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Comments for Air-Ground IP communications

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SUMMARY

This short paper provides some problems for air-ground communications by Internet Protocol (IP).

1 Introduction

In this paper, some comments are provided for air-ground communications. Some technology such as Mobile IPv6 is still developing and changing. I think that making a document only for ground-ground communications is a good idea because some problems are still remain for air-ground IP communications.

2 Comments from Professor Asano

I asked Shoichiro Asano, an professor of National Institute of Informatics. He is an researcher of network, and also has an experience of operating a huge IPv4 / IPv6 dual-stack network in Japan. I will describe his comments because his comments are very informative.

1. Handover problems:
The essential reason why cell-phone networks can make a handover smoothly is that a control channel and data (voice) channels are separated. On the other hand, control and data channels are not separated. In other words, sending IP routing information over IP (e.g. BGP, OSPF) makes handover problems difficult.
2. Application of IP for aeronautical communication may face with previously unknown problem. Then, we have to standardize not to get in the way of the future standardization.
3. Some requirements (e.g. packet loss probability of multicast) are not clear for aeronautical IP communications.
4. From the technical viewpoint, a transient phenomenon of BGP multihoming during handover may be interesting.

3 My Comments

3.1 Air-Ground Communications

I think that only publishing Ground-Ground communications part is a good idea to finish to make a document.

The reasons are follows:

1. A document for Ground-Ground communication by Internet Protocol means much a great deal.

2. I think that one of the reason why implementations of ATN protocol stacks are difficult is the large manual. For example, it is known that an implementation for RFC3261 (SIP 2.0) is difficult because its amount is too large. In fact, RFC3261 is the second largest RFC. (The largest RFC is RFC4949: Internet Security Glossary.)
3. Mobile IPv6 has some problems. These problems are still open. Typical problems are described as follows:
 - (a) Typical handover time is one minute. It is too slow for air traffic controllers.
 - (b) Implementations of multicast and P2P applications like ADS-B, or Mobile ad-hoc network (MANET) may be difficult for Mobile IPv6 due to home agents.
4. Although multicast is required for party line communication, IPSec or TLS/SSL prevents multicast.
5. Deadline is coming soon....

3.2 Security

Denial of Service (DoS), Distributed DoS (DDoS) Attacks are the other threat for aeronautical communications. These attacks are done by too many requests, SYN flooding, or the other techniques. Encryption is not a solution for these threats. Filtering (e.g. RFC3704) may help to protect them because IP spoofing is often used by DDoS.