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Probing IP Interfaces By Virtual Function Index
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Abstract

This document enhances the PROBE diagnostic tool so that it can identify the probed interface by Virtual Function Index. In order to achieve that goal, this document also extends the Interface Identification Object. The Interface Identification Object is an ICMP Extension Object class.

Status of This Memo

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1. Problem Statement

PROBE [RFC8335] is a diagnostic tool that can be used to query the status of an interface. PROBE sends an ICMP Extended Echo Request message to a proxy interface. The ICMP Extended Echo Request message contains an ICMP Extension Structure and the ICMP Extension Structure contains an Interface Identification Object. The Interface Identification Object identifies the probed interface by name, ifIndex or address.

When the proxy interface receives the ICMP Extended Echo Request, the node upon which it resides executes access control procedures. If access is granted, the node determines the status of the probed interface and returns an ICMP Extended Echo Reply message. The ICMP Extended Echo Reply indicates the status of the probed interface.

This document enhances the PROBE so that it can identify the probed interface by Virtual Function Index (VFI) [SR-IOV]. In order to achieve that goal, this document extends the Interface Identification Object. The Interface Identification Object is an ICMP Extension Object class.

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.

3. ICMP Extended Echo Request Message

Section 2.1 of [RFC8335] defines the ICMP Extended Echo Request message. As per [RFC8335], the ICMP Extended Echo Request message contains the following fields:

- Type
- Code
- Checksum
- Identifier
- Reserved
- L (local)
- ICMP Extension Structure

Section 7 of [RFC4884] defines the ICMP Extension Structure. As per [RFC4884], the Extension Structure contains exactly one Extension Header followed by one or more objects. When applied to the ICMP Extended Echo Request message, the ICMP Extension Structure contains exactly one instance of the Interface Identification Object. Section 2.1 of [RFC8335] defines the Interface Identification Object. Section 4 of this document extends that definition.

If the L-bit is set, the Interface Identification Object can identify the probed interface by name, index, address or VFI. If the L-bit is clear, the Interface Identification Object identifies the probed interface by address.

4. Interface Identification Object

Section 2.1 of [RFC8335] defines the Interface Identification Object. The Interface Identification Object identifies the probed interface by name, index, or address. Like any other ICMP Extension Object, it contains an Object Header and Object Payload. The Object Header contains the following fields:

- Class-Num: Interface Identification Object. The value is 3.
- C-Type: Determines how the probed interface is identified.

- Length: Length of the object, measured in octets, including the Object Header and Object Payload.

Currently, the following values are defined for C-Type:

- (0) Reserved
- (1) Identifies Interface by Name
- (2) Identifies Interface by Index
- (3) Identifies Interface by Address

This document defines the following, new C-Type:

- (value TBD by IANA) Identifies Interfaces by Virtual Function Index (VFI)

If the Interface Identification Object identifies the probed interface by Virtual Function Index, the length is equal to 8 and the payload contains the Virtual Function Index.

5. ICMP Extended Echo Reply Message

Section 3 of [RFC8335] defines the ICMP Extended Echo Reply message. This document does not change that definition.

6. ICMP Message Processing

Section 4 of [RFC8335] defines the ICMP message processing. This document does not change that definition.

7. Updates To RFC 8335

Section 2 of [RFC8335] states:

"If the L-bit is set, the Interface Identification Object can identify the probed interface by name, index, or address. If the L-bit is clear, the Interface Identification Object MUST identify the probed interface by address."

This document updates that text as follows:

"If the L-bit is set, the Interface Identification Object can identify the probed interface by name, index, address, or Virtual Function Index (VFI). If the L-bit is clear, the Interface Identification Object MUST identify the probed interface by address."

8. IANA Considerations

IANA is requested to add the following a new C-type:

- (value TBD by IANA) Identifies Interfaces by Virtual Function Index (VFI)

This new C-Type is to be added to the Interface Identification Object under the "ICMP Extension Object Classes and Class Sub-types" registry.

9. Security Considerations

This documen neither extends nor mitigates any of the security considerations mentioned in [RFC8335].

10. Acknowledgements

The authors wish to acknowledge Ross Callon for his helpful comments.

11. References

11.1. Normative References

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[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>.

[RFC8335] Bonica, R., Thomas, R., Linkova, J., Lenart, C., and M. Boucadair, "PROBE: A Utility for Probing Interfaces", RFC 8335, DOI 10.17487/RFC8335, February 2018, <https://www.rfc-editor.org/info/rfc8335>.

11.2. Informative References

[SR-IOV] PCI-SIG, ., "Single Root I/O Virtualization and Sharing Specification Revision 1.1", January 2010, <https://members.pcisig.com/wg/PCI-SIG/document/download/8238>.

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