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B. Fox
Lucent Technologies
B. Gleeson
Nortel Networks

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Virtual Private Networks Identifier

Status of this Memo

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Abstract

Virtual Private IP networks may span multiple Autonomous Systems or Service Providers. There is a requirement for the use of a globally unique VPN identifier in order to be able to refer to a particular VPN (see section 6.1.1 of [1]). This document proposes a format for a globally unique VPN identifier.

1. Introduction

As the Public Internet expands and extends its infrastructure globally, the determination to exploit this infrastructure has led to widespread interest in IP based Virtual Private Networks. A VPN emulates a private IP network over public or shared infrastructures. Virtual Private Networks provide advantages to both the Service Provider and its customers. For its customers, a VPN can extend the IP capabilities of a corporate site to remote offices and/or users with intranet, extranet, and dialup services. This connectivity should be achieved at a lower cost to the customer with savings in capital equipment, operations, and services. The Service Provider is able to make better use of its infrastructure and network administration expertise offering IP VPN connectivity and/or services to its customers.

There are many ways in which IP VPN services may be implemented. The IP based VPN framework document [1] identifies four types of VPN to be supported: Virtual Leased Lines, Virtual Private Routed Networks,

Virtual Private Dial Networks, and Virtual Private LAN Segments. In addition, numerous drafts and white papers outline methods to be used by Service Providers and/or Service Provider customers to enable this service. Solutions may be customer based or network based. Network based solutions may provide connectivity and services at layer 2 and/or layer 3. The devices involved in enabling the solution may be Customer Premises Equipment (CPE), Service Provider Edge equipment, Service Provider Core equipment, or some combination of these.

While the various methods of VPN service implementation are being discussed and debated, there are two points on which there is agreement:

Because a VPN is private, it may use a private address space which may overlap with the address space of another VPN or the Public Internet.

A VPN may span multiple IP Autonomous Systems (AS) or Service Providers.

The first point indicates that an IP address only has meaning within the VPN in which it exists. For this reason, it is necessary to identify the VPN in which a particular IP address has meaning, the "scope" of the IP address.

The second point indicates that several methods of VPN service implementation may be used to provide connectivity and services to a single VPN. Different service providers may employ different strategies based on their infrastructure and expertise. It is desirable to be able to identify any particular VPN at any layer and at any location in which it exists using the same VPN identifier.

2. Global VPN Identifier

The purpose of a VPN-ID is to identify a VPN. This identifier may be used in various ways depending on the method of VPN service implementation. For example, the VPN-ID may be included:

- In a MIB to configure attributes to a VPN, or to assign a physical or logical access interface to a particular VPN.

- In a control or data packet, to identify the "scope" of a private IP address and the VPN to which the data belongs.

It is necessary to be able to identify the VPN with which a data packet is associated. The VPN-ID may be used to make this association, either explicitly (e.g. through inclusion of the VPN-ID in an encapsulation header [2]) or implicitly (e.g. through inclusion

of the VPN-ID in a ATM signalling exchange [3]). The appropriateness of using the VPN-ID in other contexts needs to be carefully evaluated.

There is another very important function that may be served by the VPN identifier. The VPN identifier may be used to define the "VPN authority" who is responsible for coordinating the connectivity and services employed by that VPN. The VPN authority may be the Private Network administrator or the primary Service Provider. The VPN authority will administer and serve as the main point of contact for the VPN. The authority may outsource some functions and connectivity, set up contractual agreements with the different Service Providers involved, and coordinate configuration, performance, and fault management.

These functions require a VPN that is global in scope and usable in various solutions. To be a truly global VPN identifier, the format cannot force assumptions about the shared network(s). Conversely, the format should not be defined in such a way as to prohibit use of features of the shared network. It is necessary to note that the same VPN may be identified at different layers of the same shared network, e.g. ATM and IP layers. The same VPN-ID format and value should apply at both layers.

The methods of VPN-ID usage are beyond the scope of this memo.

3. Global VPN Identifier Format Requirements

The VPN Identifier format should meet the following requirements:

- Provide a globally unique VPN Identifier usable across multiple Service Providers.
- Enable support of a non-IP dependent VPN-ID for use in layer 2 VPNs.
- Identify the VPN Authority within the VPN Identifier.

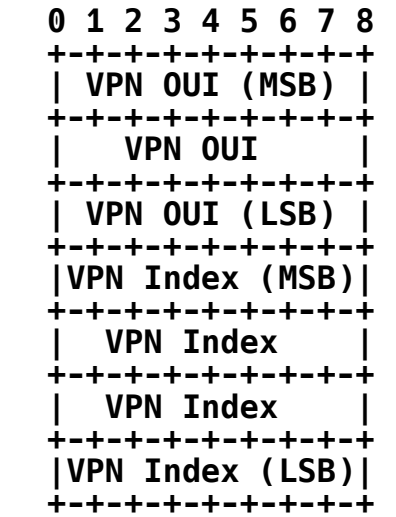
4. Global VPN Identifier Format

The global VPN Identifier format is:

3 octet VPN authority Organizationally Unique Identifier [4]

followed by

4 octet VPN index identifying VPN according to OUI



The VPN OUI (IEEE 802-1990 Organizationally Unique Identifier) [4] identifies the VPN authority. The VPN authority will serve as the primary VPN administrator. The VPN authority may be the company/organization to which the VPN belongs or a Service Provider that provides the underlying infrastructure using its own and/or other providers' shared networks. The 4 octet VPN Index identifies a particular VPN serviced by the VPN authority.

5. Security Considerations

This document defines the format of the global VPN identifier without specifying usage. However, the association of particular characteristics and capabilities with a VPN identifier necessitates use of standard security procedures with any specified usage. Misconfiguration or deliberate forging of VPN identifier may result different breaches in security including the interconnection of different VPNs.

6. References

[1] Gleeson, Heinanen, Lin, Armitage, Malis, "A Framework for IP Based Virtual Private Networks", Work in Progress.

[2] Grossman, D. and J. Heinanen, "Multiprotocol Encapsulation over ATM Adaptation Layer 5", RFC 2684, September 1999.

[3] "MPOA v1.1 Addendum on VPN Support", ATM Forum, af-mpoa-0129.000, August, 1999, Bernhard Petri, editor, final ballot document.

[4] http://standards.ieee.org/regauth/oui/index.html

7. Authors' Addresses

Barbara A. Fox
Lucent Technologies
300 Baker Ave, Suite 100
Concord, MA 01742-2168

Phone: +1-978-287-2843
EMail: barbarafox@lucent.com

Bryan Gleeson
Nortel Networks
4500 Great America Parkway,
Santa Clara, CA 95054

Phone: +1-408-855-3711
EMail: bgleeson@shastanets.com

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