HUGHES®
An EchoStar Company

DATASHEET

High-Performance IP Satellite Broadband System

The Hughes HX System is designed and optimized for carrier-grade IP broadband networking and specialized applications such as mobility and mesh networking. The HX System is a broadband satellite system with an economical gateway earth station and high-performance remote terminals.

HX System Architecture

The core component of the HX System is the HX Gateway, which acts as the system master and includes the network management and dynamic bandwidth assignment manager. The HX Gateway uses a DVB-S2 carrier with Adaptive Coding and Modulation (ACM) for the outbound channel received by all HX System remote terminals. HX remote terminals utilize FDMA/TDMA channels to communicate back to the HX Gateway (star mode) or to each other (mesh mode).

The FDMA/TDMA channels of the HX System are highly efficient and are based on the industry-leading standard, Internet Protocol over Satellite (IPoS), which has been endorsed by ETSI, ITU, and TIA. The HX System FDMA/TDMA channels of the HX System support data rates up to 9.8 Mbps.

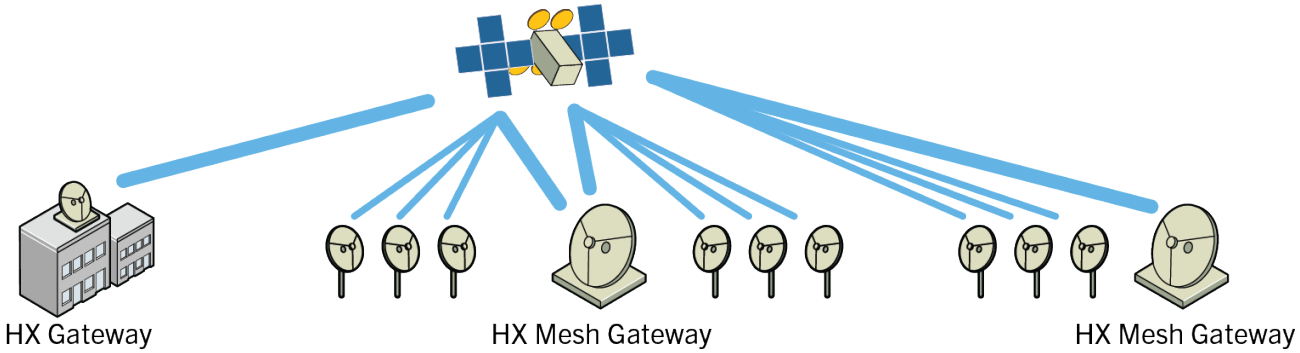
Efficiency and flexibility in utilizing satellite bandwidth are core to the design of the HX System. Each link, in star or mesh mode, can be configured to provide a QoS tailored for an individual remote terminal. And each remote link can be independently configured with unique Commited Information Rates (CIRs), thereby allowing a service provider to develop a service tailored to their customers' specific requirements. In addition, the HX System bandwidth allocation scheme is designed so that idle terminals can be configured to release all bandwidth assignments thus ensuring optimal bandwidth utilization.

Target Markets

- Broadband Internet/Intranet access
- GSM/3G/4G backhaul
- Maritime, air, and ground-based mobile networks
- SCPC/MCPC replacement links
- MPLS extension or replacement services
- Private leased-line services
- Voice/video/data trunking for mesh networks
- Embassy and government secure networks

HX Gateway Features

- Compact hub configuration
- Intelligent, protocol-sensitive bandwidth assignment for optimum performance and efficiency for each application
- Dynamically assigned CIRs per remote or group of remote terminals
- High-performance IP feature set
- End-to-end network security
- Advanced network management capabilities including detailed remote diagnostics
- Active redundancy for all critical components
- Optional mesh controller for supporting single hop remote-to-remote connectivity



Features:

Quality of Service features include:

- On-demand Constant Bit Rate (CBR) services
- Adaptive CBR with Minimum, Maximum, and user- definable step-sizes
- CIR with Minimum, Guaranteed, and Maximum rates
- Backlog-based dynamic stream with weighted fair queuing
- Class-based weighted prioritization
- Multicast data delivery
- Four levels of IP traffic prioritization

Bandwidth allocation

- Supports both preassigned (static) traffic assignment and dynamic traffic assignment
- Idle remotes can release all network resources

Bandwidth optimization

- Integrated TCP spoofing
- TurboPage HTTP acceleration (optional)
- Integrated TCP and UDP compression
- Header compression
- Outbound Adaptive Coding and Modulation
- Inbound Adaptive Inroute Selection

IP routing capability

- IPv4 and IPv6 native support
- 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 (end-to-end)
- Firewall support through integrated access control lists

L-band interface on forward and return channel

Remote terminal management via the Hughes Unified Element Manager and SNMP agent

Backhaul features

- Real-time Bypass - Just-In-Time burst scheduling
- Configurable jitter buffer
- Support for Clock Synchronisation (optional)

On-the-Move features (optional)

- FDMA/TDMA channel spreading
- NEMA interface
- Roaming support
- Doppler compensation
- Fast reacquisition of outbound
- Persistent IP connection

Mesh features (optional)

- Simultaneous star/mesh
- Multichannel mesh receiver at remote
- Mesh TCP and UDP connections
- Mesh Gateway

Technical Specifications

Forward Channel

Standard	DVB-S2 with Adaptive Coding and Modulation
Frequency Bands	Full C, Extended Ku, Ka, X
Modulation	QPSK/8PSK/16APSK
Symbol Rates	1 to 45 Msps (in steps of 0.5 Msps)
DVB-S2 Encoding	LDPC with BCH outer code, ACM capable 1/2, 3/5, 2/3, 3/4, 5/6, 8/9, or 9/10
Bit Error Rate	10^{-10} or better

FDMA/TDMA (IPoS) Return Channel

Modulation	OQPSK
Coding Rates	Adaptive Coding 1/2, 2/3, 4/5 with TurboCode 1/2, 2/3, 4/5 and 9/10 with LDPC
Symbol Rates	256, 512, 1024, 2048, 4096, 6144 ksps
Channel Rate	256 kbps to 9.8 Mbps
TDMA Spreading Factors	x 1, 2, 4, 8 (256 ksps); x 1, 2, 4 (512 ksps); x 1,2 (1024 ksps and 2048 ksps

Size & Scalability

Base Configuration	Single 24U rack
	Supports up to 3,000 terminals
	Supports up to 18 inbound channels
	Expansion of inroutes and remotes via additional components
	Base rack wired for multi-satellite expansion
Optional	45U rack w/ 29 free slots Wired for 2nd uplink & downlink

Security

Standard	Integrated Conditional Access Control (CAC) and DES encryption of outbound channel
Optional	Bidirectional 256 bit AES encryption (optional; subject to local government approval) FIPS 140-2 Level 2 (HX280)

Network Management Systems

Hughes HX ExpertNMS™

Remote Terminals Supported

HX50L, HX90, HX200, HX260, HX280

HX Mesh Gateway Router

The IPoS Advantage

The Hughes family of satellite terminals and routers is compliant with the global IPoS standard, the only standard approved by the TIA, ETSI, and ITU standards organizations. IPoS enables Hughes broadband routers/terminals to provide superior performance and efficiency by providing a clearly defined interface conforming to the ETSI SI-SAP standard. IPoS provides truly dynamic bandwidth assignment—remote sites requiring no traffic capacity are assigned no resources. Finer granularity allows a lower average burst overhead, thereby increasing efficiency.

For more information, please visit www.hughes.com or email globalsales@hughes.com.

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H38158 JUL 22