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## DNS Resolver Information

### Abstract

This document specifies a method for DNS resolvers to publish information about themselves. DNS clients can use the resolver information to identify the capabilities of DNS resolvers. How such an information is then used by DNS clients is out of the scope of the document.

### Discussion Venues

This note is to be removed before publishing as an RFC.

Discussion of this document takes place on the Adaptive DNS Discovery Working Group mailing list ([add@ietf.org](mailto:add@ietf.org)), which is archived at <https://mailarchive.ietf.org/arch/browse/add/>.

Source for this draft and an issue tracker can be found at <https://github.com/boucadair/add-resolver-information>.

### Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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### 1. Introduction

Historically, DNS stub resolvers communicated with recursive resolvers without needing to know anything about the features supported by these recursive resolvers. As more and more recursive resolvers expose different features that may impact delivered DNS services, means to help stub resolvers to identify the capabilities of resolvers are valuable. Typically, stub resolvers can discover and authenticate encrypted DNS servers provided by a local network, for example, using the techniques specified in [[I-D.ietf-add-dnr](#)] and [[I-D.ietf-add-ddr](#)]. However, these stub resolvers need a mechanism to retrieve information from the discovered recursive resolvers about their capabilities.

This document fills that void by specifying a method for stub resolvers to retrieve such information. To that aim, a new resource record (RR) type is defined for stub resolvers to query the

recursive resolvers. The information that a resolver might want to expose is defined in [Section 5](#).

Retrieved information can be used to feed the server selection procedure. However, that selection procedure is out of scope.

## 2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

This document makes use of the terms defined in [[RFC8499](#)].

'Encrypted DNS' refers to a DNS scheme where DNS exchanges are transported over an encrypted channel between a DNS client and server (e.g., DNS- over-HTTPS (DoH) [[RFC8484](#)], DNS-over-TLS (DoT) [[RFC7858](#)], or DNS- over-QUIC (DoQ) [[RFC9250](#)]).

## 3. Retrieving Resolver Information

A stub resolver that wants to retrieve the resolver information may use the RR type "RESINFO" defined in this document.

The content of the RDATA in a response to RR type query is defined in [Section 5](#). If the resolver understands the RESINFO RR type, the RRSets in the Answer section **MUST** have exactly one record.

A DNS client can retrieve the resolver information using the RESINFO RR type and QNAME of the domain name that is used to authenticate the DNS server (referred to as ADN in [[I-D.ietf-add-dnr](#)]).

If the special use domain name "resolver.arpa" defined in [[I-D.ietf-add-ddr](#)] is used to discover the encrypted DNS server, the client can retrieve the resolver information using the RESINFO RR type and QNAME of the designated resolver.

## 4. Format of the Resolver Information

The resolver information uses the same format as DNS TXT records. The intention of using the same format as TXT records is to convey a small amount of useful information about a DNS resolver. As a reminder, the format rules for TXT records are defined in Section 3.3.14 of the DNS specification [[RFC1035](#)] and further elaborated in Section 6.1 of the DNS-based Service Discovery (DNS-SD) [[RFC6763](#)]. The recommendations to limit the TXT record size are discussed in Section 6.2 of [[RFC6763](#)].

Similar to DNS-SD, the RESINFO RR type uses "key/value" pairs to convey the resolver information. Each "key/value" pair is encoded using the format rules defined in Section 6.3 of [RFC6763]. Using standardized "key/value" syntax within the RESINFO RR type makes it easier for future keys to be defined. If a DNS client sees unknown keys in a RESINFO RR type, it **MUST** silently ignore them. The same rules for the keys as those defined in Section 6.4 of [RFC6763] **MUST** be followed for RESINFO.

Keys **MUST** either be defined in the IANA registry (Section 7.2) or begin with the substring "temp-" for names defined for local use only.

## 5. Resolver Information Keys/Values

The following resolver information keys are defined:

**qnamemin:** If the DNS resolver supports QNAME minimisation [RFC9156] to improve DNS privacy, the key is present. Note that, as per the rules for the keys defined in Section 6.4 of [RFC6763], if there is no '=' in a key, then it is a boolean attribute, simply identified as being present, with no value.

This is an optional attribute.

**exterr:** If the DNS resolver supports extended DNS errors (EDE) [RFC8914] to return additional information about the cause of DNS errors, the value of this key lists the possible extended DNS error codes that can be returned by this DNS resolver. When multiple values are present, these values **MUST** be comma-separated.

This is an optional attribute.

**infourl:** An URL that points to the generic unstructured resolver information (e.g., DoH APIs supported, possible HTTP status codes returned by the DoH server, how to report a problem) for troubleshooting purpose.

The server **MUST** support the content-type 'text/html'. The DNS client **MUST** reject the URL if the scheme is not "https". The URL **SHOULD** be treated only as diagnostic information for IT staff. It is not intended for end user consumption as the URL can possibly provide misleading information. A DNS client **MAY** choose to display the URL to the end user, if and only if the encrypted resolver has sufficient reputation, according to some local policy (e.g., user configuration, administrative configuration, or a built-in list of respectable resolvers).

This is an optional attribute. For example, a DoT server may not want to host an HTTPS server.

New keys can be defined as per the procedure defined in [Section 7.2](#).

[Figure 1](#) shows an example of a published resolver information record:

```
resolver.example.net. 7200 IN RESINFO qnamemin exterr=15,16,17
                        resinfourl=https://resolver.example.com/guide
```

Figure 1: An Example of Resolver Information Record

## 6. Security Considerations

Unless a DNS request to retrieve the resolver information is encrypted (e.g., sent over DoT or DoH), the response is susceptible to forgery. The DNS resolver information can be retrieved before or after the encrypted connection is established to the DNS server by using local DNSSEC validation.

## 7. IANA Considerations

Note to the RFC Editor: Please update "[RFCXXXX]" occurrences with the RFC number to be assigned to this document.

### 7.1. RESINFO RR Type

This document requests IANA to register a new value from the "Resource Record (RR) TYPES" subregistry of the "Domain Name System (DNS) Parameters" registry available at [\[RRTYPE\]](#):

Type: RESINFO

Value: TBD

Meaning: Resolver Information as Key/Value Pairs

Reference: [\[RFCXXXX\]](#)

### 7.2. DNS Resolver Information Key Registration

This document requests IANA to create a new sub-registry entitled "DNS Resolver Information Keys" under the "Domain Name System (DNS) Parameters" registry ([\[IANA-DNS\]](#)). This new registry contains definitions of the keys that can be used to provide the resolver information.

The registration procedure is Specification Required (Section 4.6 of [\[RFC8126\]](#)).

The structure of the registry is as follows:

**Name:**

The key name. The name **MUST** conform to the definition in [Section 4](#) of this document. The IANA registry **MUST NOT** register names that begin with "temp-", so these names can be used freely by any implementer.

**Value Type:** The type of the value to be used in the key.

**Description:** A description of the registered key.

**Specification:** The reference specification for the registered element.

The initial content of this registry is provided in [Table 1](#).

Name	Value Type	Description	Specification
qnamemin	boolean	Indicates whether 'qnameminimization' is enabled or not	[RFCXXXX]
exterr	number	Lists the set of extended DNS errors	[RFCXXXX]
infourl	string	Provides an unstructured resolver information that is used for troubleshooting	[RFCXXXX]

Table 1: Initial RESINFO Registry

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