A Case for End System Multicast

Yang-hua Chu, Sanjay G. Rao, and Hui Zhang

Presented by: Pratik Fegade
IP Multicast

- Best effort multicast service provided by the IP layer
- Drawbacks:
  - Stateful
  - Vulnerable to flooding by malicious sources
  - Difficult to implement reliability and the like on top
  - Distributed consensus required to obtain group address
- End system multicast helps mitigate these
Performance Tradeoffs

Multicast source
Naive Unicast

IP Multicast

End System Multicast
Narada: An Overview

• Construct an overlay (a mesh) between the end systems
  • Used for distributed control and coordination

• Construct reverse shortest path spanning trees
  • Used for actual data transfer
Narada: Design Goals

- Self-organizing
  - Fully distributed and robust to changes in membership
- Overlay efficiency
  - Efficient mesh construction
- Self-improving in an incremental fashion
  - Quality of mesh (and hence spanning trees) improves over time
Narada: Group Management

• Each member
  • maintains a list of all other members
  • periodically sends out this list to neighbours
    • Heart beat
    • Disseminating membership changes
  • Repair mesh by probing and adding links
  • New member requests current member(s) for membership
Incremental Mesh Improvement

- Probe members randomly to discover potentially better links
- Drop links perceived as not useful
Narada: Routing

• Run distance vector on the mesh

• Avoid count-to-infinity by maintaining shortest path

• Require leaving members to forward packets for some time after leaving to avoid transient losses
Narada: Evaluation

• 1024 end systems with a group size of 128
• All group join within the first 100 seconds with no changes later
Internet deployment

- 13 hosts distributed throughout USA
Thank you!