SOCKS Protocol Version 6 (Update)

draft-olteanu-intarea-socks-6-02

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Overview

- 0-RTT overhead and TFO support
  - Clients optimistically send as much information upfront
  - 0-RTT authentication
- Run over TLS (protect against malicious 3rd parties)
  - Mitigate early data replay attacks
  - Plaintext password authentication now viable
- setsockopt()-like mechanism (new in -02)
  - MPTCP scheduler
  - Discovery of servers supporting MPTCP (for proxy bypass)

Plain text password authentication

- Viable if done over TLS
  - Expected de facto standard
- Initial message from RFC1929 placed in SOCKS Request as an option
  - 0 RTT
  - Only if it fits: ULEN + PLEN <= 249

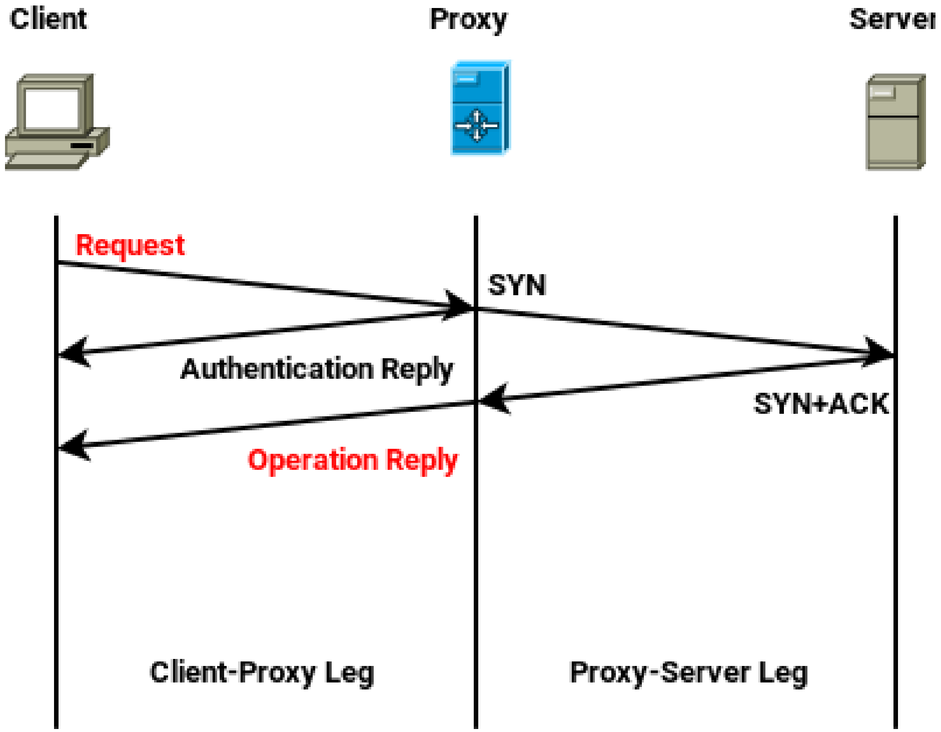
```
+---------------+--------------+----+------+----------+------+----------+
| Kind | Length | Method = 0x2 |VER | ULEN |  UNAME   | PLEN |  PASSWD  |
+------+--------+--------------+----+------+----------+------+----------+
|  1   |   1    |      1       | 1  |  1   | 1 to 255 |  1   | 1 to 255 |
+------+--------+--------------+----+------+----------+------+----------+
```

Socket Options

- Part of Requests and Operation Replies
- Inspired by setsockopt()/getsockopt() (from *nix)
  - Not an RPC
  - Individual options must be standardized separately
- Will be renamed in -03

```
+------+--------+--------+--------+-----+----------+
| Kind | Length |  Leg   | Level  | Code |   Data   |
+------+--------+--------+--------+-----+----------+
|  1   |   1    | 2 bits | 6 bits |  1   | Variable |
+------+--------+--------+--------+-----+----------+
```

- Leg: Client-Proxy (0x1), Proxy-Server (0x2) or Both(0x3)
- Level: Socket, IPv4, IPv6, TCP, UDP
- Code



TFO Option

- Replaces field in Request
- As part of a CONNECT Request: TFO SHOULD be attempted
  - Absence means TFO MUST NOT be attempted
- As part of an Operation Reply: TFO succeded

```
+---------------+--------+--------+------+
| Kind | Length |  Leg   | Level  | Code |
+------+--------+--------+--------+------+
|  1   |   1    | 2 bits | 6 bits |  1   |
+------+--------+--------+--------+------+
```

- Leg: Proxy-Server (0x2)
- Level: TCP
- Code: 0x17

Proxy Bypass

- Let multihomed clients know when a server supports MPTCP
  - Can contact server directly
- Place MPTCP option in Operation Reply

```
+-----------------+---------+---------+------+
| Kind  | Length  |  Leg    | Level   | Code |
+-------+---------+---------+---------+------+
|   1   |   1     | 2 bits  | 6 bits  |  1   |
+-------+---------+---------+---------+------+
```

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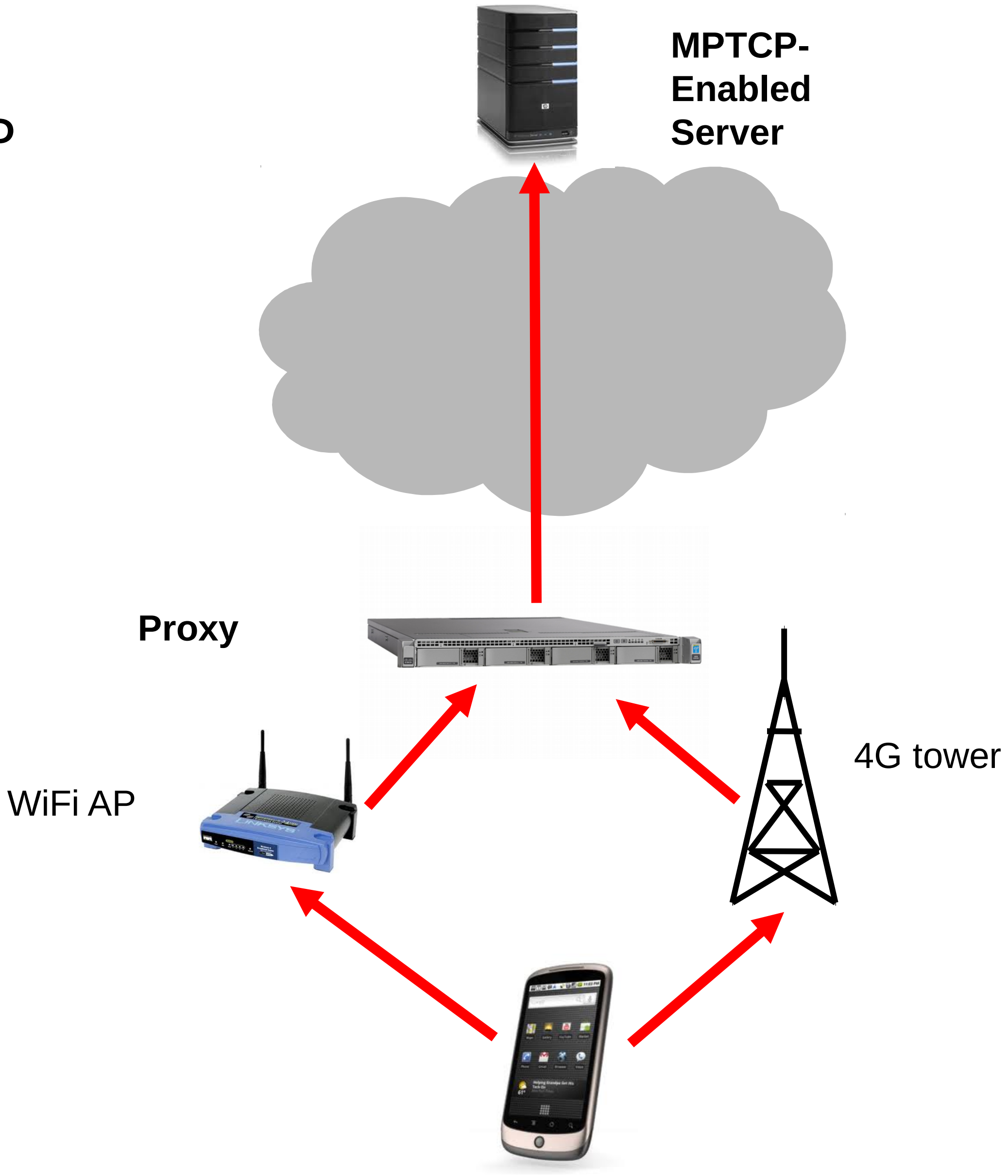

Proxy Bypass

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  - Can contact server directly
- Place MPTCP option in Operation Reply

Kind	Length	Leg	Level	Code
1	1	2 bits	6 bits	1

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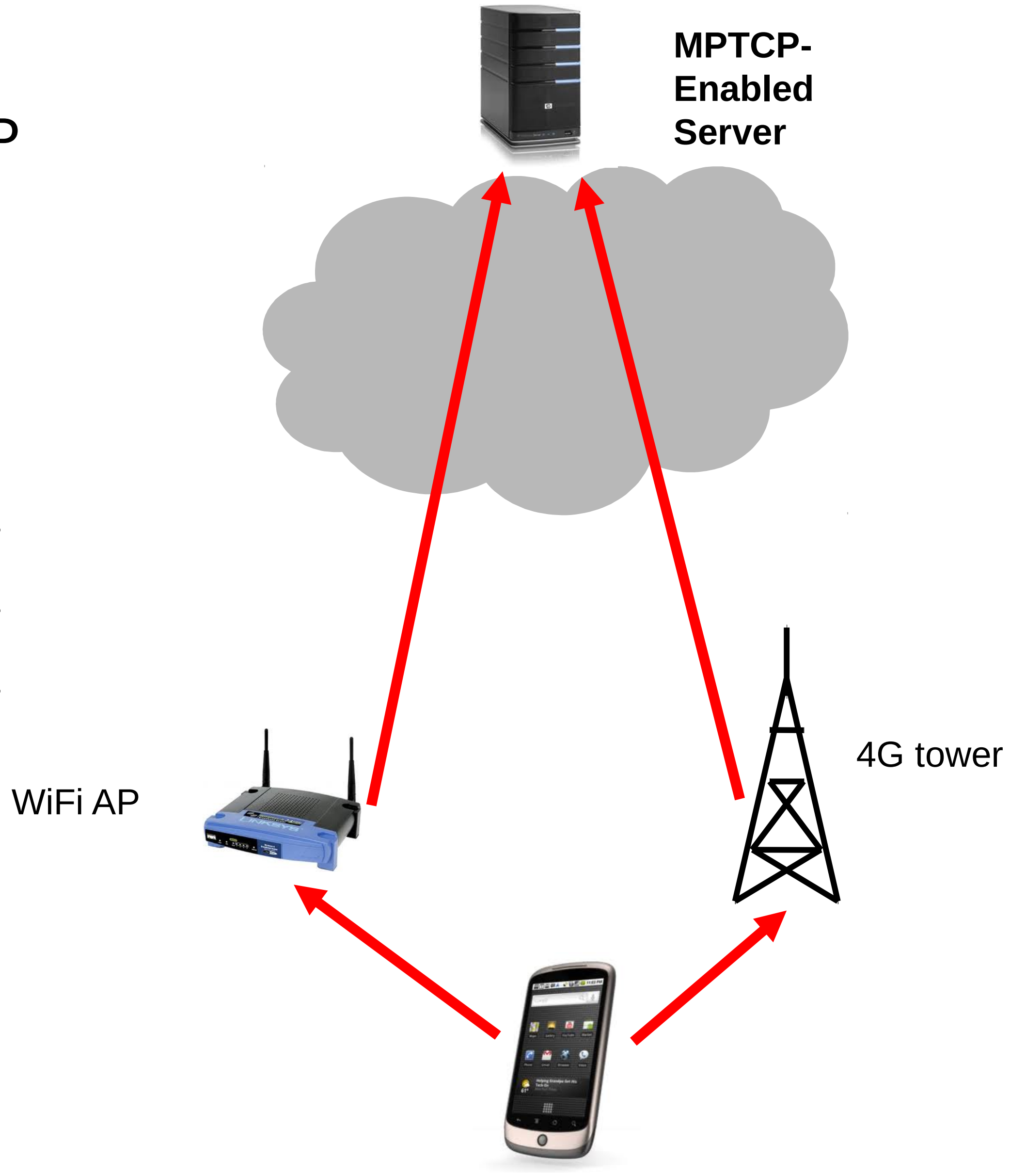

Choosing the MPTCP Scheduler

- As part of a Request: indicates the scheduler to be used
- As part of an Operation Reply: indicates what scheduler is used
- Supports schedulers available in the Linux MPTCP implementation
- Use case: low latency services
  - The REDUNDANT scheduler duplicates data across paths

Kind	Length	Leg	Level	Code	Scheduler
1	1	2 bits	6 bits	1	1

- Level: TCP
- Code: 0x2b
- Scheduler: Default/Round-Robin/Redundant

Backup Slides

Salt Options

- Clients may make multiple duplicate requests
  - May be encrypted using the same PSK
- Intended to protect against profiling attacks by adding a random value
  - TLS 1.3 forces everyone to use AEAD
  - Salt option is redundant; will remove in -03