

Improving Route Diversity through the Design of iBGP topologies

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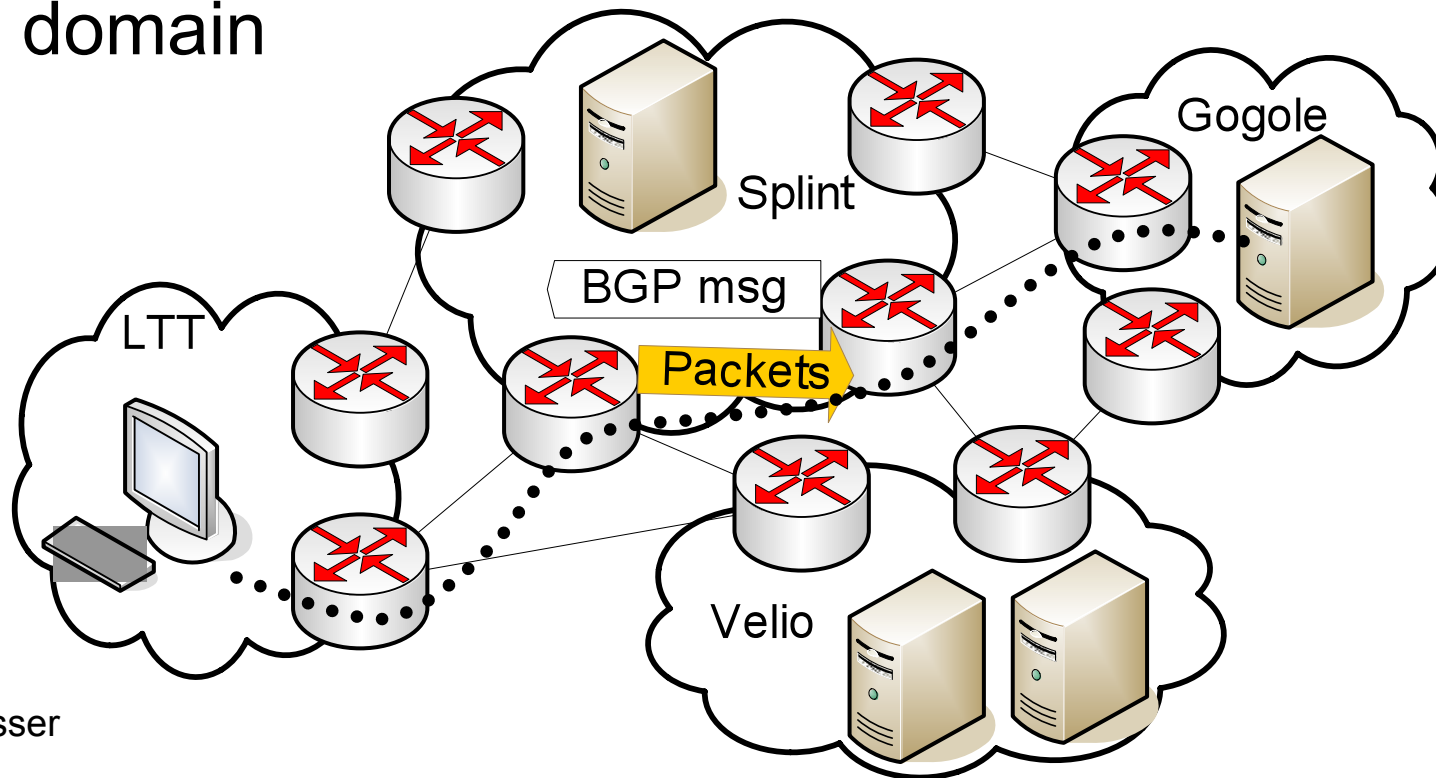
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Outline

- Background
 - Introduction to BGP
 - Problem statement
 - Objective
- Proposal: iBGP session topologies design
 - Idea
 - Algorithm
 - Evaluation
- Conclusion

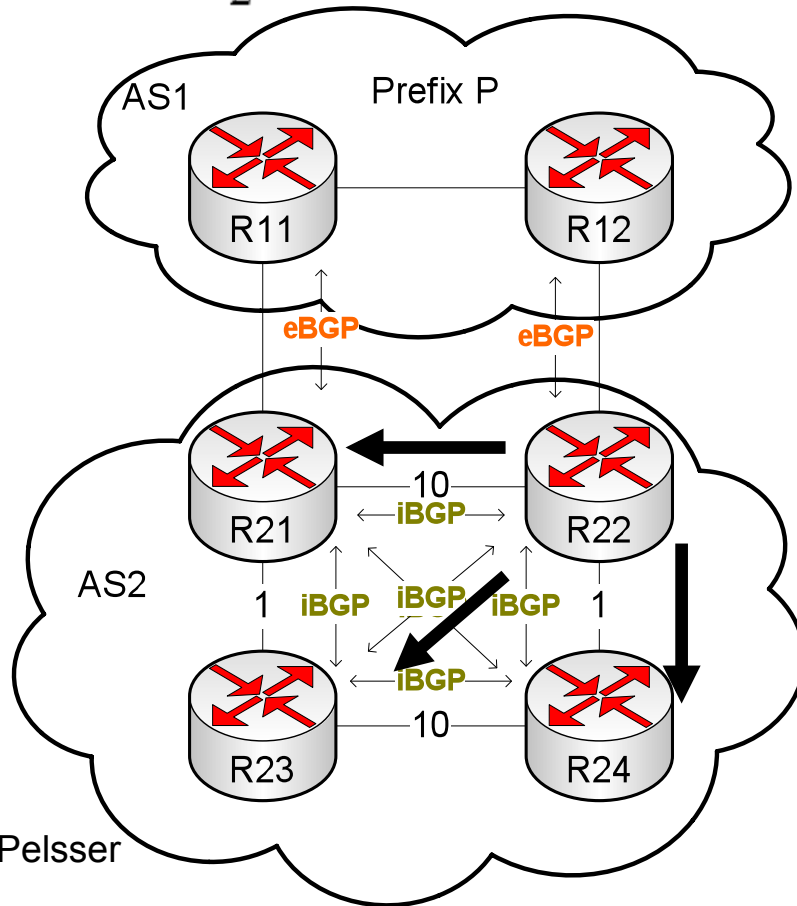
Background

- The Internet is composed of **domains**
 - also called an Autonomous System (**AS**)
- **BGP** distributes **routes** for destinations outside a domain

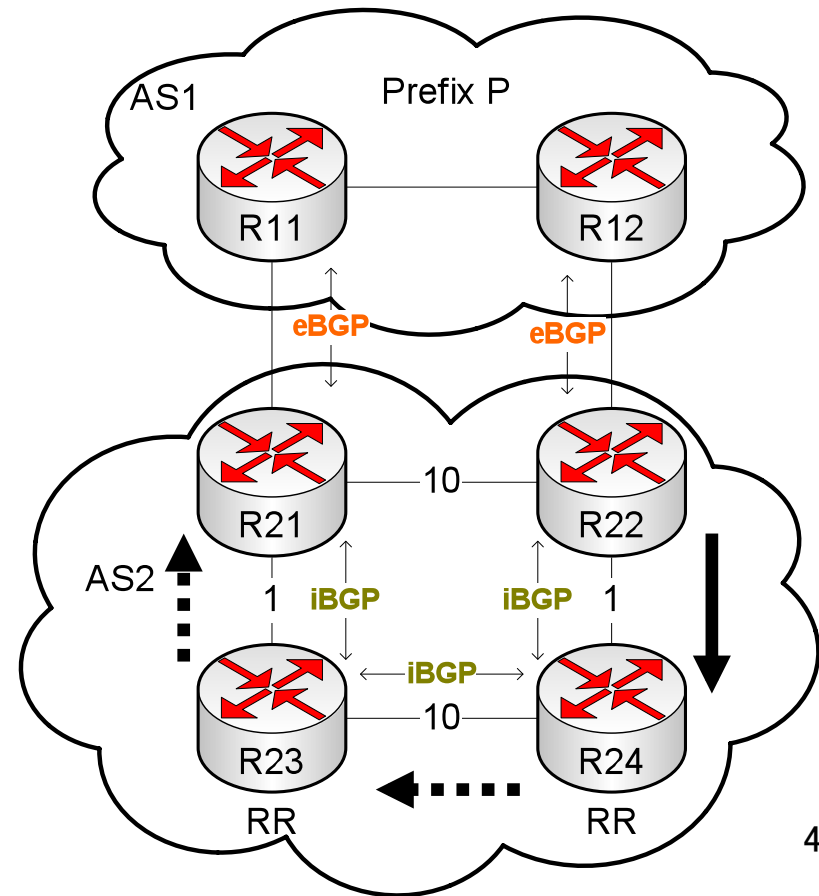


BGP route distribution

- iBGP full-mesh
 - $\frac{n * (n - 1)}{2}$ sessions



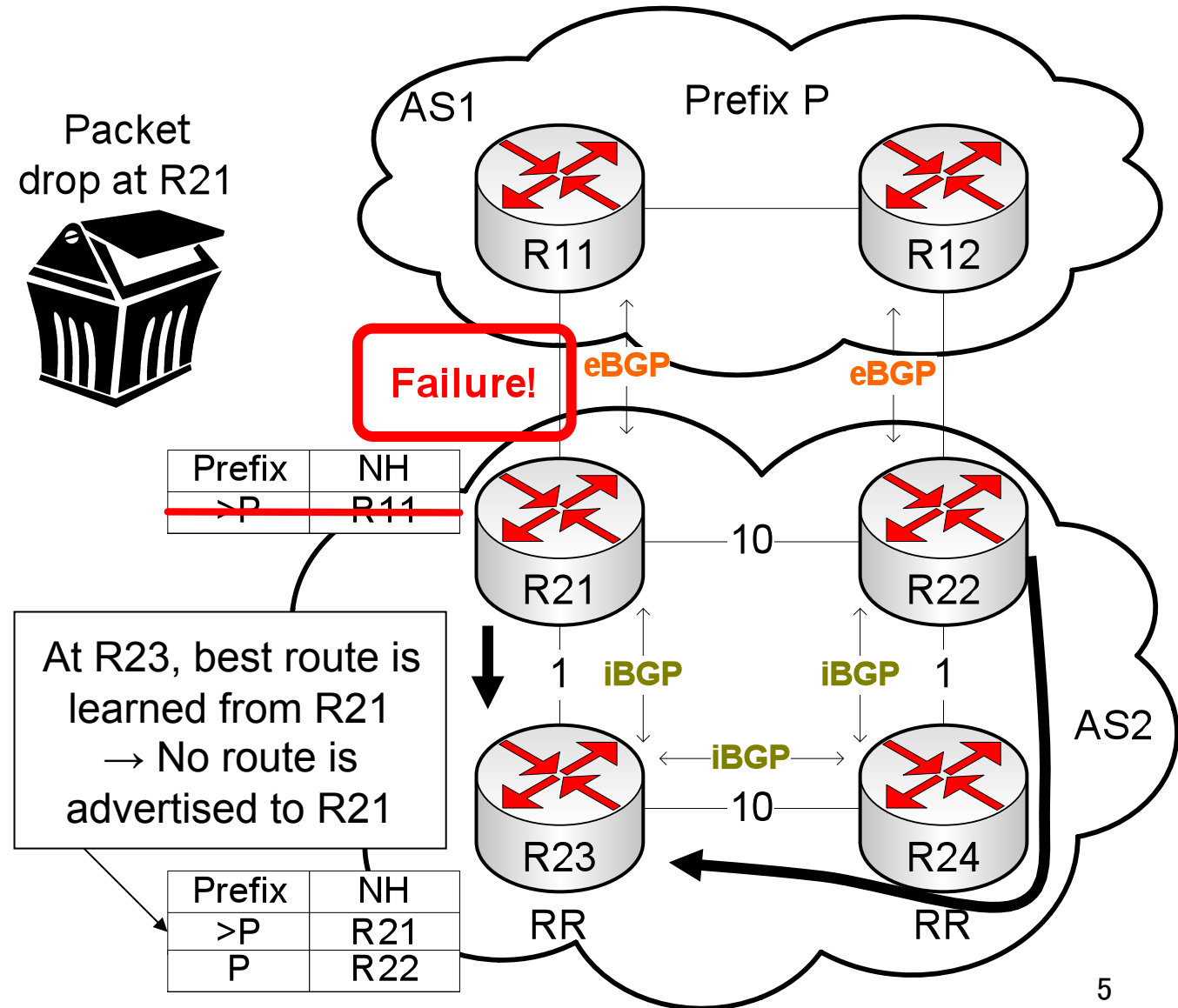
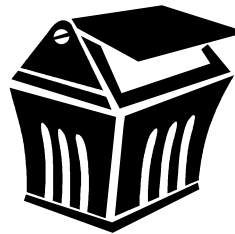
- Route-reflectors
 - less sessions → scalable



Problem statement

- Only the best route is redistributed by a router
- Upon the **failure** of resources at the border of the SP network
- **Connectivity losses** lasting several 10th of seconds may occur
- This leads to packet losses

Packet drop at R21



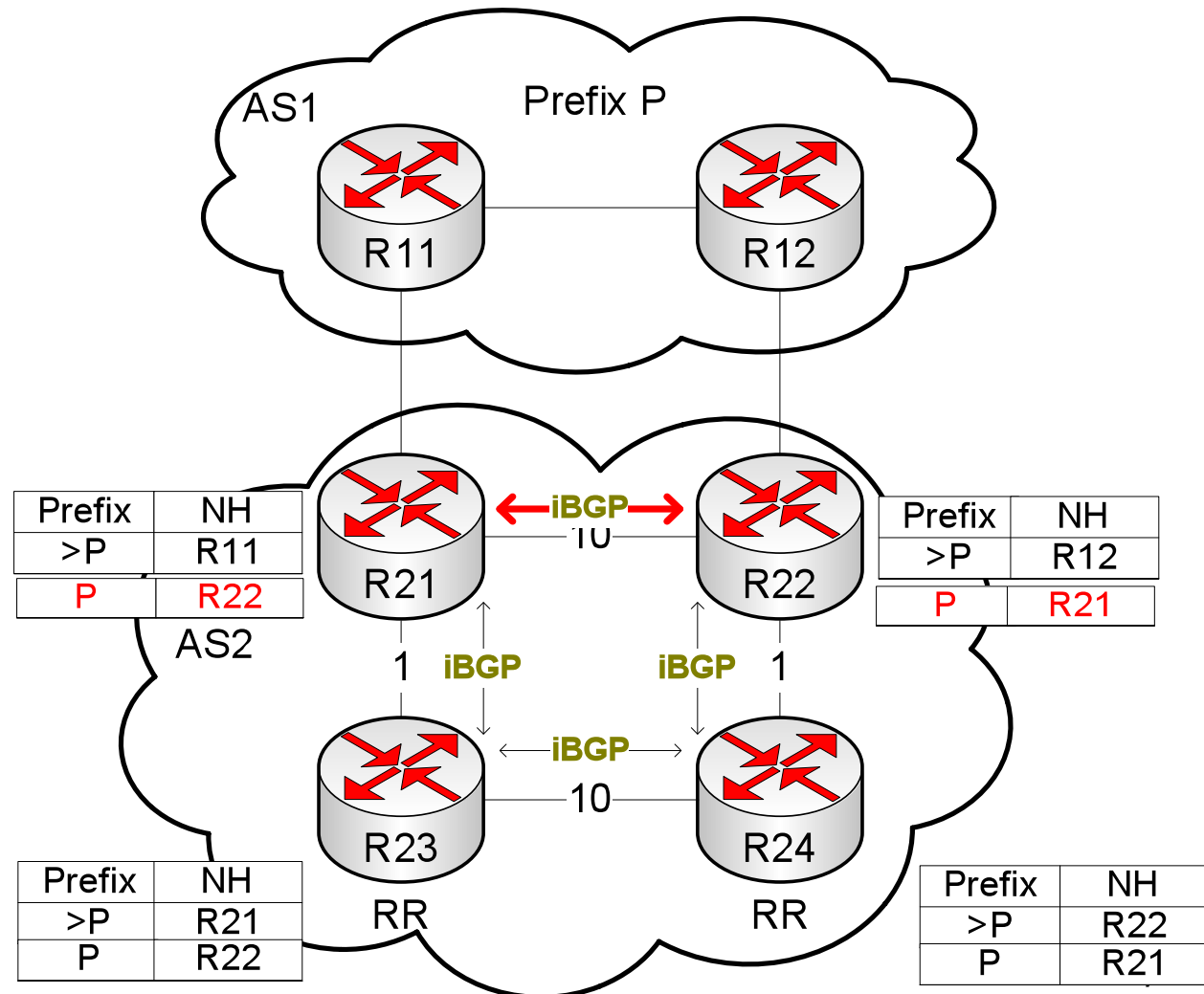
Objective

- **Ensure connectivity** in case of **failure** of inter-AS resources

iBGP session topologies

Idea

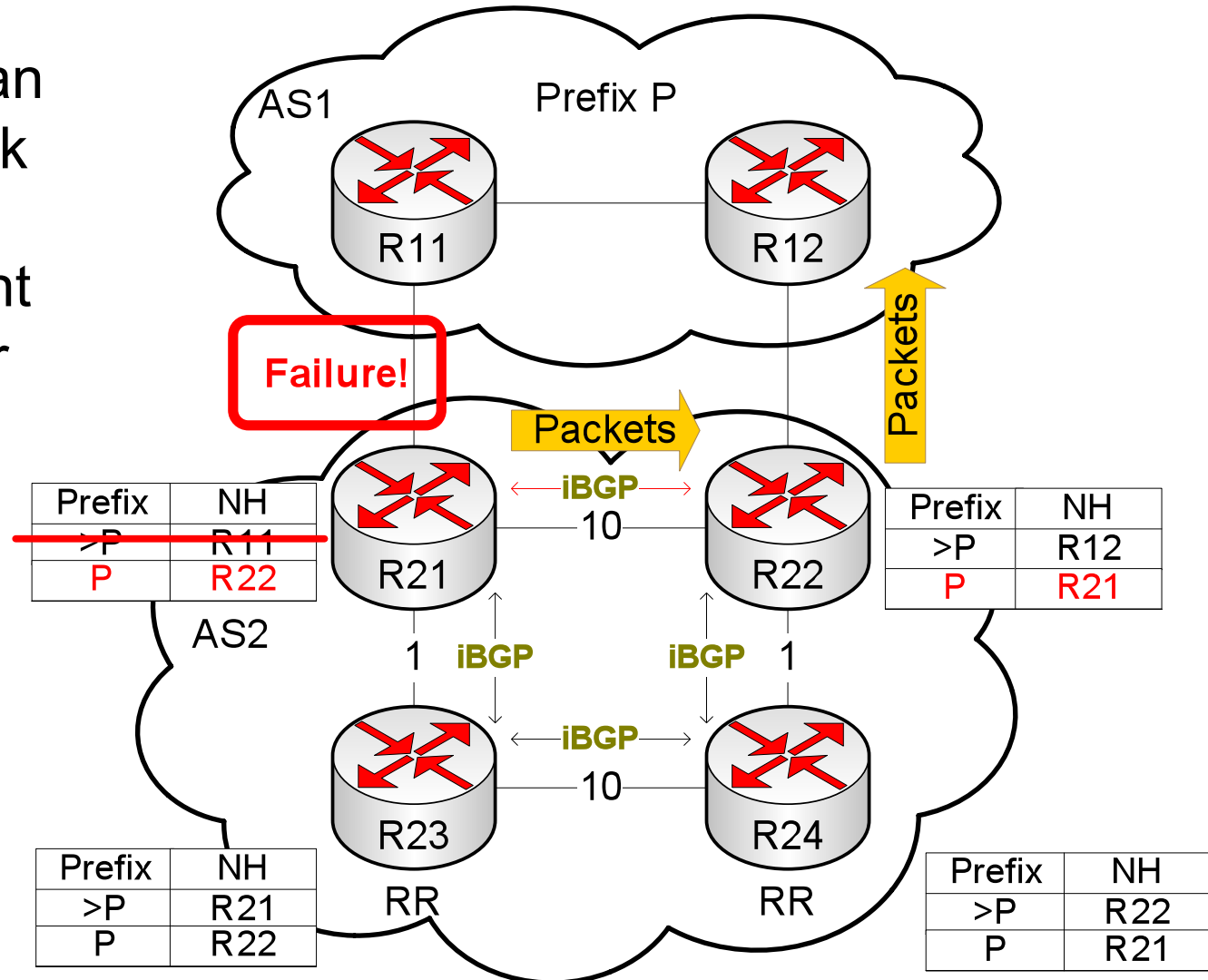
- Add iBGP sessions in order for each router to know two distinct NHs for each destination



iBGP session topologies

Idea

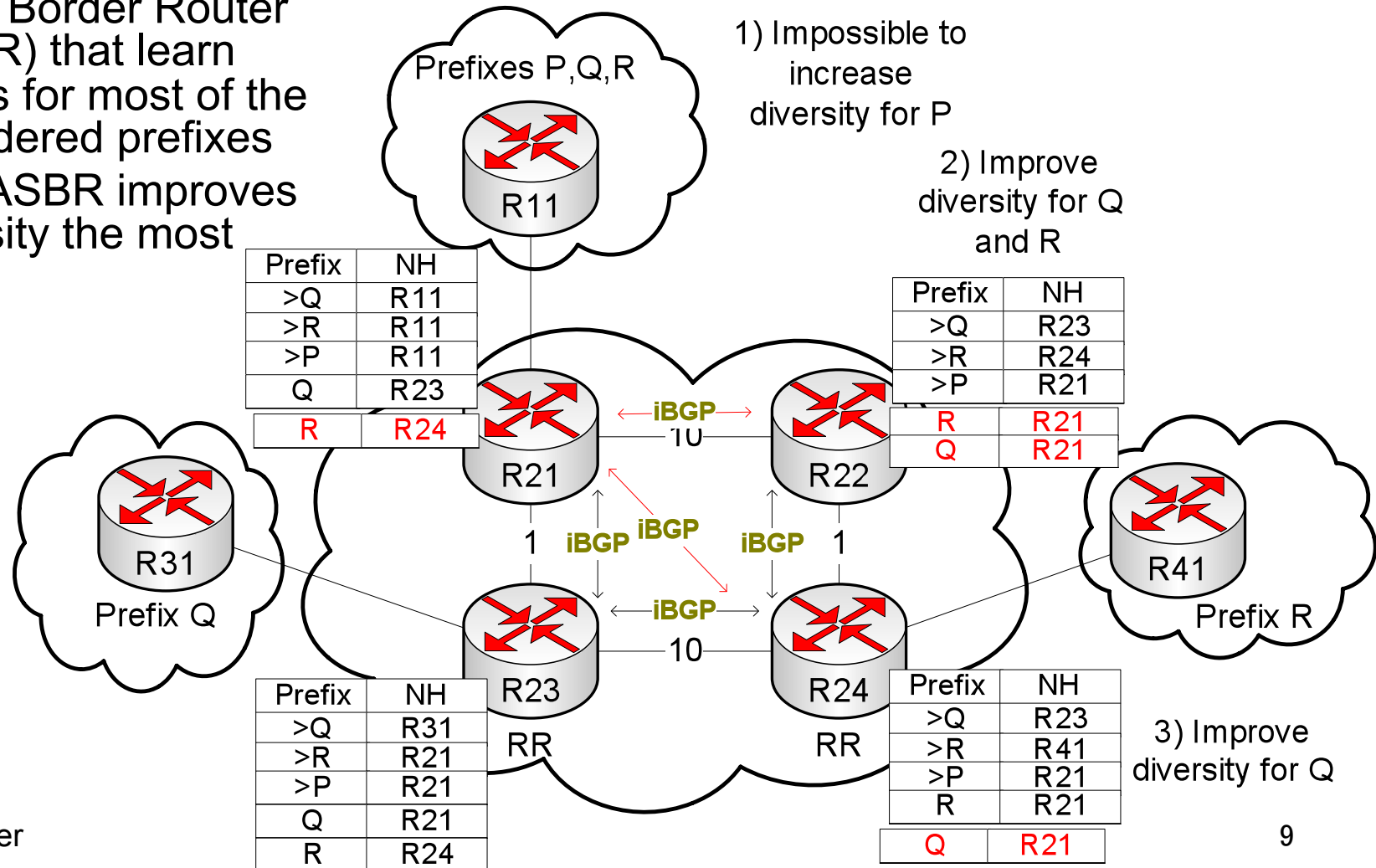
- If a NH or an inter-AS link fails, traffic may be sent to the other NH



iBGP session topologies

Algorithm

- Add an iBGP session to AS Border Router (ASBR) that learn routes for most of the considered prefixes
- This ASBR improves diversity the most



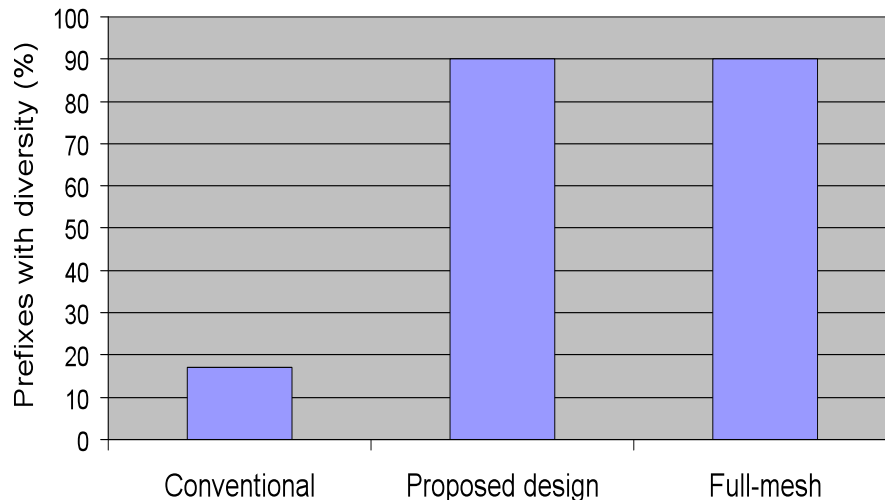
iBGP session topologies Evaluation

The **proposed design** provides
Maximum diversity
With low number of iBGP sessions
→ **Scalable**

Topology description

- Research network
- 12 eBGP sessions
- 17 nodes
- 2 Route-Reflectors

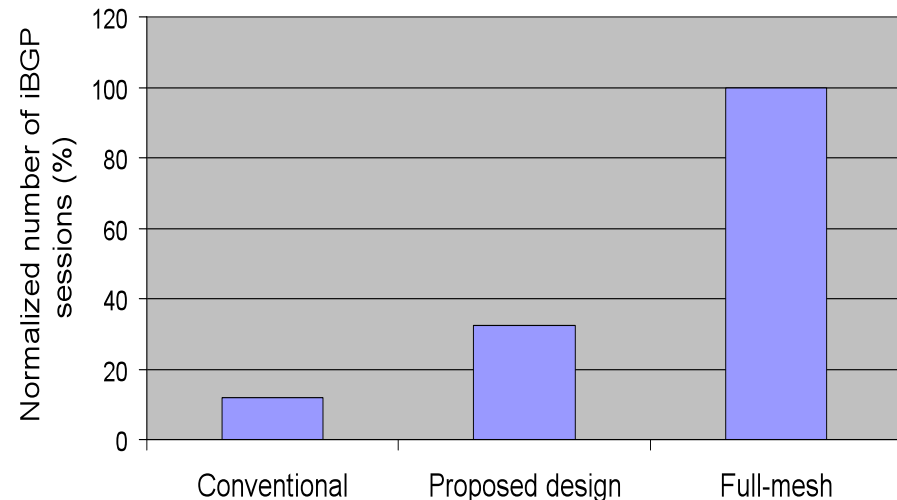
Average percentage of prefixes with diversity in the routers



C. Pelsser

iBGP topology

Normalized number of iBGP sessions



iBGP topology

10

Conclusion

- We proposed a solution to reduce connectivity losses during the failure of inter-AS resources
- The solution is
 - Applicable today
 - Scalable in the number of iBGP sessions

Questions?