Domain Name System Operations
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March 23, 2015

Responsibility for Authoritative DNSSEC Mistakes
draft-livingood-dnsop-auth-dnssec-mistakes-01

Abstract

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

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1. Introduction

The Domain Name System (DNS), DNS Security Extensions (DNSSEC), and related operational practices are defined extensively [RFC1034] [RFC1035] [RFC4033] [RFC4034] [RFC4035] [RFC4398] [RFC4509] [RFC6781] [RFC5155].

DNSSEC has now entered widespread deployment. However, domain signing tools and processes are not yet as mature and reliable as is the case for non-DNSSEC-related domain administration tools and processes. As a result, operators of DNS recursive resolvers, such as Internet Service Providers (ISPs), occasionally observe domains incorrectly managing DNSSEC-related resource records. This mismanagement triggers DNSSEC validation failures, and then causes large numbers of end users to be unable to reach a domain. Many end users tend interpret this as a failure of their DNS servers, and may switch to a non-validating resolver (reducing their security) or contact their ISP to complain, rather than seeing this as a failure on the part of the domain they wanted to reach.

This document makes clear, however, that responsibility for these failures rests squarely with authoritative domain name operators, as noted in Section 3.

2. Domain Validation Failures

A domain name can fail validation for two general reasons, a legitimate security failure such as due to an attack or compromise of some sort, or as a result of misconfiguration on the part of an domain administrator. As domains transition to DNSSEC the most likely reason for a validation failure will be due to misconfiguration. Thus, domain administrators should be sure to read [RFC6781] in full. They should also pay special attention to Section 4.2, pertaining to key rollovers, which appears to be the cause of many recent validation failures.

In one recent example [DNSSEC-Validation-Failure-Analysis], a specific domain name failed to validate. An investigation revealed

that the domain's administrators performed a Key Signing Key (KSK) rollover by (1) generating a new key and (2) signing the domain with the new key. However, they did not use a double-signing procedure for the KSK and a pre-publish procedure for the ZSK. Double-signing refers to signing a zone with two KSKs and then updating the parent zone with the new DS record so that both keys are valid at the same time. This meant that the domain name was signed with the new KSK, but it was not double-signed with the old KSK. So, the new key was used for signing the zone but the old key was not. As a result, the domain could not be trusted and returned an error when trying to reach the domain. Thus, the domain was in a situation where the DNSSEC chain of trust was broken because the Delegation Signer (DS) record pointed to the old KSK, which was no longer used for signing the zone. (A DS record provides a link in the chain of trust for DNSSEC from the parent zone to the child zone - in this case between TLD and domain name.)

3. Responsibility for Failures

A domain administrator is solely and completely responsible for managing their domain name(s) and DNS resource records. This includes complete responsibility for the correctness of those resource records, the proper functioning of their authoritative DNS servers, and the correctness of DNS records linking their domain to a top-level domain (TLD) or other higher level domain. The domain owner is also responsible for selection of the authoritative domain administrator, operator, or service provider. Thus, even in cases where some error may be introduced by a third party, whether that is due to an authoritative server software vendor, software tools vendor, domain name registrar, or other organization, these are all parties that the domain administrator has selected and is responsible for managing successfully.

There are some cases where the domain administrator is different than the domain owner. In those cases, a domain owner has delegated operational responsibility to the domain administrator. So no matter whether a domain owner is also the domain administrator or not, the domain administrator is nevertheless operationally responsible for the proper configuration operation of the domain.

So in the case of a domain name failing to successfully validate, when this is due to a misconfiguration of the domain, that is the sole responsibility of the domain administrator.

Any assistance or mitigation responses undertaken by other parties to mitigate the misconfiguration of a domain name by a domain administrator, especially operators of DNS recursive resolvers, are optional and at the pleasure of those parties.

4. Comparison to Other DNS Misconfigurations

As noted in Section 3 domain administrators are ultimately responsible for managing and ensuring their DNS records are configured correctly. ISPs or other DNS recursive resolver operators cannot and should not correct misconfigured A, CNAME, MX, or other resource records of domains for which they are not authoritative. Expecting non-authoritative entities to protect domain administrators from any misconfiguration of resource records is therefore unrealistic and unreasonable, and in the long-term is harmful to the delegated design of the DNS and could lead to extensive operational instability and/or variation.

5. Other Considerations

5.1. Security Considerations

Authoritative domain name operators and domain name owners, in the case of DNSSEC-related mistakes that cause validation failures to occur, should focus on correcting the issue and then improving their processes and tools in the future. During the period of time that their domain cannot be resolved due to a DNSSEC-related mistake, they should not encourage end users to switch to non-validating resolvers, as the use of a non-validating DNS recursive resolver has comparatively less security capabilities than a validating resolver, since one implements DNS Security Extensions and one does not. In addition, if an end user changes to a non-validating resolver they may subject themselves to increased security risks and threats against which DNS Security Extensions may have provided protection.

5.2. Privacy Considerations

There are no privacy considerations in this document.

5.3. IANA Considerations

There are no IANA considerations in this document.

6. Acknowledgements

- William Brown

7. References

7.1. Normative References

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Appendix A. Document Change Log

[RFC Editor: This section is to be removed before publication]

Individual-00: First version published as an individual draft.

Individual-01: Fixed nits identified by William Brown

Individual-02: Updated prior to IETF-91

WG-00: Renamed at request of DNSOP co-chairs

WG-01: Updated doc to keep it from expiring

Appendix B. Open Issues

[RFC Editor: This section is to be removed before publication]

No open issues at this time

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