The implication of Overlay Routing on ISPs’ Connection Strategies

Internet interconnection

- Tier-1 ISP
- Tier-2 ISP
- Local ISP
- Peering link

The challenge by overlay routing

Overlay routing changes traffic routing at the application which brings challenge to the ISPs’ interconnection

Business model

Latency costs

Transit prices

Peering prices

Traffic model

- Overlay routing traffic takes a portion of all traffic
- Overlay routing applications are assumed as latency sensitive
- Overlay routing traffics play a non-cooperate routing game

Economic issues

- Three levels of peering capacity
  - Low level
  - Medium level
  - High level
- Incentive to upgrade peering link

\[ \frac{\partial J_A}{\partial c_{AB}}, \frac{\partial J_B}{\partial c_{AB}}, \frac{\partial (J_A + J_B)}{\partial c_{AB}} \]

- The conditions in which peering is better
- Regime equilibrium

Bilateral Nash Equilibrium is used for coordinated two-person deviations

Numerical study

- Assume M/M/1 model is used
- With high level, assume ISP A free-rides ISP B
- Overlay routing traffic takes 50% of all traffic

Future plan

- Extend to include more realistic features
- Incorporate implementing issues