Routing in a small network: some considerations

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Initial requirements

- ODA implementations generally use open source code that is generally available
  - A google-search survey of 20 consumer-grade IPv4 residential gateways found that all except one supported RIPv2, and one that supported RIPv2 also supported RIPv1 and OSPFv2

- IETF general rule on routing protocols
  - Historically *interoperable implementation is documented* at least by DS, and in practice at PS.

- IEEE 802.15.4 has special requirements
  - Hence consider RPL or manet protocols

- Zero Configuration

- Bottom line: must be able to calculate reasonable routes including default routes
IPv4 “Analysis” documents

Typical configurations: the watchword is “simple”

- Single router with some number of subnets
- Multi-router generalized network
- Multi-router Tree network
- Multihomed network
Simplest case: only one router

- If there is only the CPE Router, it derives routing from:
  - 2000::/3 route upstream
  - Interface routes
- Essentially static routing
- Running a routing protocol
  - Doesn’t hurt
  - Doesn’t help
Next-simplest case: Non-looping networks

- CPE Router
  - 2000::/3 route upstream
  - Interface routes
- Interior routers
  - Interface routes
- Protocol:
  - Any working protocol acceptable
Multipath Networks

- Ideally want a protocol that works well in multipath networks
  - Not a great advertisement for RIP variants
  - Strong point of OSPF/IS-IS
- OSPF/IS-IS can help with prefix allocation
  - DR allocates prefix for subnet
**Multihoming**

- **Definition:**
  - Connects to multiple upstream networks

- **If you assume upstream BCP 38**
  - Option: RFC 3704
  - Option: new protocol that can announce routing policy

- **Rule that would be nice:**
  - Default route for traffic with a given source prefix is via router that announced the prefix
Protocol styles

- Distance vector/Bellman-Ford
  - RIPng, AODV
  - RPL around a DAG
  - Relatively small code
  - Issues around route changes

- SPF
  - OSPF/IS-IS (DV across area boundaries)
  - Relatively large code, exists in gated
Proactive vs Reactive

- Proactive routing protocols maintain all routes all the time
  - Familiar routing protocols include RIPng, OSPF, IS-IS, OLSR, and one mode of RPL, etc
- Reactive routing protocols calculate a route when a route is needed
  - RPL and AODV fall in this category
  - Useful when routes frequently change
  - Appropriate in IEEE 802.15.4 networks