

# **IPv6 Address Allocation and Assignment Policy**

*Version 0.2*

*4 April 2003*

Version	Description	Date (yyyy-mm-dd)	Approved by
v0.2	draft; revised scheme and allocation policy	2003-04-04	

<b>1</b>	<b><i>Introduction / Purpose of Document</i></b> .....	<b>1</b>
<b>2</b>	<b><i>CANARIE Address Space</i></b> .....	<b>1</b>
<b>3</b>	<b><i>Allocations</i></b> .....	<b>1</b>
<b>3.1</b>	<b>Allocation Scheme</b> .....	<b>1</b>
<b>3.2</b>	<b>GigaPoP Operator Sub-Allocations</b> .....	<b>2</b>
<b>3.3</b>	<b>Subsequent sub-allocations</b> .....	<b>2</b>
<b>3.4</b>	<b>Registration</b> .....	<b>2</b>
<b>4</b>	<b><i>Assignments</i></b> .....	<b>2</b>
<b>4.1</b>	<b>Assignment size</b> .....	<b>2</b>
<b>4.2</b>	<b>Subsequent assignments</b> .....	<b>2</b>
<b>4.3</b>	<b>Registration</b> .....	<b>2</b>
<b>5</b>	<b><i>Reverse lookup</i></b> .....	<b>3</b>
<b>6</b>	<b><i>Routing</i></b> .....	<b>3</b>
<b>7</b>	<b><i>References</i></b> .....	<b>3</b>
	<b>Appendix A – Canarie IPv6 address space</b> .....	<b>4</b>
	<b>Appendix B – “leftmost bit” algorithm for address space allocations</b> .....	<b>5</b>

## 1 Introduction / Purpose of Document

This document describes the CA\*net 4 IPv6 address allocation and assignment policy. It is based on, and fully compliant with, the Regional Internet Registries' (ARIN, APNIC and RIPE) jointly developed "IPv6 Address Allocation and Assignment Policy" [RIRv6-policies], and with RFC3177, "IAB/IESG Recommendations on IPv6 Address Allocation to Sites" [RFC3177].

CANARIE, acting as a Local Internet Registry, delegates IPv6 address space to CA\*net 4 GigaPoP Operators/Regional Advanced Networks. In turn, the GigaPoP Operators assign address space to their CA\*net 4 connected end-user institutions.

This document is intended for engineering staffs of the GigaPoP Operators. This document will be updated as RIR policies and Internet best practices evolve.

## 2 CANARIE Address Space

ARIN allocated the Top-Level Aggregation (TLA) address block 2001:410::/35 to Viagenie on behalf of the Canadian Research and Education community in March 2000. Subsequent to this, new RIR allocation policies resulted in the /35 allocation expanding to a /32, and, CANARIE assumed direct responsibility of the 2001:410::/32 block.

It should be noted that assignment and routing of this IPv6 address space is bound by ARIN policy and in no case are allocated or assigned IPv6 address blocks to be considered property. All IPv6 address space is licensed for use, rather than owned.

## 3 Allocations

### 3.1 Allocation Scheme

CANARIE allocates IPv6 address space to CA\*net 4 GigaPoP Operators/RANs for the purpose of subsequent assignment to the CA\*net 4 connected end-user institutions. The term sub-allocation is used to describe this additional level of allocation hierarchy.

The original CA\*net3 allocation scheme<sup>1</sup> has been revised. The scheme allocated consecutive /40s from the beginning of the block making subsequent contiguous allocations to a given GigaPoP Operator impossible.

The new allocation scheme uses the "leftmost bit" algorithm of "A Flexible Method for Managing the Assignment of Bits of an IPv6 Address Block" [RFC3531]<sup>2</sup>. It provides maximal flexibility for subsequent allocations to GigaPoP Operators to be contiguous, in the face of an undefined number of downstream aggregators and an undefined number of sub-allocation blocks required by each downstream, over a relatively long period.

---

<sup>1</sup> <http://www.6pop.canet3.net/connections.html> developed and maintained by John Sherwood of Dalhousie University

<sup>2</sup> The new CA\*net 4 IPv6 allocation scheme can be reproduced using Viagenie's IPv6 prefix allocation tool (<http://www.viagenie.qc.ca/en/ipv6/allocation/index.shtml>) by applying the following parameters:

Last prefix allocated:	2001:410::/40
Number of bits (range):	8
Algorithm:	leftmost
Number of prefix to generate:	255

Currently allocated IPv6 address space is shown in Table 1 of Appendix A. Sub-allocations delegated under the original scheme remain valid (/40s allocated under the original scheme are greyed).

The sub-allocation size is /40. It is consistent with the allocation size of the original scheme and it allows GigaPoP Operators to develop and implement long-term address assignment plans.

### **3.2 GigaPoP Operator Sub-Allocations**

CA\*net 4 GigaPoP Operators can request a /40 address block to the CANARIE CA\*net 4 NOC.

### **3.3 Subsequent sub-allocations**

GigaPoP Operators may request additional /40 sub-allocations. Such requests will be evaluated based on the utilization of previously allocated address space, as defined by the HD-ratio[RFC3194]. An HD ratio of 0.8, translating to 33% or 84 /48s assigned, should result in approval of the request.

### **3.4 Registration**

All /40 sub-allocations to GigaPoP Operators will be registered with ARIN, as per ARIN policy, and in CA\*net 4 Routing Registry (C4RR) by the CA\*net 4 NOC.

For the C4RR each "inet6num" object describing the /40 sub-allocations will have the "mnt-lower" attribute set to the GigaPoP Operator maintainer object. This will permit GigaPoP Operator maintainers to create more specific objects, i.e. /48 "inet6num" objects that reflect assignments to end-user institutions.

## **4 Assignments**

### **4.1 Assignment size**

GigaPoP Operators/RANs assign IPv6 address space to their CA\*net 4 connected end-users.

GigaPoP Operators can develop their own address assignment scheme, however, address space assignments must comply with existing guidelines [RIRv6-policies, RFC3177]. In general, /48s should be assigned to end-user institutions. Exceptions may be very large end-user networks where multiple /48s are required, or when only one subnet (/64) or one device (/128) is needed by design.

### **4.2 Subsequent assignments**

There is no common policy for the assignment of multiple /48s to a same end-user site. End-user institutions should be able to request additional blocks upon providing the necessary justification.

### **4.3 Registration**

GigaPoP Operators are to register assigned /48s in the C4RR. CANARIE will use the registered data to calculate (1) overall address space usage and (2) the HD-ratio at the time RAN applies for subsequent /40 allocations.

## 5 Reverse lookup

GigaPoP Operators receiving CANARIE IPv6 address space allocations are responsible for the proper management of the corresponding reverse lookup zone.

GigaPoP Operators assigning IPv6 address space must also delegate responsibility for the proper management of the corresponding reverse lookup zone to the end-user institution.

## 6 Routing

The goal of this allocation policy is to maximize the aggregatability of CA\*net 4 IPv6 address space. The CA\*net 4 IPv6 routing policy is described in companion document [CA\*net 4 Routing Policy].

## 7 References

- [RIRs-on-48] <http://www.arin.net/policy/ipv6reassign.html>,
- [RIRv6-policies] RIPE-246, <http://www.ripe.net/ripe/docs/ripe-246.html>  
<http://www.arin.net/policy/ipv6.html>
- [RFC2374] "An IPv6 Aggregatable Global Unicast Address Format", R. Hinden, M. O'Dell, S. Deering. July 1998, [RFC 2374](#).
- [RFC3194] "The H-Density Ratio for Address Assignment Efficiency An Update on the H ratio", A. Durand, C. Huitema. November 2001, [RFC 3194](#).
- [RFC3177] "IAB/IESG Recommendations on IPv6 Address". IAB, IESG. September 2001, [RFC 3177](#).
- [RFC3531] "A Flexible Method for Managing the Assignment of Bits of an IPv6 Address Block", M. Blancher, April 2003, [RFC 3531](#).

**Appendix A – Canarie IPv6 address space**

For up to date allocations visit: <http://www.canarie.ca/canet4/services/ipv6address.html>.

Organisation	/40 block allocation
CA*net 4 backbone	2001:410:100::/40
ACORN-NS	2001:410:200::/40
RISQ	2001:410:300::/40
Federal GigaPoP	2001:410:400::/40
NETERA	2001:410:500::/40
Onet	2001:410:600::/40
PEI GigaPoP	2001:410:700::/40
BCnet	2001:410:900::/40
ORION	2001:410:8000::/40
NB GigaPoP	2001:410:4000::/40
NL GigaPoP	2001:410:c000::/40

Table 1: IPv6 address space currently allocated to CA\*net4 GigaPoPs

**Appendix B – “leftmost bit” algorithm for address space allocations**

1	2001:410:8000::/40
2	2001:410:4000::/40
3	2001:410:c000::/40
4	2001:410:2000::/40
5	2001:410:a000::/40
6	2001:410:6000::/40
7	2001:410:e000::/40
8	2001:410:1000::/40
9	2001:410:9000::/40
10	2001:410:5000::/40
11	2001:410:d000::/40
12	2001:410:3000::/40
13	2001:410:b000::/40
14	2001:410:7000::/40
15	2001:410:f000::/40
16	2001:410:800::/40

Table 2: First 16 sub-allocations of the “leftmost bit” allocation scheme