SOCKS Protocol Version 6

draft-olteanu-intarea-socks-6-06

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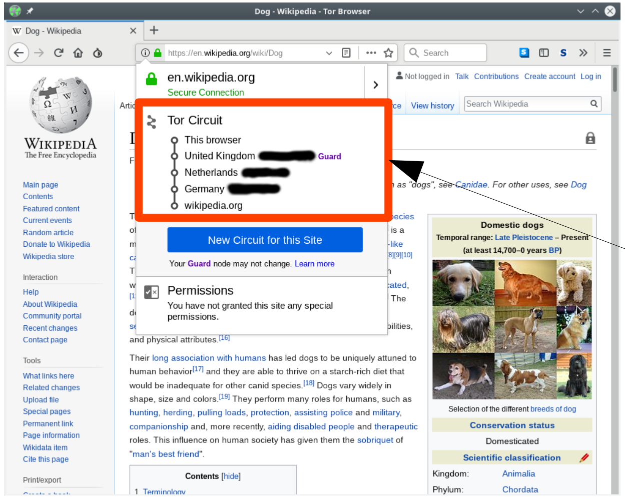
SOCKS Sessions

- (Elegantly) share state across multiple requests
  - Done since -01, but on a per-username basis
- Motivation
  - Tor
  - Credential sharing across clients (e.g. multiple browsers)

Tor



en.wikipedia.org
Secure Connection

Tor Circuit
- This browser
- United Kingdom [redacted] Guard
- Netherlands [redacted]
- Germany [redacted]
- wikipedia.org

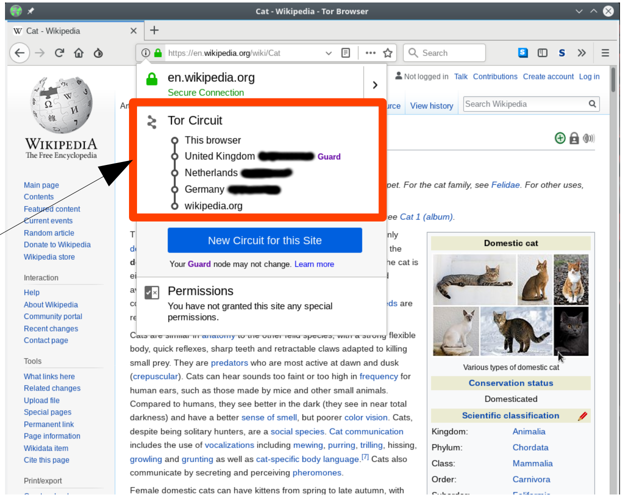
New Circuit for this Site

Your Guard node may not change. Learn more

Permissions
You have not granted this site any special permissions.

Their long association with humans has led dogs to be uniquely attuned to human behavior[17] and they are able to thrive on a starch-rich diet that would be inadequate for other canid species.[18] Dogs vary widely in shape, size and colors.[19] They perform many roles for humans, such as hunting, herding, pulling loads, protection, assisting police and military, companionship and, more recently, aiding disabled people and therapeutic roles. This influence on human society has given them the sobriquet of "man's best friend".

Same domain =
same circuit



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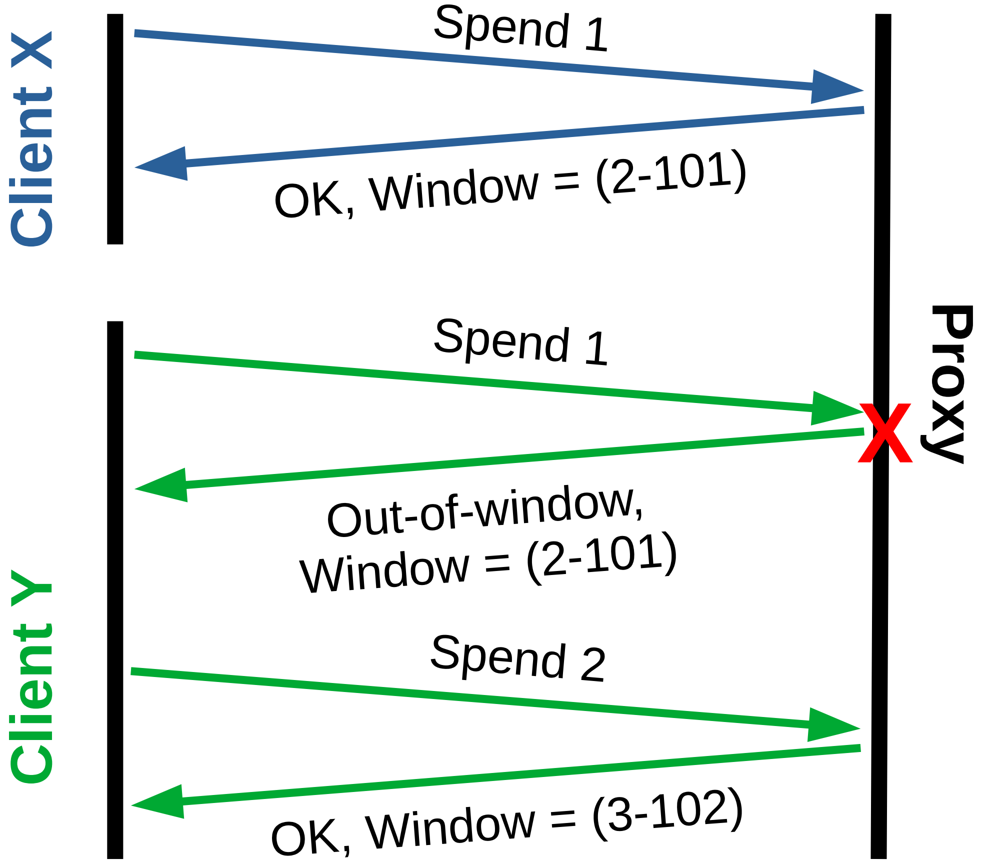
body, quick reflexes, sharp teeth and retractable claws adapted to killing small prey. They are predators who are most active at dawn and dusk (crepuscular). Cats can hear sounds too faint or too high in frequency for human ears, such as those made by mice and other small animals. Compared to humans, they see better in the dark (they see in near total darkness) and have a better sense of smell, but poorer color vision. Cats, despite being solitary hunters, are a social species. Cat communication includes the use of vocalizations including mewing, purring, trilling, hissing, growling and grunting as well as cat-specific body language.[7] Cats also communicate by secreting and perceiving pheromones.

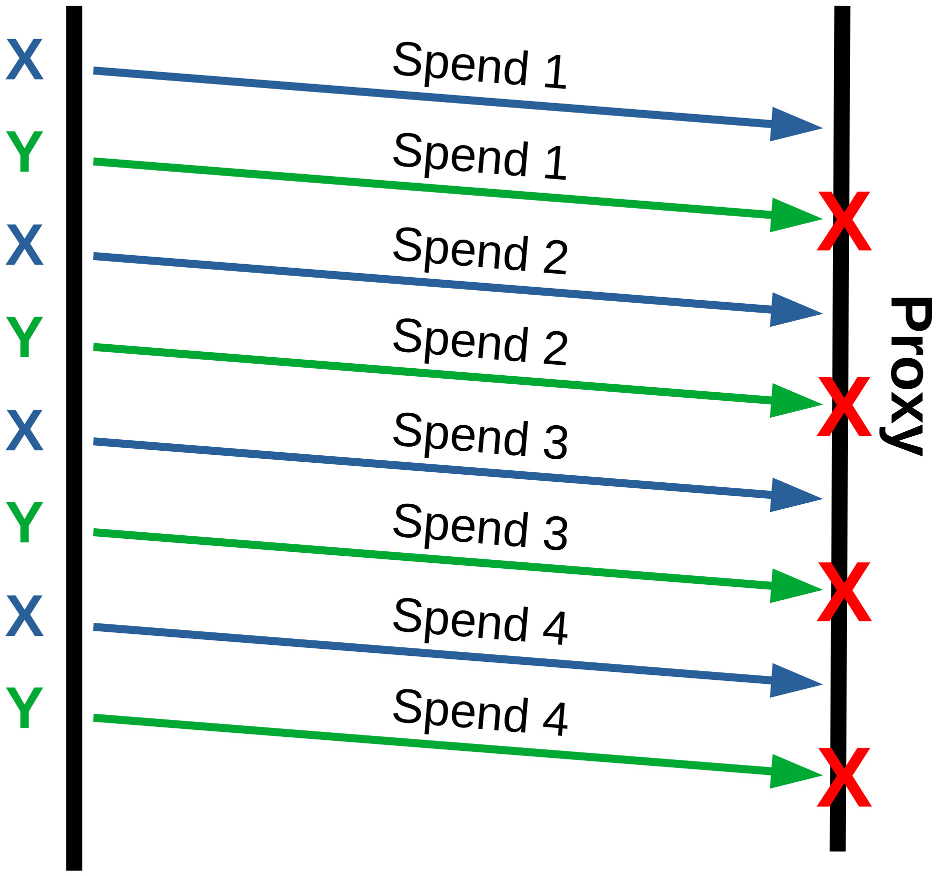
- One circuit per bar domain
- Current behavior: use SOCKS5 + username/password authentication
- Encode bar domain in username (i.e. username = “wikipedia.org”)

Idempotence + shared credentials (-05)



- Clients risk spending each other’s tokens
- At best: occasional wasted RTTs

Idempotence + shared credentials (-05)



- Clients risk spending each other’s tokens
- At best: occasional wasted RTTs
- At worst: livelock

Other motivators (-05)

- Unauthenticated clients:
  - Can’t use Idempotence options
  - Can’t use Listen Backlog options
- Shared credentials + BIND Backlog: X “listens” and Y can accept X’s connections

SOCKS Sessions

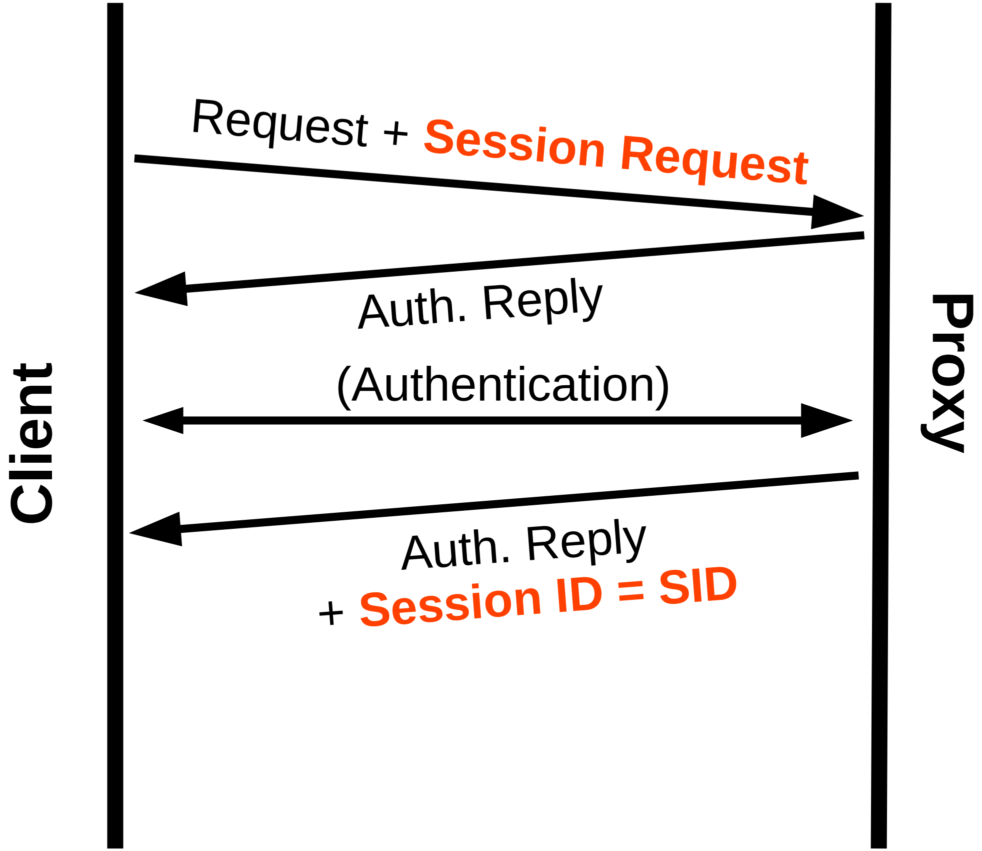
- Proxy holds shared state on a per-session basis
  - Was on a per-username basis
- (By default) authentication is waived once a session is established
- The proxy decides when to kill a session (e.g. using inactivity timers)
  - The client can also instruct it to do so
- All options are part of Requests and Authentication Replies
  - Only the client-proxy RTT is relevant

SOCKS Session options

```
+------+--------+------+---------------------+
| Kind | Length | Type | Session Option Data |
+------+--------+------+---------------------+
|  1   |   2    |  1   |       Variable      |
+------+--------+------+---------------------+
```

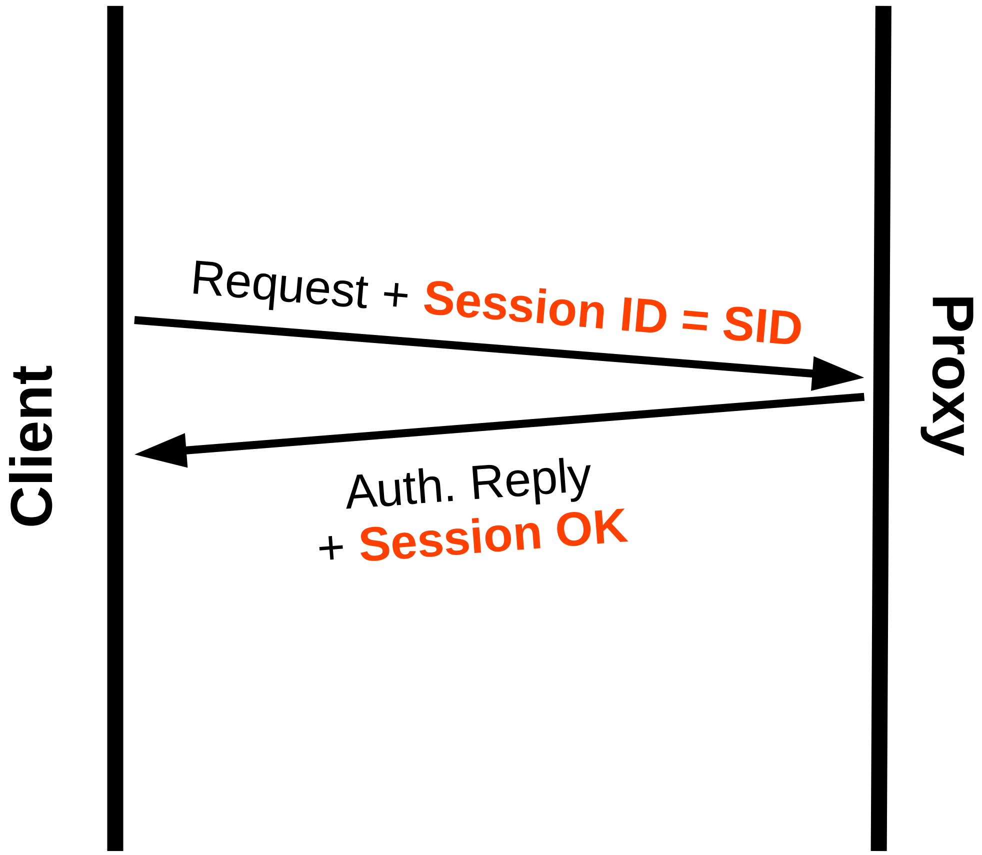
- Type: Request, ID, Teardown, OK, Invalid, Untrusted
- Option data: only used by Session ID options

Establishing a session



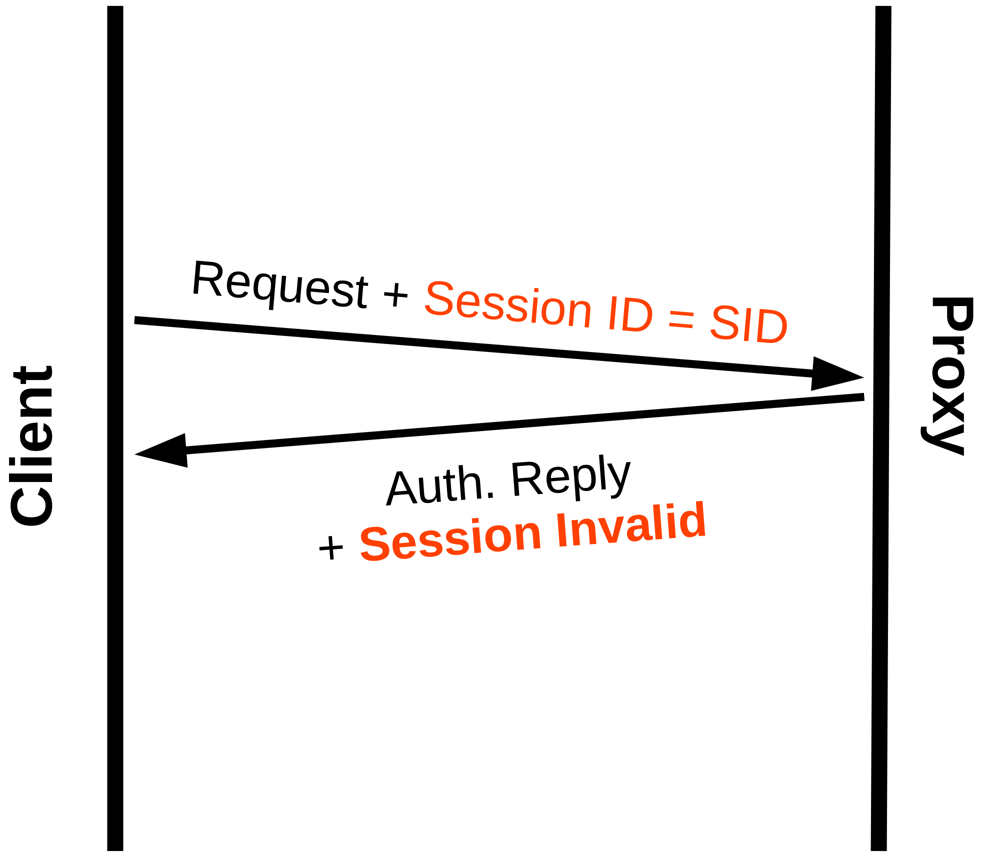
- The session-initiating request also part of the session
  - Corollary 1: can also request a token window, etc.
  - Corollary 2: can’t initiate a session from within a session
- Session ID: opaque sequence of bytes (arbitrary length)

Further requests



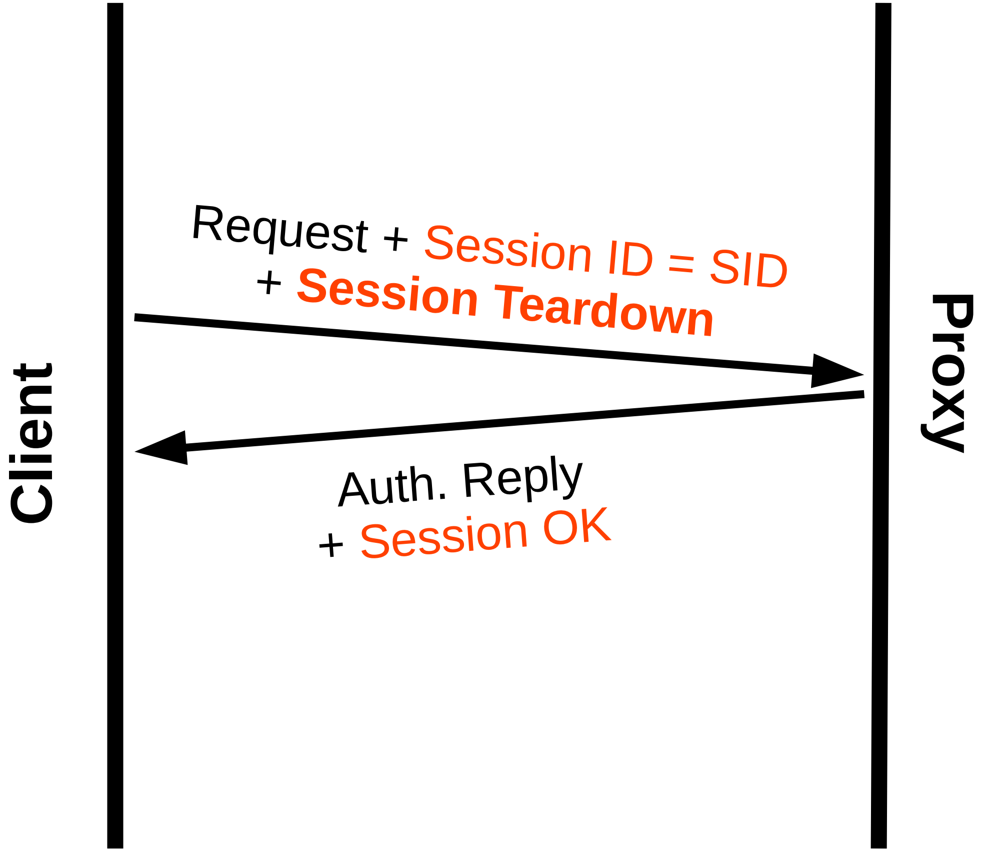
- The client’s credentials are tied to the Session ID
- Authentication is no longer performed

Invalid Session ID



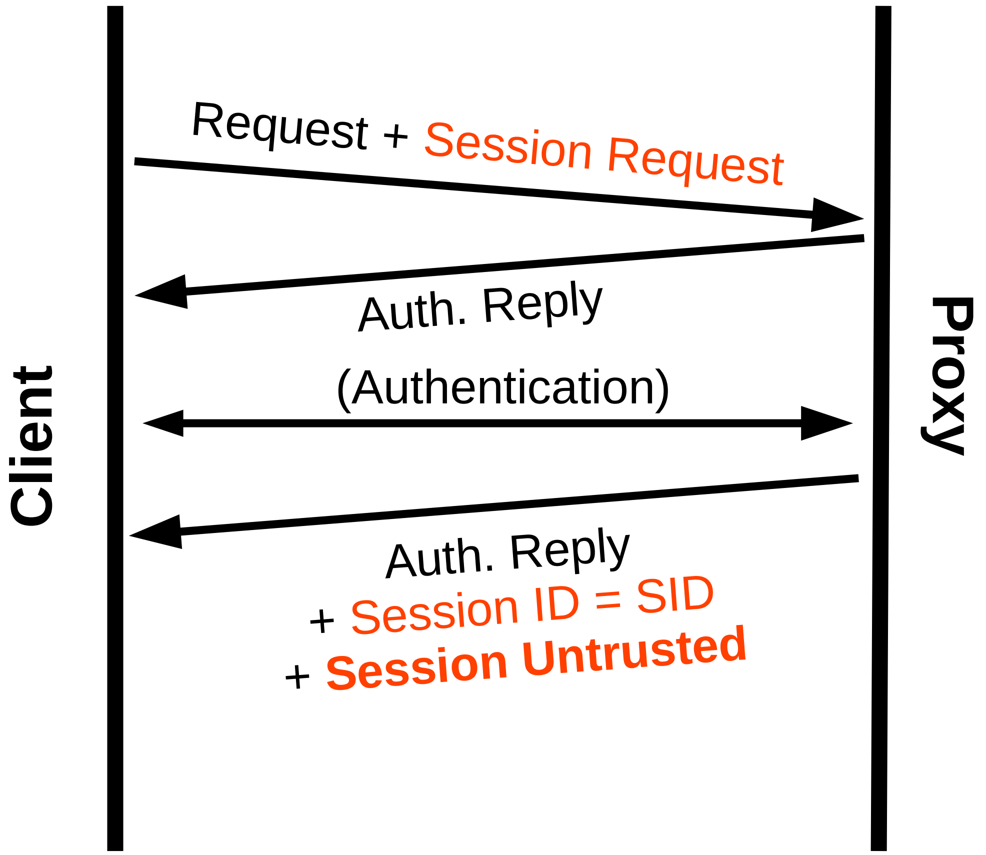
- Authentication automatically fails (even if not required by proxy policy)

Session teardwon



- Free session state early, rather than after a timeout
- The session-killing Request is part of the session

Untrusted sessions



- The client must authenticate every time it makes a Request
  - With the same credentials
- Only protects against passive attackers
- Open question: Do we want this feature?
  - Or just leave security to TLS?

Other changes in -06

- Future-proofing: options have a 2-byte length field
  - Can fit X.509 certificates etc.
- Option count (max 255) replaced with options length (2 bytes, but capped at 16KB)
- Authentication methods: eliminated user data encryption
  - Backward compatibility: encryption can still be negotiated, but it is not honored
  - Can still run SOCKS over TLS.
- Nits and quality-of-life changes for implementers