

High-quality broadband for smaller networks

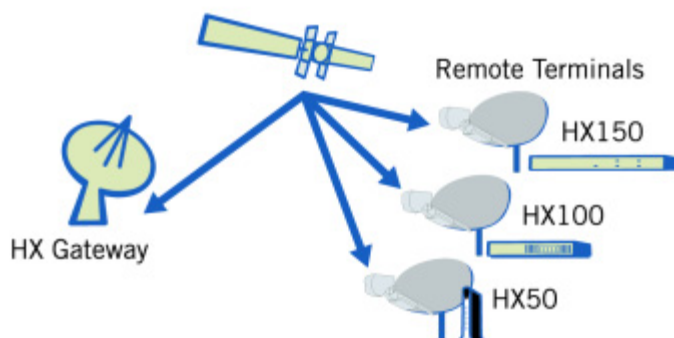
Designed and optimized for small- to medium-size networks where high Quality of Service (QoS) is of utmost importance, the Hughes HX System brings to the market a satellite broadband system with an economical gateway earth station and high-performance remote terminals. Key to the HX System is the ability to provide dynamic allocation of bandwidth to economically support such QoS features as Minimum Committed Information Rates (CIRs) with Maximum Rates. Remote links that are idle can be configured to de-allocate their network bandwidth for reuse by other links.

HX System Architecture

The HX System provides star TDM/TDMA connectivity comprising a central gateway connected to multiple HX remote terminals. With a DVB-S/DVB-S2 outbound carrier supporting rates up to 121 Mbps (DVB-S2) and multiple inbound carriers supporting rates up to 3.2 Mbps, the HX System provides the high throughput needed for high QoS networking. And with the Adaptive Coding and Modulation (ACM) feature of DVB-S2, the HX system provides unmatched efficiency and availability.

Efficiency and flexibility in utilizing satellite bandwidth are the core of its design. Each link can be configured to provide a QoS tailored for the individual remote terminal. And each remote link can be independently configured with unique CIRs, thereby allowing a service provider to develop a service tailored to its customers' specific requirements. In addition, the HX System bandwidth allocation scheme uses an Aloha channel for initial traffic requests, which means that remote terminals can be configured to de-allocate bandwidth based on inactivity. This frees up unused bandwidth and allows an operator to make more efficient use of space segment resources.

Because the HX System is DVB-S conformant, the HX System can easily be multiplexed to an existing DVB outbound carrier such as the Hughes HN System, DTH system, or other DVB-based broadband systems.



HX Gateway Features

- Compact economical 26U design, which utilizes highly modular design, provides scalability, and enables rapid deployment
- Intelligent, protocol-sensitive bandwidth assignment for optimum performance and efficiency for each application
- Dynamically assigned inroute CIRs per remote or group of remote terminals
- Efficiently engineered IP transport that supports data as well as real-time applications with equal ease
- Unique network security with bi-directional encryption and conditional access
- Comprehensive, yet simple to use, network management system that configures and manages both the gateway and the remote terminals
- Active redundancy for all critical components ensuring high availability

Target Markets

- SCPC/MCPC replacement links
- GSM backhaul
- MPLS extension services
- Embassy and government networks
- Private leased-line services



HUGHES, the world leader in satellite networking, has introduced the HX System, designed and optimized for small networks where the provision of high-quality and high-bandwidth links is the most important criterion. Building upon the heritage and capabilities of the more than 700,000 broadband satellite terminals shipped by Hughes, the HX System incorporates many of the advanced features pioneered by Hughes including integrated TCP acceleration and advanced IP networking features.

Features

Traffic Management Capabilities

- Constant bit rate services
- Minimum CIR with fixed steps to maximum rate (Rate limiting)
- Minimum CIR with best effort to maximum rate (Rate limiting)
- Best effort services—weighted fair queueing
- Class-based weighted prioritization
- Multicast data delivery
- Four levels of IP traffic prioritization
- Any combination of the above

The IPoS Advantage

The Hughes family of satellite terminals and routers is compliant with the global IPoS (IP over Satellite) standard, the only standard approved by the TIA, ETSI, and ITU standards organizations. IPoS enables Hughes broadband routers/terminals to provide superior inroute performance and efficiency.

- Clearly defined interface conforming to the ETSI SI-SAP standard enables back-end systems to work easily with the Hughes infrastructure
- Truly dynamic bandwidth assignment; remote sites with no traffic are assigned no resources
- Finer inroute granularity allows a lower average burst overhead, thereby increasing efficiency

Integrated Acceleration and IP Features

- Advanced techniques, including TCP spoofing, ACK reduction, and flow control, accelerate TCP traffic using Hughes proprietary Performance Enhancement Proxy (PEP)
- Advanced compression algorithms, including stateful compression, significantly improve compression ratios and resulting throughput
- IP routing features including DNS caching, NAT/PAT, ICMP support, DHCP server and relay, and VLAN tagging at gateway and remote

High Availability Features

- Closed-loop control between hub and remote
- Dynamic outbound coding and modulation changes based on received signal (DVB-S2)
- Dynamic inbound coding changes based on received signal
- Dynamic remote power control

Technical Specifications

■ Outbound Channel

DVB-S or DVB-S2 compliant
 Frequency: C-, Extended C-, Ku-, Ka-band
 Modulation: QPSK/8PSK
 Symbol Rates: 1 to 45 Msps (in steps of 1 Msps)
 Encoding DVB-S: Convolutional with concatenated Reed Solomon; Viterbi $\frac{7}{8}$, $\frac{5}{6}$, $\frac{3}{4}$, $\frac{2}{3}$, or $\frac{1}{2}$
 Encoding DVB-S2: BCH with LDPC $\frac{3}{5}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{8}{9}$, or $\frac{9}{10}$ (8PSK) $\frac{1}{2}$, $\frac{3}{5}$, $\frac{2}{3}$, $\frac{4}{5}$, $\frac{5}{6}$, $\frac{8}{9}$, $\frac{9}{10}$ (QPSK)
 Bit Error Rate: 10^{-10} or better

■ Inbound Channel

FDMA/TDMA
 Transmit modulation: OQPSK
 Transmit encoding: Rate $\frac{1}{2}$, $\frac{2}{3}$, $\frac{4}{5}$ TurboCode, Rate $\frac{1}{2}$ Convolutional
 Transmit bit rates: 128 kbps to 3.2 Mbps

■ Size & Scalability

Base Configuration:
 Single 26U rack
 Supports up to 500 terminals
 Supports up to 16 inbound channels or total inbound aggregate bandwidth of 12.8 Mbps
 Expansion capable via additional equipment rack

■ Security

Integrated Conditional Access and DES encryption of outbound channel
 Optional bi-directional 128 bit AES encryption

■ Network Management Systems

Hughes Vision® NMS

■ Remote Terminals & Appliances Supported

HX50
 HX100
 HX150
 Voice Appliance
 Serial Appliance