Homenet Routing DT

Discussion Process

- Examine existing IGPs
  - BABEL and IS-IS represent the distance-vector and link state options
  - OSPF is possible, but anything applicable to OSPF would also be applicable to IS-IS
- Examine RFC7368
- Look at mailing lists and other sources to expand the requirements list
- Consider each requirement in terms of routing protocols
  - Discard those that appear to be unrelated to routing

Discussion Realities

- Low participation
- Many requirements are unclear
  - Clarification sought
  - Different people give different answers

MUST + Clearly Defined

Existing Protocol

- *The homenet routing protocol should be based on a previously deployed protocol that has been shown to be reliable and robust.*
  RFC7368
  - BABEL, IS-IS are both previously deployed
  - Both appear to fulfill this requirement

Lightweight Implementation

- *The resulting code must support lightweight implementations and be suitable for incorporation into consumer devices, where both fixed and temporary storage and processing power are at a premium.*
  RFC7368
  - Either BABEL or IS-IS can be run on this class of device
  - BABEL appears to have a slight edge
    - The key point is the services required, as a larger set of services requires more processor and memory resources
    - As services are added to any protocol…

Community Support

- Protocol must have a community of support and a clear path to standardization
  - IS-IS has a wider community of support
  - IS-IS more likely to be understood and supported by providers offering managed services in the home*
  - BABEL has a community of support, however

*This is out of charter, but it does seem to be a concern of some providers

Multiple Physical Networks

- *Multiple types of physical interfaces must be accounted for in the homenet routing topology. Technologies such as Ethernet, Wi-Fi, Multimedia over Coax Alliance (MoCA), etc.*
  RFC7368
  - IS-IS runs over layer 2, so specific steps would need to be taken for each layer 2
    - On the other hand, IS-IS will likely need to run over all of these anyway, so the additional work is likely minimal
  - BABEL runs over IP, so it will run over anything IPv6 is defined on

Autoconfiguration

- *The routing environment should be self-configuring…*
  RFC7368
  - IS-IS: draft-liu-isis-auto-conf
  - BABEL: ??
- One remaining area of work is not building adjacencies “outside this realm”
  - draft-liu-isis-auto-conf has some text on this
  - But no fully thought out solution (?)

Source Based Routing

- *Given a packet with a source address on the home network, the packet must be routed to the proper egress to avoid ingress filtering as described in BCP 38 if exiting through the wrong ISP.*
  RFC7368
  - IS-IS: draft-baker-ipv6-isis-dst-src-routing
  - BABEL: ??
- Given the above, assume this doesn't imply an overlay network

MUST + Unclear

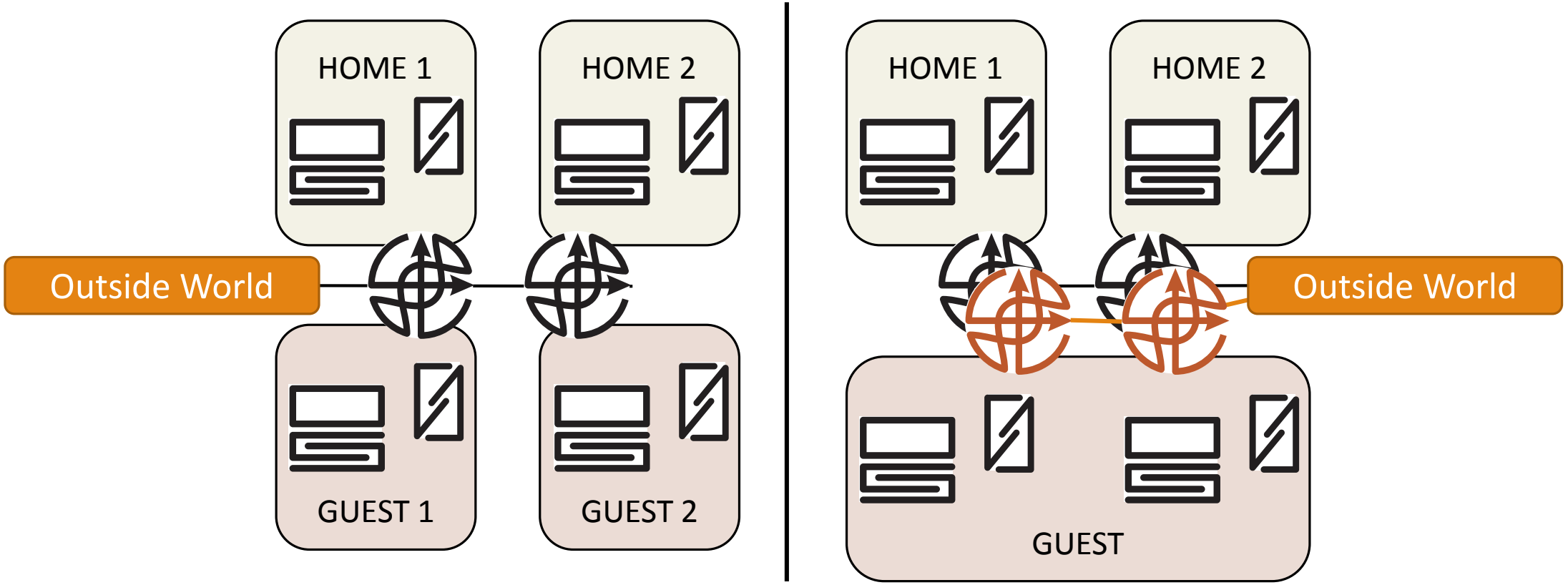
Traffic Engineering

- *Homenet protocols should be designed to deal well with interconnecting links of very different throughputs. … the homenet protocols should be able to choose the faster links and avoid the slower ones.*
  RFC7368
- If this means traffic engineering, then a link state view of the topology is required
- If this just means single metrics, then either protocol can fulfill this requirement

Internal Realms

- *A homenet will most likely also have internal borders between internal realms, e.g., a guest realm or a corporate network extension realm. It is desirable that appropriate borders can be configured to determine, for example, the scope of where network prefixes, routing information, network traffic, service discovery, and naming may be shared.*
  RFC7368
- Does this mean:
  - An overlay?
  - Each subnet is classified as being on one realm?
    - How does traffic move between subnets on different realms if there's no overlay?
  - Each subnet has one instance of each realm?

Internal Realms



Unclear

NOT CERTAIN IF THESE ARE MUST, SHOULD, OR NOT RELATED TO ROUTING

Rapid Renumbering

- *This implies a need for the homenet to be able to handle a sudden renumbering event that, unlike the process described in [RFC4192], would be a 'flag day' event, which means that a graceful renumbering process moving through a state with two active prefixes in use would not be possible.*
  RFC7368
  - HNCP handles numbering, so routing is “just following”
  - Can routing operate during such a renumbering event?
  - Renumbering doesn’t appear to impact either protocol
    - IS-IS runs at layer 2
    - BABEL can run over link local addressing (?)
  - Does the routing protocol need to play a role?

Device Mobility

- *Devices may be mobile within the homenet. While resident on the same subnet, their address will remain persistent, but should devices move to a different (wireless) subnet, they will acquire a new address in that subnet. It is desirable that the homenet supports internal device mobility. To do so, the homenet may either extend the reach of specific wireless subnets to enable wireless roaming across the home (availability of a specific subnet across the home) or support mobility protocols to facilitate such roaming where multiple subnets are used.*
  RFC7368
- This appears to require either host routing or a virtual overlay
  - But which one?

Recommendations

First Choice

- BGP
- We do everything else with BGP, so why not? ☺

Seriously...

- No “clear winner” at this point
- Some requirements need clarification
- Lots of new technologies on the horizon in this space
- Given this, whither?

SHOULD Actions

- Add a control plane election mechanism to HNCP
  - Allows future flexibility
    - Newer layer 2 standards are being formalized
    - Different providers might prefer different solutions in their managed networks

SHOULD Actions

- Build a document that clearly explains the requirements
  - No clear separation between what HNCP, the routing protocol, and other mechanisms are expected to do
  - Some requirements are unclear – these need to be hammered out
- Build a document that clearly explains the gaps for each protocol
  - Give the community a clear sense of the work that needs to be done
- Build a WG that can support the development of BABEL

Do we need to decide?

- What is the timeline for the large scale requirements?
  - How many homes with hundreds/thousands of wired ports are being built today?
    - Even including network over power and other wired mechanisms
  - Can we decide when this starts to happen?
  - Could give us a few more years to work with the problem space and understand it better…
- On the other hand…
  - Consumer equipment has a lead time in years/decades
  - Not deciding now could cause a problem ten+ years down the road

MAY Action

- If we MUST choose today…
- Lean to IS-IS
  - Some requirements appear to need a link state view of the topology
    - But this is unclear
    - Depends on the anticipated size of the homenet and interaction with other requirements
  - Broader deployment experience and community support