Source Address Validation Using Source Origin Authorizations (SOAs)

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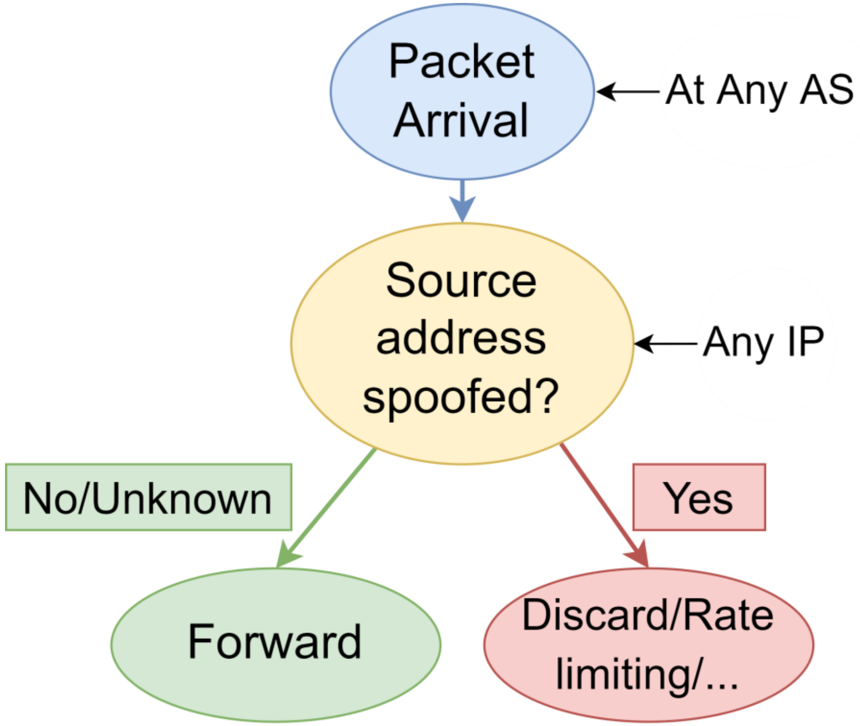
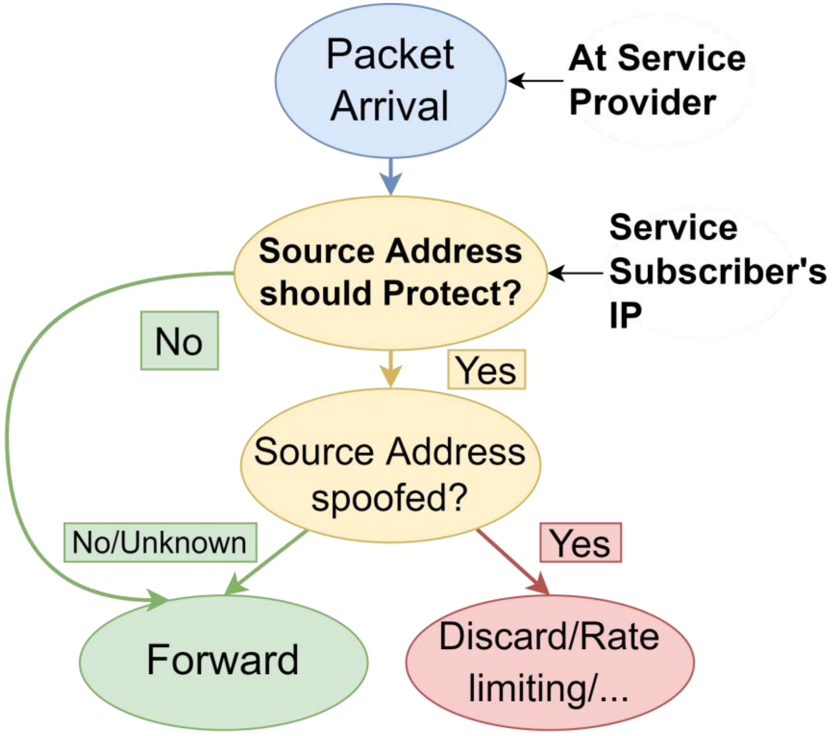
Source Address ~~Validation~~ Protection Service (SAPS)

SAV with SAPS



Source Address **Validation**



Source Address **Protection Service**

Source Address ~~Validation~~ Protection Service (SAPS)

- Why SAPS?
  - IP spoofing primarily harms the owner of the spoofed IP
  - More accurate SAV requires inter-domain collaboration
  - Filtering legitimate packets is **undesirable** by ASes do not require SAV.

Why Does SAPS Need RPKI?

- SAPS’ Challenges:
  - Global Service Discovery Platform
  - Building Trust Between ASes
  - Secure Routing Information Transport

Why Does SAPS Need RPKI?

- SAPS’ Challenges:
  - Global Service Discovery Platform
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  - Secure Routing Information Transport
- RPKI’s Characteristics:
  - Global Deployment
  - Accessible to Anyone, Anywhere
  - Reliable Authentication
  - Trusted Object Content

How Does SAPS Use RPKI? (How Does SOA Work?)

- What is a Source Origin Authorization (SOA)?
  - A new proposed RPKI object
  - Issued by the AS that owns an IP prefix block (similar to an ROA).
  - Allows an AS to send packets using source addresses from its own IP prefix block.
  - Content:

SOA Structure	
Sub. AS(4 Bytes, req'd)	Prov. AS(4 Bytes， req'd)
Dst IP(16 Bytes， opt.)	Legitimate Pre AS Length (4 Bytes， req'd)
Legitimate Pre AS (variable length)	

How Does SAPS Use RPKI? (How Does SOA Work?)

- Becoming a **Service Subscriber:**
  - Select an appropriate service provider.
    - Consider AS rank, global reputation, and historical performance in network security.
  - Determine the legitimate predecessor AS.
    - Based on BGP routing table analysis.
  - Generate the SOA.

How Does SAPS Use RPKI? (How Does SOA Work?)

- Becoming a **Service Provider**:
  - Query the SOAs where the provider's ASN is itself in RPKI.
  - Extract its Subscriber ASes and Legitimate Predecessor ASes.
  - Allow packets from the Subscriber AS to pass only through the Legitimate Predecessor ASes.
    - Refer to the document for detailed implementation steps.
    - Assumes that ASes deploying SOAs have already implemented ROAs.

Effectiveness and Cost

- Effectiveness
  - Depends on number and placement of service providers
  - Simulate Results:
    - With 100 providers deployed, an expected 1 valid provider is present per random attack path.
- Cost
  - RPKI Storage Requirements
    - SOA numbers(Sub. Number * Prov. number) * SOA size(Avg Pre-AS number)
  - Provider ACL usage
    - Higher ACL usage increases profit, leading to greater capacity.

Thank you for any comments!

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