Babel: recent developments

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Babel is a (layer 3) routing protocol:
- designed for hybrid networks, e.g.
  - wired backbone with meshy bits at the edges; or
  - wired bits connected by a wireless mesh;
- the usual features of traditional protocols:
  - filtering, etc.
- competitive with dedicated mesh protocols.
Babel

Babel IETF Standards Track (RFC 8966, January 2021).

A number of useful extensions:
- (H)MAC authentication;
- source-specific routing;
- v4-via-v6 routing;
- RTT-sensitive metrics.

These extensions are:
- implemented in both Babeld and BIRD;
- interoperable with the base protocol;
- (in principle) protocol-agnostic: easily adapted to other routing protocols.
MAC authentication

RFC 8967 defines an authentication protocol:
- minimalistic and easy to implement
  - RFC 8968 defines a more comprehensive protocol;
- invulnerable to replay
  - pen-and-paper proof;
- minimal requirements:
  - no real-time clocks,
  - no persistent storage;
- protocol-agnostic.
Source-specific routing

RFC 9079 defines source-specific routing for Babel:
– routes packets depending on their source;
– allows a cheap form of network multihoming;
– requires kernel support (Linux 3.11 and later);
– requires host changes for best performance;
– protocol-agnostic.
RFC 9229 defines v4-via-v6 routing for Babel:
- IPv4 routes through IPv6 nodes;
- no translation, no tunnelling:
  - almost indistinguishable from magic;
- required kernel changes:
  - IP: Linux 5.2,
  - ICMP: Linux 5.13 (Toke Høyland-Jørgensen);
- protocol-agnostic.
RTT-sensitive

Draft-ietf-babel-rtt-extension defines RTT-sensitive metric for Babel:

- designed for tunnels (overlay networks):

- widely deployed in production since 2014;
- the draft needs more work
  - didn’t prevent independent implementation in BIRD;
- somewhat protocol-agnostic.
Conclusion

Babeld and BIRD implement a number of useful extensions to the base Babel protocol:

– MAC authentication;
– source-specific routing;
– v4-via-v6 routing;
– RTT-sensitive metrics.

These extensions are protocol-agnostic: they could easily be implemented in other routing protocols.

Please steal our ideas and adapt them to your favourite routing protocol.

(We’ll take it as a compliment.)