

IP Subnet Allocations

1. Scope

This document addresses the allocation of IP subnets at Carnegie Mellon. Network Services, as the operator of the campus' main Internet gateway and campus backbone, is responsible for ensuring the validity and uniqueness of addresses used across the backbone and on the Internet.

Most IP address needs are handled by registration in NetReg on a particular subnet. When a new subnet is required, this is treated as an "IP Subnet Allocation Request". When such requests are received or a need is identified, this procedure should be followed to ensure proper recording of the subnet use and to meet the requirements stated above.

This document addresses internal interactions of Network Services, and Network Services staff that may receive or identify subnet allocation needs should be familiar with the procedures described here. Requirements of this document apply to NetReg administrators and those responsible for subnet allocations especially.

2. Subnet Allocation Requests

To simplify the subnet registration process and ensure subnets are properly registered and available for use, the Manager of Network Development (or designate) is responsible for subnet allocations. All subnet allocation requests should be directed to this person.

Allocation requests should include the following information:

- Subnet name (and brief description of the purpose, if not clear)
- Lifetime of subnet need (indefinite needs versus short-term needs)
- Requirements of address space (for example: publicly routable, privately addressed, dot-com)
- Subnet size required (immediate and 1 year projections, if available)
- Whether QuickReg capabilities are required on the subnet
- Trunk Sets in which the subnet will exist
- DNS domains that should be allowed
- Protections on the subnet (who should have access to register addresses in the subnet)
- Dynamic pools (if a dynamic address pool is required and, if so, the size of the pool)

3. Subnet Allocations

When a subnet allocation request is received, the subnet allocation manager reviews the request. At this time, questions or clarifications may be raised prior to allocation. Once the allocation is approved, the subnet is promptly registered and provided to the requester.

The following steps are followed (by the allocation manager or designate) to prepare the subnet allocation:

- Identify the IP address block, addressing the requirements of the request.
 - Examine current allocations in NetReg and identify candidate blocks
 - Weigh the subnet lifetime and the impact of each candidate block. For example, determine:
 - if a candidate block would eliminate the possibility of a surrounding subnet growing easily
 - if the candidate block would break a large CIDR block
 - the difficulty of expanding the CIDR block, if necessary
 - Common fixed allocation sizes, such as /29 and /30 blocks, generally have reserved areas to ensure productive allocations.
 - A subnetting plan may address certain larger blocks that are expected to be allocated in particular sizes (for example, a /20 that is expected to be allocated as 8 /23 subnets)
 - A subnetting plan may also group similarly purposed subnets into larger blocks. For example, residence hall subnets have historically been created from 2 consecutive /20 blocks.
- Register the subnet in NetReg, subject to the requirements stated by the request, including:
 - DNS domains
 - Trunk Sets
 - Protections
 - Creation of dynamic pool, if necessary
 - Creation of QuickReg subnet, if necessary
 - Addition of standard DHCP options and any subnet-specific options as necessary
- Verify the address space is not currently routed on any block attached to the campus backbone. This can be done as a simple ‘traceroute’ to an address within the block. The traceroute should end at rtrbone or whichever router is providing a black hole for unused address space¹.

Once complete, the requestor is notified that the address space is ready for use.

4. Domain Name Requirements

Some subnets have particular domain name requirements. Unless documented here, it is assumed that a subnet may allow any valid domain name to be used.

A. Residence Halls

The `res.cmu.edu` domain must be the only domain associated with the subnet that allows any person to register a machine in said domain. This forces student machine registrations in the residence halls to use this domain.

¹ For example, rtrbone is configured (and announces) 128.2.0.0/16 to its Null0 interface, so traffic to a 128.2 address not routed anywhere else will end at rtrbone.

B. Private Address Subnets

Any subnet that is not globally unique (for example, RFC1918 address space) must use a domain name in `local.` (such as `cmu.local.`) instead of a domain in `cmu.edu`. This is to prevent names in a visible zone (like `cmu.edu`) from returning addresses unreachable from the general Internet.

5. NetReg Service Group Membership

Subnets in NetReg may exist as members of one or more service groups. The following rules are used by the subnet allocation manager and coordinator to determine the service groups of particular subnets.

A. DHCP Service Pool

A subnet may exist in one or more DHCP service pools. These pools define which DHCP servers are responsible for the service on this subnet. Note that the main pool, *dhcp.net.cmu.edu*, is marked as the default pool. Thus any subnet served entirely from the main pool does not need to be in a special service pool.

The subnets that will likely need to be added to service pools are those off-campus. Once added to a single pool, a subnet is removed from any “default” pools, such as *dhcp.net.cmu.edu*.

The IP helper addresses of the router providing subnet connectivity are set based upon the DHCP service pool(s) for a given subnet.

B. NetScan Configuration

NetScan uses service groups to define the target subnets for its scanning operations. Refer to NOP-2004-01 for further details regarding this configuration.

6. Revision History

Revision: 1	Date: 3/30/2004	Author: Kevin Miller
Revision: 2	Date: 3/30/2004	Author: Kevin Miller
Changes: Updated responsible parties		
Revision: 3	Date: 4/23/2004	Author: Kevin Miller
Changes: Clarifications and reference updates		
Revision: 4	Date: 4/30/2004	Author: Kevin Miller
Changes: Additional clarifications on scope		