A Simple BGP-based Mobile Routing System for the Aeronautical Telecommunications Network

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July 17, 2017
Background

• International Civil Aviation Organization (ICAO) building an IP-based networking system for worldwide Air Traffic Management (ATM)

• Developing the Aeronautical Telecommunications Network with Internet Protocol Services (ATN/IPS)

• Under development in ICAO Working Group I (WG-I)

• IPv6-based; mobility capable

• Accommodates aircraft with multiple data links
  • SATCOM
  • LDACS
  • VHF
  • etc.
Mobility Subgroup Solution Discussion

• Looking at three candidate mobility solutions:
  • PMIP
  • Ground-based LISP
  • BGP-based overlay (subject of this document)

• A Simple BGP-Based Mobile Routing System for the Aeronautical Telecommunications Network

• BGP overlay network – does not interact with the global public Internet BGP routing system

• Based on a “hub and spokes” arrangement with stub ASBRs in data link provider subnetworks and core ASBRs in center of network

• s-ASBRs advertise and withdraw airplane Mobile Network Prefixes (MNPs)

• c-ASBRs in a hub AS forward packets between s-ASBRs

• Route optimization removes c-ASBRs from path
ATN/IPS With BGP

BGP Routing Service (Hub AS)

Stub AS

Subnetwork (MNP routing)

Subnetwork (MNP routing)

Subnetwork (MNP routing)

Subnetwork (MNP routing)

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Subnetwork (MNP routing)
BGP Details

• S-ASBRs advertise their associated MNPs to c-ASBRs
• C-ASBRs originate “default”, but DO NOT advertise any MNPs to S-ASBRs
• Each stub subnetwork is assigned a MED metric
• C-ASBRs disable AS_PATH selection and select routes based on MED
• Means that packets may take a longer path in order to reach a stub network with a lower MED value
• Reason: some data links are preferred over others (airplane should use SATCOM as first alternative and fail over to other links if necessary)

**System ensures that there will always be a working route – even if only “default”**
• Have working network model – demonstrations on request
Route Optimization

• Initial packets of a flow go through default router
• Route optimization informs source of a direct route to the target
• Source tests direct route to target BEFORE cutting data packets over to the direct route
• Subsequent data packets go directly from source to target
Draft Status

• Draft presented at ICAO WG-I mobility subgroup