

dnsop
Internet-Draft
Intended status: Best Current Practice
Expires: November 23, 2018

D. Crocker
Brandenburg InternetWorking
May 22, 2018

DNS Scoped Data Through '_Underscore' Naming of Attribute Leaves
draft-ietf-dnsop-attrleaf-08

Abstract

Formally, any DNS resource record may occur for any domain name. However some services have defined an operational convention, which applies to DNS leaf nodes that are under a DNS branch having one or more reserved node names, each beginning with an underscore. The underscore naming construct defines a semantic scope for DNS record types that are associated with the parent domain, above the underscored branch. This specification explores the nature of this DNS usage and defines the "DNS Global Underscore Scoped Entry Registry" with IANA. The purpose of the Underscore registry is to avoid collisions resulting from the use of the same underscore-based name, for different services.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on November 23, 2018.

Copyright Notice

Copyright (c) 2018 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<https://trustee.ietf.org/license-info>) in effect on the date of

publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

1.	Introduction	2
1.1.	_Underscore Scoping	2
1.2.	Scaling Benefits	4
2.	DNS Underscore Scoped Entry Registries Function	4
3.	IANA Considerations	5
3.1.	DNS Underscore Global Scoped Entry Registry	6
3.2.	DNS Underscore Global Scoped Entry Registry Definition	6
3.3.	Initial entries	7
4.	Guidance for Expert Review	9
5.	Security Considerations	9
6.	References	9
6.1.	Normative References	9
6.2.	URIs	11
Appendix A.	Acknowledgements	11
	Author's Address	11

[1.](#) Introduction

The core Domain Name System (DNS) technical specifications assign no semantics to domain names or their parts, and no constraints upon which resource record (RR) types are permitted to be stored under particular names [[RFC1035](#)], [[RFC2181](#)]. Over time, some leaf node names, such as "www" and "ftp" have come to imply support for particular services, but this is a matter of operational convention, rather than defined protocol semantics. This freedom in the basic technology has permitted a wide range of administrative and semantic policies to be used -- in parallel. DNS data semantics have been limited to the specification of particular resource record types, on the expectation that new ones would be added as needed. Unfortunately, the addition of new resource record types has proven extremely challenging, over the life of the DNS, with significant adoption and use barriers.

[1.1.](#) [_Underscore Scoping](#)

As an alternative to defining a new RR type, some DNS service enhancements call for using an existing resource record type, but specify a restricted scope for its occurrence. Scope is meant as a static property, not one dependent on the nature of the query. It is

Crocker

Expires November 23, 2018

[Page 2]

an artifact of the DNS name. That scope is a leaf node, within which the uses of specific resource record sets can be formally defined and constrained. The leaf occurs in a branch having a distinguished naming convention: At the top of the branch -- beneath the parent domain name to which the scope applies -- one or more reserved DNS node names begin with an underscore ("_"). Because the DNS rules for a "host" (host name) are not allowed to use the underscore character, this distinguishes the underscore name from all legal host names [RFC952]. Effectively, this convention for leaf node naming creates a space for the listing of 'attributes' -- in the form of resource record types -- that are associated with the parent domain, above the underscored sub-branch.

The scoping feature is particularly useful when generalized resource record types are used -- notably "TXT", "SRV", and "URI" [RFC1035], [RFC2782], [RFC6335], [RFC7553]. It provides efficient separation of one use of them from others. Absent this separation, an undifferentiated mass of these "RRsets" is returned to the DNS client, which then must parse through the internals of the records in the hope of finding ones that are relevant. Worse, in some cases the results are ambiguous because a record type might not adequately self-identify. With underscore-based scoping, only the relevant "RRsets"s are returned.

A simple example is DKIM [RFC6376], which uses "_domainkeys" for defining a place to hold a "TXT" record containing signing information for the parent domain.

This specification formally defines how underscore labels are used as "attribute" enhancements for their parent domain names. For example, domain name "_domainkey.example." acts as attribute of parent domain name "example." To avoid collisions resulting from the use of the same underscore-based labels for different applications using the same resource record type, this document establishes DNS Underscore Global Scoped Entry IANA Registry for the highest-level reserved names that begin with _underscore; _underscore-based names that are farther down the hierarchy are handled within the scope of the highest-level _underscore name.

Discussion Venue: Discussion about this draft should be directed to the dnsop@ietf.org [1] mailing list.

NOTE TO RFC EDITOR: Please remove "Discussion Venue" paragraph prior to publication.

1.2. Scaling Benefits

Some resource record types are used in a fashion that can create scaling problems, if an entire RRset associated with a domain name is aggregated in the leaf node for that name. An increasingly-popular approach, with excellent scaling properties, places the RRset under a node having an underscore-based name, at a defined place in the DNS tree under the 'parent' name. This constrains the use of particular "RR" types associated with that parent name. A direct lookup to the subordinate leaf node produces only the desired record types, at no greater cost than a typical DNS lookup.

The definition of a underscore global registry, provided in this specification, primarily attends to the top-most names used for scoping an RR type; that is the _underscore "global" names.

2. DNS Underscore Scoped Entry Registries Function

A global registry for DNS nodes names that begin with an _underscore is defined here. The purpose of the Underscore Global Registry is to avoid collisions resulting from the use of the same _underscore-based name, for different applications.

- o If a public specification calls for use of an _underscore-prefixed domain node name, the 'global' (right-most) _underscoped name MUST be entered into this registry.

The _underscore names define scope of use for specific resource record types, which are associated with the domain name that is the "parent" to the branch defined by the _underscore naming. A given name defines a specific, constrained context for one or more RR types, where use of such record types conforms to the defined constraints.

- o Within an _underscore scoped leaf, other RRsets that are not specified as part of the scope MAY be used.

Structurally, the registry is defined as a single, flat table of RR types, under node names beginning with _underscore. In some cases, such as for use of an "SRV" record, the full scoping name might be multi-part, as a sequence of underscore names. Semantically, that sequence represents a hierarchical model and it is theoretically reasonable to allow re-use of a subordinate underscore name in different underscore context; that is, a subordinate name is meaningful only within the scope of the right-most (top-level) underscore name. Therefore they are ignored by this DNS Underscore Global Scoped Entry Registry. This registry is for the definition of highest-level -- ie, global -- underscore node name used.


```

+-----+
|                NAME |
+-----+
|           _service1 |
|   ._protoB._service2 |
|       _protoB._service3 |
|       _protoC._service3 |
|   _useX._protoD._service4 |
| _protoE._region._authority |
+-----+

```

Example of Underscore Names

Only the right-most _underscore names are registered in the IANA Underscore Global table.

The use of underscored node names is specific to each RRTYPE that is being scoped. Each name defines a place, but does not define the rules for what appears underneath that place, either as additional underscored naming or as a leaf node with resource records. Details for those rules are provided by specifications for individual RRTYPES. The sections below describe the way that existing underscore labels are used with the RRTYPES that they name.

Definition and registration of the subordinate underscore node names is the responsibility of the specification that creates the highest-level (right-most) global registry entry.

That is, if a scheme using a global underscore node name also has one or more subordinate levels of underscore node naming, the namespaces from which names for those lower levels is chosen is controlled by the parent underscore node name. Each globally-registered underscore name owns a distinct, subordinate name space.

3. IANA Considerations

Per [\[RFC8126\]](#), IANA is requested to establish the:

DNS Underscore Global Scoped Entry Registry

This section describes actions requested of IANA. The guidance in [\[IANA\]](#) is used.

3.1. DNS Underscore Global Scoped Entry Registry

The DNS Global Underscore Scoped Entry Registry is for DNS node names that begin with the underscore character (`_`) and are the right-most occurrence of any underscored names in a domain name sequence having that form; that is they are the "top" of a DNS branch, under a "parent" domain name.

- o This registry is to operate under the IANA rules for "Expert Review" registration; see [Section 4](#).
- o The contents of each entry in the Global registry are defined in [Section 3.2](#).
- o Each entry in the registry MUST contain values for all of the fields specified in [Section 3.2](#).
- o Within the registry, the combination of RR Type and `_Node Name` MUST be unique.
- o The table is to be maintained with entries sorted by the first column (RR Type) and within that the second column (`_Node Name`).
- o The required Reference for an entry MUST have a stable resolution to the organization controlling that registry entry

3.2. DNS Underscore Global Scoped Entry Registry Definition

A registry entry contains:

RR Type: Lists an RR type that is defined for use within this scope.

`_Node Name`: Specifies a single `_`underscore name that defines a reserved name; this name is the "global" entry name for the scoped resource record types that are associated with that name

References: Lists specification that defines a record type and its use under this Name. The organization producing the specification retains control over the registry entry for the `_Node Name`.

Each RR type that is to be used MUST have a separate registry entry.

3.3. Initial entries

Initial entries in the registry are:

RR Type	_NODE NAME	REFERENCE
OPENPGPKEY	_openpgpkey	[RFC7929]
SMIMEA	_smimecert	[RFC8162]
SRV	_dccp	[RFC2782]
SRV	_sctp	[RFC2782]
SRV	_tcp	[RFC2782]
SRV	_udp	[RFC2782]
TLSA	_sctp	[RFC6698]
TLSA	_tcp	[RFC6698]
TLSA	_udp	[RFC6698]
TXT	_mta-sts	[MTA-STS]
TXT	_acme-challenge	[ACME]
TXT	_dmarc	[RFC7489]
TXT	_domainkey	[RFC6376]
TXT	_spf	[RFC7208]
TXT	_vouch	[RFC5518]
URI	_iax	[RFC7553]
URI	_acct	[RFC7553]
URI	_dccp	[RFC7553]
URI	_email	[RFC7553]
URI	_ems	[RFC7553]
URI	_fax	[RFC7553]
URI	_ft	[RFC7553]
URI	_h323	[RFC7553]
URI	_ical-sched	[RFC7553]
URI	_ical-access	[RFC7553]
URI	_ifax	[RFC7553]
URI	_im	[RFC7553]
URI	_mms	[RFC7553]
URI	_pres	[RFC7553]
URI	_pstn	[RFC7553]
URI	_sctp	[RFC7553]
URI	_sip	[RFC7553]
URI	_sms	[RFC7553]
URI	_tcp	[RFC7553]
URI	_udp	[RFC7553]
URI	_unifmsg	[RFC7553]
URI	_vcard	[RFC7553]
URI	_videomsg	[RFC7553]
URI	_voice	[RFC7553]
URI	_voicemail	[RFC7553]
URI	_vpim	[RFC7553]
URI	_xmp	[RFC7553]

Table 1: Underscore Global Registry (initial entries)

4. Guidance for Expert Review

This section provides guidance for expert review of registration requests in the of DNS Underscore Global Scoped Entry Registry.

This review is solely to determine adequacy of a requested entry in this Registry, and does not include review of other aspects of the document specifying that entry. For example such a document might also contain a definition of the resource record type that is referenced by the requested entry. Any required review of that definition is separate from the expert review required here.

The review is for the purposes of ensuring that:

- o The details for creating the registry entry are sufficiently clear, precise and complete
- o The combination of the _underscore name, under which the listed resource record type is used, and the resource record type, is unique in the table

For the purposes of this Expert Review, other matters of the specification's technical quality, adequacy or the like are outside of scope.

5. Security Considerations

This memo raises no security issues.

6. References

6.1. Normative References

- [ACME] Barnes, R., Hoffman-Andrews, J., McCarney, D., and J. Kasten, "Automatic Certificate Management Environment (ACME)", I-D [draft-ietf-acme-acme-11](#), March 2018.
- [IANA] M. Cotton, B. Leiba, and T. Narten, "Guidelines for Writing an IANA Considerations Section in RFCs", [RFC 8126](#), June 2017.
- [MTA-STX] Margolis, D., Risher, M., Ramakrishnan, B., Brotman, A., and J. Jones, "SMTP MTA Strict Transport Security (MTA-STX)", I-D [draft-ietf-uta-mta-stx](#).
- [RFC1035] Mockapetris, P., "Domain names - implementation and specification", STD 13, [RFC 1035](#), November 1987.

- [RFC2181] Elz, R. and R. Bush, "Clarifications to the DNS Specification", [RFC 2181](#), July 1997.
- [RFC2782] Gulbrandsen, A., Vixie, P., and L. Esibov, "A DNS RR for specifying the location of services (DNS SRV)", [RFC 2782](#), February 2000.
- [RFC5518] Hoffman, P., Levine, J., and A. Hathcock, "Vouch By Reference", [RFC 5518](#), April 2009.
- [RFC6335] Cotton, M., Eggert, L., Tsuchioka, J., Westerlund, M., and S. Cheshire, "Internet Assigned Numbers Authority (IANA) Procedures for the Management of the Service Name and Transport Protocol Port Number Registry", [RFC 6335](#), Aug 2011.
- [RFC6376] Crocker, D., Hansen, T., and M. Kucherawy, "DomainKeys Identified Mail (DKIM) Signatures", [RFC 6376](#), Sept 2011.
- [RFC6698] Hoffman, J. and J. Schlyter, "The DNS-Based Authentication of Named Entities (DANE) Transport Layer Security (TLS) Protocol: TLSA", [RFC 6698](#), August .
- [RFC7208] Kitterman, S., "Sender Policy Framework (SPF) for Authorizing Use of Domains in E-Mail, Version 1", [RFC 7208](#), April 2014.
- [RFC7489] Kucherawy, M., Ed. and E. Zwicky, Ed., "Domain-based Message Authentication, Reporting, and Conformance (DMARC)", [RFC 7489](#), March 2015.
- [RFC7553] Falstrom, P. and O. Kolkman, "The Uniform Resource Identifier (URI) DNS Resource Record", [RFC 7553](#), ISSN 2070-1721, June 2015.
- [RFC7929] Wouters, P., , [RFC 7929](#), August 2016.
- [RFC8126] Cotton, M., Leiba, B., and T. Narten, "Guidelines for Writing an IANA Considerations Section in RFCs", [RFC 8126](#), June 2017.
- [RFC8162] Hoffman, P. and J. Schlyter, "Using Secure DNS to Associate Certificates with Domain Names for S/MIME", [RFC 8162](#), May 2017.
- [RFC952] Harrenstien, K., Stahl, M., and E. Feinler, "DOD Internet Host Table Specification", [RFC 952](#), October 1985.

6.2. URIs

[1] <mailto:dnsop@ietf.org>

Appendix A. Acknowledgements

Thanks go to Bill Fenner, Tony Hansen, Martin Hoffmann, Peter Koch, Olaf Kolkman, and Andrew Sullivan for diligent review of the (much) earlier drafts. For the later enhancements, thanks to: Stephane Bortzmeyer, Bob Harold, Warren Kumari, John Levine, Joel Jaeggli, Petr Špaček, Ondřej Surř;, Paul Vixie, Tim Wicinski, and Paul Wouters.

Special thanks to Ray Bellis for his persistent encouragement to continue this effort, as well as the suggestion for an essential simplification to the registration model.

Author's Address

Dave Crocker
Brandenburg InternetWorking
675 Spruce Dr.
Sunnyvale, CA 94086
USA

Phone: +1.408.246.8253
Email: dcrocker@bbiw.net
URI: <http://bbiw.net/>

