



CCIE Security Version 5 Advanced Technologies Class



Unicast Reverse Path Forwarding

What is RPF – Reverse Path Forwarding?

How is it used for unicast traffic?

Reverse Path Forwarding Overview

▶ What is RPF?

- Perform some validations for source address of a packet
- Packets failing the validations are dropped

▶ For which packet types is the check done?

- Multicast, enabled by default
- Unicast (uRPF), disabled by default

▶ What is the purpose of RPF?

- In multicast: loop prevention and multicast tree building
- In unicast: IP address spoofing

uRPF Overview

- ▶ uRPF is defined in RFC 3704 for IPv4 unicast
 - Feature has been implemented also for IPv6 unicast
- ▶ RFC 3704 defines three deployment options
 - Strict RPF
 - Feasible path RPF
 - Loose RPF
- ▶ IOS routers support only strict and loose
 - In both modes, validation of the source address is performed against the FIB

uRPF Overview

▶ uRPF strict and loose considerations

- CEF is required for uRPF to work
- Any best route (not LFA) from the FIB can be used to validate the source address
- uRPF is compatible with ECMP (equal cost multipath)
- uRPF is compatible with UCMP (unequal cost multipath)

Strict uRPF Overview

▶ With strict uRPF enabled

- Packet is accepted only if it was received on the RPF interface

▶ What is the RPF interface?

- Identifies the egress interface the router would use to route for the source IP of the packet

▶ Which routes are usable for strict RPF?

- Any routes except the default route
- Optionally, the default route can be taken into account

Strict uRPF Overview

▶ Considerations

- It's not compatible with asymmetric routing environments

Strict uRPF

▶ Implementation steps

- Enable uRPF strict mode
- Verify its functionality

▶ Optionally

- Configure the default route to be valid for RPF checks

Loose uRPF Overview

▶ With loose uRPF enabled

- Packet is accepted as long as the router has a route for the source IP of the packet
- Traffic with source matching on a Null0 route is dropped

▶ In which environment does loose mode fit?

- Asymmetric routing

▶ Which routes are usable for RPF?

- Any routes except the default route
- Optionally, the default route can be taken into account

Loose uRPF

▶ Implementation steps

- Enable uRPF loose mode
- Verify its functionality

▶ Optionally

- Configure the default route to be valid for RPF checks

uRPF Conclusions

▶ uRPF is preferred against the RFC's defined for IP address spoofing

- It is dynamic
- It is performed in CEF, thus CPU friendly
- Fits both symmetric and asymmetric routing environments



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