Abstract

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

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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 as per [RFC8335] security considerations. 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.

Virtualized instance of the network adapter are created out of a Network Interface Card to enable efficient sharing of Network Interface Card in a virtualization environment. These Virtualized instances of the network adapter are implemented in the hardware and assigned a Vendor Specific Identifier to uniquely identify the Virtualized instance of the network adapter.

This document enhances the PROBE so that it can identify the probed interface by Vendor Specific Identifiers. This probe type is necessary when none of the other probe types of PROBE (i.e., probe interface by name, probe interface by address, etc) work.

Virtual Function Index (VFI) [SR-IOV] is one (but not the only) instance of Vendor Specific Identifiers. Vendor Specific Identifiers, hereinafter referred to as VSI in the remaining part of this document. In order to achieve PROBE’s enhancement, this document extends the Interface Identification Object. The Interface Identification Object is an ICMP Extension Object class.

2. Requirements Language
3. ICMP Extended Echo Request Message

Section 2 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.
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Currently, the following values are defined for C-Type:

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

This document defines the following, new C-Type:

o  (value TBD by IANA) Identifies Interfaces by Vendor Specific Identifier (VSI)

Every vendor specific ID needs to be N-bits long and the vendor gets to have exactly one of them (i.e., either VFI or some other Vendor Specific Identifiers). If the Interface Identification Object identifies the probed interface by VSI (Vendor Specific Identifier), the payload is as depicted in Figure 1.

```
  0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                   enterprise-number                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Identifier Length |            Reserved                      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+                                  
.             identifier(variable length)                       
.                                                               
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 1: VSI Format

This VSI consists of the 4-octet vendor’s registered Private Enterprise Number as maintained by IANA [IANA-PEN] followed by a unique identifier assigned by the vendor.

Payload fields are defined as follows:

o  Identifier Length: Number of significant bytes contained by the VSI. (The VSI field contains significant bytes and padding bytes.)

o  Reserved: This field MUST be set to 0 and ignored upon receipt.

o  Identifier: This variable-length field represents an Identifier associated with the probed interface. If the Identifier field would not otherwise terminate on a 32-bit boundary, it MUST be padded with zeroes.
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 Vendor Specific Identifier (VSI). 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 Vendor Specific Identifier (VSI)

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

10. Acknowledgements

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11. References

11.1. Normative References


[RFC4884] Bonica, R., Gan, D., Tappan, D., and C. Pignataro,


11.2. Informative References


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