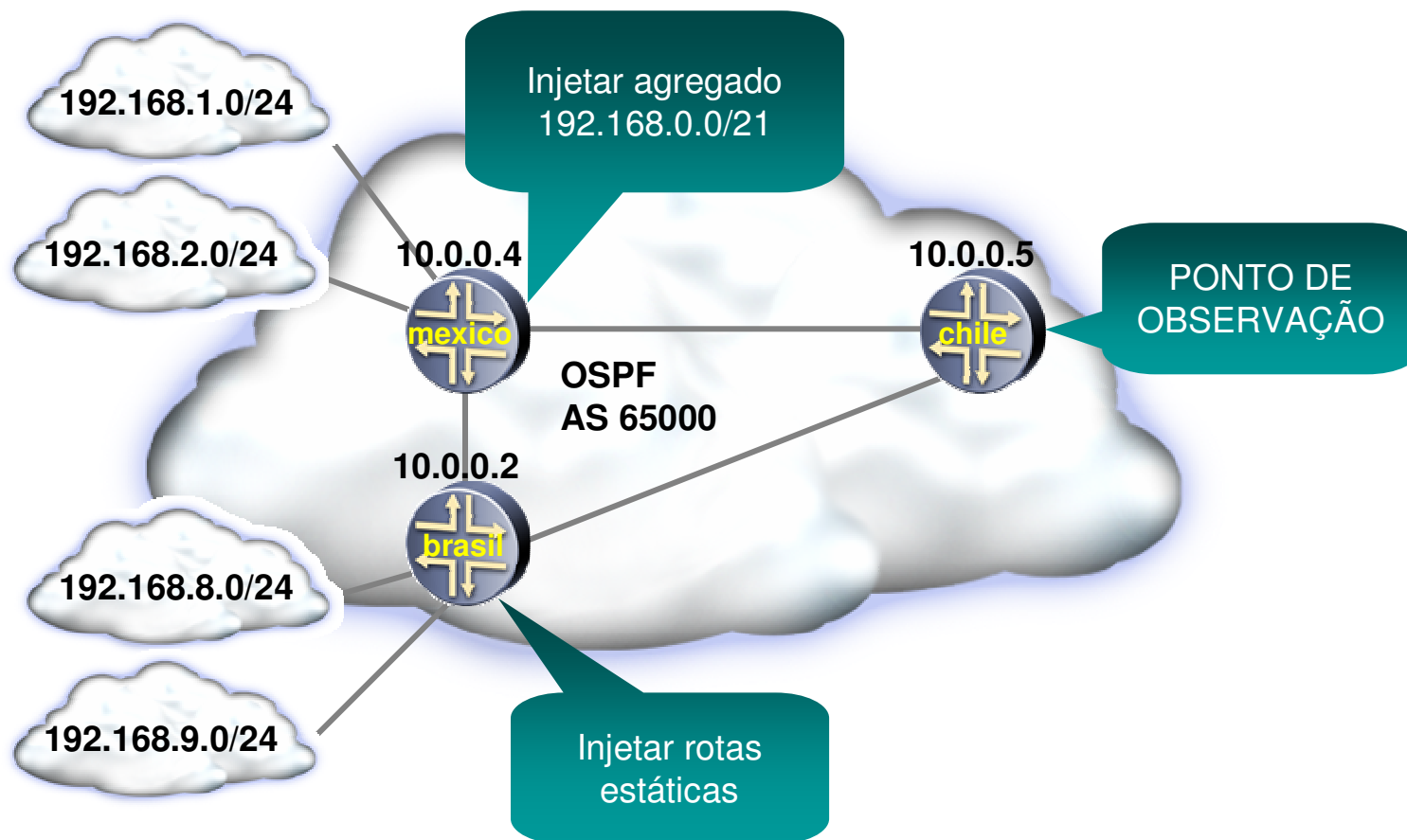


Gerando Rotas BGP

BGP – Gerando rotas internas BGP



Gerando rotas BGP

- Agregado
 - Aloca blocos por equipamento
 - Reduz número de rotas
 - Rota estável
- Estáticas
 - Caso não seja possível o agregado
 - Procedimento muito utilizado

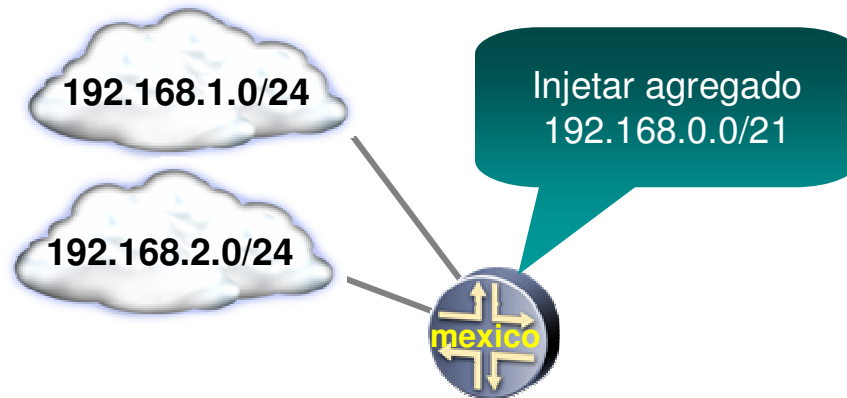
Configuração Básica iBGP

```
mexico
bgp {
  group iBGP {
    type internal;
    local-address 10.0.0.4;
    neighbor 10.0.0.5;
    neighbor 10.0.0.2;
  }
}
routing-options {
  autonomous-system 65000;
}
```

```
chile
bgp {
  group iBGP {
    type internal;
    local-address 10.0.0.5;
    neighbor 10.0.0.4;
    neighbor 10.0.0.2;
  }
}
routing-options {
  autonomous-system 65000;
}
```

```
brasil
bgp {
  group iBGP {
    type internal;
    local-address 10.0.0.2;
    neighbor 10.0.0.4;
    neighbor 10.0.0.5;
  }
}
routing-options {
  autonomous-system 65000;
}
```

Injeção de um agregado no iBGP

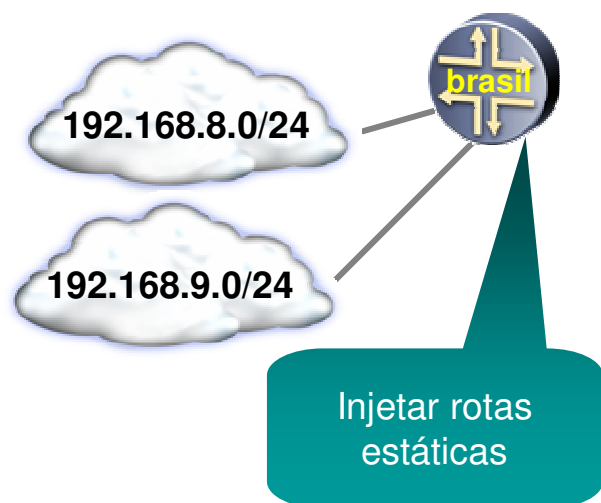


```
routing-options {  
  /* rotas estáticas */  
  static {  
    route 192.168.1.0/24 next-hop 10.1.1.2;  
    route 192.168.2.0/24 next-hop 10.1.2.2;  
  }  
  /* rota agregada */  
  aggregate {  
    route 192.168.0.0/21;  
  }  
}
```

```
policy-statement distribui-agregado {  
  term agregado {  
    from protocol aggregate;  
    then accept;  
  }  
}  
bgp {  
  group iBGP {  
    type internal;  
    local-address 10.0.0.4;  
    export distribui-agregado;  
    neighbor 10.0.0.5;  
    neighbor 10.0.0.2;  
  }  
}
```

Injeção de rotas individuais no iBGP

```
routing-options {  
  /* rotas estaticas */  
  static {  
    route 192.168.8.0/24 next-hop 10.1.3.2;  
    route 192.168.9.0/24 next-hop 10.1.4.2;  
  }  
}
```



```
policy-statement rotas-iBGP {  
  term rotas-especificas {  
    from {  
      protocol static;  
      route-filter 192.168.8.0/21 orlonger;  
    }  
    then {  
      next-hop self;  
      accept;  
    }  
  }  
}  
bgp {  
  group iBGP {  
    type internal;  
    local-address 10.0.0.2;  
    export rotas-iBGP;  
    neighbor 10.0.0.4;  
    neighbor 10.0.0.5;  
  }  
}
```

Visualização das rotas

10.0.0.5



PONTO DE
OBSERVAÇÃO

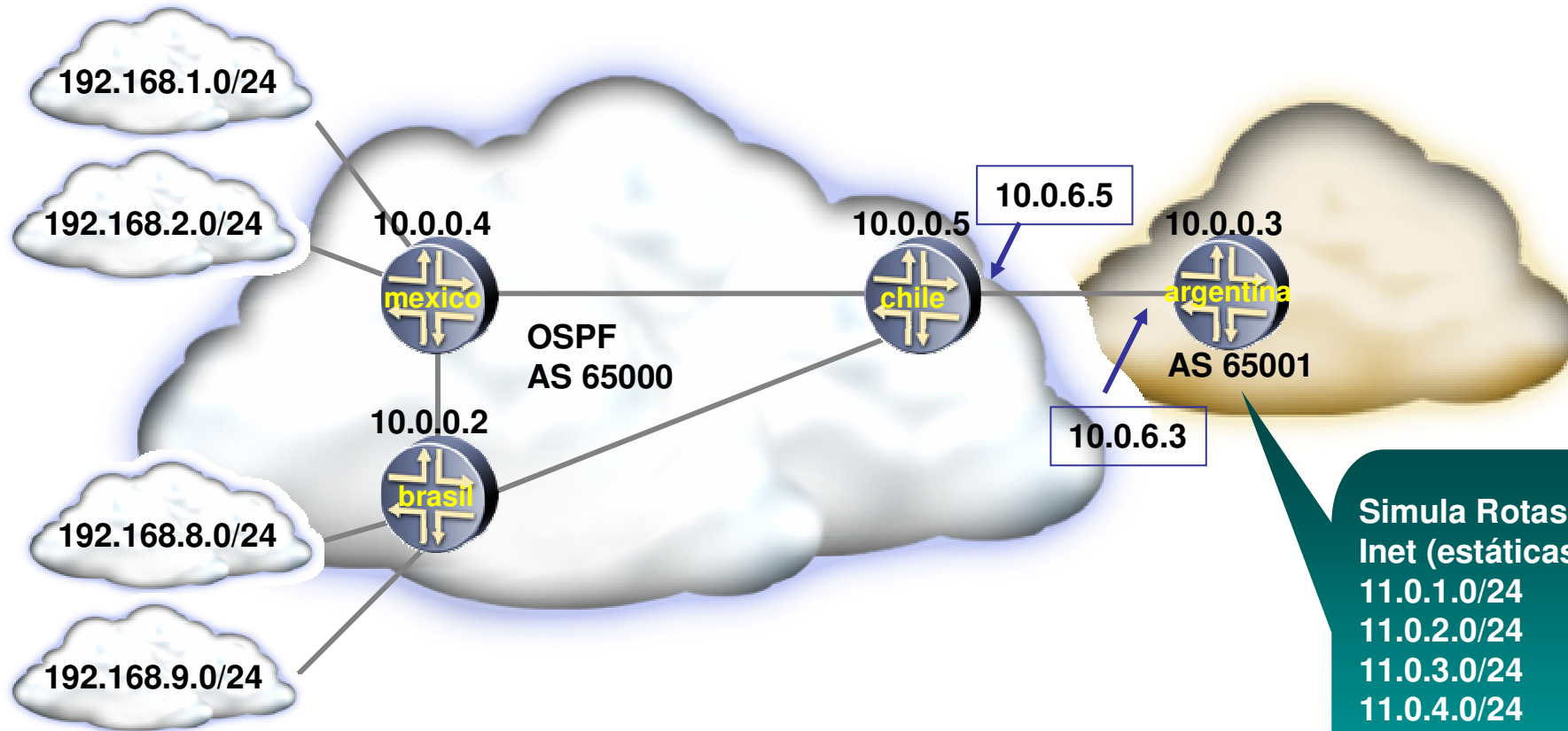
```
user@chile# run show route protocol bgp

inet.0: 16 destinations, 16 routes (16 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.0.0/21      *[BGP/170] 00:36:03, localpref 100, from 10.0.0.4
                   AS path: I
                   > to 10.0.5.4 via fe-0/0/1.0
192.168.8.0/24     *[BGP/170] 00:36:13, localpref 100, from 10.0.0.2
                   AS path: I
                   > to 10.0.2.2 via fe-0/0/2.0
192.168.9.0/24     *[BGP/170] 00:36:13, localpref 100, from 10.0.0.2
                   AS path: I
                   > to 10.0.2.2 via fe-0/0/2.0
```

Assinante Single Homed

Assinante Single Homed

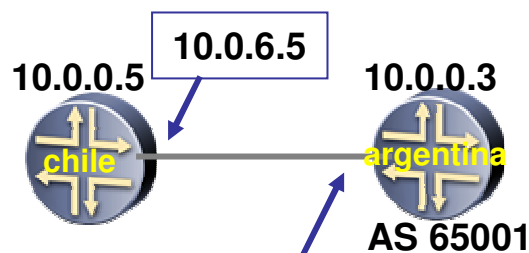


Simula Rotas Inet (estáticas)
11.0.1.0/24
11.0.2.0/24
11.0.3.0/24
11.0.4.0/24
11.0.5.0/24
11.0.6.0/24
11.0.7.0/24

Configuração eBGP

```
chile
bgp {
  group eBGP-argentina {
    type external;
    export anuncio-para-inet;
    peer-as 65001;
    neighbor 10.0.6.3;
  }
}
policy-statement anuncio-para-inet {
  term bloco-local {
    from {
      route-filter 192.168.0.0/20 exact;
    }
    then accept;
  }
  term rejeita {
    then reject;
  }
}
```

```
argentina
bgp {
  group eBGP-chile {
    type external;
    export simula-inet;
    peer-as 65000;
    neighbor 10.0.6.5;
  }
}
policy-statement simula-inet {
  term distribui-estatica {
    from protocol static;
    then accept;
  }
}
routing-options {
  autonomous-system 65001;
}
```



Resultado no AS 65000

```
user@chile# run show route protocol bgp terse
```

```
inet.0: 24 destinations, 24 routes (24 active, 0 holddown, 0 hidden)  
+ = Active Route, - = Last Active, * = Both
```

A Destination	P Prf	Metric 1	Metric 2	Next hop	AS path
* 11.0.1.0/24	B 170	100	0	>10.0.6.3	65001 I
* 11.0.2.0/24	B 170	100	0	>10.0.6.3	65001 I
* 11.0.3.0/24	B 170	100	0	>10.0.6.3	65001 I
* 11.0.4.0/24	B 170	100	0	>10.0.6.3	65001 I
* 11.0.5.0/24	B 170	100	0	>10.0.6.3	65001 I
* 11.0.6.0/24	B 170	100	0	>10.0.6.3	65001 I
* 11.0.7.0/24	B 170	100	0	>10.0.6.3	65001 I
* 192.168.0.0/21	B 170	100		>10.0.5.4	I
* 192.168.8.0/24	B 170	100		>10.0.2.2	I
* 192.168.9.0/24	B 170	100		>10.0.2.2	I

```
user@mexico# run show route protocol bgp terse
```

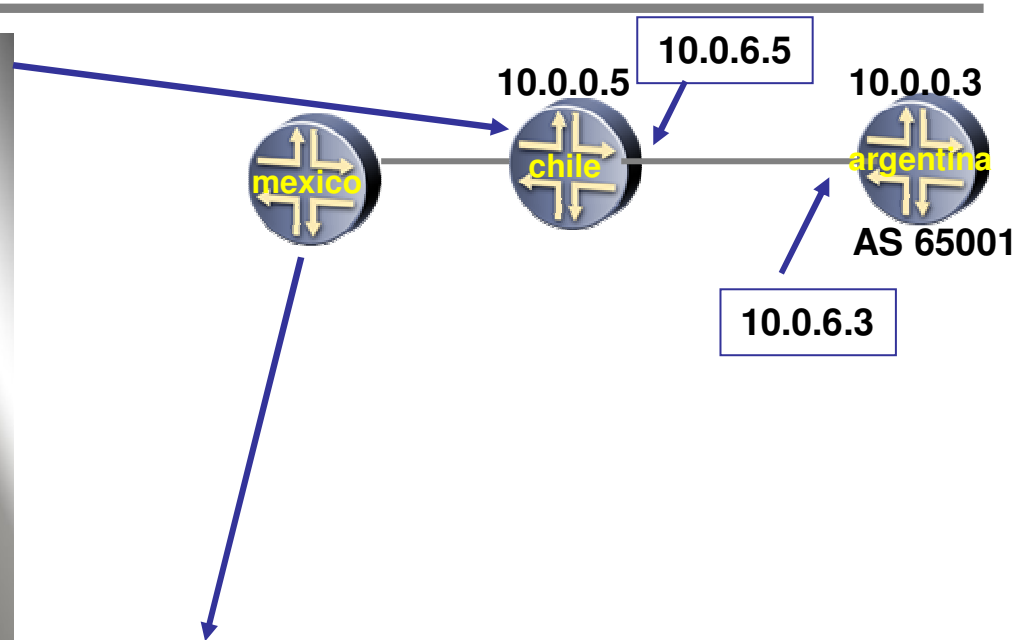
```
inet.0: 27 destinations, 27 routes (20 active, 0 holddown, 7 hidden)  
+ = Active Route, - = Last Active, * = Both
```

A Destination	P Prf	Metric 1	Metric 2	Next hop	AS path
* 192.168.8.0/24	B 170	100		>10.0.3.2	I
* 192.168.9.0/24	B 170	100		>10.0.3.2	I

???

Next-hop Self

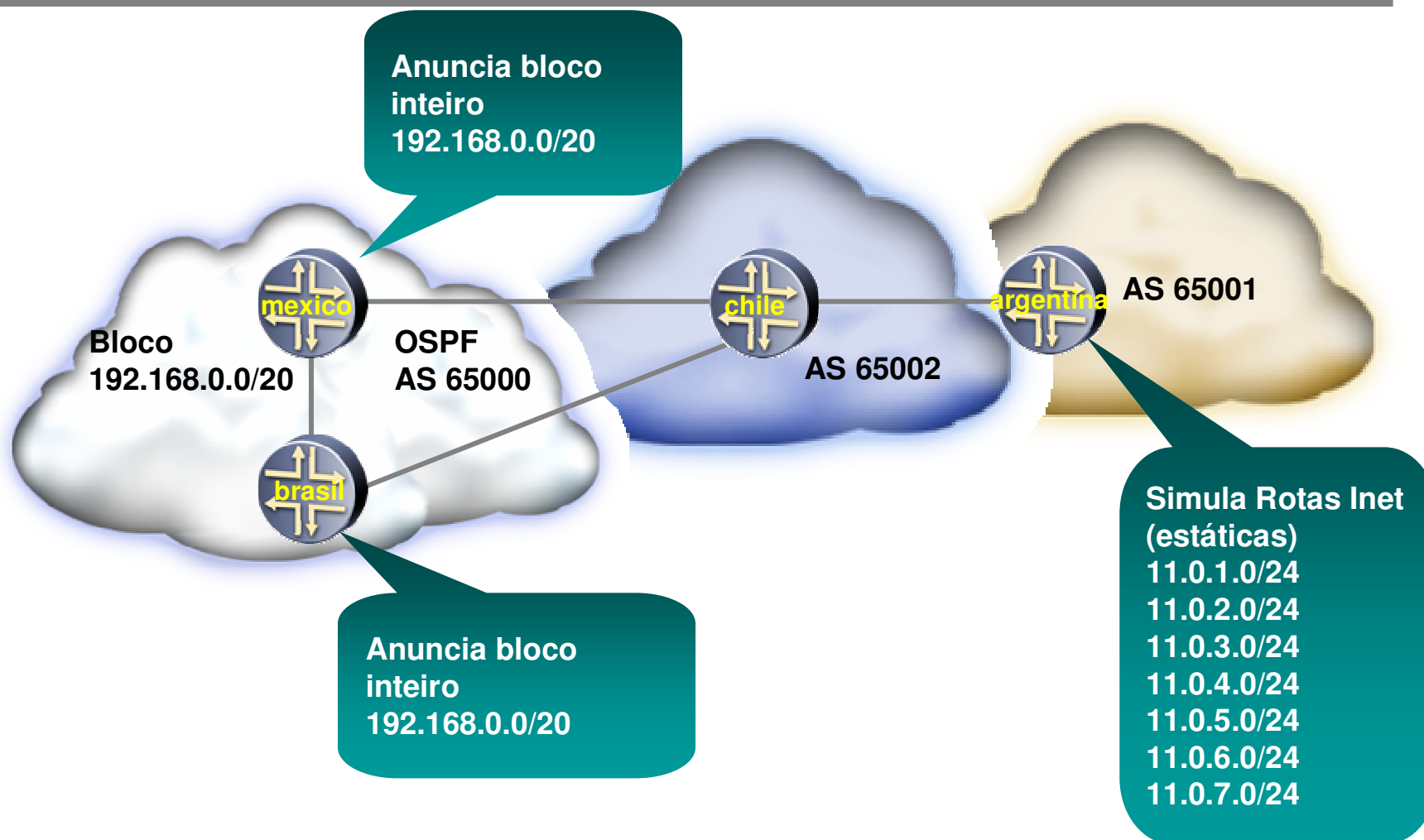
```
bgp {  
  group iBGP {  
    type internal;  
    export next-hop-self;  
    neighbor 10.0.0.4;  
  }  
}  
policy-statement next-hop-self {  
  term muda-next-hop {  
    from protocol bgp;  
    then {  
      next-hop self;  
    }  
  }  
}
```



```
user@mexico# run show route protocol bgp terse  
  
inet.0: 27 destinations, 27 routes (27 active, 0 holddown, 0 hidden)  
+ = Active Route, - = Last Active, * = Both  
  
A Destination          P Prf    Metric 1    Metric 2    Next hop          AS path  
* 11.0.1.0/24          B 170      100          0 >10.0.5.5      65001 I  
* 11.0.2.0/24          B 170      100          0 >10.0.5.5      65001 I  
...
```

Assinante Multi Homed

Assinante Multi Homed

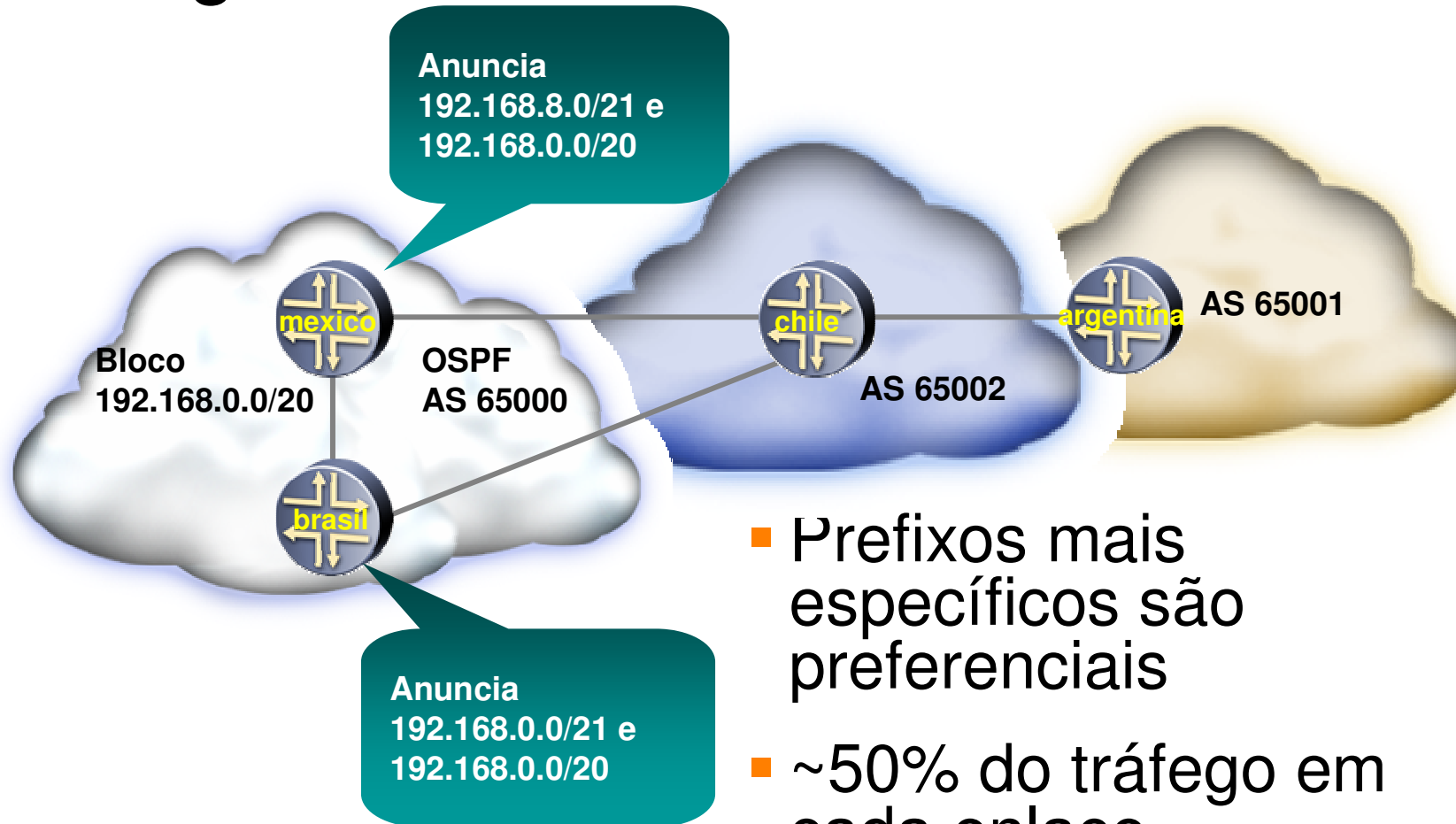


Sem balanceamento de carga

```
user@chile# run show route 192.168/16 extensive

inet.0: 17 destinations, 18 routes (17 active, 0 holddown, 0 hidden)
192.168.0.0/20 (2 entries, 1 announced)
Path 192.168.0.0 from 10.0.2.2 Vector len 4. Val: 0 1
  *BGP      Preference: 170/-101
            Source: 10.0.2.2
            Next hop: 10.0.2.2 via fe-0/0/2.0, selected
            State: <Active Ext>
            Local AS: 65002 Peer AS: 65000
            Age: 1:15      Metric: 0
            Task: BGP_65000.10.0.2.2+4812
            Announcement bits (2): 0-KRT 1-BGP.0.0.0.0+179
            AS path: 65000 I
            Localpref: 100
            Router ID: 10.0.0.2
  BGP      Preference: 170/-101
            Source: 10.0.5.4
            Next hop: 10.0.5.4 via fe-0/0/1.0, selected
            State: <NotBest Ext>
            Inactive reason: Router ID
            Local AS: 65002 Peer AS: 65000
            Age: 1:03      Metric: 0
            Task: BGP_65000.10.0.5.4+179
            AS path: 65000 I
            Localpref: 100
            Router ID: 10.0.0.4
```

Uma Alternativa de Balanceamento de Carga



- Prefixos mais específicos são preferenciais
- ~50% do tráfego em cada enlace
- Redundância mantida

Com balanceamento de carga

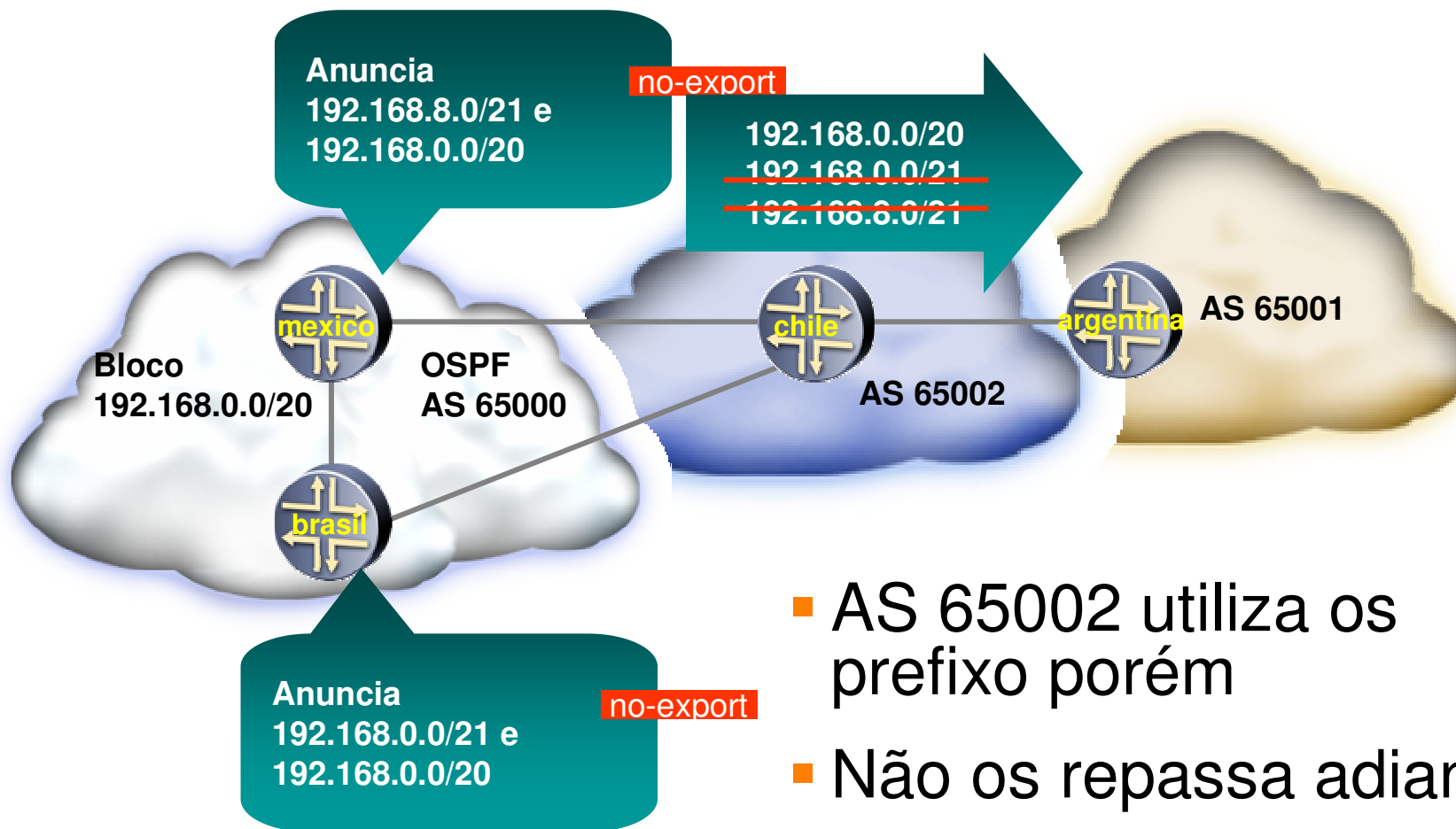
```
user@chile# run show route 192.168/16

inet.0: 19 destinations, 20 routes (19 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.0.0/20      *[BGP/170] 00:25:05, MED 0, localpref 100
                   AS path: 65000 I
                   > to 10.0.2.2 via fe-0/0/2.0
                   [BGP/170] 00:24:53, MED 0, localpref 100
                   AS path: 65000 I
                   > to 10.0.5.4 via fe-0/0/1.0
192.168.0.0/21    *[BGP/170] 00:01:23, MED 0, localpref 100
                   AS path: 65000 I
                   > to 10.0.2.2 via fe-0/0/2.0
192.168.8.0/21   *[BGP/170] 00:00:21, MED 0, localpref 100
                   AS path: 65000 I
                   > to 10.0.5.4 via fe-0/0/1.0
```

- Faz sentido para o upstream provider
- Não faz sentido para ASs além do upstream
 - Gera muitas rotas desnecessárias

Community NO_EXPORT



- AS 65002 utiliza os prefixo porém
- Não os repassa adiante

Configuração no-export

```
policy-statement anuncio-inet {  
  term bloco-local {  
    from {  
      route-filter 192.168.0.0/20 exact;  
    }  
    then accept;  
  }  
  term especifico {  
    from {  
      route-filter 192.168.0.0/21 exact;  
    }  
    then {  
      community set bloqueia-especifica;  
      accept;  
    }  
  }  
  term rejeita-resto {  
    then reject;  
  }  
}  
community bloqueia-especifica members no-export;
```

```
bgp {  
  group eBGP-chile {  
    type external;  
    export anuncio-inet;  
    peer-as 65002;  
    neighbor 10.0.2.5;  
  }  
}
```



Anuncia
192.168.0.0/21 e
192.168.0.0/20

no-export

Rota com no-export

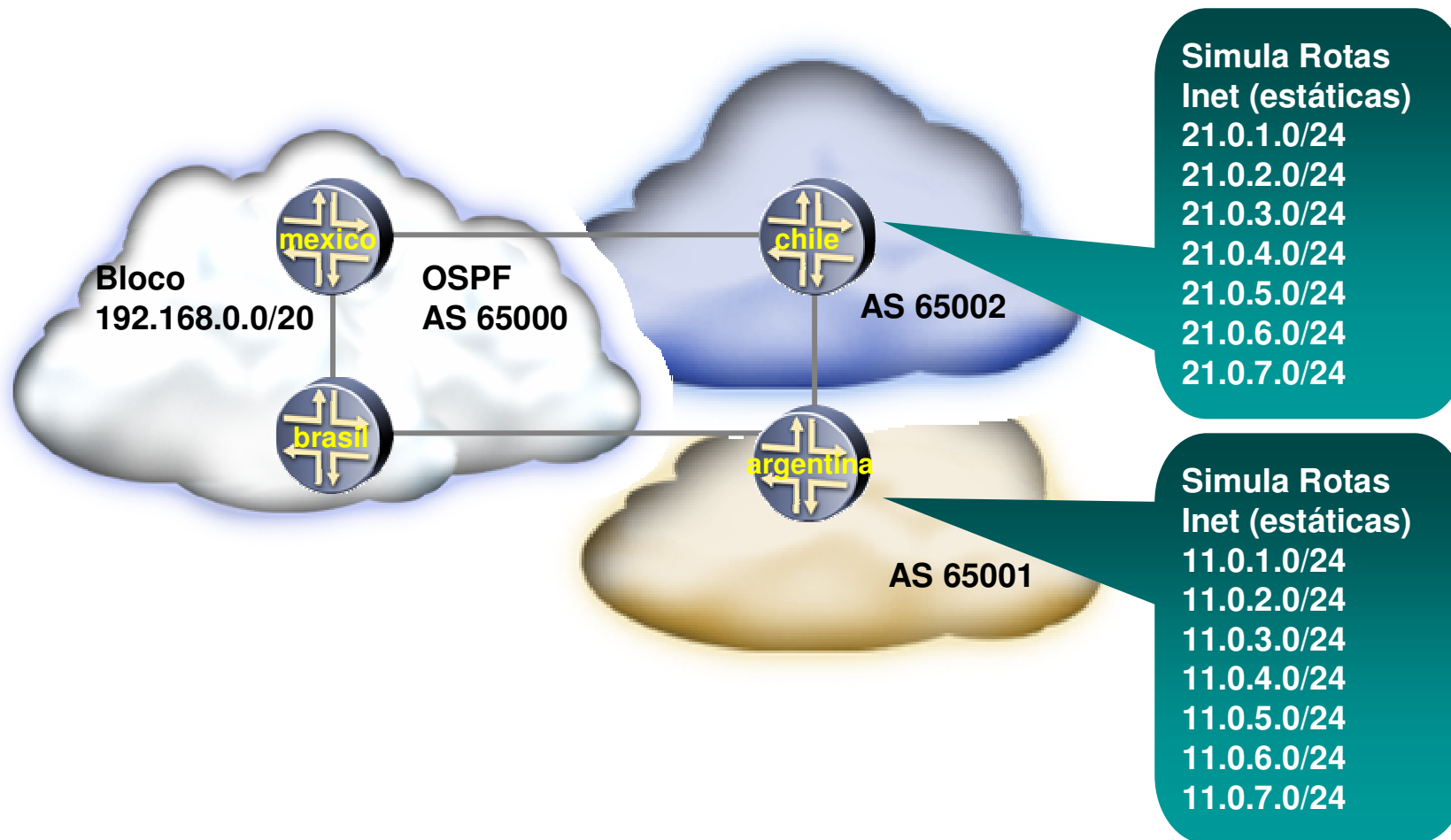
```
user@chile# run show route 192/8 extensive community no-export

inet.0: 19 destinations, 20 routes (19 active, 0 holddown, 0 hidden)
192.168.0.0/21 (1 entry, 1 announced)
TSI:
KRT in-kernel 192.168.0.0/21 -> {10.0.2.2}
    *BGP      Preference: 170/-101
              Source: 10.0.2.2
              Next hop: 10.0.2.2 via fxp2.0, selected
              State: <Active Ext>
              Local AS: 65002 Peer AS: 65000
              Age: 3:50      Metric: 0
              Task: BGP_65000.10.0.2.2+4812
              Announcement bits (1): 0-KRT
              AS path: 65000 I
              Communities: no-export
              Localpref: 100
              Router ID: 10.0.0.2

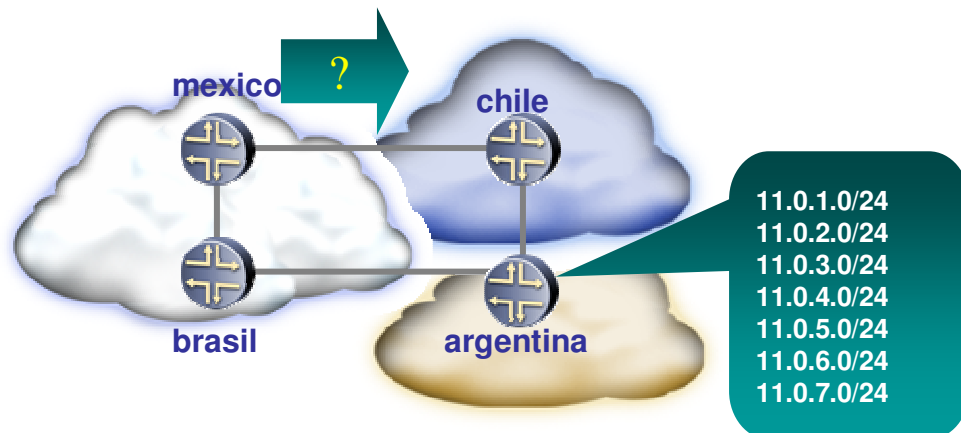
192.168.8.0/21 (1 entry, 1 announced)
...
```

Multi Homed com Múltiplos Provedores

Multihomed com múltiplos provedores



Função de Trânsito



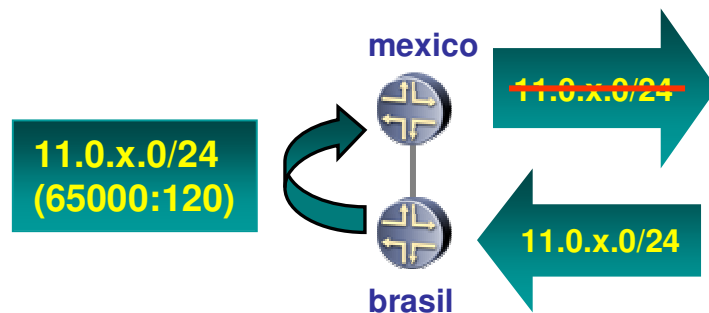
```
user@mexico# run show route advertising-protocol bgp 10.0.5.5 (CHILE)

inet.0: 28 destinations, 35 routes (28 active, 0 holddown, 0 hidden)
Prefix                Nexthop                MED    Lclpref    AS path
11.0.1.0/24           Self                   0      0          65001 I
11.0.2.0/24           Self                   0      0          65001 I
11.0.3.0/24           Self                   0      0          65001 I
11.0.4.0/24           Self                   0      0          65001 I
11.0.5.0/24           Self                   0      0          65001 I
11.0.6.0/24           Self                   0      0          65001 I
11.0.7.0/24           Self                   0      0          65001 I
192.168.0.0/20        Self                   0      0          I
```

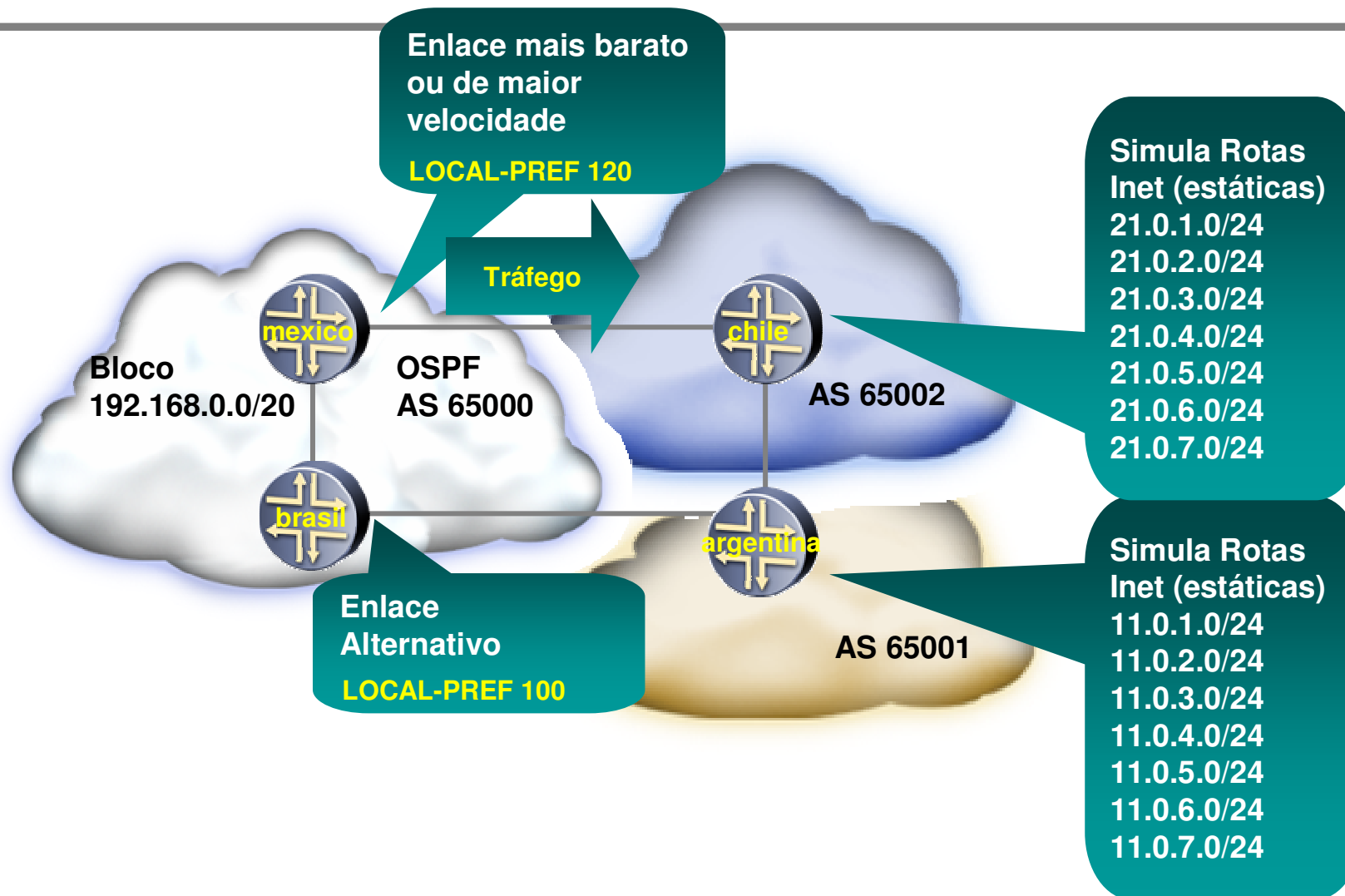
Bloqueando trânsito com communities

```
brasil
bgp {
  group eBGP-argentina {
    type external;
    import recebe-inet;
    export anuncio-inet;
    peer-as 65001;
    neighbor 10.0.1.3;
  }
}
policy-statement recebe-inet {
  term unico {
    then {
      community add transito;
    }
  }
}
community transito members 65000:120;
```

```
mexico
bgp {
  group eBGP-chile {
    import recebe-inet;
    export anuncio-inet;
    peer-as 65002;
  }
}
policy-statement anuncio-inet {
  term bloco-local {
    from {
      route-filter 192.168.0.0/20 exact;
    }
    then accept;
  }
  term bloqueia-transito {
    from community transito;
    then reject;
  }
}
community transito members 65000:120;
```



Saída preferencial – Local Pref



Impacto do Local-Pref

```
user@brasil# run show route protocol bgp

inet.0: 26 destinations, 40 routes (26 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

11.0.1.0/24      *[BGP/170] 00:05:44, localpref 120, from 10.0.0.4
                  AS path: 65002 65001 I
                  > to 10.0.3.4 via fe-0/0/3.0
                  [BGP/170] 02:04:45, MED 0, localpref 100
                  AS path: 65001 I
                  > to 10.0.1.3 via fe-0/0/1.0
...
21.0.1.0/24      *[BGP/170] 00:05:44, MED 0, localpref 120, from 10.0.0.4
                  AS path: 65002 I
                  > to 10.0.3.4 via fe-0/0/3.0
                  [BGP/170] 02:04:45, localpref 100
                  AS path: 65001 65002 I
                  > to 10.0.1.3 via fe-0/0/1.0
...
```

Obrigado