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1. Introduction

Application-aware Networking (APN) is introduced in [[I-D.li-apn-framework](#)] and [[I-D.li-apn-problem-statement-usecases](#)]. APN conveys an attribute along with data packets into the network and make the network aware of data flow requirements at different granularity levels. Such an attribute is acquired, constructed as a structured value, and then encapsulated in the packets. Such a structured value is treated as an opaque object in the network, to which the network operator applies policies in various nodes/service functions along the path, providing corresponding services.

[[I-D.li-apn-header](#)] defines the application-aware networking (APN) header which can be used in different data planes to carry the APN attribute. This document defines the encapsulation of the APN header in the IPv6 data plane.

2. Requirements Language

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 [RFC 2119](#) [[RFC2119](#)] [RFC 8174](#) [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

3. Terminologies

APN: Application-aware Networking

APN6: Application-aware IPv6 Networking, i.e., the data plane of APN is IPv6

APN Attribute: Application-aware information. It is added at the edge devices of an APN domain along with any tunnel encapsulation.

APN ID: Application-aware Networking ID

APN Para: Application-aware Networking Parameters

SRH: Segment Routing Header [RFC 8754](#) [[RFC8754](#)]

4. The APN Option

To support Application-aware IPv6 networking, one IPv6 Header option [RFC 8200](#) [[RFC8200](#)], the APN option, is defined.

The APN option has the following format:

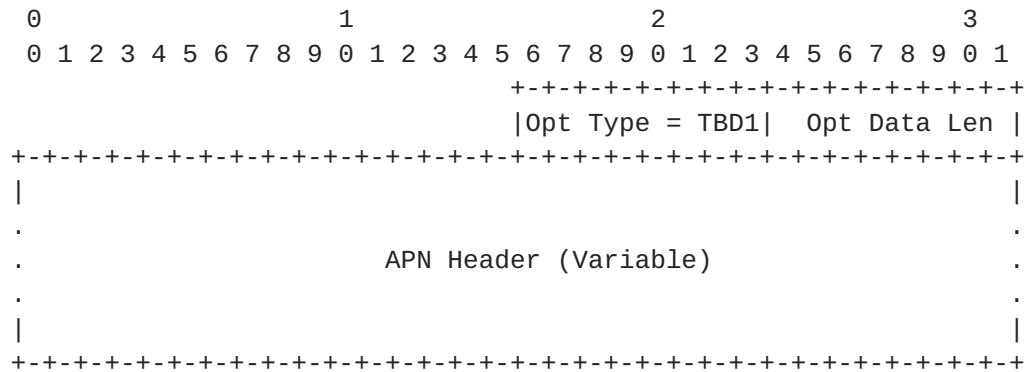


Figure 1. The APN Option

where:

- o Opt Type: Type value is TBD1 (suggested value 0x13), an 8-bit unsigned integer. Identifier of the type of this APN Option.
- o Opt Data Len: An 8-bit unsigned integer. Length of the Option Data field of this option, that is, length of the APN header.
- o APN Header: Option-Type-specific data. It carries the APN header. Variable-length field as specified in [[I-D.li-apn-header](#)].

5. Locations for the APN Option

The APN IPv6 Header option can be placed in two locations in an IPv6 packet header [RFC 8200](#) [[RFC8200](#)] depend upon the scenario and implementation requirements. These are defined in the subsections below.

5.1. IPv6 Hop-by-Hop Options Header (HBH)

The APN option can be carried in the IPv6 Hop-by-Hop Options Header. By using the HBH Options Header, the information carried can be read by every node along the path.

| Hex Value | Binary Value | Description | Reference |
|-----------|--------------|------------------------------|-----------------|
| | act chg rest | | |
| 0x13 | 00 0 10011 | Application-aware Networking | [this document] |

7.2. SRH TLV Type

IANA is requested to assign an SRH TLV Type from the range of type values for TLVs that do not change en route (2-127) as follows:

| Value | Description | Reference |
|-------|------------------------------|-----------------|
| 0x13 | Application-aware Networking | [this document] |

8. Security Considerations

The Security Considerations are described in [\[I-D.li-apn-problem-statement-usecases\]](#).

9. References

9.1. Normative References

[I-D.li-apn-framework] Li, Z., Peng, S., Voyer, D., Li, C., Liu, P., Cao, C., and G. S. Mishra, "Application-aware Networking (APN) Framework", Work in Progress, Internet-Draft, draft-li-apn-framework-06, 30 September 2022, <<https://www.ietf.org/archive/id/draft-li-apn-framework-06.txt>>.

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[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/info/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/info/rfc8174>>.

[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>>.

[RFC8754]

Filsfils, C., Ed., Dukes, D., Ed., Previdi, S., Leddy, J., Matsushima, S., and D. Voyer, "IPv6 Segment Routing Header (SRH)", RFC 8754, DOI 10.17487/RFC8754, March 2020, <<https://www.rfc-editor.org/info/rfc8754>>.

9.2. Informative References

[I-D.li-apn-problem-statement-usecases]

Li, Z., Peng, S., Voyer, D., Xie, C., Liu, P., Qin, Z., and G. S. Mishra, "Problem Statement and Use Cases of Application-aware Networking (APN)", Work in Progress, Internet-Draft, draft-li-apn-problem-statement-usecases-07, 30 September 2022, <<https://www.ietf.org/archive/id/draft-li-apn-problem-statement-usecases-07.txt>>.

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