

Delay/Disruption Tolerant Networking
Internet-Draft
Intended status: Informational
Expires: 8 May 2026

E. Kline
Aalyria Technologies, LLC
4 November 2025

The ipn.arpa Zone and IPN DNS Operations
draft-ek-dtn-ipn-arpa-00

Abstract

This document requests a DNS parent for IPN addresses, discusses the registration procedures and management of the DNS zone, as well as some operational recommendations. This document specifies that IPN addresses may have a DNS representation of the form 1.978879.ipn.arpa, for IPN node 1 under IPN Allocator 978879.

This document also describes how this DNS structure can be useful in locating the Bundle Protocol (BP) Convergence Layer (CL) endpoint(s) of the BP Agent responsible for a given IPN address.

About This Document

This note is to be removed before publishing as an RFC.

The latest revision of this draft can be found at <https://ekline.github.io/draft-dtn-ipn-arpa/draft-ek-dtn-ipn-arpa.html>. Status information for this document may be found at <https://datatracker.ietf.org/doc/draft-ek-dtn-ipn-arpa/>.

Discussion of this document takes place on the Delay/Disruption Tolerant Networking mailing list (<mailto:dtn@ietf.org>), which is archived at <https://mailarchive.ietf.org/arch/browse/dtn/>. Subscribe at <https://www.ietf.org/mailman/listinfo/dtn/>.

Source for this draft and an issue tracker can be found at <https://github.com/ekline/draft-dtn-ipn-arpa>.

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 8 May 2026.

Copyright Notice

Copyright (c) 2025 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 Revised BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Revised BSD License.

Table of Contents

1. Introduction	2
2. Conventions and Definitions	3
3. Concept of Operations	3
4. Operational Considerations	4
5. Security Considerations	5
6. IAB Considerations	5
7. IANA Considerations	5
7.1. 'ipn' Allocator Registry List of Nameservers	5
7.2. Guidance to Designate Experts	5
8. References	5
8.1. Normative References	5
8.2. Informative References	5
Acknowledgments	6
Author's Address	6

1. Introduction

TODO Introduction

2. Conventions and Definitions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

TODO

3. Concept of Operations

The Forwarding Information Base (FIB) of a BP Agent may be populated from a variety of sources. Typically, explicit (manual) configuration is given to associate BP destination endpoints with the Convergence Layer parameters required to establish communication with a responsible receiving BP Agent.

A BP Agent may also dynamically create a FIB entry by querying for DNS Resource Records as follows.

Consider a space agency with a registered IPN Allocator ID of 978879 that published the following two DNS zones:

```
; zone 978879.ipn.arpa.
@ IN SOA ns1.space-agency.example ...
1 IN PTR lunar-orbiter1.space-agency.example.
2 IN PTR mars-orbiter2.space-agency.example.
500 IN PTR research-department.space-agency.example.

; zone space-agency.example.
@ IN SOA ns1.space-agency.example ...

antenna-relay IN A 192.0.2.1
antenna-relay IN AAAA 2001:db8::1

lunar-orbiter1 IN TXT "{ 'norad-id': '81111' }"
_dtn-bundle._tcp.2 IN SRV 1 1 4556 antenna-relay.space-agency.example.

mars-orbiter2 IN TXT "{ 'norad-id': '82222' }"
_dtn-bundle._udp.2 IN SRV 1 1 4556 antenna-relay.space-agency.example.

cloud-service IN A 192.0.2.5
cloud-service IN AAAA 2001:db8::5

_dtn-bundle._tcp.research-department IN SRV 1 1 4556 cloud-service.space-agency.example.
_dtn-bundle._udp.research-department IN SRV 1 1 4556 cloud-service.space-agency.example.
```

A BP Agent, perhaps collocated at a landing station, which had received a Bundle destined for ipn:978879.500.345 could determine the proper TCP and UDP CL IP addresses and ports by:

- * querying for a PTR record associated with 500.978879.ipn.arpa
- * (receiving research-department.space-agency.example)
- * querying for an SRV record associated with _dtn-bundle._tcp.research-department.space-agency.example (ditto for ._udp)
- * (receiving port 4556 and hostname cloud-service.space-agency.example.)
- * querying for A and AAAA records for cloud-service.space-agency.example.
- * (receiving 192.0.2.5 and 2001:db8::5)

The BP Agent at the landing station could then attempt to initiate a [TCPCL] or [UDPCL] connection to [2001:db8::5]:4556, for example, and attempt to deliver the given Bundle.

Similarly, a researcher attempting to send a Bundle payload to mars-orbiter2.space-agency.example could use a BP Agent capable of querying DNS and learning about the [UDPCL] endpoint at 192.0.2.1:4556. Once the Bundle had been forwarded to antenna-relay.space-agency.example, it would be the antenna-relay's responsibility to forward it to the spacecraft.

Any future CLs that define DNS records (e.g. SVCB records, etc) may be added to the space-agency.example zone and, through the use of PTR records in the 978879.ipn.arpa zone, be discovered by appropriately capable BP agents.

4. Operational Considerations

TODO Operational

Note that use of DNS may not be appropriate for all network environments. Any deployments where querying DNS might not align with reliability or performance requirements are recommended to obtain BP FIB information by other mechanisms (out of scope of this document).

5. Security Considerations

TODO Security

6. IAB Considerations

The IAB is requested to approve the zone "ipn.arpa" as parent for IPN addresses, similar to in-addr.arpa and ip6.arpa "reverse DNS" for IPv4 and IPv6 addresses (respectively).

Per [RFC9758], IPN addresses have an Allocator identifier and an allocator-specific identifier (both 32-bit unsigned integers).

7. IANA Considerations

7.1. 'ipn' Allocator Registry List of Nameservers

IANA is requested to augment its registration procedures for entries in the 'ipn' Scheme URI Allocator Identifiers Registry with a column for "Authoritative Nameservers". Requesters of an Allocator or Allocator range MAY provide the IP addresses of DNS nameservers that will be considered authoritative for the .ipn.arpa zone for each requested Allocator.

7.2. Guidance to Designate Experts

TBD: things like make sure there are at least two nameserver IP addresses and both IPv4 and IPv6 addresses are given, etc.

8. References

8.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/rfc/rfc2119>>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/rfc/rfc8174>>.

8.2. Informative References

[RFC9758] Taylor, R. and E. Birrane III, "Updates to the 'ipn' URI Scheme", RFC 9758, DOI 10.17487/RFC9758, May 2025, <<https://www.rfc-editor.org/rfc/rfc9758>>.

- [TCPCL] Sipos, B., Demmer, M., Ott, J., and S. Perreault, "Delay-Tolerant Networking TCP Convergence-Layer Protocol Version 4", RFC 9174, DOI 10.17487/RFC9174, January 2022, <<https://www.rfc-editor.org/rfc/rfc9174>>.
- [UDPCL] Kruse, H., Jero, S., and S. Ostermann, "Datagram Convergence Layers for the Delay- and Disruption-Tolerant Networking (DTN) Bundle Protocol and Licklider Transmission Protocol (LTP)", RFC 7122, DOI 10.17487/RFC7122, March 2014, <<https://www.rfc-editor.org/rfc/rfc7122>>.

Acknowledgments

TODO acknowledge.

Author's Address

Erik Kline
Aalyria Technologies, LLC
Email: ek.ietf@gmail.com