Third Time's Not a Charm

Exploiting SNMPv3 for Router Fingerprinting

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RIPE 83 Academic Session

SNMP

What is SNMP?

- Simple Network Management Protocol
- Example use case: Retrieve various device statistics
- Introduced in the 1980s
- SNMPv3 standardized in 2002

SNMPv3 request

```
Simple Network Management Protocol
    msgVersion: snmpv3 (3)
    msgGlobalData
    msgAuthoritativeEngineID: <MISSING>
    msgAuthoritativeEngineBoots: 0
    msgAuthoritativeEngineTime: 0
    msgUserName:
    msgAuthenticationParameters: <MISSING>
    msgPrivacyParameters: <MISSING>
    msgData: plaintext (0)
```

SNMPv3 response

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Simple Network Management Protocol
    msgVersion: snmpv3 (3)
    msgGlobalData
    msgAuthoritativeEngineID: 800007c703748ef831db80
        1... .... = Engine ID Conformance: RFC3411 (SNMPv3)
        Engine Enterprise ID: Brocade Communication Systems, Inc.
        Engine ID Format: MAC address (3)
        Engine ID Data: BrocadeC_31:db:80 (74:8e:f8:31:db:80)
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Engine ID: unique and unambiguous identifier

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Responses

- **12.5M IPv4** addresses
- **140k IPv6** addresses

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- **12.5M IPv4** addresses
- **140k IPv6** addresses
- 22k ASes, of which **8k in the RIPE region**

Why should operators care?

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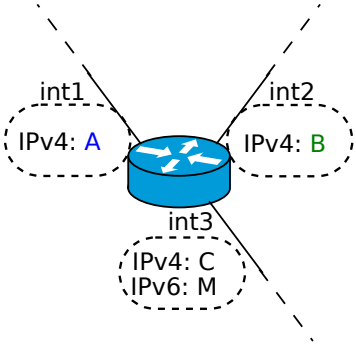
- Improperly secured SNMPv3 allows anyone to
  - Learn about your **network infrastructure**
  - **Fingerprint** your routers
  - Use this information for **malicious purposes**

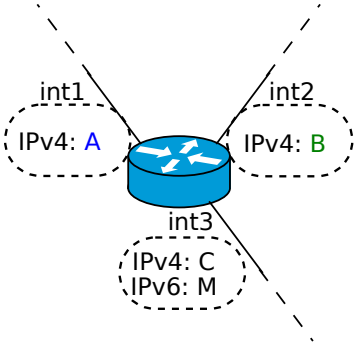
Learn about your network infrastructure

Addresses belonging to routers



Addresses belonging to routers

Prober



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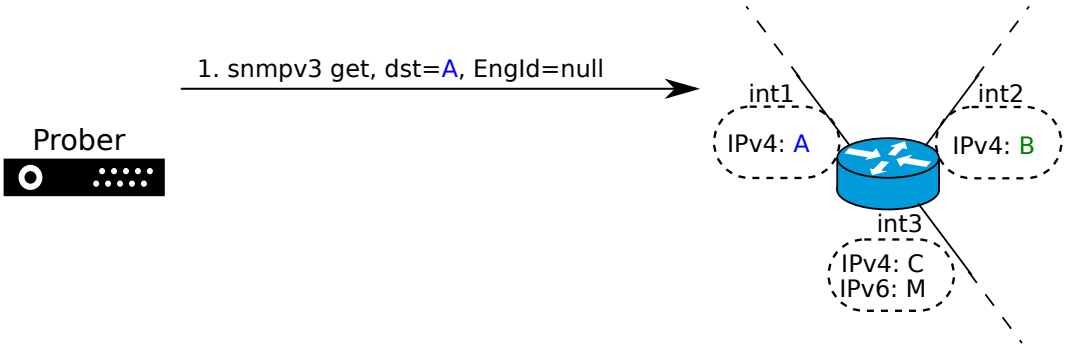

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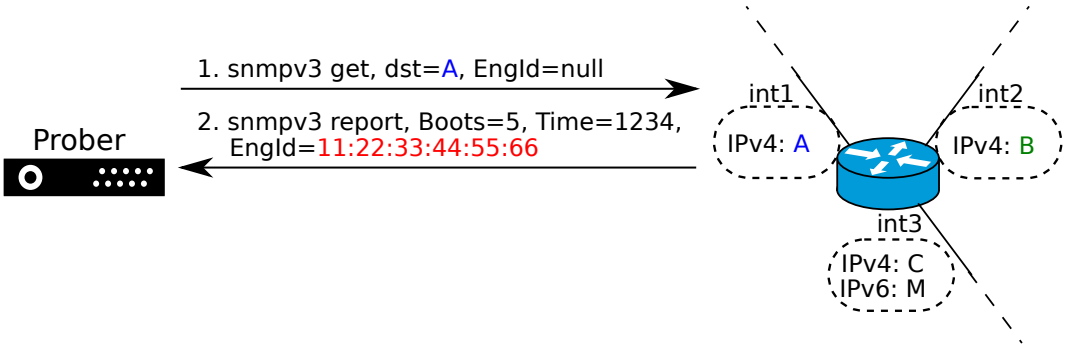

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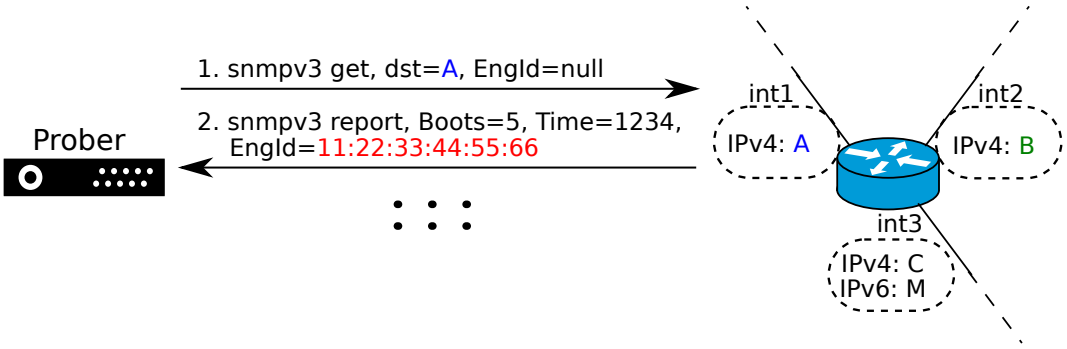

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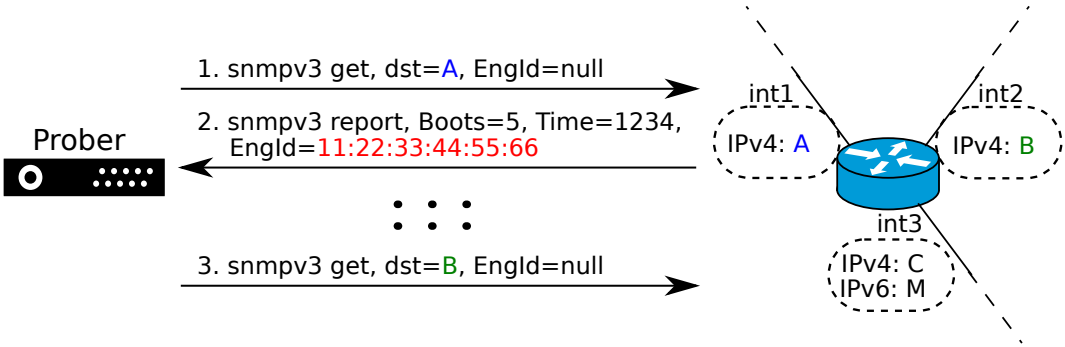

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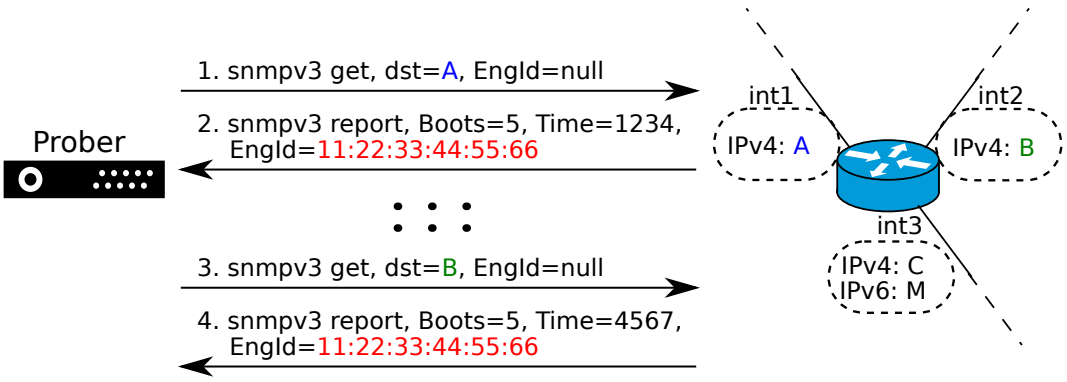

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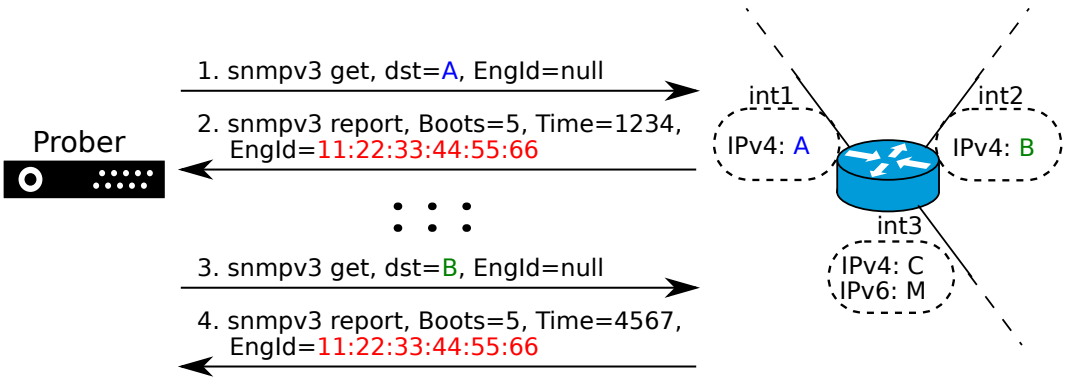

With a single packet per target IP!

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Nice

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Nice, but so what?

Fingerprint your router

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MAC → vendor fingerprinting!

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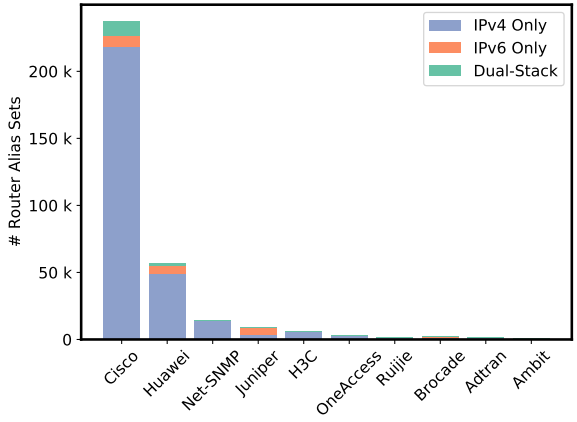

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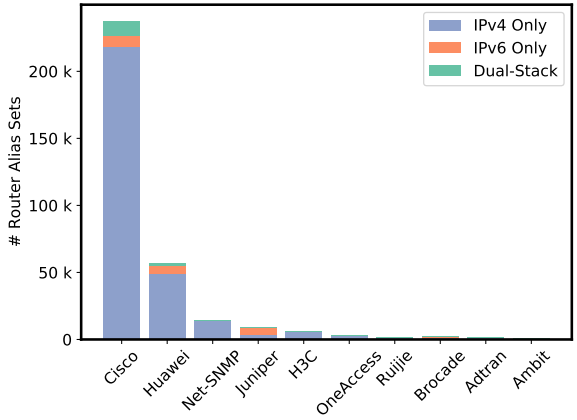

Cisco is dominating!

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Lab experiments

- Enable **SNMPv2c**

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Devices unknowningly respond to SNMPv3

Response by Cisco

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- We reached out to Cisco

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Response by Cisco

- We reached out to Cisco, they confirmed the issue
- Multiple bug reports and one **CVE from 2012**
- New IOS command: `snmp-server drop unknown-user`
- Workaround: Drop packets from untrusted networks

What else?

Monitoring the SNMPv3 landscape

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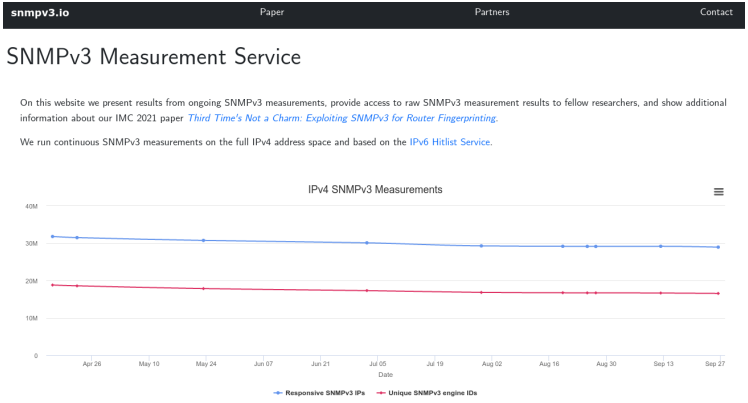

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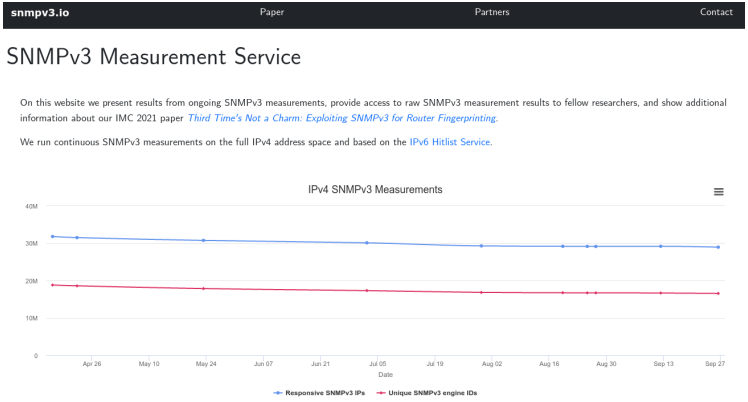

https://snmpv3.io

Conclusion

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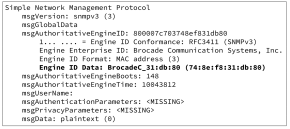

Engine ID to **identify devices**

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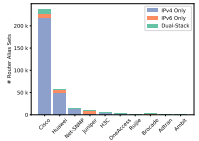

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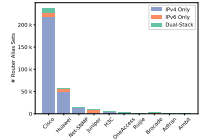

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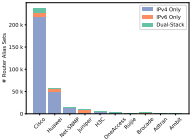

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SNMPv3.io