BGP Route Leaks

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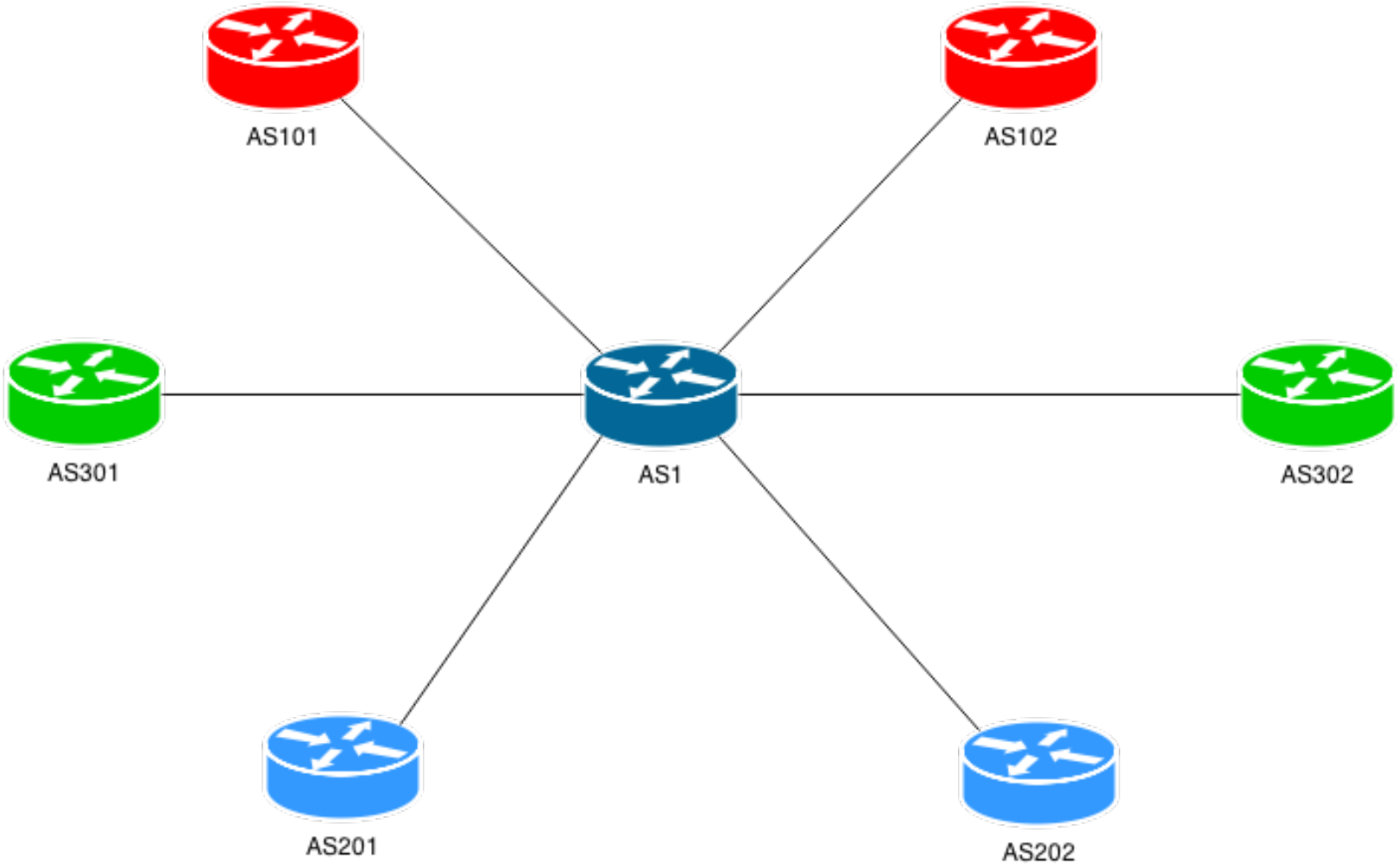
BGP Route Leak

- **Basics of routing**
- What is route leak?
- Why does it happen?
- Sample configuration
- Impact of route leak
- How to save yourself & your customers?

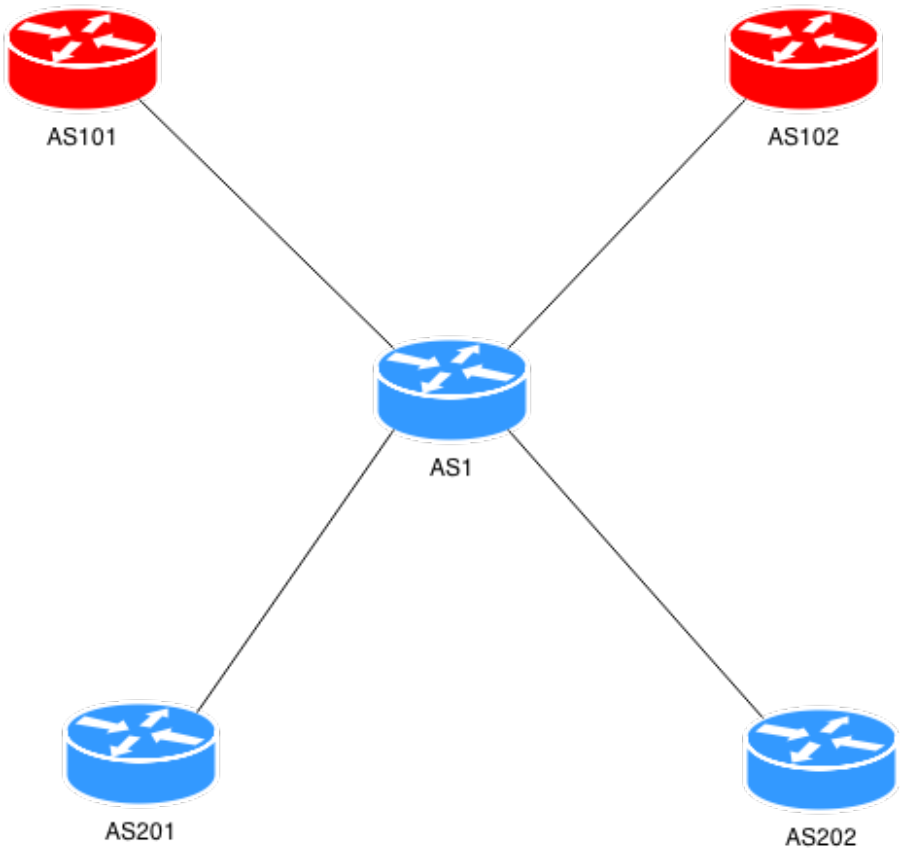
Routing setup of typical network

- Service Provider - **AS1**
- Upstream Provider - **AS101 & AS102**
- Strategic Peers - **AS301 & AS302**
- Downstream Customers - **AS201 & AS202**

Routing setup of typical network



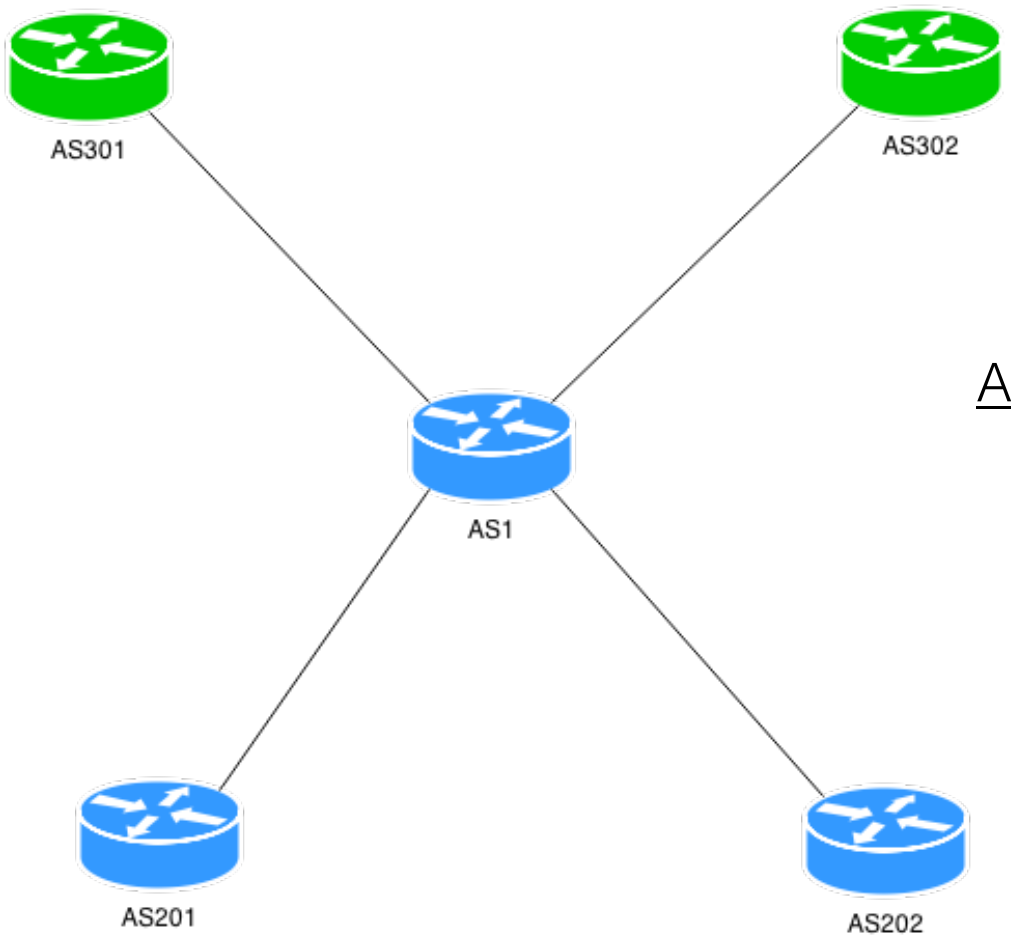
Routes announced to upstream…



AS101 will get routes with AS_PATH:

```
1
1 > 201
1 > 202
```

Routes announced to peer…



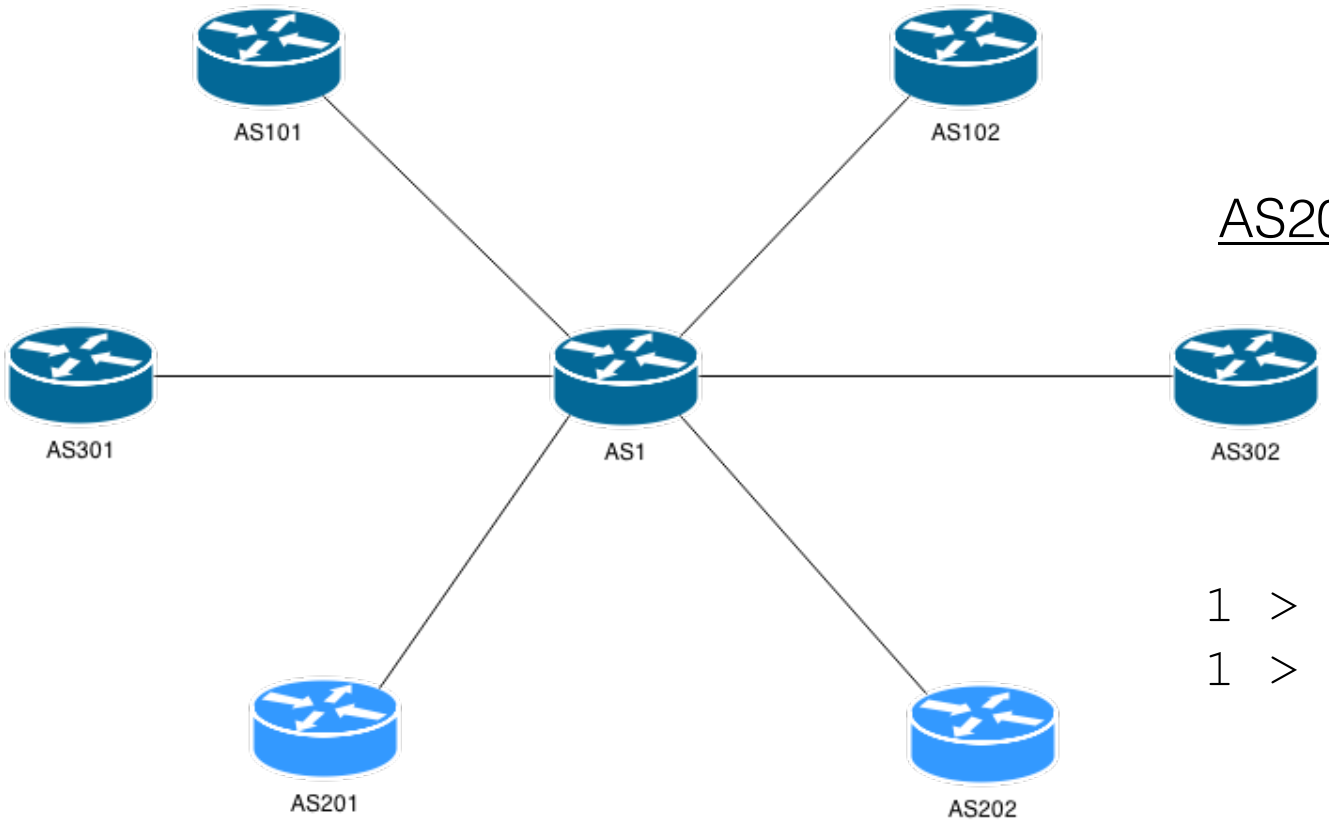
AS301 will get routes with AS_PATH:

1

1 > **201**

1 > **202**

Routes announced to downstream…



AS201 will get routes with AS_PATH

1

1 > 202

1 > 301

1 > 302

1 > 101…(all others)

1 > 102…(all others)

But that’s just ideal world!

BGP Route Leak

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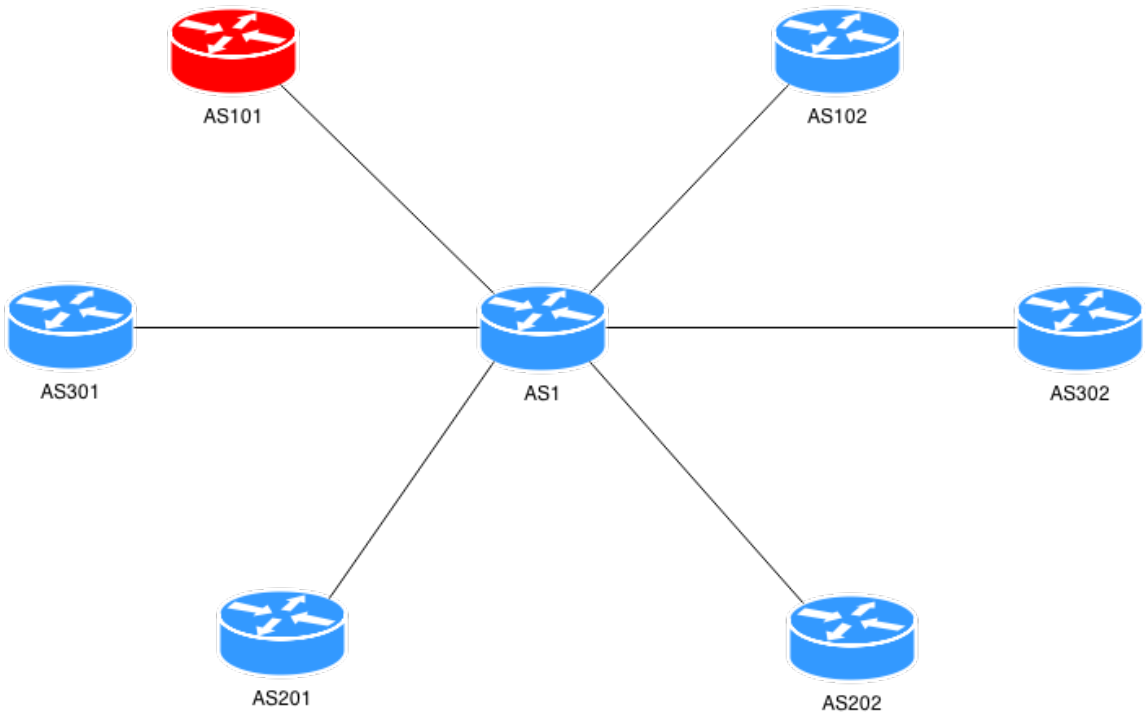
Scenario of route leak…

Possible route leaks

- Leaking routes to Upstream
- Leaking routes to Peers

Route leak to Upstream (AS101)…



AS101 will get routes with AS_PATH

1

1 > 201

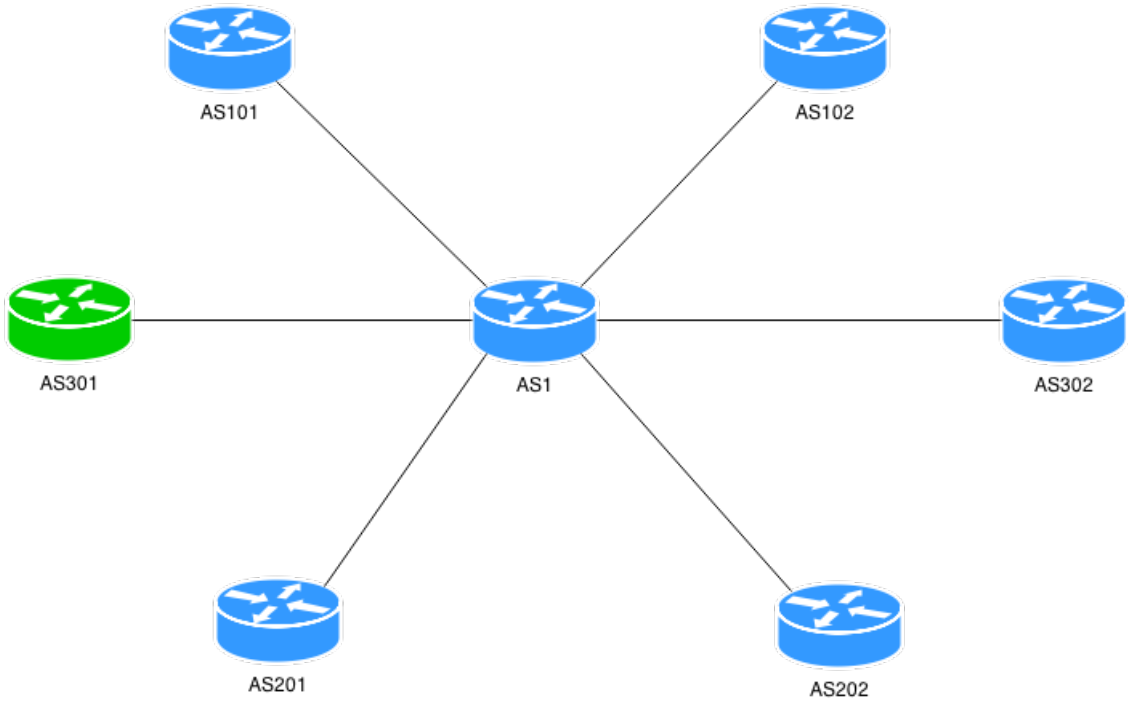
1 > 202

1 > 301

1 > 302

1 > 102

Route leak to Peer (AS301)…



AS301 will get routes with AS_PATH

```
1
1 > 201
1 > 202
1 > 101
1 > 102
1 > 302
```

General Routing Principles

- Upstreams get own routes + downstream network routes (**only**)
- Peers get own routes + downstream network routes (**only**)
- Downstream networks get all routes (*unless asked explicitly for default route*)

BGP Route Leak

- Basics of routing
- What is route leak?
- **Why does it happen?**
- Sample configuration
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- How to save yourself & your customers?

Why does it happen?

Typical reasons

- Bad filter configuration
- Bad AS_PATH regex

Typical filtering logic

- Filter BGP session with downstream based on pre-shared prefix list.

- Filter BGP session with upstream and inject routes of downtreams based on ASN for ***directly*** received routes.

BGP Route Leak

- Basics of routing
- What is route leak?
- Why does it happen?
- **Sample configuration**
- Impact of route leak
- How to save yourself & your customers?

Sample Configuration for session with AS201 (Cisco)

```
router bgp 1

 no synchronization

 bgp log-neighbor-changes

 neighbor AS201_PeerIP remote-as 201

 neighbor AS201_PeerIP description ***Downstream AS201***

 neighbor AS201_PeerIP next-hop-self

 neighbor AS201_PeerIP default-originate

 neighbor AS201_PeerIP route-map AS201-Inbound in
```

Sample Configuration for session with AS201 (Cisco)

```
route-map AS201-Inbound permit 10

match ip address prefix-list AS201_Prefix



ip prefix-list AS201_Prefix description
***Downstream AS201 Prefixes***

ip prefix-list AS201_Prefix seq 5 permit
AS201_Permitted_Prefix
```

Sample Configuration for session with AS101 (Cisco)

```
router bgp 1

 no synchronization

 bgp log-neighbor-changes

 network 10.10.1.0 mask 255.255.255.0

 neighbor 10.10.10.10 remote-as 101

 neighbor 10.10.10.10 description ***Upstream AS101***

 neighbor 10.10.10.10 route-map Upstream_Out out
```

Sample Configuration for session with AS101 (Cisco)

```
route-map Upstream_Out permit 10

 match as-path 1 2 3



ip as-path access-list 1 permit ^$

ip as-path access-list 2 permit ^201$

ip as-path access-list 3 permit ^202$
```

Sample Configuration for session with AS201 (JunOS)

```
neighbor AS201_PeerIP {
        description *****Downstream AS201*****;
        local-address AS1_LocalIP;
        import AS201-In;
        peer-as 201;
        local-as 1;
    }
```

Sample Configuration for session with AS201 (JunOS)

```
term a {
    from {
        protocol bgp;
        route-filter AS201_Permitted_Prefix exact;
    }
    then accept;
}
term b {
    then reject;
}
```

Sample Configuration for session with AS101 (JunOS)

```
neighbor AS201_PeerIP {
        description *****Upstream AS101*****;
        local-address AS1_LocalIP;
        import AS101-In;
 export AS101-Out;
        peer-as 101;
        local-as 1;
    }
```

Sample Configuration for session with AS101 (JunOS)

```
term Internal_Routes
from {
            prefix-list Internal-Routes;

      }
then accept;



term Customer
from {
            protocol bgp;
            as-path [AS201 AS202];
      }
then accept;


term reject {
      then reject;
}
```

BGP Route Leak

- Basics of routing
- What is route leak?
- Why does it happen?
- Sample configuration
- **Impact of route leak**
- How to save yourself & your customers?

Impact of route leak

- Unexpected traffic flow (*specially when localpref is tweaked*) leading to increased cost of transit
- Floods global routing table with bad routes wasting memory
- Might make data to flow through narrow pipes due to unexpected routing
- Consistent route leak will lead to de-peering!
- You may unknowingly cause outage to a 3rd party service
- Unexpected relationship visibility on tools like bgp.he.net, RIPE RIS, Oregon data etc

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- Basics of routing
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- Impact of route leak
- **How to save yourself & your customers?**

Saving yourself & your customers

- Strictly filter your customers based on prefix lists
- Filter your peers for based on AS_PATH
- Keep an eye on your AS number using tools like RIPE Stat, bgp.he.net, Oregon route-views etc and verify your peers
- Use tools like IRRToolSet in large scale automated filter configuration
- Create bogon filters & reject RFC1918 private address
- Scream on xNOG mailing lists if you need help ;)

Questions?

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