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**Bidirectional Forwarding Detection (BFD) for Multi-point Networks and  
Virtual Router Redundancy Protocol (VRRP) Use Case  
draft-mirsky-bfd-p2mp-vrrp-use-case-03**

Abstract

This document discusses use of Bidirectional Forwarding Detection (BFD) for multi-point networks to provide Virtual Router Redundancy Protocol (VRRP) with sub-second Master convergence and defines the extension to bootstrap point-to-multipoint BFD session.

This draft updates [RFC 5798](#).

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## [1.](#) Introduction

The [[RFC5798](#)] is the current specification of the Virtual Router Redundancy Protocol (VRRP) for IPv4 and IPv6 networks. VRRPv3 allows for faster switchover to a Backup router. Using such capability with software-based implementation of VRRP is may prove challenging. But it still may be possible to deploy VRRP and provide sub-second detection of Master router failure by Backup routers.

Bidirectional Forwarding Detection (BFD) [[RFC5880](#)] had been originally defined detect failure of point-to-point (p2p) paths: single-hop [[RFC5881](#)], multihop [[RFC5883](#)]. Single-hop BFD may be used to enable Backup routers to detect failure of the Master router within 100 msec or faster. [[I-D.nitish-vrrp-bfd](#)] demonstrates how, with some extensions to [[RFC5798](#)], that can be achieved.

[[I-D.ietf-bfd-multipoint](#)] extends [[RFC5880](#)] for multipoint and multicast networks, which is precisely characterizes deployment scenarios for VRRP over LAN segment. This document demonstrates how point-to-multipoint (p2mp) BFD can enable faster detection of Master failure and thus minimize service disruption in a VRRP domain. The document also defines the extension to VRRP [[RFC5798](#)] to bootstrap a VRRP Backup router to join in p2mp BFD session.

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



### **1.1.1. Terminology**

BFD: Bidirectional Forwarding Detection

p2mp: Pont-to-Multipoint

VRRP: Virtual Router Redundancy Protocol

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

## **2. Problem Statement**

A router may be part of several Virtual Router Redundancy groups, as Master in some and as Backup in others. Supporting sub-second mode for VRRPV3 [[RFC5798](#)] for all these roles without specialized support in data plane may prove to be very challenging. BFD already has many implementations based on HW that are capable to support multiple sub-second session concurrently.

## **3. Applicability of p2mp BFD**

[I-D.ietf-bfd-multipoint] may provide the efficient and scaleable solution for fast-converging environment that uses default route rather than dynamic routing. Each redundancy group presents itself as p2mp BFD session with its Master being the root and Backup routers being tails of the p2mp BFD session. Figure 1 displays the extension of VRRP [[RFC5798](#)] to bootstrap tail of the p2mp BFD session. Master







### **3.1. Multipoint BFD Encapsulation**

The MultipointHead of p2mp BFD session when transmitting BFD control packet:

MUST set TTL value to 1 (though note that VRRP packets have TTL set to 255);

SHOULD use group address VRRP ('224.0.0.18' for IPv4 and 'FF02::0:0:0:0:0:0:0:12' for IPv6) as destination IP address

MAY use network broadcast address for IPv4 or link-local all nodes multicast group for IPv6 as destination IP address;

MUST set destination UDP port value to 3784 when transmitting BFD control packets, as defined in [[I-D.ietf-bfd-multipoint](#)];

MUST use Master IP address as source IP address.

## **4. IANA Considerations**

This document makes no requests for IANA allocations. This section may be deleted by RFC Editor.

## **5. Security Considerations**

Security considerations discussed in [[RFC5798](#)], [[RFC5880](#)], and [[I-D.ietf-bfd-multipoint](#)], apply to this document.

## **6. Acknowledgements**

## **7. Normative References**

[I-D.ietf-bfd-multipoint]

Katz, D., Ward, D., Networks, J., and G. Mirsky, "BFD for Multipoint Networks", [draft-ietf-bfd-multipoint-18](#) (work in progress), June 2018.

[I-D.nitish-vrrp-bfd]

Gupta, N., Dogra, A., Docherty, C., Mirsky, G., and J. Tantsura, "Fast failure detection in VRRP with BFD", [draft-nitish-vrrp-bfd-04](#) (work in progress), August 2016.

[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>>.





- [RFC5798] Nadas, S., Ed., "Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6", [RFC 5798](#), DOI 10.17487/RFC5798, March 2010, <<https://www.rfc-editor.org/info/rfc5798>>.
- [RFC5880] Katz, D. and D. Ward, "Bidirectional Forwarding Detection (BFD)", [RFC 5880](#), DOI 10.17487/RFC5880, June 2010, <<https://www.rfc-editor.org/info/rfc5880>>.
- [RFC5881] Katz, D. and D. Ward, "Bidirectional Forwarding Detection (BFD) for IPv4 and IPv6 (Single Hop)", [RFC 5881](#), DOI 10.17487/RFC5881, June 2010, <<https://www.rfc-editor.org/info/rfc5881>>.
- [RFC5883] Katz, D. and D. Ward, "Bidirectional Forwarding Detection (BFD) for Multihop Paths", [RFC 5883](#), DOI 10.17487/RFC5883, June 2010, <<https://www.rfc-editor.org/info/rfc5883>>.
- [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>>.

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