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DNS Extensions to support IP version 6

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Abstract

This document defines the changes that need to be made to the Domain Name System to support hosts running IP version 6 (IPv6). The changes include a new resource record type to store an IPv6 address, a new domain to support lookups based on an IPv6 address, and updated definitions of existing query types that return Internet addresses as part of additional section processing. The extensions are designed to be compatible with existing applications and, in particular, DNS implementations themselves.

1. INTRODUCTION

Current support for the storage of Internet addresses in the Domain Name System (DNS)[1,2] cannot easily be extended to support IPv6 addresses[3] since applications assume that address queries return 32-bit IPv4 addresses only.

To support the storage of IPv6 addresses we define the following extensions:

- o A new resource record type is defined to map a domain name to an IPv6 address.
- o A new domain is defined to support lookups based on address.
- o Existing queries that perform additional section processing to locate IPv4 addresses are redefined to perform additional section processing on both IPv4 and IPv6 addresses.

The changes are designed to be compatible with existing software. The existing support for IPv4 addresses is retained. Transition issues related to the co-existence of both IPv4 and IPv6 addresses in DNS are discussed in [4].

2. NEW RESOURCE RECORD DEFINITION AND DOMAIN

A new record type is defined to store a host's IPv6 address. A host that has more than one IPv6 address must have more than one such record.

2.1 AAAA record type

The AAAA resource record type is a new record specific to the Internet class that stores a single IPv6 address.

The value of the type is 28 (decimal).

2.2 AAAA data format

A 128 bit IPv6 address is encoded in the data portion of an AAAA resource record in network byte order (high-order byte first).

2.3 AAAA query

An AAAA query for a specified domain name in the Internet class returns all associated AAAA resource records in the answer section of a response.

A type AAAA query does not perform additional section processing.

2.4 Textual format of AAAA records

The textual representation of the data portion of the AAAA resource record used in a master database file is the textual representation of a IPv6 address as defined in [3].

2.5 IP6.INT Domain

A special domain is defined to look up a record given an address. The intent of this domain is to provide a way of mapping an IPv6 address to a host name, although it may be used for other purposes as well. The domain is rooted at IP6.INT.

An IPv6 address is represented as a name in the IP6.INT domain by a sequence of nibbles separated by dots with the suffix ".IP6.INT". The sequence of nibbles is encoded in reverse order, i.e. the low-order nibble is encoded first, followed by the next low-order nibble and so on. Each nibble is represented by a hexadecimal digit. For example, the inverse lookup domain name corresponding to the address

4321:0:1:2:3:4:567:89ab

would be

b.a.9.8.7.6.5.0.4.0.0.0.3.0.0.0.2.0.0.0.1.0.0.0.0.0.0.1.2.3.4.IP6.INT.

3. MODIFICATIONS TO EXISTING QUERY TYPES

All existing query types that perform type A additional section processing, i.e. name server (NS), mail exchange (MX) and mailbox (MB) query types, must be redefined to perform both type A and type AAAA additional section processing. These new definitions mean that a name server must add any relevant IPv4 addresses and any relevant

IPv6 addresses available locally to the additional section of a response when processing any one of the above queries.

4. SECURITY CONSIDERATIONS

Security issues are not discussed in this memo.

5. REFERENCES

- [1] Mockapetris, P., "Domain Names - Concepts and Facilities", STD 13, [RFC 1034](#), USC/Information Sciences Institute, November 1987.
- [2] Mockapetris, P., "Domain Names - Implementation and Specification", STD 13, [RFC 1035](#), USC/Information Sciences Institute, November 1987.
- [3] Hinden, R., and S. Deering, Editors, "IP Version 6 Addressing Architecture", [RFC 1884](#), Ipsilon Networks, Xerox PARC, December 1995.
- [4] Gilligan, R., and E. Nordmark, "Transition Mechanisms for IPv6 Hosts and Routers", Work in Progress.

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