Network Time Security

draft-ietf-ntp-network-time-security-01

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Introduction

Scope:

Network Time Security shall provide

- Authenticity of time servers
- Integrity of synchronization data packets
- Conformity with the TICTOC Security Requirements
- It must support NTP
- It can/should support PTP if possible
## Introduction

### History

<table>
<thead>
<tr>
<th>IETF 83</th>
<th>Presentation of security issues of RFC 5906 (autokey)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IETF 84</td>
<td>Plan for a new autokey standard was presented</td>
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<tr>
<td>IETF 85</td>
<td>I-D “draft-sibold-autokey-00”</td>
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<tr>
<td>IETF 86</td>
<td>I-D “draft-sibold-autokey-02”</td>
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<tr>
<td>IETF 87</td>
<td>I-D was renamed; it is presented as I-D “draft-ietf-ntp-network-time-security-00”</td>
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Changes since IETF 87

- **According to the comments of the last IETF meeting**
  - Brian Dickson about DANE Certificate exchange: This will be considered for the 02 version.

- **Mailing list comments**
  - Dave Mills comments about usage of asymmetric signature for the broadcast mode: This will be considered for the 02 version.
  - Kurt’s comments about NTP Pools: A short section has been added to the draft. It states that the current version of NTS cannot be used together with NTP pools.
  - Kurt’s hint about signature of the cookie exchanges has been added to the draft.
Changes since IETF 87

- **Other changes**
  - A nonce has been added to the time request message (6.5) in order to prevent replay attacks.
  - Editorial changes have been made especially in the description of the broadcast mode.
  - Comparison with the TICTOC requirements has been revised.
Open issues

- **Authorization**
  - Is not yet addressed

- **Recursive authentication**
  - In the current approach each client (clock) authorizes only the intermediate server (master). B authorizes C and A authorizes B.
  
  ![Diagram](image)
  
  - A certification trail (chain of trust) is not provided, i.e., client A does not learn about C if it authorizes B.
Open issues (continued)

- **Recursive authentication (continued)**
  
  ![Diagram](A -> B -> C)

  - The challenge:
    - Chain of trust and chain of time do not coincide necessarily.
    - Chain of time can change dynamically.
    - Is a intermediate clock trustworthy because it is authenticated? Can or has to be considered in connection with authorization.

- **Delay attack**
  
  - To be discussed in section “Security Considerations” (multi-source approach, available for NTP)
Next steps

- Review and comments are requested from
  - TICTOC WG
  - NTP WG
  - NTP development team

- Formal verification of the protocol
  - Model checking