Traffic engineering on a multihoming environment

Fernando García
fernando.garcia@tecnocom.es

Tecnocom

What's this about

- Solution to a request from a real customer

- Real solution in a real scenario

Tecnocom

The customer...

- Two E3 lines to diferent carriers (A & B)

- He wants redundancy

- But he wants to get optimal usage of the lines

  - Optimal: both lines up to maximum capacity

Tecnocom

Me...

- Must try to be a good netcitizen:
    - DON'T flap routes
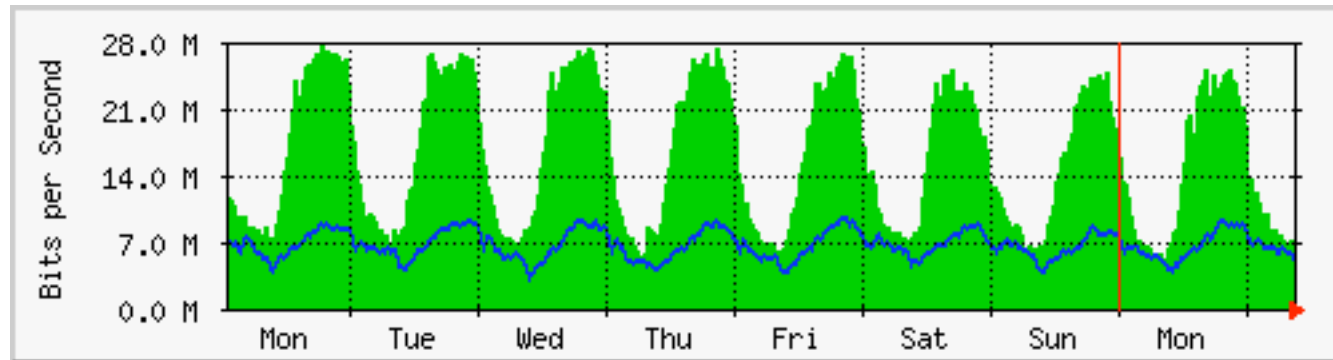   - DON'T deaggregate
- Let's try

Tecnocom

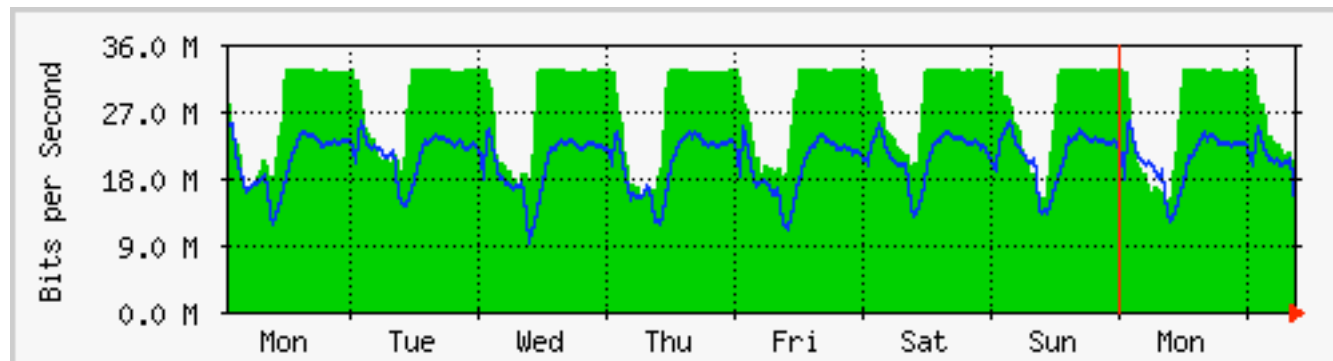The customer lets us play with his network!!!
aka: real life test

Tecnocom

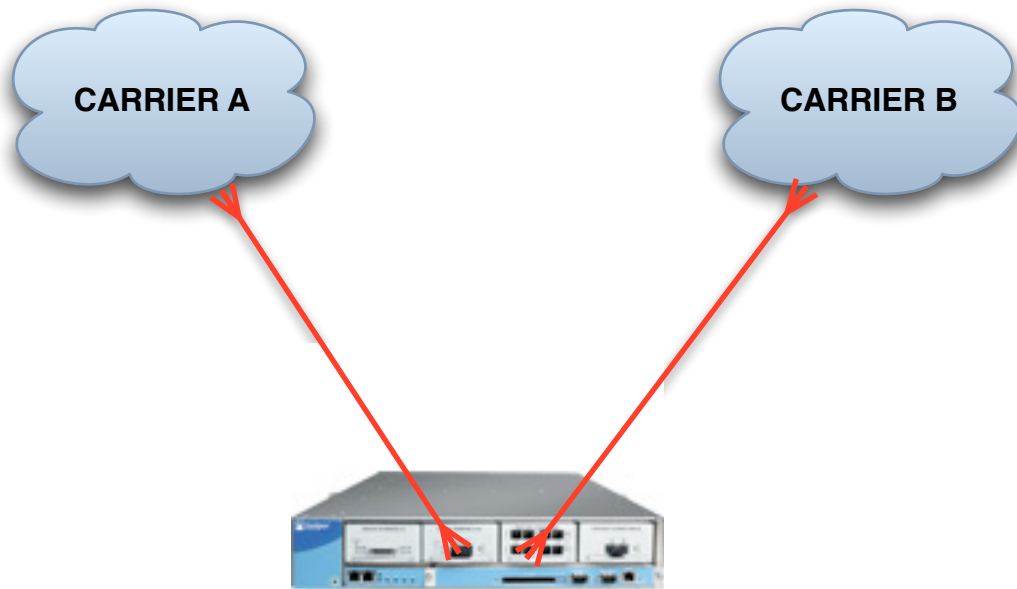# Real traffic

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

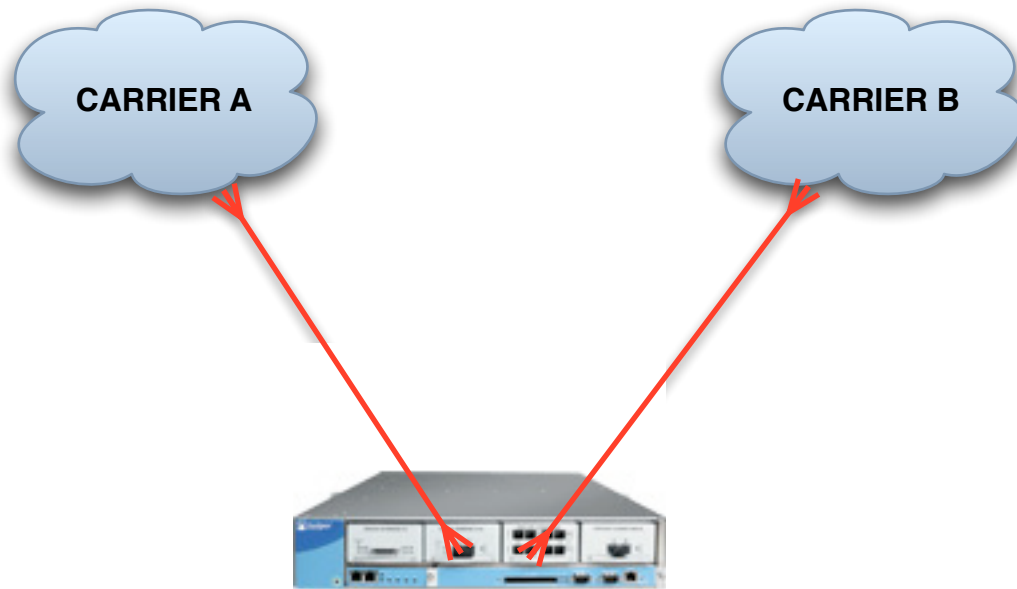**Tecnocom**

Input/Output

- Not always the same

- Output easier to "influence"

- Sometimes different policies and/or in each direction

- We'll focus on input traffic

Tecnocom

Measuring method

1. Stable situation

CARRIER A

CARRIER B

Tecnocom

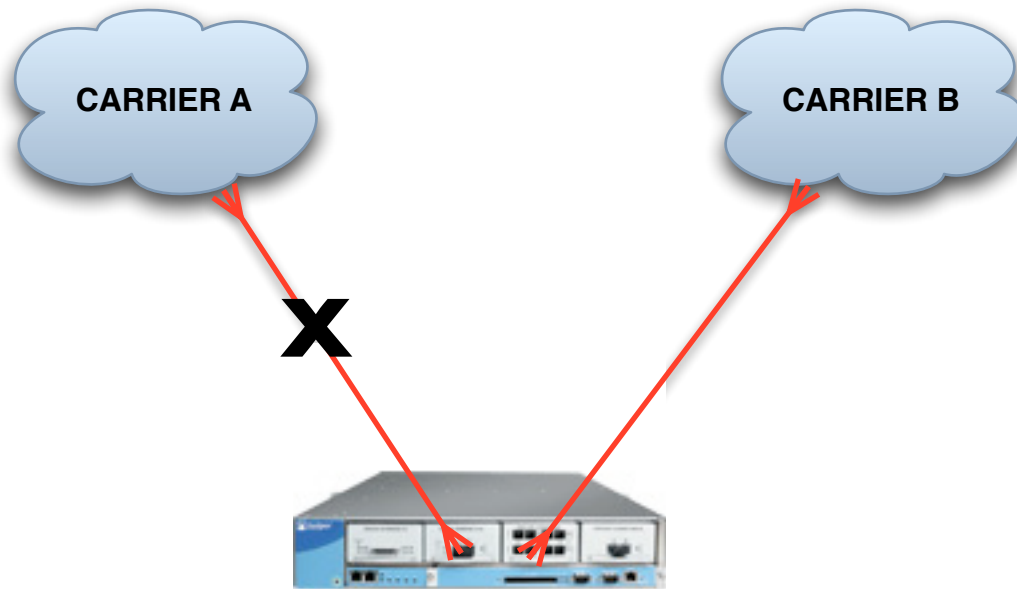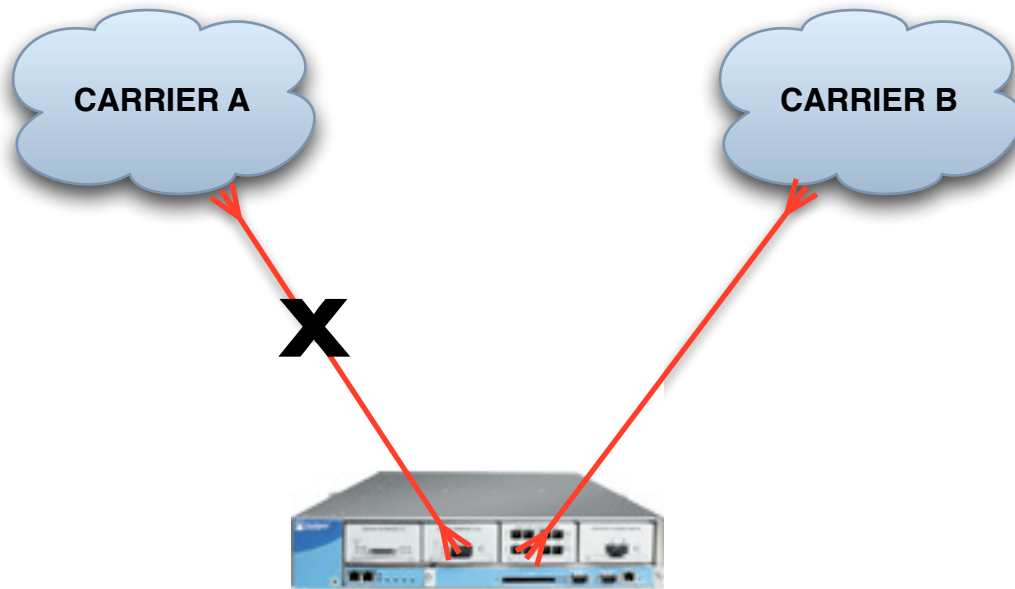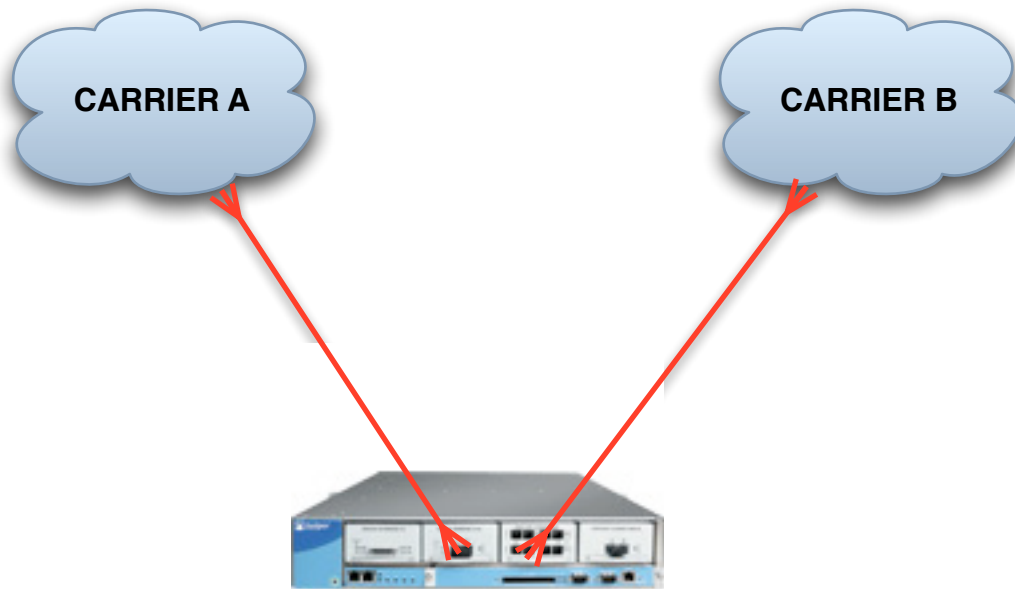# Measuring method

CARRIER A

CARRIER B

1. Stable situation
2. Reset circuit with A

Tecnocom

Measuring method

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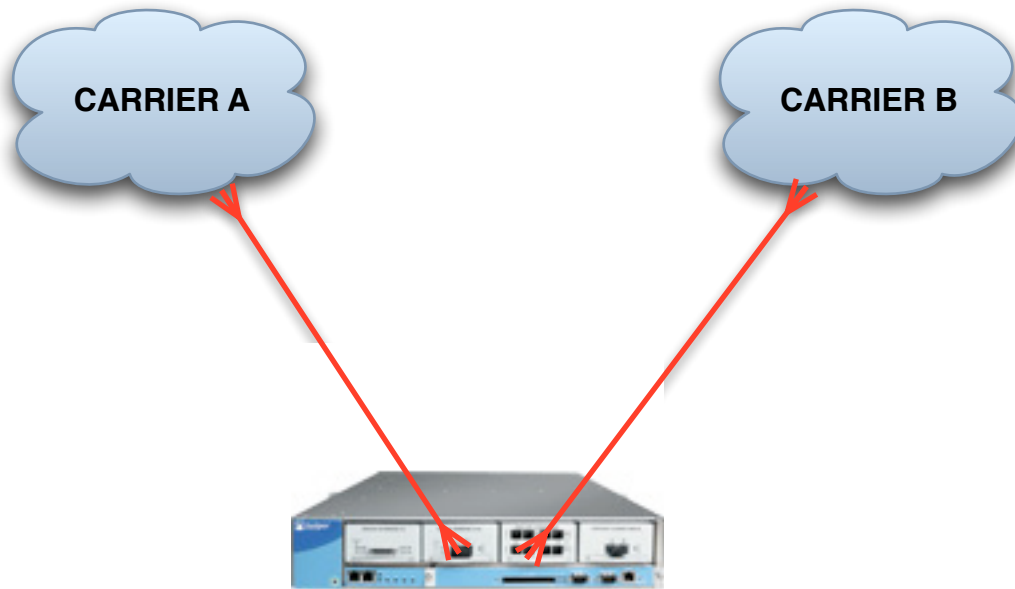
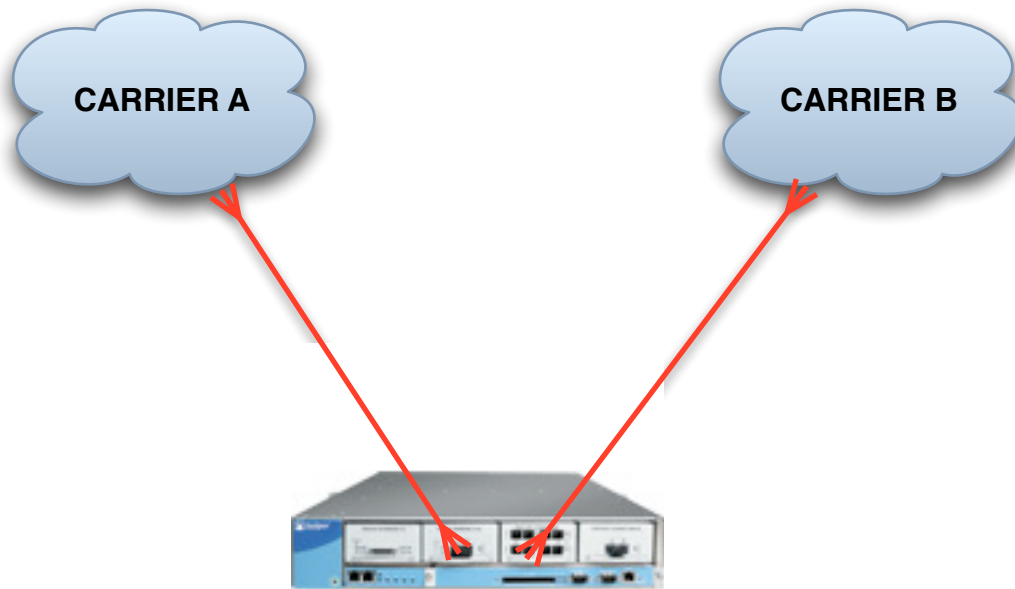# Measuring method

CARRIER A

CARRIER B

X

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

Tecnocom

Measuring method

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

CARRIER A

CARRIER B

Tecnocom

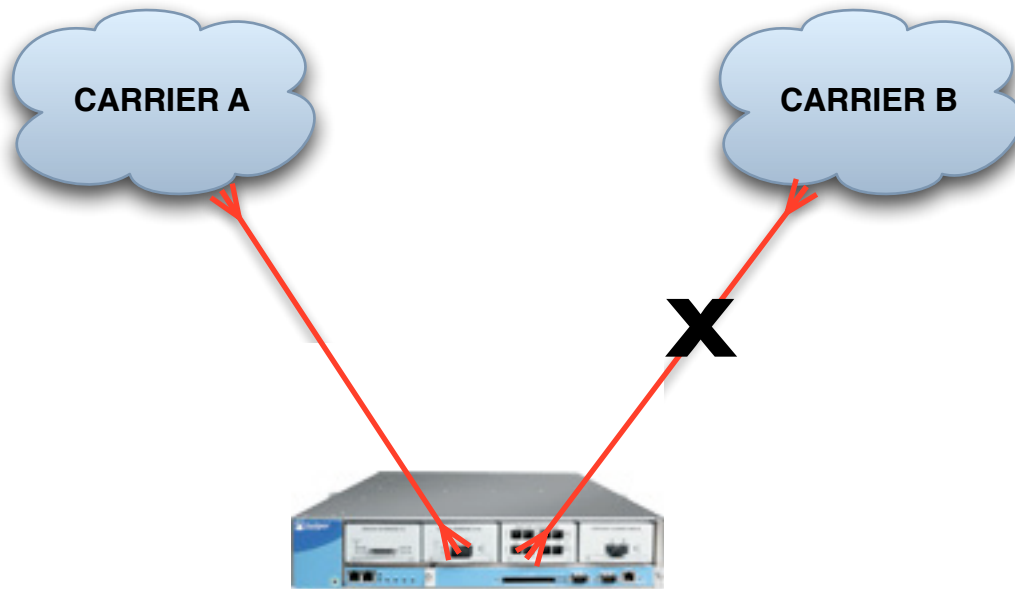# Measuring method

CARRIER A

CARRIER B

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

Tecnocom

Measuring method

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

CARRIER A

CARRIER B

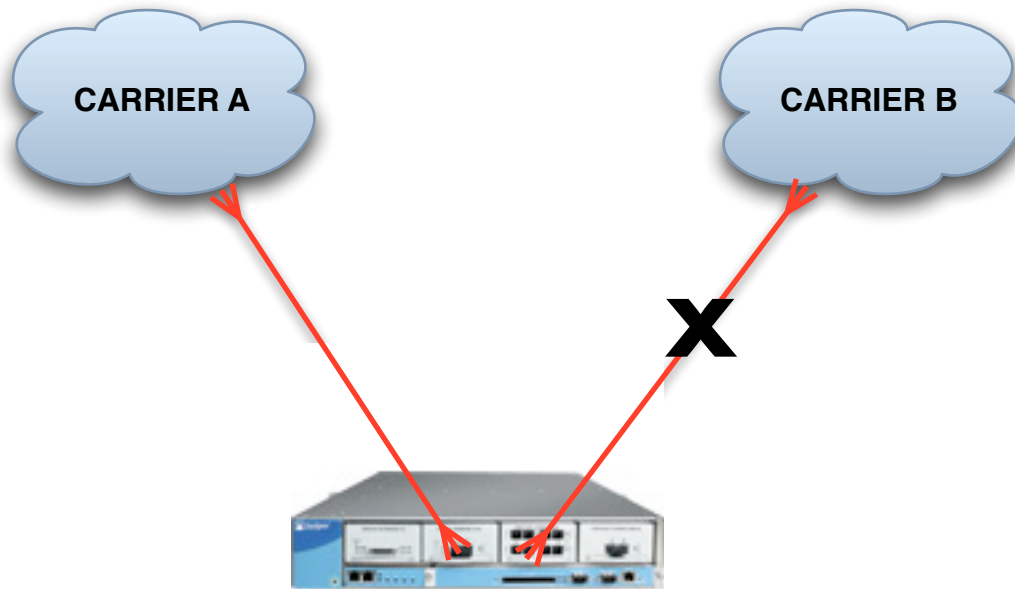Tecnocom

Measuring method

CARRIER A

CARRIER B

X

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

Tecnocom

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

CARRIER A

CARRIER B

X

Tecnocom

Measuring method

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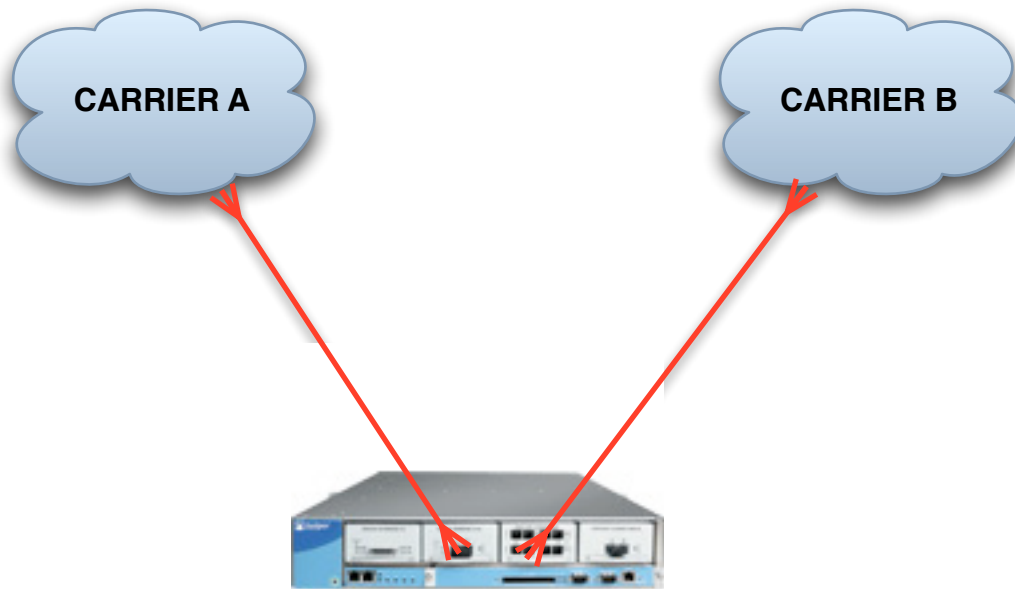3. Recover circuit with A
4. Measure
5. Reset circuit with B
6. Recover circuit with B
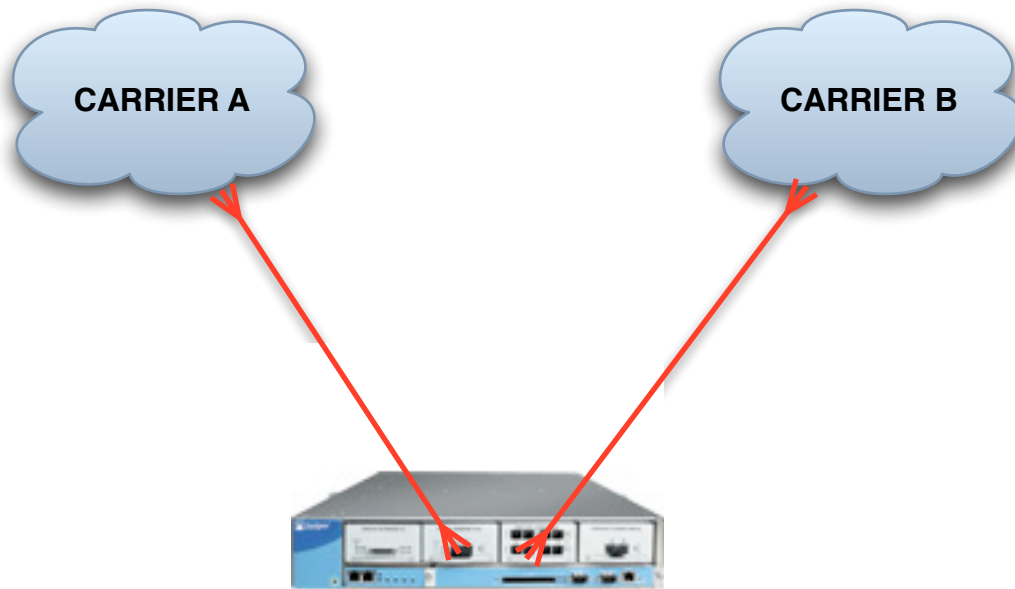
CARRIER A

CARRIER B

Tecnocom

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

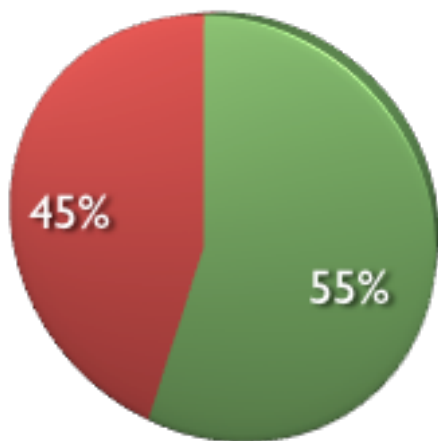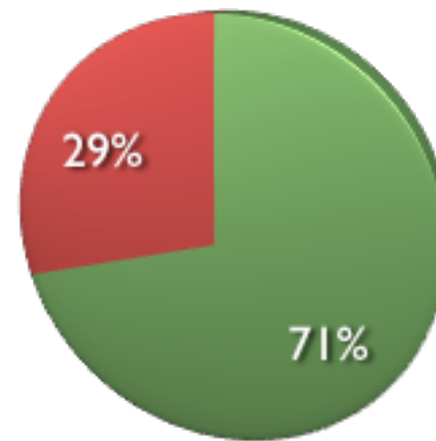# Starting point

Carrier A
Carrier B

45% 55%

After resetting
conection "A"

29% 71%

After resetting
conection "B"

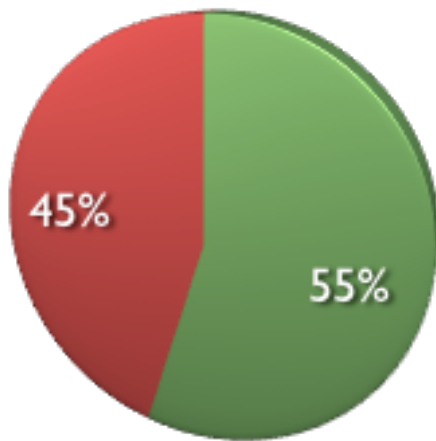Tecnocom

Solution #1: Prepends

- Add your prefix several times

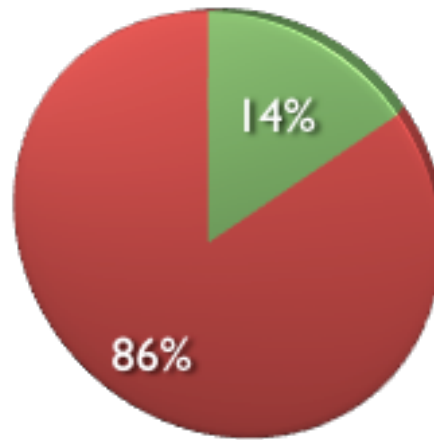- Router A:

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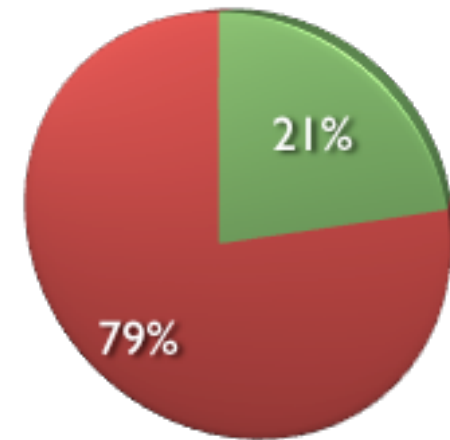
- Too much influence

Tecnocom

Solution #1: Prepends

Carrier A
Carrier B

45% 55%

Original

14%
86%

After resetting conection "A"

21%
79%

After resetting conection "B"
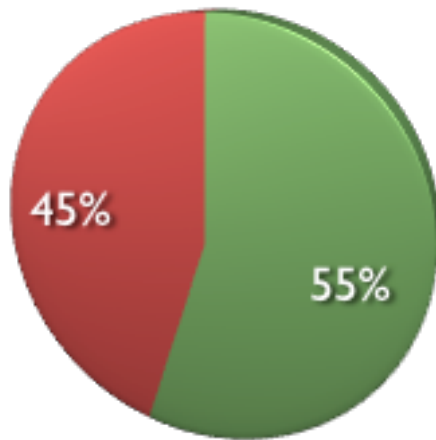
Tecnocom

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

Tecnocom

Solution #2: Deaggregate
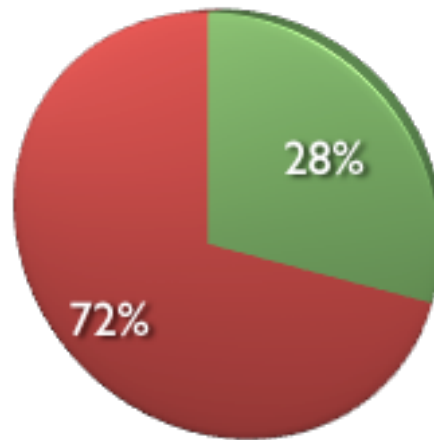
- Router A

```
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";
    }
}
```
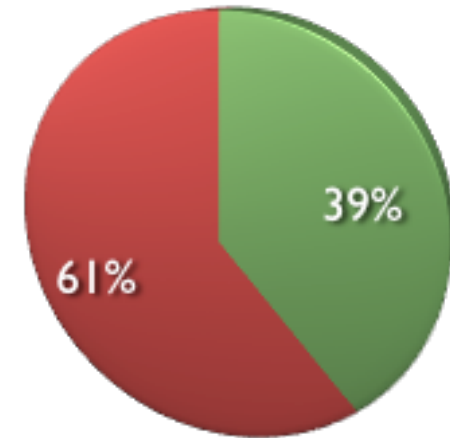
Tecnocom

Solution #2: Deaggregate

● Carrier A
● Carrier B

45% 55%

Original

28% 72%

After reseting
conection "A"

39% 61%
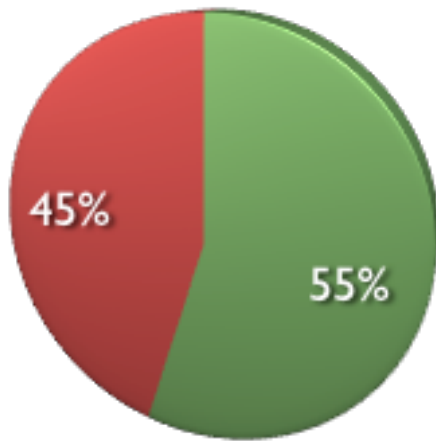
After reseting
conection "B"

Tecnocom

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
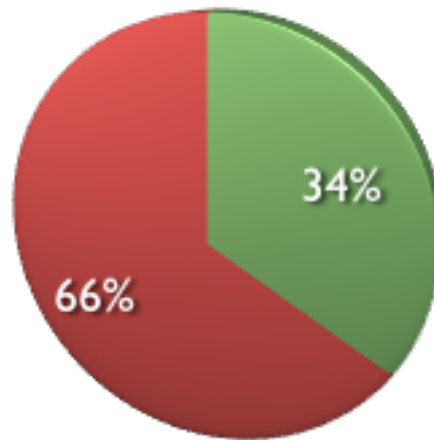
Tecnocom

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"

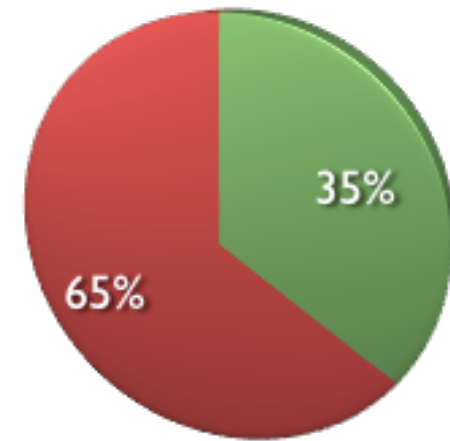- Set the origin of announces to the other peer to "incomplete"

Tecnocom

Solution #4: Origin

Carrier A
Carrier B

Original

After reseting conection "A"

After reseting conection "B"

Tecnocom

Our solution

- Tuning:

  - Set the origin

- Finer tuning:

  - Selectively apply origin to some prefixes

    - Not deaggregated, but disjunct prefixes assigned by RIPE

Tecnocom

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

Tecnocom

Questions?

Tecnocom