Extended Ping (XPING)
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IETF 97

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Motivation

• An operator deploys a router with
  • An unnumbered IPv4 interface
  • An IPv4 interface numbered from RFC 1918 address space
  • An IPv6 interface numbered from link-local space
• Sadly, these interfaces cannot be pinged from all points on the Internet
• XPING to the rescue!
How Does Xping Work?

• XPING is an application
  • Very similar to PING

• User specifies a destination interface and a probed interface
  • Destination interface must be reachable from the probing node
  • Probed interface does not need to be reachable from the probing node
  • Destination and probed interfaces must be local to one another

• Xping sends an ICMP Extended Echo message to the destination interface
  • ICMP Extended Echo message is new
  • ICMP Extended Echo message includes Interface Identifier Object
  • Interface Identifier Object identifies probed interface by name, ifIndex, or address
How Does Xping Work? (continued)

• Recipient of ICMP Extended Echo Message determines
  • Whether the query is well-formed
  • Whether the query type is supported
  • Whether the query uniquely identifies a probed interface
  • Whether the probed interface exists
  • The operational status of the probed interface
  • Which protocols are running on the probed interface (IPv4, IPv6)

• The recipient of the ICMP Extended Echo Message sends an *ICMP Extended Echo Reply*
  • New ICMP message
  • Reflects the above mentioned information
reji@R11_re0:~ # xping -I ge-0/0/0.0 10.10.10.2
PING 10.10.10.2 (10.10.10.2): 56 data bytes
8 bytes from 10.10.10.2 via ge-0/0/0.0: icmp_seq=0 ttl=64
Extended Ping Results
Queried for status of Interface name : ge-0/0/0.0
Status: IPv4 ACTIVE
IPv6 ACTIVE

--- 10.10.10.2 ping statistics ---
1 packets transmitted, 1 packets received, 0% packet loss
reji@R11_re0:~ # xping -l fe80::1 10.10.10.2
PING 10.10.10.2 (10.10.10.2): 56 data bytes
8 bytes from 10.10.10.2 via ge-0/0/0.0: icmp_seq=0 ttl=64
Extended Ping Results
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Status: IPv4 ACTIVE
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ICMP Extended Echo Message

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Checksum</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Identifier</td>
<td>Sequence Number</td>
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</tbody>
</table>

*ICMP Extension Structure described in RC 4884

ICMP Extension Structure contains one or two Interface Identifier Objects
Interface Identifier Object

• Identifies probed interface by name, ifIndex or address
• Class-Num : TBD by IANA
• C-Type
  • By Name (1) : Payload is interface name
  • By ifIndex (2) : Payload is ifIndex
  • By Address (3): Payload is TLV
AFI can be any address type (IPv4, IPv6, MAC)

Some addresses may not uniquely identify an interface (e.g., IPv6 link-local). In such cases, two Interface Identification Objects can be specified.
ICMP Extended Echo Response Message

<table>
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</thead>
<tbody>
<tr>
<td>Identifier</td>
<td>Sequence Number</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Reserved</td>
<td>Protocol Flags</td>
</tr>
</tbody>
</table>
ICMP Extended Echo Response Message

• Type, checksum, identifier and sequence numbers are as defined for the ICMP Echo message

• Code
  • No Error (0)
  • XPING not enabled (1)
  • Malformed query (2)
  • Query type not enabled (3)
  • No such interface (4)
  • Multiple interfaces satisfy query (5)

• S field is set if Code is equal to No Error and probed interface is up

• Protocol Flags indicate which protocol are running on probed interface
Next Steps

• Call for adoption