Implement anti-spoofing to prevent DNS Amplification Attack

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ip spoofing

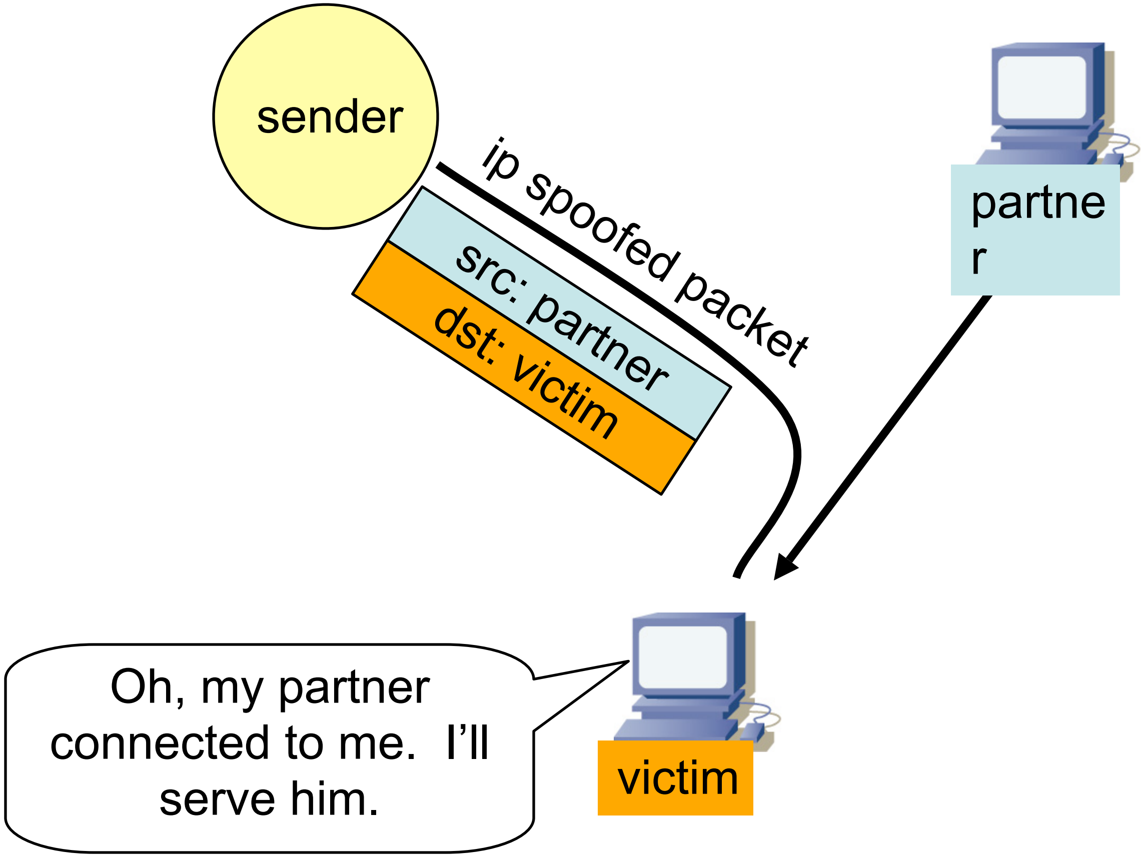
creation of IP packets

with source addresses other than those assigned to that host

Malicious uses with IP spoofing

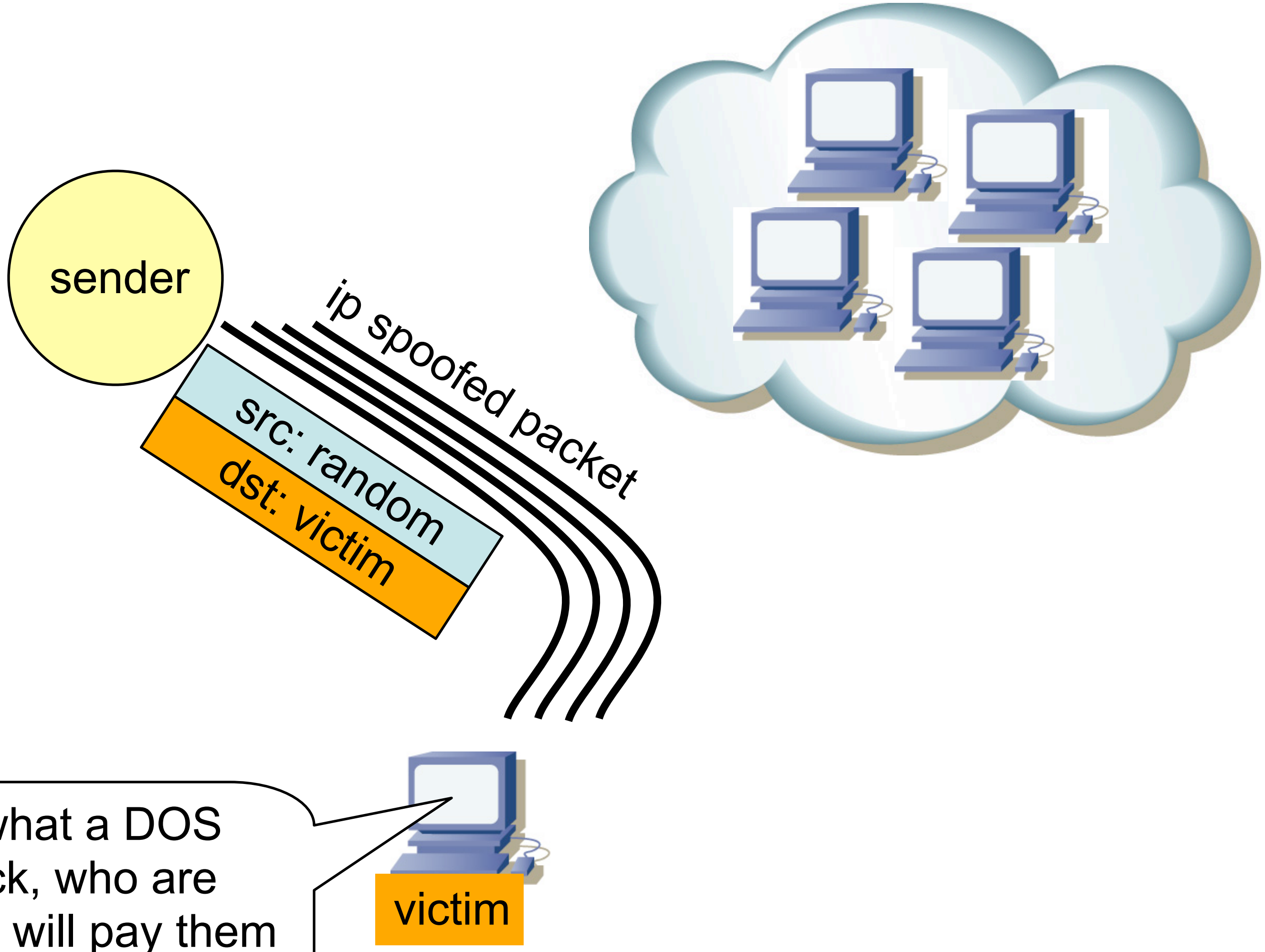
- impersonation
  - session hijack or reset
- hiding
  - flooding attack
- reflection
  - ip reflected attack

impersonation



Oh, my partner connected to me. I'll serve him.

hiding



sender

ip spoofed packet

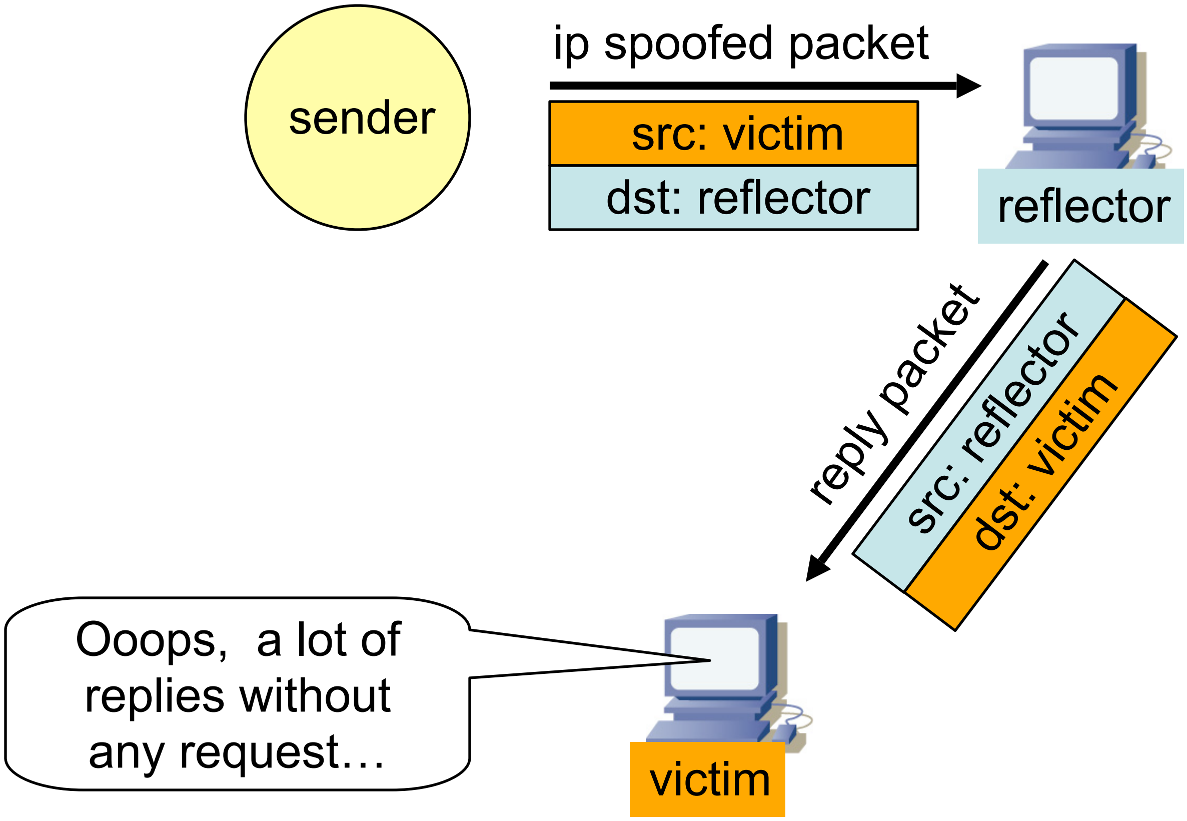
src: random

dst: victim

victim

Oh what a DOS attack, who are they? I will pay them back later…

reflection

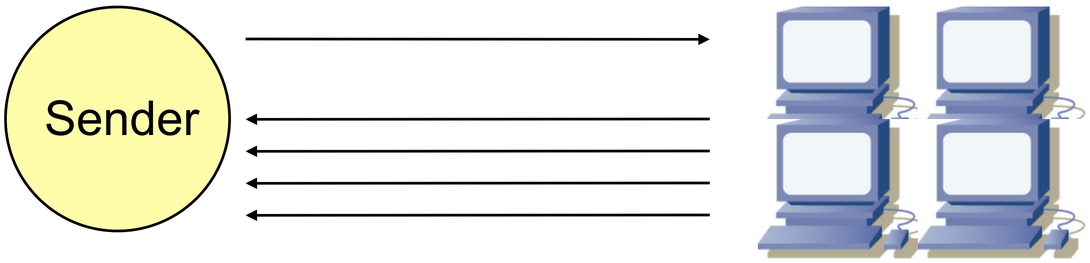

sender
ip spoofed packet
src: victim
dst: reflector
reflector
reply packet
src: reflector
dst: victim
Ooops, a lot of replies without any request…
victim

ip reflected attacks

- smurf attacks
  - icmp echo (ping)
  - ip spoofing(reflection) + amplification (multiple replies)
- **dns amplification attacks**
  - **dns query**
  - **ip spoofing(reflection) + amplification (bigger reply / multiple replies)**

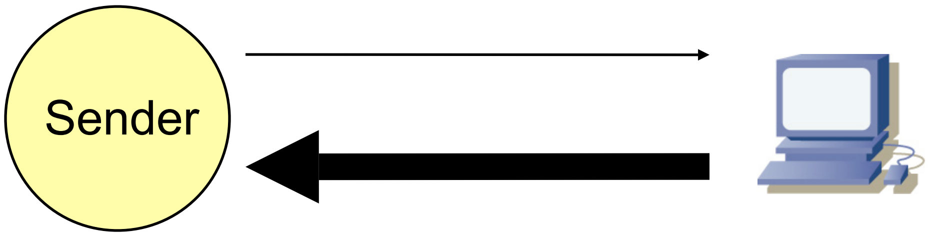
amplification

1. multiple replies



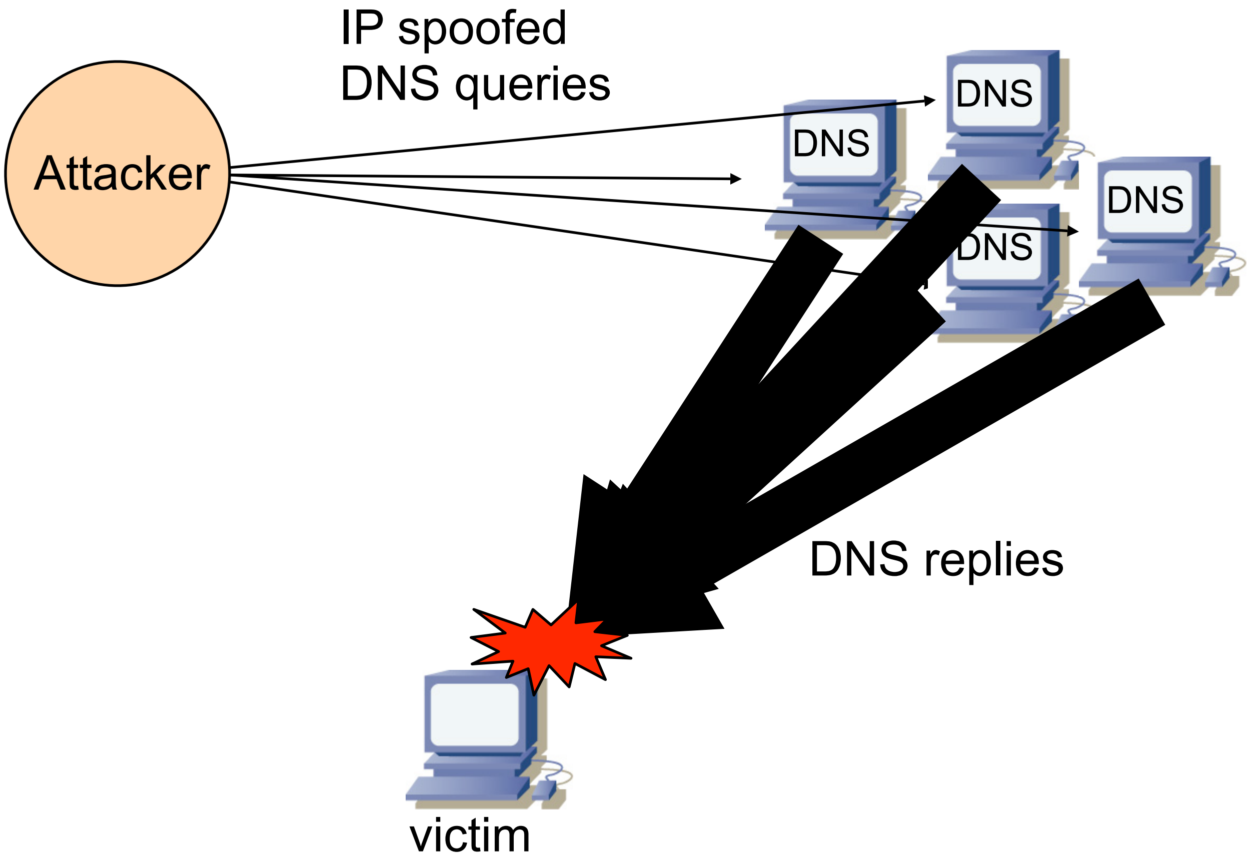
Sender

2. bigger reply

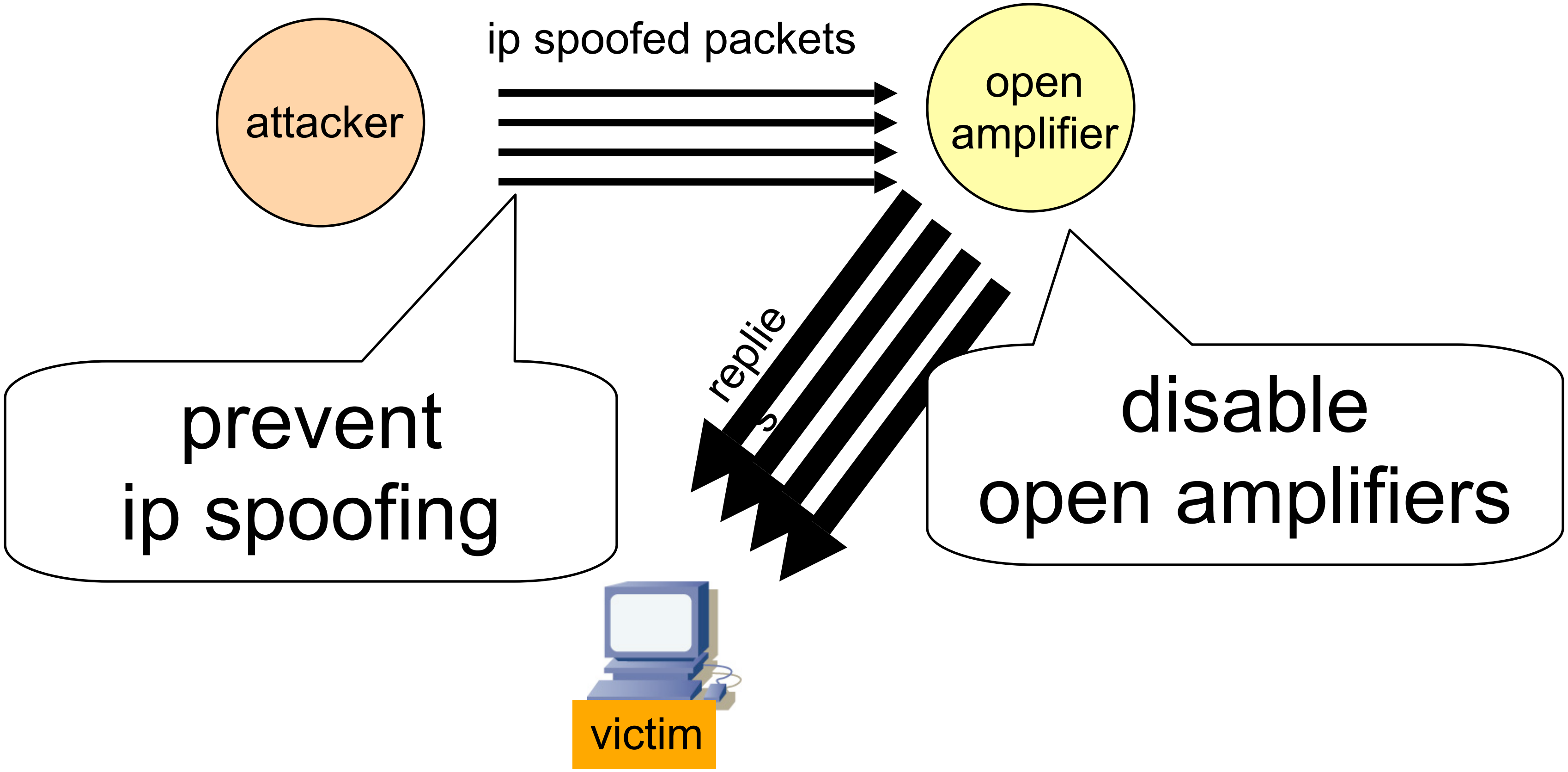


Sender

DNS amplification attack



solutions for ip reflected attacks



attacker

ip spoofed packets

open amplifier

replies

prevent ip spoofing

disable open amplifiers

victim

two solutions

- disable amplification
  - disable ‘directed-broadcast’, ‘open dns server’
    - Actually we need to accept dns queries for resolution of our own zone.
    - But we can limit recursive query to limited area that server need to serve.
- prevent ip spoofing!!
  - source address validation
  - BCP38 & BCP84

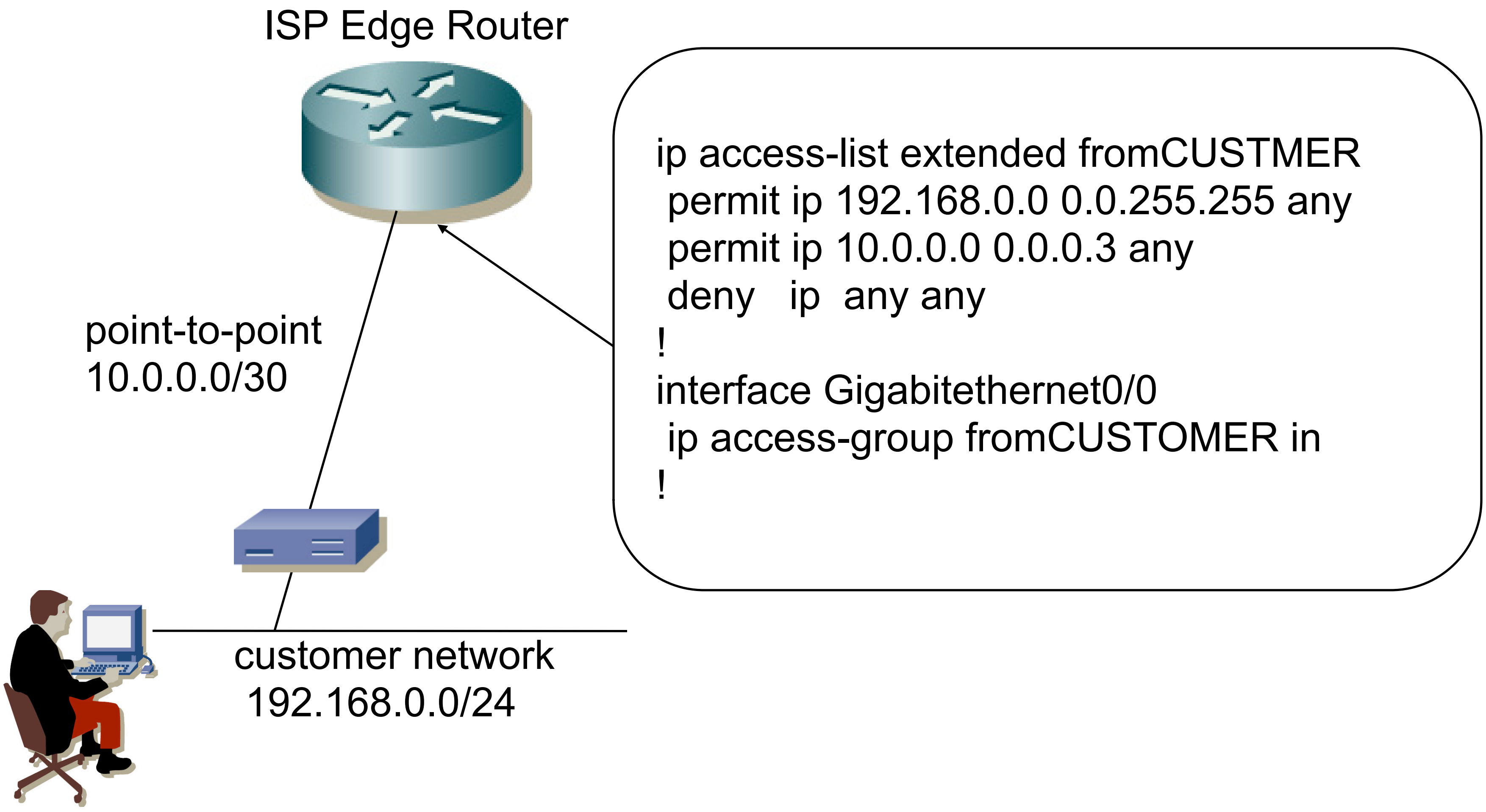
Source Address Validation

- Check the souce ip address of incoming ip packets close to the network edge
  - BCP84/RFC3704
    - updating BCP38/RFC2827
    - It is important for ISPs to implement ingress filtering to prevent spoofed addresses being used, both to curtail DoS attacks and to make them more traceable, and to protect their own infrastructure.

How to configure the checking

- ACL
  - packet filter
- uRPF check
  - uRPF: Unicast Reverse Path Forwarding
  - using ‘routing table’
  - look-up the return path for the source ip address

cisco ACL example



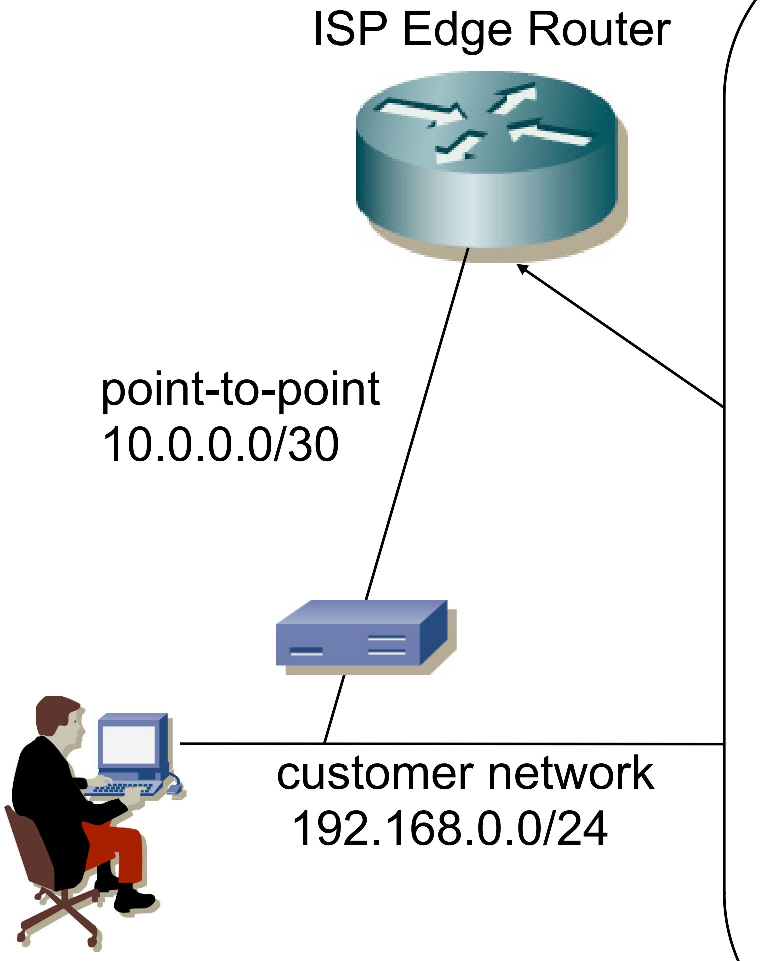
ISP Edge Router

point-to-point
10.0.0.0/30

customer network
192.168.0.0/24

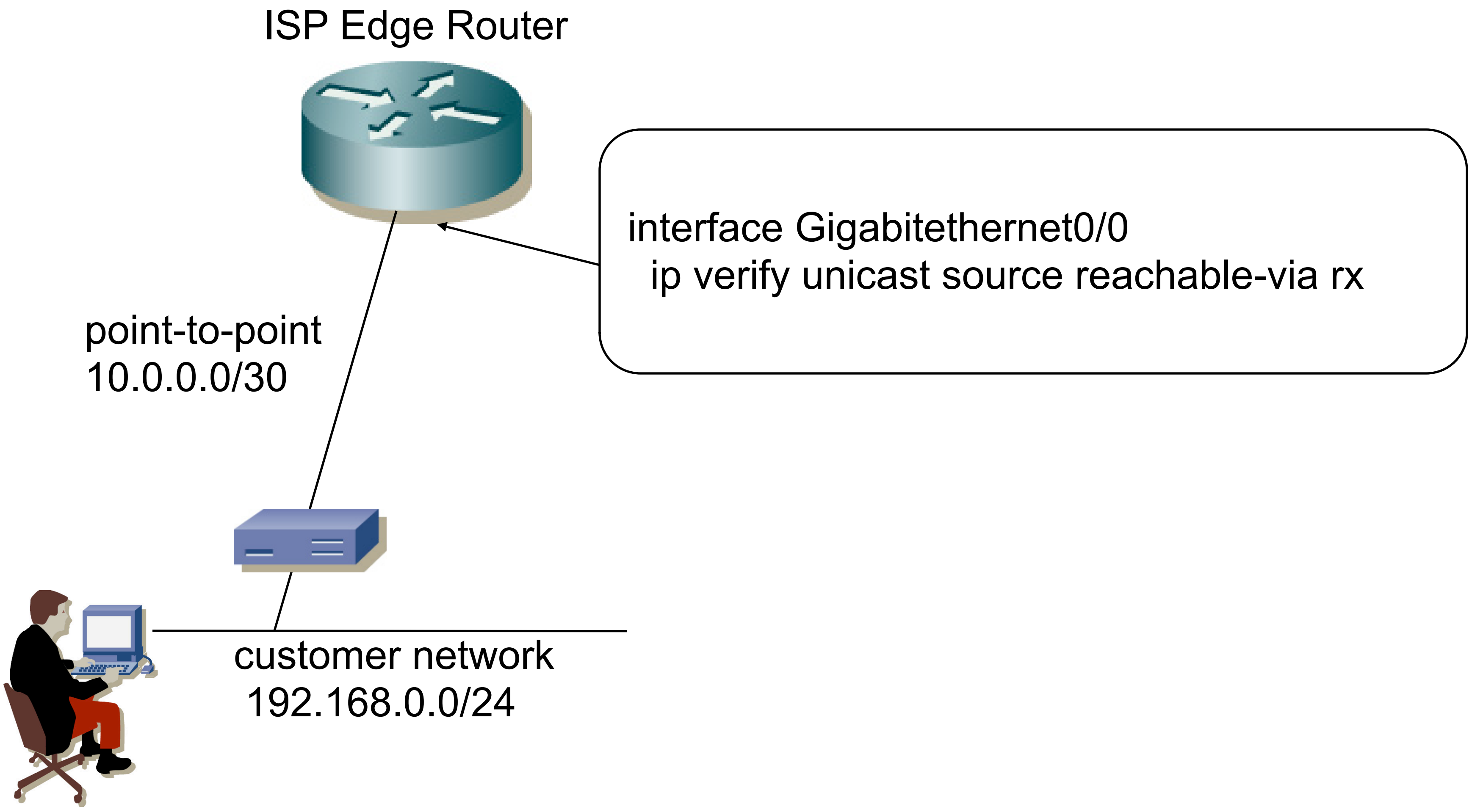
```
ip access-list extended fromCUSTMER
 permit ip 192.168.0.0 0.0.255.255 any
 permit ip 10.0.0.0 0.0.0.3 any
 deny   ip  any any
!
interface Gigabitethernet0/0
 ip access-group fromCUSTOMER in
!
```

juniper ACL example



```
firewall family inet {
 filter fromCUSTOMER {
  term CUSTOMER {
   from source-address {
    192.168.0.0/16;
    10.0.0.0/30;
   }
   then accept;
  }
  term Default {
   then discard;
  }
 }
}
[edit interface ge-0/0/0 unit 0 family inet]
filter {
 input fromCUSTOMER;
}
```

cisco uRPF example



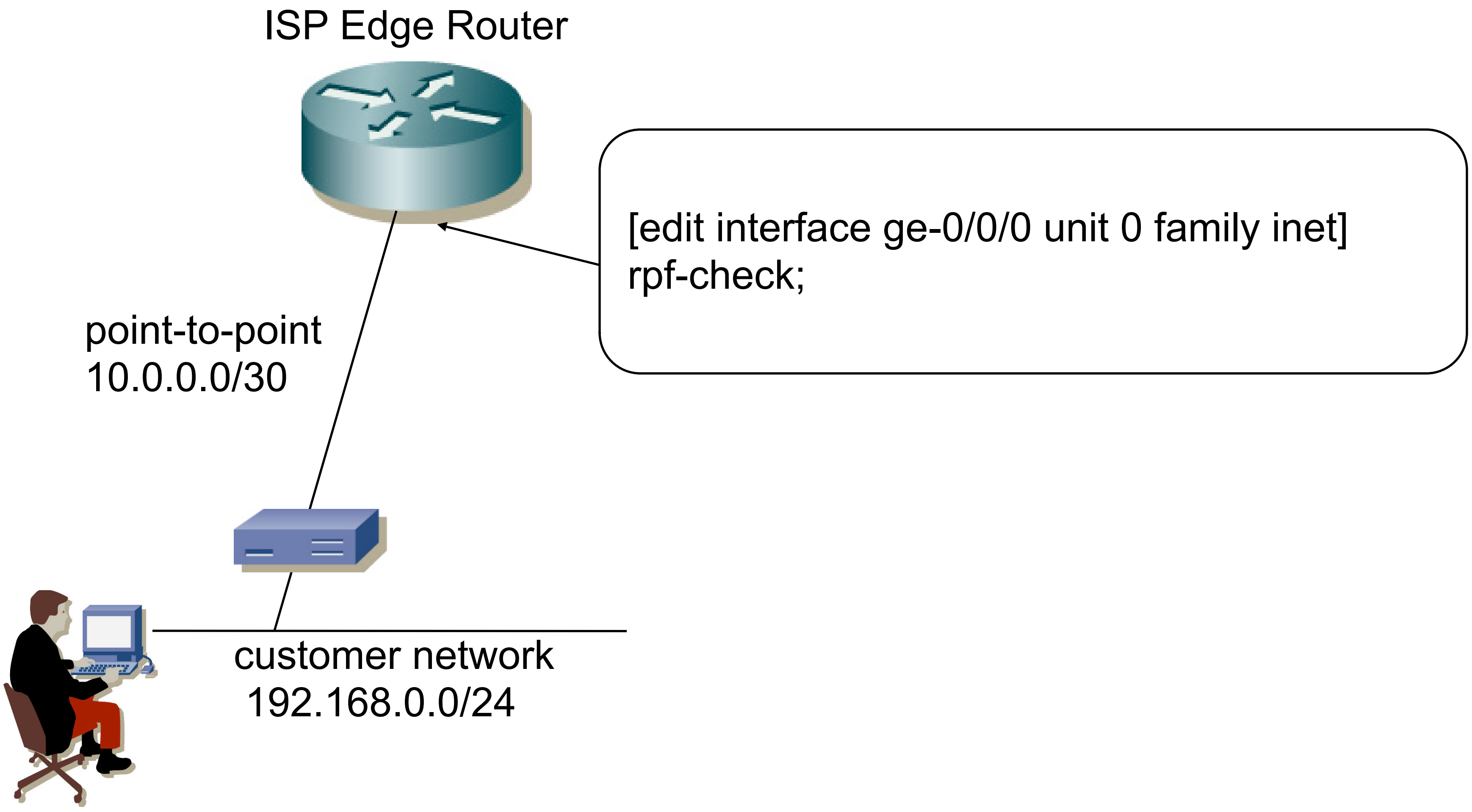
ISP Edge Router

```
interface Gigabitethernet0/0
  ip verify unicast source reachable-via rx
```

point-to-point
10.0.0.0/30

customer network
192.168.0.0/24

juniper uRPF example



ISP Edge Router

```
[edit interface ge-0/0/0 unit 0 family inet]
rpf-check;
```

point-to-point
10.0.0.0/30

customer network
192.168.0.0/24

END