

# iNET Seminar

Report on the 1st SISCom-Bretagne research school on Networks and Telecommunications

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# Outline

- Research School Program
- Quotes from Andrew Odlysko
- D. Papadimitriou: Internet Routing & paradigms
- Damien Saucez: LISP
- John Day: RiNA

# Program Overview

- Location: Rennes, France
- Timetable: 1 Week, 14 Talks (12 Speakers)
- Widespread topic, covering the todays + future Internet
- Lab-Visit and tour to Mont St. Michel
- Participants: ~50 students, 3 not living in France ;)



# Some Quotes [A. Odlysko]

- Myth: Streaming real-time traffic
  - Mostly progressive downloading, not streaming
- “Human impatience has no limit, therefore there is no limit to bandwidth ...”
- Traffic Volume is not value – Revenue per MB
  - SMS: \$1000.00
  - Cell Call: \$1.00
  - Internet: \$0.01
- Big question remains: Is the Internet threatened by *too much* or *too little* traffic?

# Internet Routing [D. Papadimitriou]

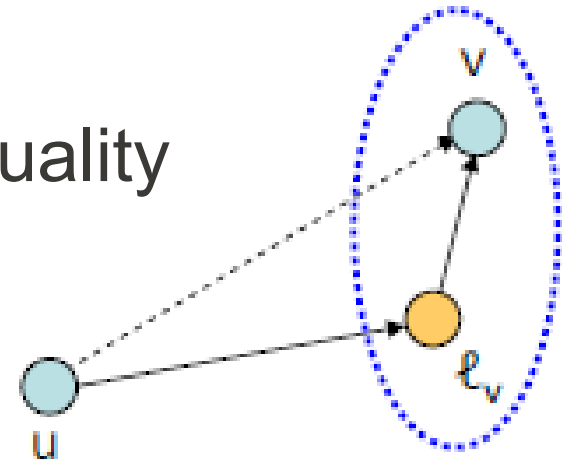
- Problems:
  - Internet growth rate: 50% p.a. in BGP entries
  - BGP convergence time degradation: 10% p.a.
  - Advancements in Hardware cannot keep up
  - ...
- New routing schemes:
  - Compact Routing
  - Greedy Geometric Routing
  - Hybrid Routing (Combining DV with LS routing)
  - Others (e.g. overlay)

# Compact Routing (1)

- A routing scheme is compact, if
  - Node IDs and header size scale logarithmically
  - Routing table size scales sublinear
  - Stretch is bounded to a constant
- General tradeoffs in routing:
  - Routing table size (Memory usage)
  - Stretch (Path length)
  - Topology adaption (msg. cost, processing time)

# Compact Routing (2)

- Basic ideas:
  - Store shortest path for nodes within local neighborhood (close region around node)
  - Outside neighborhood store some landmarks to reach other nodes
  - Stretch bounded by triangle inequality
- Stretch:
  - Routing path / shortest path
  - SPR has stretch 1 (incompressible)



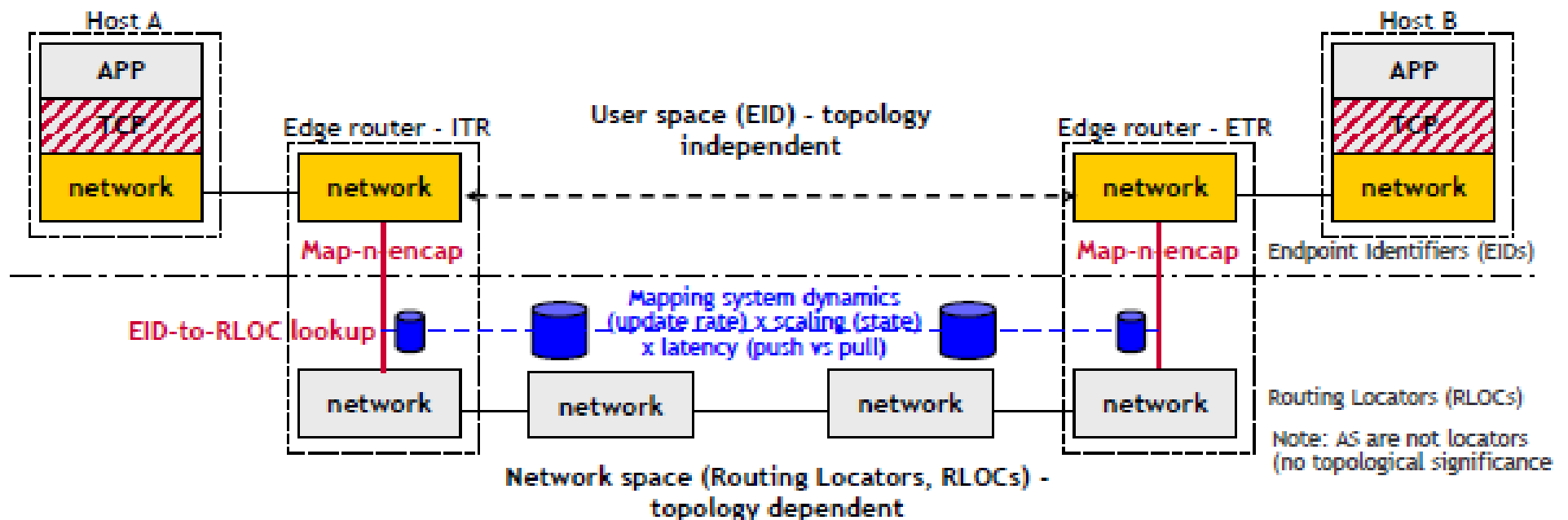
# LISP (1) [D. Saucez]

- LISP: Locator Identifier Split Protocol
- Map-Encap Scheme
- Core-Edge-Separation
- Routing on RLOCs in the core, on EID in the edges
- LOC-ID-Split? ... Well, not exactly.
- Mapping EID to RLOC with distributed DB e.g. DNS, DHT, others ...



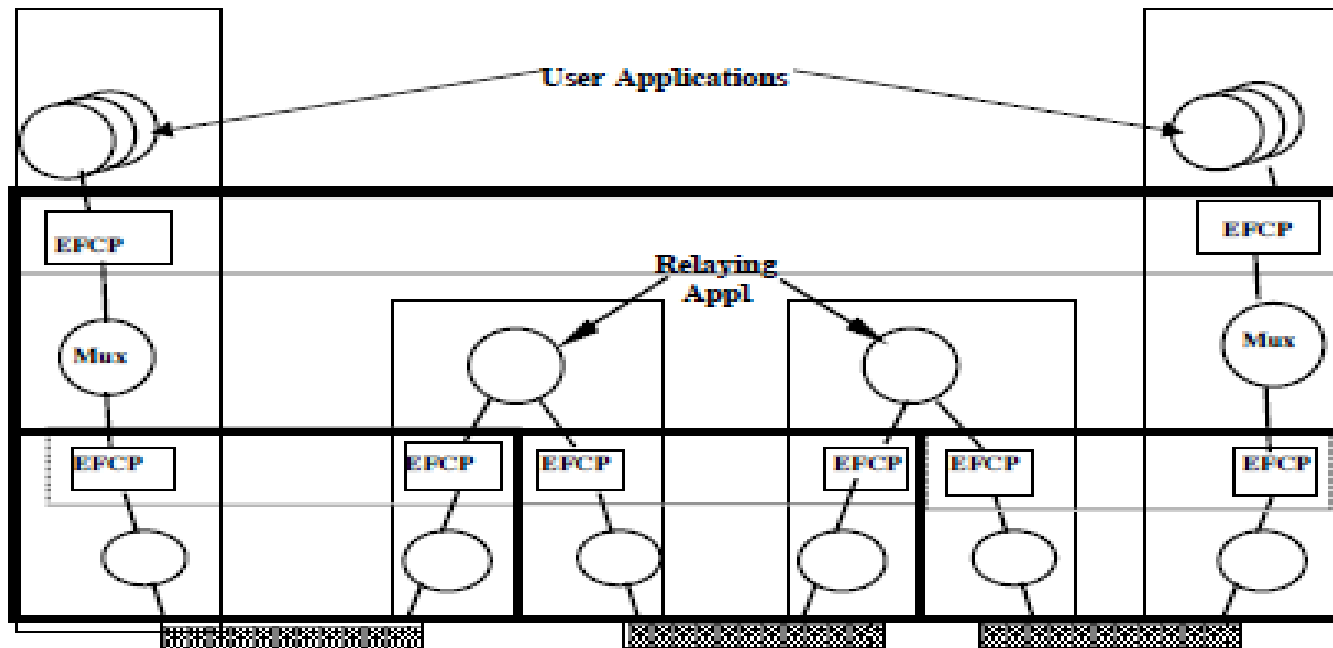
# LISP (2)

- EIDs allocated per organization
- RLOCs aggregatable



# Networking is IPC [J. Day]

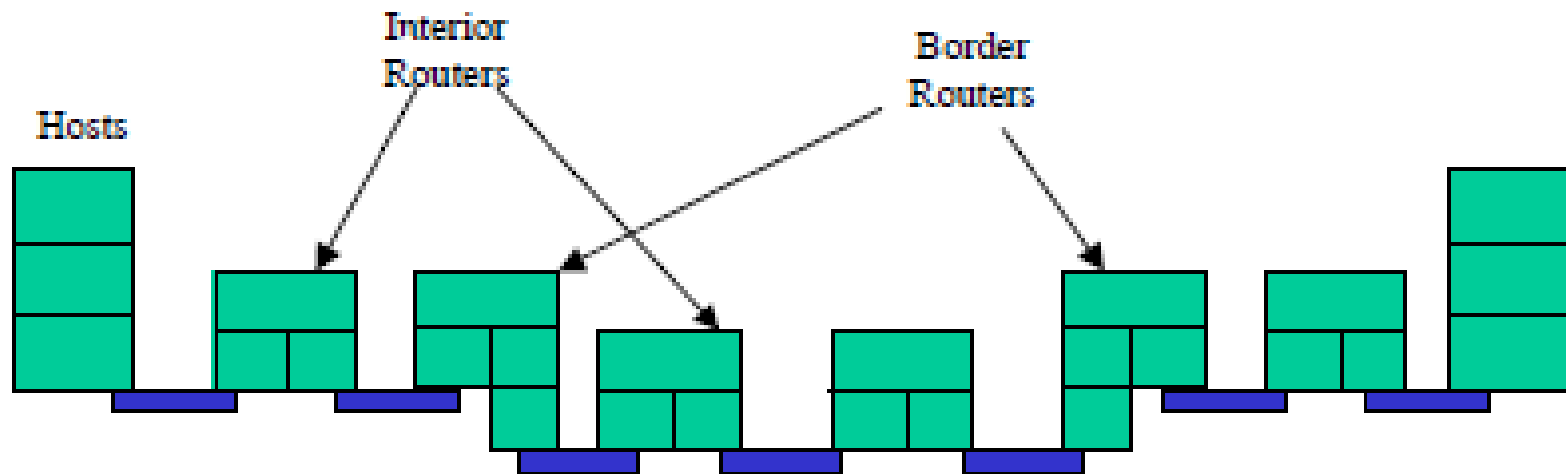
- „Networking is Inter Process Communication - and only IPC“ [B. Metcalfe + J. Day], idea is guided by OS design
- A layer is a distributed application managing IPC



- Communication is between applications not hosts!

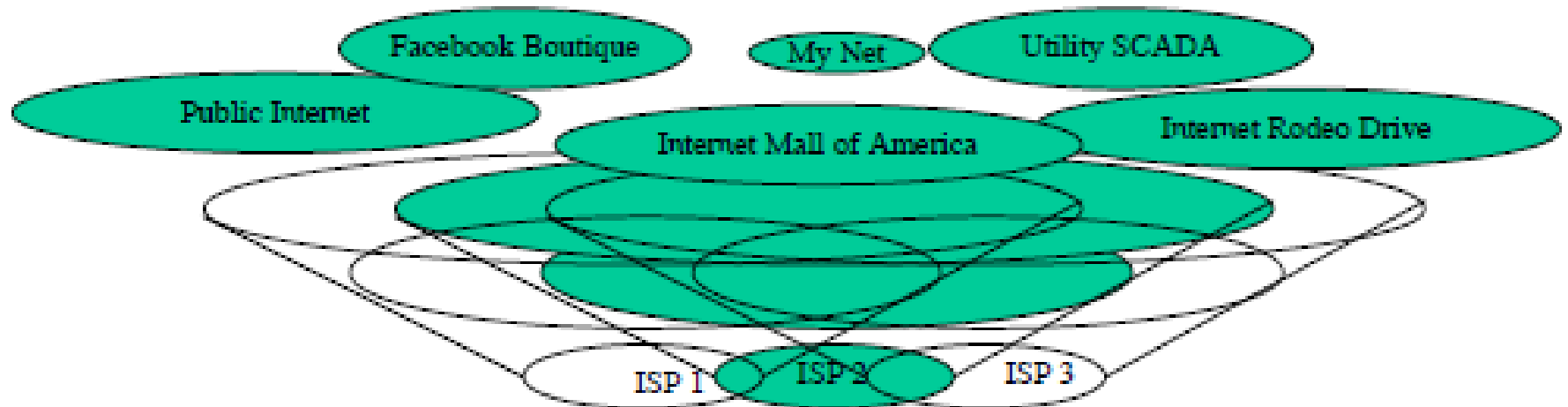
# RiNA (1)

- RiNA: Recursive inter-Networking Architecture
- Recursive layers of same functionality with different scope → IPC Facilities



# RiNA (2)

- Not just THE Internet anymore, but many “e-malls”



- Combines/borrows ideas from:
  - J.D. Touch: RNA Meta protocol
  - J. Rexford: Cabo
  - ...

# Conclusion – Final Photo



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HAW Hamburg - iNET - Sebastian Meiling

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# References

SISCom-Bretagne research school

- [siscombretagne.inria.fr/school\\_2010/](http://siscombretagne.inria.fr/school_2010/)

Andrew Odlysko:

- [www.dtc.umn.edu/~odlyzko/](http://www.dtc.umn.edu/~odlyzko/)

LISP:

- LISP-Drafts @ [tools.ietf.org](http://tools.ietf.org)

John Day, RiNA:

- [www.pouzinsociety.org](http://www.pouzinsociety.org)

Even more?

- Ask me ...