IAB/IESG Recommendations on IPv6 Address Allocations

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Background

☐ **IPv6 address space has 128 bit width**

☐ **IETF ipngwg (hence IAB/IESG) recommended /48 allocation for all sites, or all households**
  ○ 48 bits for site prefix, 16 bits for subnet ID, 64 bits for interface ID

```
<- 48 --------><16 ><- 64 --------------->
+----+----+----+----+----+----+----+----+
| site prefix  |net |    interface ID    |
+----+----+----+----+----+----+----+----+
```

☐ **RIR issued a comment on address allocation**
  ○ /48 for big sites
  ○ /56 for small sites
  ○ or varaible length prefix allocation

☐ **Now IETF IAB/IESG comments back to RIR**
  ○ This document.

IPv6 design phase (1992-1995)

- **During the analysis phase, 64bit address (in total) seemed enough**
  - 40bit subnet number, 10bit hosts
- **We took a safe side and picked 128bit address**

- **Fixed site boundary (/48)**
  - Ease of renumbering
- **64bit subnet number (48 + 16), 64bit interface ID**
  - Ease of autoconfiguration

- **"Site" can be cellphone, vehicle, household**
  - Even cellphone needs subnetting

- **No shortage of /48 site prefixes was expected**

RIR allocations toward ISPs

□ **Current allocation practice is more conservative than the initial desig**

□ **sTLA allocation for ISPs**
  ○ /29 - allows 0.5 million /48 customers
  ○ /35 - allows 8000 /48 customers

□ **TLA allocation**
  ○ /16 - allows 4 billion /48 customers

□ **RIRs worried and proposed /56 or variable length allocation**

□ **Now, IAB/IESG comments back...**

The needs for fixed prefix

- **We need a fixed bounary to facilitate site renumbering**
  - Easier renumber = future adaptability, easier aggregation
  - Business incentive: more competition among ISPs

- **Some of multihoming proposals work better with fixed boundary**

- **Allow customers to grow sufficiently large**
  - /48 should be enough for almost all sites
  - If not enough, they can ask for more /48

- **RIR/ISP does not need to judge future customer growth**

- **Addresses should not be precious resource any more**
  - We don't want to introduce NAT

- **Reverse DNS table can be configured easily for multiple prefixes**

Specific requirements for /48

- **GSE proposal (8+8) asks for /48**
  - Not used at this moment, research ongoing

- **Site local prefix is fec0::/48**
  - If we set global prefix to /48, it is easier to map/renumber
  - Important for renumbering (router reumbering protocol)

- **6to4 prefix assumes /48 allocation**
  - 2002:xxxx:xxxx::/48

Conservation of address space

☐ **RIR says: /48 to all subscribers = too optimistic, waste of address**

☐ **We can get 2^{45} (3×10^{13}) /48 prefixes out of aggregatable global unicast address space**
  ○ Even with aggressive example like "One /48 prefix per human", we cannot fill it up (6×10^9 prefixe
  ○ Order of magnitude difference

☐ **H ratio analysis: the required efficiency is 0.22, and is less than the efficiency of IPv4 address allocation**

☐ **85% of IPv6 address space is still unallocated, and available for future use**

☐ **Conclusion: don't worry.**

Summary

□ **IAB/IESG recommends /48 allocation for all statically allocated IPv6 address blocks**

□ **Dynamically allocated cases?**
  ○ Basically recommends /48
  ○ It may makes sense to do /64, in some cases

□ **Technical analysis**
  ○ RIR do not need to worry that much