Framework for IPv4/IPv6 Translation
LIR vs. Well-Known

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Key point

- Due to the fundamental difference between stateless and stateful translation modes, the comparison of LIR vs. Well-know prefix should be discussed specific to the operation modes.

- The factors considered are
  - IPv6 Routing system scalability
  - Referral support
  - Native connectivity preference in communications involving dual stack nodes
  - DNS ALG configuration
  - Support for multiple translators

Stateless (1)

- IPv6 routing system scalability
  - In the stateless mode, the more specifics inside the IPv4-embedded IPv6 address block are used to represent the IPv6 end systems, therefore the LIR prefix should be used.
    - The reason is that the LIR prefix can be aggregated in the ISP's border routers and will not affect the global IPv6 routing system.
    - On the other hand, if the Well-Known prefix is used, the global IPv4 routing table will be inserted into the global IPv6 routing system, which is known to be a very bad idea.
  - In the stateless mode, it is possible to use LIR prefix to represent the IPv6 addresses in the IPv4 Internet and use Well-Known prefix to represent the IPv4 addresses in the IPv6 Internet. However, this is also a bad idea.

Stateless (2)

- ## Referral support
  - For the referral support in the stateless mode, only the IVI6 hosts use LIR prefix to represent IPv4 addresses in IPv6, and the IVI6 hosts know the PREFIX, therefore, the IVI6 hosts can pass the original IPv4 addresses to the other hosts rather than mapped form and the referral support is the same as in the dual-stack case.

- ## Native connectivity preference in communications involving dual stack nodes
  - In the stateless mode, the IVI6 hosts are IPv6 single-stack host, therefore, the native connectivity preference can be achieve automatically.

Stateless (3)

- ## DNS ALG configuration

  – For the DNS ALG configuration in the stateless mode, the IVI6 hosts know the PREFIX, therefore, DNS ALG can be implemented in the end-system without additional information.

- ## Support for multiple translators

  – Support for multiple translators is achieved automatically in the stateless mode.

Stateful (1)

- ## IPv6 routing system scalability
  - In the stateful mode, it is possible to either use LIR prefix or Well-Known prefix to represent the IPv4 addresses in the IPv6 Internet. If the LIR prefix is used, the potential leakage of the IPv6 more specifics may happen. This can be filtered at the ISP's border routers via manual configuration. If the Well-Known prefix is used, the configuration could be simpler since it is the unique Well-Known prefix.

- ## Referral support
  - A Well- Known prefix is more likely to work with referral in the case that ALG is needed than the LIR prefix.

Stateful (2)

- ## Native connectivity preference in communications involving dual stack nodes
  - If a Well-Known prefix is used, it can be configured in the default policy table. If we use a LIR prefix, we need a mean to properly configure the policy table, which is not currently available (only manual configuration is currently defined).

- ## DNS ALG configuration
  - The result is that the LIR prefix option requires more tools than the Well-Known prefix.

- ## Support for multiple translators
  - In any case, this would be achieved by inserting (or not) some subnet bits between the prefix and the embedded IPv4 address that would be used to identify the translator box.

Recommendations

- For the PREFIX selection
  - We recommend to use LIR prefix.
  - For the stateful translator, the Well-Known prefix can be used.
- For the prefix length selection
  - There are some obvious values that might be popular, including /40, /44, and /96.
  - But there is no requirement than any of them be used; this is left to the operator's discretion.
- For the SUFFIX selection
  - It is entirely zero at this time.
  - However, it could be used for the future extension of the translation functions.