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IGMP / MLD Extension for Signaling Eco-Mode
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Abstract

This document specifies an extension to IGMPv3 and MLDv2 messages to indicate eco mode in the delivery of multicast content based on the mechanism described in [RFC9279].

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction

Video contents currently represent the major source of traffic in operator's networks. The same content can be distributed in multicast with different resolution adapted to the characteristics of suscriber's receiver. The amount of traffic per multicast flow is dependent of the resolution of the encoded video (the higher the resolution, the higher the bit rate per multicast video flow), which tends to be higher as long as the suscribers' devices support higher resolutions. In addition to that, the distribution trees are continuously built in the network, in most cases proactively subscribing to channels to minimize access to the content even during periods of low (or inexistent) demand.

As of today, there is no mechanism available for the subscribers to indicate their willingness of applying an eco-mode consumption of multicast content to their suscription. This can be incentivize the user to explicitely signal the network the desire of receiving more energy efficient service, or it could even be activated by default, then forcing the user to explicitely indicate the opposite behavior in certain circumstances (for instance, to perceive better quality of service).

Multicast content distribution inherently optimizes bandwidth by delivering the same content to multiple receivers simultaneously, reducing redundant transmissions. An eco-mode, when applied to multicast distribution, can further optimize resource utilization by dynamically adjusting transmission power, reducing active network elements, or enabling sleep modes when demand is low. By implementing an eco-mode, the system can reduce power usage during off-peak hours, when fewer receivers are active in the system, or by reducing resolution of the content.

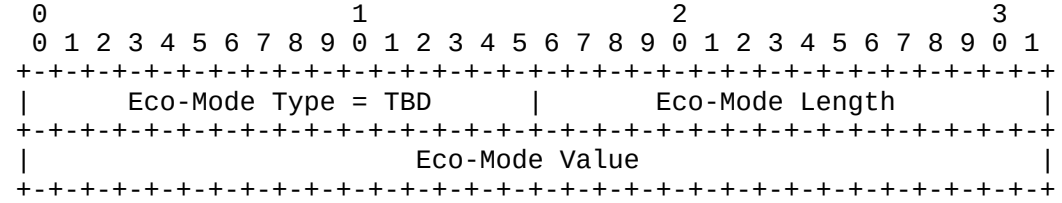
This document proposes an extension of IGMP and MLD messages for supporting the signaling of eco-mode. The implications of the eco-mode either in the receiver or the provider side is out of the scope of this document.

2. Eco-mode Extension

[RFC9279] defines a mechanism for extending IGMPv3 and MLDv2 messages. This document proposes an extension for indication of eco-mode.

2.1. Eco-mode TLV format

The format of the extension is as follows:



Eco-Mode Type: 2 octets. The type of the Eco-Mode TLV extension is TBD.

Eco-Mode Extension Length: 2 octets. This specifies the length in octets of the following Value field. The length of the Eco-Mode extension is set to 8 octects.

Eco-Mode Value: This field contains the eco-mode value, which is considerd as boolean, where a value of 1 represents the eco-mode set to true, and a value of 0 represents the eco-mode set to false.

2.2. Eco-mode usage

The eco-mode is intended to be supported in both the Query and Report messages for IGMP and MLD. The logic behind the inclusion of the eco-mode extension at both susbcriber and provider side is out of the scope of this draft.

3. Security and operational considerations

Same security and operational considerations as described in [RFC9279] apply also in this document.

4. IANA Considerations

This document defines a new extension to IGMPv3 and MLDv2 messages according to [RFC9279]. IANA is requested to allocate the following extension type to the registry.

Extension Type	Length	Name	Reference
TBD	8	Eco-mode	This document

5. Informative References

[RFC9279] Sivakumar, M., Venaas, S., Zhang, Z., and H. Asaeda, "Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Version 2 (MLDv2) Message Extension", RFC 9279, DOI 10.17487/RFC9279, August 2022, <https://www.rfc-editor.org/info/rfc9279>.

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