

# Hughes HX200 Broadband Satellite Router



## High-performance IP satellite router for specialized markets

The HX200 is a high-performance satellite router designed to provide carrier-grade IP services using dynamically assigned high-bandwidth satellite IP connectivity. The HX200 satellite router provides flexible Quality of Service (QoS) features that can be tailored to the network applications at each individual remote router, such as Adaptive Constant Bit Rate (CBR) bandwidth assignment to deliver high-quality, low jitter bandwidth for real-time traffic such as Voice over IP (VoIP) or videoconferencing. With integrated IP features including RIPv1, RIPv2, BGP, DHCP, NAT/PAT, and DNS Server/Relay functionality, together with a high-performance satellite modem, the HX200 is a full-featured IP Router with an integrated high-performance satellite router. The HX200 enables high-performance IP connectivity for a variety of applications including cellular backhaul, MPLS extension services, virtual leased line, mobile services and other high-bandwidth solutions.



### HX System Architecture

The HX System provides true IP broadband connectivity via satellite. The HX System is based on a “star” network topology where the outbound channel is DVB-S2 with Adaptive Coding and Modulation (ACM). The return channel of the HX System is FDMA/TDMA using the IPoS standard for broadband over satellite. With a DVB-S/DVB-S2 outbound carrier and transmit rates up to 9.6 Mbps, the HX200 provides the high throughput needed for high QoS networking and meets the demands of specialized applications.

### Target Markets

- Comms on the Move (COTM)
- Satellite on the Move (SOTM)
- Maritime
- Aeronautical
- Land Mobile
- Voice/data broadband IP connections
- Cellular backhaul, SCPC/MCPC replacement links
- MPLS extension services
- Embassy and government networks
- Air traffic control
- Private, leased-line services

Efficiency and flexibility in utilizing satellite bandwidth are at the core of the HX200 design. Each link can be configured to provide a QoS tailored to the requirements of the remote site. This includes adaptive Committed Information Rate (CIR) and Constant Bit Rate (CBR) services that provide guaranteed bandwidth though optimizing use of the bandwidth during periods of idle or light traffic. Remote sites with less stringent bandwidth requirements or service level agreements can be configured for best effort service, thereby allowing service providers to develop a service tailored to their customers' specific requirements. In addition, the HX System bandwidth allocation scheme uses Aloha channels for initial bandwidth assignment which results in very efficient use of space segment. This frees up unused bandwidth and allows an operator to make more efficient use of space segment resources.

### On-The-Move Capabilities

Full Range of Mobility Features	Benefit
Return channel spreading	Enables use of very small antennas
Fast outroute acquisition	Quick recovery from temporary blockages
Automatic beam switching	Enables roaming across multiple satellites
National Marine Electronics Association (NMEA) interface	Interface to mobile antenna control unit
External 10 MHz reference	Accurate antenna tracking
Doppler compensation	Support for high speed On-The-Move terminals

(Note: these features require an optional software license)

The HX System from Hughes, the world leader in broadband satellite networks and services, is designed and optimized for smaller and mobile networks, including maritime and airborne applications, where the provision of high-quality and high-bandwidth links is paramount. Capable of simultaneous mesh, star, and multi-star configurations, the HX System builds upon the capabilities and global success of the high-performance HN System, incorporating many advanced features pioneered by Hughes, including integrated TCP acceleration and advanced IP networking. Its broadband satellite products are based on global standards approved by TIA, ETSI, and ITU, including IPoS/DVB-S2, RSM-A, and GMR-1.

## Features

- Quality of Service features include:
  - Constant Bit Rate (CBR) services
  - Adaptive CBR. Minimum and maximum rates are configurable, as is step size.
  - Committed Information Rate (CIR) with minimum, guaranteed, and maximum rates
  - Best effort with weighted fair queuing
  - Class-based weighted prioritization
  - Multicast data delivery
  - Four levels of IP traffic prioritization
- Bandwidth management
  - Supports both preassigned (static) traffic assignment and dynamic traffic assignment
  - Idle remotes can be configured to release all network resources
- Acts as a local router providing:
  - Static and dynamic addressing
  - DHCP server or relay
  - DNS caching
  - RIPV1, RIPV2, BGP routing support
  - Multicasts to and from the LAN by using IGMP
  - NAT/PAT
  - VRRP
  - VLAN tagging
  - Firewall capability with integrated access control lists
- Supports unicast and multicast IP traffic
- Software and configuration updates via download from the HX Gateway
- Implements dynamic, self-tuning Performance Enhancement Proxy (PEP) software to accelerate the throughput performance by optimizing the TCP transmission over the satellite, delivering superior user experience and link efficiency
- Bidirectional data compression
- IPSec encryption (optional)
- Configuration, status monitoring, and commissioning via the HX ExpertNMS™
- Embedded Web interface for local status and troubleshooting
- User-friendly LED display indicating terminal operational status
- Closed loop control between hub and remote
- Dynamic outbound coding and modulation changes based on received signal
- Dynamic inbound coding changes based on received signal
- Dynamic remote uplink power control
- IPV6 ready

## Technical Specifications

### Physical Interfaces

Two 10/100BaseT Ethernet LAN RJ45 ports (independent subnets)  
 One Serial Port (RS-422 or RS-232) used for antenna control  
 One BNC interface for external 10 MHz reference

### Satellite Specifications

Frequency	C-, Extended C-, X-, Ku-, Ka-band
DVB-S2 ACM Channel	DVB-S2 with Adaptive Coding and Modulation or DVB-S
DVB-S2 ACM Rate	1–45 Msps (in 0.5 Msps steps)
DVB-S2 ACM Modulation	QPSK, 8PSK, 16APSK (Adaptive Modulation)
DVB-S2 ACM Coding	BCH with LDPC 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 (Adaptive Coding)
FDMA/TDMA (IPoS) Channel Rate	256 to 6144 kbps (256 kbps to 9.6 Mbps)
FDMA/TDMA (IPoS) Channel Modulation	OQPSK
FDMA/TDMA (IPoS) Channel Coding Rate	Adaptive Coding 1/2, 2/3, 4/5 with TurboCode 1/2, 2/3, 4/5 and 9/10 with LDPC
Error Rate (Receive):	Quasi Error Free
Error Rate (Transmit):	10 <sup>-5</sup> PLR (equivalent to 10 <sup>-7</sup> or better)
Interface to ODU	Industry standard BUC (L-Band) or Hughes saturated carrier BUC

### Performance

Packets per second	5,000
UDP throughput	45 Mbps
TCP throughput	15 Mbps
Multicast throughput	60 Mbps

### HX200 Mechanical and Environmental

1U rack mount unit for 19" rack	
Weight	5.5 lbs (2.5 kg)
Dimensions	19"W x 1.75"H x 14"D (48.26cm W x 4.45cm H 35.6cm D)
Operating Temperature:	32° F (0° C) to 122° F (50° C)

## Optimizing the Return Channel with LDPC

OQPSK with LDPC coding provides exceptional performance:

- Spectral efficiency is similar when comparing Rate 9/10 versus 8PSK Rate 2/3
- OQPSK is less susceptible to noise
- Lower power BUC requirements
- 8PSK requires larger burst size for coding gain

Overall, LDPC provides superior performance.

For additional information, please contact us at [globalsales@hughes.com](mailto:globalsales@hughes.com) or visit our Website at [www.hughes.com](http://www.hughes.com).

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