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Roughtime Ecosystem
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Abstract

   This document specifies the roles of Roughtime validators, clients,
   and servers in providing a ecosystem for secure time.

Status of This Memo

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1. Introduction

   The Roughtime protocol enables servers to provide cryptographic proof
   of the times requests were made. This enables clients to expose
   cheating by servers. This document describes how these proofs are
   seralized and verified, as well as APIs to access and submit reports
   of malfeasnce in an automated manner.

2. Chaining in roughtime

   Two responses are chained if the NONC field of the second is SHA-
   512(blinder || first) where blinder is a 64 byte value. Blinder MUST
   be generated uniformly at random to prevent tracking. The first
   response is serialized as a roughtime message. The first response is
   chained to the second.

   A chain is a sequence of messages where each message is chained to
   the one before. Every contiguous subsequence of a chain is a chain.

3. Impeachement

   For each index i, let m_i denote the timestamp of the response, r_i
   the radius around it. Then we have m_i-r_i the earliest actual time
   at which the response could have been generated, and m_i+r_i the
   latest actual time at which the response could have been generated.

   If all requests are generated honestly $m_i+r_i < m_{i+j}-r_{i+j}$
   holds for all indices i and positive numbers j. A failure of this
   relation to hold demonstrates that at least one of the responses was
   generated incorrectly.

   The more distinct servers and responses that are mutually consistent
   except for the questionable response, the more likey a failure of the
   generator of the errneous response is.

4. Serialization of chains

    TODO

5. Submission API

6. Viewing Reports

7. Trust Anchors and Policies

    A trust anchor is any distributor of a list of trusted servers. It
    is RECOMMENDED that trust anchors subscribe to a common public forum
    where evidence of malfeasance may be shared and discussed. Trust
    anchors SHOULD subscribe to a zero-tolerance policy: any generation
    of incorrect timestamps will result in removal. To enable this trust
    anchors SHOULD list a wide variety of servers so the removal of a
    server does not result in operational issues for clients. Clients
    SHOULD attempt to detect malfeasance and report it as discussed in
    this document.

    Because only a single Roughtime server is required for successful
    synchronization, Roughtime does not have the incentive problems that
    have prevented effective enforcement of discipline on the web PKI.

8. Normative References

    [I-D.ietf-ntp-roughtime]
              Malhotra, A., Langley, A., and W. Ladd, "Roughtime",
              draft-ietf-ntp-roughtime-03 (work in progress), August
              2020.

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