JASON DION

TRAINING THE CYBER SECURITY WORKFORCE

Network Event Monitoring

CYBER INCIDENT RESPONSE

Network Event Monitoring

- Network event analysis is a common task for cybersecurity analysts
- Gather, correlate, and analyze data from different systems/sensors on network
- Used to detect or prevent incidents

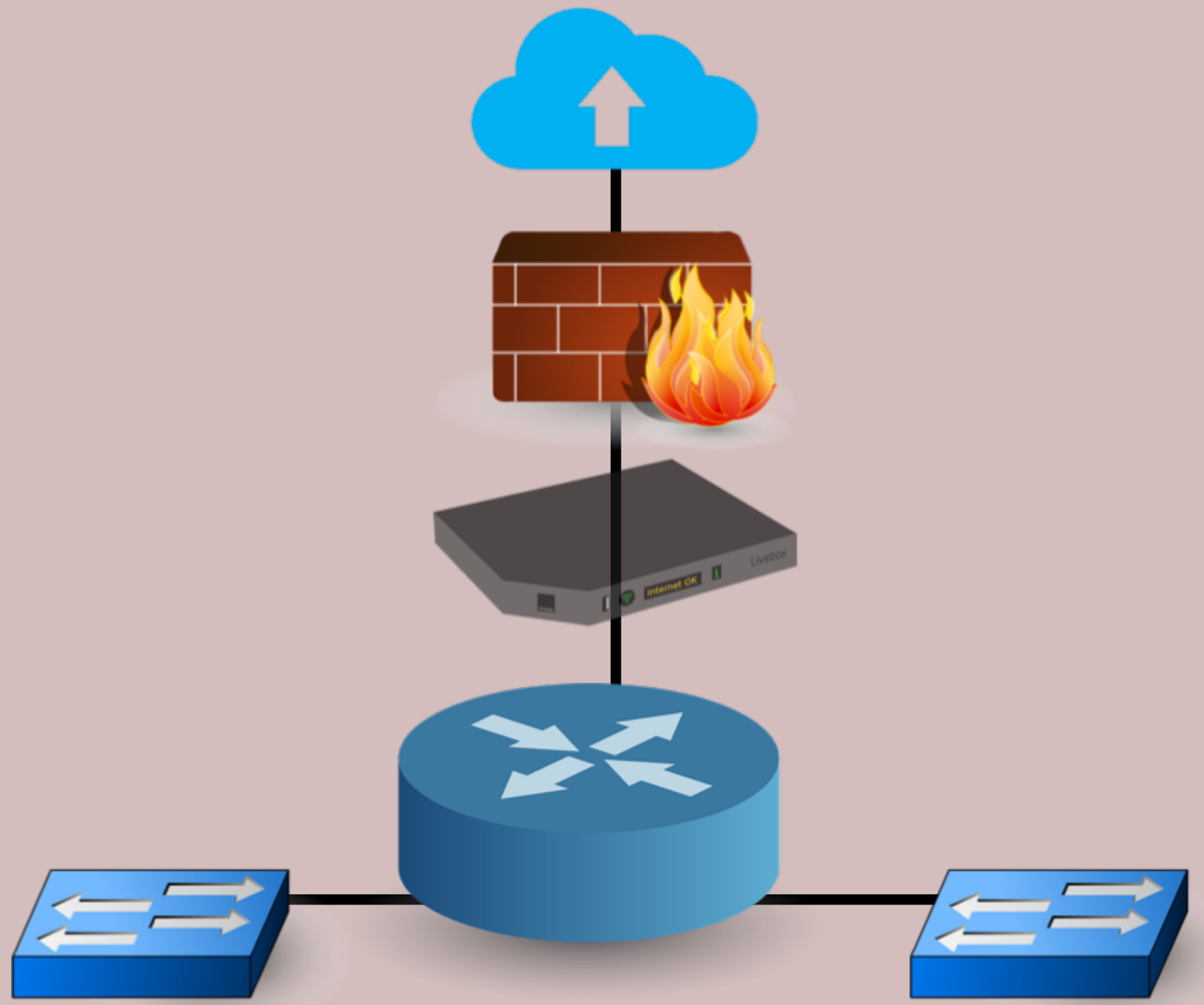
Router-based Monitoring

- Provides data flow on the network and information on the status of the device
- Relies on capturing the data about the traffic passing through a router
- Called *network flows*

Network Flows

- Netflow, sFlow, J-Flow, …
  - All are standards for monitoring traffic flows
  - Count information about the traffic at the interface
  - Samples traffic (1:100, 1:1000, etc)
- RMON
  - Operates at layers 1, 2, 3, 4 of the OSI model
  - Operates as client/server model with probes
  - Provides statistics, history, alarms, and events to a Management Information Base (MIB)
- SNMP (Simple Network Management)
  - Collects information about routers/switches
  - Information is about the devices themselves, not the traffic crossing those devices

Network Flows



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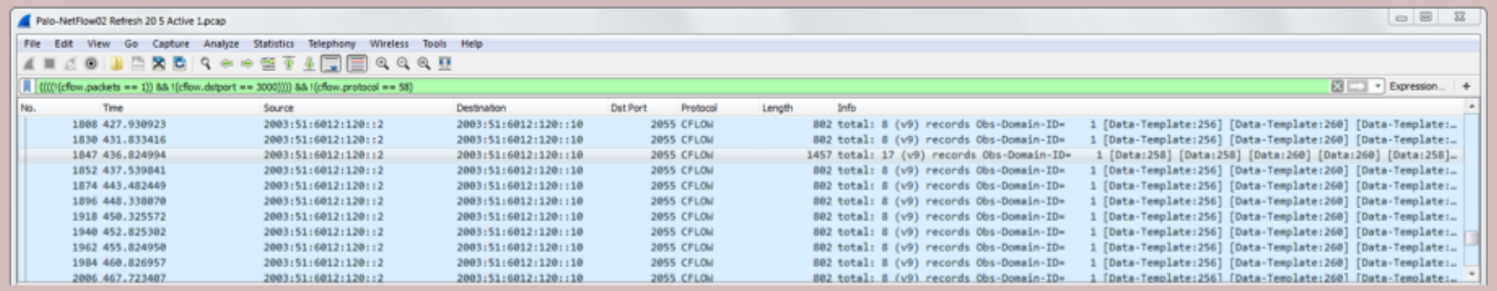
Example Network Flows



No.	Time	Source	Destination
1808	427.930923	2003:51:6012:120::2	2003:51:6012:120::10
1830	431.833416	2003:51:6012:120::2	2003:51:6012:120::10

Dst Port	Protocol	Length
2055	CFLOW	802
2055	CFLOW	802

Info
total: 8 (v9) records Obs-Domain-ID= 1 [Data-Template:256] [Data-Template:260] [Data-Template:…
total: 8 (v9) records Obs-Domain-ID= 1 [Data-Template:256] [Data-Template:260] [Data-Template:…

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Example Network Flows

NetFlow Collection Status | Interface Status

Filter Domain : NinjaNet Time : Today
Exporter : lchqgw01 (10.201.0.1)

Interface Status - 16 records

Exporter	Interface	Direction	Interface ...	Current Utilization	Current Traffic (...	Maximum Utilization	Maximum Traffic (...
lchqgw01 (10.201.0.1)	Vl1	Inbound	1G	10.87%	108.74M	10.9%	108.96M
lchqgw01 (10.201.0.1)	Vl240	Outbound	10M	4.13%	413.43k	5.35%	535.14k
lchqgw01 (10.201.0.1)	Vl240	Inbound	10M	3.58%	358.25k	48.48%	4.85M
lchqgw01 (10.201.0.1)	Vl203	Inbound	1G	1.19%	11.92M	1.25%	12.46M
lchqgw01 (10.201.0.1)	Vl202	Outbound	1G	1.09%	10.89M	1.09%	10.89M
lchqgw01 (10.201.0.1)	Vl202	Inbound	1G	0.6%	6.02M	0.72%	7.17M
lchqgw01 (10.201.0.1)	Vl1	Outbound	1G	0.4%	4M	0.82%	8.17M
lchqgw01 (10.201.0.1)	ifIndex-0	Outbound	1G	0.29%	2.94M	0.31%	3.08M
lchqgw01 (10.201.0.1)	Vl203	Outbound	1G	0.27%	2.69M	0.27%	2.69M
lchqgw01 (10.201.0.1)	Vl232	Outbound	1G	0.14%	1.42M	0.14%	1.42M
lchqgw01 (10.201.0.1)	Vl210	Outbound	1G	0.08%	829.14k	0.11%	1.06M
lchqgw01 (10.201.0.1)	Vl232	Inbound	1G	0.05%	457.91k	0.06%	554.58k
lchqgw01 (10.201.0.1)	Vl210	Inbound	1G	<0.01%	56.75k	0.01%	100.87k

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SNMP v3

- Simple Network Management Protocol
- Adds encryptions, authentication, and user capabilities to SNMP traffic
- SNMP v1 and SNMP v2 are considered obsolete and a security risk

Active Monitoring

- Request is sent to a remote system and data is collected from the end point

- Data contains information about:
  - Availability
  - Routes
  - Packet delays
  - Packet loss
  - Bandwidth

Active Monitoring (Examples)

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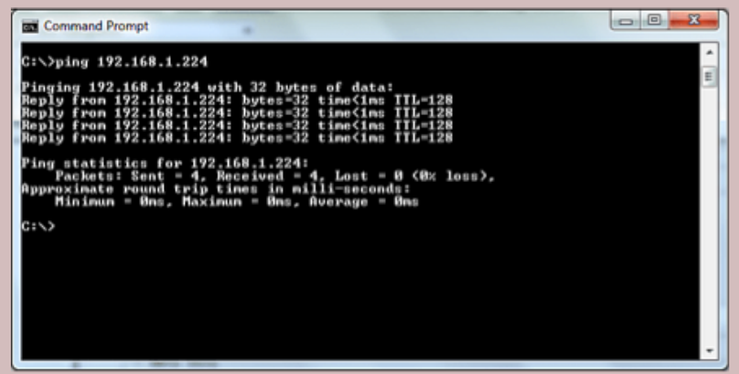
- Ping
  - Data acquired by using ICMP on remote system
  - Basic up and down information and latency only
- iPerf
  - Measures maximum bandwidth of a given network
  - Remote testing of a link
  - Useful to determine a baseline of the network



Passive Monitoring

- Uses a network tap to copy all traffic between two devices
- Useful for after-the-fact analysis
- Detailed information about:
  - Rate of traffic
  - Protocols used
  - Content