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
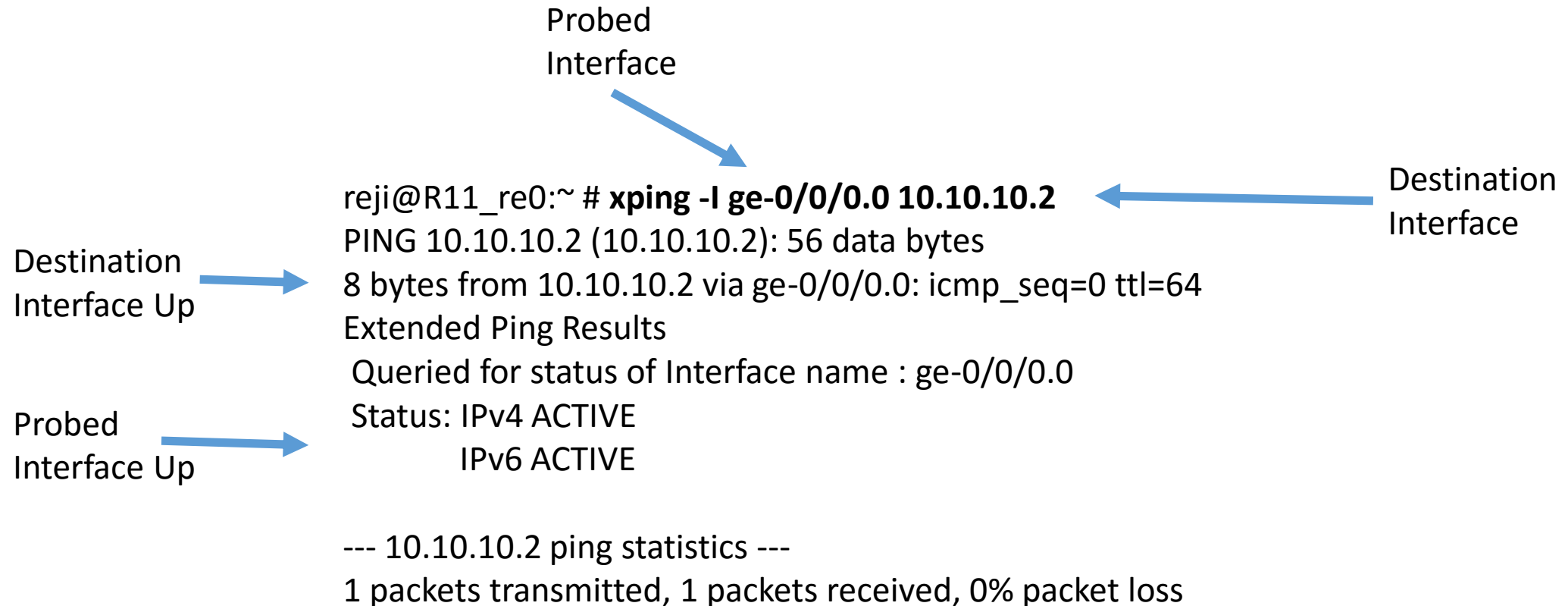- XPING to the rescue!

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
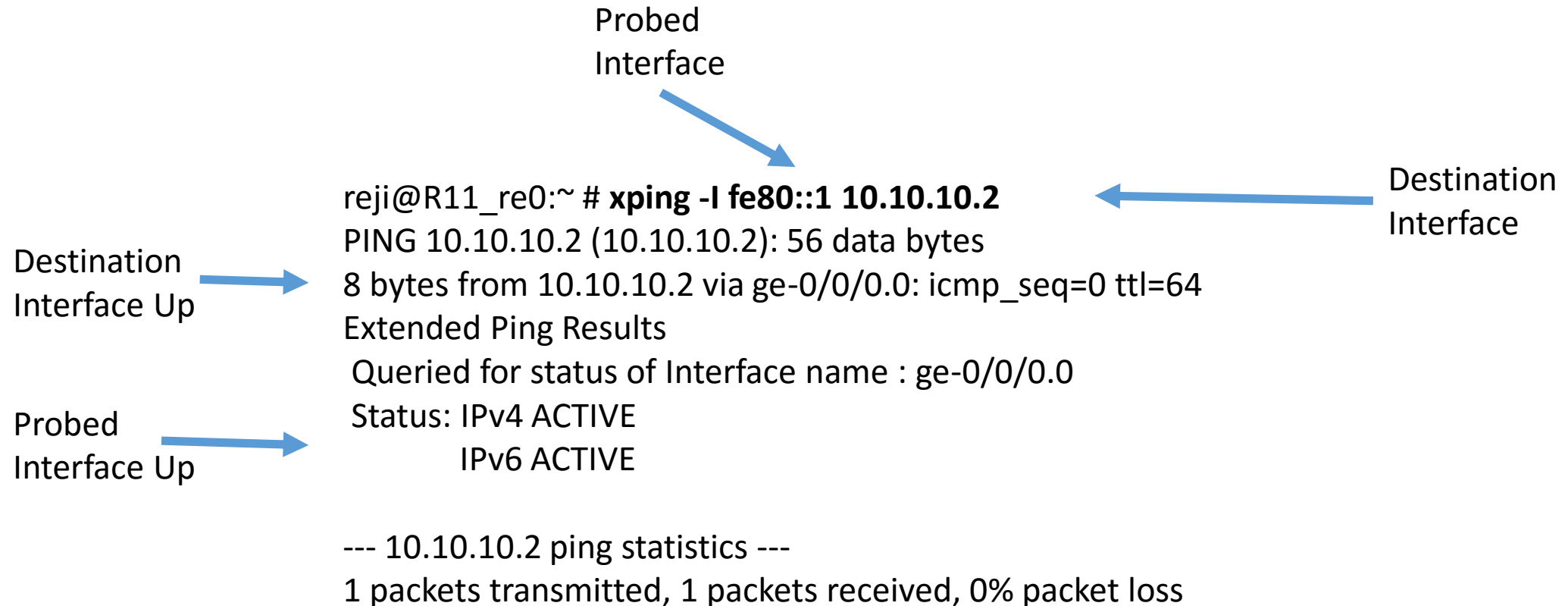
How Does Xping Work? (continued)

- 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

XPING: User View By Name

Probed
Interface

Destination
Interface

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

Destination
Interface Up

Probed
Interface Up

XPING: User View by IPv6 Link-local Address

Probed
Interface

reji@R11_re0:~ # **xping -I fe80::1 10.10.10.2**

Destination
Interface

PING 10.10.10.2 (10.10.10.2): 56 data bytes

Destination
Interface Up

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

Probed
Interface Up

 Status: IPv4 ACTIVE

         IPv6 ACTIVE

--- 10.10.10.2 ping statistics ---

1 packets transmitted, 1 packets received, 0% packet loss

ICMP Extended Echo Message

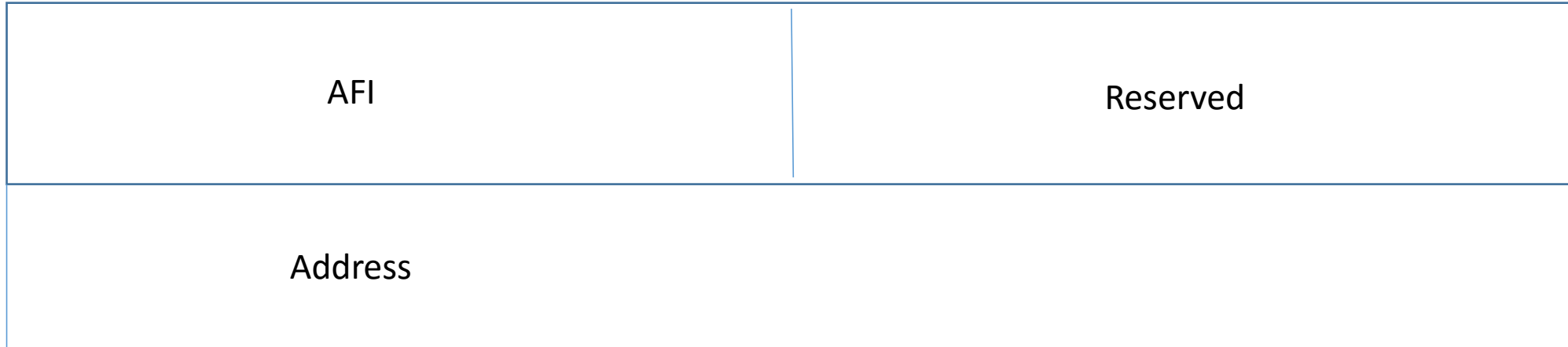| Type	Code	Checksum
Identifier		Sequence Number
ICMP Extension Structure*		

* 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

Interface Identifier Object Payload: C-Type 3

AFI	Reserved
Address	

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

Type	Code	Checksum
Identifier		Sequence Number
S	Reserved	Protocol Flags

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