# Entropy Labels – IETF 83

draft-ietf-mpls-entropy-label-01

# Two Remaining Issues

- Reserved label for Entropy Label Indicator?
- Signal Entropy Labels (ELs) with <u>tunnels</u> or with <u>applications</u>?

# Reserved Label for ELI

- Good technical reasons for having a reserved label for the ELI

- Good group support for allocating a reserved label for ELI

- Can we move this forward?  What is needed to do so?  ("IETF Consensus")

# Signaling ELs with Tunnels

- Tunnels (e.g., signaled using hop-by-hop LDP) have multiple paths
  - ELs help load balance across those paths
- Applications are "point-to-point-ish"
  - Start here, go there (via a tunnel)
  - Application = PWs, VPNs, etc.
  - Applications don't know or care if there are multiple underlying paths from "here" to "there"

# Theory of Operation

- Egress signals hop-by-hop LDP (say) tunnel to ingress(es)
  - Signaling indicates that egress can process entropy labels, and says what ELI to use
- Egress signals application (say VPN) to ingress
- Ingress "resolves" application over the tunnel
  - If ingress can insert ELs, it does so
  - *Ingress computes EL based on **application***

# Theory of Operation



Tunnel to egress
with multiple paths

Client traffic

TL
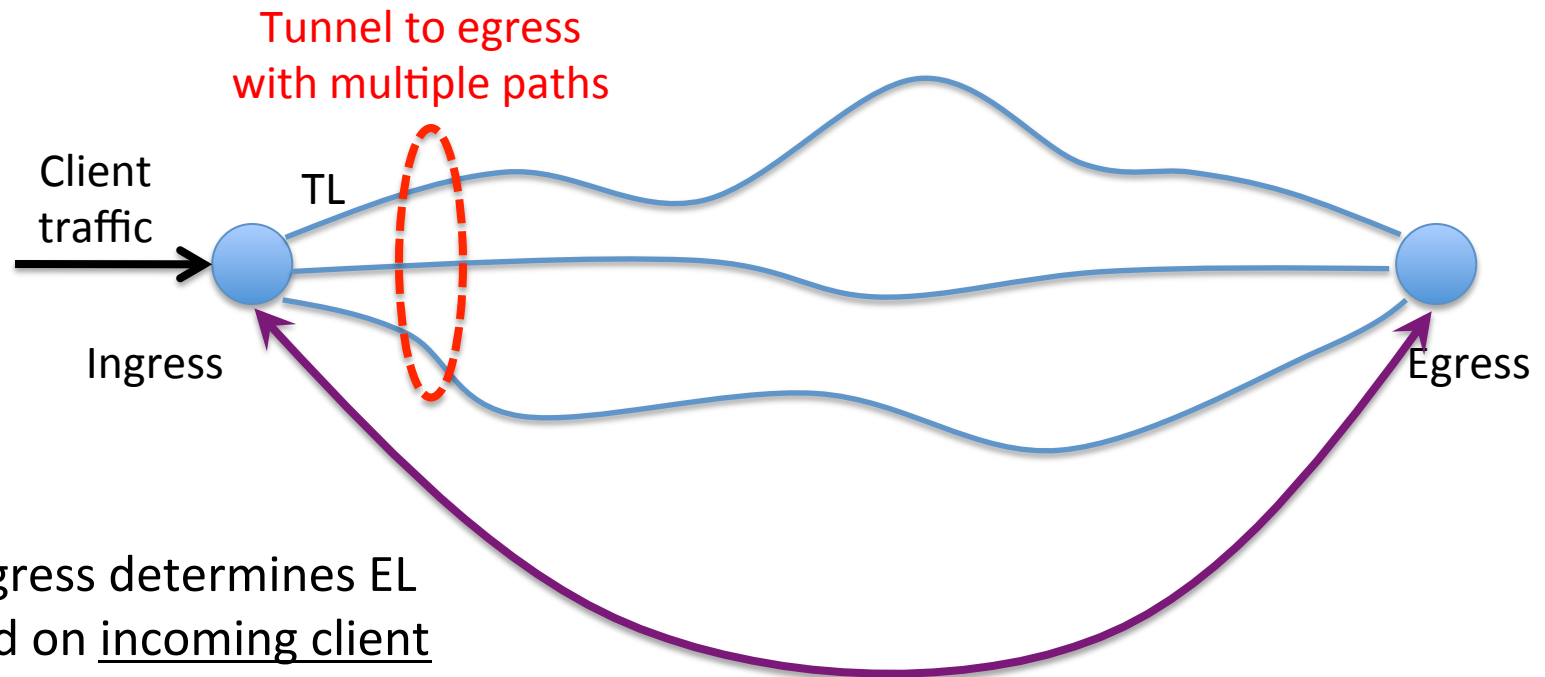
Ingress

Egress

1. Ingress determines EL based on <u>incoming client traffic for application</u>
2. Ingress chooses path to egress, then pushes <TL, ELI, EL, AL>

Application to egress
(label = AL)

# Theory of Operation

- With PHP, egress receives a packet with top label = ELI (either well-known reserved label or signaled by egress)
  - Egress recognizes ELI and pops two labels (ELI+EL)
  - Egress then processes following label (AL) as usual
- If ingress didn't add EL, then egress processes AL as usual

# Benefits

- Application signaling and label processing is unchanged
  - Tunnel signaling and processing modified
  - No need for per-application EL signaling
  - No need for per-application data plane processing changes to handle entropy labels
- No ELs if underlying tunnel has no ECMP

# Cost

- ELs MUST be always be preceded by ELI
- Hidden benefit: no ambiguity about ELs
  - Example: EL with "Carrier's Carrier" VPNs is now very straightforward
- Also, this, plus a reserved label for ELI allows ELs to appear anywhere in the label stack
  - Allows autonomy of EL insertion (e.g., in Carrier's Carrier VPNs, or with hierarchical inter-AS tunnels)