P4P: Provider Portal for P2P Applications

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P4P Portal Services

- Location Portal Service
- pDistance Portal Service
Location Portal Service

- Allows an ISP to aggregate the Internet address space to define its own “my-Internet” view
  - Highly preferred by ISPs during our field tests

- The “my-Internet” view of an ISP consists of a set of PIDs (partition IDs)
A PID denotes a set of network locations

- A generalization of network aggregation concepts such as autonomous system (AS) or intradomain routing area

- Can denote aggregation such as
  - a subnet, a point of presence (PoP), a type of customers (dsl vs fiber), an AS, or a set of ASes

- May define hierarchical PIDs, but focus on one level so far
“My-Internet” View of isp1: an Example

pid1.intra.isp1

pid2.intra.isp1

pid3.intra.isp1

pid4.intra.isp1

pid5.exter.isp1

pid6.exter.isp1

pid7.exter.isp1
Implementation: Interfaces Defined in the Location Portal Service

- GetPID (MUST)
  - IP address → PID

- GetPIDMap (SHOULD)
  - PID → list of IP prefixes/ASNs belonging to the PID
The pDistance Portal Service allows an ISP to define the pDistance for any given pair of network locations:
- network location: IP address/PID
- pDistance: path metric distance, provider distance
pDistance

- Semantics of pDistance depends on
  - Ordinal or numerical (default) pDistance
  - Type of pDistance, e.g.,
    - Routing Hop-Count pDistance
    - Routing Air-Mile pDistance
    - Routing Cost pDistance (default if not indicated)
Example: Routing Cost pDistance of isp1

- OSPF path cost;
- TE dual variables

Multihoming cost opt. dual, or
f(BGP local pref., AS_PATH, …)
Implementation: Interface Defined in the pDistance Portal Service

- GetpDistance (MUST)
  - [a pair of network locations, and optionally type of pDistance] $\rightarrow$ pDistance value
How May a P2P Application Use these P4P Portal Services?

- This depends on the applications
- It is a place for application innovation
Example: Tracker-Based File-Sharing P2P in July/August 2008

- The tracker resolves the PIDs of clients
  - By using PID Maps
- The tracker uses a peering weight matrix to select initial peers for a new client
- Peering weight matrix computed according to swarm state and pDistance matrix
Application Tracker Data Structure

pid1 -> PID Map, list of clients in pid1

pid7 -> PID Map, list of clients in pid7

peering weight matrix

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