

Classless addressing

CIDR classless addressing Introduced in 1993, the classless inter-domain routing (CIDR) system rejects the rigid division of the address into network and computer addresses designated by a class. Currently, any IPv4 address consists of a prefix (the first part) of any length, which is the network address, and the remainder, which is the computer address. In the CIDR system, it is impossible to know the part of the address that is the network address by the address class. Thus, the notation $x.y.z.t/p$ is used to indicate the length of the prefix. For example, $156.17.9.0/25$ is a network address where 25 bits are the network address and the remaining 7 are the host address. This means that there can be 128 addresses in this network, the first of which (all 0s in the host address portion) is the network address and the last (all 1s in the host address portion) is the broadcast address, leaving 126 real addresses. Classless addressing allows owners of blocks of addresses to manage them more efficiently, resulting in less wasted addresses in individual blocks. But just as importantly, it allows network administrators to define aggregated routing paths. For example, although there are many small networks with addresses starting with $156.17.x.x$, for a global router they can be represented by one path $156.17/16$.

Private networks

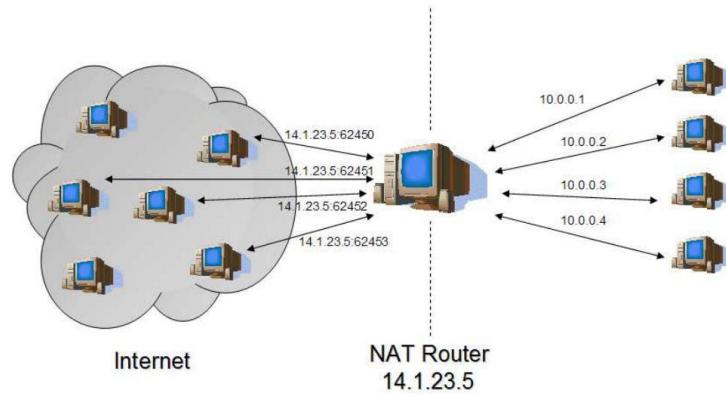
In the IPv4 addressing scheme, three ranges of addresses have been reserved as "private". They were intended for use in LAN networks: home, office and company, not connected to the Internet. The use of these addresses does not require any permissions, agreements or registration:

- 10.0.0.0 - 10.255.255.255
- 172.16.0.0 - 172.31.255.255
- 192.168.0.0 - 192.168.255.255

This means that these networks can use Internet-specific software, devices, and configurations, but the network will not communicate with the Internet because these Internet addresses are not recognized or associated with any network. Example: a large bank has a computer network that uses TCP/IP software, but there are no plans to connect this network to the Internet.

NAT address translation

Introduced in 1996, NAT (Network Address Translation) allows private address LANs to connect to the Internet through routers that convert private LAN addresses to the public Internet address of the LAN router, plus a unique port number that identifies the connection.



From the Internet side, it looks as if all traffic from such a private network comes from the router itself. The router, on the other hand, converts the outgoing addresses from the local network to its own address, and the addresses of incoming replies to the correct private LAN addresses, based on the port number.