        A flexible allocation scheme for IP addresses (IPv4 and IPv6)
              <**draft-blanchet-ipaddressalloc-00.txt**>

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Abstract

This draft presents an IP address allocation scheme that enables the IP
allocator (the organisation that allocates addresses) to postpone the final
decision of prefix length by keeping space between allocated bits of the
different parts of the IP address. This enables the allocator to change
the different part lengths of the prefix (TLA, subTLA, SLA, ...) even after
allocated spaces. This scheme is applicable to both IPv4 and IPv6 but is
envisionned mainly for IPv6 where the address space is larger and more
flexible.

1. Context

IPv6 addresses have a more flexible structure for address allocation where
no pre-defined prefixes (called subnetmasks in IPv4) are used (except a few
special cases). It enables the registries, the service provider, the
network designer and others to allocate addresses based on different
criterias, like size of networks, estimated growth rate, etc. It happens
often that the initial design of the allocation doesn t scale well because
a small network becomes larger than expected, needing more addresses. But
then, the allocator cannot allocate contiguous addresses because they were
already assigned to another network. Non-contiguous addresses breaks the
address aggregation for routing.

RFC1219 [IPv4Assign] describes an allocation scheme for IPv4 where address
space is kept
unallocated between the leftmost bits of the subnet part and the rightmost
bits of the host part of the address. This enables the network designer to
change the subnetmask without renumbering, for the central bits that were

not allocated.

This work generalize the previous scheme by an algorithm to allocate IP
addresses for all the parts of an IPv6 address allocated by all levels of
the allocators (TLA, registries, ISPs, organisations, ...).

2. Scheme

We define parts of the IP address as p1, p2 , p3, ... pN in order, so that
an IP address is composed of all its parts contiguous. Boundaries between
each part is based on the prefix allocated by the next level allocator.
Part p1 is the leftmost part probably assigned to a TLA, Part p2 can be
allocated by the TLA to a large provider or a national registry. Part p3
can be allocated to a large customer or a smaller provider, etc. Each part
can be of different length. We define l(pX) the length of part X.

```
+------+------+------+------+------+------+
| p1   | p2   | p3   | p4   | ...  | pN   |
+------+------+------+------+------+------+
<------- ipv6 or ipv4 address ------------>
```

The algorithm for allocating addresses is as follows :
a) for the leftmost part (p1), allocate addresses using the leftmost
bits first
b) for the rightmost part (pN), allocate addresses using the
rightmost bits first
c) for all other parts (center parts), predefine an arbitrary
boundary (prefix) and then allocate addresses using the center
bits first of the part being allocated.

This algorithm grow allocated bits in such way that it keeps unallocated
bits near the boundary of the parts. This means that the prefix between
any two parts can be changed forward or backward, later on, up to the
allocated bits.

3. Allocation

p1 will be allocated as follows :

```
Order   Assignment
1 10000000
2 01000000
3 11000000
4 00100000
5 10100000
6 01100000
7 11100000
8 00010000
9 ...
```

pN (the last part) will be allocated as follows :

```
Order   Assignment
1 00000001
```

```
2 00000010
3 00000011
4 00000100
5 00000101
6 00000110
7 00000111
8 00001000
9 ...
```

pX (where 1 < X < N) will be allocated as follows : (for example, with a 8
bit predefined length l(pX)=8))


```
Order   Assignment
1 00001000
2 00010000
3 00011000
4 00000100
5 00001100
6 00010100
7 00011100
8 00100000
9 ...
```

4. Acknowledgements

5. Security Considerations

Address allocation doesn t seem to have any specific security consideration.

6. References

[IPv4Assign] RFC1219 On the assignment of subnet numbers. P.F. Tsuchiya.
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[IPv6AddrArch] IP Version 6 Addressing Architecture, R. Hinden, S. Deering,
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