Experimenting with Programmable Management Policies over GENI
ProtoRINA over GENI

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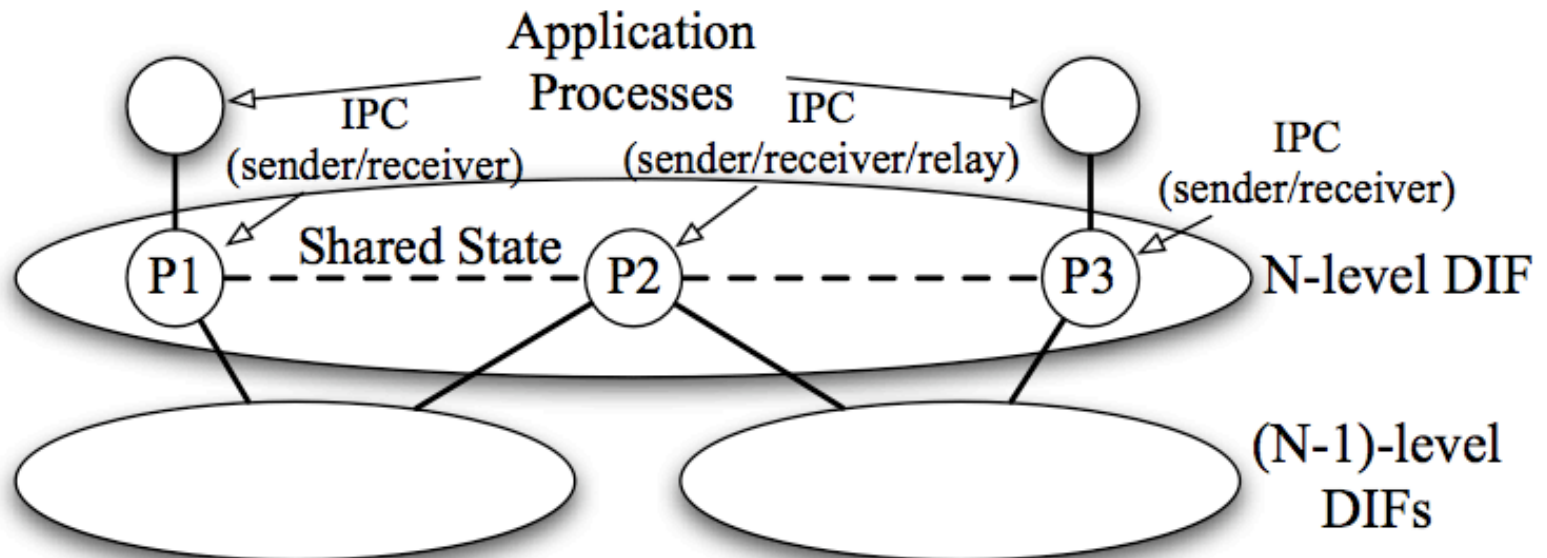Boston University

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(Some) Problems with Current Internet

- **Manageability**
  - lack of scoping
  - inability to provide _predictable_ service

- **Mobility**
  - naming the interface rather than the process
  - inability to _late bind_ name to point-of-attachment

- **Security**
  - addresses are exposed to apps/users rather than kept private
  - inability to naturally create _secure domains_

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Recursive InterNetwork Architecture (RINA)

- Networking *is* Inter-Process Communication(IPC)
- Distributed IPC Facility (DIF) is *the* layer
- DIF is *policy based* and dynamically instantiated

ProtoRINA

- **Overview**
  - Boston University prototype of the RINA architecture
  - Researchers can develop new (non-IP) protocols and applications
  - Educators can use it as a teaching tool for networking classes

- **Status**
  - cross-debugged with two other RINA prototypes (IRATI and TRIA)
  - around 50,000 lines of Java code
  - more components continually being added
  - code and user manual now available online

ProtoRINA over GENI

- **Goals**
  - Run ProtoRINA within a long-lived slice over GENI
  - Allow researchers and educators to opt-in and experiment with *<u>programmable management policies</u>*

- **Resources and tools**
  - ProtoGENI
  - Flack and Omni

Prior RINA Experiments over GENI

- Enrollment procedure
  - An enrollment creates, distributes and maintains information within a DIF

- Dynamic layer (DIF) instantiation
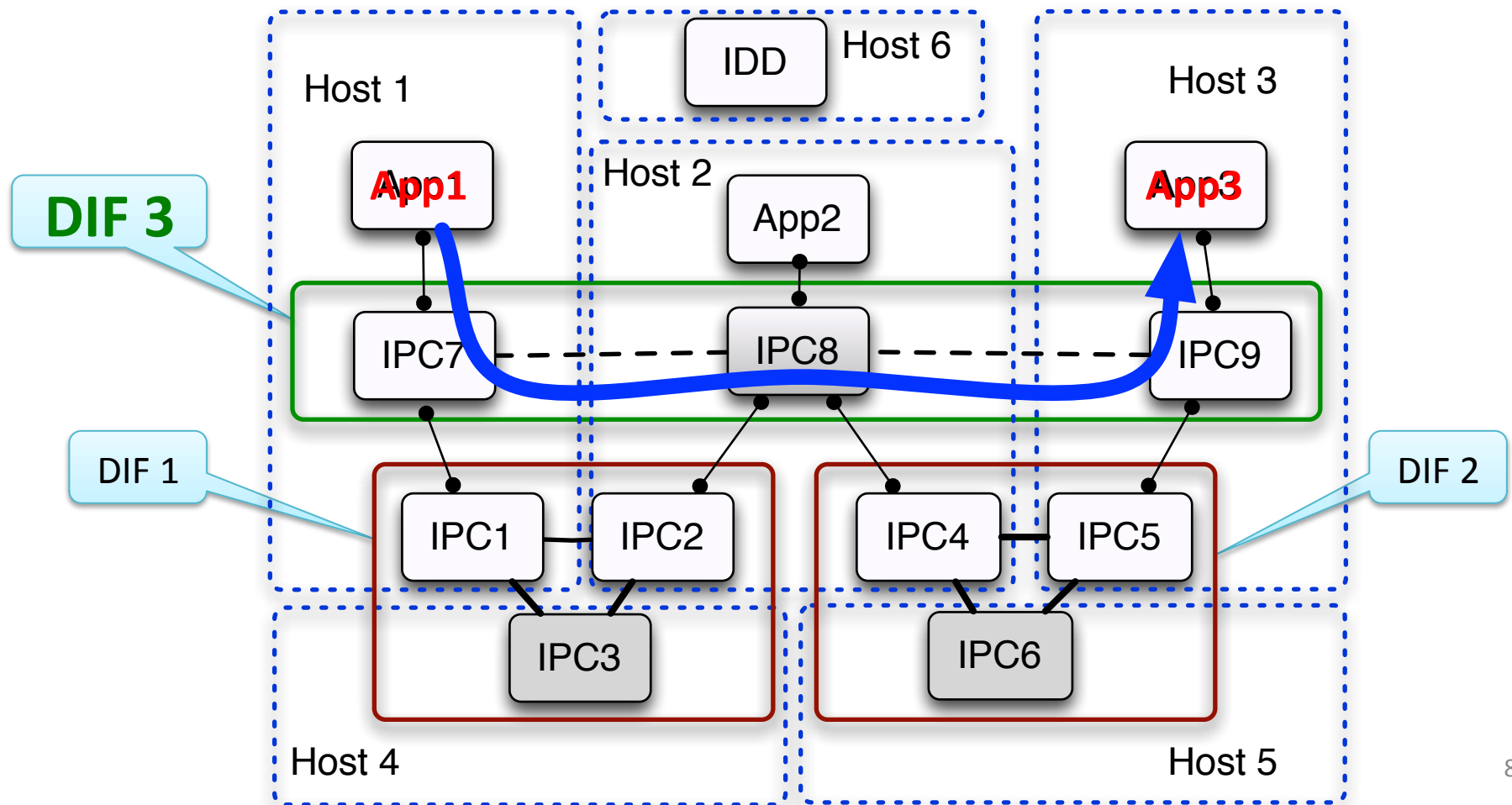 - High-level DIF layer is formed to provide communication service over a wider scope

Dynamic Layer (DIF) Instantiation

- App 1 wants to establish a flow to App 3 to communicate
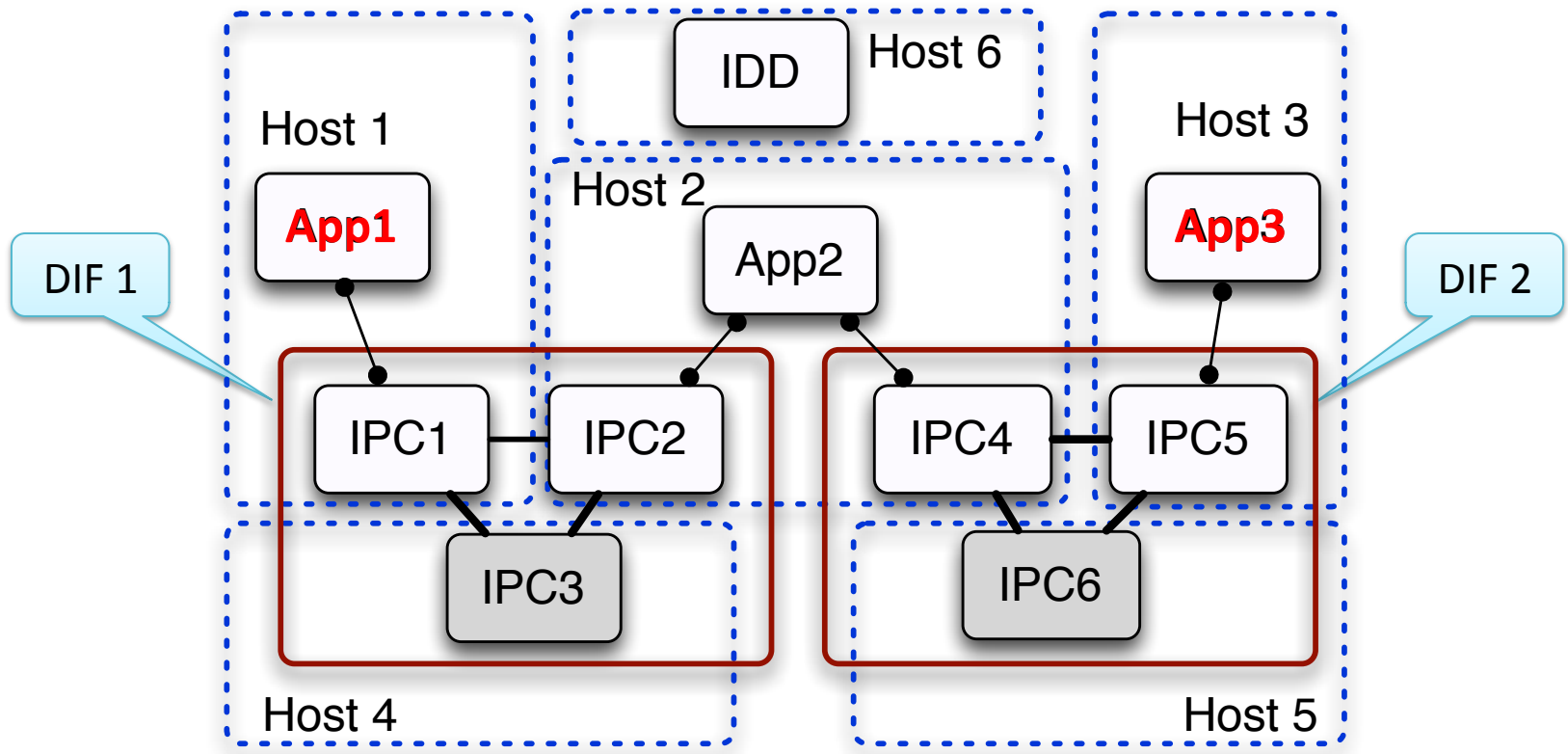
Dynamic Layer (DIF) Instantiation

- DIF 3 is dynamically formed to provide communication service

Proposed Shake-down Experiments

- RINA experiments will be scaled up to 20 nodes across different aggregates over GRE tunnels

- RINA experiments will be scaled up to 50 nodes across different aggregates over layer-2 VLANs

Challenges

- Connecting slivers across different aggregates is seldom successful

- Slice with many slivers requires several attempts to be created

- Long-running experiment needs to continually renew slivers and slice

Benefits from GENI and outreach

- Large-scale experimentation for correctness and performance

- Publication in experimentally focused venues: NSDI, SIGCOMM, etc.

- ProtoRINA wiki page
  - Preliminary webpage:

  http://csr.bu.edu/rina/protorina