

# IPv6 Addressing of IPv6/IPv4 Translators

draft-thaler-behave-translator-addressing-00.txt

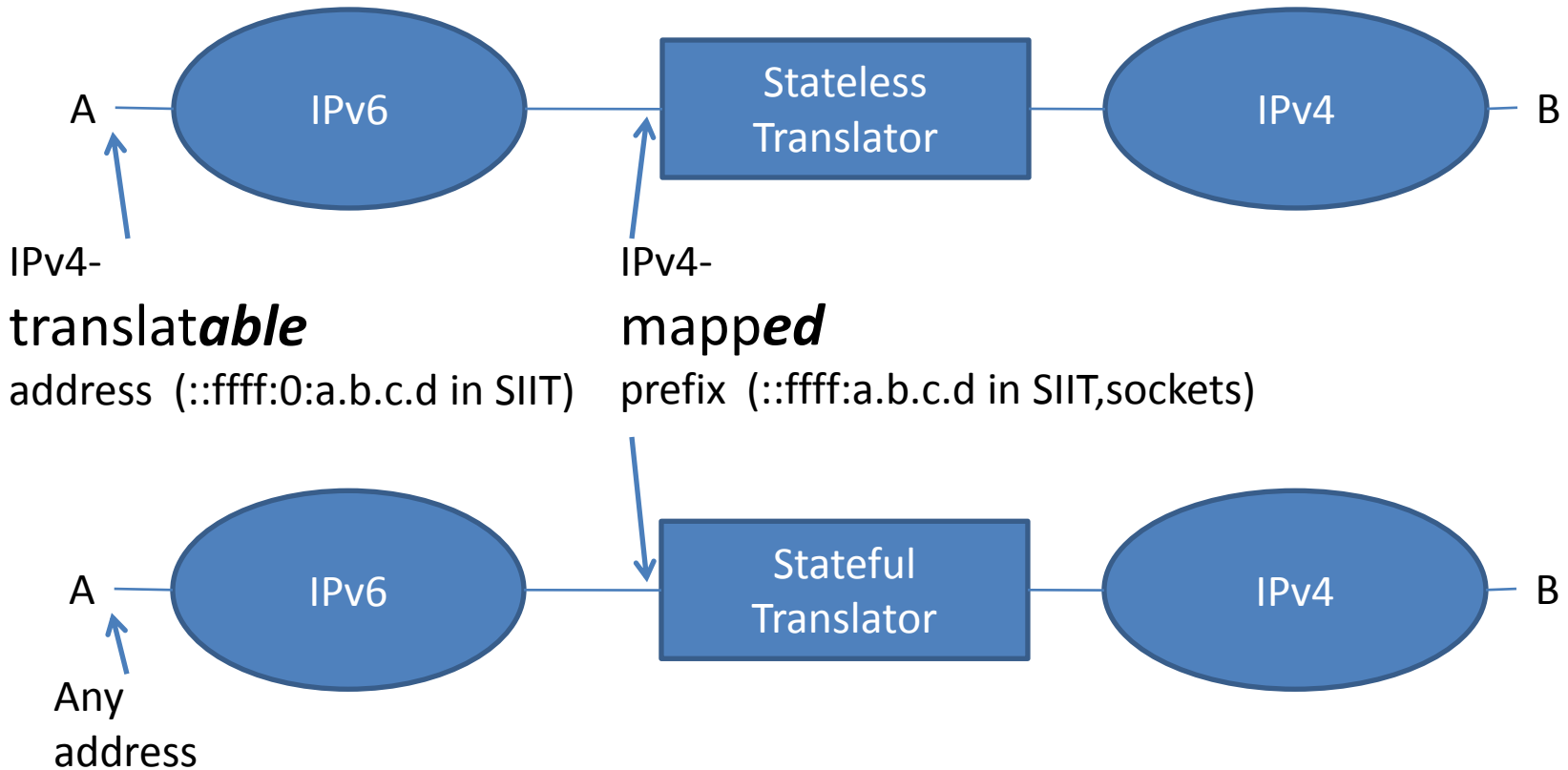
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# Terminology

IPv6 addresses assigned to IPv6 hosts:

IPv6 addresses used for IPv4 hosts:



# Prefix Requirements

## IPv4-“Mapped”:

1. With IPv6 network, an IPv4-mapped prefix MUST map to a unique IPv4 network
2. Prefix MUST be short enough to allow more-specifics for multiple translators
3. IPv6 nodes SHOULD be able to distinguish IPv4-mapped vs. native IPv6 addresses

## IPv4-“Translatable (stateless only):

4. Prefix MUST be  $\leq 64$  bits to work with stateless addrconf

## Both:

5. MUST NOT inject into IPv6 network a route for every route in the IPv4 Internet
6. SHOULD be deployable with no code changes to existing hosts
7. SHOULD only require routing on 80 bits or less

# IPv6 Internet <-> an IPv4 network

- Requires stateful
- IPv4-“Mapped”:
  - Must be network-specific prefix

# An IPv6 network <-> IPv4 Internet

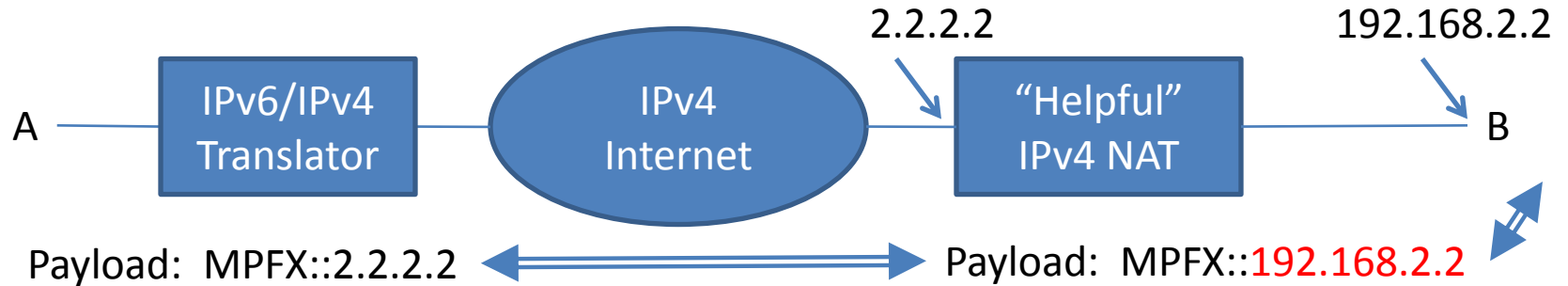
- IPv4-“Mapped”:
  - Default to a well-known prefix, but be configurable in all devices to be network-specific
  - WKP MUST NOT be advertised into IPv6 Internet, & SHOULD be filtered
  - Can’t use ::ffff:<IPv4> for in-network translator without changing hosts, so need new IANA range
- IPv4-“Translatable” (stateless only):
  - If IPv6 Internet connected, a WKP would require separate translatable vs globally-routable IPv6 prefixes
  - Simplest to just use network-specific prefix

# Address Format Requirements

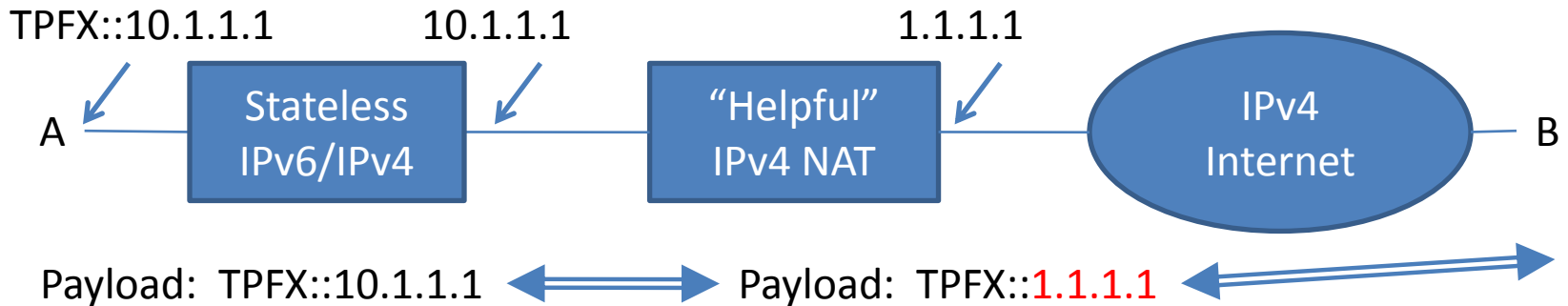
1. MUST be 1-1 and reversible
2. MUST NOT change meaning of universal/local bit (71<sup>st</sup> bit) in IPv6 address unless starts with binary 000
3. SHOULD provide space to number multiple translators if “mapped” address
4. SHOULD be checksum-neutral if stateless
5. SHOULD allow v4-dotted decimal in addr (which requires IPv4 in last 32 bits)
6. SHOULD support (optional) IPv4 topology hiding (for “IPv6 Internet” $\leftrightarrow$ “an IPv4 network” mapped addrs)
7. MAY hide IPv4 addr for “helpful” NATs

# “Helpful” IPv4 NATs

## IPv4-“Mapped” addresses:



## IPv4-“Translatable” addresses:



# Address Formats

- SIIT/sockets mapped= ::ffff:<IPv4>
- SIIT translatable= ::ffff:0:<IPv4>
- Zero-pad & embed= PREFIX::<IPv4>
- Compensation-pad & embed= PREFIX::<comp16>:a.b.c.d
- Embed & zero-pad (IVI)= PREFIX:<IPv4>::
  - Unless WKP: prefix length <38 or >70
- Embed & comp-pad= PREFIX:<IPv4>:<comp16>
- Preconfigured table



# Comparison against opt. requirements

	Route on <= /80 (xlatable)	Multiple xlators	Checksum neutral	Dotted decimal	Topology hiding	Obscure IPv4
::ffff:<IPv4>	No	Using IPv4	Yes	Yes	No	No
::ffff:0:<IPv4>	No	n/a	Yes	Yes	No	No
PFX::<IPv4>	Using PFX	Yes	No	Yes	No	No
PFX::<comp>:<IPv4>	Using PFX	Using PFX	Yes	Yes	No	No
PFX:<IPv4>::	Yes	Yes	No	No	No	No
PFX:<IPv4>:<comp>	Yes	Yes	Yes	No	No	No
Configured table	Yes	Yes	Yes	No	Yes	Yes

# Summary

- Can we narrow down the list?
- Do we need an opt. topology hiding algorithm?
- Get a new IANA WKP for IPv4-mapped default for scenarios:
  - “an IPv6 network” $\leftrightarrow$ “IPv4 Internet”
  - “an IPv6 network” $\leftrightarrow$ “an IPv4 network”
- Filter it (like `::ffff:0:0/96`) on IPv6 Internet

## More open questions:

1. Expand doc to cover encapsulation too?
  - If both, then joint Behave/Softwires doc?
2. Any additional requirements (e.g., for referrals)?
3. Deprecate SIIT IPv4-translatable format?