Protocol Name

NAT: Network Address Translation

Protocol Description

Basic Network Address Translation (Basic NAT) is a method by which IP addresses are mapped from one group to another, transparent to end users. Network Address Port Translation, or NAPT, is a method by which many network addresses and their TCP/UDP ports are translated into a single network address and its TCP/UDP ports. Together, these two operations, referred to as traditional NAT, provide a mechanism to connect a realm with private addresses to an external realm with globally unique registered addresses.

The need for IP Address translation arises when a network's internal IP addresses cannot be used outside the network either for privacy reasons or because they are invalid for use outside the network. Network topology outside a local domain can change in many ways. Customers may change providers, company backbones may be reorganized, or providers may merge or split. Whenever external topology changes with time, address assignment for nodes within the local domain must also change to reflect the external changes. Changes of this type can be hidden from users within the domain by centralizing changes to a single address translation router. Basic Address Translation allows hosts in a private network to transparently access the external network and enable access to selected local hosts from the outside. Organizations with a network setup predominantly for internal use and with a need for occasional external access are good candidates for this scheme.

There are limitations to using the translation method. It is mandatory that all requests and responses pertaining to a session be routed via the same NAT router. One way to ascertain this would be to have NAT based on a border router that is unique to a stub domain, where all IP packets either originated from the domain or are destined for the domain. There are other ways to ensure this with multiple NAT devices.

The NAT solution has the disadvantage of taking away the end-to-end significance of an IP address, and making up for this with an increased state in the network. As a result, with a NAT device enroute, end-to-end IP network level security assured by IPSec cannot be assumed to apply to end hosts. The advantage of this approach, however, is that it can be installed without changes to hosts or routers.

Protocol Structure

NAT is a procedure, not a structured protocol.

Related protocols

IP, IPv6, TCP, UDP, NATP

Sponsor Source

NAT is defined by IETF (http://www.ietf.org) in RFC 3022.

Reference

http://www.javvin.com/protocol/rfc3022.pdf
Traditional IP Network Address Translator (Traditional NAT)