HUGHES
An EchoStar Company

JUPITER IPv6 Transport Benefits

The world is running out of IPv4 addresses. In fact, in parts of the world, the available pool of IPv4 addresses is exhausted, which means that network operators who remain solely IPv4-based must utilize extensive Network Address Translation (NAT) schemes in order to reuse the limited supply of IPv4 addresses available to them. In turn, this means that these IPv4 addresses are transient and cannot practically be assigned to any particular device on a permanent basis. This is why IPv6 was developed: To bring a vastly larger addressing space and enable virtually any intelligent device in the world to be assigned its own unique address. Clearly, IPv6 is the future of Internet networking.

With this in mind, Hughes has architected the JUPITER™ System on an internal IPv6 transport network. Robust Header Compression (ROHC) is used to cancel out the increase in IP address size. (With ROHC, IPv4 and IPv6 headers compress to the same size.) As illustrated in Figure 1, the gateway and satellite routers utilize a dual IPv4/IPv6 protocol stack at either end of the link enabling the JUPITER system to efficiently and simultaneously (and natively) transport both types of traffic, end-to-end (with ROHC again used to reduce overhead).

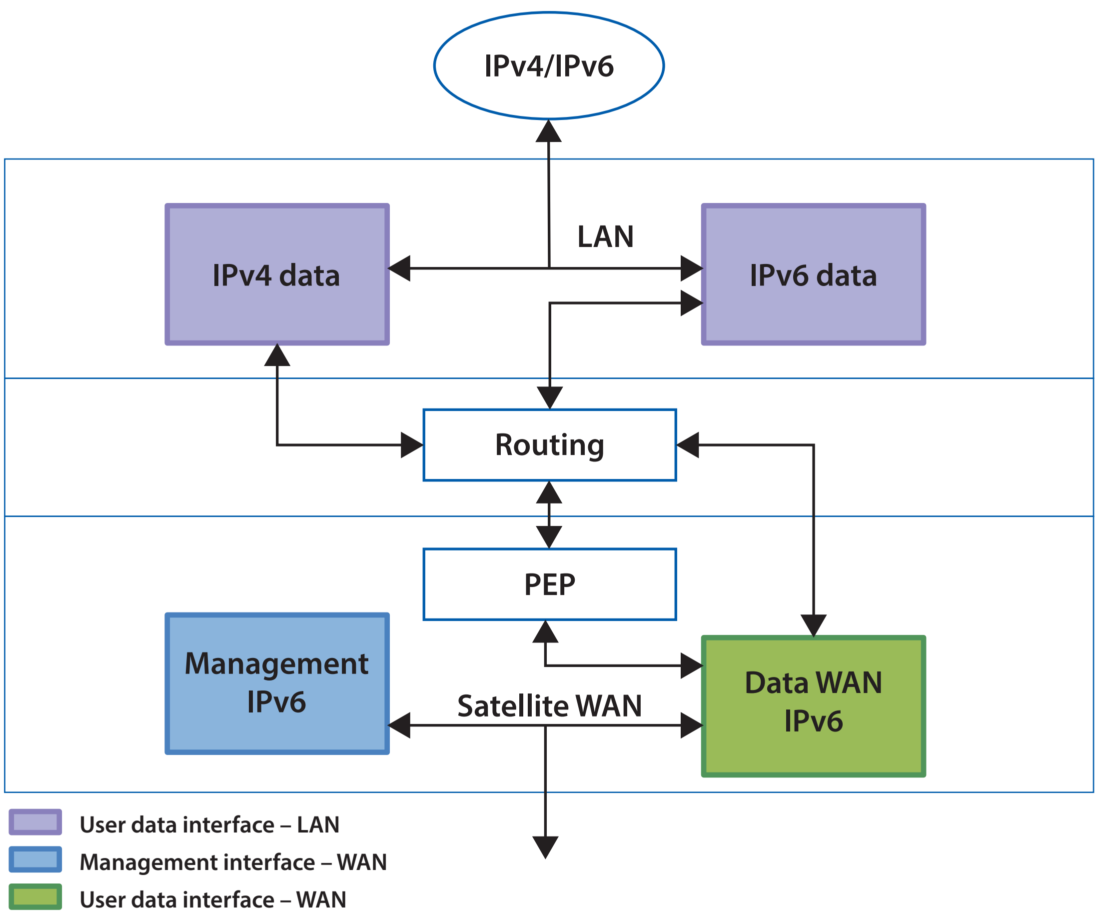

Figure 1 JUPITER IPv4/IPv6 Dual Stack Architecture

Designing the control and management plane of the JUPITER system to be IPv6-based brings significant benefits to network operators, including the following:

Integration with larger networks: As networks grow to thousands of nodes, employing IPv4 addressing for management of these devices becomes extremely complex and requires some form of NAT. Using IPv6 to address and manage the entire network eliminates the need for NAT and greatly simplifies the addressing scheme to manage all devices within a large network.

Name-based addressing: In an IPv6 environment, addresses can much more easily be name-based versus number-based, thereby making the management of devices far more intuitive and reducing implementation errors. The permanency provided by not needing to translate between public and private IPv4 addresses simplifies the process of automatic registration of assigned IP addresses with appropriate registries (e.g., the local DNS server), thereby simplifying operator tasks by allowing access via the devices' logical names rather than via memorized addresses.

Ease of managing multicast streams: In an IPv4 environment, there are a limited number of multicast addresses available, which leads to frequent use of overlapping multicast addresses. IPv6 enables the implementation of unique addresses, including multicast, and thereby simplifies the implementation of multicast streams.

In addition, IPv6 enables the use of Stateless Address Autoconfiguration (SLAAC), which allows IPv6 hosts to configure themselves automatically when connected to an IPv6 network using the Neighbor Discovery Protocol via Internet Control Message Protocol version 6 (ICMPv6) Router Discovery messages. The availability of the DHCP prefix delegation (DHCP-PD) further simplifies the management of IPv6 devices.

Beyond the control and management plane benefits, the use of IPv6 for internal transport produces higher efficiency for the data plane compared to other VSAT systems where IPv6 traffic is tunneled into an IPv4 transport stream. In these instances there will be an impact on the MTU (maximum transmission unit) or the packet will need to be fragmented, thereby increasing overhead and reducing efficiency.

Improved Security Feature: IP Security, or IPsec for short, is built into the IPv6 protocol – that is, with IPv6 it is more likely that a communication partner will support IPsec. Furthermore, due to the removal of NAT boxes in IPv6 networks, IPsec can be easily deployed on a larger scale. This makes IPsec an attractive candidate to secure information sent over vulnerable wireless links, such as satellite networks.

In addition, the JUPITER System employs a hardware-based AES 256 encryption (optional; subject to local government approval) of the transport layer, which ensures that all communications over the satellite are highly secure. As the encryption/decryption processing is done in hardware, there is no degradation of throughput performance related to encryption.

Proprietary Statement