

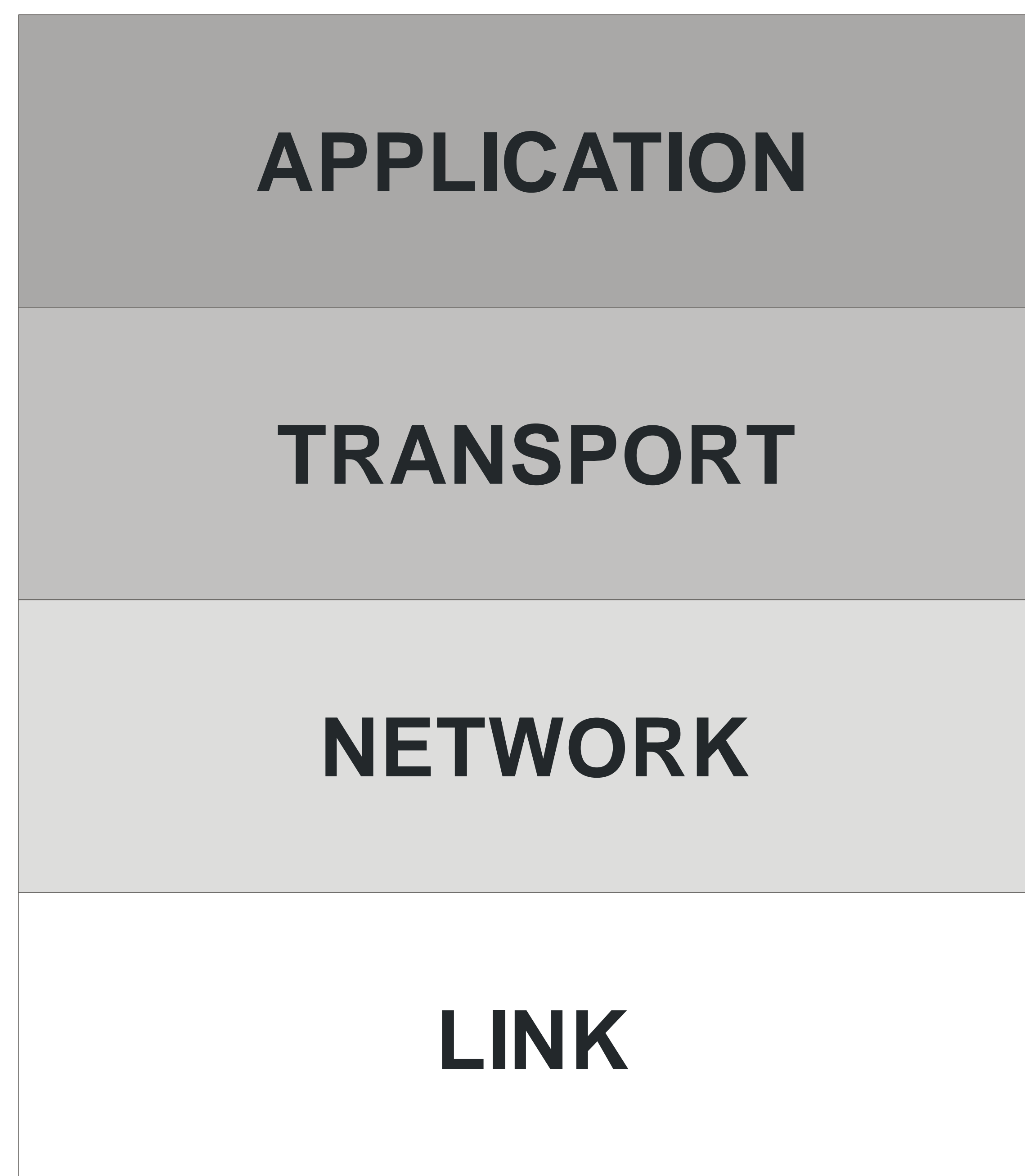
A Generalized Label-Forwarding Architecture for the Future Internet

**2nd GI/ITG KuVS Workshop
Future Internet**

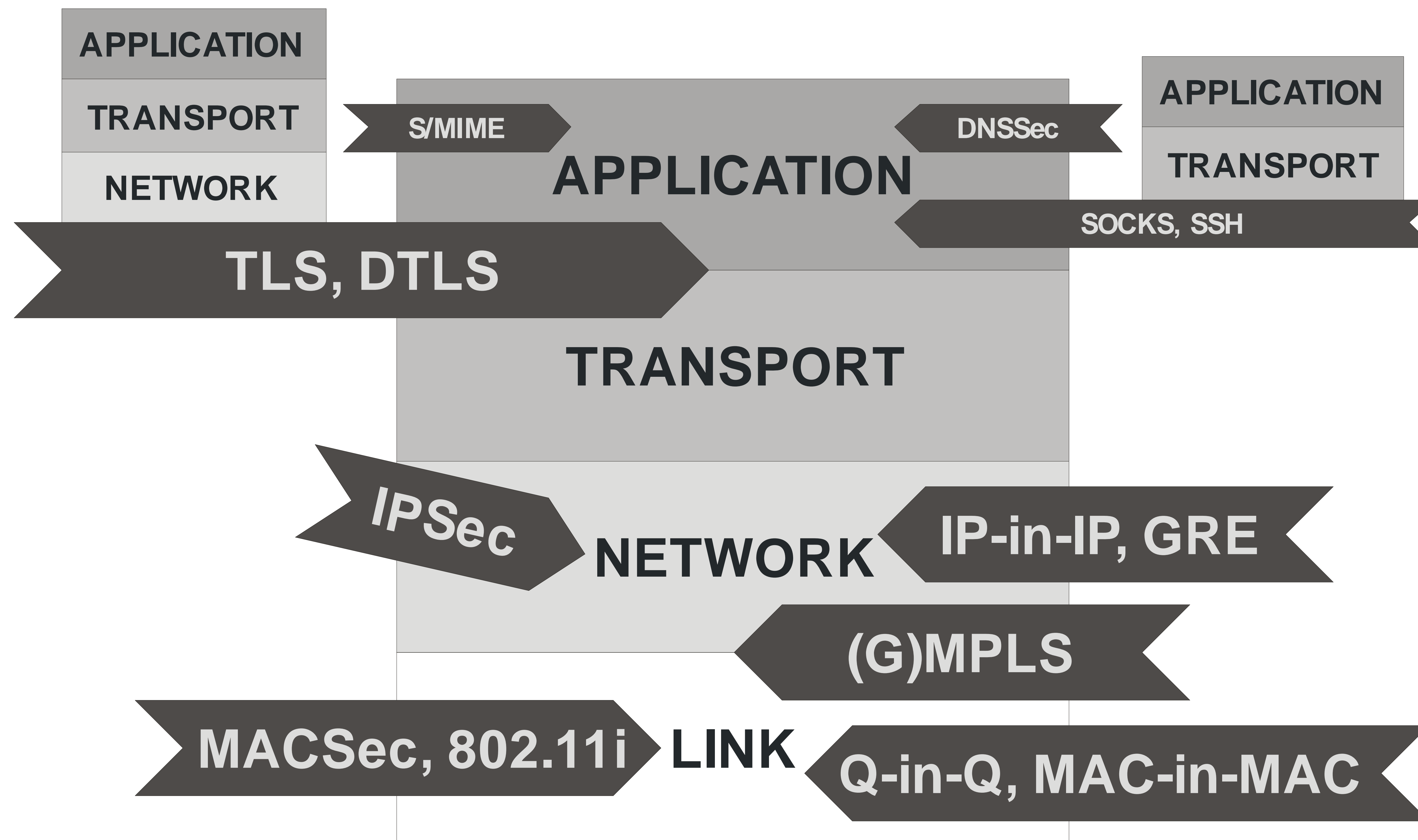
Karlsruhe 11/2008

Achim Friedland
SONES GmbH / TU Ilmenau
achim.friedland@sones.de

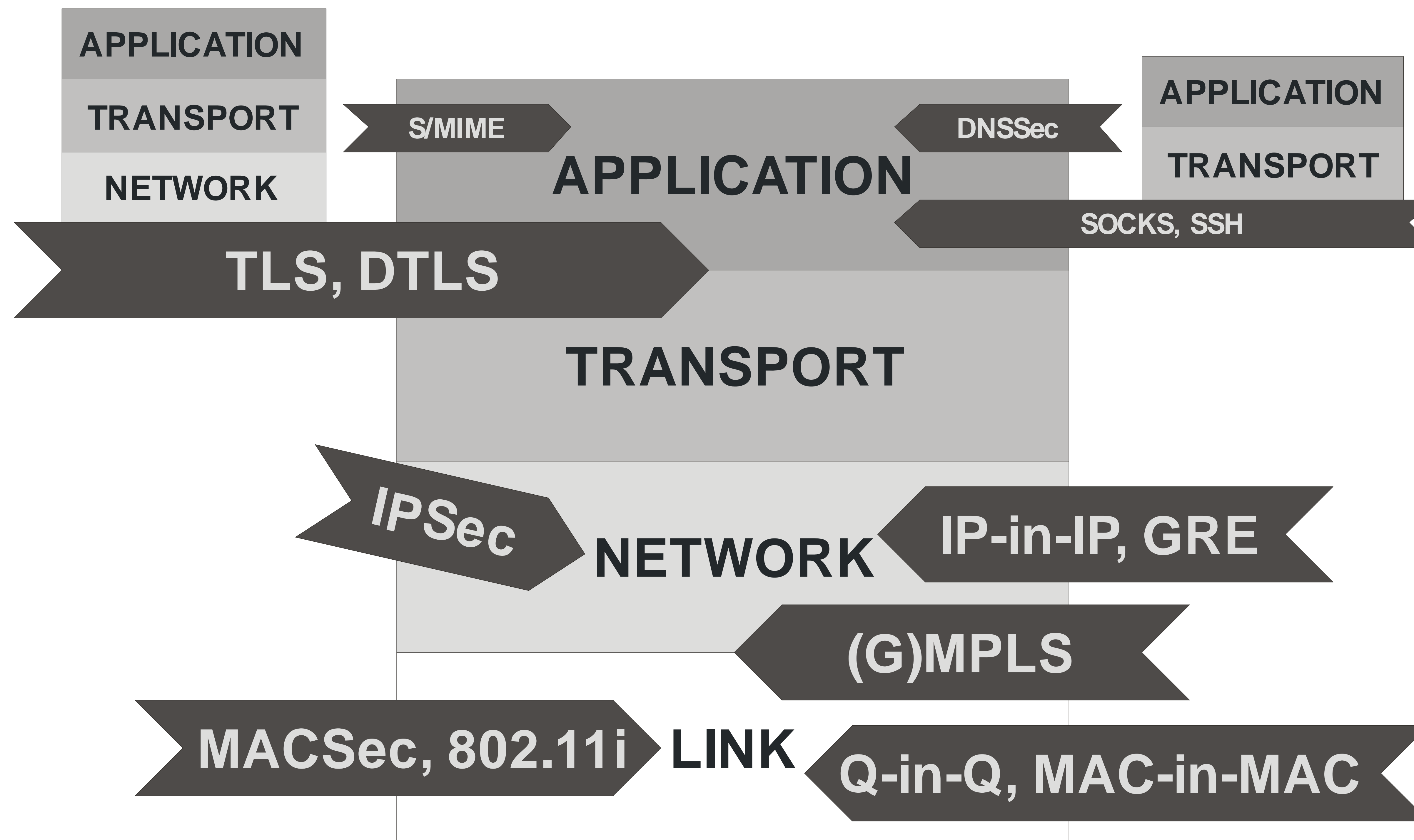
Today's Internet model – in theory



Today's Internet model – in reality



Today's Internet model – in real



The Software Engineers' way:

1. Refactoring
2. Enhancement



Lessons learned so far (1)...

- End-to-End semantics are good for overall robustness but bad for privacy
- Minimize the state within the network but allow some state at the (domain) edges
(Firewalls, NAT, VPN, Proxies, MobileIP, QoS Classification)
- Protocol layering minimizes complexity and boosts abstraction but everyone tries to bypass the layer model using tunnels

Lessons learned so far (2)...

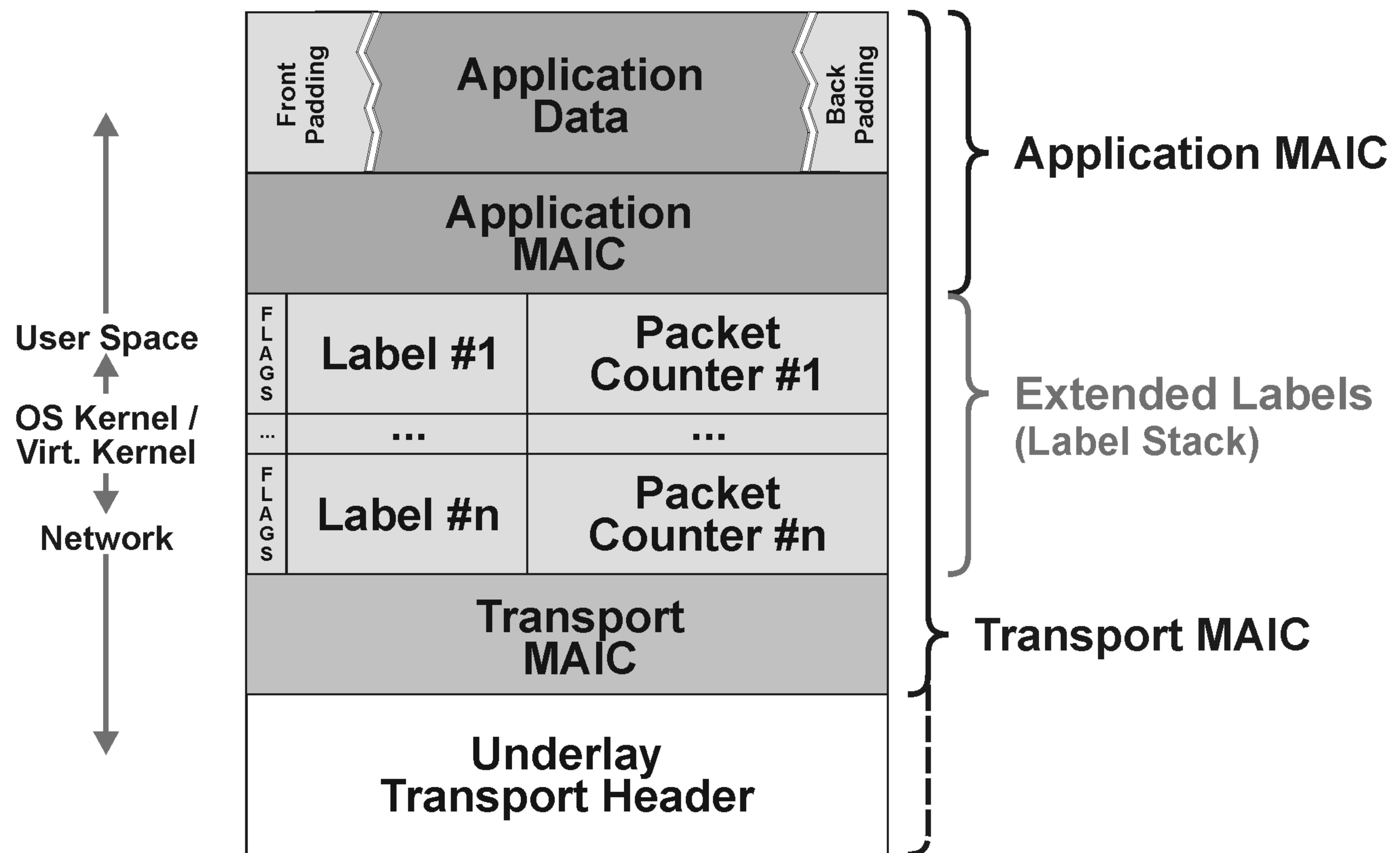
- Security is needed everywhere but has to be easily deployable (*IPSec vs. TLS*)
- Some of today's (Cross-Layer)-Designs can be seen as „lawfull“ layer violations (*e.g. TCP, IPSec*)
- Stackable Flow-Labels for traffic differentiation, aggregation and advanced traffic engineering (*e.g. MPLS*)

Basic Idea

- Label-switched network design between applications using „extended labels“
- Extended labels include a packet counter to support e.g. security, loss detection, ...
- Label may be „*globally unique*“ for supporting e.g. *IP Addresses, DIFF-Serv tags*
- Network state is used to implement security, privacy, mobility and QoS

Proposed Architecture: ELSSA protocol

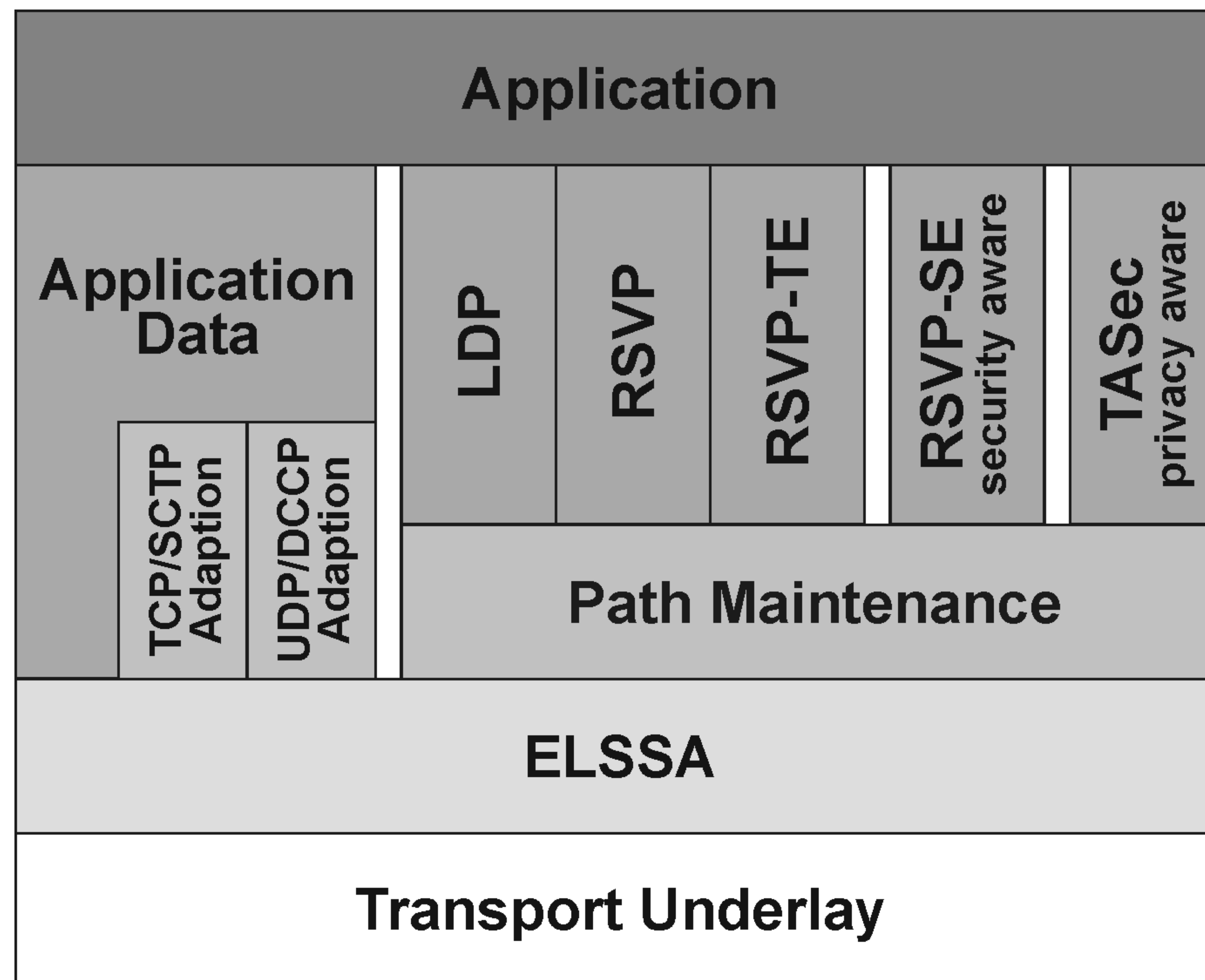
Extended Label Stream Switching Architecture



Properties and Comparisons

- Separation of forwarding and routing, location and addressing
- Built-in security and privacy
- Built-in (micro-)mobility and QoS
- Support of heterogeneous subnetworks, modularity and soft migration

Future Project Development



Thank you for listening...

- Questions?
- Feedback?