Network Security Monitoring with Flow Data

Anomaly Detection & DDoS Protection

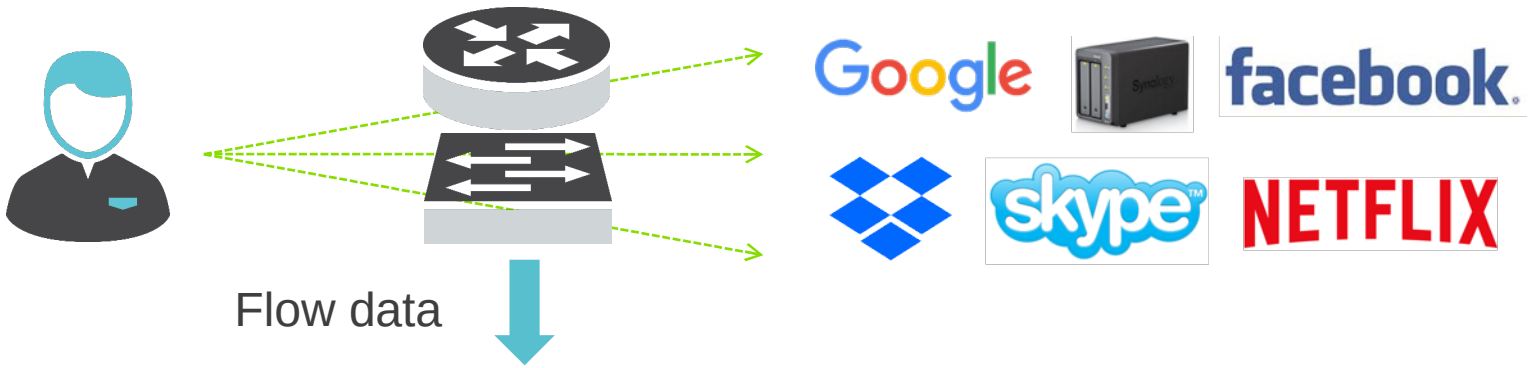
Pavel Minařík, Chief Technology Officer

Flowmon

Driving Network Visibility

What is Flow Data?

- Modern network telemetry data, supported by many vendors
- Cisco standard NetFlow v5/v9, IETF standard IPFIX
- Focused on L3/L4 information and volumetric parameters
- Real network traffic to flow statistics reduction ratio 500:1



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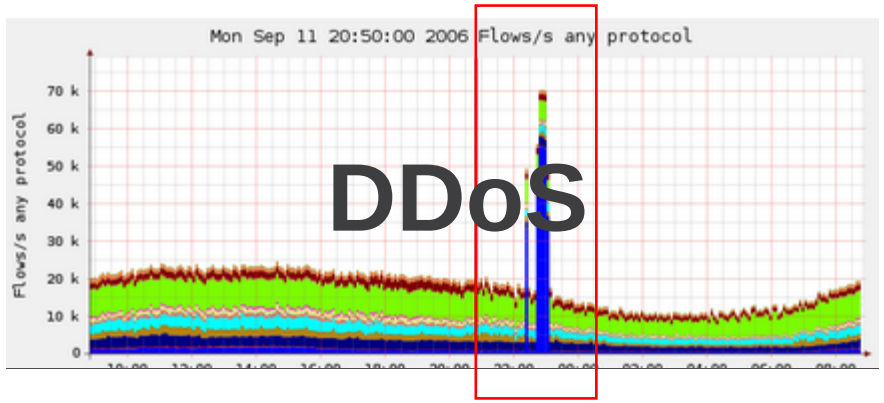
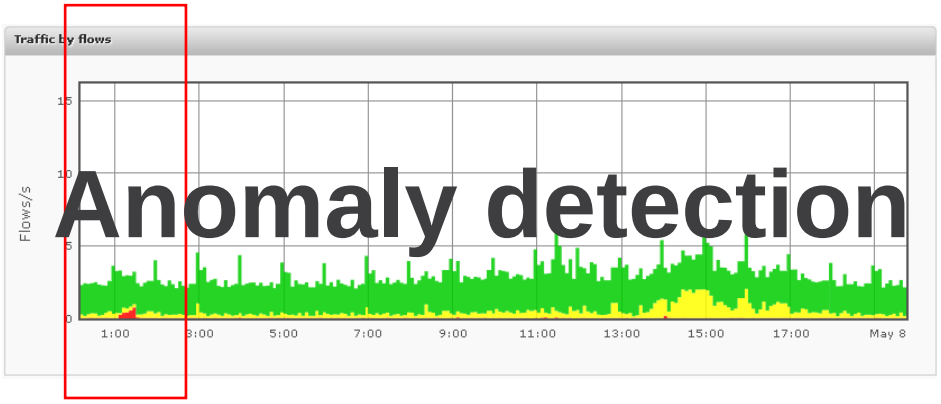
Flow-Based Traffic Analysis

- Network as a sensor concept (and enforcer)
  - blogs.cisco.com/enterprise/the-network-as-a-security-sensor-and-enforcer
- Bridges the gap left by signature-based security
- Key technology for incident response
- Designed for multi 10G environment



Statistical analysis
Volumetric DDoS detection



Advanced data analysis algorithms
Detection of non-volumetric anomalies

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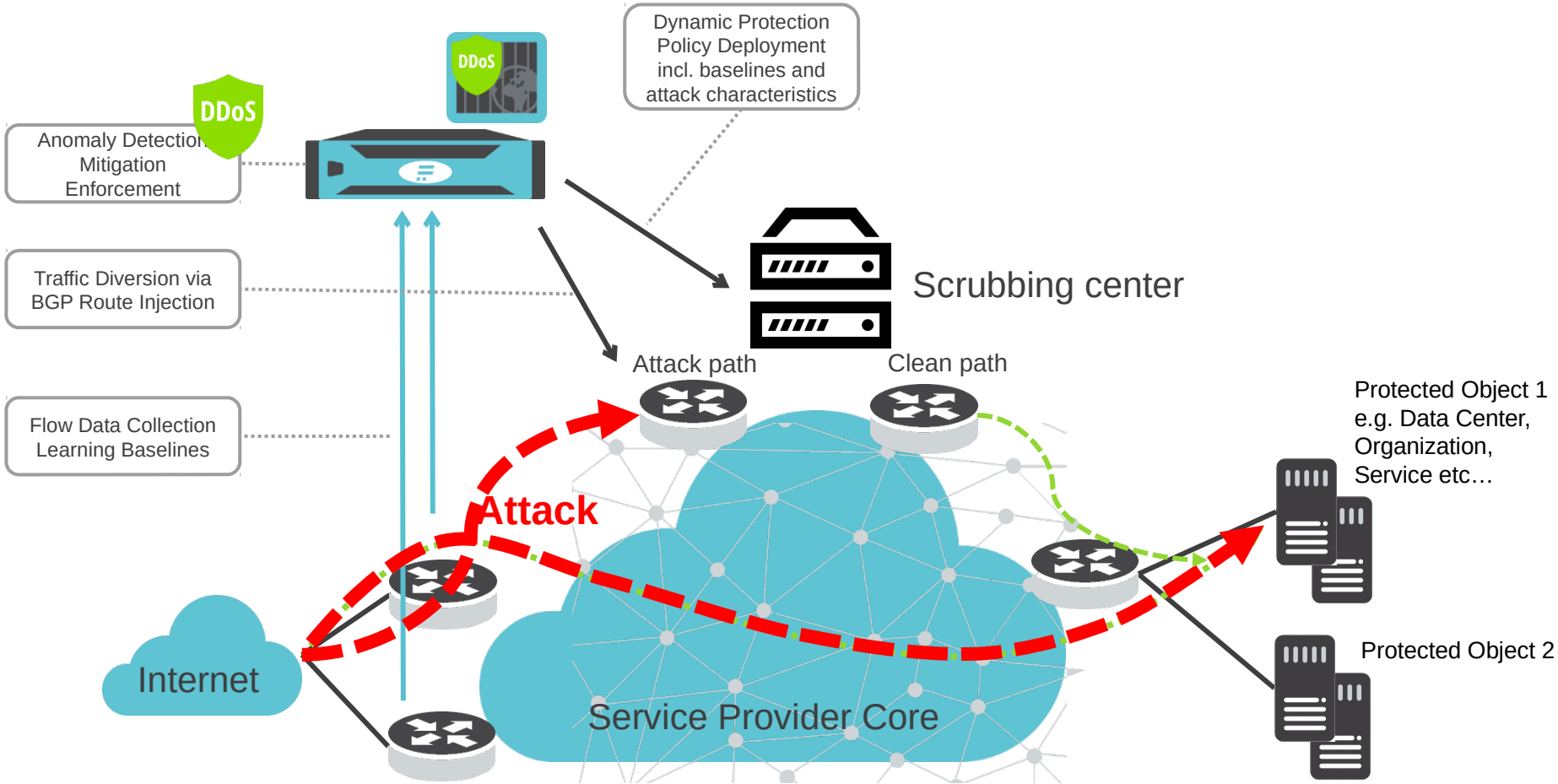
DDoS Protection on Backbone

- Backbone perimeter specifics
  - Multiple peering points – routers & uplinks
  - Large transport capacity – tens of gigabits easily
  - In-line protection is close to impossible!

1. Flow collection
2. DDoS detection
3. Routing control
4. Mitigation control

- Flow-based detection and out-of-path mitigation
  - Easy and cost efficient to deploy in backbone/ISP
  - Prevents volumetric DDoS to reach enterprise perimeter

Out-of-Path Mitigation



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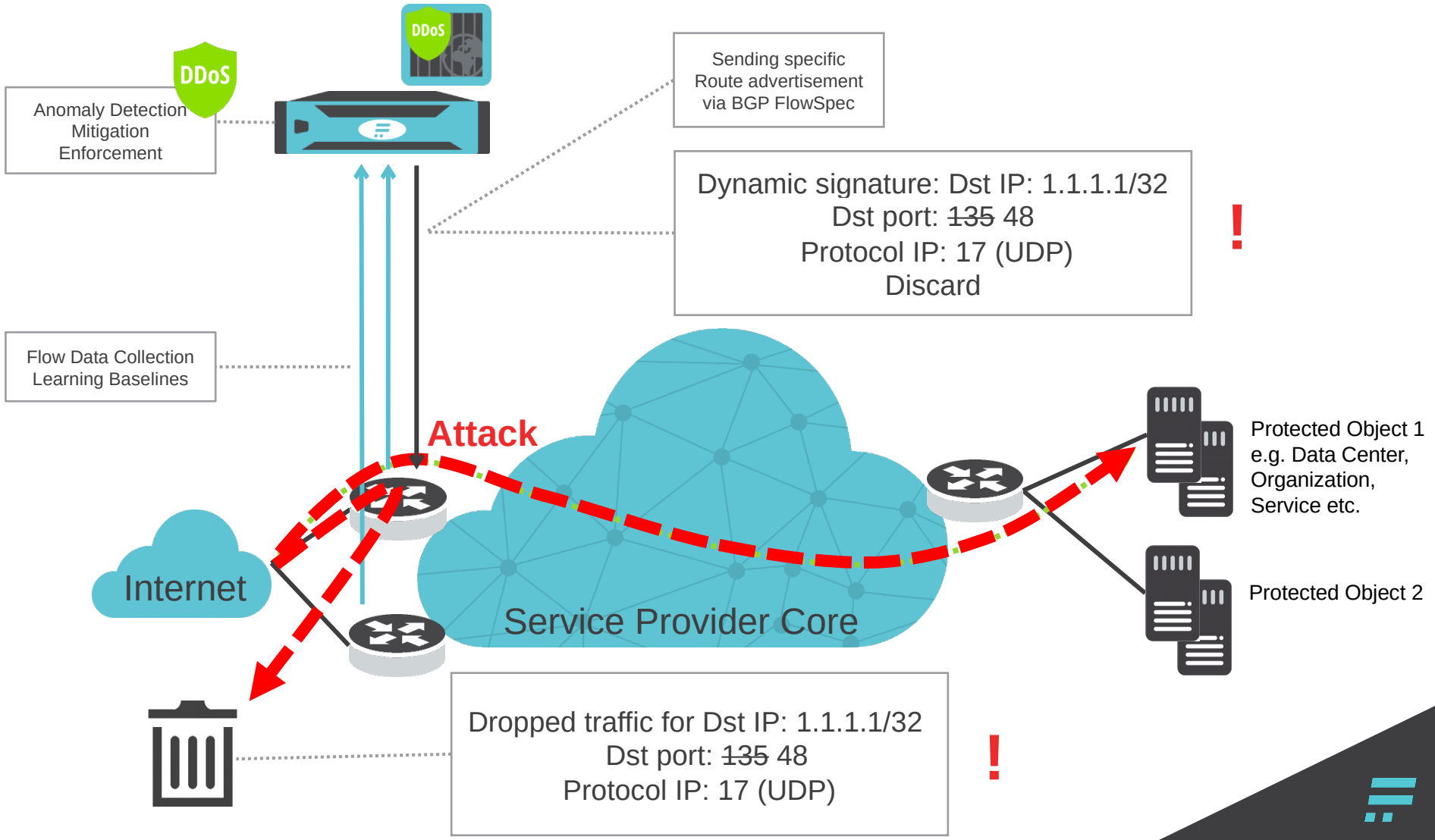
BGP Flowspec Mitigation



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Anomaly Detection on Backbone

Anomaly Detection

- Machine Learning
- Adaptive Baselining
- Heuristics
- Behavior Patterns
- Reputation Databases

#	Zdrojová IP	Typ události	Detail	Čas	Zdroj NetFlow dat	Cíle
1	112.90.18.105	L3ANOMALY	The traffic not belonging to any internal network was detected (this may indicate spoofing). Transferred: 2.66 MiB, packets: 65 559.	2013-08-24 07:15:21	localhost	1.52.6.170, 1.52.13.199, 1.52.42.167, 1.52.59. 1.52.71.217, 1.52.87.249, 1.52.133.228, 1.52.1 1.52.192.113, 1.52.218.16, ...
2	112.91.30.17	L3ANOMALY	The traffic not belonging to any internal network was detected (this may indicate spoofing). Transferred: 2.37 MiB, packets: 58 379.	2013-08-24 07:15:21	localhost	1.52.54.212, 1.52.109.106, 1.52.167.73, 1.52.1 1.52.191.229, 1.52.218.123, 1.52.220.241, 1.52 1.52.241.199, 1.53.8.41, ...
3	121.10.112.17	L3ANOMALY	The traffic not belonging to any internal network was detected (this may indicate spoofing). Transferred: 2.37 MiB, packets: 58 266.	2013-08-24 07:15:21	localhost	1.52.1.176, 1.52.2.100, 1.52.7.105, 1.52.44.16 1.52.77.224, 1.52.128.196, 1.52.128.214, 1.52. 1.52.199.183, 1.52.241.170, ...
4	183.61.138.105	L3ANOMALY	The traffic not belonging to any internal network was detected (this may indicate spoofing). Transferred: 2.66 MiB, packets: 65 415.	2013-08-24 07:15:21	localhost	1.52.58.25, 1.52.85.224, 1.52.86.18, 1.52.92.1 1.52.174.104, 1.52.183.10, 1.52.184.230, 1.52. 1.52.203.16, 1.52.235.13, ...
5	210.73.221.181	L3ANOMALY	The traffic not belonging to any internal network was detected (this may indicate spoofing). Transferred: 2.36 MiB, packets: 58 086.	2013-08-24 07:15:21	localhost	1.52.28.245, 1.52.44.63, 1.52.112.109, 1.52.14 1.52.177.97, 1.53.40.147, 1.53.58.10, 1.53.89. 1.53.122.157, 1.53.221.26, ...
6	112.90.18.105	L3ANOMALY	The traffic not belonging to any internal network was detected (this may indicate spoofing). Transferred: 5.04 MiB, packets: 125 924.	2013-08-24 05:39:59	localhost	1.52.4.138, 1.52.12.103, 1.52.28.61, 1.52.31.7 1.52.42.130, 1.52.44.24, 1.52.48.142, 1.52.67. 1.52.83.34, ...
7	112.90.18.105	L3ANOMALY	The traffic not belonging to any internal network was detected (this may indicate spoofing). Transferred: 3.60 MiB, packets: 88 749.	2013-08-24 03:38:31	localhost	1.52.7.220, 1.52.11.109, 1.52.28.57, 1.52.42.9 1.52.95.134, 1.52.114.14, 1.52.115.205, 1.52.1 1.52.122.10, ...
8	112.90.18.105	L3ANOMALY	The traffic not belonging to any internal network was detected (this may indicate spoofing). Transferred: 2.60 MiB, packets: 63 126.	2013-08-24 03:00:34	localhost	1.52.12.16, 1.52.77.184, 1.52.104.14, 1.52.125 1.52.128.99, 1.52.134.215, 1.52.137.109, 1.52. 1.52.203.143, 1.52.209.197, ...

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FlowMon Reports

Date: 2014-03-21, Location: ads.cdtel.cz, FlowMon ADS ISP 6.05.00

[redacted] - udalosti

Prehled udalosti v siti [redacted]

Time interval: 2014-03-14 07:23 - 2014-03-21 07:23

Priority: **INFORMATION**

#	Source	Event type	Detail	Timestamp	NetFlow source	Targets
1	I [redacted]0.167	BLACKLIST	Known botnet command & control center, attempts: 1, uploaded: 843.00 B, downloaded: 8.28 KiB.	2014-03-21 04:05:16	localhost	54.72.9.51
2	I [redacted]0.167	BLACKLIST	Known botnet command & control center, attempts: 1, uploaded: 883.00 B, downloaded: 8.28 KiB.	2014-03-21 01:55:00	localhost	54.72.9.51
3	I [redacted].161	SCANS	horizontal TCP SYN scan (successful attempts: 6, unsuccessful attempts: 1 192, targets: 1 168, port list: 445, 81, 80, 443).	2014-03-20 23:25:00	localhost	12.1.186.55, 12.10.13.25, 12.12.148.32, 12.35.254.39, 12.61.158.77, 12.81.130.37, 12.113.100.18, 12.117.155.81, 14.23.168.113, 14.32.62.38, ...
4	I [redacted].161	SCANS	horizontal TCP SYN scan (successful attempts: 9, unsuccessful attempts: 1 231, targets: 1 216, port list: 445, 81, 80).	2014-03-20 23:20:00	localhost	12.72.224.61, 14.40.185.42, 14.55.0.69, 14.64.169.96, 14.65.71.9, 14.68.165.90, 14.69.98.28, 14.74.190.26, 14.78.145.76, 14.86.85.90, ...
5	I [redacted].161	SCANS	horizontal TCP SYN scan (successful attempts: 3, unsuccessful attempts: 1 152, targets: 1 133, port list: 445, 81, 80, 139).	2014-03-20 23:15:00	localhost	12.1.60.107, 12.16.188.69, 12.29.238.33, 12.74.220.30, 12.75.189.103, 13.29.16.97, 14.32.158.69, 14.33.65.100, 14.49.106.103, 14.49.122.65, ...
6	I [redacted].161	SCANS	horizontal TCP SYN scan (successful attempts: 3, unsuccessful attempts: 1 096, targets: 1 079, port list: 445, 81, 80).	2014-03-20 23:10:00	localhost	12.43.162.116, 12.63.222.46, 12.69.238.52, 14.54.230.97, 14.61.214.105, 14.62.152.125, 14.71.28.19

Sample Anomaly Detection Report

Focus on Indicators of Compromise

Provided by ISP to Enterprise Customers

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Thank you

Performance monitoring, visibility and security with a single solution

Pavel Minařík, Chief Technology Officer

pavel.minarik@flowmon.com, +420 733 713 703

Flowmon Networks a.s.
Sochorova 3232/34
616 00 Brno, Czech Republic
www.flowmon.com

Flowmon
Driving Network Visibility