

Consideration for IP-Based Satellite Routing Protocol

draft-wang-rtgwg-sat-routing-protocol-consider-02

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Background

Satellite and terrestrial networks utilize different physical and link layer protocols, making it challenging to achieve convergence at these layers



Advantages on IP-based satellite routing

- **Standardized Basis for Global Interconnection**
 - TCP/IP is a simple, open protocol that helps break down barriers between heterogeneous networks and enable global connectivity
- **Reduce operating and construction costs**
 - Mainstream internet services, such as web browsing, email, VoIP, and video on demand, are primarily based on the IP protocol
 - The use of IP protocols enables seamless coordination between terrestrial and satellite operations, thereby helping to reduce operational costs

Challenges

- **Dynamic Topologies**

- The satellite network topology is periodically altered by orbital motion, resulting in link disruptions or abrupt bandwidth variations.

- **Limited Spaceborne Resources**

- Satellite equipment has limited resources, such as computing capacity and energy
- Therefore, multiple factors must be taken into account when routing

Current Research(1/3)

- **IS-IS and OSPF Extensions**

- The IGP extensions for predictable and scheduled changes of TVR have been defined in [I-D.zw-lsr-tvr-extensions].
- This document defines the a set of extensions to IS-IS, OSPFv2 and OSPFv3 for predictable and scheduled changes of TVR.
- These extensions can be advertised by the node self which has predictable and scheduled changes, or by the node which connected or adjacent to the node which has predictable and scheduled changes

<https://datatracker.ietf.org/doc/draft-zw-lsr-tvr-extensions/>

Current Research(2/3)

- **LISP for Satellite Networks**

- The document [I-D.farinacci-lisp-satellite-network] gives the adaptation of LISP in satellite networks.
- It describes how a LISP overlay structure can run on top of a satellite network underlay. This satellite deployment use-case (described in this document) requires no changes to the LISP architecture or standard protocol specifications.
- In addition, any LISP implementations that run on a device with an existing satellite interface does not need to be upgraded.

<https://datatracker.ietf.org/doc/draft-farinacci-lisp-satellite-network/>

Current Research(3/3)

- **New Network Header for DR-SDSN**

- In [DR-SDSN] define a new 8 B network header for DR-SDSN(Software-defined satellite networking) to further decrease overheads in packet encapsulations, where 16-bit addresses are used instead of 32-bit IPv4 and 128-bit IPv6 addresses

- **Mmotivation**

- Considering the limited number of satellites in the constellation, it is sufficient to adopt 16-bit Locs for node addressing, and shorter identifiers as the source and destination address can significantly decrease header overheads for encapsulations
- To distinguish different consumers and traffic, user priority and type of service should be indicated in the header so that forwarding nodes can determine the user privilege in resource allocation and requirement preference for flow steering

[1] Feng, Bohao, et al. "DR-SDSN: An elastic differentiated routing framework for software-defined satellite networks." *IEEE Wireless Communications* 29.6 (2022): 80-86.

Next Steps

- We hope our proposals can be of help to RG.
- Any discussions and comments are welcome.