                 Management Guidelines & Operational Requirements for
              the Address and Routing Parameter Area Domain ("arpa")

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Abstract

   This memo describes the management and operational requirements for
   the address and routing parameter area ("arpa") domain. The "arpa"
   domain is used to support a class of infrastructural identifier
   spaces, providing a distributed database that translates elements of
   a structured name space derived from a protocol family to service
   names. The efficient and reliable operation of this DNS space is
   essential to the integrity of operation of various services within
   the Internet. The Internet Architecture Board (IAB) has the
   responsibility, in cooperation with the Internet Corporation for
   Assigned Names and Numbers (ICANN), to manage the "arpa" domain.
   This document describes the principles used by the IAB in undertaking
   this role.

1. Introduction

   The Domain Name System (DNS) [1] [2] is predominately used to
   translate a structured textual identifier into a protocol-specific
   value. It uses the structure embedded within a hierarchical
   identifier space to create a distributed database, where every node
   within the database corresponds to a node within the name structure.
   The most prevalent role of the DNS is to store a set of name to
   address translations, allowing a domain name to be translated to an
   IP address. The DNS is also used to store a number of other
   translations from hierarchically structured identifier spaces into
   target values of various types.

The DNS is also capable of supporting a translation in the opposite
direction, from protocol values to the names of service entities.
One approach in using the DNS in this fashion has been to transform
protocol values into a hierarchically structured identifier space,
and then use these transformed protocol value names as a DNS lookup
key into the appropriate DNS name hierarchy. A common use of this
mechanism has been the reverse of the name to address lookup,
allowing for an IPv4 address to be used to look up a matching domain
name. For example, the IP address 128.9.160.55 can be associated
with the domain name "www.iab.org." by creating the DNS entry
55.160.9.128.in-addr.arpa." and mapping this entry, via a DNS PTR
record, to the value "www.iab.org.".

The resolution of protocol objects into service names is used by a
number of applications to associate services with a particular
protocol object. The correct and efficient operation of these
applications is dependent on the correct and efficient operation of
the associated "arpa" domain name servers.

2. The "arpa" domain

The "arpa" domain was originally established as part of the initial
deployment of the DNS, to provide a transition mechanism from the
Host Tables that were common in the ARPANET, as well as a home for
the IPv4 reverse mapping domain. During 2000, the abbreviation was
redesignated to "Address and Routing Parameter Area" in the hope of
reducing confusion with the earlier network name.

The Internet Architecture Board (IAB), in cooperation with the
Internet Corporation for Assigned Names and Numbers (ICANN), is
currently responsible for managing the Top Level Domain (TLD) name
"arpa". This arrangement is documented in Appendix A. This domain
name provides the root of the name hierarchy of the reverse mapping
of IP addresses to domain names. More generally, this domain name
undertakes a role as a limited use domain for Internet
infrastructure applications, by providing a name root for the mapping
of particular protocol values to names of service entities. This
domain name provides a name root for the mapping of protocol values
into lookup keys to retrieve operationally critical protocol
infrastructure data records or objects for the Internet.

The IAB may add other infrastructure uses to the "arpa" domain in the
future. Any such additions or changes will be in accordance with the
procedures documented in Section 2.1 and Section 3 of this document.

This domain is termed an "infrastructure domain", as its role is to
support the operating infrastructure of the Internet. In particular,
the "arpa" domain is not to be used in the same manner (e.g., for
naming hosts) as other generic Top Level Domains are commonly used.

The operational administration of this domain, in accordance with the
provisions described in this document, shall be performed by the IANA
under the terms of the MoU between the IAB and ICANN concerning the
IANA [3].

2.1 Criteria for "arpa" Sub-domains

The "arpa" sub-domains are used for those protocol object sets
defined as part of the Internet Standards Process [4], and are
recommended to be managed as infrastructure protocol objects.
Normally, the recommendation is to be made in the "IANA
Considerations" section of the Internet Standard protocol
specification. The recommendation should include the manner in which
protocol objects are to be mapped into lookup keys, and
recommendations to IANA concerning the operation of the "arpa" sub-
domain in conjunction with the recommendations concerning the
operation of the protocol object registry itself.

The IESG consideration of a document which proposes the use of an
"arpa" sub-domain shall include consideration of the "IANA
Considerations" section. If the document is approved, the IESG will
ask the IAB to request the IANA to add the corresponding protocol
object sub-domain domain to the "arpa" domain, in accordance with RFC
2860 [3], with administration of the sub-domain undertaken in
accordance with the provisions described in this document.

2.2 "arpa" Name Server Requirements

As this domain is part of the operationally critical infrastructure
of the Internet, the stability, integrity and efficiency of the
operation of this domain is a matter of importance for all Internet
users.

The "arpa" domain is positioned as a top level domain in order to
avoid potential operational instabilities caused by multiple DNS
lookups spanning several operational domains that would be required
to locate the servers of each of the parent names of a more deeply
nested infrastructure name. The maximal lookup set for "arpa" is a
lookup of the name servers for the "arpa" domain from a root server,
and the query agent is then provided with a list of authoritative
"arpa" name servers.

The efficient and correct operation of the "arpa" domain is
considered to be sufficiently critical that the operational
requirements for the root servers apply to the operational
requirements of the "arpa" servers. All operational requirements
noted in RFC 2870 [5] as they apply to the operational requirements
of the root servers shall apply to the operation of the "arpa"
servers. Any revision to RFC 2870 in relation to the operation of
the root servers shall also apply to the operation of the "arpa"
servers.

Many of the servers that are authoritative for the root zone (or the
"." zone) also currently serve as authoritative for the "arpa" zone.
As noted in RFC 2870 [5], this arrangement is likely to change in the
future.

3. Delegation of "arpa" Sub-Domains

   While the decision as to which protocol elements are loaded into the
   "arpa" domain, and the hierarchical structure of such protocol
   elements, remains within the role of the IAB, the role of managing
   the sub-domain may be delegated by the IAB to an appropriate protocol
   management entity.

   The IAB shall only recommend the creation of "arpa" sub-domains
   corresponding to protocol entities where:

   - the delegation, and the hierarchical name structure, is described
      by an IETF Standards Track document [4], and

   - the use of the "arpa" domain is explicitly recommended in the
      "IANA Considerations" section of that document.

   The "IANA Considerations" section should include the name of the
   subdomain, the rules for how the subdomain is to be administered, and
   the criteria for entries within the subdomain.

4. Current Status of "arpa"

   The "arpa" domain is used for the sub-domains "in-addr.arpa" [1],
   "ip6.arpa" [7] and "e164.arpa" [8].

   Currently, the "arpa" zone is located on a subset of the root
   servers, and the zone is managed in accordance with these
   specifications. The IAB is working with ICANN, IANA, and the
   regional registries to move "arpa" and "in-addr.arpa" records from
   the root servers in accord with the RFC 2870 recommendation for
   exclusive use of those servers [5].

The IPv4 reverse address domain, "in-addr.arpa" is delegated to the
IANA. The "in-addr.arpa" zone is currently located on the same same
subset of the root servers as "arpa". Sub-delegations within this
hierarchy are undertaken in accordance with the IANA's address
allocation practices.

The "ip6.arpa" IPv6 reverse address domain uses a method of
delegation that is the same as is used for "in-addr.arpa", where the
"ip6.arpa" domain is delegated to the IANA, and names within this
zone further delegated to the regional IP registries in accordance
with the delegation of IPv6 address space to those registries [6]
[7].

The "e164.arpa" domain is used to map E.164 style phone numbers into
URIs. This mechanism is defined in RFC 2916 [9]. RFC 2916 notes
that the provision that names within this DNS zone are to be
delegated to parties according to ITU recommendation E.164 [10]. RFC
3026 [8] describes the overall liaison arrangements between the IETF
and ITU-T about the use of this domain.

5. Infrastructure domains elsewhere in the DNS tree

   Any infrastructure domains that are located elsewhere in the DNS tree
   than as sub-domains of "arpa", for historical or other reasons,
   should adhere to all of the requirements established in this document
   for sub-domains of "arpa", and consideration should be given to
   migrating them into "arpa" as and when appropriate.

6. Security Considerations

   The security considerations as documented in RFC 2870 [5], and any
   successors to that document, apply to the operation of the "arpa"
   servers.

   The security considerations specific to the E.164 subdomain are
   documented in Section 5 of RFC 2916 [9].

   Any new subdomain delegation must adequately document any security
   considerations specific to the information stored therein.

7. IANA Considerations

   As noted in section 3 of this document, the IAB may request the IANA
   to delegate the sub-domains of "arpa" in accordance with the "IANA
   Considerations" section of an IETF Standards Track document. This
   request falls under the scope of section 4 of the MoU between the
   IETF and ICANN concerning the IANA [3].

Acknowledgements

   This document is a document of the IAB, and the editor acknowledges
   the contributions of the members of the IAB in the preparation of the
   document. In addition, suggestions have been incorporated from Scott
   Bradner.

References

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   [4]   Bradner, S., "The Internet Standards Process -- Revision 3", BCP
         9, RFC2026, October 1996.

   [5]   Bush, R., Karrenberg, D., Kosters, M. and R. Plzak, "Root Name
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   [7]   Bush, R., "Delegation of IP6.arpa", BCP 49, RFC 3152, August
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   [8]   Blane, P., "Liaison to IETF/ISOC on ENUM", RFC 3026, January
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   [9] Falstrom, P., "E.164 number and DNS", RFC 2916, September 2000.

   [10] ITU-T Recommendation E.164/I.331 (05/97): The International
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Appendix A

   April 28, 2000

   Mr. Louis Touton
   Vice-President, Secretary, and General Counsel
   Internet Corporation for Assigned Names and Numbers
   4676 Admiralty Way, Suite 330
   Marina del Rey, CA 90292

   Re: Purchase Order No. 40SBNT067020:
         Administration of the arpa Top Level Domain

   Dear Mr. Touton:

   As noted in your organization's quotation of February 2, 2000, the
   arpa Top Level Domain (TLD) exists in the root zone of the domain
   name system as a limited use domain currently consisting of one
   record, in-addr.arpa. On April 14, 2000, the Defense Advanced
   Research Projects Agency (DARPA), formerly known as the Advanced
   Research Projects Agency (ARPA), officially signaled its
   disassociation with the arpa domain and its understanding the domain
   would be used by the Internet Corporation for Assigned Names (ICANN)
   and Numbers and the Internet Architecture Board (IAB) for additional
   Internet infrastructure uses.

   In keeping with the DARPA understanding, we believe that the arpa
   domain should be made available for this specific, limited purpose.
   The Department of Commerce considers this an Internet Assigned
   Numbers Authority (IANA) function and has requested that the WHOIS
   entry for the arpa domain reflect IANA as the registrant.

   Purchase Order No. 40SBNT067020 provides that "[ICANN] will perform
   other IANA functions as needed upon request of DOC." As such, the
   Department of Commerce requests that, as part of the IANA functions,
   ICANN undertake administration of the arpa TLD in cooperation with
   the Internet technical community under the guidance of the IAB, as a
   limited use domain for Internet infrastructure applications,
   including the migration of Internet infrastructure applications that
   currently reside in the .int TLD. Further, as indicated by DARPA,
   the arpa TLD string should be given a different expansion such as
   "Address and Routing Parameter Area" to avoid any implication that
   DARPA has operational responsibility for the domain.

   If you have any questions, please do not hesitate to contact me.

                         Sincerely, Karen Rose
                         Purchase Order Technical Representative

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Acknowledgement