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DOA over DNS  
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## Abstract

### Abstract

This document defines a DOA RR type to implement the Digital Object Architecture over DNS.

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Internet-Draft

DOA over DNS

October 2017

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[1.](#) Introduction

This document defines an RR type to implement an architecture similar to the Digital Object Architecture [[ITU-X.1255](#)] within the DNS. Each DOA RR contains an object type that might be opaque and private to the producer and the consumer of the data and either the data (if small enough to fit in the RR) or a pointer on how to retrieve the actual data.

[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.

[3.](#) The DOA Resource Record

### [3.1.](#) Description

The Type value for the DOA RR is TBD. The DOA RR is class independent. No special processing is required within DNS servers or libraries.

The RDATA of the resource record comprises of five fields: DOA-ENTERPRISE, DOA-TYPE, DOA-MEDIA-TYPE, DOA-LOCATION and DOA-DATA.

#### [3.1.1.](#) Enterprise and Type fields

The DOA-ENTERPRISE and DOA-TYPE fields are combined to indicate the semantic type of the DOA record being represented by the RR. That semantic is private to the producer of data hosted on an authoritative DNS server and the application software using a DNS stub resolver to retrieve it.

The DOA-ENTERPRISE field uses values as specified in the IANA SMI Network Management Private Enterprise Codes Registry [[IANA-ENTERPRISE](#)]. An exception to that is that the reserved value of zero (0) is used to indicate that the the DOA-ENTERPRISE is not set.

Some commonly used values of DOA-TYPE are registered in the IANA DOA Type Registry [Section 7.1](#), others are privately defined. As those private types might be used in cross-organization systems, use of the DOA-ENTERPRISE field is RECOMMENDED to disambiguate types.

#### [3.1.2.](#) Location field

The DOA-LOCATION signals how the DOA-DATA field should be interpreted using the values specified in the DOA Location Type Registry [Section 7.2](#).

The value 0 is reserved.

For the value 1 ("Local"), the DOA-DATA contains the actual DOA object.

For the value 2 ("URI") the DOA-DATA contains a UTF-8 encoded string representing the URI from which the DOA object can be obtained.

For the value 3 ("HDL") the DOA-DATA contains a UTF-8 encoded string representing the handle from the Handle System [[RFC3650](#)] from which the DOA object can be obtained.

Other values might be defined in the future, for example for NFS, LDAP, etc...

DNS software implementing the DOA RR type MUST NOT drop or otherwise refuse to handle the DOA RRs containing an unknown or unsupported DOA-location and MUST treat the DOA-DATA portion of the RR as an abstract opaque field.

### [3.1.3.](#) Media Type

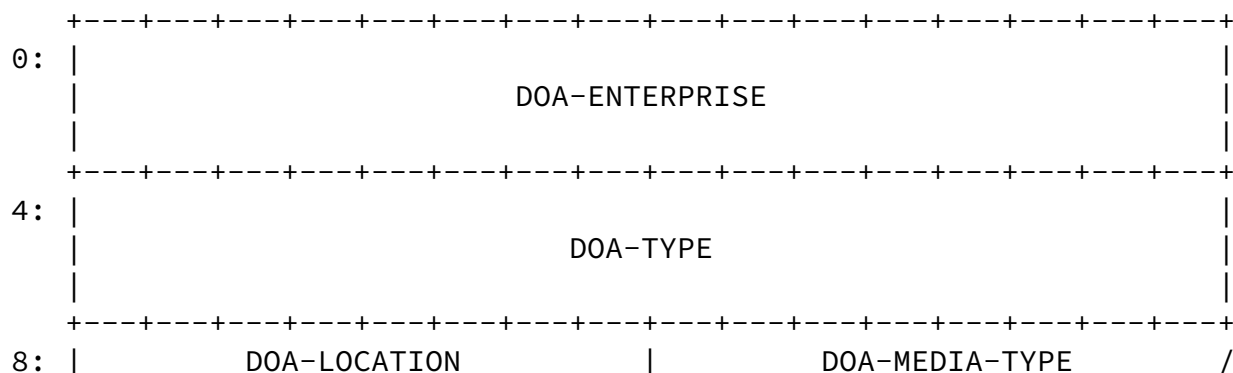
The DOA-MEDIA-TYPE field contains the Internet media type [[RFC6838](#)] for the DOA object represented by this record.

If a non-Local object is retrieved over a protocol that supports inclusion of a media type value (e.g. an HTTP Content-Type header) then the client MUST use that value (if supplied) in preference to any value specified inside this resource record. In such case, the DOA-MEDIA-TYPE MAY be set to NULL, length 0.

### [3.1.4.](#) Data

The DOA-DATA field contains either the object's data, or some form of reference specifying from where the data can be obtained, per the DOA-LOCATION field above.

## [3.2.](#) DOA RDATA Wire Format



```

+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
10: /                                                                /
    /                      DOA-MEDIA-TYPE (continued)                /
    /                                                                /
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
    /                                                                /
    /                      DOA-DATA                                  /
    /                                                                /
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

DOA-ENTERPRISE: a 32-bit unsigned integer in network order.

DOA-TYPE: a 32-bit unsigned integer in network order.

DOA-LOCATION: an 8-bit unsigned integer.

DOA-MEDIA-TYPE: A <character-string> (see [[RFC1035](#)]). The first octet of the <character-string> contains the number of characters to follow.

DOA-DATA: A variable length blob of binary data. The length of the DOA-DATA is not contained within the wire format of the RR and has to be computed from the RDLENGTH of the entire RR once other fields have been taken into account.

### [3.3](#). DOA RDATA Presentation Format

The DOA-ENTERPRISE field is presented as an unsigned 32-bit decimal integer with range 0 - 4,294,967,295.

The DOA-TYPE field is presented as an unsigned 32-bit decimal integer with range 0 - 4,294,967,295.

The DOA-LOCATION field is presented as an unsigned 8-bit decimal integer with range 0 - 255.

The DOA-MEDIA-TYPE field is presented as a single <character-string>.

The DOA-DATA is presented as Base64 encoded data [[RFC4648](#)] unless the DOA-DATA is empty in which case it is presented as a single dash character ("-"), ASCII 45). White space is permitted within Base64 data.

#### [4.](#) Security Considerations

The use of DNSSEC is encouraged to protect the integrity of the data contained in the DOA RR type.

#### [5.](#) Privacy Considerations

Personally identifiable information (PII) data appearing in the DOA-DATA field SHOULD be encrypted.

#### [6.](#) Operational consideration

Some DOA records might contain large data that is only of interest to a single party, as such, caching those records does not provide much benefits and could be considered a denial of service attack on the caching resolver infrastructure. It is thus RECOMMENDED that the TTL associated with large DOA RRs be set as small as possible to avoid caching.

#### [7.](#) IANA Considerations

##### [7.1.](#) DOA Type Registry

IANA are requested to create the DOA Type Registry with initial contents as follows:

Value	Name	Specification
0	Reserved - cannot be assigned	RFC-TBD1
1	contact email	RFC-TBD1
2	contact website	RFC-TBD1
3	contact telephone	RFC-TBD1

4 - 99	Unassigned	
100	public key	RFC-TBD1
101 - 99,999	Unassigned	
100000 -	Reserved for Private Use	RFC-TBD1

Assignments in the 1-99,999 range in this registry require Expert Review.

## 7.2. DOA Location Type Registry

IANA are requested to create the DOA Location Type Registry with initial contents as follows:

Value	Location	Specification
0	Reserved - cannot be assigned	RFC-TBD1
1	Local	RFC-TBD1
2	URI	RFC-TBD1

3	HDL	RFC-TBD1
4 - 199	Unassigned	
200 - 254	Reserved for Private Use	RFC-TBD1
255	Reserved - cannot be assigned	RFC-TBD1

Assignments in the 4-199 range in this registry require Expert Review.

## [8.](#) Acknowledgments

## [9.](#) References

### [9.1.](#) Normative References

#### [IANA-ENTERPRISE]

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## 9.2. Informative References

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