

# Stub Networks

Ted Lemon <[mellon@fugue.com](mailto:mellon@fugue.com)>

# Motivation

- <https://datatracker.ietf.org/doc/draft-ietf-6lo-backbone-router/>
- Problem: how to connect a 6lowpan network to infrastructure?
- Solution: proxy ND, single address space

# Characteristics of this solution

- All devices on the stub network are numbered from the prefix of the infrastructure network.
- Each edge router must have a timely and accurate list of all devices on its stub network
- Service discovery using mDNS will work
- No special requirements from the infrastructure routing system
- Full reachability:
  - device-to-internet
  - internet-to-device
  - device-to-device, same stub network
  - device-to-device, different stub network
- No address translation
- No IPv4 legacy support

# A Modest Proposal

- Why didn't we just solve the homenet problem this way?

# Other solutions

- NAT64
- Managed, routed IPv6
- Stub reachability advertised using RA
- HNCP+BABEL
- ???

# Characteristics of NAT64

- Each stub network has its own prefix
- Prefixes can be ULAs
- Each stub network appears on the home network as a single device with a single IPv4 address
- Service discovery using mDNS will not work
- No special requirements from the infrastructure routing system
- Full reachability:
  - device-to-internet: yes
  - internet-to-device: no
  - device-to-infrastructure: yes
  - infrastructure-to-device: not easily
  - device-to-device, same stub network: yes
  - device-to-device, different stub network: no
- Address translation
- IPv4 legacy support

# Characteristics of Managed, Routed IPv6

- Each stub network has its own prefix
- Prefixes can be ULAs, GUAs or both
- Service discovery using mDNS will not work
- Somebody has to set up the network topology
- Full reachability:
  - device-to-internet: yes (if GUA)
  - internet-to-device: yes (if GUA)
  - device-to-infrastructure: yes
  - infrastructure-to-device: yes
  - device-to-device, same stub network: yes
  - device-to-device, different stub network: yes
- No address translation required
- IPv4 legacy support could be added with NAT64 at the edge

# Characteristics of Stub Reachability using Router Advertisements

- Each stub network has its own prefix
- Topology managed automatically
- Prefixes can be ULAs, GUAs or both
- Service discovery using mDNS will not work
- No special requirements from the infrastructure routing system unless GUAs are wanted
- Full reachability:
  - device-to-internet: yes (if GUA)
  - internet-to-device: yes (if GUA)
  - device-to-infrastructure: yes (assumes single backbone link)
  - infrastructure-to-device: yes (assumes single backbone link)
  - device-to-device, same stub network: yes
  - device-to-device, different stub network: yes
- No address translation required
- IPv4 legacy support could be added with NAT64 at the stub

# Characteristics of Stub Reachability using HNCP+Babel

- Each stub network has its own prefix
- Topology managed automatically
- Prefixes can be ULAs, GUAs or both
- Service discovery using mDNS will not work
- No special requirements from the infrastructure routing system unless GUAs are wanted
- Full reachability:
  - device-to-internet: yes (if GUA)
  - internet-to-device: yes (if GUA)
  - device-to-infrastructure: yes
  - infrastructure-to-device: yes
  - device-to-device, same stub network: yes
  - device-to-device, different stub network: yes
- No address translation required
- IPv4 legacy support could be added with NAT64 at the edge

# Why tell you this?

- HNCP+Babel hasn't caught on
- HNCP+Babel could be useful to address this use case
- I seriously doubt the 6lo working group even considered using HNCP+Babel
- It sucks that the IETF is essentially requiring flat topologies for networks of this type
- This will probably scale poorly and be hard to manage
- On the other hand, plug and play is nice

# Things we could do

- Advocate HNCP+Babel as a solution to this problem
  - In order to be taken seriously, we have to have running code that is as easy to use as the 6lo backbone router solution.
- Describe the Router Advertisements solution in more detail
  - We talked about this during the routing protocol wars, as the No Protocol option
  - If you look at it closely, there are clearly gaps
  - It might be worth doing a gap analysis and coming up with ways to address the gaps
  - Or maybe it's just a bad idea

# Service Discovery

- We have done some useful work on service discovery on home networks that is applicable to the problem of discovering services on stub networks
- Maybe we should finish that work and offer this as a solution