Protecting Network Infrastructure, Routers, Switches, etc

by Randy Bush

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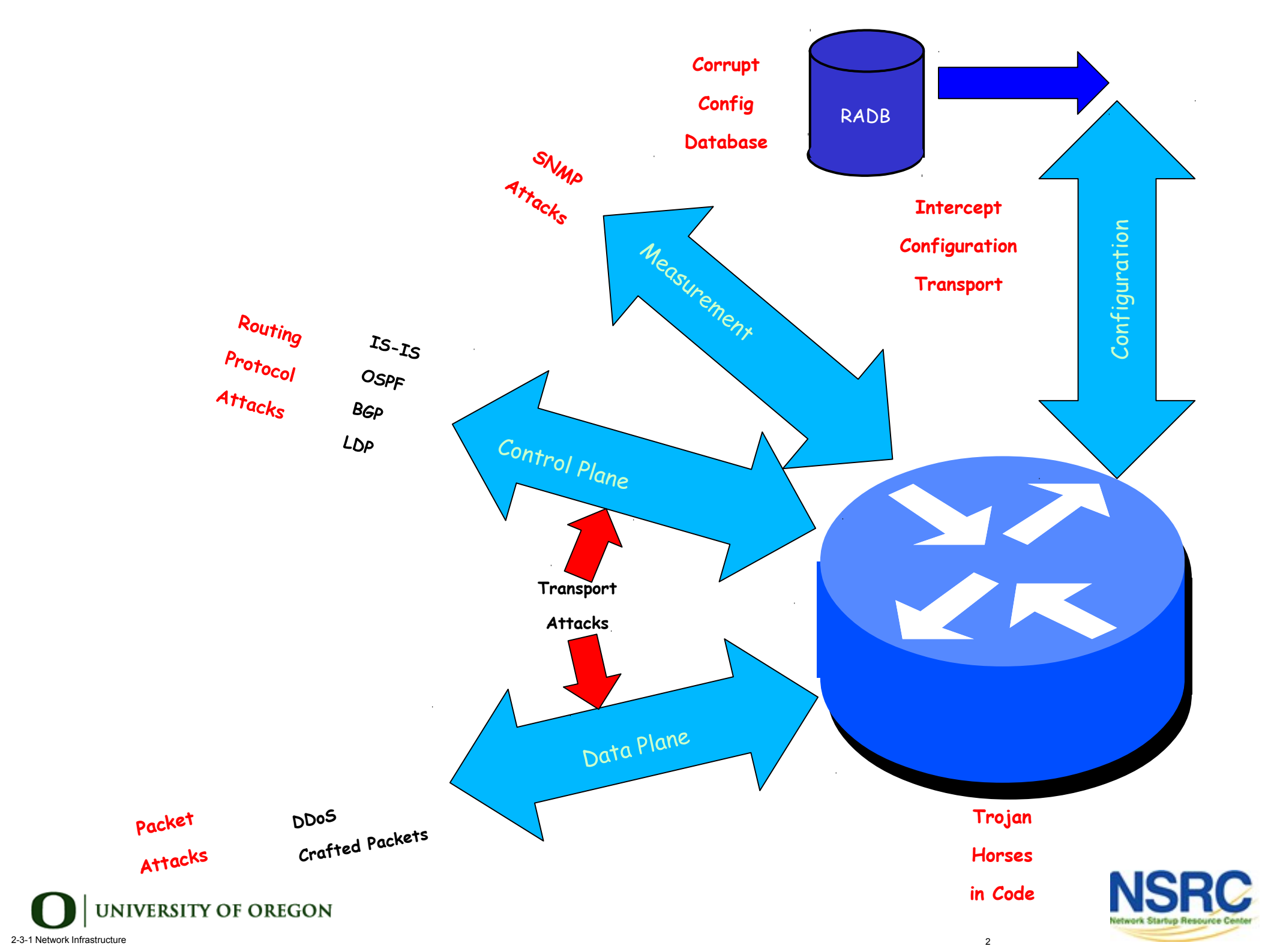
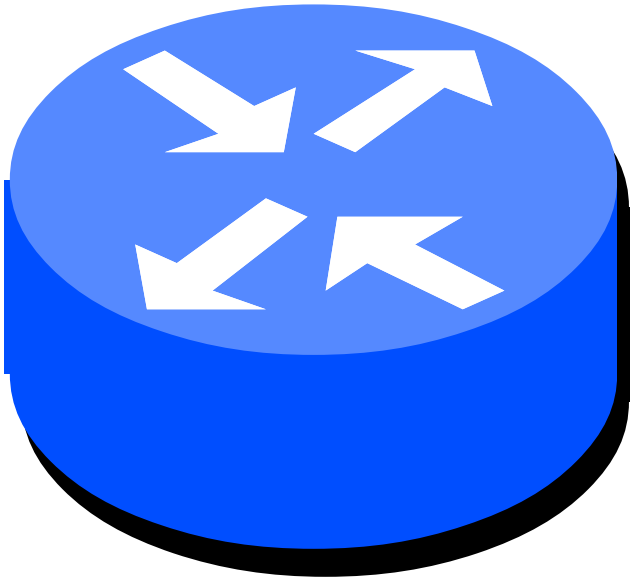

Corrupt
Config
Database
RADB
SNMP
Attacks
Intercept
Configuration
Transport
Configuration
Measurement
Routing
Protocol
Attacks
IS-IS
OSPF
BGP
LDP
Control Plane
Transport
Attacks
Data Plane
Packet
Attacks
DDoS
Crafted Packets
Trojan
Horses
in Code

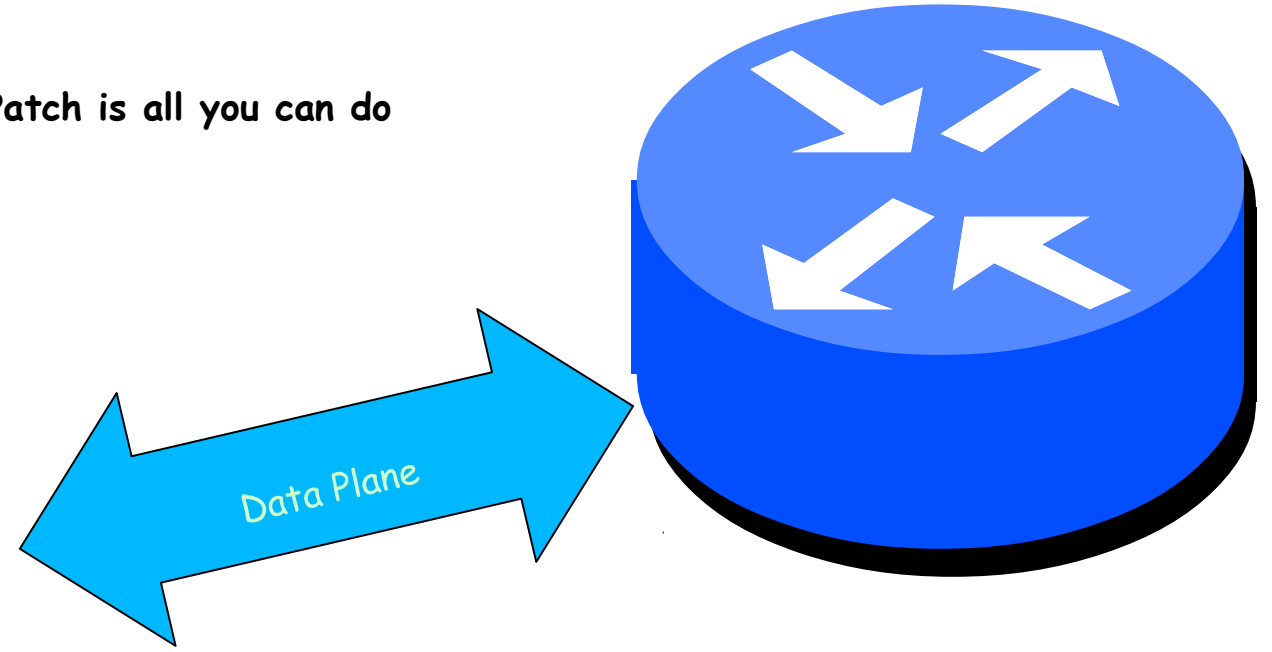
- Could Spy on Protocols, Data, or Configuration
- Could Alter Protocols, Data, or Configuration
- Would Require Vendor Collusion
- NationStateAttack
- Considered Unlikely
- Only Protection is Code Audit



Trojan Horses in Code

- DDoSis Continual Every Day in Large Networks
- Mitigation Techniques such as Black Hole
- Crafted Packets Exploit Weakness in Vendor Code

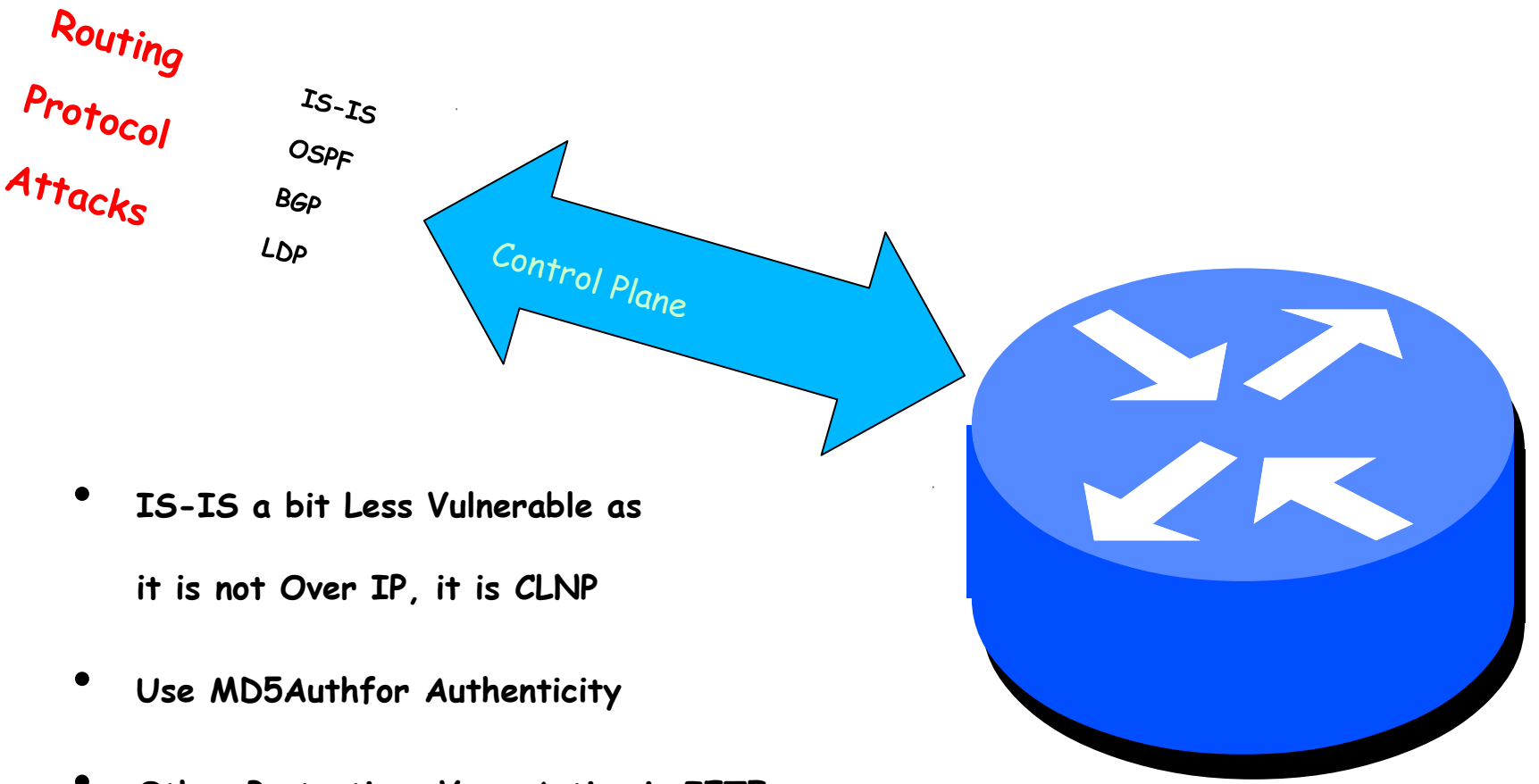
  E.g. IPv6 HDR0, etc.
- Filter & Patch is all you can do



Packet Attacks

DDoS Crafted Packets

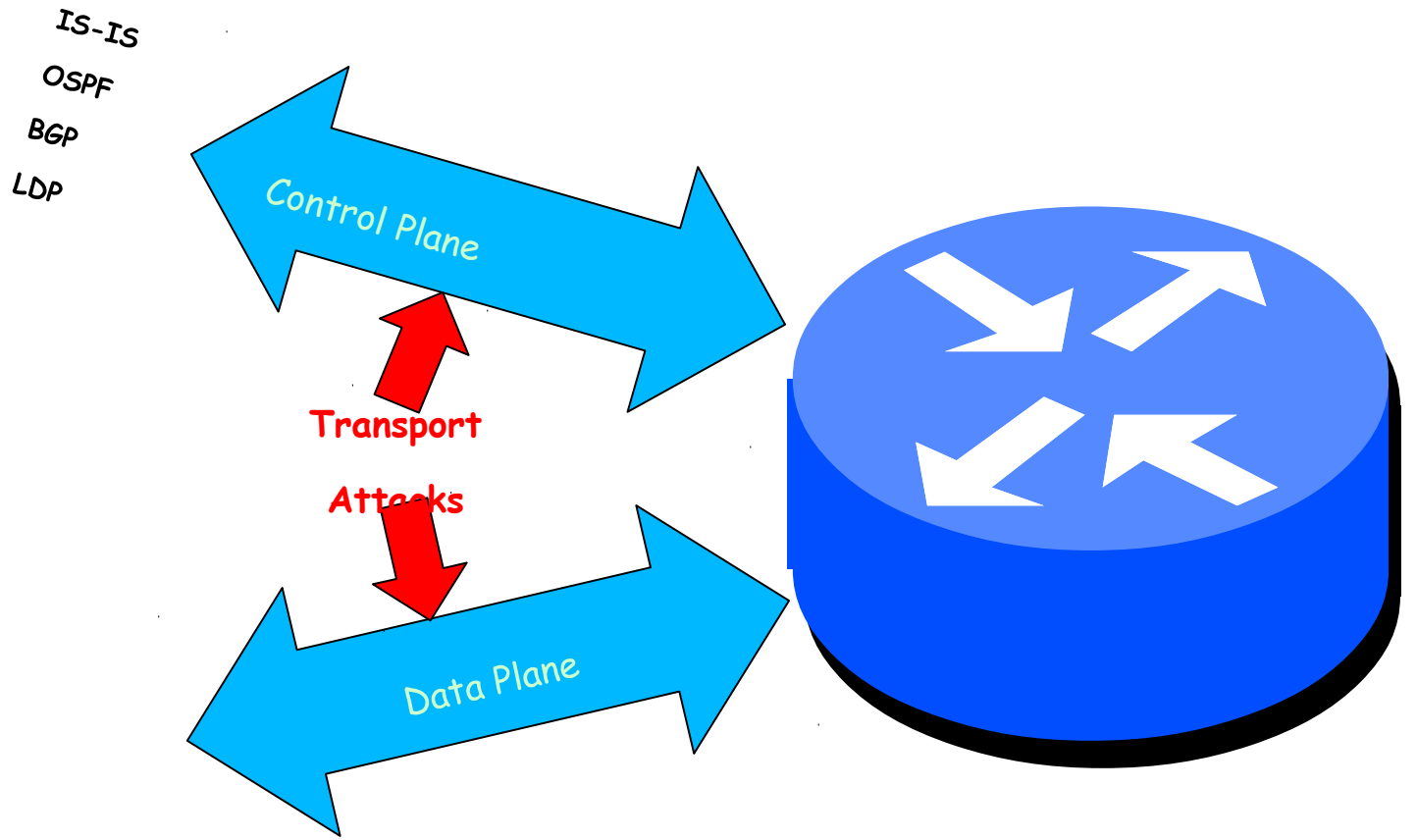
- Routing was Designed With no Concern for Security
- Attacks can be Close or Remote, e.g. YouTube Incident



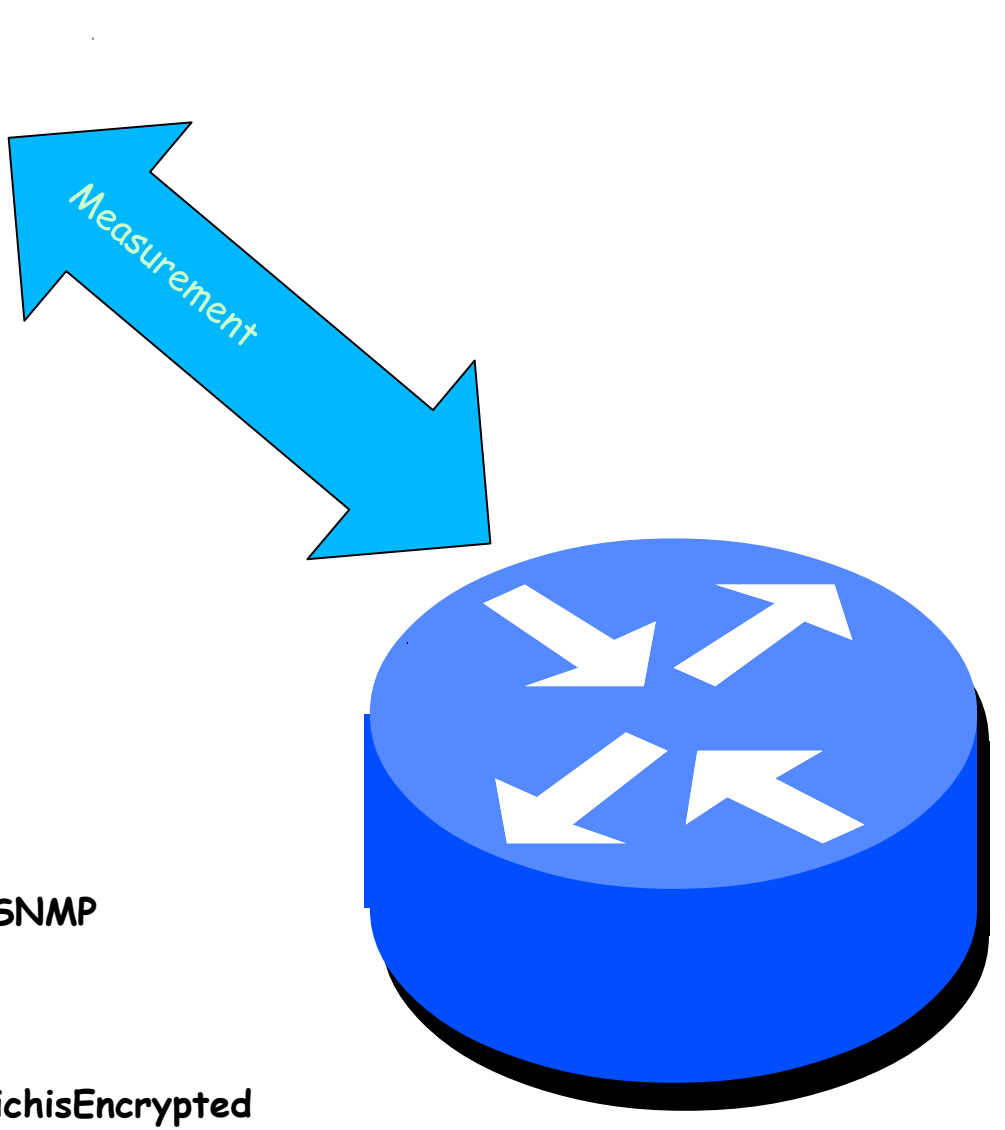
- IS-IS a bit Less Vulnerable as

  it is not Over IP, it is CLNP
- Use MD5Authfor Authenticity
- Other Protections Very Active in IETF

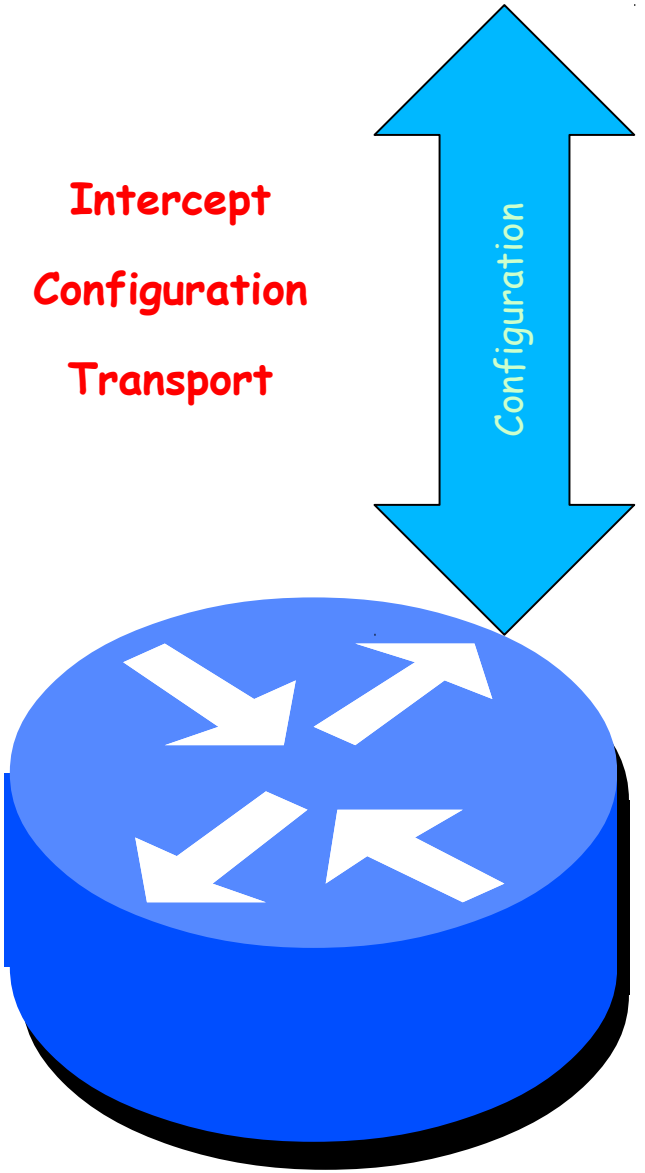
- Assume Monkeys are in the Middle
- Authenticate all Control Traffic, MD5 or Stronger
- Teach Customers to Encrypt:https,imaps, ssh, …
- WPA2 onWiFi



- Occasional New Ones
- Usually against ASN.1
- Network may be Mapped
- Traffic may be Monitored
- Configuration may be Changed
- Use ACLs on What Host may SNMP
- Defense is Using SNMPv3 whichisEncrypted



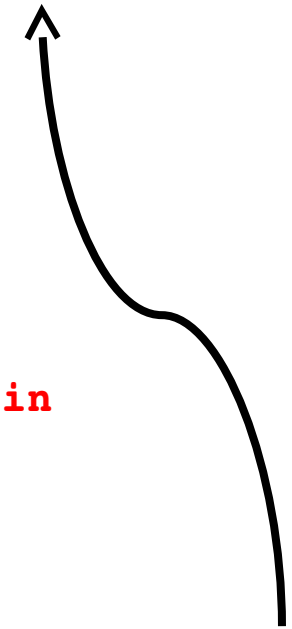
- Tapping Configuration Session
  - Stealing Password
  - Stealing Configuration
- DO NOT USE Telnet
- Configure Over ssh
- Restrict ssh to Special Hosts



ssh Access Control List

```
linevty0 4
password 7 071C205F4600140C5C
exec-timeout 0 0
transport input ssh
access-class vty4 in
ipv6 access-class vty6 in
transport preferrednone
```

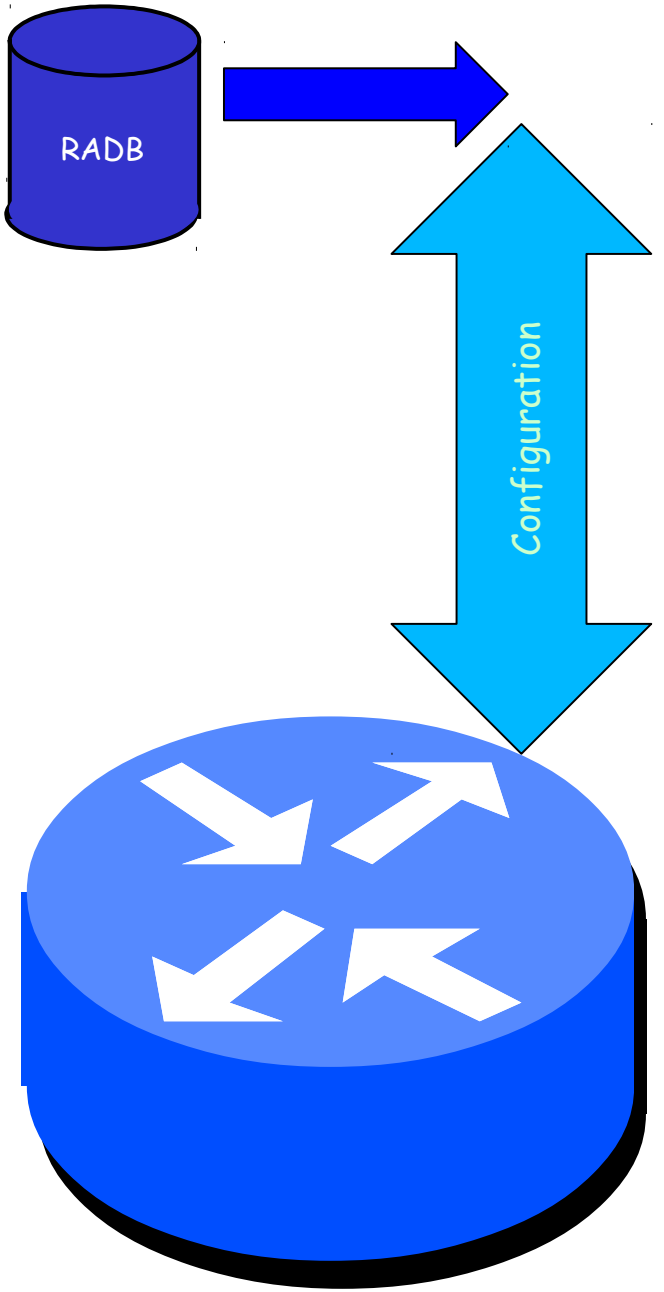
```
ip access-list standardvty4
permit 147.28.0.0      0.0.7.255
permit 198.180.150.0   0.0.0.255
permit 198.180.152.0   0.0.0.255
!
ipv6access-listvty6
permit ipv6 2001:418:1::/48 any
```



Cisco password 'encryption' is trivial to attack

So protect your configurations!

- Protect Your Provisioning
- Against Intrusion and Employees
- Isolate and Protect Servers
- Secure All Inter-System Communication
- Two-Factor Authenticate all Access



It Is Not A Friendly World