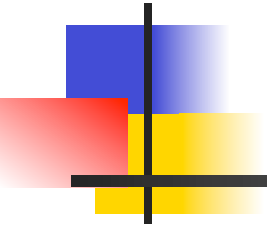


Homenet Routing Comparison

draft-mrw-homenet-rtg-comparison-02.txt



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Document Purpose & Status

- Compares Babel and IS-IS routing protocols based on criteria pertinent to Homenet environments
- Intended to aid Homenet WG in making an informed routing protocol choice
- Babel information from Babel expert (Juliusz Chroboczek)
- IS-IS information from IS-IS expert (Christian Hopps)
- Not a consensus document of any group



IS-IS Specifications Considered

- Base IS-IS protocol specification (ISO10589)
- Use of OSI IS-IS for Routing in TCP/IP and Dual Environments (RFC1195)
- IS-IS Extensions for Traffic Engineering (RFC5305)
- Routing IPv6 with IS-IS (RFC5308)
- IS-IS Auto-Configuration (draft-liu-isis-auto-conf)
- Source-Specific routing in IS-IS (draft-baker-ipv6-isis-dst-src-routing)



Babel Specifications Considered

- Base Babel Protocol specification (RFC 6126)
- Extension Mechanism for the Babel Routing Protocol
(draft-chroboczek-babel-extension-mechanism)
- Source-Specific Routing
(draft-boutier-babel-source-specific & <http://arxiv.org/abs/1403.0445>)



Key Differences

- This presentation focuses on the key differences between IS-IS and Babel for use as a Homenet Routing Protocol
- There were other criteria considered in the document where both protocols were largely equivalent



Support for Link Metrics

- Both protocols have sufficiently wide metrics (16-bits for Babel, 24-bits for IS-IS)
- Babel automatically includes multiple sources of information in metric calculations
 - Wireless/wired, packet loss, latency, radio interference
- IS-IS uses default metric unless configured to do otherwise

- Support for dynamically computed link metrics could be added to IS-IS
 - Getting this right in Babel was non-trivial
 - IS-IS might be able to leverage some of that work but may require a different stability algorithm



Multicast Routing

- IS-IS has support for multicast metrics
- Babel does not

- There has been some discussion that this is not an important difference, because
 - We do not currently support multicast in Homenet
 - Some people consider it better to run a separate multicast routing protocol, anyway



Encapsulation

- Babel is an IP-based protocol
- IS-IS runs directly over a link-layer protocol
- As a result, IS-IS requires “raw sockets” or some other means to send packets directly over a link layer, which complicates porting to new systems/architectures
- Special support needed for PPP, PPPoE and GRE (and perhaps Zigbee?) links



Resource Exhaustion Behavior

- Babel degrades gracefully in presence of resource exhaustion
 - As long as default route is not discarded, not prioritized in current code
 - Redundant routes are discarded first
- IS-IS contains explicit notification of “overload”
 - An overloaded router becomes “destination only” (i.e. a stub router)
- How likely are we to reach resource exhaustion on non-stub Homenet routers?



Performance on IEEE 802.11 Links

- Babel has been carefully optimized for wireless deployments
 - Control traffic is optimized for lossy, variable bandwidth links
 - Works with IBSS (non-transitive communication) links, such as mobile ad-hoc networks
- There is no solid information for how IS-IS performs on 802.11 links
 - Will not work on IBSS links because DIS and pseudo-node optimization assume that communication is transitive

Standardization Status



- IS-IS is documented in IETF standards-track RFCs
 - Has an active IETF WG for maintenance
 - Some extensions are in drafts, but could be standardized by IS-IS for use in Homenet
- Babel is documented in Individual Submission Experimental RFCs
 - No IETF WG
 - Would require down-ref (if allowed) for use in Homenet standards-track documents

Implementation Status



- There are multiple, independent, interoperable implementation of IS-IS
 - Three open source implementations (AutoISIS in Erlang, alpha-quality Quagga implementation in C, and tinyisis stub router implementation in C)
 - Multiple proprietary implementations
- Two open source implementations of Babel
 - babeld in C, and sbabeld stub router implementation in C, both by the same author
 - No known proprietary implementations

Open Source Implementations

	babeld(ss)	sbabeld(stub)	AutoISIS(ss)	tinyisis(stub)
Protocol	Babel	Babel	IS-IS	IS-IS
Version	2598774	cc7d681	[update]0.8.0	3ed2068
Date	2014-09-08	2014-11-21	2014-08-26	2015-02-22
License	MIT	MIT	Apache 2.0	Apache 2.0
Lines of Code	10,000 (C)	1,000 (C)	7,000 (Erlang)	1,300 (C)
Installed Size	129kB	13kB	732kB	17kB
Total Installed Size	129kb	13kB	11MB	17kB
Baseline RSS	~300kB	~200kB	17MB	330kB



Deployment Status

- IS-IS is quite widely deployed in managed networks
 - Little/no deployment in unmanaged networks
 - IS-IS source-specific routing has not been deployed
- Babel is much less widely deployed
 - Source-specific Babel has seen some deployment in CeroWRT and an optional package for OpenWRT



Document Feedback

- Much discussion and feedback, not all reflected in current document
- Open questions:
 - Add OSPF? Would the WG find this useful?
 - Need for improved section on security? What would it contain?
- Further updates may be moot if we decide on a routing protocol today



Thank you

- Questions? Comments?
- Feedback to the Homenet WG
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