SCSI-2 type connector for HSSI and RJ-45 for Ethernet option	
Receiver/Transmitter ASI Interface	Encoded Line Rate:	270 Mbps +100 ppm
	Min. Sensitivity (D21.5 idle pattern):	200 mV
	Max. Input Voltage:	880 mV p-p
	Min. Discrete Connector Return Loss:	15 dB
	Max. Distance:	150 Meters
Multiple G.703	Encoded Line Rate:	n x 2048 kbps (with Fractional E1) +102.4 bits/s (+50 ppm)
	Line Coding:	HDB3
	Digital Interface:	Balanced or Unbalanced

PHYSICAL AND POWER SPECIFICATIONS

Dimensions	Standalone or rack-mountable	1U Rack or 1U EIA chassis
	Height:	4.4 cm (1.75")
	Width:	48.26 with mounting ears or 43.2 cm without (19" or 17")
	Depth:	40.0 cm (15.75")
	Weight:	8 lb (3.7 kg) maximum
Power, AC	Power Supply Voltage	90 – 264 VAC, 50/60 Hz
Power, DC (Option)	DC Power:	-48 VDC (32 to 72 VDC)
	Power Consumption:	50 Watts not including BUC power supply
	BUC Power Supply:	24 VDC @ 4.0 A, 48 VDC @ 2.3 or 4.0 A

ENVIRONMENTAL SPECIFICATIONS

Environmental	Operating Temperature:	0°C to 45°C (32°F to 122°F)
	Storage Temperature:	-25°C to 85°C (-13°F to 185°F)
	Relative Humidity:	Operating: Up to 90% non-condensing
		Non-Operating: Up to 95% non-condensing
	Altitude:	Operating: Up to 10,000' (3,045 M)
		During Transit: Up to 40,000' (12,180 M)



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