



ENGENHARIA DE TRÁFEGO NA PRÁTICA: COMO UTILIZAR AS COMMUNITIES BGP DO IX.br AO SEU FAVOR

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O QUE É COMMUNITY BGP?



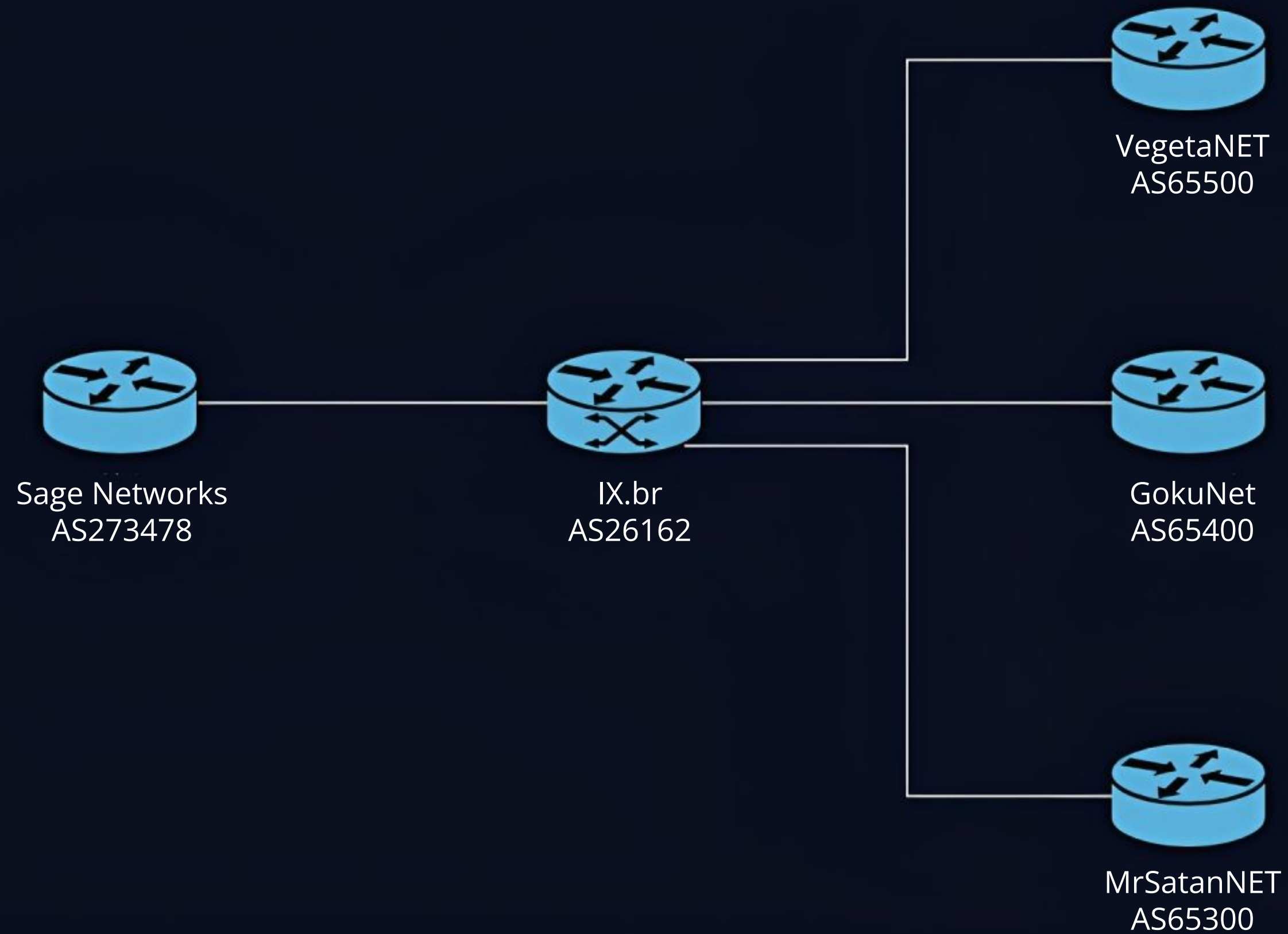
- Uma etiqueta que faz uma marcação em um determinado prefixo/rota
 - Standard Community - RFC1997
 - 32 bits
 - 65535:65535
 - Extended Community - RFC4360
 - 64 bits
 - 192.168.0.1:65535
 - Large Community - RFC8092
 - 96 bits
 - 4294967295:4294967295:4294967295
- Atributo BGP transitivo e opcional.

COMO O ROUTE-SERVER ANUNCIA PREFIXOS?



```
Route Duration: 0d01h00m31s
Direct Out-interface: Eth-Trunk2.3284
Original nexthop: 187.16.215.17
Qos information : 0x0
Community: <26162:64661>, <26162:64671>, <26162:64685>, <26162:65011>, <26162:65111>, <26162:65122>, <26162:65131> ←
Ext-Community: RT <26162 : 64661>, RT <26162 : 64671>, RT <26162 : 64685>, RT <26162 : 65011>, RT <26162 : 65111>, RT <26162 : 65122>, RT <26162 : 65131>, RT
<26162 : 273478>, So0 <26162 : 64661>, So0 <26162 : 64671>, So0 <26162 : 64685>, So0 <26162 : 65011>, So0 <26162 : 65111>, So0 <26162 : 65122>, So0 <26162 :
65131>, So0 <26162 : 273478> ←
Large-Community: <26162:0:65011>, <26162:0:273478>, <26162:100:1>, <26162:200:2>, <26162:300:1>, <26162:660:1>, <26162:670:1>, <26162:680:5> ←
AS-path 273478 273478 273474, origin igp, localpref 150, pref-val 0, valid, external, pre 255, not preferred for router ID
Not advertised to any peer yet
#
```


TOPOLOGIA



MANIPULANDO SEU UPLOAD POR MEIO DE COMMUNITIES

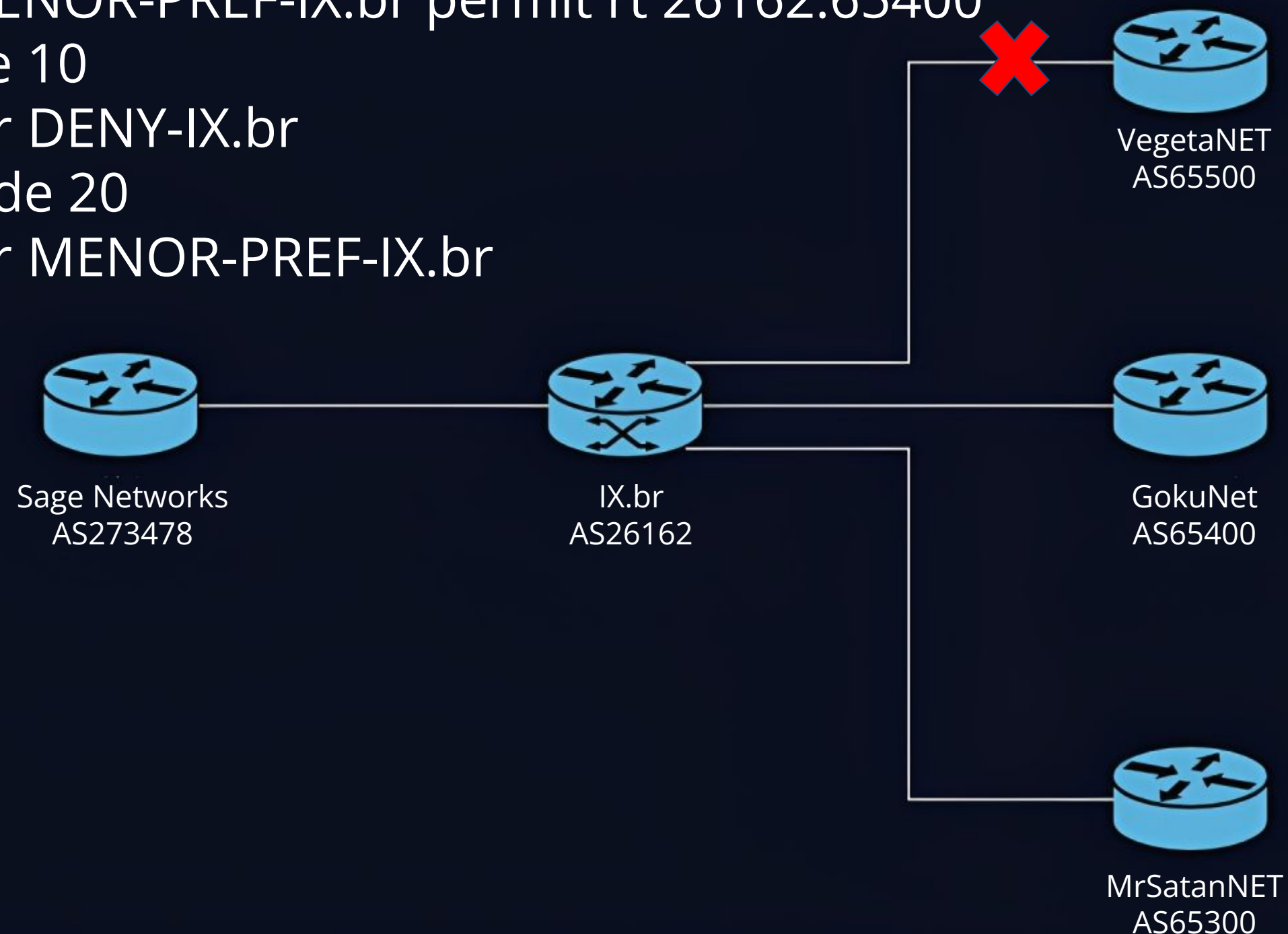


- ASN de origem
 - Community: 26162:(asn-peer) / 26162:0:(asn-peer)
 - Exemplo:
 - 26162:65500
 - 26162:0:65500

MANIPULANDO SEU UPLOAD BASEADO EM COMMUNITIES INFORMATIVAS



```
ip extcommunity-filter basic DENY-IX.br permit rt 26162:65500
ip extcommunity-filter basic MENOR-PREF-IX.br permit rt 26162:65400
route-policy IX.br-IN deny node 10
  if-match extcommunity-filter DENY-IX.br
route-policy IX.br-IN accept node 20
  if-match extcommunity-filter MENOR-PREF-IX.br
apply local-preference 50
```



MANIPULANDO SEU UPLOAD POR MEIO DE COMMUNITIES

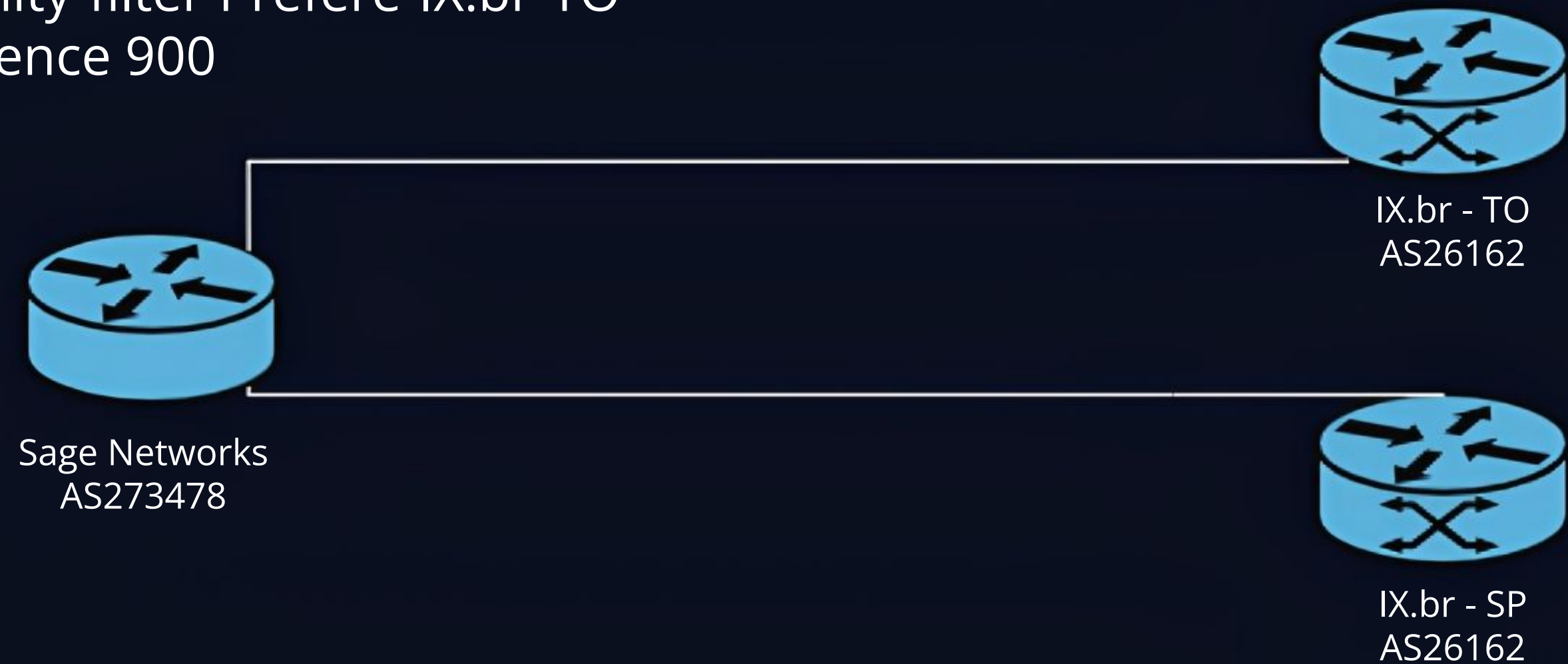


- IXP de Origem
 - Community: 26162:65(DDD) / 26162:0:65(DDD)
 - Exemplo:
 - 26162:65011
 - 26162:0:65011

MANIPULANDO SEU UPLOAD BASEADO EM COMMUNITIES INFORMATIVAS



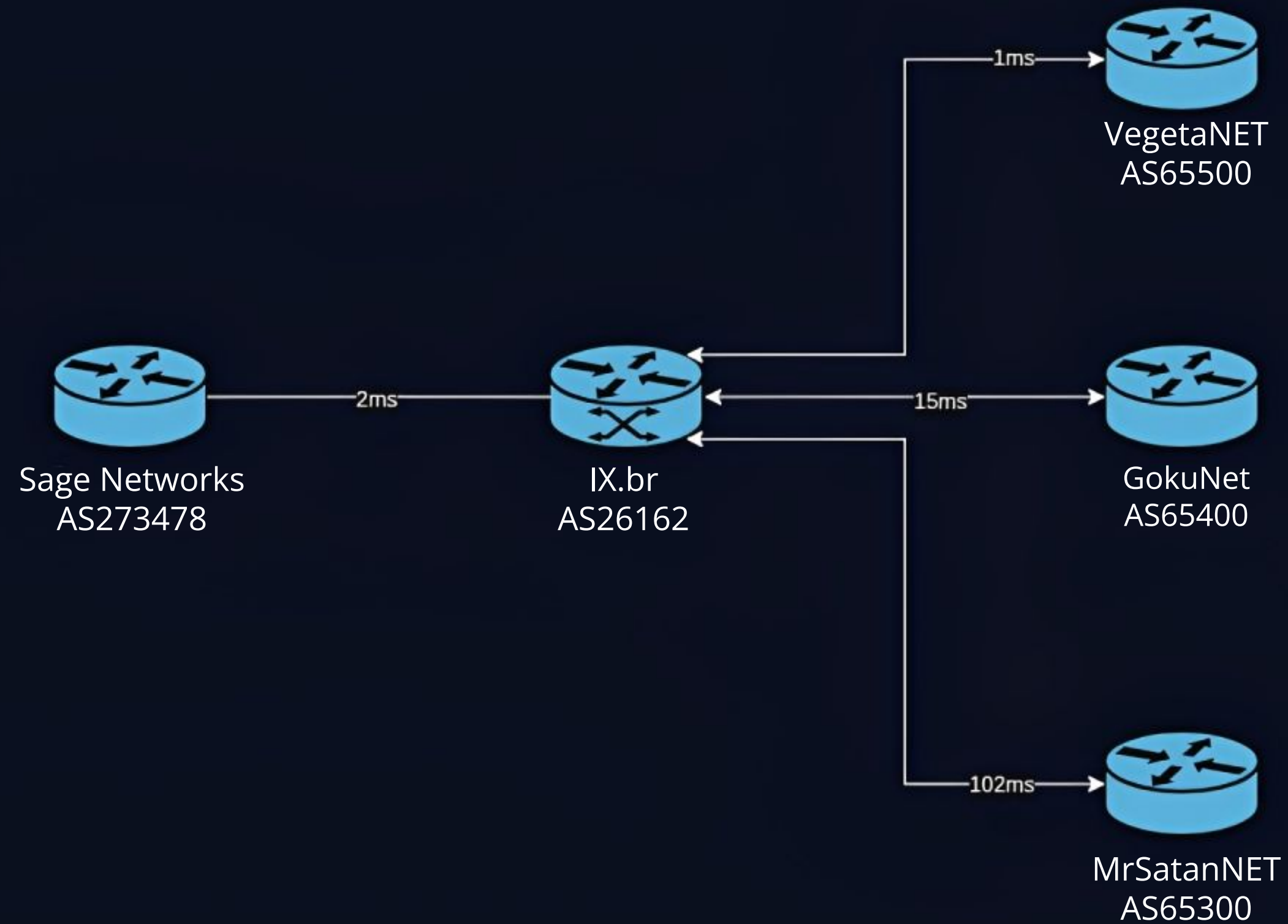
```
ip extcommunity-filter basic Prefer-IX.br-TO permit rt 26162:65063
route-policy IX.br-IN accept node 10
  if-match extcommunity-filter Prefer-IX.br-TO
  apply local-preference 900
```





IXP location	Origin Location	Do not announce to this IXP
Aracaju/SE	26162:65079	65004:65079
Belém/PA	26162:65092	65004:65092
Belo Horizonte/MG	26162:65031	65004:65031
Boa Vista/RR	26162:65095	65004:65095
Brasília/DF	26162:65061	65004:65061
Campina Grande/PB	26162:65183	65004:65183
Campinas/SP	26162:65019	65004:65019
Campo Grande/MS	26162:65067	65004:65067
Cascavel/PR	26162:65145	65004:65145
Caxias do Sul/RS	26162:65054	65004:65054
Cuiabá/MT	26162:65065	65004:65065
Curitiba/PR	26162:65041	65004:65041
Florianópolis/SC	26162:65048	65004:65048
Fortaleza/CE	26162:65085	65004:65085
Foz do Iguaçu/PR	26162:65045	65004:65045
Goiânia/GO	26162:65062	65004:65062
João Pessoa/PB	26162:65083	65004:65083
Lajeado/RS	26162:65051	65004:65051
Londrina/PR	26162:65043	65004:65043
Maceió/AL	26162:65082	65004:65082
Manaus/AM	26162:65092	65004:65092
Maringá/PR	26162:65044	65004:65044
Natal/RN	26162:65084	65004:65084
Palmas/TO	26162:65063	65004:65063
Porto Alegre/RS	26162:65051	65004:65051
Recife/PE	26162:65081	65004:65081
Rio de Janeiro/RJ	26162:65021	65004:65021
Salvador/BA	26162:65071	65004:65071
Santa Maria/RS	26162:65055	65004:65055
S. J. dos Campos/SP	26162:65012	65004:65012
S. J. Rio Preto/SP	26162:65017	65004:65017
São Luís/MA	26162:65098	65004:65098
São Paulo/SP	26162:65011	65004:65011
Teresina/PI	26162:65086	65004:65086
Vitória/ES	26162:65027	65004:65027

RTT - ROUND-TRIP TIME



MANIPULANDO MEU UPLOAD COM COMMUNITIES DE RTT - ROUND-TRIP TIME



```
ip extcommunity-filter basic DENY-RTT>100 permit rt 26162:64664
route-policy IX.br-IN deny node 10
  if-match extcommunity-filter DENY-RTT>100
```



MANIPULANDO MEU UPLOAD COM COMMUNITIES DE RTT - ROUND-TRIP TIME



```
ip extcommunity-filter basic DENY-RTT>100 permit rt 26162:64664
route-policy IX.br-IN deny node 10
  if-match extcommunity-filter DENY-RTT>100
```

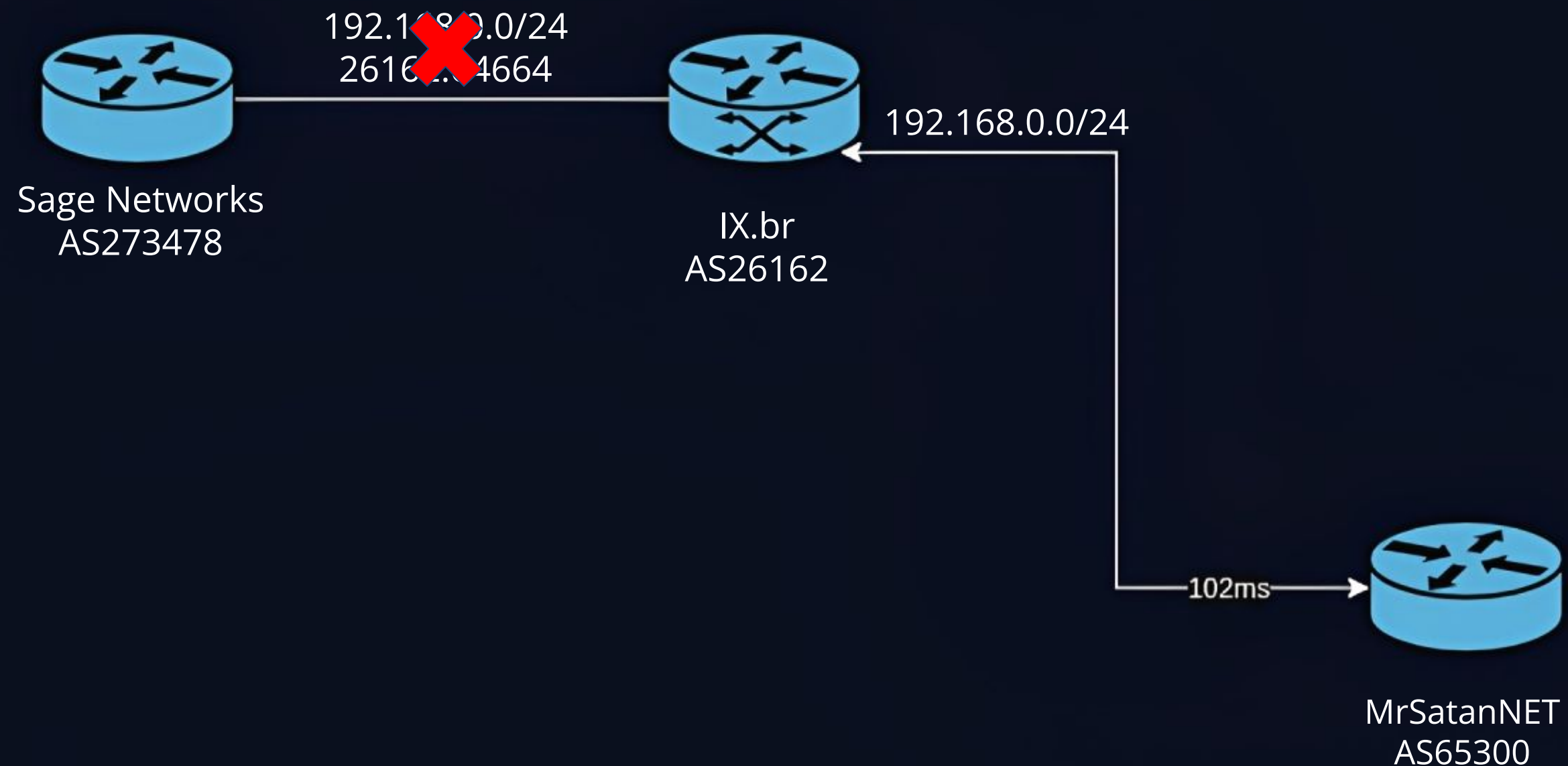
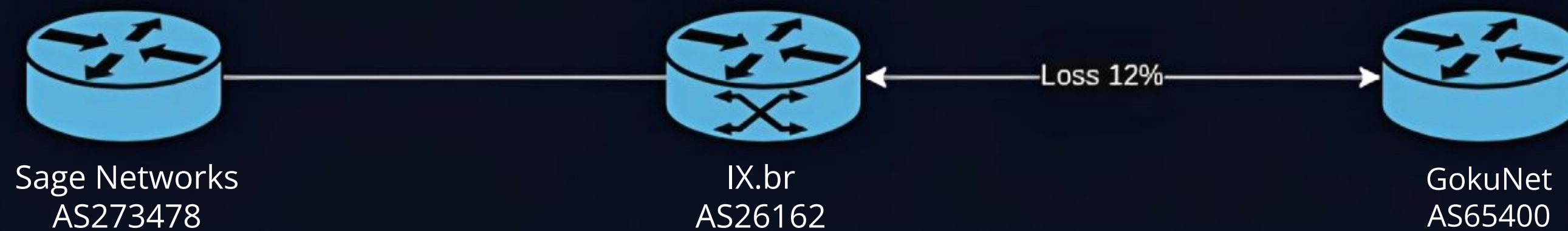


TABELA DE COMMUNITIES INFORMATIVAS RTT



ASN - RTT 0.001ms < 10ms	rs-asn:64661	(ro rt):rs-asn:64661	rs-asn:660:1
ASN - RTT 10ms < 50ms	rs-asn:64662	(ro rt):rs-asn:64662	rs-asn:660:2
ASN - RTT 50ms < 100ms	rs-asn:64663	(ro rt):rs-asn:64663	rs-asn:660:3
ASN - RTT 100ms < 150ms	rs-asn:64664	(ro rt):rs-asn:64664	rs-asn:660:4
ASN - RTT 150ms < 200ms	rs-asn:64665	(ro rt):rs-asn:64665	rs-asn:660:5
ASN - RTT 200ms < 250ms	rs-asn:64666	(ro rt):rs-asn:64666	s-asn:660:6
ASN - RTT > 250ms	rs-asn:64667	(ro rt):rs-asn:64667	rs-asn:660:7
ASN - RTT = unknown	rs-asn:64669	(ro rt):rs-asn:64669	rs-asn:660:9

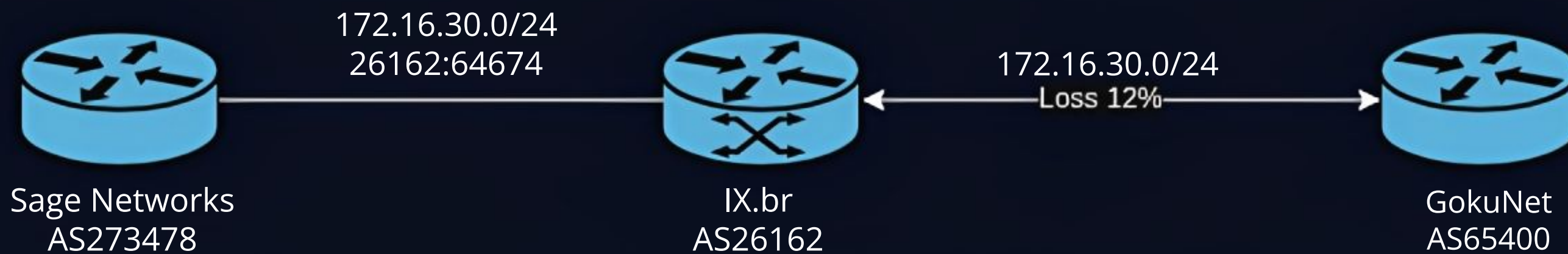
MANIPULANDO MEU UPLOAD COM COMMUNITIES DE PACKET LOSS



MANIPULANDO MEU UPLOAD COM COMMUNITIES DE PACKET LOSS



```
ip extcommunity-filter basic DENY-LOSS>10 permit rt 26162:64674
route-policy IX.br-IN deny node 10
  if-match extcommunity-filter DENY-LOSS>10
```



MANIPULANDO MEU UPLOAD COM COMMUNITIES DE PACKET LOSS



```
ip extcommunity-filter basic DENY-LOSS>10 permit rt 26162:64674
route-policy IX.br-IN deny node 10
  if-match extcommunity-filter DENY-LOSS>10
```

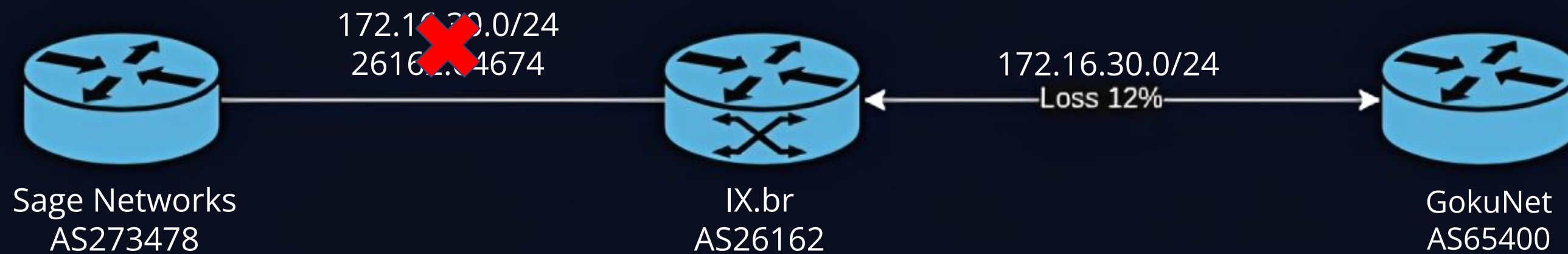


TABELA DE COMMUNITIES INFORMATIVAS LOSS

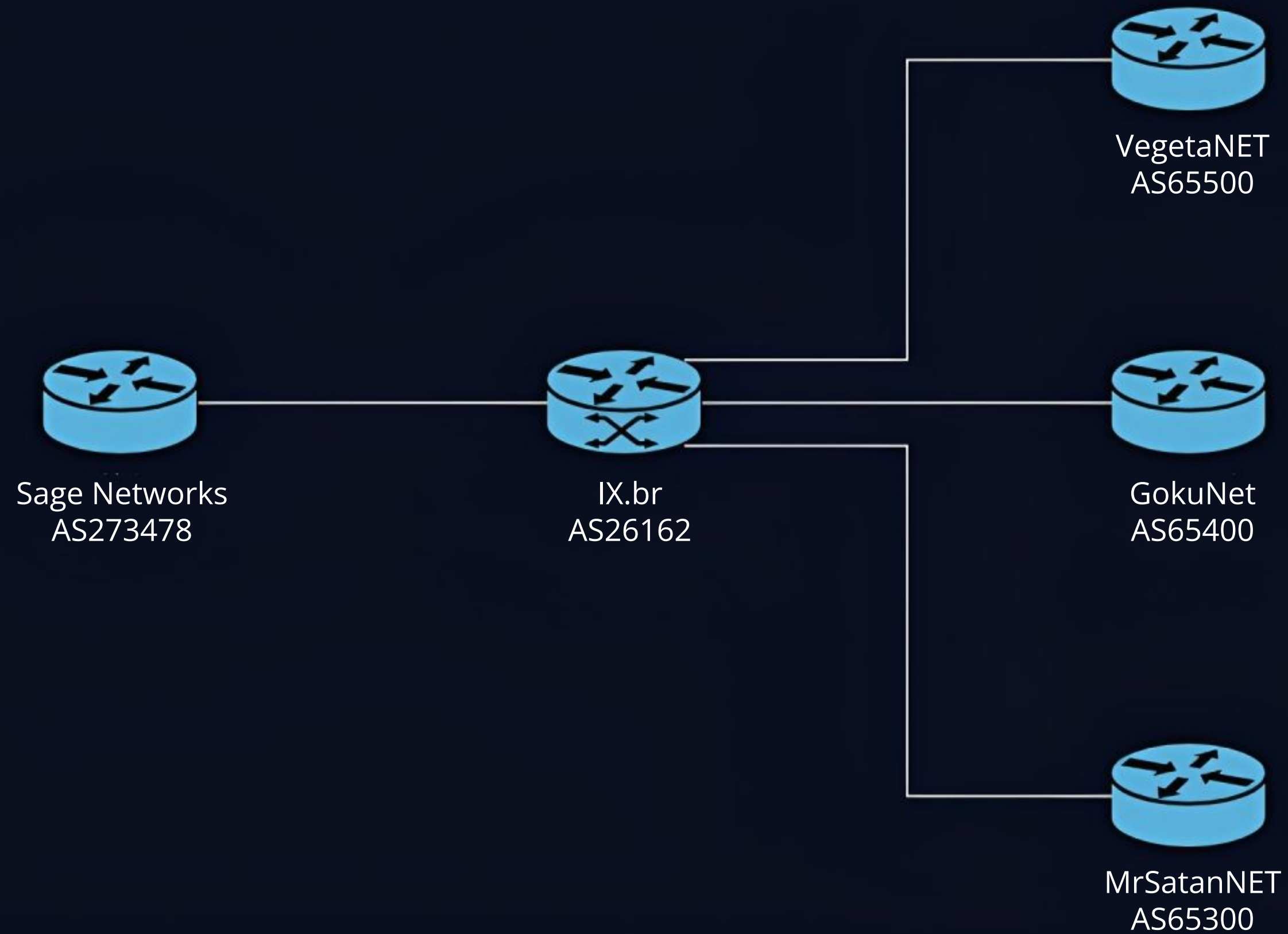


ASN - LOSS 0%ASN - LOSS 0%	rs-asn:64671	(ro rt):rs-asn:64671	rs-asn:670:1
ASN - LOSS 0.001 < 2%	rs-asn:64672	(ro rt):rs-asn:64672	rs-asn:670:2
ASN - LOSS < 10%	rs-asn:64673	(ro rt):rs-asn:64673	rs-asn:670:3
ASN - LOSS > 10%	rs-asn:64674	(ro rt):rs-asn:64674	rs-asn:670:4
ASN - LOSS = unknown/100%	rs-asn:64679	(ro rt):rs-asn:64679	rs-asn:670:9



E MEU DOWNLOAD, COMO FICA?

TOPOLOGIA



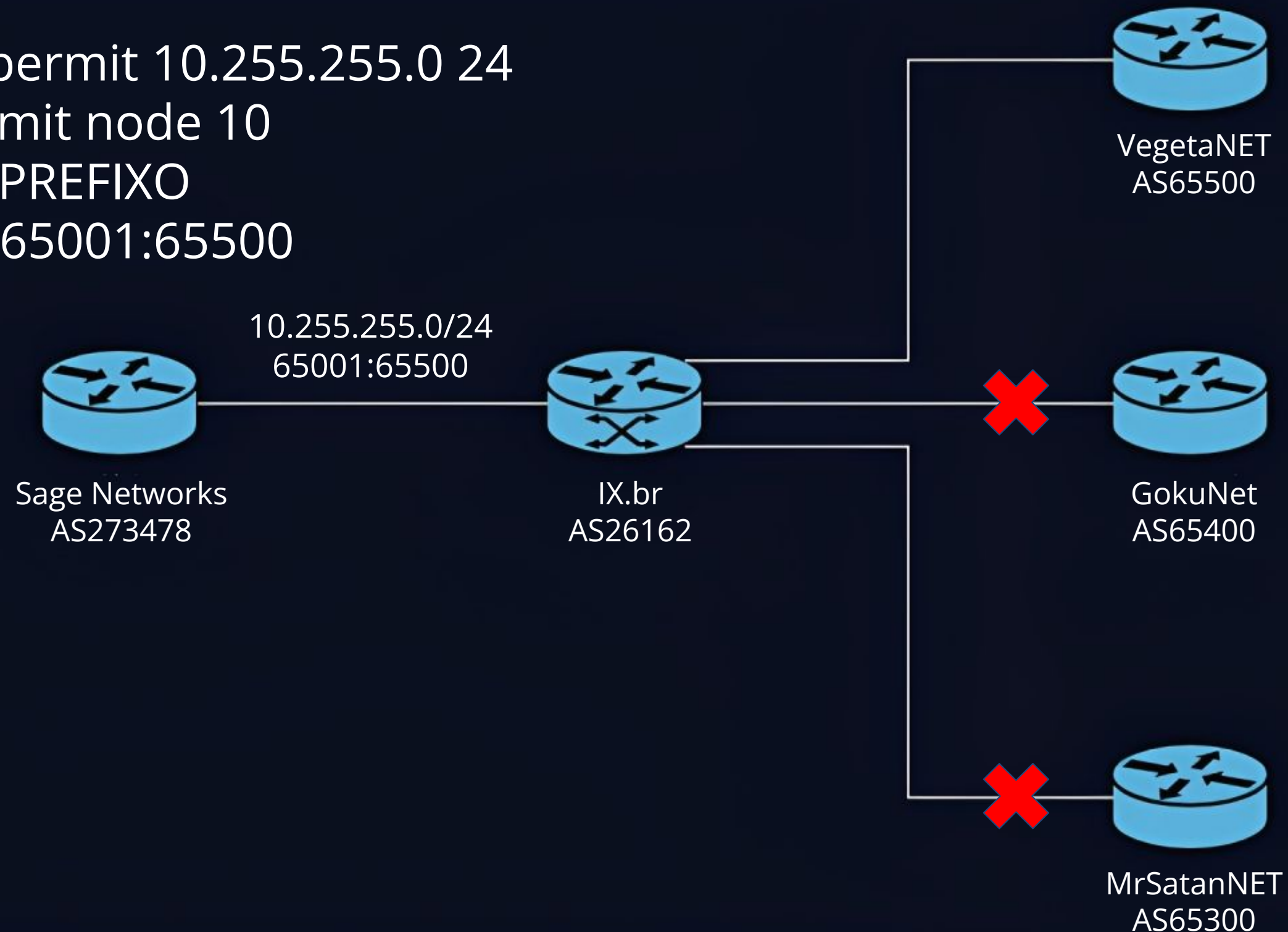


MANIPULANDO MEU DOWNLOAD COM COMMUNITIES DE EXPORT-ONLY

MANIPULANDO MEU DOWNLOAD COM COMMUNITIES DE EXPORT-ONLY



```
ip ip-prefix MEU-PREFIXO permit 10.255.255.0 24
route-policy IX.br-OUT permit node 10
  if-match ip-prefix MEU-PREFIXO
  apply extcommunity rt 65001:65500
```



MANIPULANDO MEU UPLOAD COM COMMUNITIES DE EXPORT-ONLY



Em cenários de ataques DDoS você pode utilizar a community de Export-only para conteúdos confiáveis.

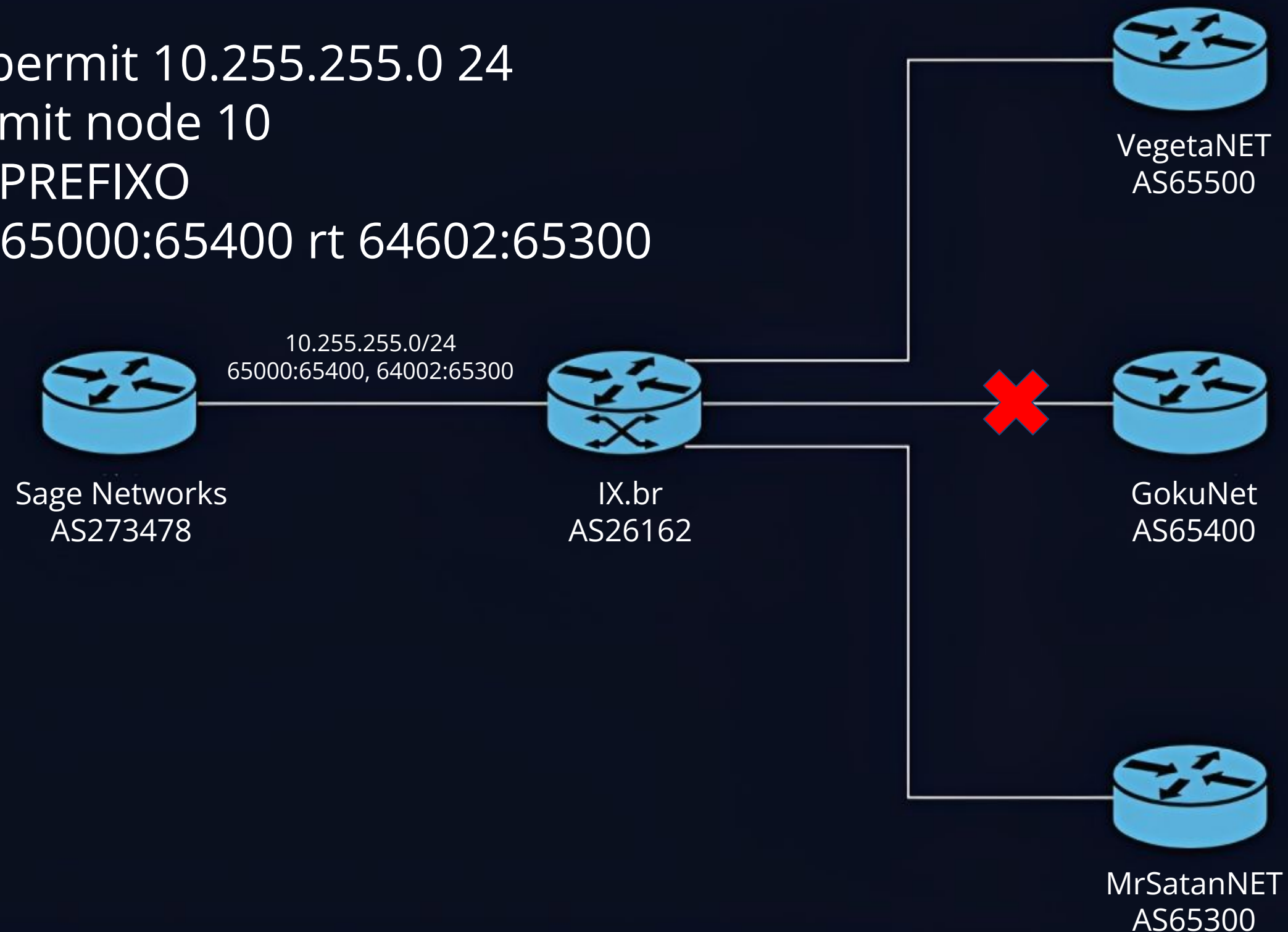


MANIPULANDO MEU DOWNLOAD COM COMMUNITIES DE NO-EXPORT E EXPORT COM PREPENDS

MANIPULANDO MEU DOWNLOAD COM COMMUNITIES DE NO-EXPORT E EXPORT COM PREPENDS



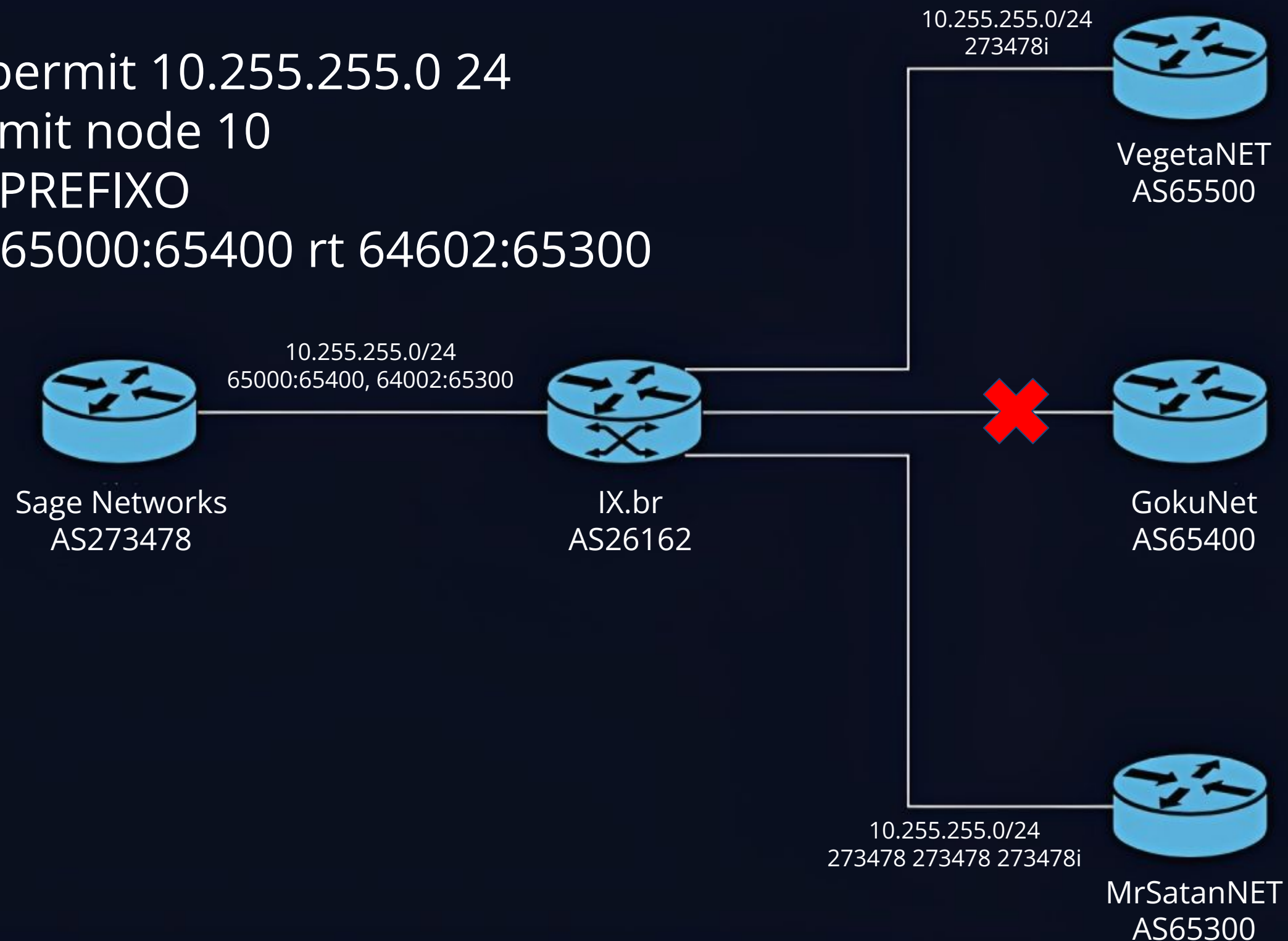
```
ip ip-prefix MEU-PREFIXO permit 10.255.255.0 24
route-policy IX.br-OUT permit node 10
  if-match ip-prefix MEU-PREFIXO
  apply extcommunity rt 65000:65400 rt 64602:65300
```



MANIPULANDO MEU DOWNLOAD COM COMMUNITIES DE NO-EXPORT E EXPORT COM PREPENDS



```
ip ip-prefix MEU-PREFIXO permit 10.255.255.0 24
route-policy IX.br-OUT permit node 10
  if-match ip-prefix MEU-PREFIXO
  apply extcommunity rt 65000:65400 rt 64602:65300
```



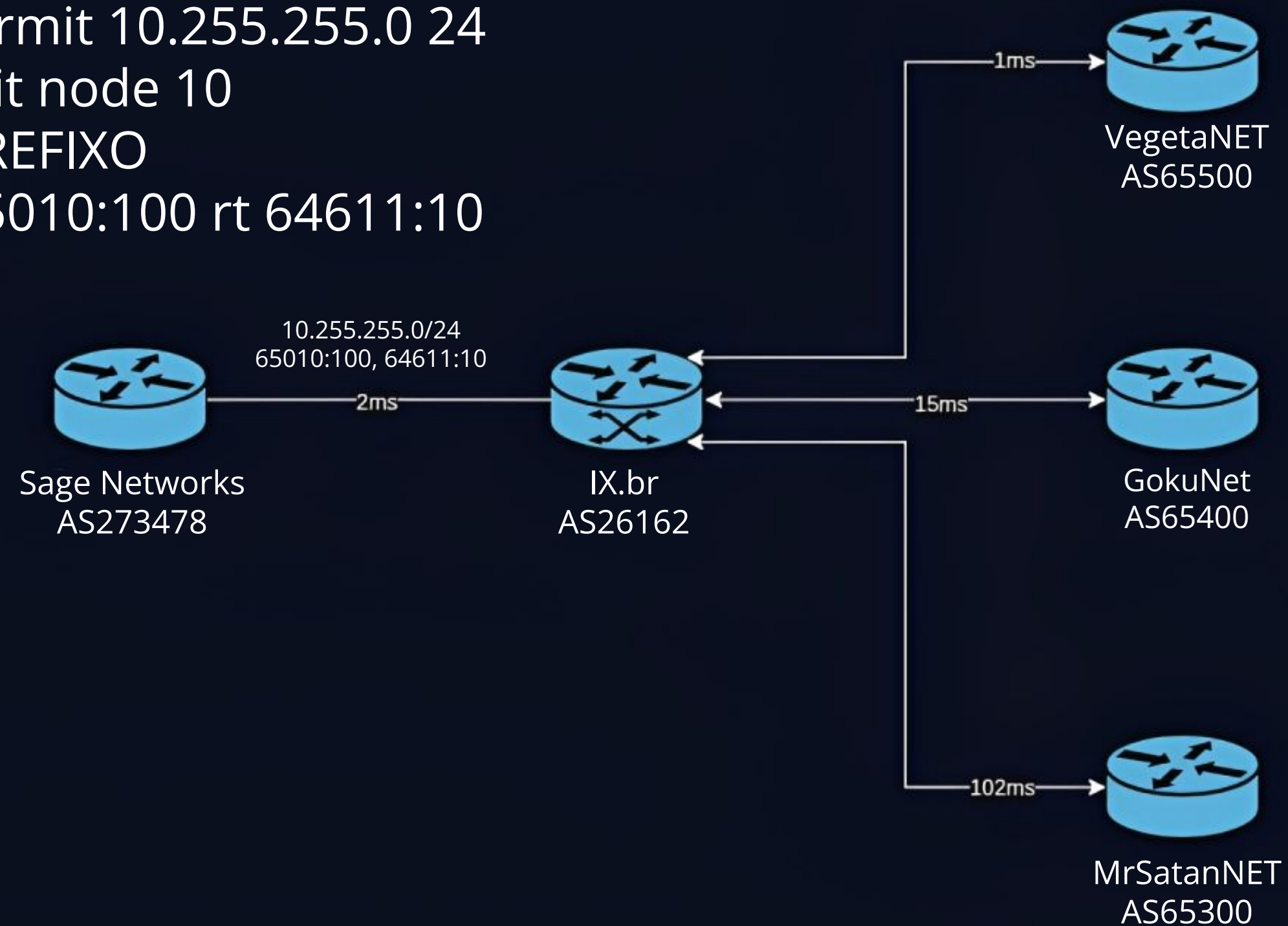


MANIPULANDO MEU DOWNLOAD COM BASE NO RTT

MANIPULANDO MEU DOWNLOAD COM BASE NO RTT



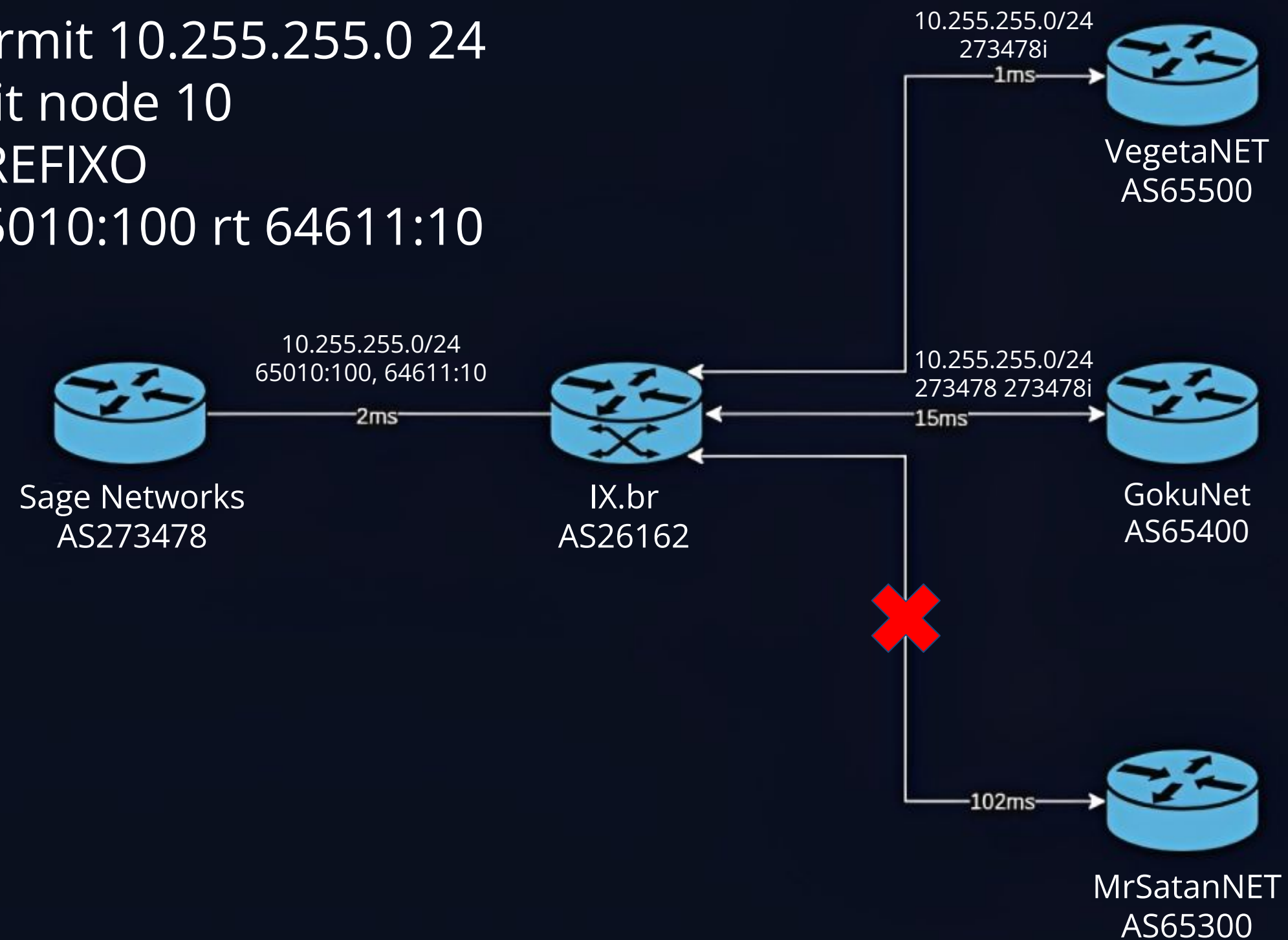
```
ip ip-prefix MEU-PREFIXO permit 10.255.255.0 24
route-policy IX.br-OUT permit node 10
  if-match ip-prefix MEU-PREFIXO
  apply extcommunity rt 65010:100 rt 64611:10
```



MANIPULANDO MEU DOWNLOAD COM BASE NO RTT



```
ip ip-prefix MEU-PREFIXO permit 10.255.255.0 24
route-policy IX.br-OUT permit node 10
  if-match ip-prefix MEU-PREFIXO
  apply extcommunity rt 65010:100 rt 64611:10
```





do not announce to rtt > 10ms	65010:10	(ro rt):65010:10	65010:0:10
do not announce to rtt > 50ms	65010:50	(ro rt):65010:50	65010:0:50
do not announce to rtt > 100ms	65010:100	(ro rt):65010:100	65010:0:100
do not announce to rtt > 150ms	65010:150	(ro rt):65010:150	65010:0:150
do not announce to rtt > 200ms	65010:200	(ro rt):65010:200	65010:0:200
do not announce to rtt > 250ms	65010:250	(ro rt):65010:250	65010:0:250
do not announce to rtt = unknown	65010:999	(ro rt):65010:999	65010:0:999

one prepend to rtt > 10ms	64611:10	(ro rt):64611:10	64611:0:10
one prepend to rtt > 50ms	64611:50	(ro rt):64611:50	64611:0:50
one prepend to rtt > 100ms	64611:100	(ro rt):64611:100	64611:0:100
one prepend to rtt > 150ms	64611:150	(ro rt):64611:150	64611:0:150
one prepend to rtt > 200ms	64611:200	(ro rt):64611:200	64611:0:200
one prepend to rtt > 250ms	64611:250	(ro rt):64611:250	64611:0:250
one prepend to rtt = unknown	64611:999	(ro rt):64611:999	64611:0:999

two prepend to rtt > 10ms	64612:10	(ro rt):64612:10	64612:0:10
two prepend to rtt > 50ms	64612:50	(ro rt):64612:50	64612:0:50
two prepend to rtt > 100ms	64612:100	(ro rt):64612:100	64612:0:100
two prepend to rtt > 150ms	64612:150	(ro rt):64612:150	64612:0:150
two prepend to rtt > 200ms	64612:200	(ro rt):64612:200	64612:0:200
two prepend to rtt > 250ms	64612:250	(ro rt):64612:250	64612:0:250
two prepend to rtt = unknown	64612:999	(ro rt):64612:999	64612:0:999

three prepend to rtt > 10ms	64613:10	(ro rt):64613:10	64613:0:10
three prepend to rtt > 50ms	64613:50	(ro rt):64613:50	64613:0:50
three prepend to rtt > 100ms	64613:100	(ro rt):64613:100	64613:0:100
three prepend to rtt > 150ms	64613:150	(ro rt):64613:150	64613:0:150
three prepend to rtt > 200ms	64613:200	(ro rt):64613:200	64613:0:200
three prepend to rtt > 250ms	64613:250	(ro rt):64613:250	64613:0:250
three prepend to rtt = unknown	64613:999	(ro rt):64613:999	64613:0:999



MANIPULANDO MEU DOWNLOAD COM BASE NO PACKET LOSS

MANIPULANDO MEU DOWNLOAD COM BASE NO PACKET LOSS



```
ip ip-prefix MEU-PREFIXO permit 10.255.255.0 24
route-policy IX.br-OUT permit node 10
  if-match ip-prefix MEU-PREFIXO
  apply extcommunity rt 65011:10
```





do not announce to loss > 2%	65011:2	(ro rt):65011:2	65011:0:2
do not announce to loss > 10%	65011:10	(ro rt):65011:10	65011:0:10
do not announce to loss = unknown	65011:999	(ro rt):65011:999	65011:0:999
one prepend to loss > 2%	64621:2	(ro rt):64621:2	64621:0:2
one prepend to loss > 10%	64621:10	(ro rt):64621:10	64621:0:10
one prepend to loss = unknown	64621:999	(ro rt):64621:999	64621:0:999
two prepend to loss > 2%	64622:2	(ro rt):64622:2	64622:0:2
two prepend to loss > 10%	64622:10	(ro rt):64622:10	64622:0:10
two prepend to loss = unknown	64622:999	(ro rt):64622:999	64622:0:999
three prepend to loss > 2%	64623:2	(ro rt):64623:2	64623:0:2
three prepend to loss > 10%	64623:10	(ro rt):64623:10	64623:0:10
three prepend to loss = unknown	64623:999	(ro rt):64623:999	64623:0:999

CONCLUSÃO



- Communities BGP muitas vezes nos dão a autonomia de manipular como o roteador vizinho irá se comportar quando receber o nosso prefixo.
- Muitos ITPs fornecem uma tabela de communities para seus clientes, pergunte para sua operadora sobre.

REFERÊNCIAS



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- IX.BR. **Política de tratamento de communities BGP e Route Servers no IX.br**. Versão 4.3. 22 jun. 2021. Disponível em: https://docs.ix.br/doc/politica-de-tratamento-de-communities-no-ix-br-v4_3.pdf
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- SANGLI, S.; TAPPAN, D.; REKHTER, Y. **BGP Extended Communities Attribute**. RFC 4360. Internet Engineering Task Force (IETF), fev. 2006. Disponível em: <https://datatracker.ietf.org/doc/html/rfc4360>
- HEITZ, J. *et al.* **BGP Large Communities Attribute**. RFC 8092. Internet Engineering Task Force (IETF), fev. 2017. Disponível em: <https://datatracker.ietf.org/doc/html/rfc8092>



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