

Characterizing and Traffic Engineering the Inter-domain Routing

G Pavan Kumar
under the guidance of
Prof. Girish Saraph

Outline

- Traffic delivery affected by the interactions of ASes and characteristics of paths
- Achieve scalability by categorizing the service offered to ASes
- Meet service provider requirements for MPLS across ASes
- Extensions to RSVP-TE

Introduction

- Current use of MPLS
 - Mainly inside ASes for VPN services, TE, fast restoration
- Across AS boundaries
 - Scalable Internet eXchange Points
 - Shorter restoration times
- No patch to NS available for inter-domain RSVP-TE

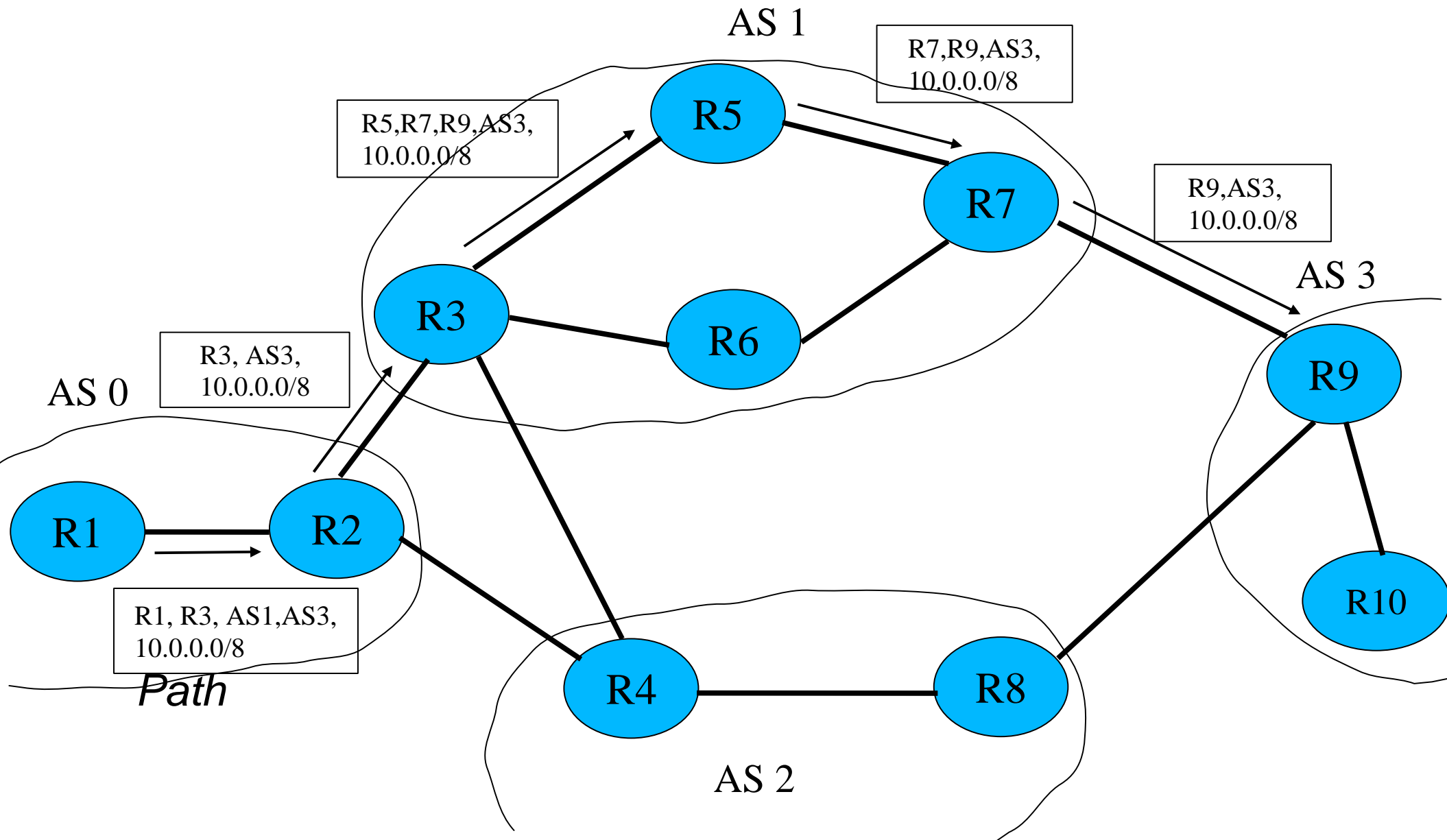
Inter-AS requirements

- What Service Providers desire
 - Keep Internal AS resources and the set of hops followed by the TE-LSP confidential
 - Restoration capabilities of inter-AS LSPs
 - Scalability in terms of the amount of IGP flooding

Tackle the problems

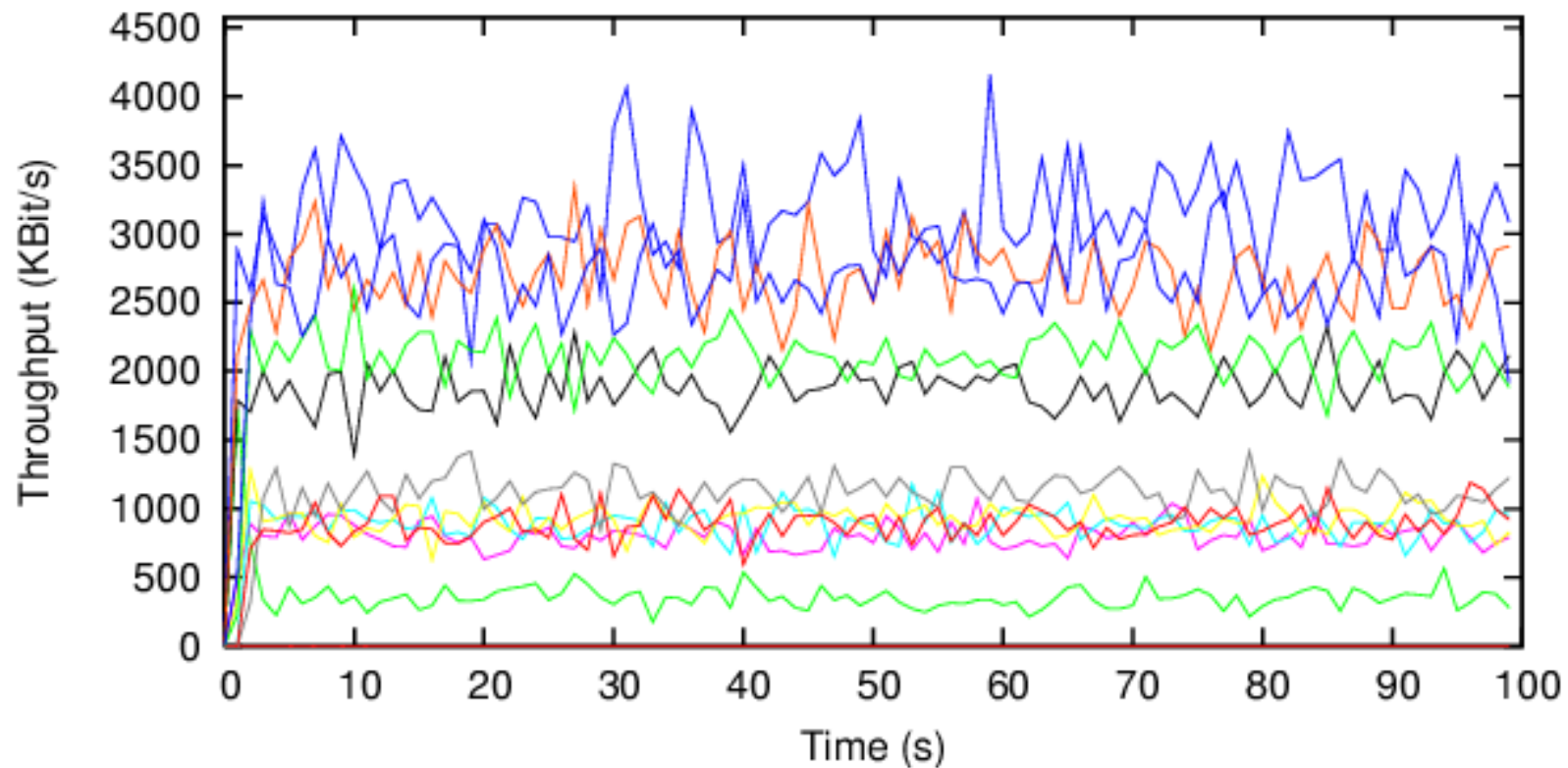
- Addressing
 - AS + Prefix as proposed by Pelsser not enough for flow based TE, need for AS-path + Prefix
 - ***path*** message is forwarded along the route specified by ERO until an LSR which is part of the prefix is reached
- *Explicit routing of an LSP*
 - ERO permits partial path computation
 - the entrance ASBR computes LSP till the downstream and completes the ERO
- *Subsequent Refresh messages*

Establishment of an inter-AS LSP

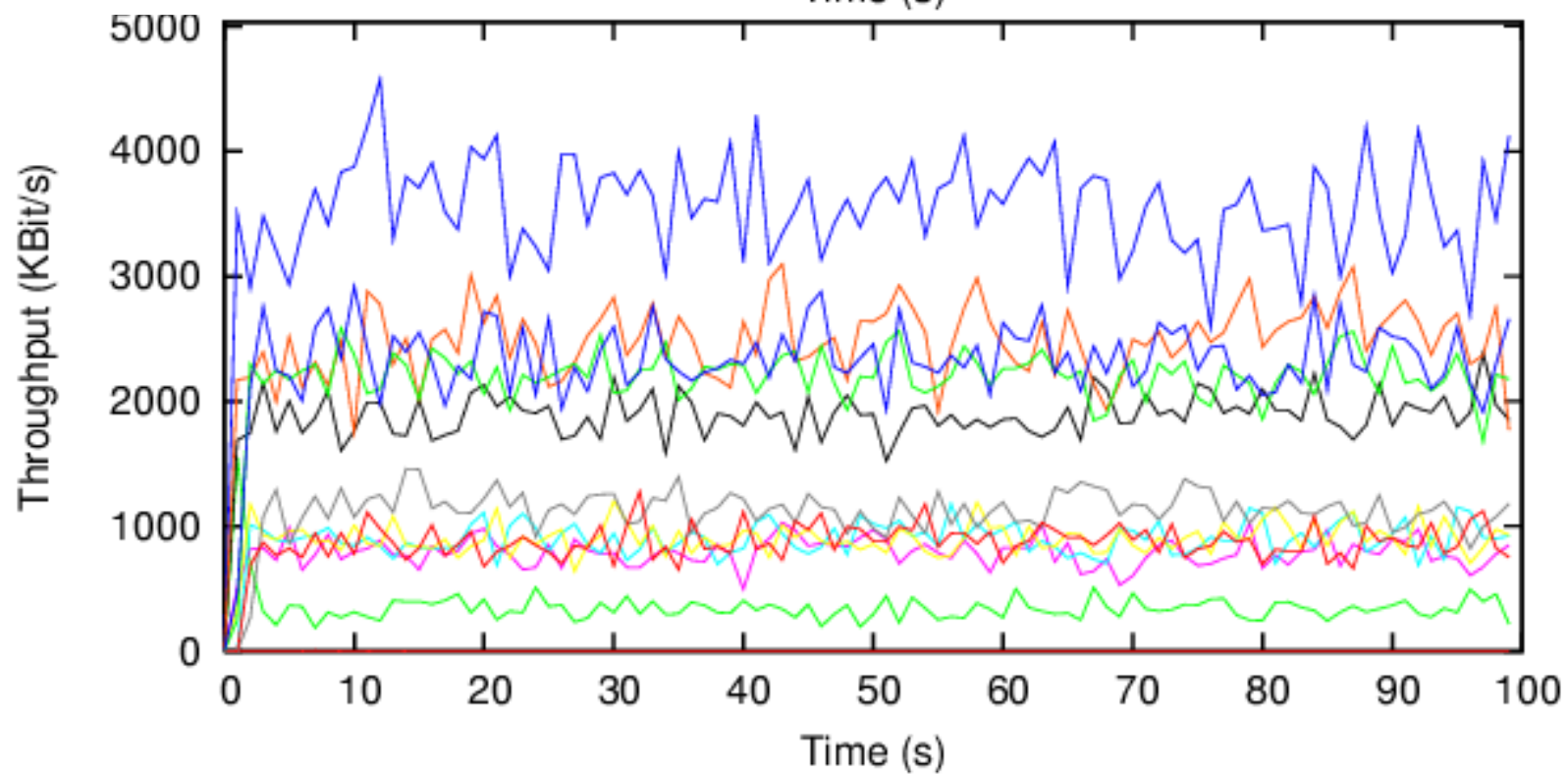


Flow based LSP establishment

- LSP along an AS-path that suits the requirements
 - Some flows do not need the best AS-path
- Send *ERO* along an AS-path depending on the flow requirements
- Flow is recognized by the source AS
- For simulations, 2 kinds of flows:
 - 10000 byte packet size, 0.001 interval
 - 1000 byte packet size, 0.01 interval



Conventional
BGP



BGP with flow-
based RSVP-
TE

Conclusion

References

1. Lixin Gao, Inferring the AS relationships
2. L.Subramanian, Characterizing the Internet hierarchy
3. Gao, On the hierarchical structure of the logical Internet graph
4. Jacobson, To infer characteristics of Internet paths
5. Zhang, MPLS inter-AS traffic engineering requirements
6. Cristel Pelsser, Extending RSVP-TE to support Inter-AS LSPs