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**Application-aware IPv6 Networking (APN6) Encapsulation**  
**draft-li-apn-ipv6-encap-01**

Abstract

Application-aware IPv6 Networking (APN6) makes use of IPv6 encapsulation to convey the APN Attribute along with data packets and make the network aware about data flow requirements at different granularity levels. The APN attribute can be encapsulated in the APN header. This document defines the encapsulation of the APN header in the IPv6 data plane.

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](#) [[RFC2119](#)].

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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 network and make the network aware about data flow requirements at different granularity levels. Such an attribute is acquired, constructed in a structured value, and then encapsulated in the packets. Such 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 and provide 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.](#) 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 the tunnel encapsulation.

APN ID: Application-aware Networking ID

APN Para: Application-aware Networking Parameters

### 3. APN Option

In order to support the Application-aware IPv6 networking, one option, the APN option, is defined.

The APN option has the following format:

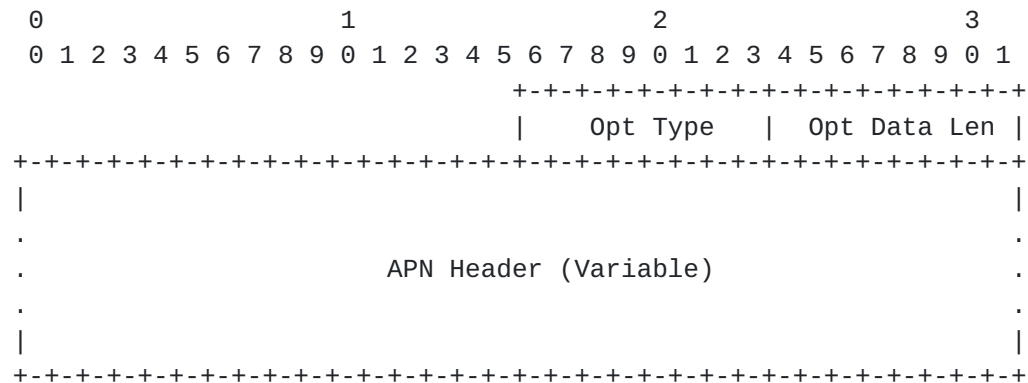


Figure 1. APN Option

where:

- o Opt Type: Type value is TBD2. 8-bit unsigned integer. Identifier of the type of this APN Option.
- o Opt Data Len: 8-bit unsigned integer. Length of the Option Data field of this option, that is, length of the APN header.
- o Option Data: Option-Type-specific data. It carries the APN header. Variable-length field.



#### 4. Locations for APN Option

The APN option can be placed in several locations in the IPv6 packet header depend upon the scenarios and implementation requirements.

##### 4.1. Hop-by-Hop Options Header (HBH)

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

##### 4.2. Destination Options Header (DOH)

The APN option can be carried in the Destination Options Header as the new option. By using the DOH Options Header, the information carried can be read by the destination node along the path.

#### 5. APN TLV of SRH

[RFC8754] defines the segment routing header (SRH) and the SRH TLV. The SRH TLV provides meta-data for segment processing. The APN header can also be placed in the SRH as one type of SRH TLV following the Segment List. By using the SRH, the information carried can be read by the specified segments along the SRv6 path.

The APN TLV is OPTIONAL and has the following format:

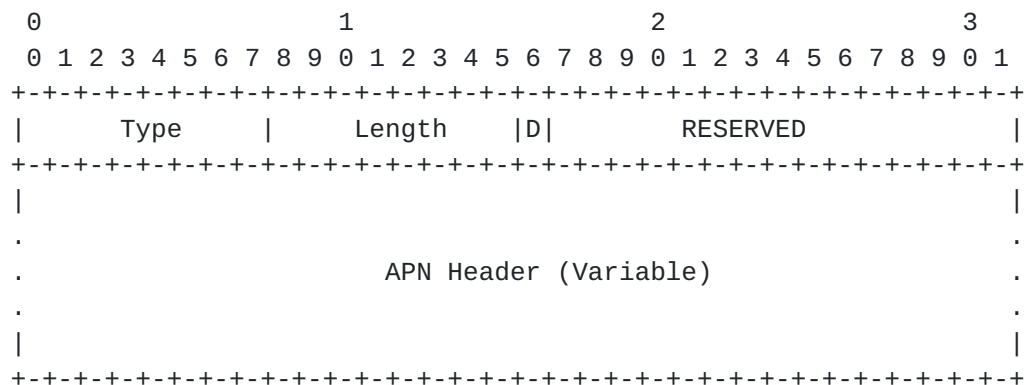


Figure 2. APN TLV

where:

- o Type: to be assigned by IANA (suggested value 5).
- o Length: The length of the variable length data in bytes.



- o D: 1 bit. When it is set, it indicates the Destination Address verification is disabled due to use of reduced segment list.
- o RESERVED: 15 bits. MUST be 0 on transmission.
- o APN Header: It carries the APN header. Variable-length field.

## 6. IANA Considerations

IANA maintains the registry for the Options and TLVs. The APN Option will require one new option type code and the APN TLV will require one new SRH TLV type code in this document:

Type	Description	Reference
-----		
TBD1	APN Option	This ID
TBD4	APN TLV	This ID

## 7. Security Considerations

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

## 8. References

### 8.1. Normative References

- [I-D.li-apn-header]  
Li, Z. and S. Peng, "Application-aware Networking (APN) Header", [draft-li-apn-header-00](#) (work in progress), October 2021.
- [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>>.
- [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>>.

### 8.2. Informative References





[I-D.li-apn-framework]

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