
Evaluating the Benefits of the Locator/Identifier Separation

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Agenda

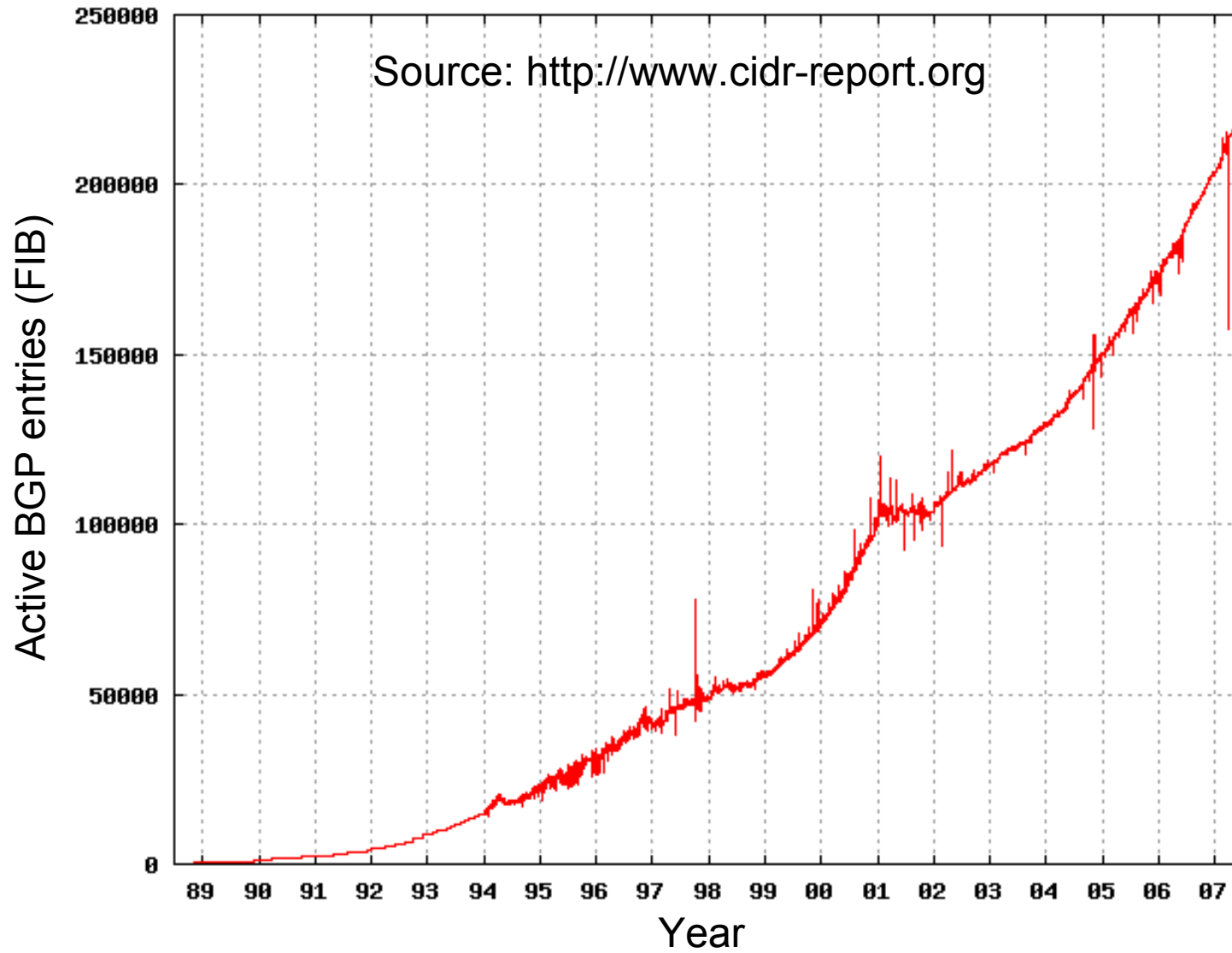
- Introduction
- Locator / Identifier Separation
- Benefits
 - FIB Size Reduction
 - Route Diversity Exploitation
- Conclusion



Introduction



Problem 1: Routing Table Growth

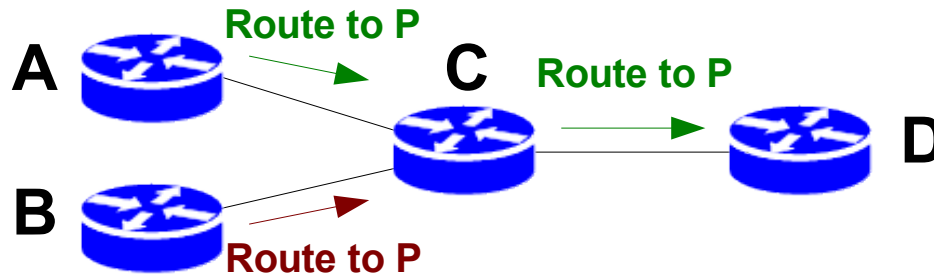


Main Causes:

- Provider Independent (PI) prefix assignment
- Multihoming
- Traffic Engineering
- ISP Switch-over
- Mobile ISPs
- ...

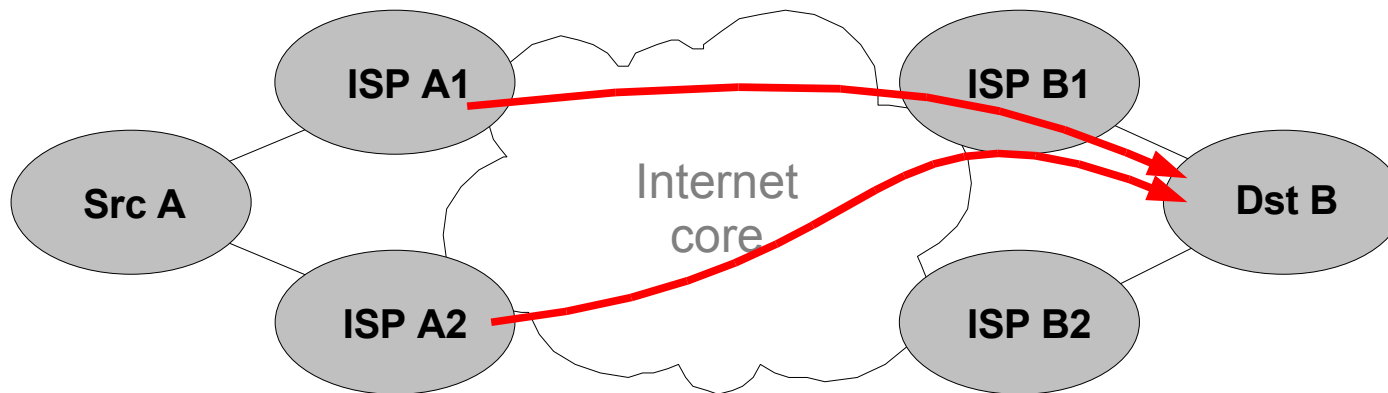
Problem 2: Limited Route Diversity

- Path-Vector nature of BGP



A BGP router C redistributes a single route for a prefix P to its neighbor D!

- Impact on Route Diversity



Consequence:
A source A might "see" only one ingress ISP B1 for dest. B

Locator / Identifier Separation to the Rescue ?



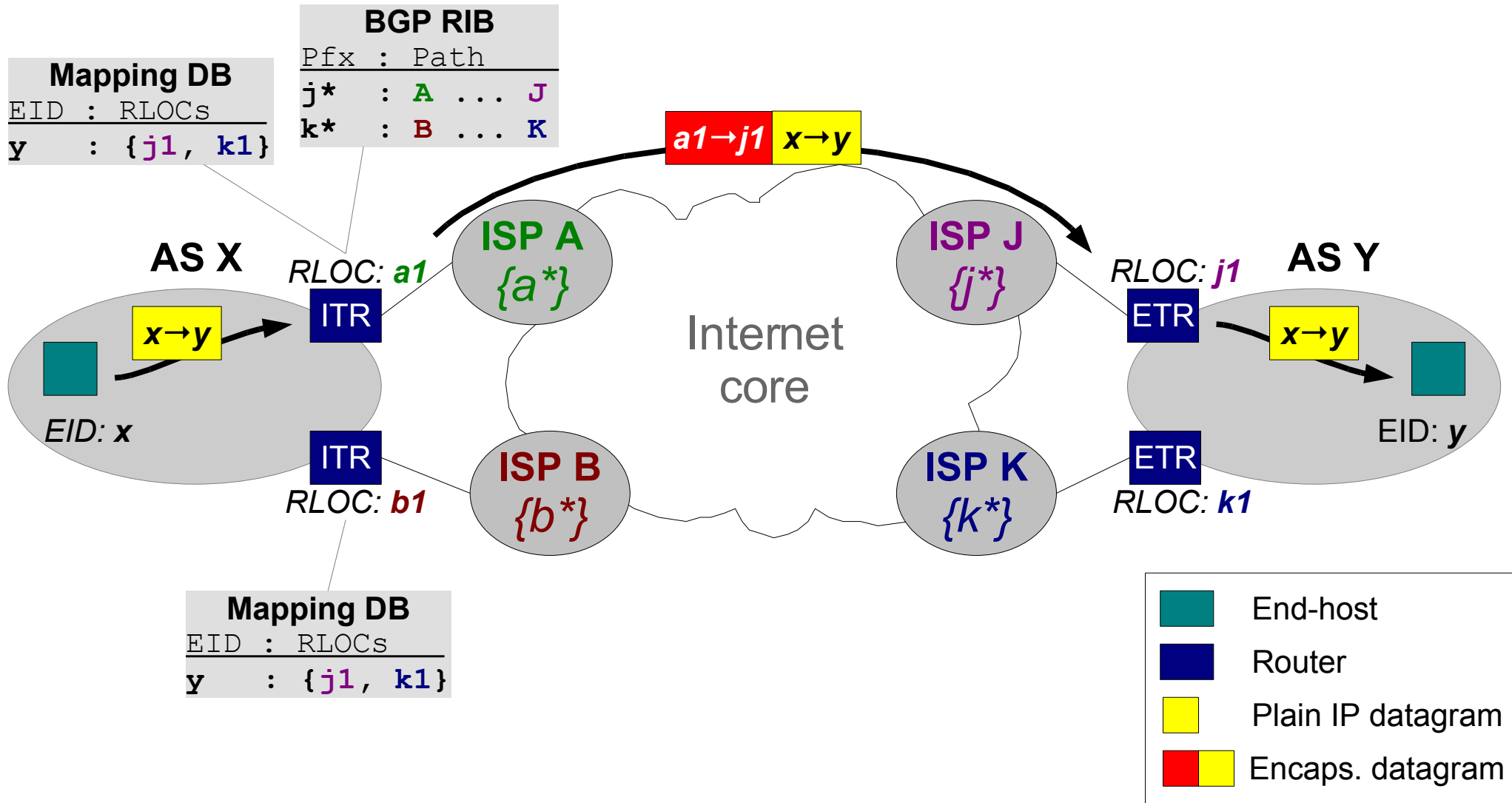
Locators and Identifiers

- **IP addresses**
 - **Overlapping semantics**
 - **Identifier** function: the mean to identify a network interface in the Internet.
 - **Locator** function: the mean to identify where in the Internet topology a device interface is located.

Separated Spaces \Rightarrow **Less complex and more scalable architecture !**



LISP



IETF draft: draft-farinacci-lisp-00 (January 2007)

Benefit 1: FIB Size Reduction



Shrinking the FIB (1)

- **Objectives**

- Evaluate how the locator/id split allows **reducing the routing table size** in the global Internet.
- Use of two separate address spaces allows new strategies for assigning routing locators
 - More **topologically driven** assignment
 - Less **prefix independent (PI)** prefixes allow tighter aggregation

- **Metric**

- Number of FIB entries per domain

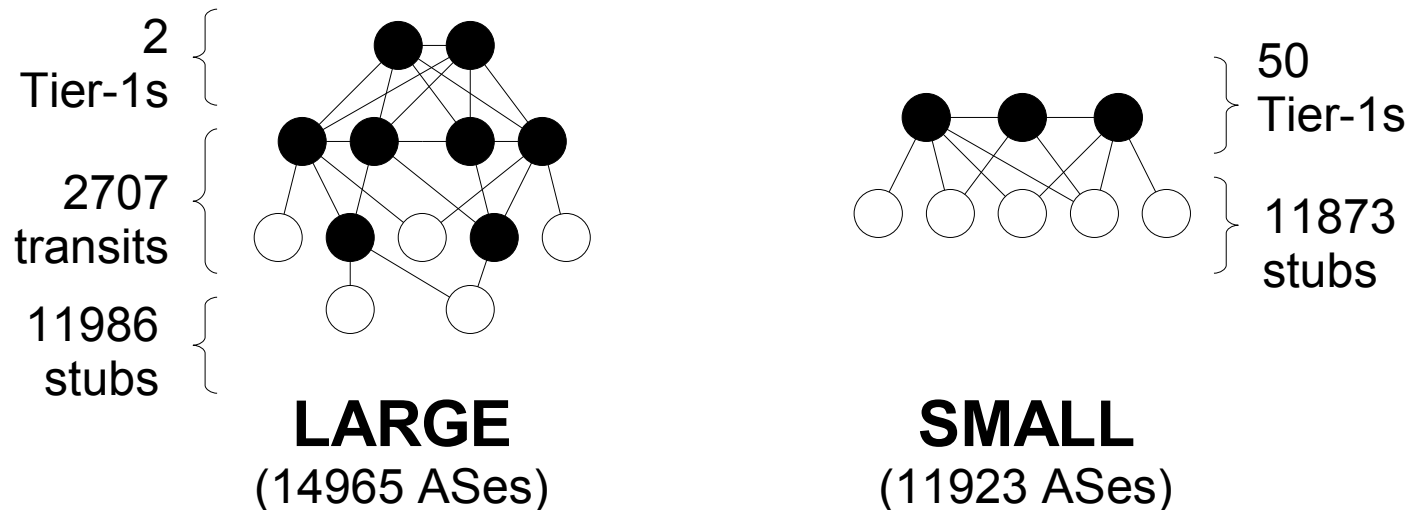


Shrinking the FIB (3)

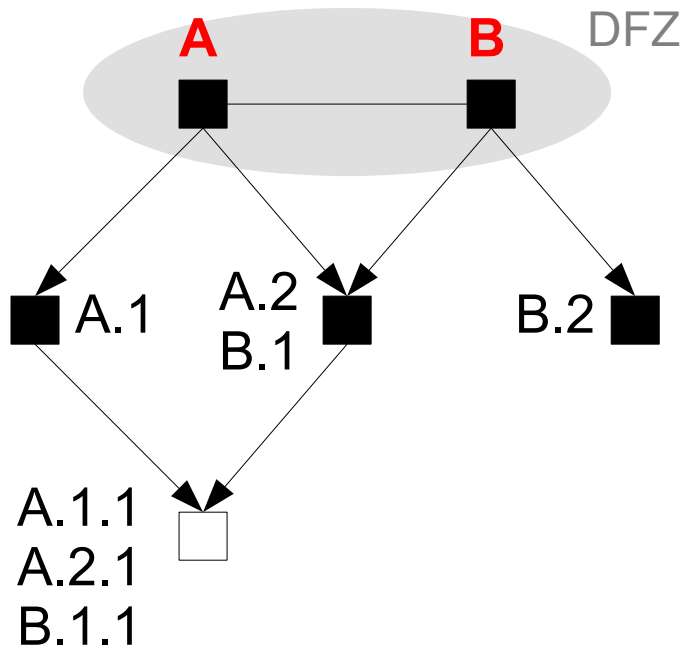
- **Evaluation methodology**

Simulation setup:

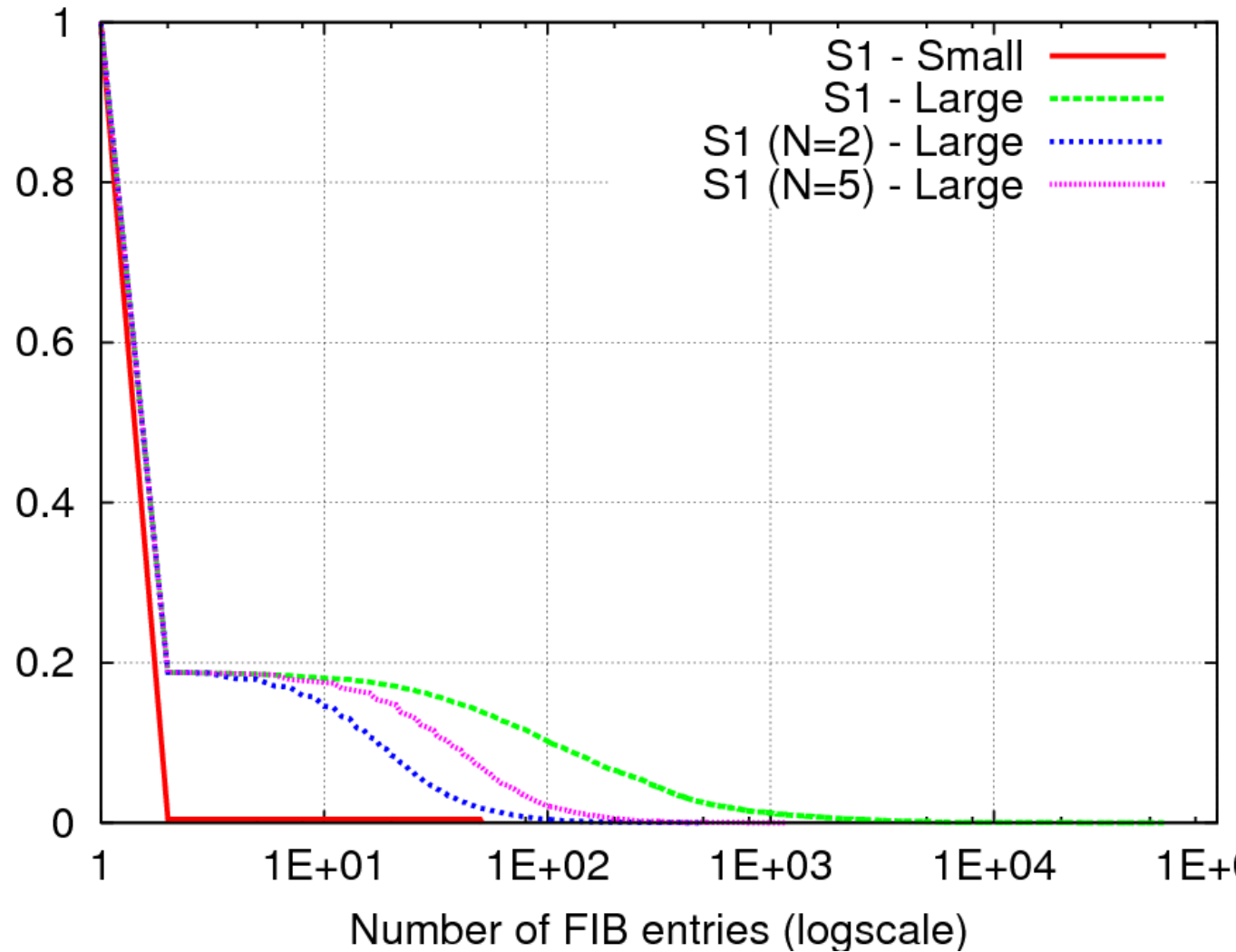
- Two synthetic topologies generated by *GHITLE*
- Hierarchical with business relationships



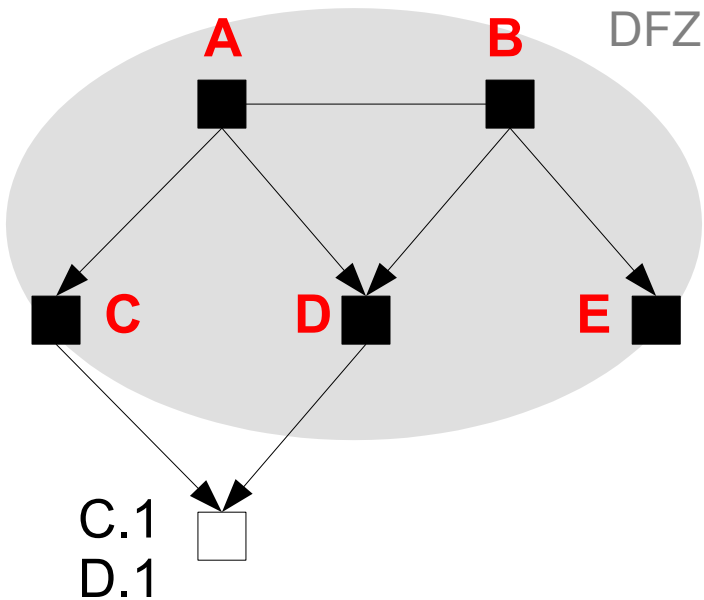
FIB Size: S1 Case



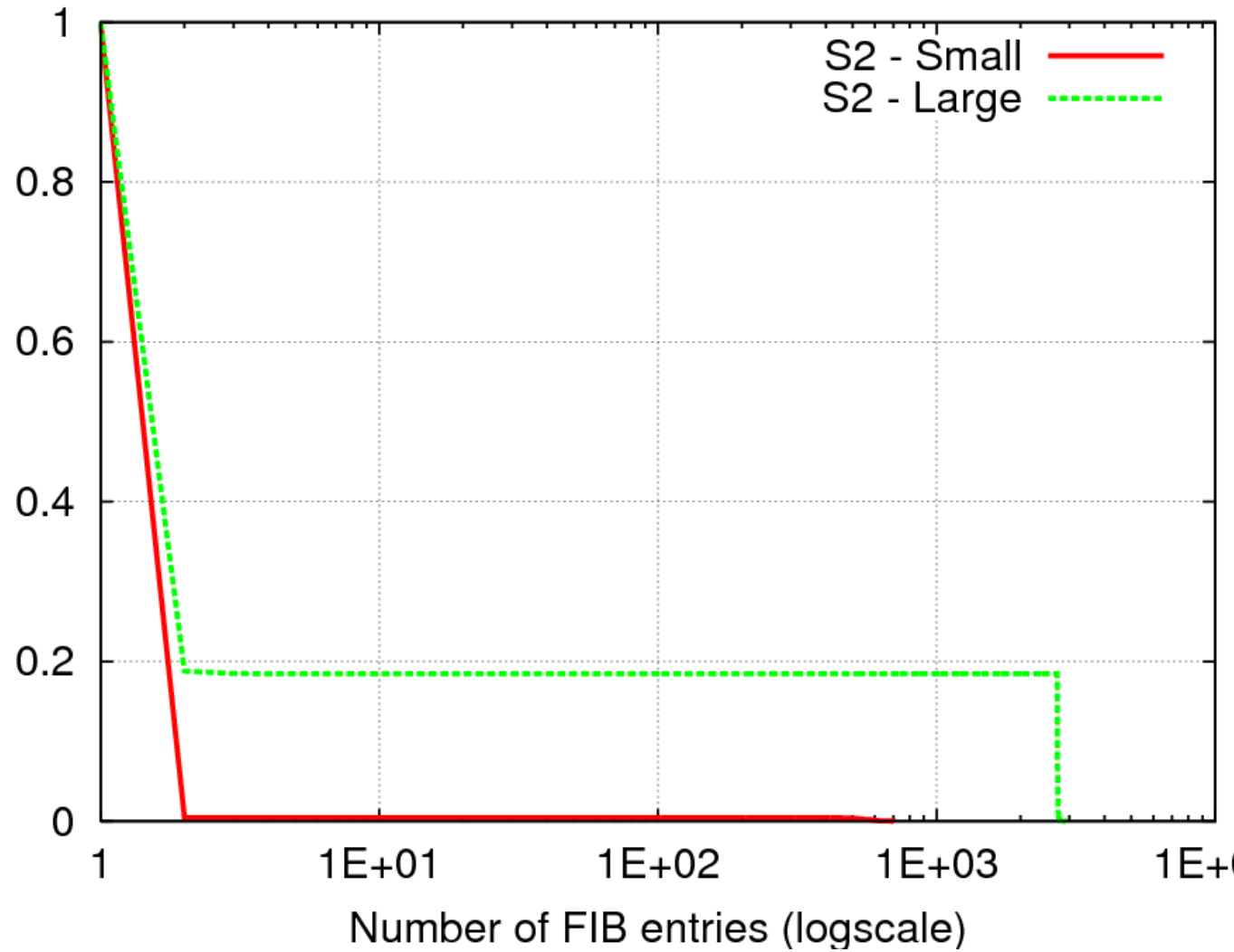
Only Tier-1s are assigned a **PI prefix**. Each provider delegates non-overlapping fractions to its customers.



FIB Size: S2 Case



All transit domains are assigned a **PI prefix**.
Delegation is done as in S1.



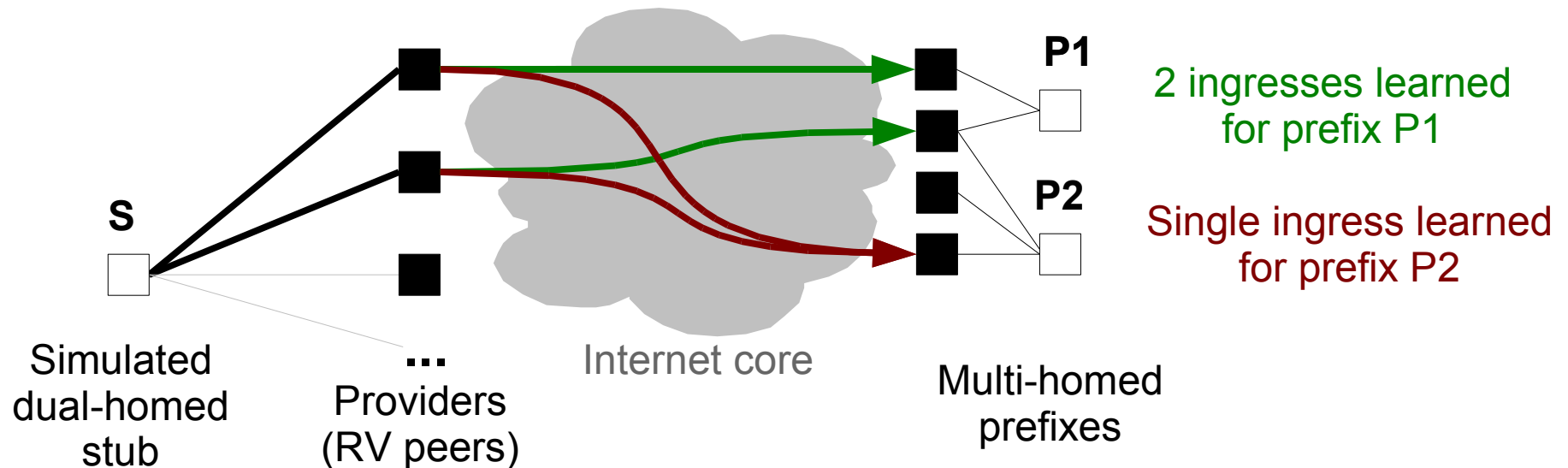
Benefit 2: Improving the Route Diversity



Route diversity (1)

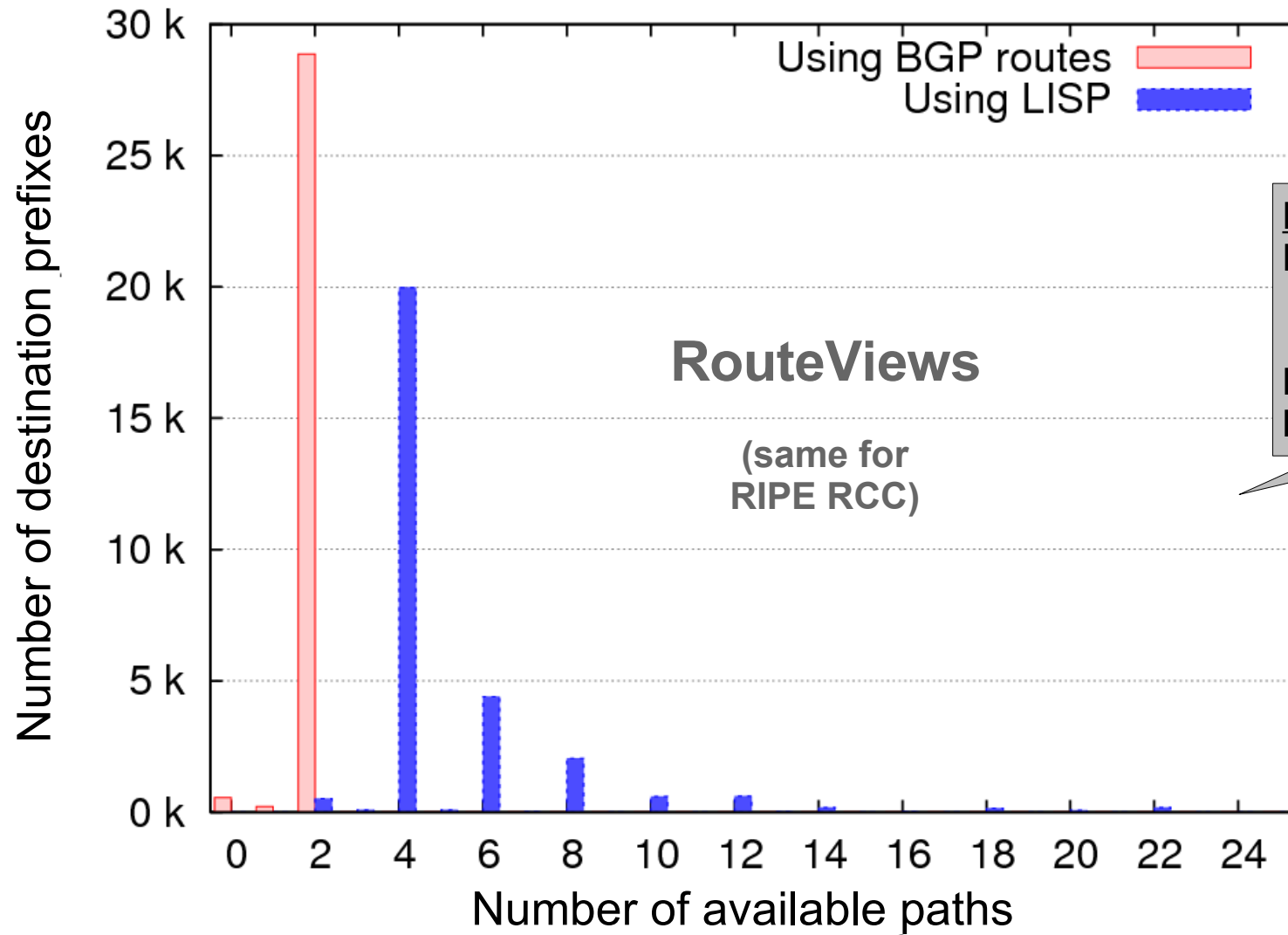
- **Objective**

- Evaluate number of paths that could be leveraged using various combinations of RLOCs.



Dataset	Routes	Peers	Pairs	M-h stubs	M-h prefixes
RouteViews	5750380	32	496	6402	29575
RIPE RCC00	1641618	11	55	6247	29934

Route diversity (2)



RouteViews

(same for
RIPE RCC)

Rule of thumb:
Route diversity is
N x M
N: num. prov. src.
M: num. prov. dst.

Conclusion



Conclusion

The Locator / Identifier Separation allows

- Better prefixes aggregation and **reduction of the RIB/FIB sizes !**
- **Higher route diversity by using different RLOCs.** End-to-end paths with better characteristics (e.g. Latency) are available !

Further work

- Design/evaluate RLOC/EID mapping schemes
- Implementation of LISP protocol
- Cost of Mappings Caching/Lookup
(<http://inl.info.ucl.ac.be/system/files/TechReport-LISP-Cost.pdf>)



Thank you for your attention !

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