A Supplement Protocol for BGP - Source Policy Route Discovery

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OUTLINE

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  — Deficiency

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  — Search Scenario
  — Discovery Message Format

• CURRENT STATUS FOR THE PROJECT
INTRODUCTION

POLICY ROUTING

Why?

Packets may be silently dropped due to violation of intermediate domain’s policy

What?

Routing protocols for finding feasible domain routes to solve the above problem

How?

Link State VS. Distance Vector
INTRODUCTION

INTERDOMAIN POLICY ROUTING (IDPR) – Link State Approach

Approach :
Huge databases for Internet topology and all other domain policies

Mechanism :
Source computes feasible routes based on its databases

Disadvantage :
Not practical due to storage requirement
INTRODUCTION

BORDER GATEWAY PROTOCOL (BGP) – Distance Vector Approach

Approach:
Advertise routing information through BGP Update messages

Mechanism:
Each router picks a route advertisement based on its own policy

Disadvantage:
Advertisements may be screened out during their journeys; but still more practical than IDPR
BORDER GATEWAY PROTOCOL (BGP)

Logic Inside a BGP Speaking Router

A BGP Speaking Router
BORDER GATEWAY PROTOCOL (BGP)

BGP Deficiency

A, B, C, D, E, G : no specific policies except shortest path

F : excludes all routes containing B

Select route BA

No route selected

No advertisement received, though a feasible route to A exists
SOURCE POLICY ROUTE DISCOVERY

Purpose

Overcome or supplement the BGP deficiency

Preliminary

A new path attr NUM_PATH is added to BGP update messages indicating number of known routes from here

A new database Source-RIB for storing discovered routes.

Approach

Depth First Search based on NUM_PATH information
Search Scenario

Value of NUM\_PATH from E is 2,
Thus, F forward request to E

DR : Discover Request
# SOURCE POLICY ROUTE DISCOVERY

## Format for a Discovery Message

<table>
<thead>
<tr>
<th>Message Fields</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Indicate the originator ID of this message</td>
</tr>
<tr>
<td>Destination</td>
<td>An IP prefix for destination</td>
</tr>
<tr>
<td>Type</td>
<td>Request, Reply or Trace back</td>
</tr>
<tr>
<td>AS_set</td>
<td>ASs have been visited so far</td>
</tr>
<tr>
<td>AS_path</td>
<td>A simple AS path this message has traveled from source to the AS currently passing the message</td>
</tr>
<tr>
<td>Hop_count</td>
<td>Terminate an unbounded discovery procedure</td>
</tr>
<tr>
<td>Depth_count</td>
<td>Specify how deep from source the message should go before tracing back in a DFS search</td>
</tr>
<tr>
<td>Excluded_ASs</td>
<td>Those ASs should be excluded from a discovered policy route</td>
</tr>
<tr>
<td>Preferred_ASs</td>
<td>Those ASs are preferred for a discovered policy route</td>
</tr>
<tr>
<td>Degree of Preference</td>
<td>Discard a route if its degree of preference is lower than this value</td>
</tr>
</tbody>
</table>

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CURRENT STATUS FOR THE PROJECT

- A research network cluster with 8 nodes
- A simulation program in C++ has been written
- PVM (Parallel Virtual Machine) is used to run the simulation
- Use Inet (from U of Michigan) to generate Internet topology with 3,000 domains
- Performance eval model has been defined
  - Percentage for activating discovery procedure
  - (Extra network load) per (beneficial communication)