

Solução de baixo custo para BGP usando Mikrotik Router OS

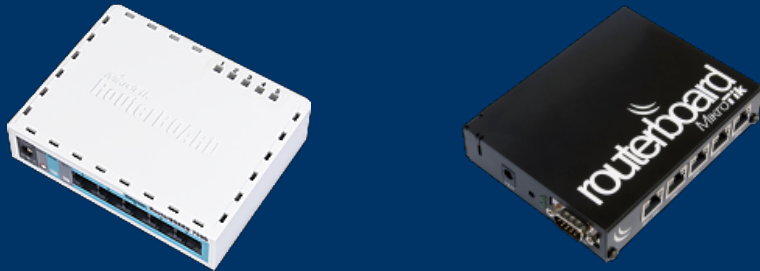
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GTER 31

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Solução de baixo custo para BGP usando Mikrotik RouterOS



O que é RouterOS?

- Distribuição Linux voltada para roteamento e wireless
- Simples porém poderosa
- Pode ser instalada em hardware x86 ou em Routerboards da própria Mikrotik

Solução de baixo custo para BGP usando Mikrotik RouterOS

Instalar o RouterOS num x86 é tão simples quanto um boot no CD.

Atenção: o conteúdo do HD será substituído pelo RouterOS.

Após o boot, deve adquirir e instalar a licença do software.

```
install remote router or 'q' to cancel and reboot.

[X] system          [X] lcd             [X] telephony
[X] ppp             [X] ntp            [X] ups
[X] dhcp           [X] radiolan       [X] user-manager
[X] advanced-tools [X] routerboard    [X] web-proxy
[X] arlan          [X] routing        [X] webproxy-test
[X] gps            [X] routing-test   [X] wireless
[X] hotspot        [X] rstp-bridge-test [X] wireless-legacy
[X] hotspot-fix    [X] security
[X] isdn           [X] synchronous

wireless-legacy (depends on system):
Provides support for Cisco Aironet cards and for PrismII and Atheros wireless
station and AP.

Do you want to keep old configuration? [y/n]:y

Warning: all data on the disk will be erased!

Continue? [y/n]:
```

```
MMM   MMM   KKK           TTTTTTTTTT   KKK
MMMM  MMMM  KKK           TTTTTTTTTT   KKK
MMM  MMMM  MMM  III  KKK  KKK  RRRRRR  000000  TTT   III  KKK  KKK
MMM  MM  MMM  III  KKKKK  RRR  RRR  000 000  TTT   III  KKKKK
MMM  MMM  III  KKK  KKK  RRRRRR  000 000  TTT   III  KKK  KKK
MMM   MMM  III  KKK  KKK  RRR  RRR  000000  TTT   III  KKK  KKK

MikroTik RouterOS 2.9.27 (c) 1999-2006      www.routerclub.com

nov/01/2007 23:31:01 system,error,critical login failure for user admin via local
Terminal linux detected, using multiline input mode
[admin@MikroTik] >
```

Solução de baixo custo para BGP usando Mikrotik RouterOS

Alguns recursos do RouterOS:

- IPv4 / IPv6
 - Statefull Firewall
 - QoS
 - Roteamento IPv4: RIP v1 & v2, OSPF v2, BGP4
 - Roteamento IPv6: RIPng, OSPF v3, BGP
 - MPLS
 - VPN (IPsec, OpenVPN, PPTP, PPPoE, L2TP)
 - VLAN 802.1q & QinQ
 - Wireless (including Mesh)
 - Hotspot, Webproxy and much more
-
-

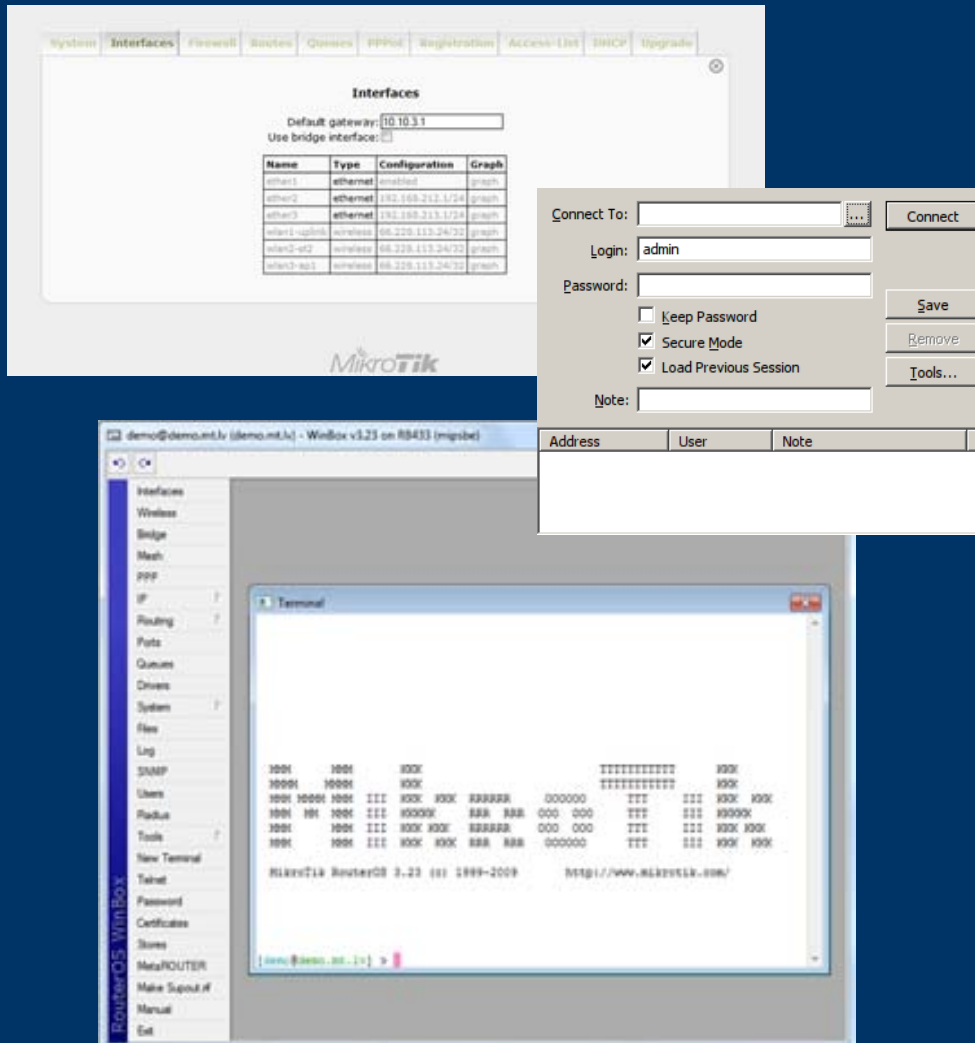
Solução de baixo custo para BGP usando Mikrotik RouterOS

Configuração:

- Console / serial
- SSH / telnet
- Simple web interface
- Winbox
- API

A estrutura dos menus do winbox é muito similar a da CLI

O winbox também funciona pelo wine do linux.



Solução de baixo custo para BGP usando Mikrotik RouterOS

Vantagens de usar RouterOS como servidor BGP:

- Abundância de profissionais treinados na plataforma
 - Baixo custo do hardware Routerboard
 - Mesmo em x86, o BGP está incluído na licença mais barata (Level 4)
 - Suporte a ASN de 32 bits (desde a versão 3.30 no pacote routing-test e da 4.0 no pacote routing de produção)
 - Suporte a IPv6
-
-

Solução de baixo custo para BGP usando Mikrotik RouterOS

Modelo	Processador	Velocidade	RAM	LANs
RB150	MIPS 32 4Kc	175MHz	32MB	5FE
RB450	AR7130	300MHz	32MB	5FE
RB450G	AR7161	680MHz	256MB	5GE
RB750G	AR7161	680MHz	32MB	5GE
RB1000	MPC6548	1333MHz	512MB	4GE
RB1100	MPC8542	800MHz	512MB	13GE
PR732	Intel Dual Core	3GHz	1GB	7GE/2SFP
PR2200	Intel Dual Xeon	2.4GHz	1GB	14GE/4SFP/2x10GE

Solução de baixo custo para BGP usando Mikrotik RouterOS

"As coisas simples devem ser simples
e as coisas complexas, possíveis."
(Alan Kay)



Solução de baixo custo para BGP usando Mikrotik RouterOS

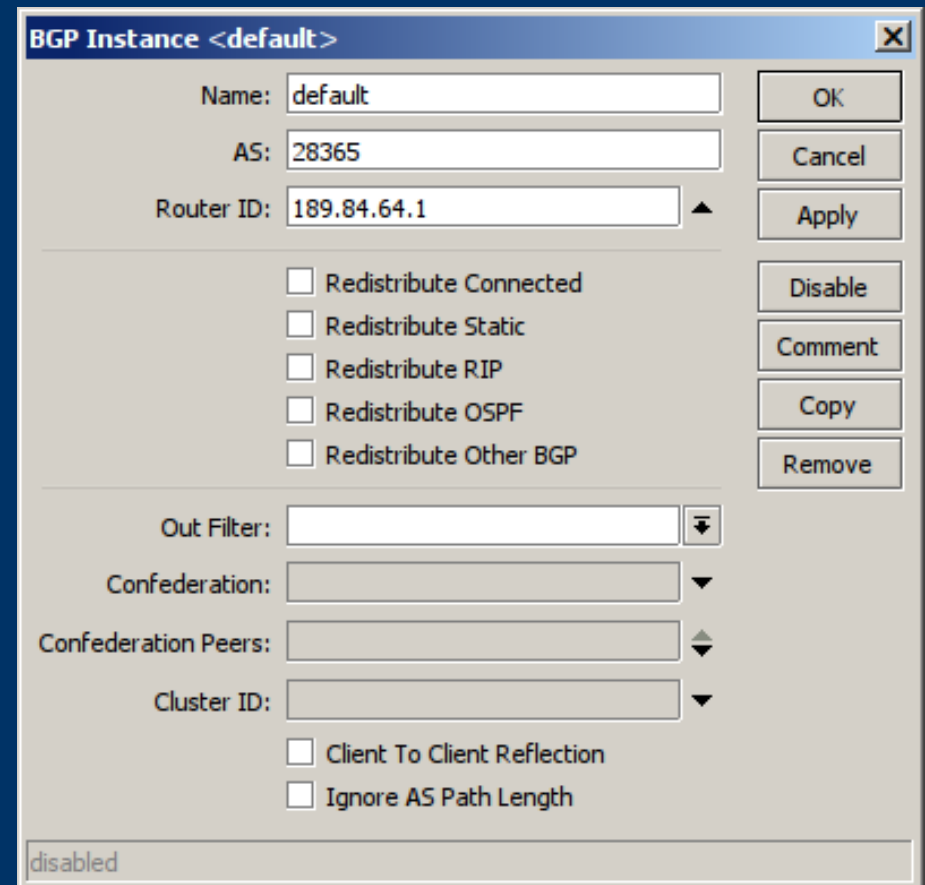
Exemplo cisco/quagga:

!

```
router bgp 28365  
  bgp router-id  
    189.84.64.1
```

!

Equivalente RouterOS:
/routing bgp instance
set default as=28365
router-id=189.84.64.1



The screenshot shows the 'BGP Instance <default>' configuration window in Mikrotik RouterOS. The window has a title bar with a close button (X). The configuration fields are as follows:

- Name: default
- AS: 28365
- Router ID: 189.84.64.1
- Redistribute Connected:
- Redistribute Static:
- Redistribute RIP:
- Redistribute OSPF:
- Redistribute Other BGP:
- Out Filter: (empty field with a dropdown arrow)
- Confederation: (empty field with a dropdown arrow)
- Confederation Peers: (empty field with a dropdown arrow)
- Cluster ID: (empty field with a dropdown arrow)
- Client To Client Reflection:
- Ignore AS Path Length:

On the right side of the window, there are several buttons: OK, Cancel, Apply, Disable, Comment, Copy, and Remove. At the bottom left of the window, the text 'disabled' is visible.

Solução de baixo custo para BGP usando Mikrotik RouterOS

Exemplo cisco/quagga:

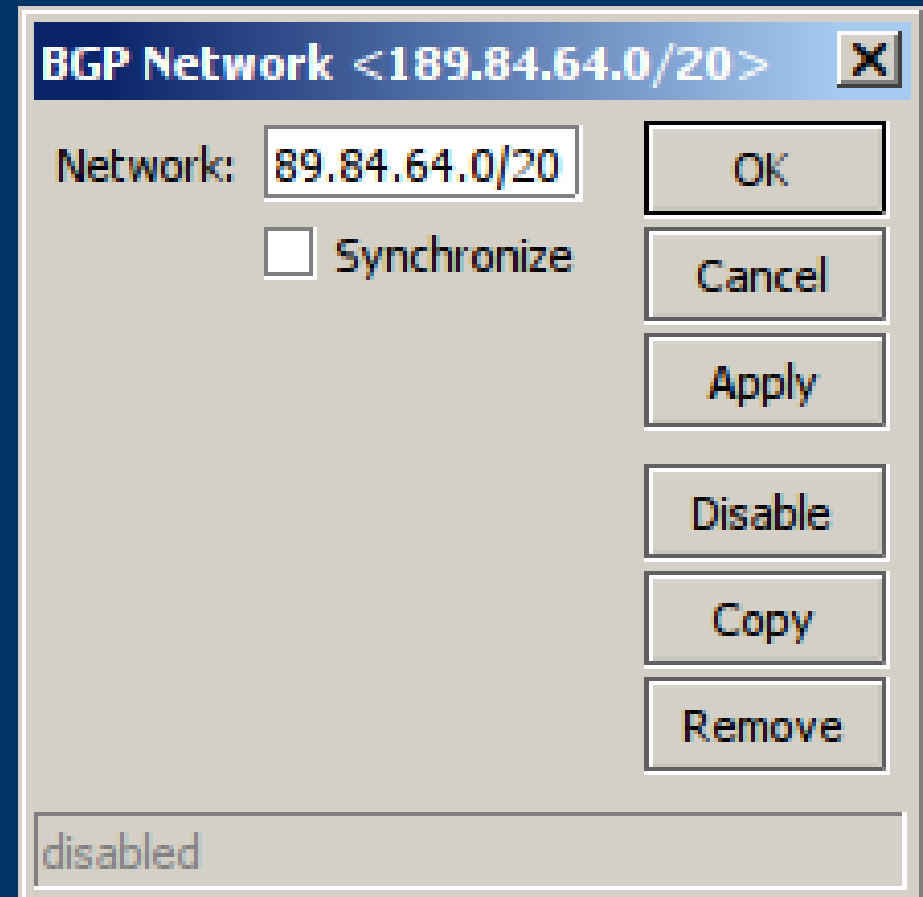
!

```
router bgp 28365  
no synchronization  
network 189.84.64.0/20
```

!

Equivalente RouterOS:

```
/routing bgp network  
add  
network=189.84.64.0/20  
synchronize=no
```



Solução de baixo custo para BGP usando Mikrotik RouterOS

Exemplo cisco/quagga:

!

```
router bgp 28365  
neighbor 200.219.130.253  
remote-as 26162
```

!

Equivalente RouterOS:

```
/routing bgp peer  
add remote-as=26162  
remote-  
address=200.219.130.253  
name=rs1.sp.ptt.br  
instance=default
```

New BGP Peer

General Advanced Status

Name: rs1.sp.ptt.br

Instance: default

Remote Address: 200.219.130.253

Remote Port:

Remote AS: 26162

TCP MD5 Key:

Nexthop Choice: default

Multihop

Route Reflect

Hold Time: 180

TTL: default

Max Prefix Limit:

Max Prefix Restart Time:

In Filter:

Out Filter:

AllowAS In:

Remove Private AS

AS Override

Default Originate

Passive

disabled idle

OK Cancel Apply Disable Comment Copy Remove Refresh Refresh All Resend Resend All

Solução de baixo custo para BGP usando Mikrotik RouterOS

Exemplo cisco/quagga:

!

```
router bgp 28365
 neighbor 200.219.130.253
  ebgp-multihop
 neighbor 200.219.130.253
  next-hop-self
```

!

Equivalente RouterOS:

```
/routing bgp peer
 set rs1.sp.ptt.br
  multihop=yes
  nexthop-choice=force-self
```

The screenshot shows the Mikrotik WinBox interface for configuring a BGP Peer. The window title is "BGP Peer <rs1.sp.ptt.br>". It has three tabs: "General", "Advanced", and "Status". The "General" tab is active. The configuration fields are as follows:

- Name: rs1.sp.ptt.br
- Instance: default
- Remote Address: 200.219.130.253
- Remote Port: (empty)
- Remote AS: 26162
- TCP MD5 Key: (empty)
- Nexthop Choice: force self
- Multihop
- Route Reflect
- Hold Time: 180 s
- TTL: default
- Max Prefix Limit: (empty)
- Max Prefix Restart Time: (empty)
- In Filter: (empty)
- Out Filter: (empty)
- AllowAS In: (empty)
- Remove Private AS
- AS Override
- Default Originate
- Passive

At the bottom of the window, there are two buttons: "disabled" and "connect". On the right side, there is a vertical column of buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove, Refresh, Refresh All, Resend, and Resend All.

Solução de baixo custo para BGP usando Mikrotik RouterOS

Exemplo cisco/quagga:

!

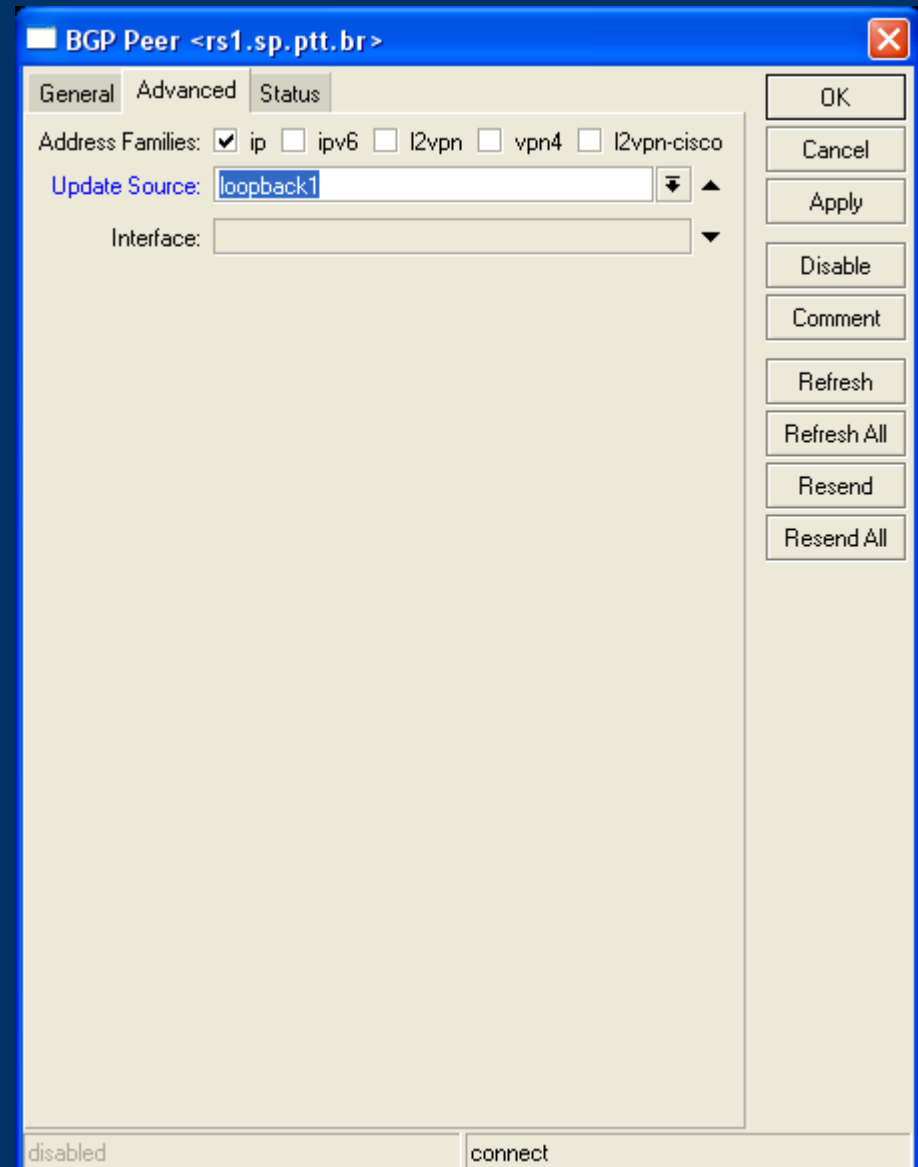
```
router bgp 28365  
neighbor 200.219.130.253  
update-source=interface
```

!

Equivalente RouterOS:

```
/routing bgp peer  
set rs1.sp.ptt.br  
update-source=interface
```

(Pode ser usado IP também)



Solução de baixo custo para BGP usando Mikrotik RouterOS

O RouterOS não implementa o conceito de interface loopback então damos uma volta nele.

```
/interface bridge add  
name=loopback1
```

```
/ip address add  
interface=loopback1  
address=189.84.64.2/32
```

The screenshot shows the 'New Interface' dialog box with the following fields and values:

- Name: loopback1
- Type: Bridge
- MTU: 1500
- L2 MTU: (empty)
- MAC Address: (empty)
- ARP: enabled
- Admin. MAC Address: (empty)

The 'Status' tab is active, and the interface is currently 'disabled'. Buttons on the right include OK, Cancel, Apply, Disable, Comment, Copy, Remove, and Torch.

The screenshot shows the 'New Address' dialog box with the following fields and values:

- Address: 189.84.64.2/32
- Network: (empty)
- Broadcast: (empty)
- Interface: loopback1

The 'Status' tab is active, and the address is currently 'disabled'. Buttons on the right include OK, Cancel, Apply, Disable, Comment, Copy, and Remove.

Solução de baixo custo para BGP usando Mikrotik RouterOS

O RouterOS implementa os recursos de
route-map e prefix-list
numa só interface denominada

ROUTING FILTER

Solução de baixo custo para BGP usando Mikrotik RouterOS

Exemplo cisco/quagga:

```
!  
router bgp 28365  
  neighbor 200.219.130.253 prefix-list 1 out  
!  
access-list 1 permit 189.84.64.0 0.0.15.255  
! deny implicito
```

Equivalente RouterOS (*accept implicito*):

```
/routing filter  
  add chain=peer-out prefix=189.84.64.0/20  
  action=accept  
  add chain=peer-out action=discard
```

Solução de baixo custo para BGP usando Mikrotik RouterOS

Route Filter <189.84.64.0/20>

Chain: peer-out
Prefix: 189.84.64.0/20

Action: accept

Jump Target:
Set Distance:
Set Scope:
Set Target Scope:
Set Pref. Source:
Set In Nexthop:
Set In Nexthop Direct:
Set Out Nexthop:
Set Routing Mark:
Set Route Comment:
Set Check Gateway:
Set Disabled:
Set Type:
Set Route Tag:
Set Use TE Nexthop:
Set Route Targets:
Append Route Targets:
Set Site Of Origin:

disabled

Route Filter <>

Chain: peer-out
Prefix: <>

Action: discard

Jump Target:
Set Distance:
Set Scope:
Set Target Scope:
Set Pref. Source:
Set In Nexthop:
Set In Nexthop Direct:
Set Out Nexthop:
Set Routing Mark:
Set Route Comment:
Set Check Gateway:
Set Disabled:
Set Type:
Set Route Tag:
Set Use TE Nexthop:
Set Route Targets:
Append Route Targets:
Set Site Of Origin:

disabled

Solução de baixo custo para BGP usando Mikrotik RouterOS

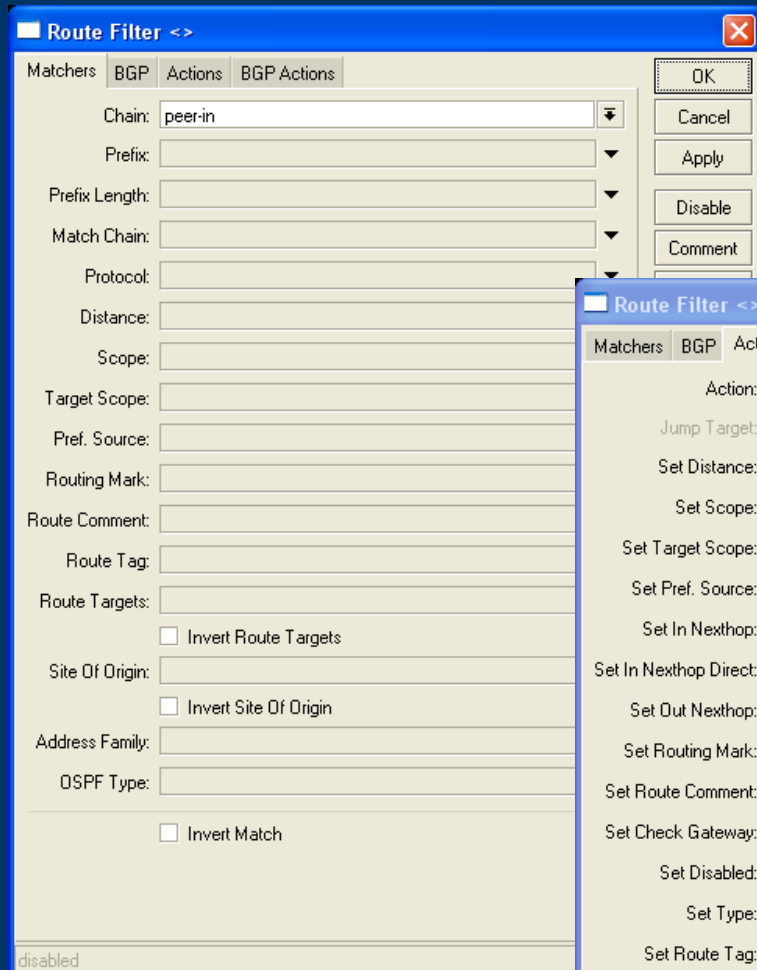
Exemplo cisco/quagga:

```
!  
router bgp 28365  
  neighbor 200.219.130.253 route-map PREFERIDO in  
!  
route-map PREFERIDO permit 10  
  set local-preference 200  
! sem match, vale para todas as rotas
```

Equivalente RouterOS:

```
/routing filter  
  add chain=peer-in set-bgp-local-pref=200 action=accept  
  comment="Sem prefix, vale para todas as rotas"
```

Solução de baixo custo para BGP usando Mikrotik RouterOS



Route Filter <>

Matchers BGP Actions BGP Actions

Chain: peer-in

Prefix:

Prefix Length:

Match Chain:

Protocol:

Distance:

Scope:

Target Scope:

Pref. Source:

Routing Mark:

Route Comment:

Route Tag:

Route Targets:

Invert Route Targets

Site Of Origin:

Invert Site Of Origin

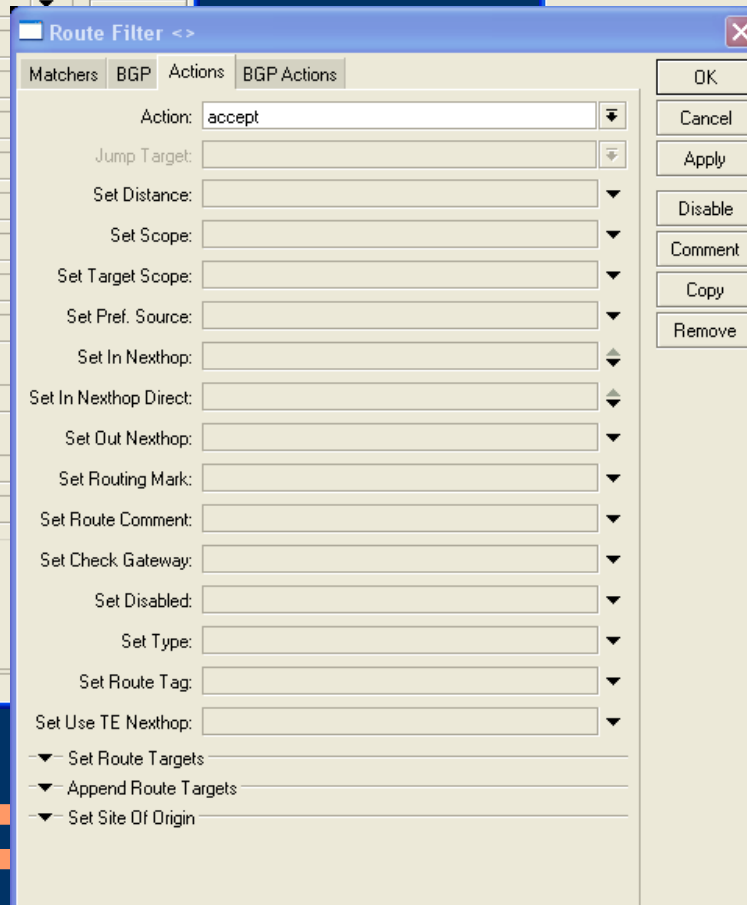
Address Family:

OSPF Type:

Invert Match

OK Cancel Apply Disable Comment

disabled



Route Filter <>

Matchers BGP Actions BGP Actions

Action: accept

Jump Target:

Set Distance:

Set Scope:

Set Target Scope:

Set Pref. Source:

Set In Nexthop:

Set In Nexthop Direct:

Set Out Nexthop:

Set Routing Mark:

Set Route Comment:

Set Check Gateway:

Set Disabled:

Set Type:

Set Route Tag:

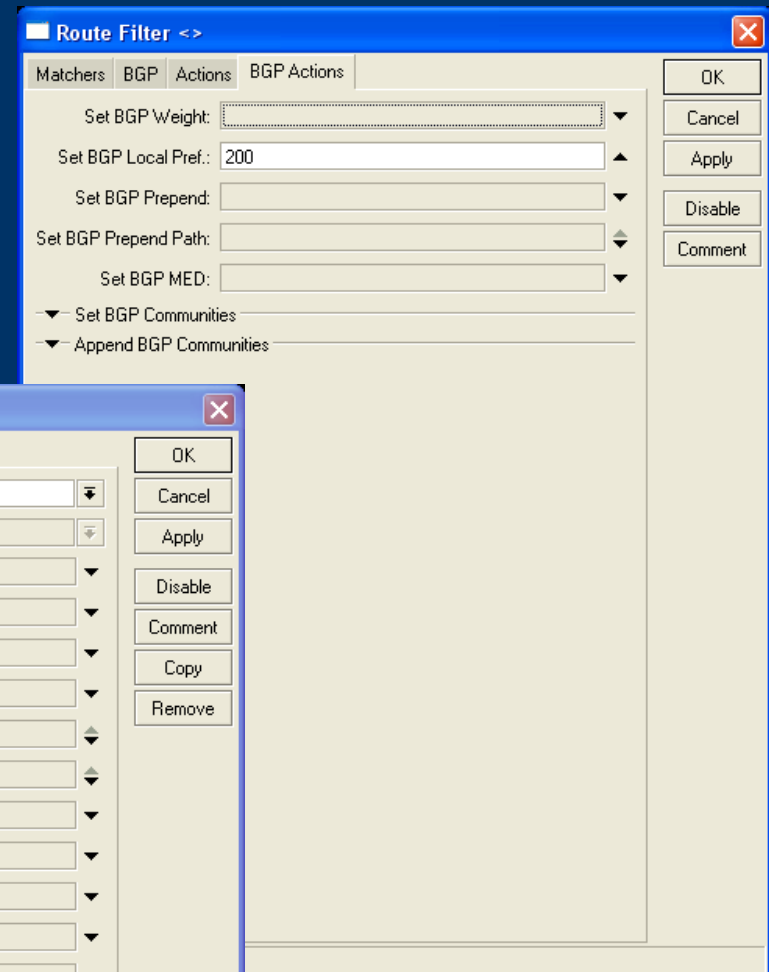
Set Use TE Nexthop:

Set Route Targets

Append Route Targets

Set Site Of Origin

OK Cancel Apply Disable Comment Copy Remove



Route Filter <>

Matchers BGP Actions BGP Actions

Set BGP Weight:

Set BGP Local Pref.: 200

Set BGP Prepend:

Set BGP Prepend Path:

Set BGP MED:

Set BGP Communities

Append BGP Communities

OK Cancel Apply Disable Comment

Solução de baixo custo para BGP usando Mikrotik RouterOS

Route Filter <>

Matchers | BGP | Actions | BGP Actions

BGP AS Path:

BGP AS Path Length:

BGP Weight:

BGP Local Pref.:

BGP MED:

BGP Atomic Aggregate:

BGP Origin:

Locally Originated BGP:

▼ BGP Communities

disabled

OK
Cancel
Apply
Disable
Comment
Copy
Remove

BGP Peer <rs1.sp.ptt.br>

General | Advanced | Status

Name: rs1.sp.ptt.br

Instance: default

Remote Address: 200.219.130.253

Remote Port:

Remote AS: 26162

TCP MD5 Key:

Nexthop Choice: default

Multihop
 Route Reflect

Hold Time: 180 s

TTL: default

Max Prefix Limit:

Max Prefix Restart Time:

In Filter: peer-in

Out Filter: peer-out

AllowAS In:

Remove Private AS
 AS Override

Default Originate
 Passive

disabled | connect

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Refresh
Refresh All
Resend
Resend All

Solução de baixo custo para BGP usando Mikrotik RouterOS

Exemplos cisco/quagga:

```
!  
router bgp 28365  
  neighbor 200.219.130.253 route-map PREPEND out  
!  
ip prefix-list 30 permit 189.84.64.0/21  
route-map PREPEND permit 10  
  match ip address prefix-list 30  
  set as-path prepend 28365 28365 28365  
!
```

Equivalentes no RouterOS:

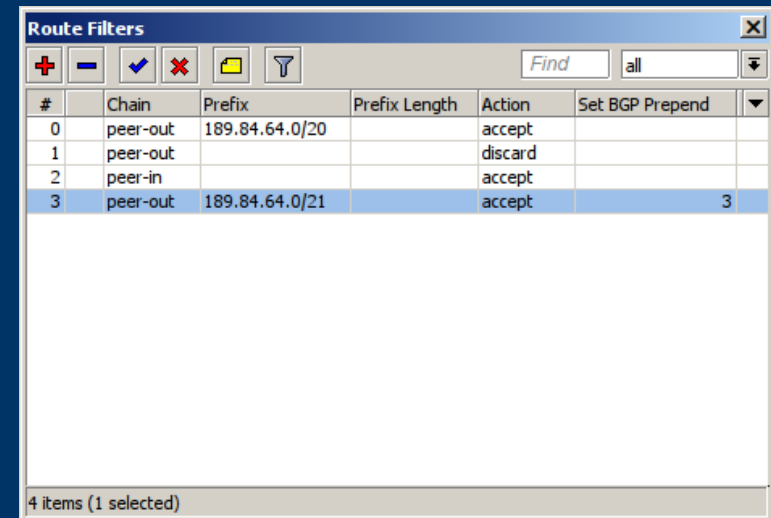
```
/routing filter  
  add chain=peer-out prefix=189.84.64.0/21  
  set-bgp-prepend=3 action=accept
```

Solução de baixo custo para BGP usando Mikrotik RouterOS

Você pode mudar a ordem dos filtros arrastando pelo winbox ou pela CLI:

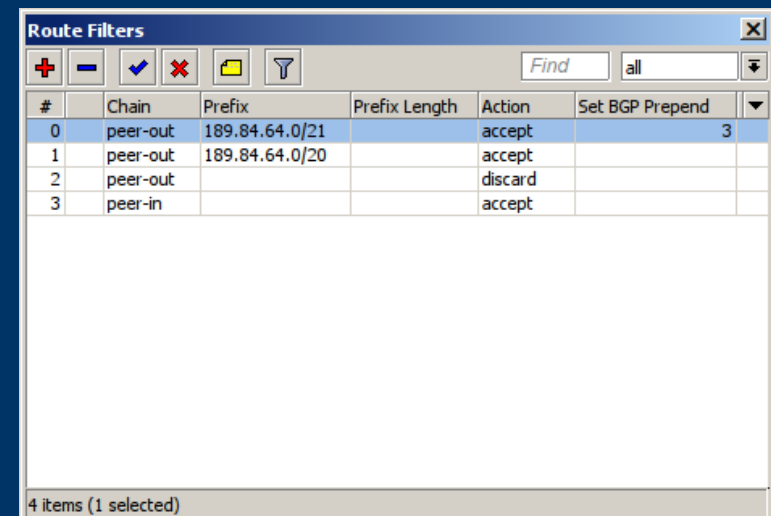
```
/routing filter  
print  
move destination=posicao  
numbers=itensamover
```

Os ITENSAMOVER (que é uma lista numérica das linhas que você quer alterar) entram ANTES de POSICAO na nova ordenação.



#	Chain	Prefix	Prefix Length	Action	Set BGP Prepend
0	peer-out	189.84.64.0/20		accept	
1	peer-out			discard	
2	peer-in			accept	
3	peer-out	189.84.64.0/21		accept	3

4 items (1 selected)



#	Chain	Prefix	Prefix Length	Action	Set BGP Prepend
0	peer-out	189.84.64.0/21		accept	3
1	peer-out	189.84.64.0/20		accept	
2	peer-out			discard	
3	peer-in			accept	

4 items (1 selected)

Solução de baixo custo para BGP usando Mikrotik RouterOS

Exemplos cisco/quagga:

```
show ip bgp neighbor a.b.c.d advertised-routes  
show ip bgp neighbor a.b.c.d received-routes  
show ip bgp neighbor  
clear ip bgp a.b.c.d [soft] out
```

Equivalentes no RouterOS:

```
/routing bgp advertisements print [peer=]peername  
/ip route print where received-from=peername  
/routing bgp peer print status  
/routing bgp peer refresh peername
```

Solução de baixo custo para BGP usando Mikrotik RouterOS

Cuidados a se tomar com o BGP no RouterOS:

- SEMPRE termine seus filtros com `action=discard` para não correr risco de virar trânsito entre suas operadoras
 - Uma instância = Um ASN. Não crie uma instância nova com o mesmo ASN para cada peer a não ser que saiba exatamente o que está fazendo.
 - Ao ativar um cliente, SEMPRE configure o filtro de entrada para só receber o prefixo correto dele.
 - Evite usar o winbox para ver a tabela de rotas BGP full, pois pode perder o acesso por vários minutos.
-
-

Solução de baixo custo para BGP usando Mikrotik RouterOS

“Não se aprende bem a
não ser pela experiência”
(Francis Bacon)

Dúvidas?

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