

# Challenges in Traffic Engineered IP networks

Barcelona 2006-04-26

**Loa Andersson**, Acreo AB  
IAB, MPLS WG co-chair  
loa@pi.se





## The Future ...

---

**... is not what it used to be, what's more it never was!**

**Lee Hayes, the Weavers!**

**However, the future is still there and we have lots of interesting problems to solve!**

# What is MPLS about anyway...

---

## Misunderstandings

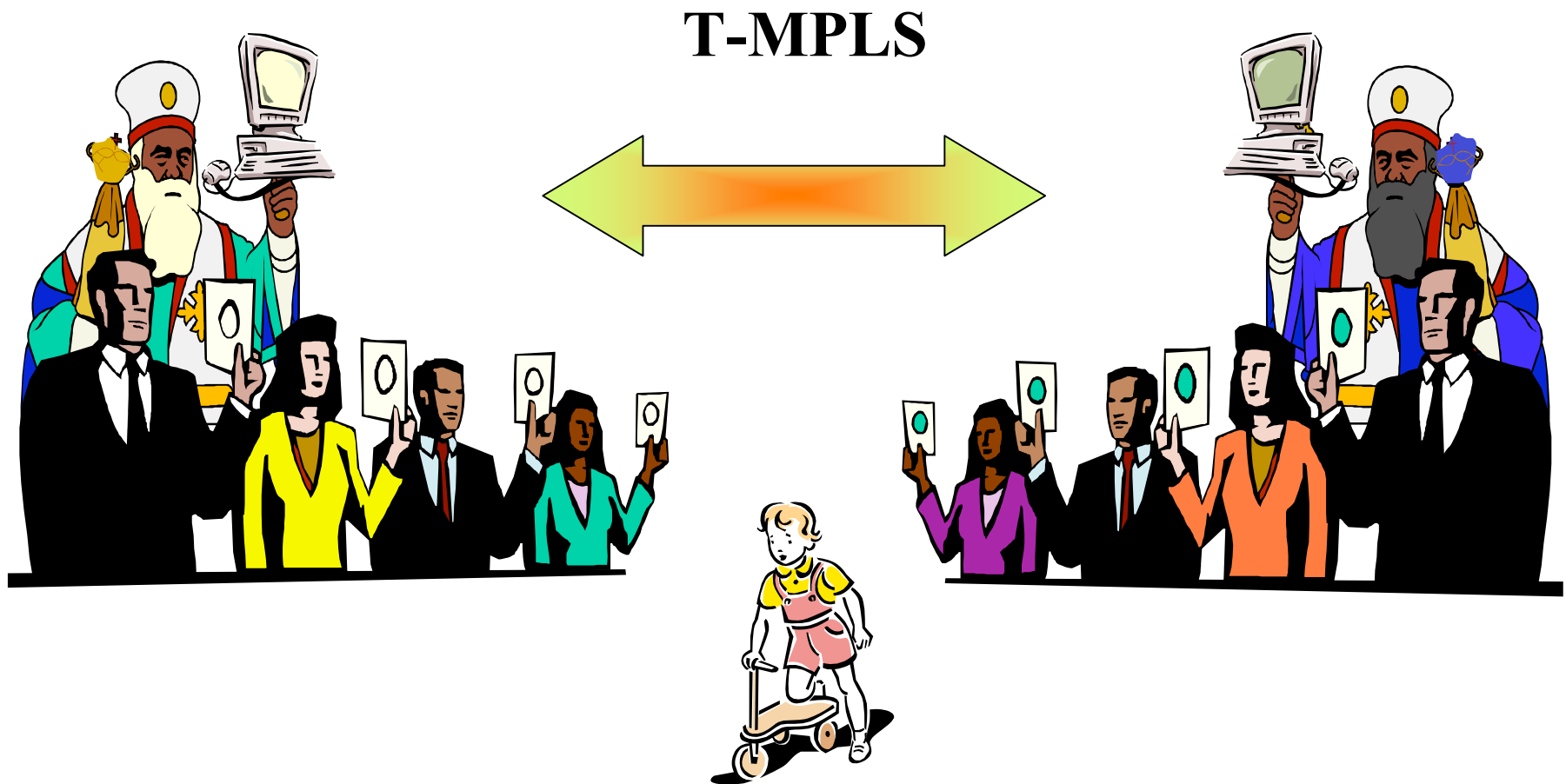
- Higher router capacity
- Security mechanism
- Etc

## Actually

- Network performance
- Traffic separation
- Constraint based routing
- Traffic engineering



# Friends and Foes





# A few additions to the IP control plane

---

**Label Distribution Protocol (LDP**

**RSVP-TE**

**OSPF-TE (CSPF and TEDB)**

**ISIS-TE**

**The outcome:**

- addition to the Forwarding Table**
- Label Information Base (LIB)**



# MPLS - one simple paradigm

---

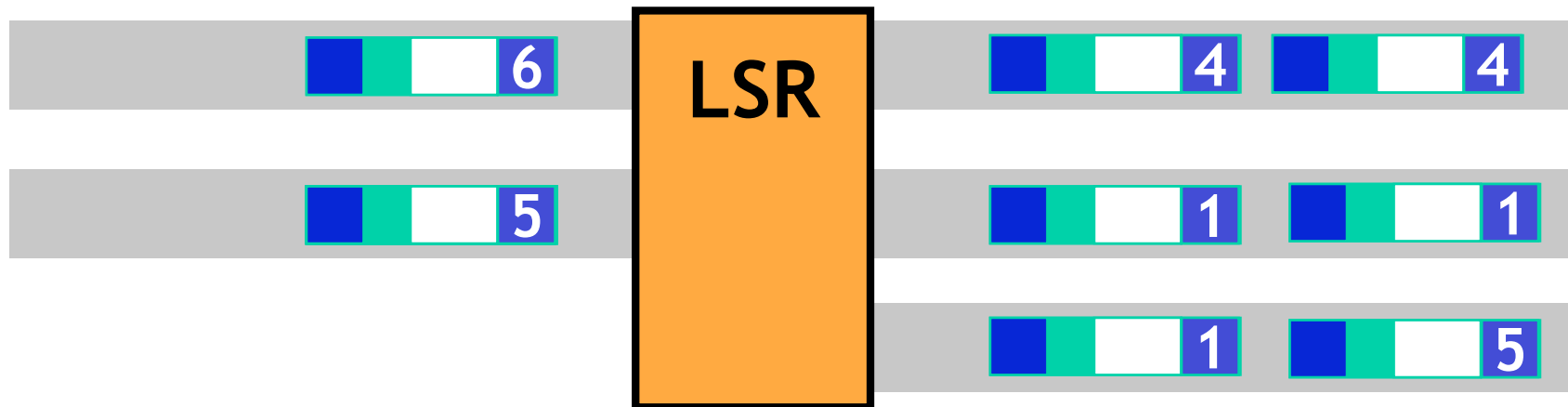
Link local identifier

**LABEL**

A packet comes in on one interface  
and is sent out on a new interface  
with a new label attached

**LABEL SWAPPING**

# MPLS data plane



**LSR – Label Switching Router**



# Traffic Engineering and Routing

---

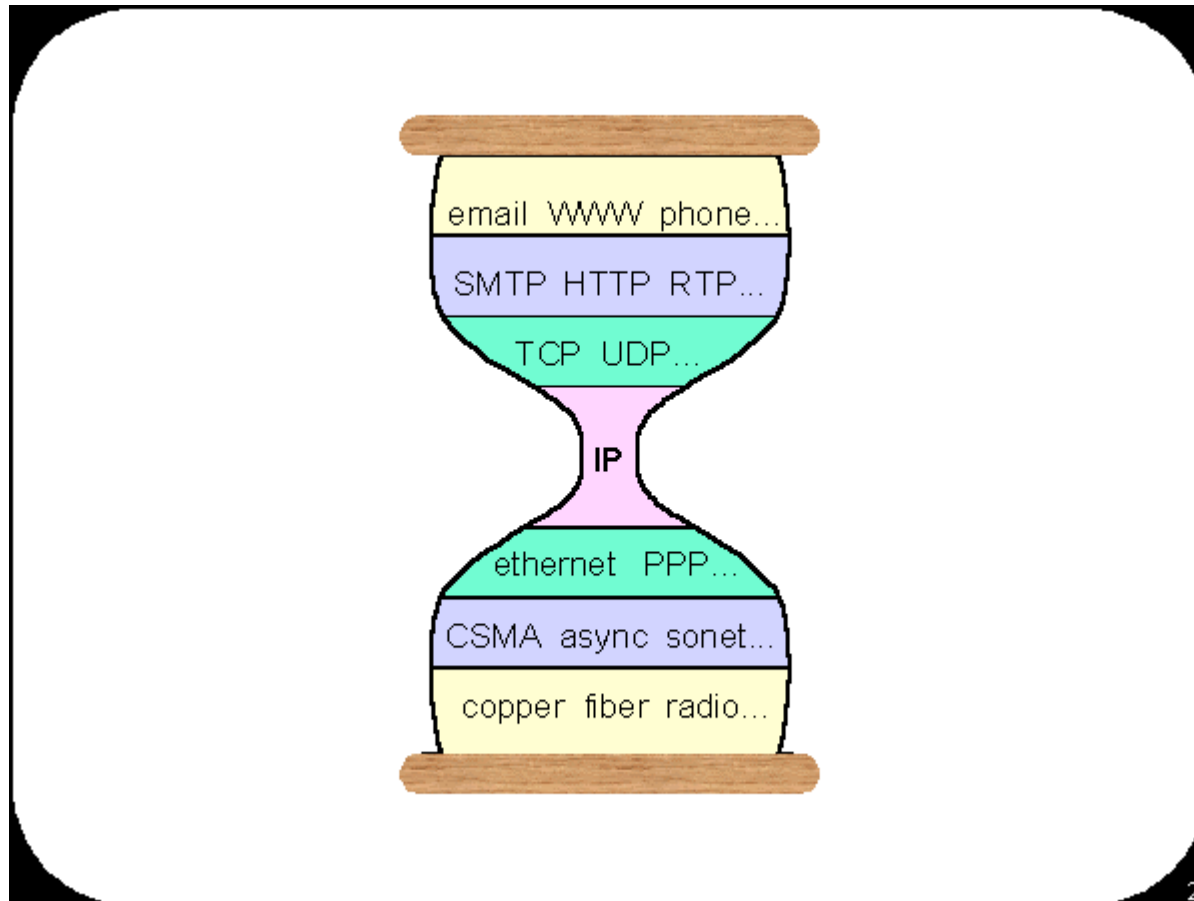
## **Two types of Traffic Engineering (TE)**

- BGP and Multi-homing**
- MPLS**

**Conclusion – TE is nothing both advanced routing**



# Generalized MPLS



From Steve Deering (London 2001)



# What really happened – RFC2547

---

**Most ISPs run MPLS**

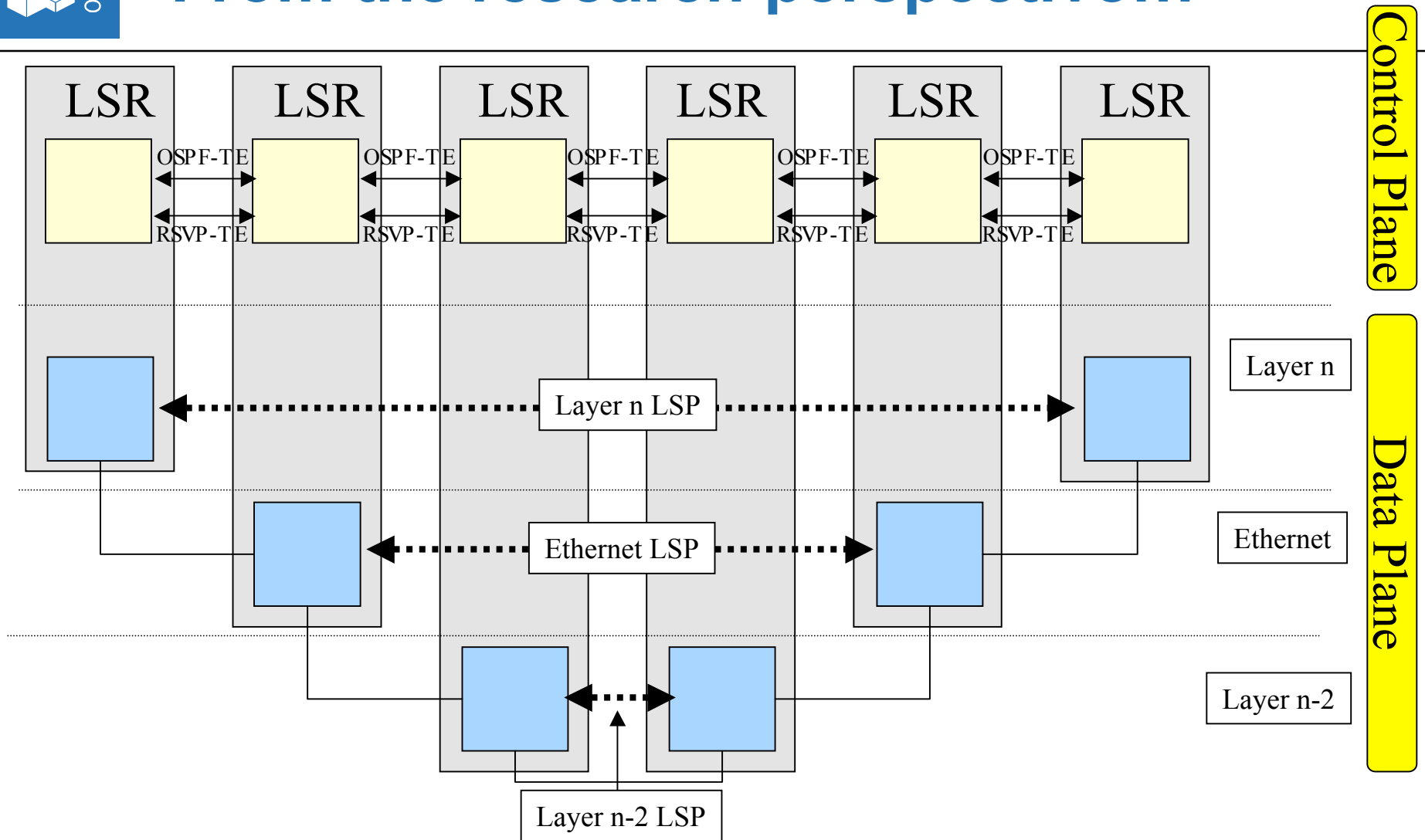
**MPLS as an application platform**

- Traffic separation
- BGP/MPLS L3 VPN
- No mix of customer and operator routing
- New VPNs – VPWS, VPLS, IPLS and L1VPN, PWs

**No such killer application for GMPLS  
- yet**



# From the research perspective...





# End of presentation!

---

## Questions?