Fair Peering

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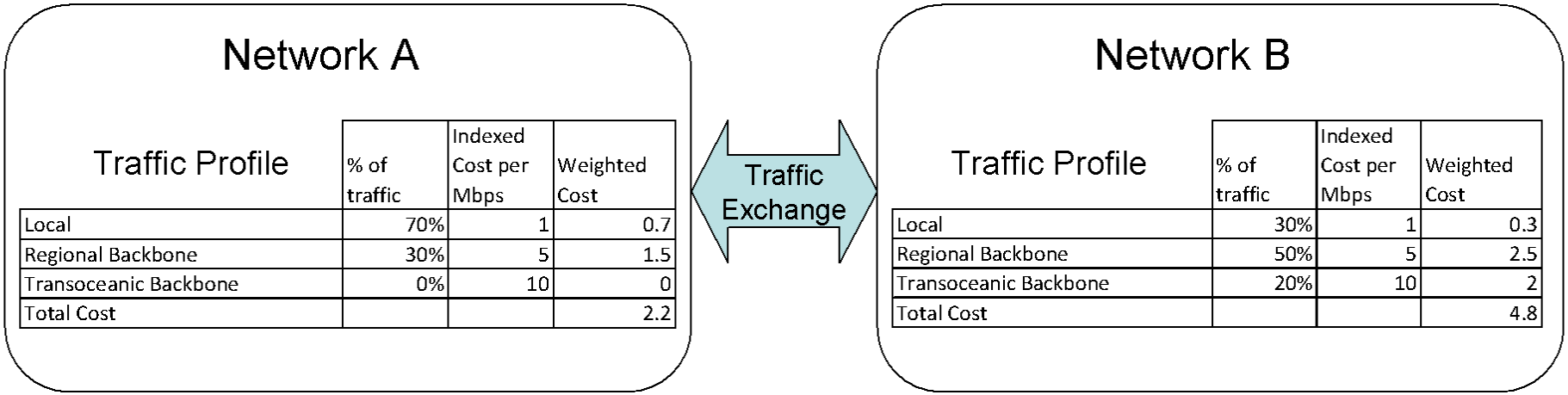
The Problem

Settlement-free peering agreements can create an economic windfall for one network at the expense of another.

- Settlement-free peers agree to exchange traffic traveling to or from each other's on-net addresses, without compensation
  - Both parties hope to save money by avoiding paying for transit
  - However, both parties do bear real costs to carry the traffic that is exchanged, and the cost burden is not always equally shared
  - The primary cost differentiator is the distance traffic is carried



The Problem (2)

An industry has developed around the arbitrage opportunity enabled by unbalanced peering relationships.

- Evidence: The Art of Peering: The Peering Playbook (William B. Norton) offers nineteen tactics for convincing another network to peer, including
  - Traffic Manipulation to mask the high cost traffic until a peering agreement has been achieved
  - Bluffing to convince the potential peering partner that your traffic profile is only temporarily out of balance due to a network outage
  - Changing the set of advertised routes once a peering agreement is achieved

(http://www.nanog.org/papers/playbook.doc)

Fair Peering Principles

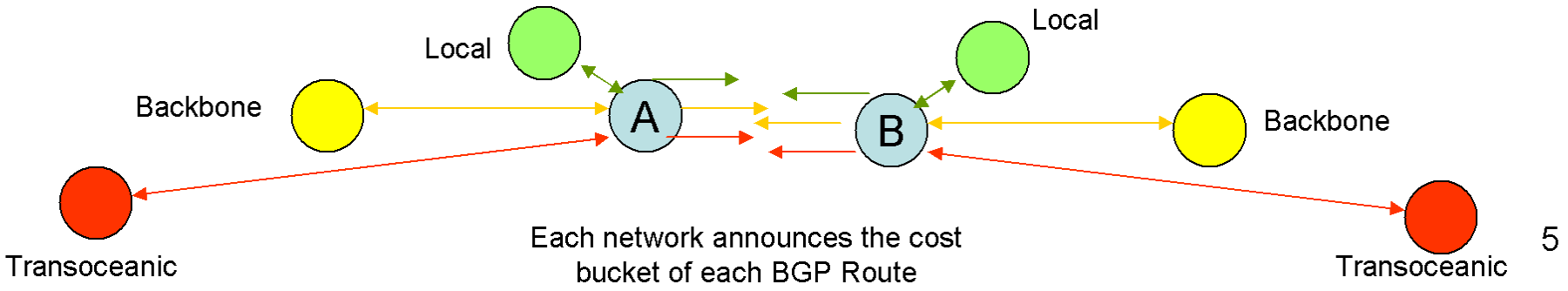
A proposal to bring economic neutrality to peering interconnection agreements.

1. Fair Peering relationships place an equal cost burden on each peering partner, with a mechanism for correcting imbalances.
2. Fair Peering partners prefer each other's routes above all others.
3. Fair Peering partners announce full on-net routes to each other.
4. Fair Peering partners commit to augment interconnection capacity to handle all of unconstrained traffic demand.
5. Fair Peering partners commit to interconnection at diverse locations in order to achieve a more survivable Internet.
6. Fair Peering partners commit to providing a minimum level of service quality to each other (uptime, latency, packet loss, and route management), and provide each other a well-defined escalation path for use in the event of quality degradation.
7. Each Fair Peering partner announces their Fair Peers to the public.

Fairness Metrics

How can the cost burden of each peer be measured?

- One proposal:
  - Each network announces the cost category of each route to its Fair Peers, in at least three cost categories:
    - Local
    - Regional Backbone
    - Transoceanic
  - Each network can then measure the amount of traffic it carries in each category
  - The Fair Peering agreement specifies relative costs of each category of traffic
  - The total cost of carrying exchanged traffic can be periodically computed and compared



Imbalance Correction Options

Networks must be given the option to correct an imbalance without paying the other party.

- When a network is imposing a greater cost burden on a Fair Peer, it can
  - Peer in additional locations so that the peering partner does not have to carry the traffic as far
  - Announce selected routes only at agreed-upon peering locations to force traffic over its own backbone instead of the partner's backbone
  - Use BGP Multi-exit discriminators (MEDS) to force traffic over different routes
- As a last resort, the cost-imposer can choose to pay the cost-bearer to compensate the cost-bearer for the imbalance

Benefits of Fair Peering

Removing arbitrage opportunities can be its own reward, but there are more direct benefits as well.

- Fair Peers that announce full routes to each other, and prefer each other's routes, will carry more billable traffic, and make more money
- Fair Peering will also reduce one form of Internet arbitrage and cause funds to flow to those who build infrastructure, providing greater incentive to build that infrastructure
- Expanding the number of peering locations increases the Internet's resiliency to outages
  - Current peering concentration in large peering centers creates unacceptable risk of Internet failure

Discussion

- Are there flaws in the Fair Peering concept?
- Are there additional elements to add to the list of seven Fair Peering Principles (slide 4)
- Are there elements on the list of Fair Peering Principles that should be removed?