HN/HX Systems
High-Performance IP Routing

High-performance, full-featured IP routing over satellite

Built on a solid foundation of IP features and functionality, the HN/HX systems are the solutions for satellite routing where full IP functionality is required together with performance. The HN/HX systems provide advanced bandwidth management capabilities, which give operators the ability to custom design various Quality of Service (QoS) and Service Level Agreements (SLAs) on a per-remote basis. As pure IP-based solutions, the HN/HX systems incorporate a strong set of IP functions and features.

IP Protocols

Every HN and HX remote terminal incorporates a full set of unicast and multicast IP protocols, including TCP and UDP and the protocols carried on top of them (HTTP, SSL, RTP, SIP, etc.). The routers also support other IP protocols such as ICMP, IGMPv3, and other commonly required protocols.

Relevant Request for Comments (RFCs) Supported

RFC 791 (IPv4)	RFC 792 (ICMPv4)
RFC 793 (TCP)	RFC 768 (UDP)
RFC 959 (FTP)	RFCs 854/855 (Telnet)
RFC 1112 (IGMPv1)	RFC 2236 (IGMPv2)
RFC 3376 (IGMPv3)	RFC 1661 (PPP)
RFC 2516 (PPoE)	

Routing Protocols

The HN/HX systems enable network interoperability through a wide range of routing protocols, including RIPv2, BGP4, ICMP, and ARP. Each HN/HX terminal can be configured using Policy-Based Routing (PBR) to provide the network connectivity and performance demanded by the user. Features such as VRRP (Virtual Router Redundancy Protocol) allow seamless support for alternate path routing and VLAN tagging provides effective support for management of multiple subnetworks on a common LAN.

Relevant RFCs Supported

RFC 1058 (RIPv1)	RFC 2453 (RIPv2)
RFC 1256 (IRDP)	RFC 3768 (VRRP)
RFCs 1519/4632 (CIDR)	RFCs 1771/1772/4271 (BGP)
RFC 1997 (BGP Communities Attribute)	RFC 2842 (Capabilities Advertisement)
RFC 2385 (BGP use of TCP/MD5)	RFC 2796 (BGP Route Reflection)
RFC 2439 (BGP Route Flap Dampening)	RFC 2918 (BGP Route Refresh Capability)
RFC 4360 (BGP Ext. Communities Attribute)	RFC 3065 (AS Confederations for BGP)

IP Services

The HN and HX routers provide IP services that benefit both enterprise and consumer applications such as flexible addressing with support for Network Address Translation (NAT) and Port Address Translation (PAT). The capability of the HN and HX routers to act as either Dynamic Host Configuration Protocol (DHCP) servers or DHCP relays provides higher performance. Integrated support for Access Control Lists (ACLs) and firewall services further enhances the features and functionality of the HN/HX solutions.

Relevant RFCs Supported

RFC 3022 (NAT)	RFC1939 (E-Mail: POP)
RFC 3501 (E-Mail: IMAP)	RFC 3461 (E-Mail: SMTP)
RFC 2131 (DHCP)	RFC 3046 (DHCP Relay)
RFC 1157 (SNMP)	

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Performance Features

To minimize the effects of satellite latency, the HN/HX systems offer a range of integrated acceleration and QoS features. These features, including prioritization of the IP traffic based on Terms of Service (TOS) or Differentiated Services Code Points (DSCP) values, together with Policy Based Routing rules, provide an easy way to achieve Weighted Fair Queuing for enterprise applications. Integrated TurboPage® is available to provide HTTP acceleration by applying pre-fetch of objects.

Relevant RFCs Supported

RFC 1349 (TOS)	RFC 2474 (DSCP)
RFC 2616 (HTTP)	RFC 2818 (HTTPS)
RFC 3051 (V.44 Compression)	RFC 3095 (Robust Header Compression)

Network Security

User security is a key feature of both the HN and HX systems that is achieved through multiple levels of security. At the transmission level, the HN/HX systems employ DES encryption of the DVB-S2/ACM outbound channel. Integrated with the outbound DES encryption is a conditional access system that ensures that the right router gets the right data and prevents unauthorized "eavesdropping." At the IP level, the HN/HX systems have the option to provide bi-directional IPSec encryption using the Internet Key Exchange (IKE) protocol for dynamic session keying. With the IPSec option, the HN/HX systems are fully FIPS 140-2 certified.

Relevant RFCs Supported

RFC 4302 (IPsec: AH)	RFC 4303 (IPsec: ESP)
RFC 4305 (ESP/AH Crypto Requirements)	RFC 1321 (MD5)
RFC 1829 (DES)	RFC 1851 (3DES)
RFC 2085 (HMAC-MD5)	RFC 2404 (HMAC-SHA-1)
RFC 2409 (IKE)	RFC 3566 (AES-XCBC-MAC-96)
RFC 3686 (AES)	RFCs 4346/4366 (SSL/TLS)

VSAT 343-I APR 08
H37875 ID

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