IAB Workshop on
Stack Evolution in a
Middlebox Internet (SEMI)
26-27 January 2015, Zurich

IETF 92 Technical Plenary Report, 23 March 2015, Dallas
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Background

- IAB IP Stack Evolution Program currently focuses on two broad areas:

  - evolution of interfaces to transport and network-layer services beyond `SOCK_STREAM` and `SOCK_DGRAM`

  - Improving path transparency in the presence of firewalls and middleboxes.

- Follows the IAB's interest in general issues of protocol evolution (RFC 5218, ITAT workshop)

- Within the program, the IAB convened a workshop in January to discuss ossification of the transport layer…

  - …and how to fix it for emerging applications (e.g. rtcweb)

Why now?

1. new energy in the IETF:
   - work which requires flexibility we don't appear to have (RTCWEB, TCPINC)
   - work to provide that flexibility at the interface (TAPS)

2. pressure created by increasing deployment of encryption:
   - "Everything over TLS" will brick lots of deployed middleboxes
   - Opportunity to strike a balance between endpoint and midpoint requirements.

Workshop Positions

- 20 position papers accepted, 38 invitations sent.
- Stated goals of participants included:
  - deeper understanding of architecture and incentives,
  - broadening of transport interfaces
  - further research and community education on the issue
  - definition of middlebox cooperation approaches.
- On transport evolution, there were two camps:
  - "TCP is broken, burn it to the ground and start over"
  - "Long live TCP!"
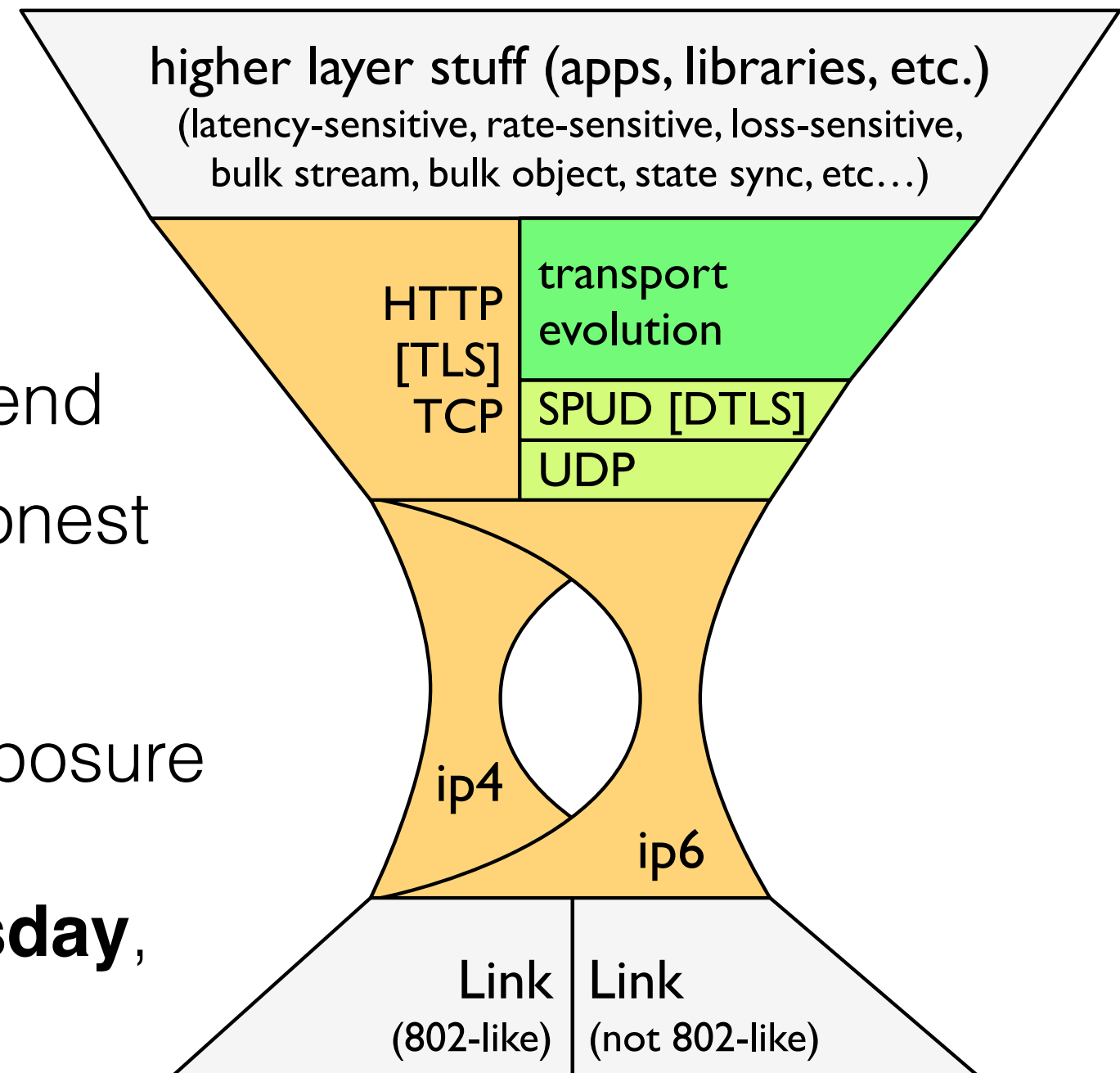
Identified Goals

- Future work (WG/RG) on middlebox cooperation (protocol/functionality/etc.), including:

    - mechanisms for detection of path characteristics

    - measurement for path impairment detection and troubleshooting

- Better understanding of how transport should/must evolve, including applicability of present transports to specific use cases.

- Interface improvement: expose more to applications about transport (in the right way)

- Identify trust issues and deployment incentives in cooperation and evolution approaches (this is hard)

Outcome: Measurement

- We need to make data-driven engineering decisions about transport protocol extension

  - If a protocol works in 99.5% of the Internet, why not use when you can?

  - If a feature breaks in 0.5% of the Internet, how much complexity to work around that is too much?

- Service providers and platform developers have access to a great deal of data which, in aggregate, could better inform these decisions.

- **HOPS BarBoF, 21:30 Sunday**

Cooperation: A new view of the two-stemmed Internet martini glass

- Expose what you must to the path

- Everything else is end-to-end

- Crypto keeps everyone honest

- Encapsulation for path exposure in user-space transports:
SPUD BoF: 9:00 Wednesday,
International room

higher layer stuff (apps, libraries, etc.)
(latency-sensitive, rate-sensitive, loss-sensitive, bulk stream, bulk object, state sync, etc…)

HTTP [TLS] TCP

transport evolution

SPUD [DTLS]

UDP

ip4

ip6

Link (802-like) Link (not 802-like)

Cooperation Vocabulary

- Once you have this mechanism, what do you say with it?

  - There need to be incentives to expose information.

  - There need to be incentives not to lie.

- A2P (app to path): problem appears tractable, there is a minimal set of useful information (e.g. session lifetime) which can be exposed, and is anyway useful to the far endpoint.

- P2A (path to app): the way forward is less clear

  - If treated as advisory: problem might be tractable; similar to ICMP, but inband.

  - If treated as authoritative: previously unsolved problem, many trust issues.

TODO

- Initial workshop report: Real Soon Now (mid-April)

  - Until then: transcripts, slides, position papers at https://www.iab.org/activities/workshops/semi/

- Cooperation with ETSI NFV Forum on middlebox issues (in progress)

- Discussions on transport extensibility in area meetings

- UDP encapsulation guidelines

- Statement on architectural assumptions in transport evolution (referred to program)

Further Discussion

- Middlebox measurement issues
  ("How Ossified is the Protocol Stack"):
  hops@ietf.org

- Substrate Protocol for User Datagrams
  spud@ietf.org

- Transport Services WG
  taps@ietf.org

- Other future work
  stackevo@iab.org