XPORT: Extensible Profile-driven Overlay Routing Trees

O. Papaemmanouil, Y. Ahmad, U. Cetintemel, J. Jannotti, Y. Yildirim

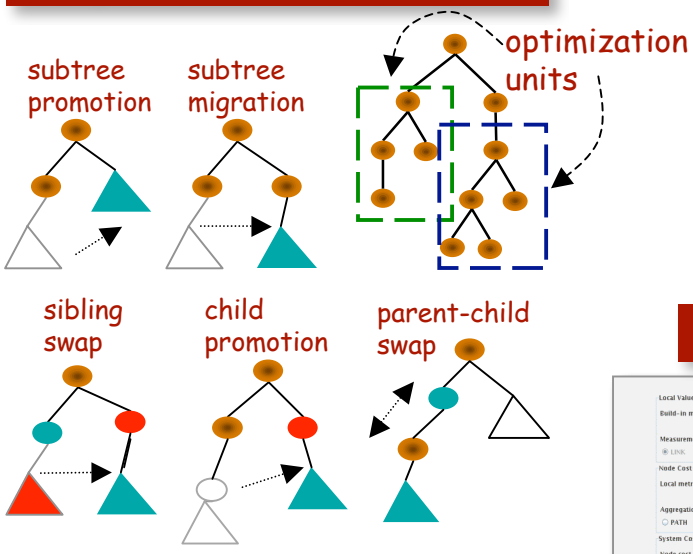
Basic XPORT Model

- A generic data dissemination system
  - Overlay network construction
- Separates "plumbing" from app-specific dissemination logic:
  - Apps provide a small set of methods:
    - Data and profile definitions
    - Profile matching functions
    - Performance goals and constraints
  - XPORT automatically builds, maintains, optimizes an overlay dissemination network

Extensibility in XPORT

- Profile/Data extensibility, e.g.,
  - `match(m,p)`: true if message matches profile
  - `merge` (p_1, p_2): merge two profiles to one
- Cost extensibility: 2-level aggregation model
  - Level 1: Defines the local node cost
    - Aggregation of a metric over some neighbors
  - Level 2: Defines the global system cost
    - Aggregate costs of all nodes

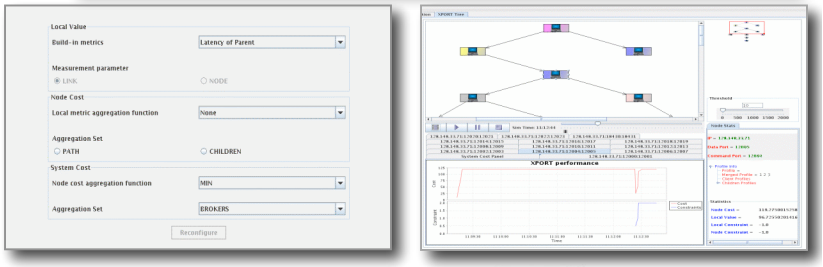
Sample Network Transformations



Example Cost and Constraint Specification

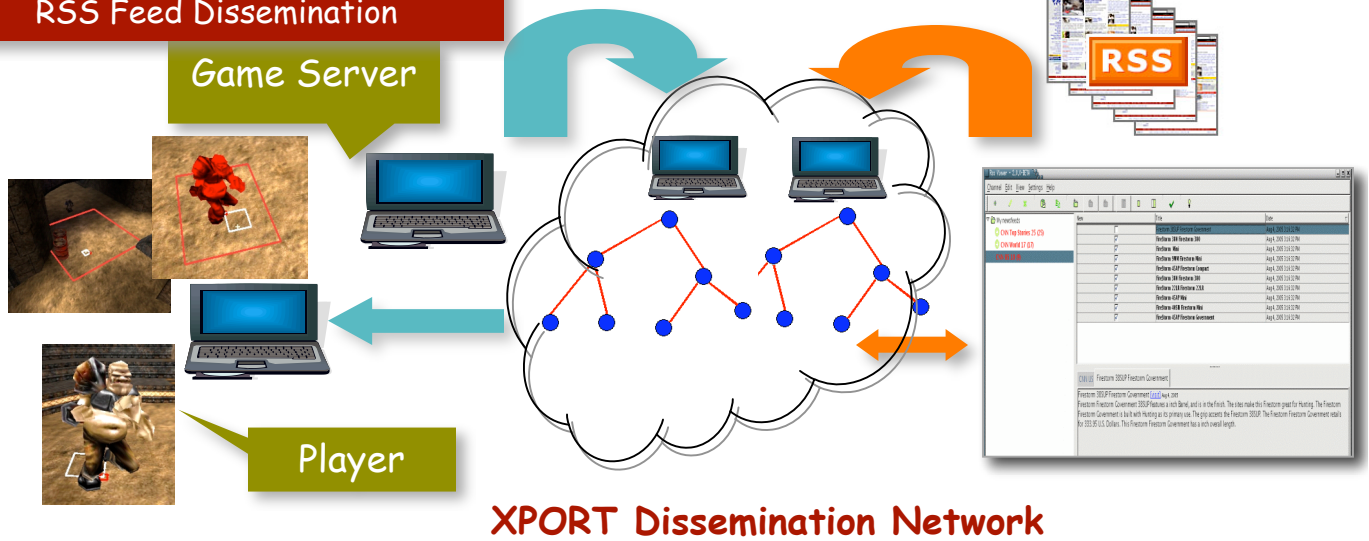
- Optimization goal:
  "Minimize total bandwidth consumption while keeping dissemination latencies under 100ms."
- In XPORT:
  min(sum(children, in_data)) while sum(ancestors, link_latency) < 100ms.

Network Configuration and Visualization Tools



Demo Applications:

1) Multiplayer Networked Game
2) RSS Feed Dissemination



XPORT Dissemination Network