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IGMPv3/MLDv2 Message Extension
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Abstract

IGMP and MLD protocols are extensible, but no extensions have been defined so far. This document provides a well-defined way of extending IGMP and MLD, using a list of TLVs (Type, Length and Value).

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[1.](#) Introduction

In this document, we describe a generic method to extend IGMPv3 [[RFC3376](#)] and MLDv2 [[RFC3810](#)] messages to accommodate information other than what is contained in the current message formats. This is done by allowing a list of TLVs (Type, Length and Value) to be used in the Additional Data part of IGMPv3 and MLDv2 messages. This document defines a registry for such TLVs, while other documents will define the specific types and their values, and their semantics. The extension would only be used when at least one TLV is to be added to the message. This extension also applies to the lightweight versions of IGMPv3 and MLDv2 as defined in [[RFC5790](#)].

The extension will be part of additional data as mentioned in [[RFC3810](#)] [Section 5.1.12](#) (resp. [[RFC3376](#)] [Section 4.1.10](#)) for query messages and [[RFC3810](#)] [Section 5.2.12](#) (resp. [[RFC3376](#)] [Section 4.2.11](#)) for report messages.

One such TLV is being defined in [[I-D.ietf-bier-mld](#)]

[2.](#) Conventions used in this document

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.

3. Extension Format

A previously reserved bit in the IGMPv2 and MLDv2 headers is used to indicate whether this extension is used. It is set to 1 if it is used, otherwise 0. When this extension is used, the Additional Data of IGMPv3 and MLDv2 messages would be formatted as follows. Note that this format contains a variable number of TLVs. It MUST contain at least one TLV.

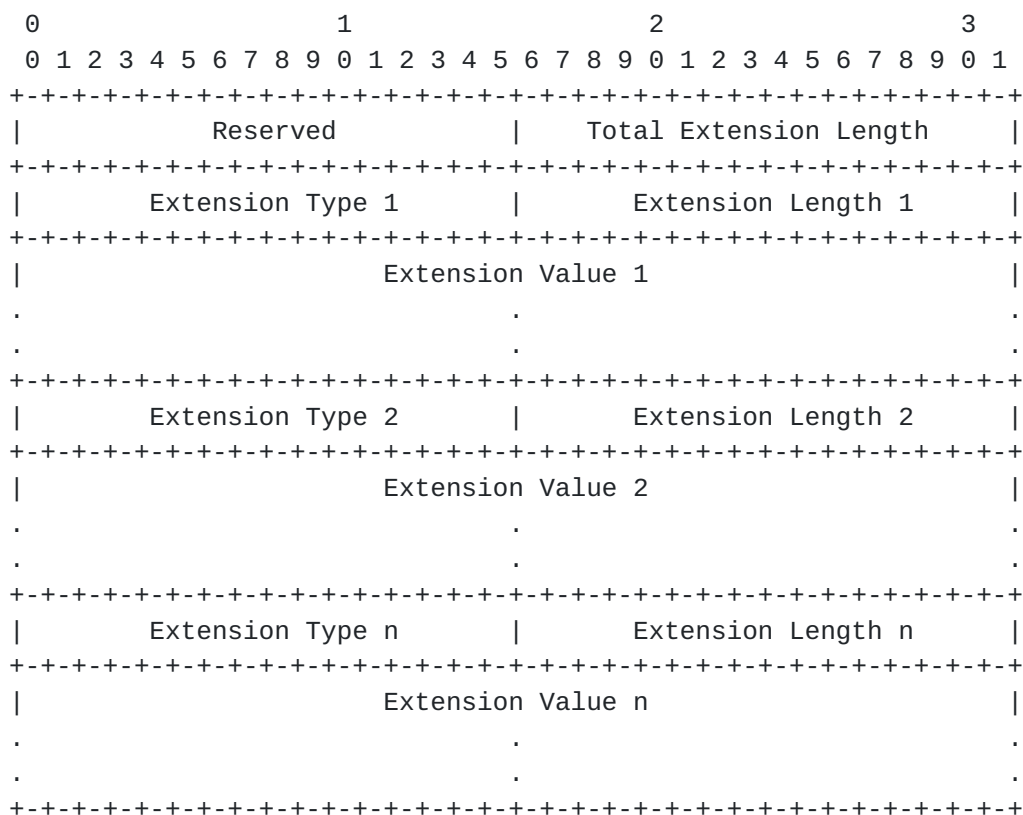


Figure 1: Extension Format

Reserved: 2 octets. Reserved. MUST be set to 0. MUST be ignored when received.

Total Extension Length: 2 octets. The remaining length of the extension. This value MUST be equal to $((2 + 2) * n) + \text{Extension Length 1} + \text{Extension Length 2} + \dots + \text{Extension Length n}$. That is, it is the sum of the lengths of all the TLVs, including the type field (2 octets), and the length field (2 octets) of each TLV. The total number of octets used by the extension is the value of

[illegible]

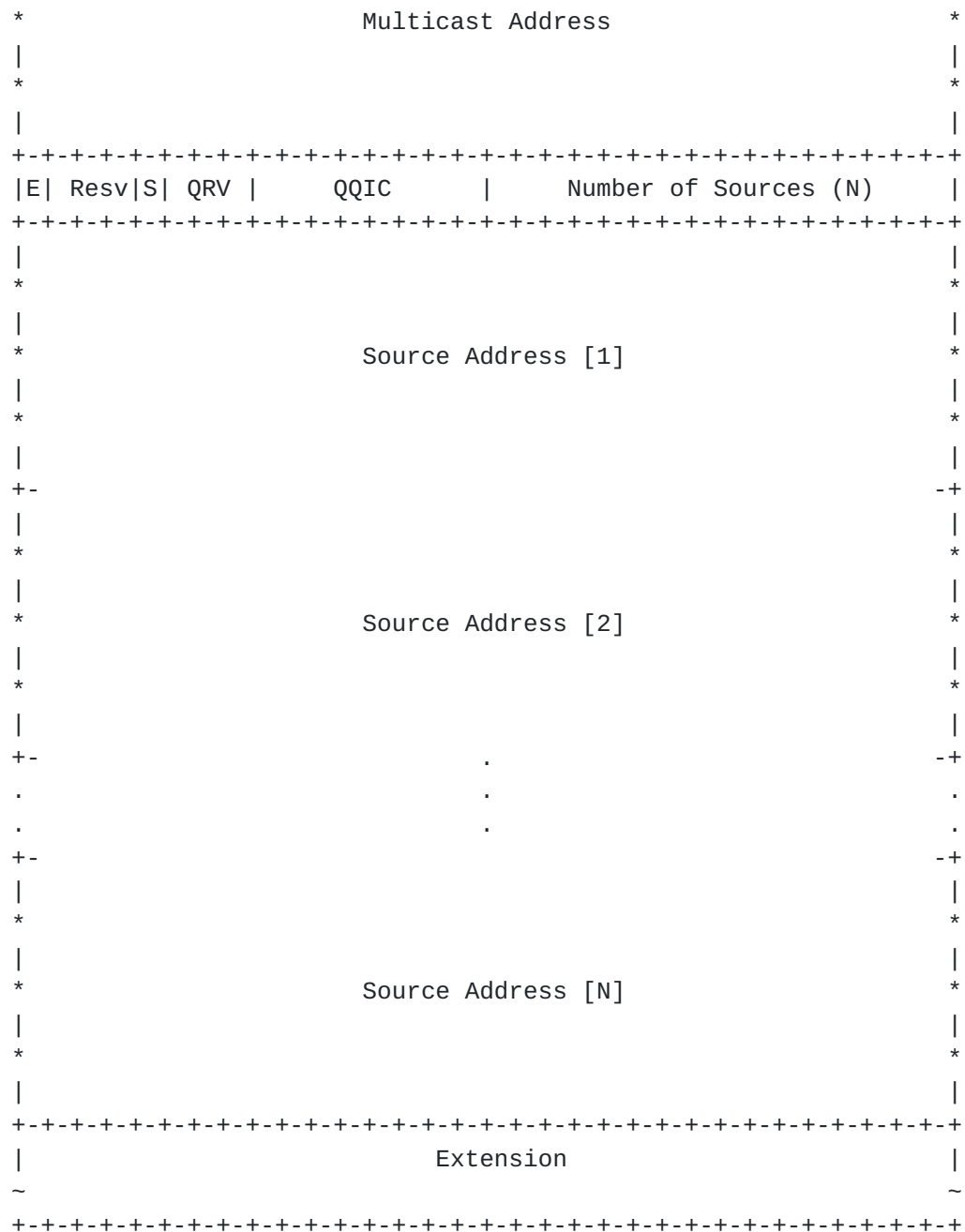


Figure 2: MLD Query Extension

3.2. Version 2 Multicast Listener Report Extension

The MLD report format with extension is shown below. The E-bit is set to 1 to indicate that the extension is present.

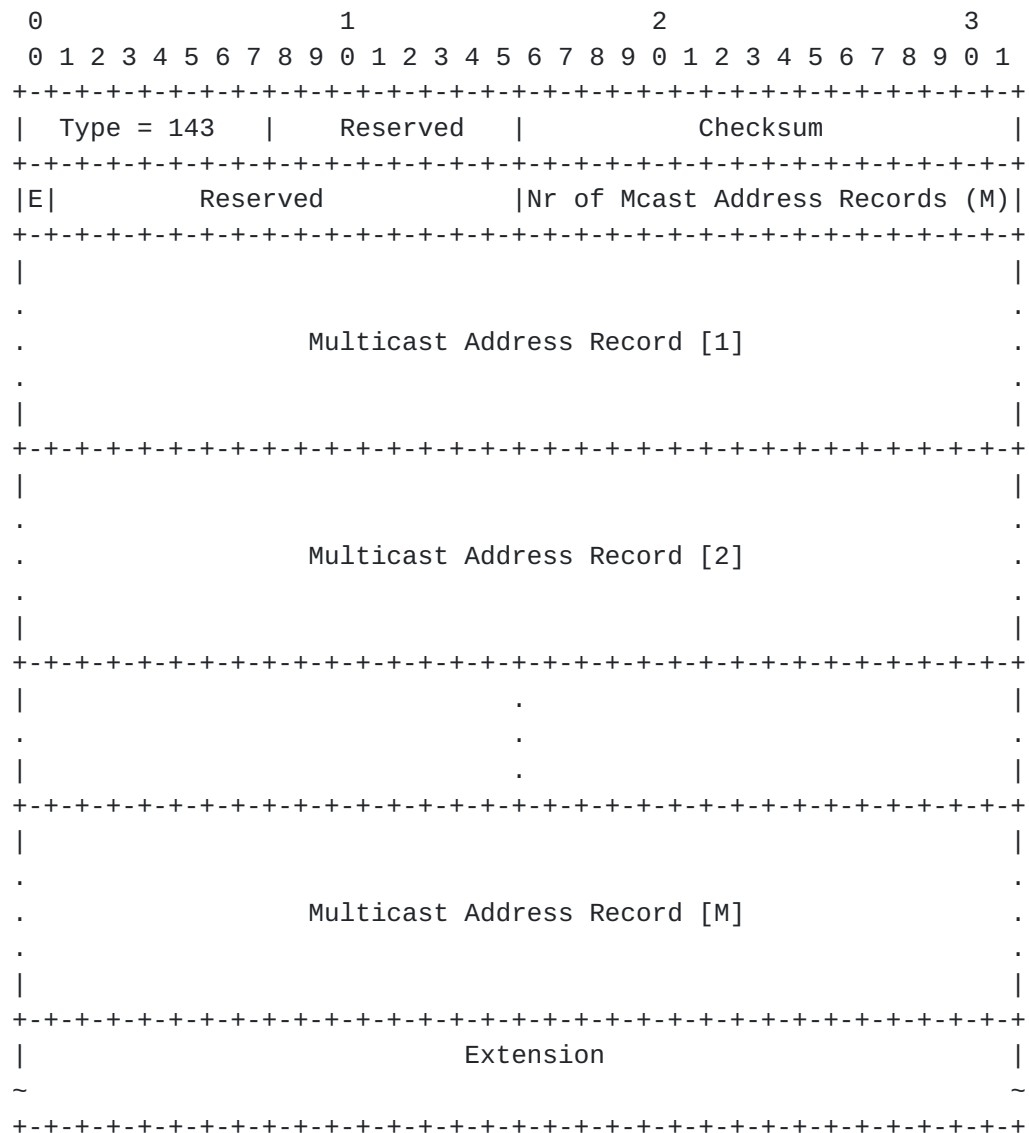


Figure 3: MLD Report Extension

3.3. IGMP Membership Query Extension

The IGMP query format with the extension is shown below. The E-bit is set to 1 to indicate that the extension is present.

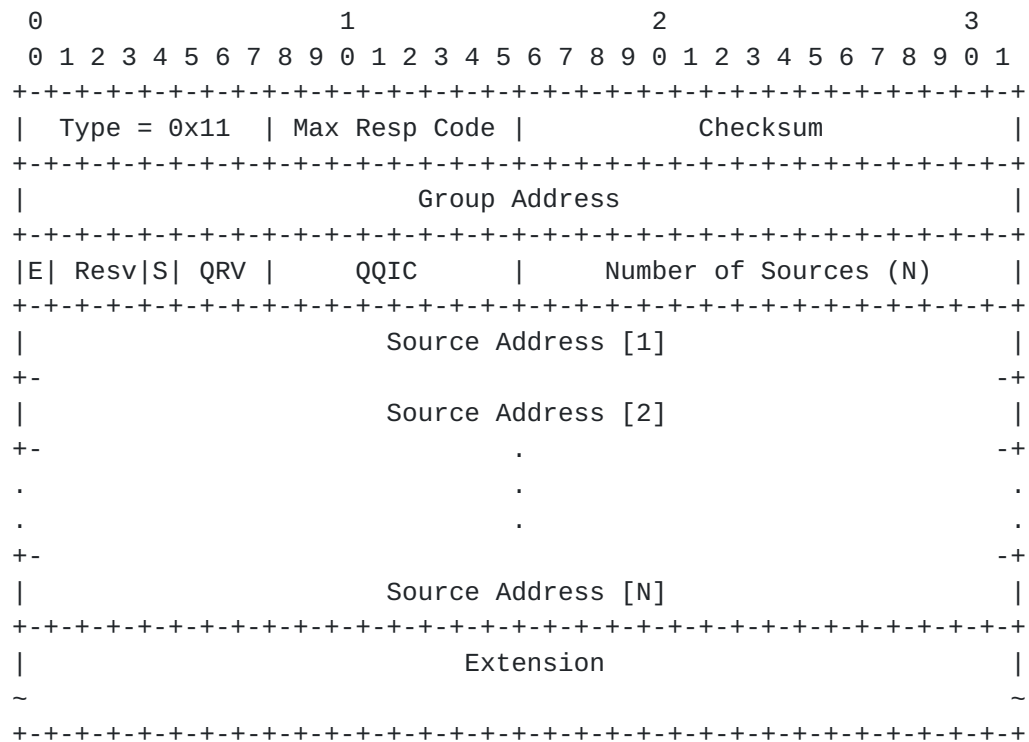


Figure 4: IGMP Query Extension

3.4. IGMP Version 3 Membership Report Extension

The IGMP report format with the extension is shown below. The E-bit is set to 1 to indicate that the extension is present.

Figure 5: IGMP Report Extension

IGMP and MLD implementations, host implementations in particular, rarely change, and it expected to take a long time for them to support this extension mechanism. Also as new extensions are defined, it may take a long time before they are supported. Implementations that do not support this extension mechanism will simply ignore the extension, provided they are compliant with IGMPv3 and MLDv2 RFCs, and behave as if the extension is not present. Implementations that support this extension **MUST** behave as if it is not present if they support non of the extension types in an IGMP/MLD message. If they support at least one of the types, they will

process the supported types according to the respective type specifications, and ignore any unsupported types.

It is possible that a new extension type only applies to queries, or only reports, or there may be other specific conditions for when it is to be used. A document defining a new type MUST specify clearly under what conditions the new type should be used, including for which message types. It MUST also be considered what the behavior should be if a message is not used in the defined manner, e.g., if it is present in a query message, when it was only expected to be used in reports.

When defining new types, care must be taken to ensure that nodes that support the type can co-exist with nodes that don't, on the same subnet. There could be multiple routers where only some support the extension, or multiple hosts where only some support the extension. Or a router may support it and none of the hosts, or all hosts may support it, but none of the routers. With multiple types being used, it must also be considered that some hosts or routers may only support some of the types, and potentially one node might support only one type, and another node only another type.

Documents defining new types MUST have security considerations relevant to the new types. They MUST also in addition to defining the behavior of host and routers supporting the new types, consider compatibility with hosts and routers on the same subnet that do not support the new types. Further, they MUST consider whether there are any dependencies or restrictions on combinations between the new types and any pre-existing types.

The extension mechanism do not support IGMPv1, IGMPv2 and MLDv1. As nodes may send older version message, they would also not be able to send messages using this extension.

5. Security Considerations

This document extends MLD (resp. IGMP) message formats. As such, there is no impact on security or changes to the considerations in [\[RFC3810\]](#) and [\[RFC3376\]](#). The respective types defined using this extension may impact security and MUST be considered as part of the respective specifications.

6. IANA Considerations

A new registry called "IGMP/MLD Extension Types" should be created with registration procedure "IETF Review" as defined in [\[RFC8126\]](#) with this document as a reference. The registry should be common for IGMP and MLD and can perhaps be added to the "Internet Group

Management Protocol (IGMP) Type Numbers" section. The initial content of the registry should be as below.

Type	Length	Name	Reference

7. References

7.1. 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/info/rfc2119>>.
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7.2. Informative References

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- [RFC5790] Liu, H., Cao, W., and H. Asaeda, "Lightweight Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Version 2 (MLDv2) Protocols", [RFC 5790](#), DOI 10.17487/RFC5790, February 2010, <<https://www.rfc-editor.org/info/rfc5790>>.

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