Traffic engineering on a multihoming environment

Fernando García
fernando.garcia@tecnocom.es
What’s this about

- Solution to a request from a real customer
- Real solution in a real scenario
The customer...

• Two E3 lines to different carriers (A & B)
• He wants redundancy
• But he wants to get optimal usage of the lines
  • Optimal: both lines up to maximum capacity
Me...

- Must try to be a good netcitizen:
  - DON’T flap routes
  - DON’T deaggregate
- Let’s try
The customer lets us play with his network!!! aka: real life test
Real traffic
Best path in eBGP

- Highest weight
- Highest Local Pref
- Network/redistributed over local aggregate
- Shorter AS-PATH
- Lowest origin type
- Lowest MED
- eBGP over iBGP
- Lowest IGP metric
- Older and random alike
Input/Output

• Not always the same
• Output easier to “influence”
• Sometimes different policies and/or in each direction
• We’ll focus on input traffic
Measuring method

1. Stable situation
Measuring method

1. Stable situation
2. Reset circuit with A
Measuring method

1. Stable situation
2. Reset circuit with A
Measuring method

1. Stable situation
2. Reset circuit with A
3. Recover circuit with A
Measuring method

1. Stable situation
2. Reset circuit with A
3. Recover circuit with A
Measuring method

1. Stable situation
2. Reset circuit with A
3. Recover circuit with A
4. Measure
Measuring method

1. Stable situation
2. Reset circuit with A
3. Recover circuit with A
4. Measure
5. Reset circuit with B
Measuring method

1. Stable situation
2. Reset circuit with A
3. Recover circuit with A
4. Measure
5. Reset circuit with B
Measuring method

1. Stable situation
2. Reset circuit with A
3. Recover circuit with A
4. Measure
5. Reset circuit with B
6. Recover circuit with B
Measuring method

1. Stable situation
2. Reset circuit with A
3. Recover circuit with A
4. Measure
5. Reset circuit with B
6. Recover circuit with B
Measuring method

1. Stable situation
2. Reset circuit with A
3. Recover circuit with A
4. Measure
5. Reset circuit with B
6. Recover circuit with B
7. Measure
Starting point

After resetting conection “A”

Carrier A: 55%
Carrier B: 45%

After resetting conection “B”

Carrier A: 71%
Carrier B: 29%
Solution #1: Prepends

- Add your prefix several times

- Router A:

  ```
  policy-statement prepend-carrier {
  term 1 {
    from {
      route-filter 192.0.2.0/24 orlonger;
    }
    then as-path-prepend "65533";
  }
  }
  ```

- Too much influence
Solution #1: Prepends

Original

After resetting connection “A”

After resetting connection “B”
Solution #2: Deaggregate

- Using more than one prefix
  - Several prefixes assigned by the RIR/LIR
  - Deagregated prefixes
- Announce in each path with different prepend (or other attribute)
- Complex to apply and... not good netizenship
Solution #2: Deaggregate

- **Router A**

```plaintext
code
policy-statement prepend-carrier {
    term 1 {
        from {
            route-filter 192.0.2.0/25 orlonger;
        }
        then as-path-prepend "65533";
    }
    term 2 {
        from {
            route-filter 192.0.2.128/25 orlonger;
        }
        then as-path-prepend "65533 65533";
    }
}
```
Solution #2: Deaggregate

Original

After resetting connection “A”

After resetting connection “B”
Solution #3: Communities

- Depend on carrier policies
- Usually allow to do a prepend on the carrier borders
- With my customer, the announced communities of the carrier didn’t work
Solution #4: Origin

- Origin: Internal, external, incomplete
- Only checked when AS paths are equal
  - This happens frequently
- Set the origin of announces to one peer with “internal”
- Set the origin of announces to the other peer to “incomplete”
Solution #4: Origin

Original:
- Carrier A: 45%
- Carrier B: 55%

After resetting connection “A”:
- Carrier A: 66%
- Carrier B: 34%

After resetting connection “B”:
- Carrier A: 65%
- Carrier B: 35%
Our solution

- Tuning:
  - Set the origin

- Finer tuning:
  - Selectively apply origin to some prefixes
    - Not deaggregated, but disjunct prefixes assigned by RIPE
General solution

• Your mileage may vary
• Gross adjust:
  • Prepend
• Fine tuning:
  • Set the origin
• Finer tuning:
  • Selectively apply prepend and/or origin to some prefixes