

**DNS Transport**  
**draft-barwood-dnsop-ds-publish-02**

Abstract

This document describes a new resource record type that allows a child zone to update the parent DS RRset for a DNS zone.

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## **1. Introduction**

This document defines a new resource record that may be used to update the parent the DS RRset [[RFC4034](#)]. A new resource record type is used, because the DS RR appears only on the upper (parental) side of a delegation.

The DNSSEC DS RRset for a zone is defined by the child zone but stored in the parent zone. After creating a new key signing key (or before an existing key is to be withdrawn), the child zone needs to update the parent zone.

There is currently no DNS protocol mechanism for accomplishing this. It is assumed that the DS RRset is transferred by some out-of-band mechanism.

The mnemonic for the new resource record type is "CDS", which is intended to stand for "Child DS".

In particular the CDS RR MAY be used to securely automate the rollover of the key signing key for a zone.

A new resource record type is preferred to using flags in the DNSKEY RRset. It allows the DS to be published without revealing the public key, delaying the time at which an attacker can start cryptanalysis; the size of the DNSKEY RRset is not changed, which avoids potential transport problems with large responses; it allows an algorithm to be retired; and it allows arbitrary DS records to be published which may have no corresponding DNSKEY, which might be useful in future for defining transport parameters.

## **2. Definitions**

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

## **3. Resource Record Format**

The wire and presentation format is identical to the DS record.

However no special processing is performed by servers or clients when serving or resolving.

The CDS record MUST be signed with a key that has the Secure Entry Point flag set.

## **3. Usage**

The CDS RRset MAY be used by the parent zone to create or update the

DS RRset. The parent zone MAY periodically check the child zone to see if the CDS RRset has changed. The child zone MAY send a NOTIFY message [[RFC1996](#)] to a name server for the parent zone to expedite the process. The child zone SHOULD take into account timing considerations

to ensure that validation failures do not occur.

The parent zone SHOULD attempt to authenticate [[RFC4033](#)] the CDS RRset. If the authentication succeeds extra security checks are not needed. If the result is insecure, extra checks MAY be performed according to the parent zone policy. If the authentication fails (the result is Bogus), no action is taken, other than appropriate alerts to inform operators or administrators that there is a problem.

The parent zone SHOULD check that the signing key(s) have the Secure Entry Point flag set.

The parent zone SHOULD ensure that old versions of the CDS RRset do not overwrite newer versions, which can occur if there is a delay updating secondary name servers for the child zone. This MAY be accomplished by checking that the signature inception in the RRSIG has increased - that is the minimum inception of the new signatures is greater than the maximum inception of the old signatures.

If the CDS RRset does not exist, the parent MUST take no action. Specifically it MUST NOT delete the existing DS RRset.

If the child zone loses the secret key(s) for the zone, and needs to reset the parent DS RRset, this must be accomplished by an out-of-band mechanism not defined here.

To mitigate situations where a key signing key has been compromised, the parent zone MAY take extra security measures, for example informing ( by email or other methods ) the zone administrator of the change, and delaying the acceptance of the new DS RRset for some period of time. However the precise out-of-band measures that a parent zone SHOULD take are outside the scope of this document.

#### **4. IANA Considerations**

IANA has assigned RR Type code 59 for CDS.

#### **5. Security considerations**

The CDS RRtype should allow for enhanced security. Since rollover is automated, updating a DS RRset by other means may be regarded as unusual and subject to extra security checks.

#### **6. Acknowledgements**

This document was created following discussion on automation of KSK rollover on the DNS Operations Working Group mailing list.

Thanks to the people who provided review and suggestions:  
Mark Andrews, Richard Doty, Olafur Gudmundsson, Shane Kerr,

Stephan Lagerholm, Chris Thompson.

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## **7. Normative References**

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC1996] Vixie, P., "A Mechanism for Prompt Notification of Zone Changes (DNS NOTIFY)", [RFC 1996](#), August 1996.
- [RFC4033] Arends, R., Austein, R., Larson, M., Massey, D., and S. Rose, "DNS Security Introduction and Requirements", [RFC 4033](#), March 2005.
- [RFC4034] Arends, R., Austein, R., Larson, M., Massey, D., and S. Rose, "Resource Records for the DNS Security Extensions", [RFC 4034](#), March 2005.

## **Appendix A. Example KSK rollover**

The example given is a simple single signature rollover. Other schemes are also possible.

Suppose the child zone is secure.

Step 1.

A new Key Signing Key is generated, and a new CDS record is added to the child CDS RRset.

Step 2.

The parent zone retrieves the new CDS RRset from the child zone, and updates the published DS RRset.

Step 3.

The child zone, after seeing the new DS record in the parent zone, publishes the new DNSKEY. Note: the child zone may also publish the new DNSKEY at Step 1.

Step 4.

The child zone waits for the new DNSKEY and DS records to fully propagate to caches.

Step 5.

The child zone stops signing with the old Key Signing Key, and starts signing with the new Key Signing Key.

Step 6.

The child zone waits for the old DNSKEY and any associated RRSIGs to expire from caches.

Step 7.

The child zone removes the old CDS record from the child CDS RRset.

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Step 8.

The parent zone retrieves the final CDS RRset from the child zone and publishes the final DS RRset.

Note: when signing a zone for the first time, the DNSKEY RRset must be published first, followed by a delay to allow the non-existence of the DNSKEY RRset to expire from caches, before the CDS RRset is published.

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