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

Status of this Memo

This document specifies an Internet Best Current Practices for the Internet Community, and requests discussion and suggestions for improvements. Distribution of this memo is unlimited.

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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 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.

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- [9] Falstrom, P., "E.164 number and DNS", RFC 2916, September 2000.
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## Author's Address

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## Appendix A

April 28, 2000

Mr. Louis Touton  
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4676 Admiralty Way, Suite 330  
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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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