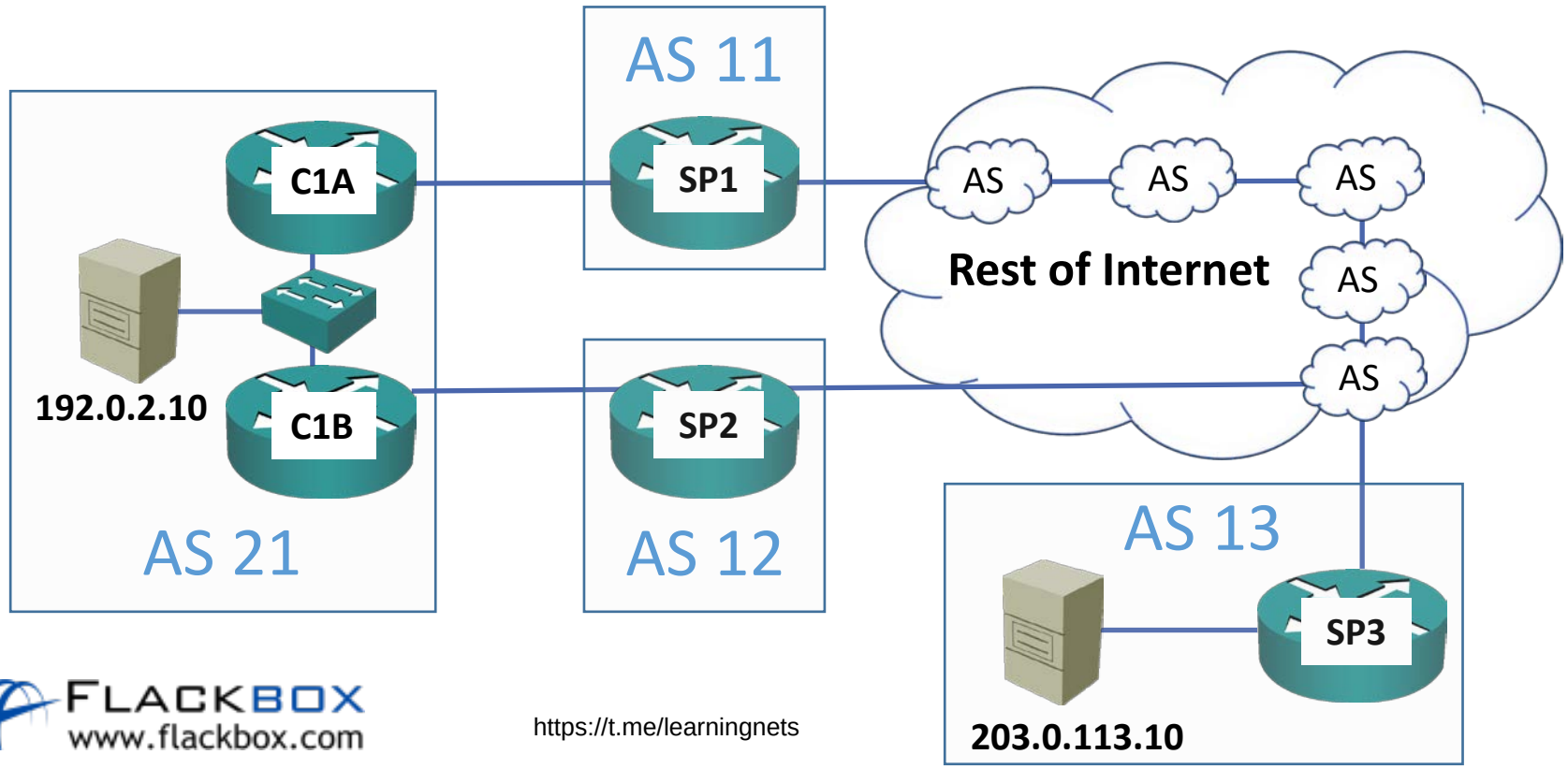
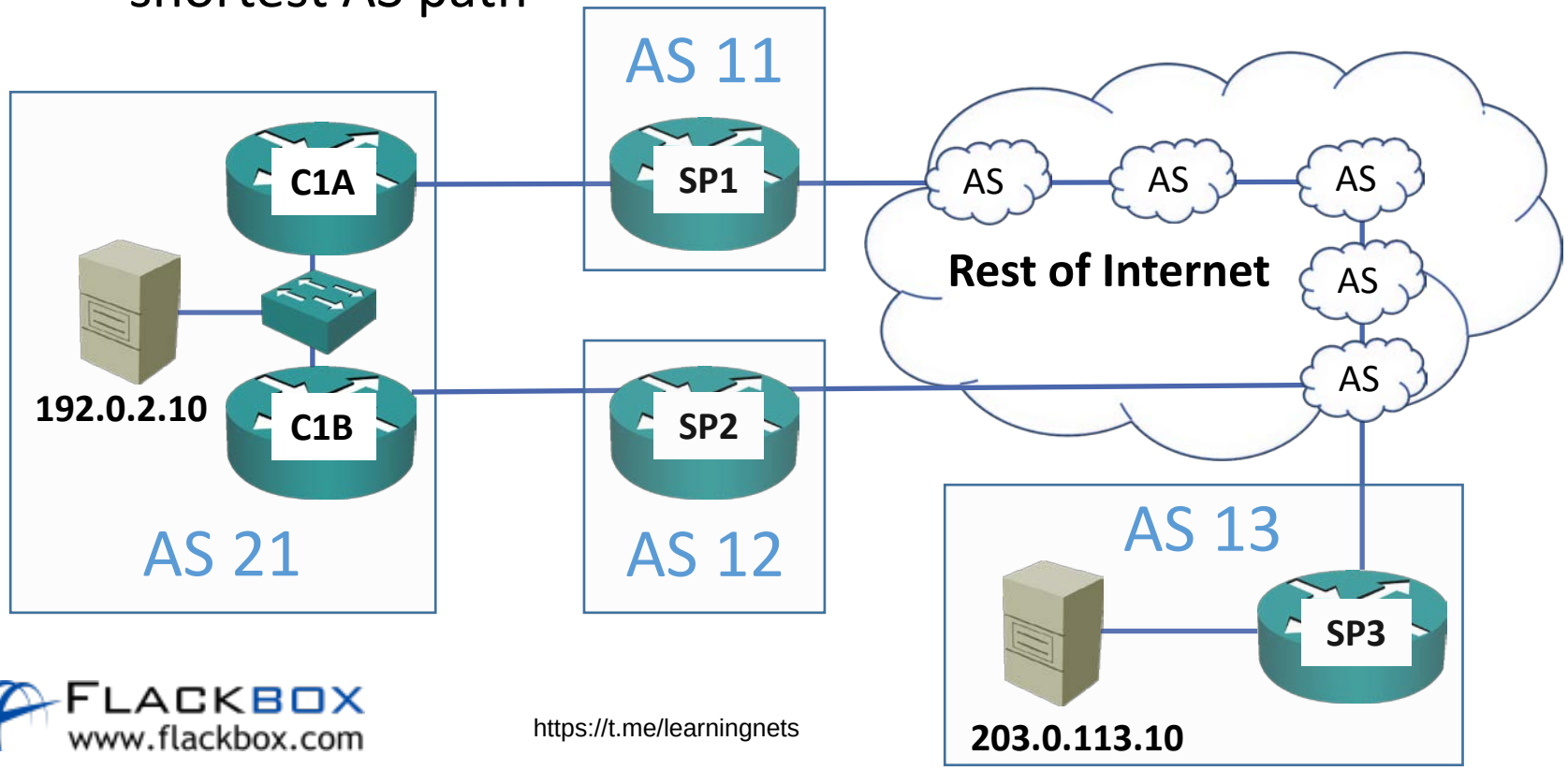
Enterprise Transit Network

- Filtering should be used to prevent an enterprise advertising external Internet routes as being available through themselves and becoming a transit network



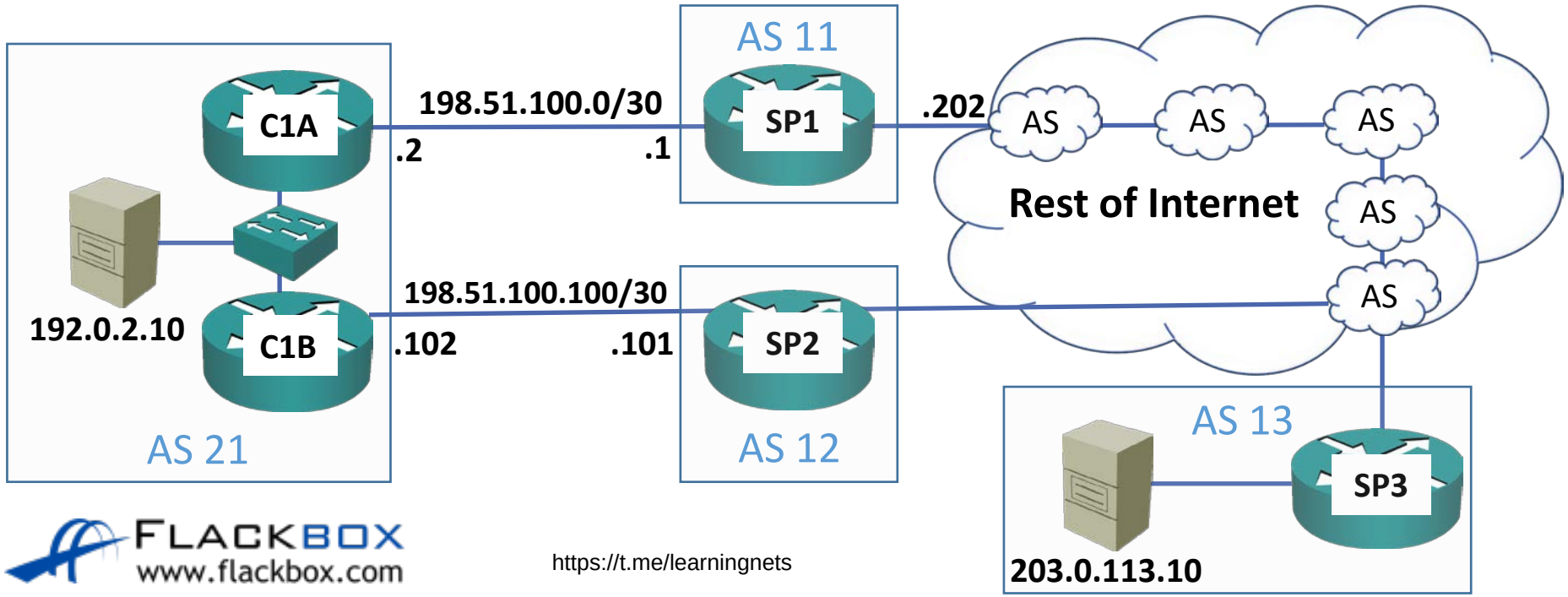
Enterprise Transit Network

- AS 21 should only advertise its own 192.0.2.0/24 network to its ISPs
- If AS 21 advertises Internet routes to its ISPs (the default), it could become a transit AS
- AS 11 will send traffic to 203.0.113.10 via 'C1A > C1B > SP2 > Internet' as that is the shortest AS path



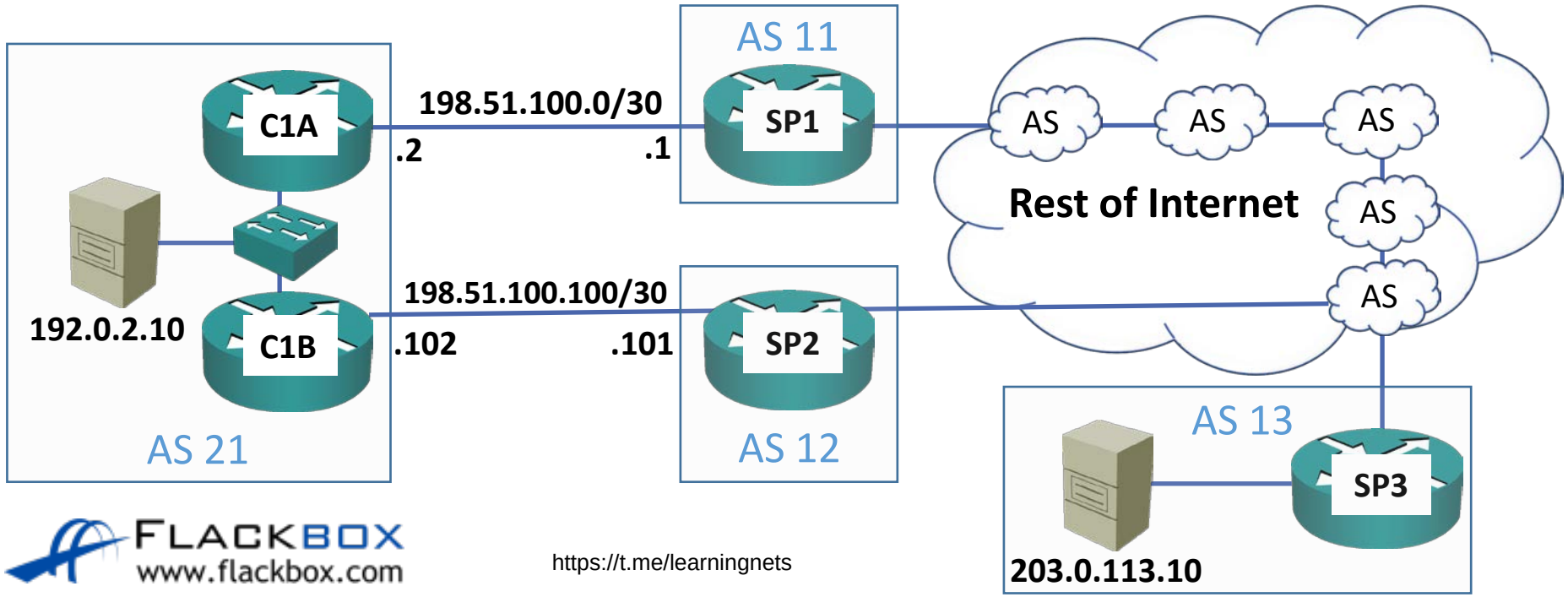
Verification – show ip bgp (Before Policy)

```
SP1#show ip bgp
 Network          Next Hop            Metric LocPrf Weight Path
*> 192.0.2.0       198.51.100.2             0             0 21 i
*                  198.51.100.202                         0 18 17 16 15 14 12 21 i
*> 203.0.113.0     198.51.100.2                           0 21 12 14 13 i
*                  198.51.100.202                         0 18 17 16 15 14 13 i
! truncated
```



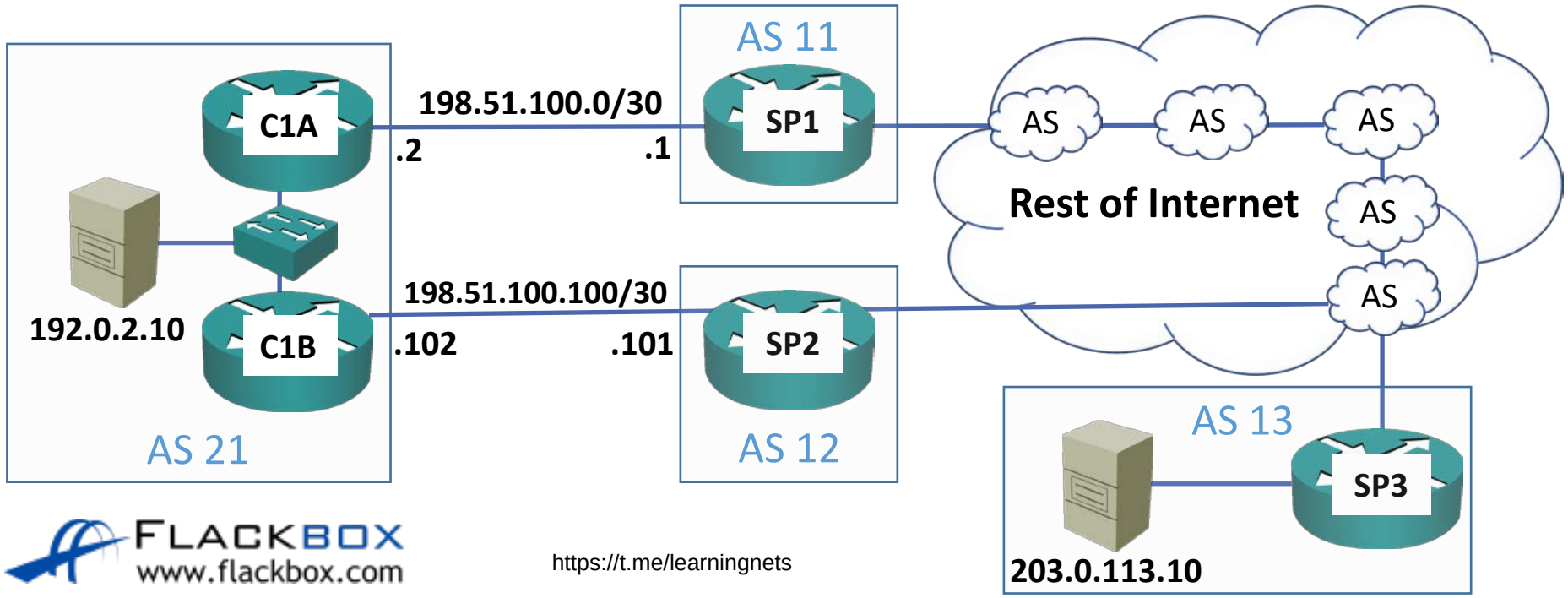
Enterprise Preventing Transit - ACL

```
C1A(config)# access-list 100 permit ip host 192.0.2.0 host 255.255.255.0
C1A(config)# router bgp 21
C1A(config-router)# neighbor 198.51.100.1 distribute-list 100 out

C1B(config)# access-list 100 permit ip host 192.0.2.0 host 255.255.255.0
C1B(config)# router bgp 21
C1B(config-router)# neighbor 198.51.100.101 distribute-list 100 out
```



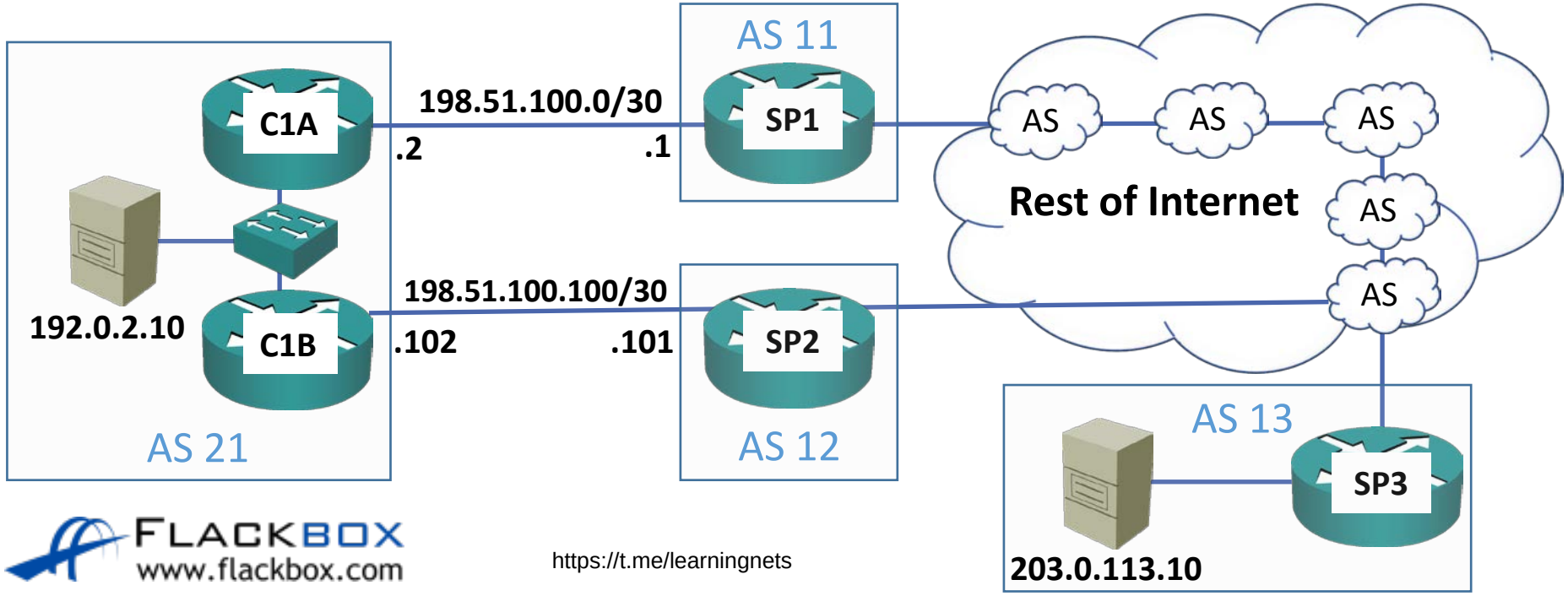
ISP Preventing Transit – ACL – Opposite Direction

```
SP1(config)# access-list 100 permit ip host 192.0.2.0 host 255.255.255.0
SP1(config)# router bgp 11
SP1(config-router)# neighbor 198.51.100.2 distribute-list 100 in

SP2(config)# access-list 100 permit ip host 192.0.2.0 host 255.255.255.0
SP2(config)# router bgp 12
SP2(config-router)# neighbor 198.51.100.102 distribute-list 100 in
```



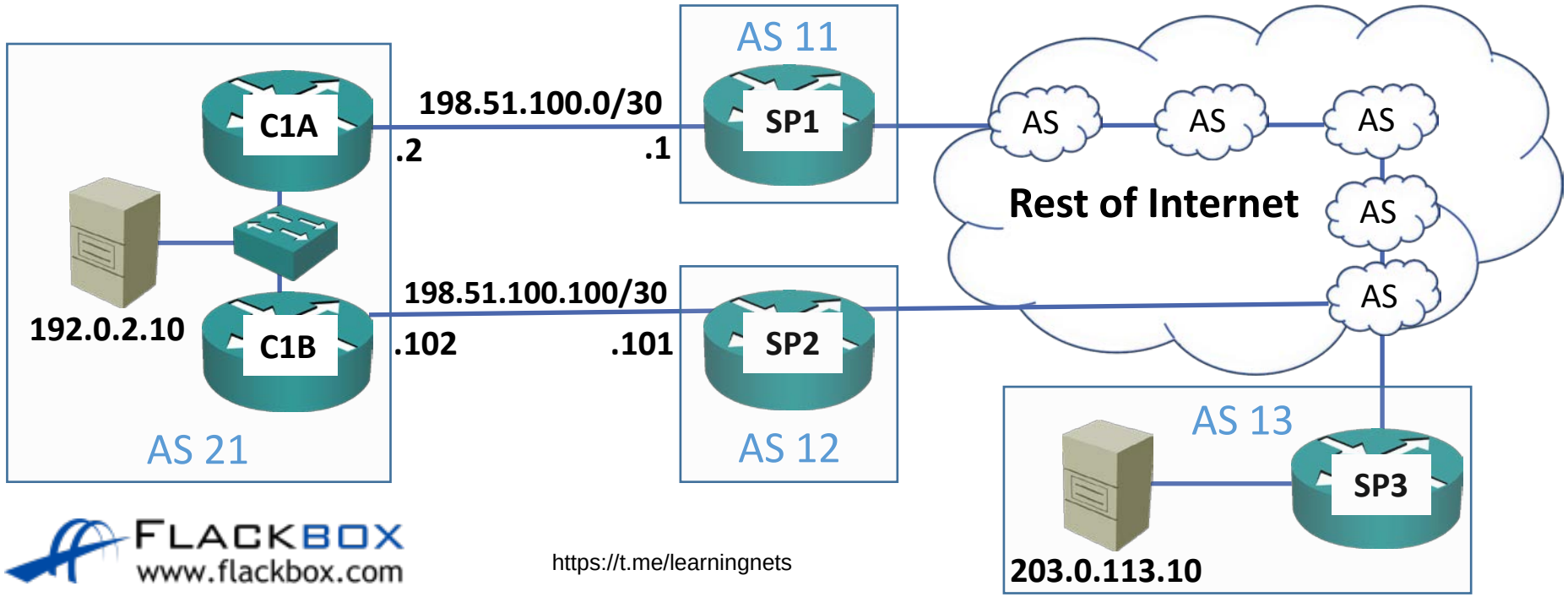
Enterprise Preventing Transit – Prefix List

```
C1A(config)# ip prefix-list DEMO permit 192.0.2.0/24
C1A(config)# router bgp 21
C1A(config-router)# neighbor 198.51.100.1 prefix-list DEMO out

C1B(config)# ip prefix-list DEMO permit 192.0.2.0/24
C1B(config)# router bgp 21
C1B(config-router)# neighbor 198.51.100.101 prefix-list DEMO out
```



ISP Preventing Transit – Prefix List

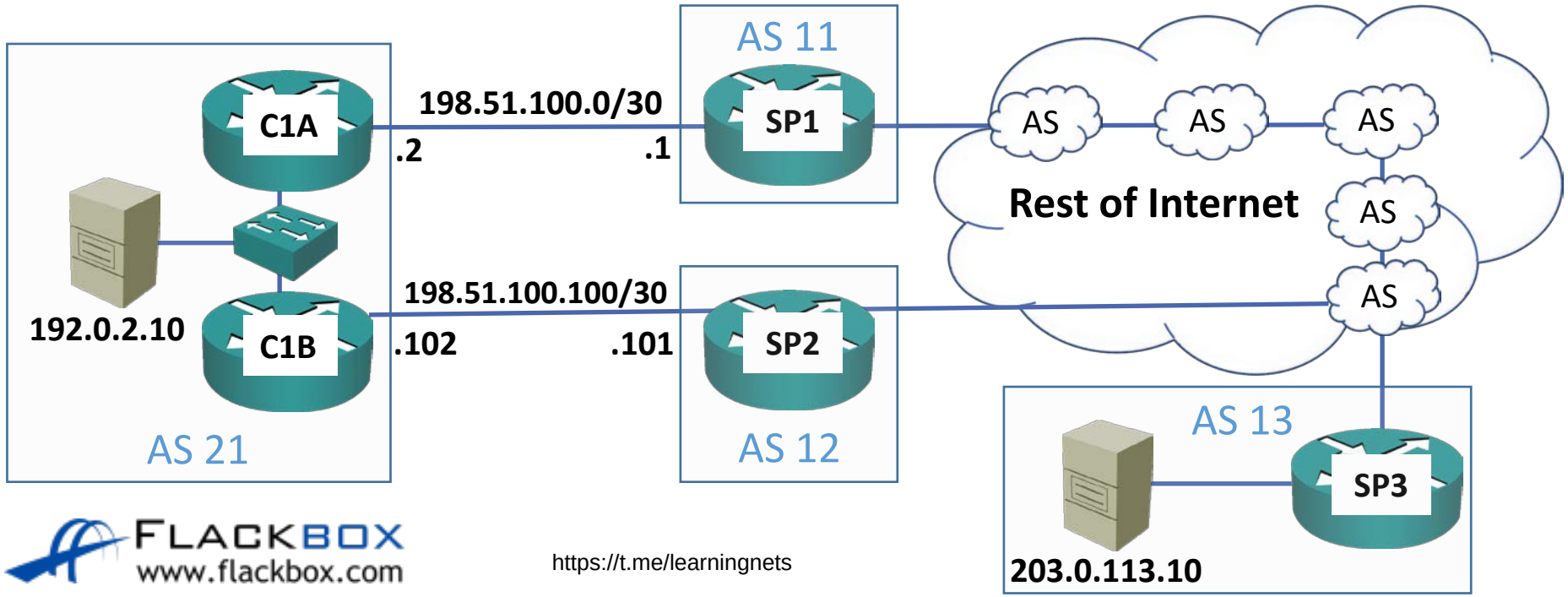
```
SP1(config)# ip prefix-list DEMO permit 192.0.2.0/24
SP1(config)# router bgp 11
SP1(config-router)# neighbor 198.51.100.2 prefix-list DEMO in

SP2(config)# ip prefix-list DEMO permit 192.0.2.0/24
SP2(config)# router bgp 12
SP2(config-router)# neighbor 198.51.100.102 prefix-list DEMO in
```



Enterprise Preventing Transit – AS Path Filter

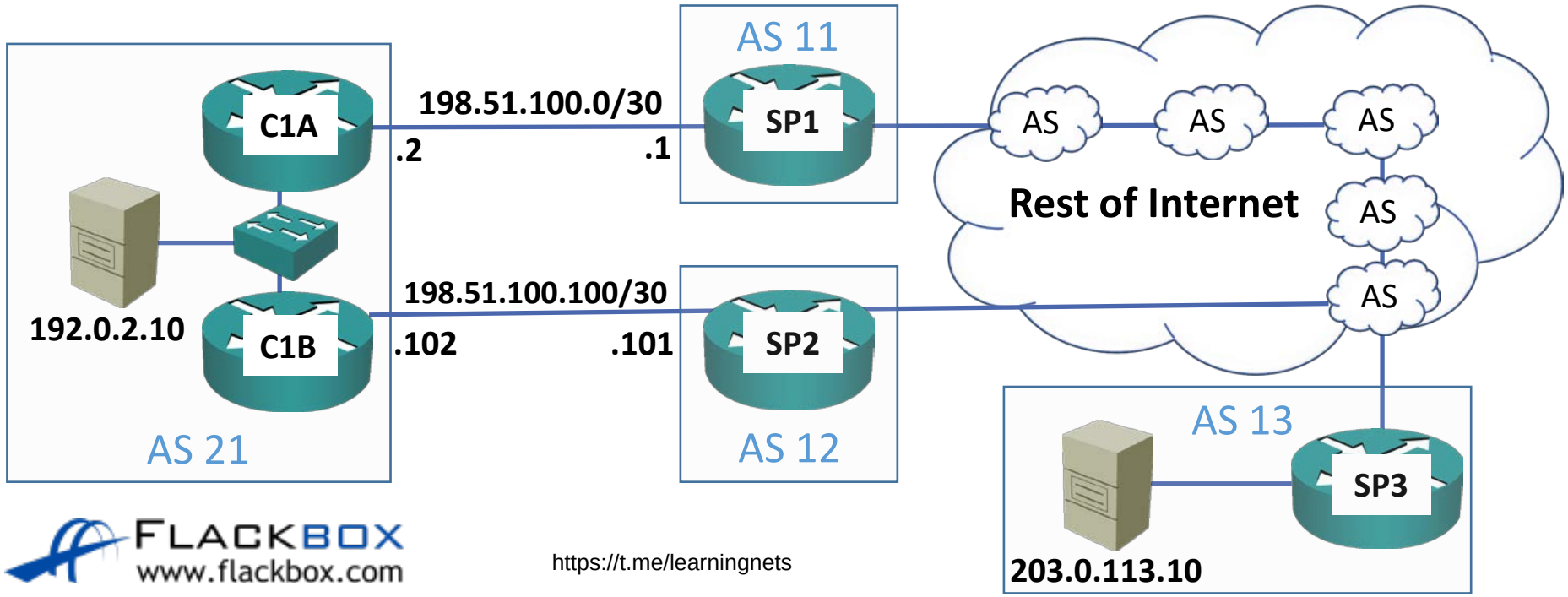
- An empty AS Path indicates the route originated in this AS

```
C1A#show ip bgp
Network          Next Hop            Metric LocPrf Weight Path
 * i  192.0.2.0         192.168.0.2         0    100      0 i
 *>                     0.0.0.0             0         32768 i
 *>i  203.0.113.0       192.168.0.2         0    100      0 12 14 13 i
 *                      198.51.100.1                      0 11 18 17 16 15 14 13 i
```



Enterprise Preventing Transit (Supports Prepending)

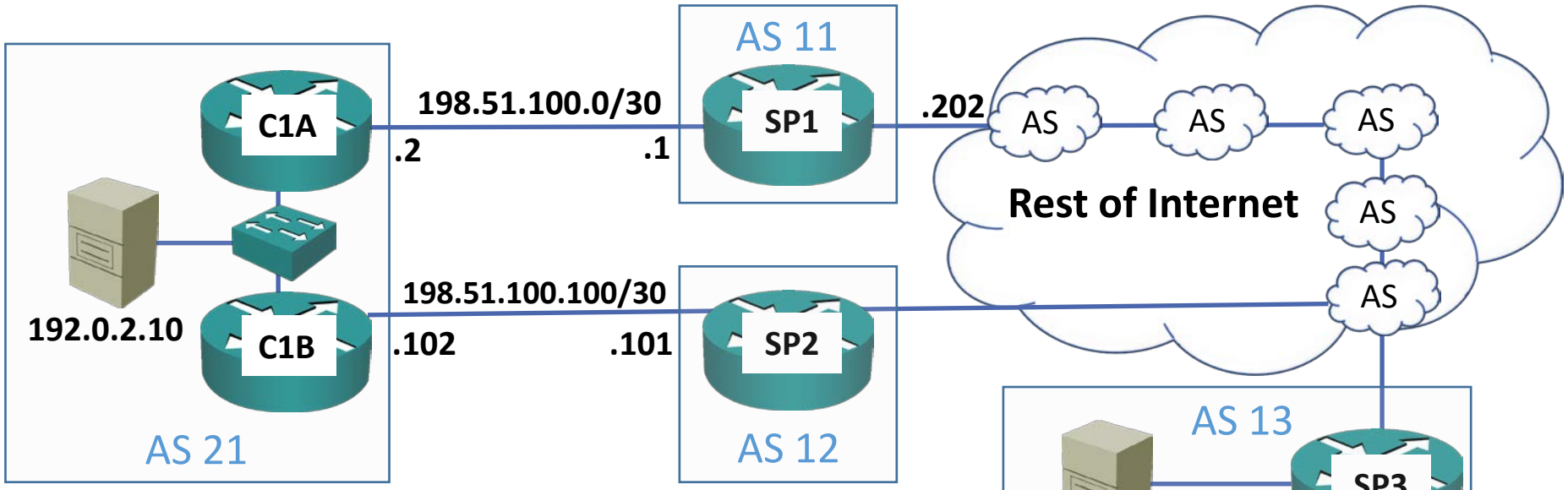
```
C1A(config)#ip as-path access-list 1 permit ^$
C1A(config)#router bgp 21
C1A(config-router)#neighbor 198.51.100.1 filter-list 1 out

C1B(config)#ip as-path access-list 1 permit ^$
C1B(config)#router bgp 21
C1B(config-router)#neighbor 198.51.100.101 filter-list 1 out
```



ISP Preventing Transit – AS Path Filter

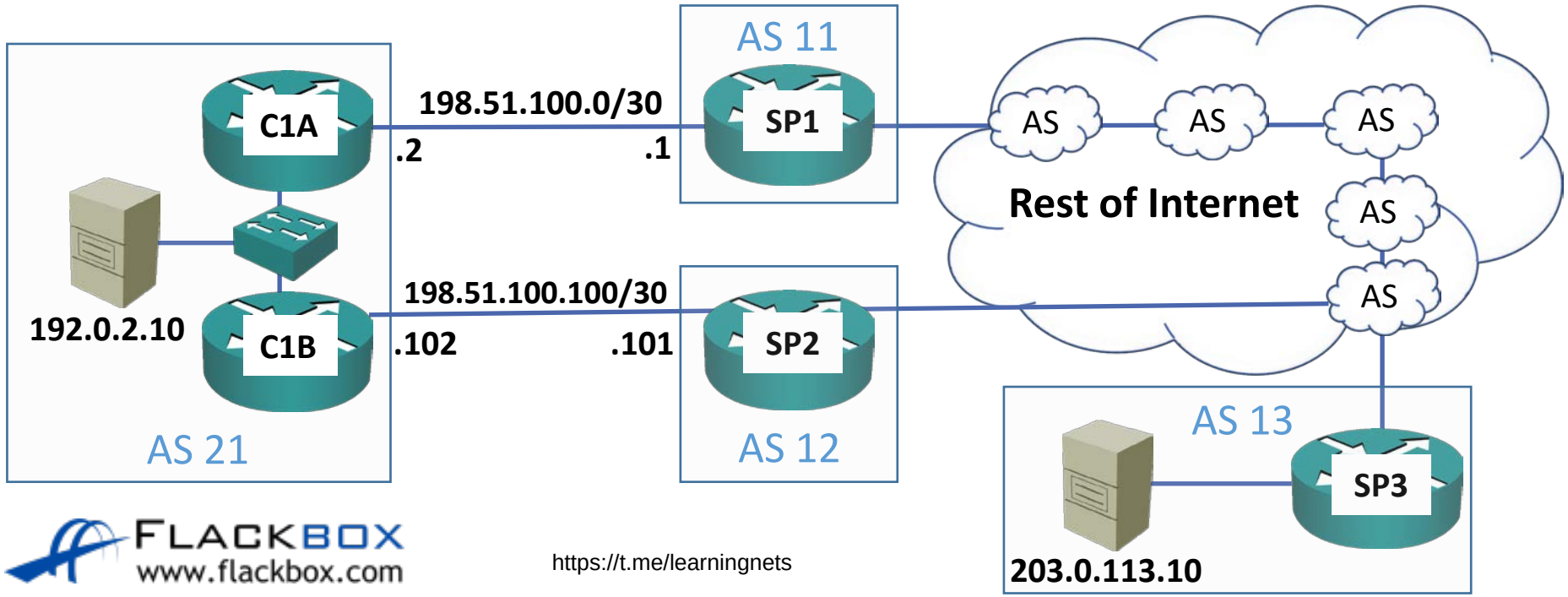
- AS Path is the neighbor AS number only

```
SP1#show ip bgp
 Network          Next Hop            Metric LocPrf Weight Path
*> 192.0.2.0       198.51.100.2             0             0 21 i
*>                  198.51.100.202                         0 18 17 16 15 14 12 21 i
*  203.0.113.0      198.51.100.202                         0 18 17 16 15 14 13 i
*>                  198.51.100.2                           0 21 12 14 13 i
! truncated
```



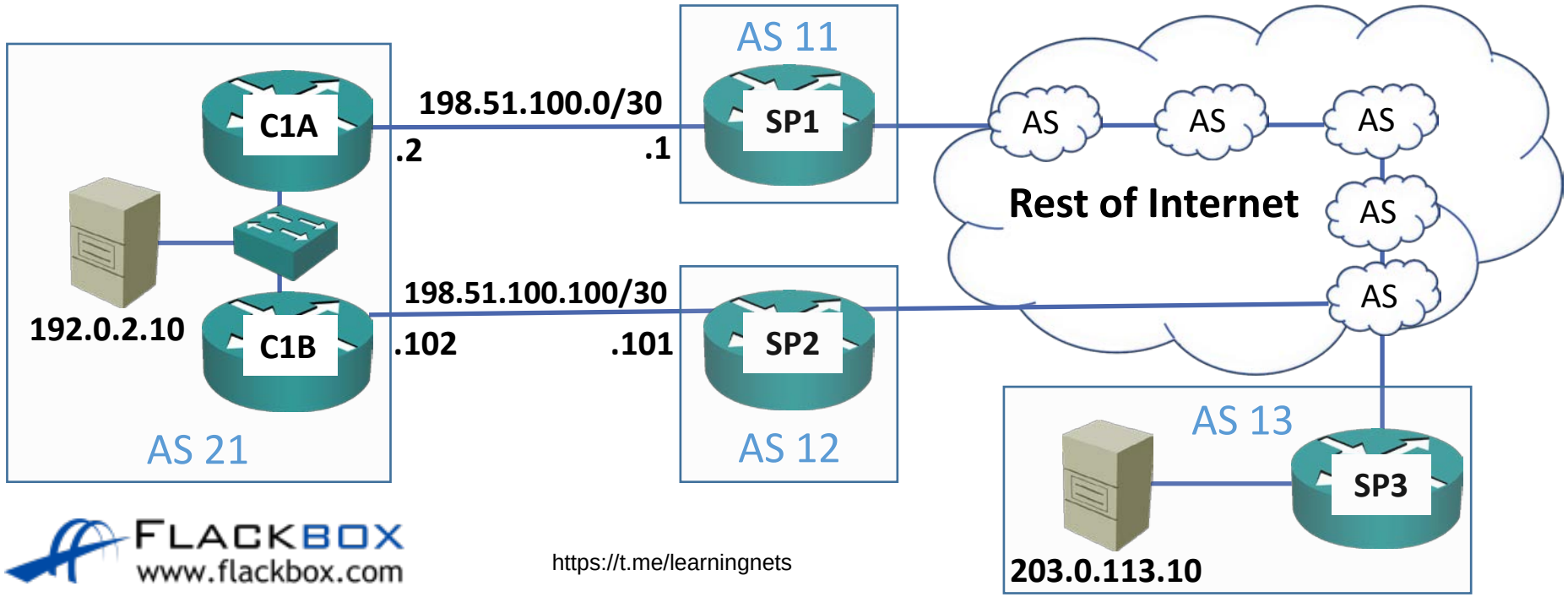
ISP Preventing Transit (No Prepending)

```
SP1(config)#ip as-path access-list 1 permit ^21$
SP1(config)#router bgp 11
SP1(config-router)#neighbor 198.51.100.2 filter-list 1 in

SP2(config)#ip as-path access-list 1 permit ^21$
SP2(config)#router bgp 12
SP2(config-router)#neighbor 198.51.100.102 filter-list 1 in
```



Allow AS Path Prepending

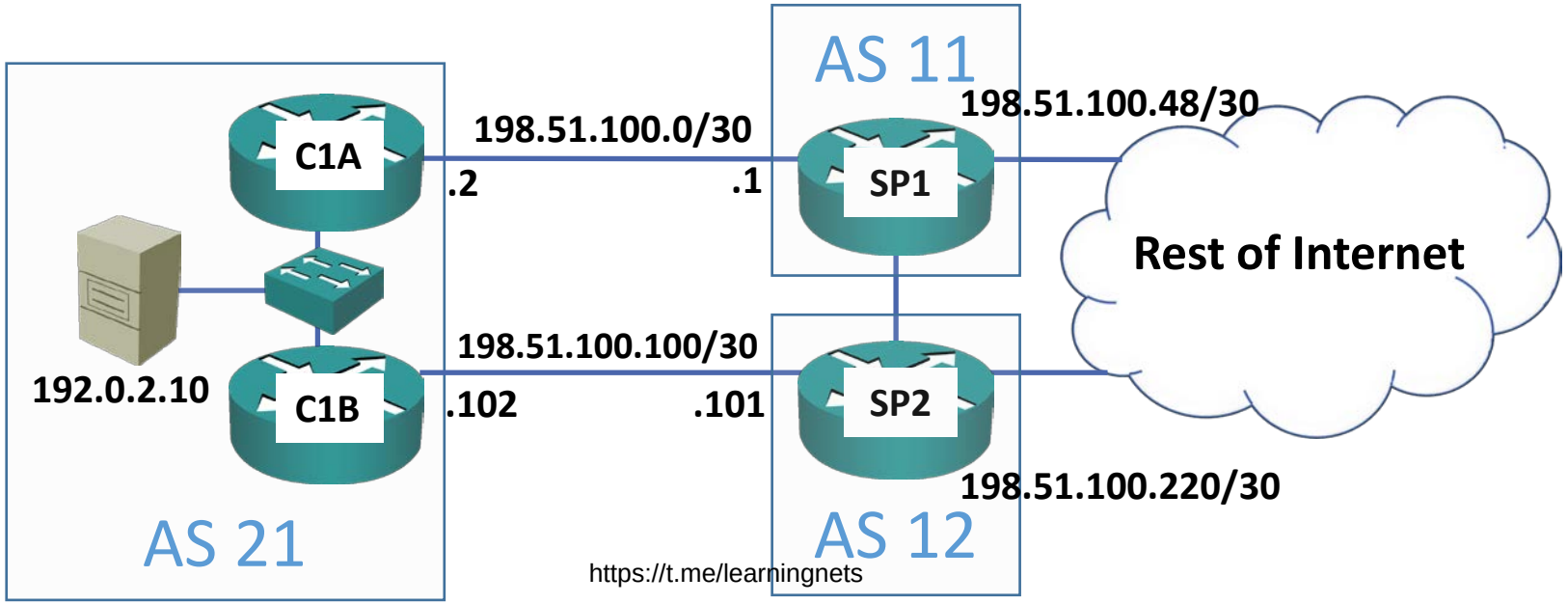
```
SP1(config)#ip as-path access-list 1 permit ^21(_21)*$
SP1(config)#router bgp 11
SP1(config-router)#neighbor 198.51.100.2 filter-list 1 in

SP2(config)#ip as-path access-list 1 permit ^21(_21)*$
SP2(config)#router bgp 12
SP2(config-router)#neighbor 198.51.100.102 filter-list 1 in
```



Enterprise Preventing Transit – Route Map

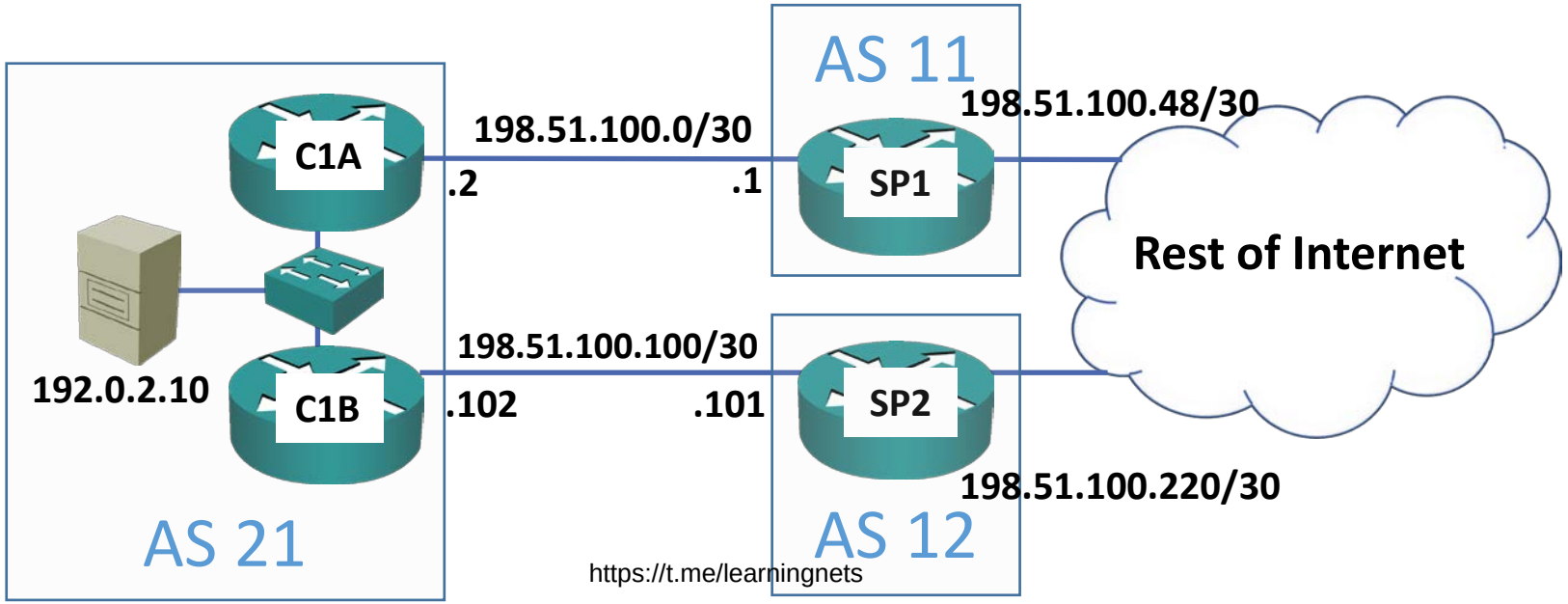
- A Route Map can set attributes on routes as well as filtering them

```
C1A(config)# ip as-path access-list 1 permit ^$
C1A(config)# route-map AS_PREPEND permit 10
C1A(config-route-map)# match as-path 1
C1A(config-route-map)# set as-path prepend 21 21 21
C1A(config)# router bgp 21
C1A(config-router)# neighbor 198.51.100.1 route-map AS_PREPEND out
```



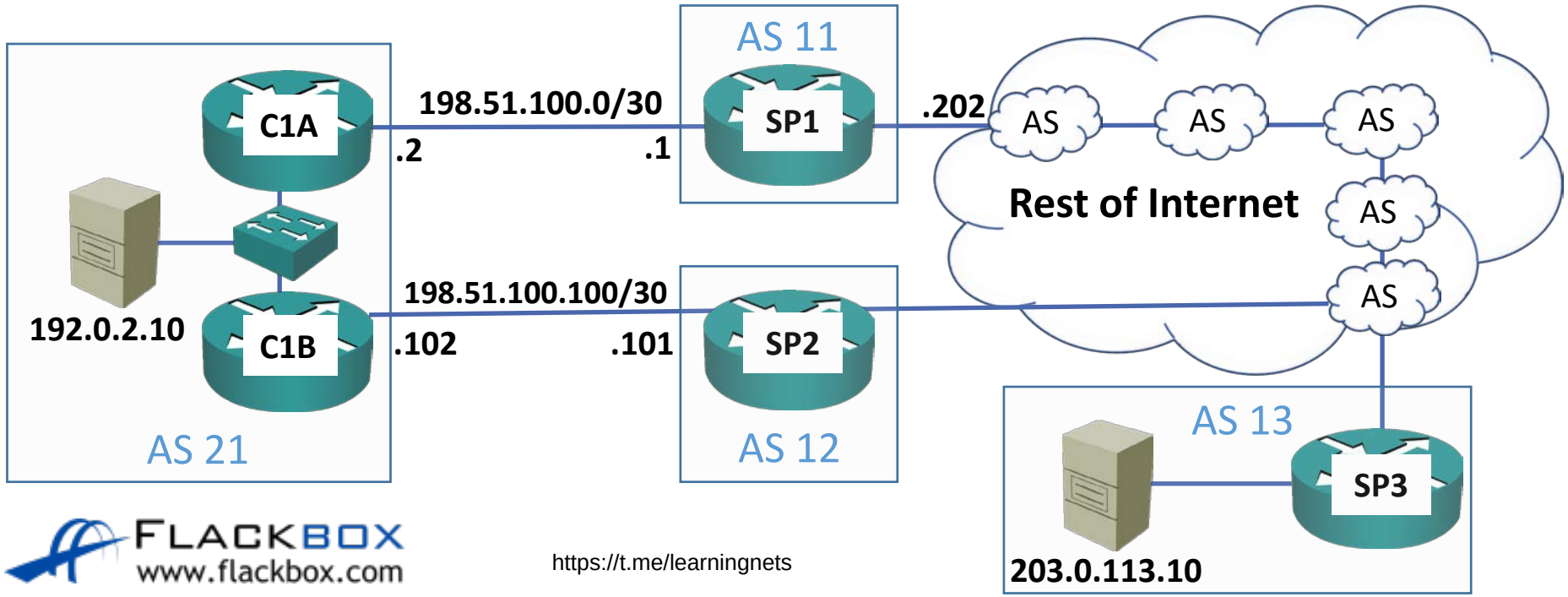
ISP Preventing Transit – Route Map

```
SP1(config)# ip prefix-list AS21 permit 192.0.2.0/24
SP1(config)# route-map DEMO permit 10
SP1(config-route-map)# match ip address prefix-list AS21
SP1(config-route-map)# set < attribute >
SP1(config)# router bgp 11
SP1(config-router)# neighbor 198.51.100.2 route-map DEMO in
```



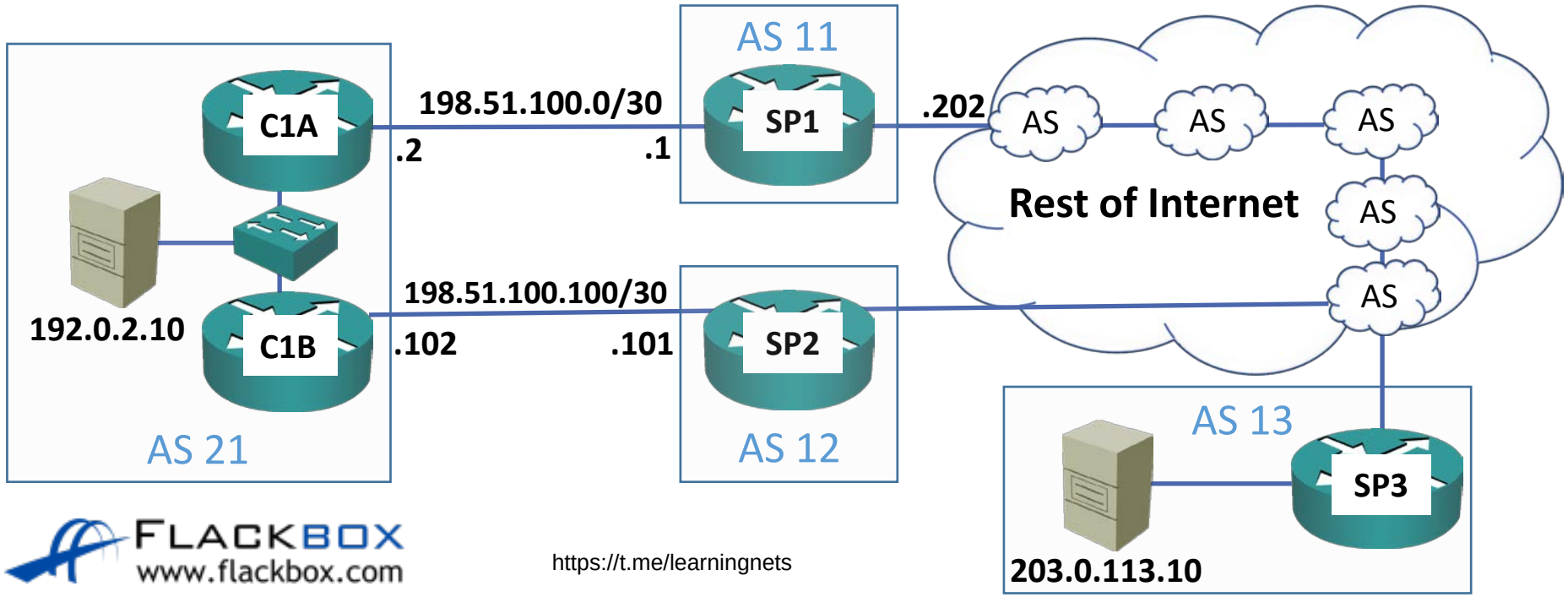
Verification – show ip bgp (Before Policy)

```
SP1#show ip bgp
 Network          Next Hop            Metric LocPrf Weight Path
*> 192.0.2.0       198.51.100.2             0             0 21 i
*                  198.51.100.202                         0 18 17 16 15 14 12 21 i
*> 203.0.113.0     198.51.100.2                           0 21 12 14 13 i
*                  198.51.100.202                         0 18 17 16 15 14 13 i
! truncated
```



Verification – show ip bgp (After Policy)

```
SP1#show ip bgp
 Network          Next Hop            Metric LocPrf Weight Path
*> 192.0.2.0       198.51.100.2             0             0 21 i
*                  198.51.100.202                         0 18 17 16 15 14 12 21 i
*  203.0.113.0     198.51.100.202                         0 18 17 16 15 14 13 i
! truncated
```



Verification – show ip bgp nei advertised-routes

```
C1A#show ip bgp neighbors 198.51.100.1 advertised-routes
! Truncated

     Network          Next Hop            Metric LocPrf Weight Path
 *>   192.0.2.0        0.0.0.0                  0         32768 I

Total number of prefixes 1
```