Babel: source-specific and v4-via-v6

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4 March 2022

Published documents:

- RFC 8965, applicability;
- RFC 8966, base specification;
- RFC 8967, MAC authentication;
- RFC 8968, Babel over DTLS.

> *The current procedural rules [...] can lead to situations where WGs or document authors believe that one or two ADs are deliberately blocking the progress of a WG document [...] Appeal processes in these circumstances are limited — RFC 3774, May 2004*

Unpublished documents:

- information model and YANG;
- source-specific;
- v4-via-v6;
- diversity (not planning to publish).

Source-specific

Implemented in 2014, published as

Matthieu Boutier and Juliusz Chroboczek. Source-specific routing. *IFIP Networking*, 2015.

draft-ietf-babel-source-specific:

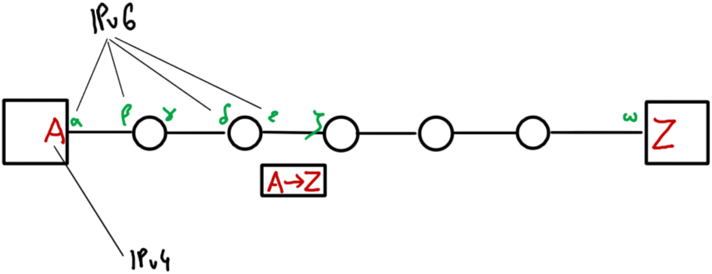
- technically correct;
- technically complete;
- difficult to understand without reading the paper.

The document is badly written :

- no point addressing individual IESG comments ;
- rewrite, make better, resubmit.

v4-via-v6

draft-ietf-babel-v4-via-v6: IPv4 via IPv6 next hops.



No encapsulation, no translation: IPv6 is only used for neighbour discovery.

v4-via-v6

- Configure an IPv6 Babel network;
- IPv4 routing works out of the box:
  - no configuration of intermediate routers;
  - no encapsulation;
  - no translation.

Encourages the IPv4 ⟶ IPv6 transition:

- makes it worthwile to build an IPv6 network.

v4-via-v6

draft-ietf-babel-v4viav6-00:

- implemented (Théophile Bastian) in spring 2021;
- some testing (not enough);
- presented (as “v4-in-v6”) to Babel WG.

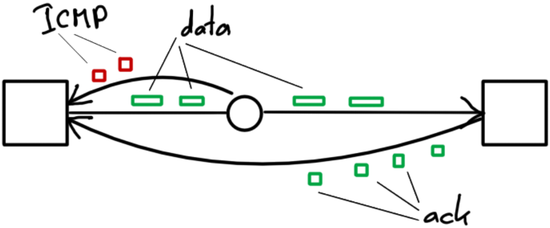
Margaret Cullen (thanks!) noticed two problems:

- the name was misleading, v4-via-v6 is better;
- what about ICMP.

v4-via-v6 and ICMP

Modern IPv4 relies on ICMP from intermediate routers:

- PMTU discovery relies on *fragmentation required*.



Three distinct paths:

- data path;
- ack path;
- ICMP path (for every router).

There is no fate sharing between the data/ack paths and the ICMP path. End-to-end is broken!

v4-via-v6 and ICMP (2)

Three distinct paths:

- data path;
- ack path;
- ICMP path (for every router).

With v4-via-v6, the ICMP path is not necessarily operational.

Since there is no fate sharing, mysterious failures.

v4-via-v6 and ICMP: solutions

ICMP needs a source address on each router.

Possible solutions:

1. require that every router have an IPv4 address; or
2. use a single IPv4 address for all routers; or
3. define ICMPv4-via-v6 for unnumbered hosts;
4. give up on ICMP.

Solution 1: IPv4 address on each router

To send ICMPv4, a router requires an IPv4 address.
Need not be assigned to the outgoing interface.
(Weak host model.)

Require an IPv4 address on each router:

- loopback address (Cisco-style);
- borrowed from another interface (Linux-style).

Consequences:

- requires manual per-router configuration;
- only one address per router, not per interface.

Mitigation:

- Donald suggests that the IPv4 address could be autogenerated (drawn randomly) à la *Zeroconf*.

Solution 2: a single IPv4 address for all routers

Require an IPv4 address on each router.
Use the same address on all routers.

Consequences:

- no per-router configuration;
- debugging made more difficult.

Issues:

- should this “fake” address be reserved, or locally assigned?
- what experience is there with sharing addresses (not NAT, not anycast — only used as source).

Solution 3: define ICMPv4-via-v6

Define a way to send ICMPv4 without an IPv4 address.

Compounds the third path problem:
lack of fate sharing made worse (IPv4 vs. IPv6).

Out of scope for this working group.

Solution 4: give up on ICMPv4

Original sin: ICMPv4 as an integral part of the protocol.
(As opposed to debugging and fault isolation.)

Solution: avoid relying on ICMPv4.

Example: RFC 4821,
Packetization Layer Path MTU Discovery.

(More explicit datapath signalling might be better.)

Out of scope for this working group.

Proposal and conclusion

Proposed wording:

- every IPv4 router MUST have at least one IPv4 address;
  - giving up on ICMPv4 is not currently an option;
- sharing a single address between routers is a tempting option, but more experimentation is needed;
  - that's why we're aiming for experimental.

Only mention in passing:

- ICMPv4-via-v6;
- packetisation-layer pMTUd.

Agreed?