Echo Cookie TCP Option

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status

• draft-briscoe-tcpm-echo-cookie-00
  • initial individual draft

• arose from SYN-option-space extension work, but orthogonal

• separated out as focused draft
  • all SYN-option-space-extensions need something like this
  • replaces tcpcrypt SYNCOOKIE/ACKCOOKIE suboptions
Problem

- **SYN flood**
  - exhausts TCP server’s pending connection state
  - while SYN/ACK checks validity of source address

- **SYN cookie,.. and friends**
  - store server connection state in flight not in memory
  - still needed (despite some thinking server config is sufficient)
  - but... further problem

- **15 bits of cookie space**
  - embedded in 16b initial seq no (ISN) and 9 lowest significant bits of timestamp (if supported)
  - only enough for degraded max seg size, wnd scale & SACK-ok
  - plus some scope for server to infer other options it negotiated

- with more, larger options on SYN: **not enough space**
  - with SYN-extension: **really not enough space**

- SYN flood becomes either connection state or option denial attack
Echo Cookie TCP Option

- underlying the space problem:
  - SYN cookie limited to fields that all TCP clients echo (ISN, TS)
- solution: a larger cookie jar
  - mandatory to implement with any new TCP option
  - and mandatory with extra SYN option space
  - ie. other options implicitly signal client support for EchoCookie
- the EchoCookie option
  - if host receives a cookie, it MUST reflect it back
  - sender can choose size and contents

<table>
<thead>
<tr>
<th>EchoCookie</th>
<th>Len=X (X&gt;1)</th>
<th>Cookie</th>
</tr>
</thead>
<tbody>
<tr>
<td>1B</td>
<td>1B</td>
<td>(X-2)B</td>
</tr>
</tbody>
</table>

- client MAY include 2-octet EchoCookie flag option on SYN
  - e.g. when using options that do not signal implicit support
security considerations (discuss on list pls)

- if client negotiated state using a secured protocol
  - cookie MUST be echoed with at least as strong security
- could be used as a reflection attack?
  - SYN/ACK MUST NOT exceed size of SYN
  - no need to include data in SYN within cookie
    - server not ACKing the data causes a retransmit anyway
    - TFO cookie serves as proof the source address is valid
  - server can/SHOULD rate-limit to repeated and/or unresponsive source IPs?
- server SHOULD only use when under stress?
- mechanism server uses to verify returned cookie?
  - no need to standardise?
- any other new attack vectors?
next steps

- security discussion pls
- applicability:
  - solely SYN/ACK – ACK?
  - solely server-client-server?
  - any segment?

- intended status: proposed std?
- adoption?