

Network Working Group  
Internet-Draft  
Intended status: Informational  
Expires: June 12, 2020

F. Templin, Ed.  
The Boeing Company  
December 10, 2019

**An IPv6 Air/Ground Interface for the International Civil Aviation  
Organization (Use Case)  
draft-templin-v6ops-icao-int-00**

**Abstract**

The International Civil Aviation Organization (ICAO) is building a worldwide IPv6-based Air Traffic Management (ATM) service known as the Aeronautical Telecommunications Network with Internet Protocol Services (ATN/IPS). Aircraft connect to the ATN/IPS via an IPv6 Air/Ground (A/G) interface that provides a nexus for control and data messages exchanges over all available aviation wireless data links. This document discusses the use case that motivates a new IPv6 interface abstraction.

**Status of This Memo**

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on June 12, 2020.

**Copyright Notice**

Copyright (c) 2019 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<https://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect

to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

## Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">2</a>
<a href="#">2.</a>	Terminology . . . . .	<a href="#">3</a>
3.	An IPv6 Air/Ground Interface for Civil Aviation (Use Case) .	4
<a href="#">4.</a>	IANA Considerations . . . . .	<a href="#">4</a>
<a href="#">5.</a>	Security Considerations . . . . .	<a href="#">4</a>
<a href="#">6.</a>	Acknowledgements . . . . .	<a href="#">4</a>
<a href="#">7.</a>	References . . . . .	<a href="#">4</a>
<a href="#">7.1.</a>	Normative References . . . . .	<a href="#">4</a>
<a href="#">7.2.</a>	Informative References . . . . .	<a href="#">4</a>
	Author's Address . . . . .	<a href="#">4</a>

## [1.](#) Introduction

The International Civil Aviation Organization (ICAO) is building a worldwide IPv6-based Air Traffic Management (ATM) service known as the Aeronautical Telecommunications Network with Internet Protocol Services (ATN/IPS). Aircraft connect to the ATN/IPS via an Air/Ground (A/G) interface that provides a nexus for control and data message exchanges over all available underlying aviation wireless data links. Aircraft frequently have many data links and use them according to inbound and outbound traffic engineering profiles in a service known as multilink.

As an aircraft travels, it's underlying aviation data link profile may change dynamically. For example, data links that are available in the ground domain may not be available at cruise altitudes, and terrestrial cellular services may not be available during trans-oceanic crossings. In still other cases, handoffs within the same access technology could result in readdressing. For these reasons, aircraft and the ATN/IPS must be able to accommodate mobility.

The ATN/IPS provides an IPv6 /32 Mobility Service Prefix (MSP), and ICAO further assigns each aircraft a 24-bit Identification value that is unique among all civil aviation aircraft worldwide. From these two values, the aircraft constructs a /56 Mobile Network Prefix (MNP) that travels with the aircraft wherever it goes. For example, if the MSP is 2001:db8::/32 and the aircraft is assigned the Identification value 0x123456, the resulting MNP is 2001:db8:1234:5600::/56.

Each aircraft registers its MNP in the ATN/IPS ground-domain mobility service over its active aviation data links. Since many aviation



data links have very low-end performance profiles (e.g., 32Kbps) it is imperative that the MNP is conveyed in the fewest possible messages and with the smallest possible message sizes. This service is termed "prefix registration" (as opposed to "prefix delegation") since the aircraft already knows its MNP and is simply asking for it to be registered in the ATN/IPS routing system.

Following prefix registration, the aircraft sends IPv6 data messages over the A/G interface and underlying data links according to its traffic engineering profile. The aircraft keeps the number of control messages to a minimum, since the ground domain is responsible for any keepalive messaging on behalf of the aircraft. In this way, reducing control message overhead on aviation data links presents the greatest possible capacity for carrying actual data.

While the ground domain ATN/IPS network will provide a mobility service, the details of the service need not be exposed to the aircraft. Instead, the aircraft simply operates its A/G interface in a manner that allows optimum data plane usage while providing the ground domain with only the necessary and sufficient control message signaling. This document therefore presents a use case for an aircraft A/G interface.

## 2. Terminology

The terminology in the normative references applies; especially, the terms "link" and "interface" are the same as defined in the IPv6 [[RFC8200](#)] and IPv6 Neighbor Discovery (ND) [[RFC4861](#)] specifications.

The following terms are defined for the purposes of this document:

International Civil Aviation Organization (ICAO)

The global governing body for civil aviation standards.

Air Traffic Management (ATM)

A command and control messaging service for coordinating safe aviation operations.

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

A proposed worldwide IPv6-based network used to enable ATM services between aircraft and air traffic controllers.

multilink

The ability of an aircraft to coordinate its available aviation data links through traffic engineering link selections.

mobility



The ability of an aircraft to adapt to changes in its underlying aviation data link connectivity and availability.

### **3. An IPv6 Air/Ground Interface for Civil Aviation (Use Case)**

Details of the use case are discussed in the Introduction.

### **4. IANA Considerations**

This document has no requirements for IANA.

### **5. Security Considerations**

Security considerations are discussed in the references.

### **6. Acknowledgements**

This document describes the use case for an Air/Ground interface for aircraft operating in the ATN/IPS service.

### **7. References**

#### **7.1. Normative References**

- [RFC4861] Narten, T., Nordmark, E., Simpson, W., and H. Soliman, "Neighbor Discovery for IP version 6 (IPv6)", [RFC 4861](#), DOI 10.17487/RFC4861, September 2007, <<https://www.rfc-editor.org/info/rfc4861>>.
- [RFC8200] Deering, S. and R. Hinden, "Internet Protocol, Version 6 (IPv6) Specification", STD 86, [RFC 8200](#), DOI 10.17487/RFC8200, July 2017, <<https://www.rfc-editor.org/info/rfc8200>>.

#### **7.2. Informative References**

- [I-D.templin-atn-aero-interface] Templin, F., "Transmission of IPv6 Packets over Aeronautical ("aero") Interfaces", [draft-templin-atn-aero-interface-07](#) (work in progress), September 2019.

Author's Address



Fred L. Templin (editor)

The Boeing Company

P.O. Box 3707

Seattle, WA 98124

USA

Email: [fltemplin@acm.org](mailto:fltemplin@acm.org)