Flowmon
Networks

FLOWMON WEBINAR 24. 3. 2020

Encrypted Traffic Analysis for Security & Compliance

FM OS 10.03.02

Table of contents

1. EXECUTIVE SUMMARY

Encrypted Traffic Analysis (ETA) is a method of malware detection and cryptographic assessment of secured network sessions, which does not rely on decryption.

New research from Flowmon and IDG Connect shows 99% of IT managers recognize encrypted network traffic as a source of security risks, but two-thirds of businesses fail to protect their assets from both internal and external threats misusing SSL/TLS.

TLS (a successor to SSL) handshake is a non-encrypted session through which client and server negotiates the encryption rules. Only after a secure channel is established, the traffic becomes encrypted. By reading the handshake and its specific parameters we can identify unusual behaviour. Download the Whitepaper here.

2. ENCRYPTED TRAFFIC ANALYSIS (ETA) DASHBOARD

Flowmon Dashboard provide us single pane of glass for Network and Security Operation (NetOps and SecOps) with customizable or preconfigured templates widgets (applied from Configuration Center -> Configuration Templates). It is possible to create multiple Dashboards which present different view on the network information (e.g. one dashboard for network operation, other for security or encrypted traffic analyses and many more). Responsive design allows to view dashboard on mobile phones and tablets.

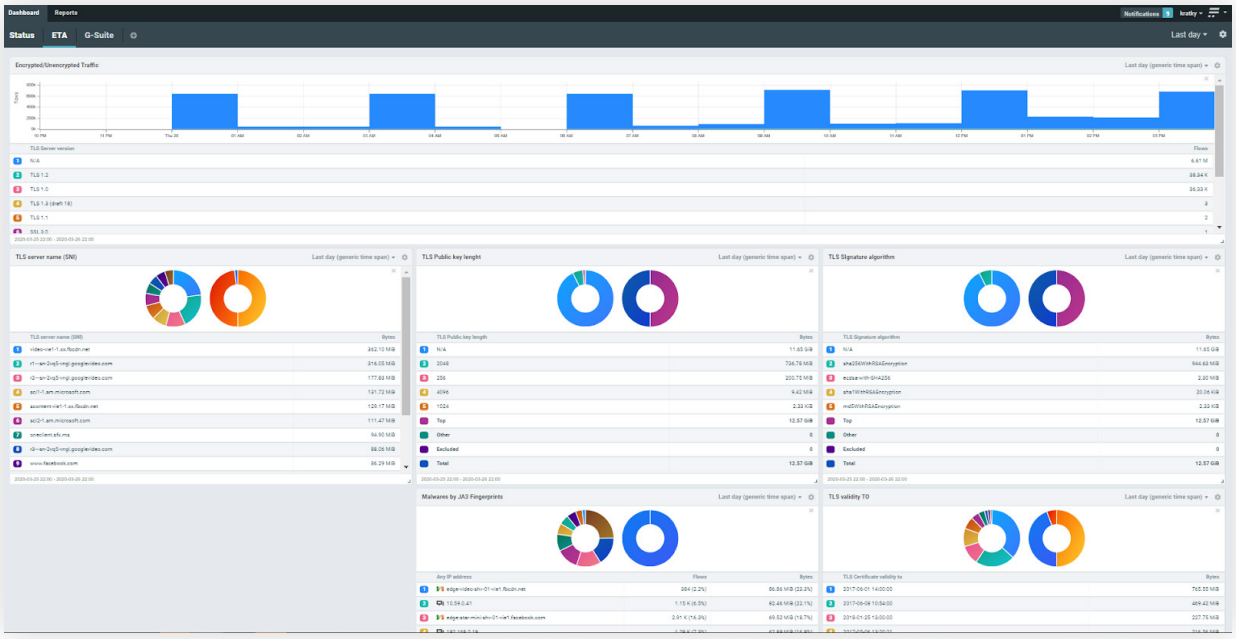
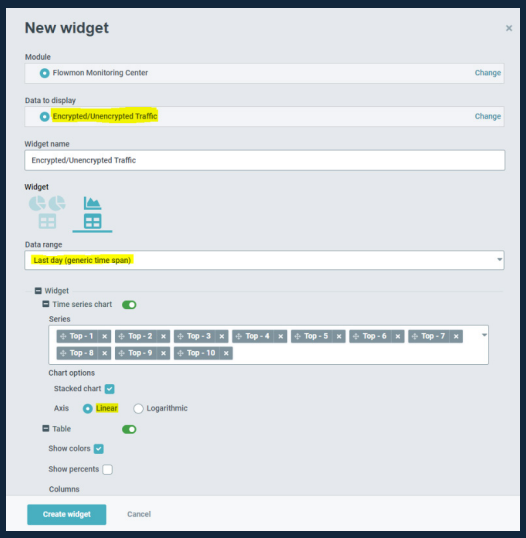


FIGURE1: DASHBOARD USER INTERFACE



New Widget setup

1. Selection of a suitable pre-prepared chapter from Flowmon Monitoring Center (FMC -> Reports -> Chapters)
2. Type of Chart (Pie or Linear/Logarithmic)
3. Selection of time interval for data conversion
4. Number of TOP Time series in the chart and their values
5. Possibility of linear or logarithmic condition and colour of table

FIGURE 2: NEW DASHBOARD WIDGET SETUP

3. FMC PROFILES

3.1 TLS SERVER VERSION REPORTING USE CASE

TLS Server Version Report provide information about used TLS Protocol versions in whole monitored traffic (recommended parent FMC Profile is All Sources) with visibility into potential unsecure and vulnerable cryptography mechanism. It allows to to show us lower TLS Protocol version than recommended TLS Protocol version for advanced security (e.g. TLS 1.0, TLS 1.1, TLS 1.2 or SSL versions).

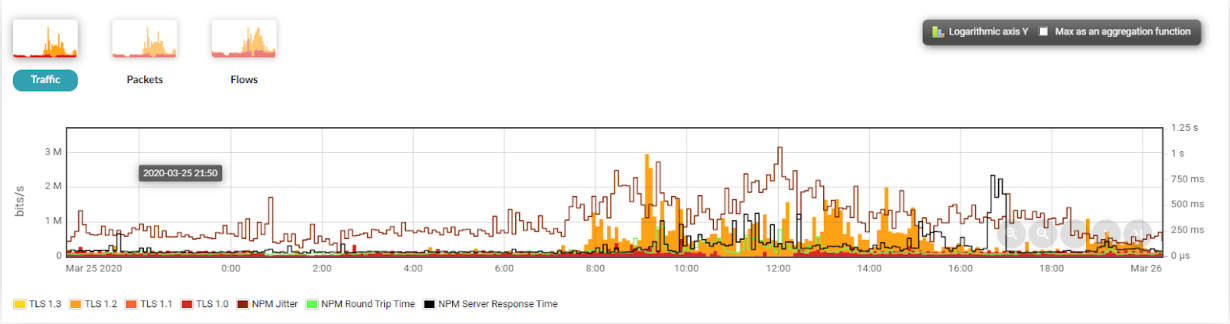
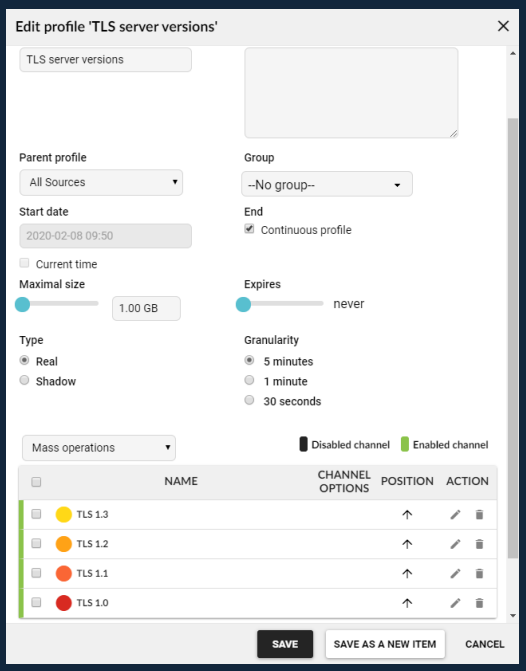
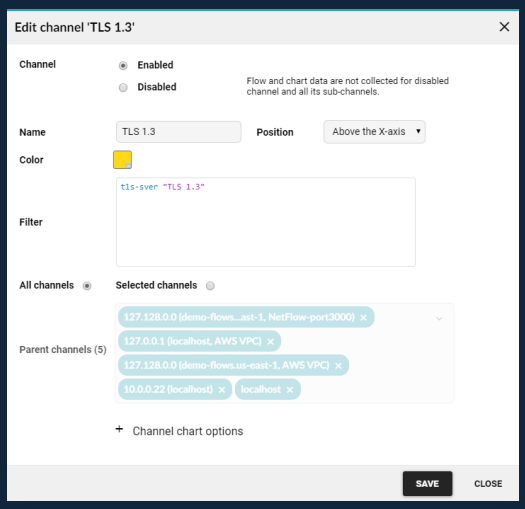


FIGURE 3: TRAFFIC CHART WITH TLS PROTOCOL VERSIONS



1. Profile name
2. Parent profile of source data for new profile
3. Group definition like “ETA”
4. Start date can be recalculated with history data
5. Expiration for data collection
6. “Real” type is with real data stored on disc and “Shadow” is about only data for graphing
7. Granularity for interval of collected data samples
8. Specification of unlimited count of channels



1. Position above or under X-axis
2. Every one channel is defined by filter
3. User can choose parent ‘s profile channels with concrete source data

FIGURE 4: FMC TLS SERVER VERSIONS PROFILE SETUP

3.2 DETECTION OF MALWARE BY JA3 FINGERPRINTS USE CASE

JA3 is a much more effective way to detect malicious activity over SSL than IP or domain-based IOCs. Since JA3 detects the client application, it does not matter if malware uses DGA (Domain Generation Algorithms), or different IPs for each C2 host, or even if the malware uses Twitter for C2, as JA3 can detect the malware itself based on how it communicates, rather than what it communicates to. This is a straightforward way how to use Flowmon to find possible threats in connection with detecting specific JA3 fingerprints. In this Use case we have been used JA3 database: https://sslbl.abuse.ch/ja3-fingerprints/

What is JA3 Fingerprint?

- Method describing encrypted communication between client and server
- Calculated during TLS handshake

How it works:

1. consists of headers from Client Hello message from TLS / SSL handshake
2. SSLVersion, Cipher, SSLExtension, EllipticCurve, EllipticCurvePointFormat respond 769,47-53-5-10-49161-49162-49171-49172-50-56-19-4,0-10-11,23-24-25,0
3. finally, MD5 hash is applied, which corresponds to the JA3 fingerprint de350869b8c85de67a350c8d186f11e6

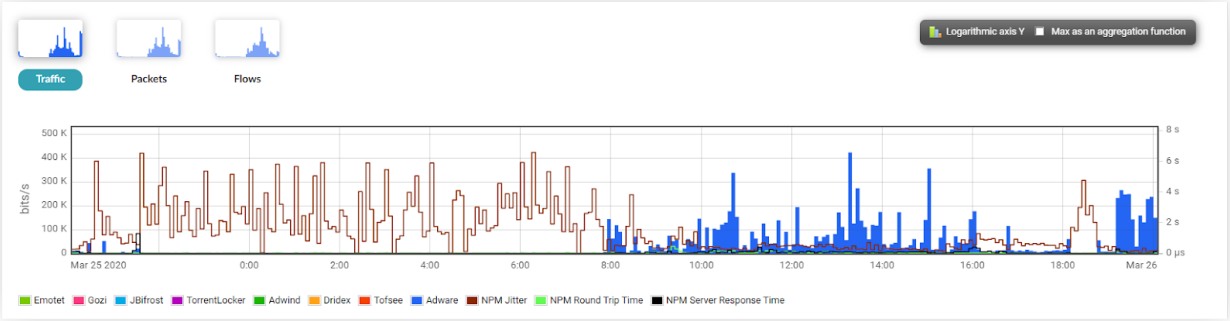


FIGURE 5: CHART WITH TYPE OF MALICIOUS TRAFFIC BY JA3 FINGERPRINT

IMPORTANT NOTE

Bypassing proxy by camouflage of encrypted traffic:

- camouflage can be recognized by negotiated encryption, usually ciphers are proposed, which are generally recognized as compromised or already compromised
- communication to the Internet directed to compromised IP addresses, compromised HTTP hostname, SNI (name servers in the certificate), etc. Communication is detected by the BLACKLIST method in the ADS module.

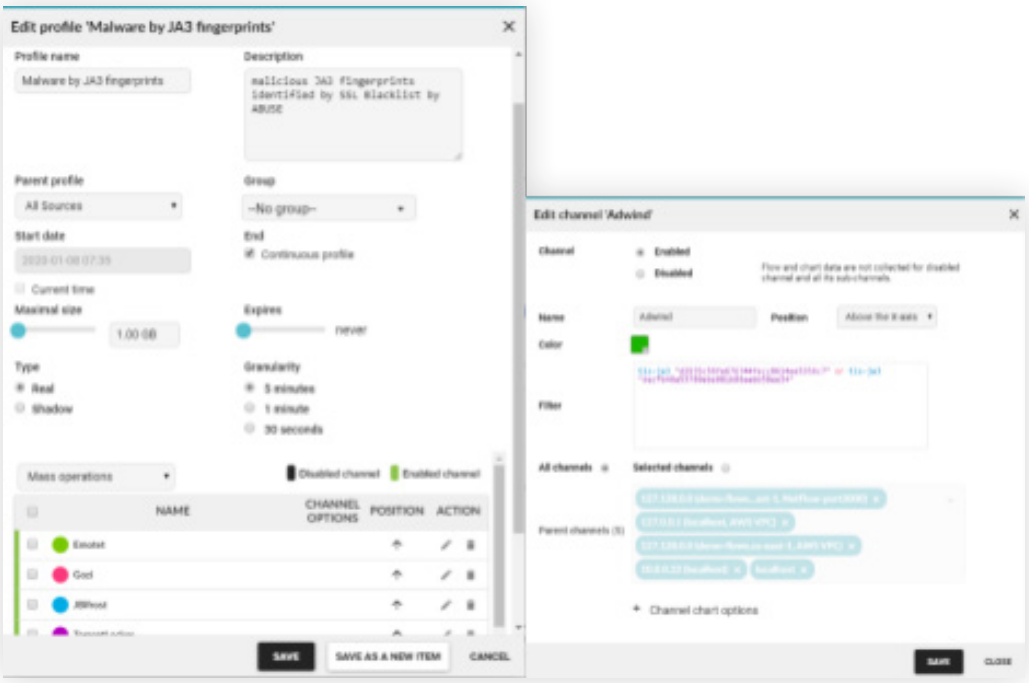


FIGURE 6: FMC MALWARE BY JA3 FIGERPRINT PROFILE SETUP

IMPORTANT NOTE

In case of profile filter definition with JA3 fingerprints monitoring is not important how many fingerprints are used for the specific malware, it need to be used “OR” as separator between every tls-ja3 parameter.

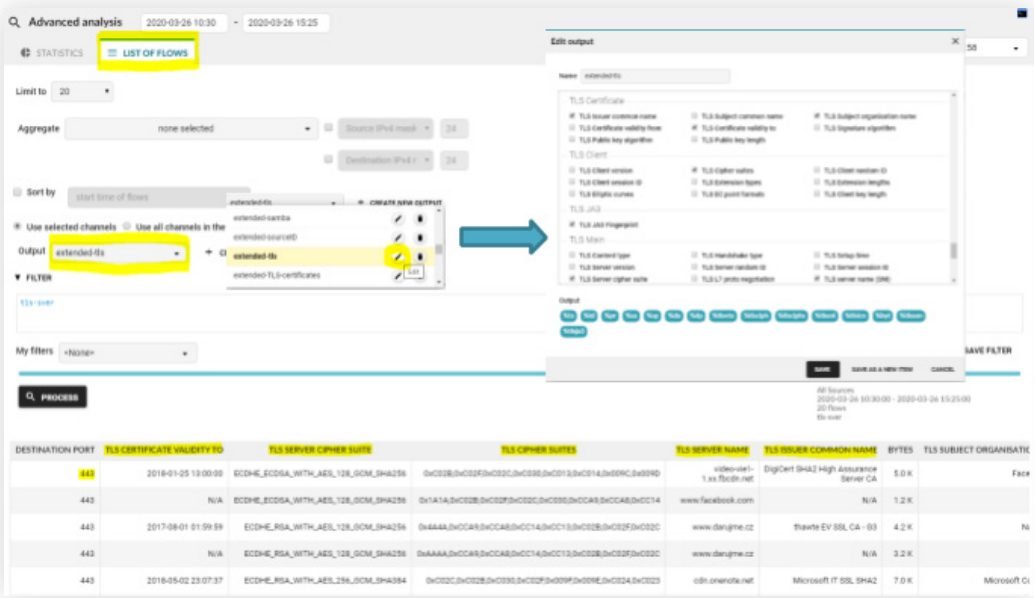


FIGURE 8:: “LIST OF FLOWS” TAB FOR A MORE DETAILED LOOK AT THE FLOW PARAMETERS, SELECTING THE APPROPRIATE “EXTENDED-TLS” OUTPUT

IMPORTANT NOTE

For relevant encrypted communication outputs where the TLS Handshake parameters are located, it is advisable to add one of the encrypted communication parameters, in our case “tls-sver”, without a value, to the filter.

4. ETA ANALYSES

4.1 PUBLIC KEY LENGTH AND ALGORITHM ANALYSIS USE CASE

Weak short keys and outdated algorithms are a serious security risk. Insufficient key length makes it easier for an attacker to perform brute force decryption. Outdated algorithms suffer from vulnerabilities malicious actors can exploit to break in (think Heartbleed). We should always check the key length and algorithm as one because different algorithms require different key lengths, for example, elliptic curve cryptography algorithms (ECC) have shorter keys while having equivalent key strength as RSA (RFC 4492):

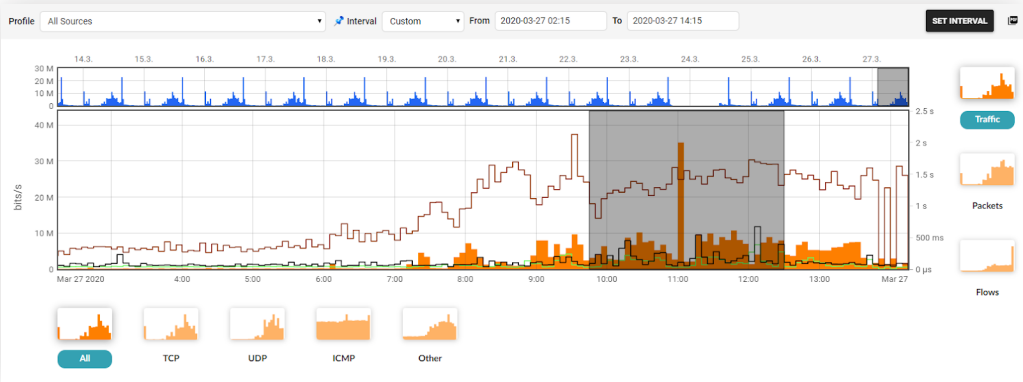


FIGURE 9: TIME INTERVAL SELECTION

Also thanks to the visibility of the key length parameter or its algorithm, we are able to identify possible risks in the network, associated with this and resulting greater vulnerability due to simpler encryption. Based on the parameter used, it is also possible to create a chapter for the calculated data in the widget in the Flowmon dashboard.

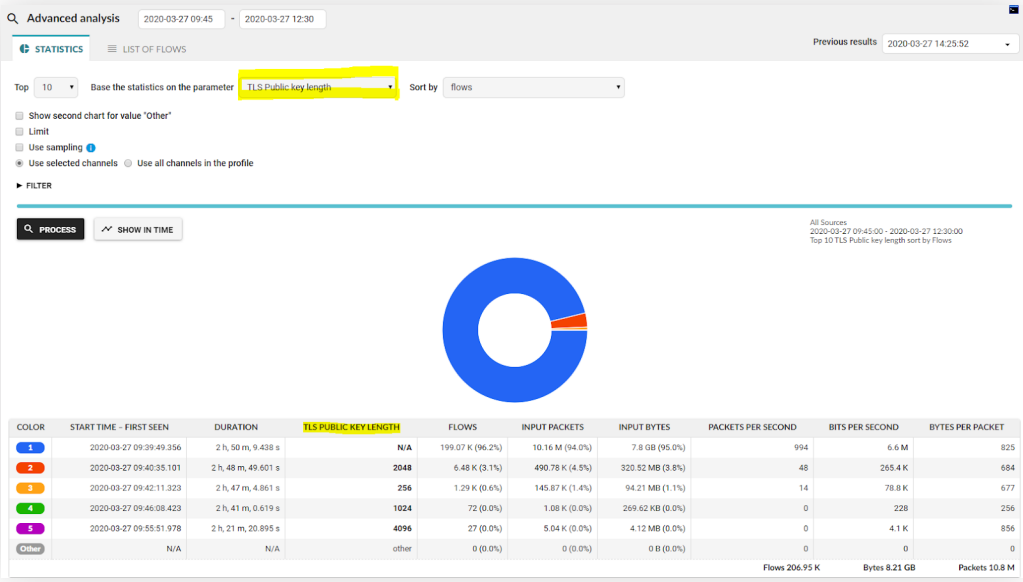


FIGURE 10: TLS PUBLIC KEYLENGHT ANALYSIS

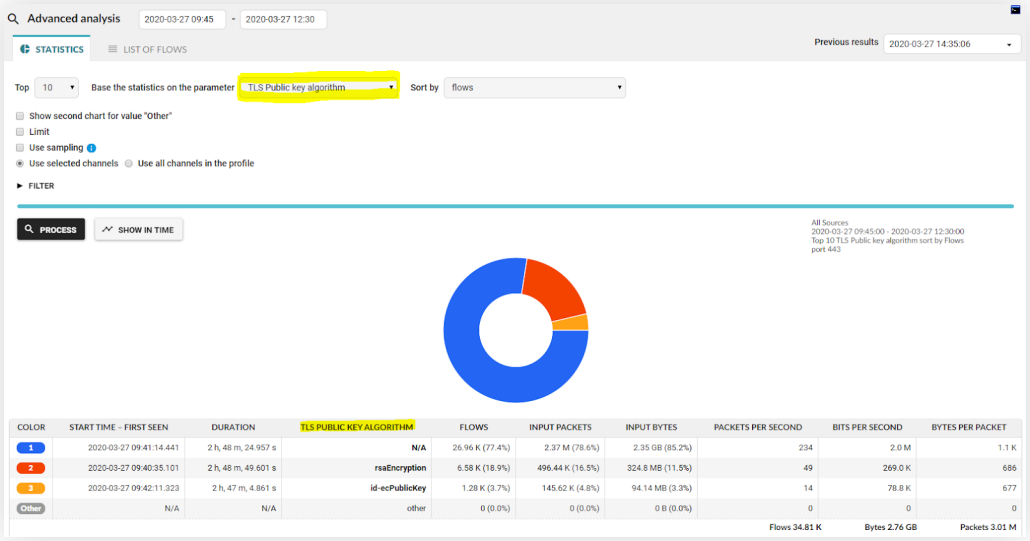


FIGURE 11: TLS PUBLIC ALGORITHM ANALYSIS

4.2 SERVER NAME INDICATION (SNI) ANALYSIS USE CASE

Similarly to ALPN, SNI is a TLS extension. It allows TLS-capable servers to host multiple services on the same IPs. Clients add this extension with the hostname of the website they want to connect to.

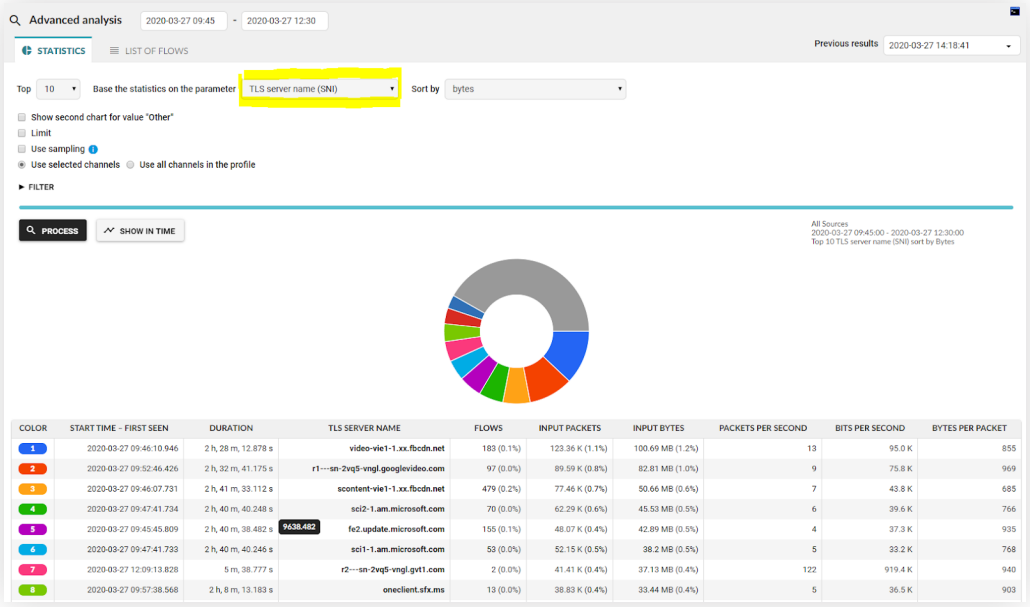


FIGURE 12: TLS SERVER SNI ANALYSIS

IMPORTANT NOTE

In case of data volume analysis in this way, the TOP10 results of the largest data volumes transmitted in communication with individual TLS server name (SNI) results. Based on the parameter used it is also possible to create a chapter for the calculated data in the widget in Flowmon dashboard.

5. CERTIFICATE CHECKUP NOTIFICATION USE CASE

While checking for expired certificates is an obvious step, we might also want to check for soon-to-be-expired certificates to prepare in advance. Furthermore, monitoring certificates and their usage in development, testing and production environments is a way to protect against and identify leaking private keys and other sensitive information.

Flowmon allow us to setup notification that the SSL certificate has expired and needs to be renew. For the purposes of notification, it is possible to use several combined actions, such as notification on an e-mail, run a user script or send a syslog to SIEM System.

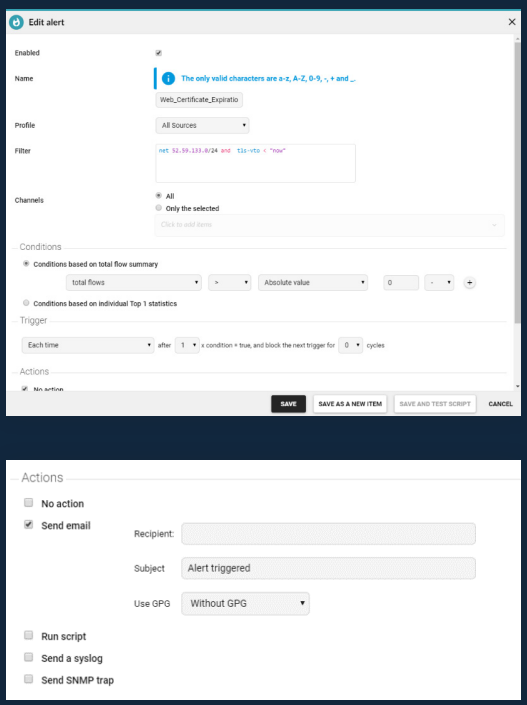


FIGURE 13: CERTIFICATE CHECKUP NOTIFICATION SETUP

1. Name of Alert
2. Parent profile like source of data
3. Additional filter as condition
4. Used channels from parent profile
5. Condition based on total flow sumary
6. How many times is alert trigered
7. Actions may by combined

6. FMC CHAPTERS

In the REPORTS tab in the left panel of the FMC module, it is possible to click through to the CHAPTERS section, where chapters are defined as a source of pre-calculated data, not only for reports, but also for the widgets in Flowmon Dashboard itself. These chapters can be fully utilized also for the purpose of monitoring encrypted traffic.

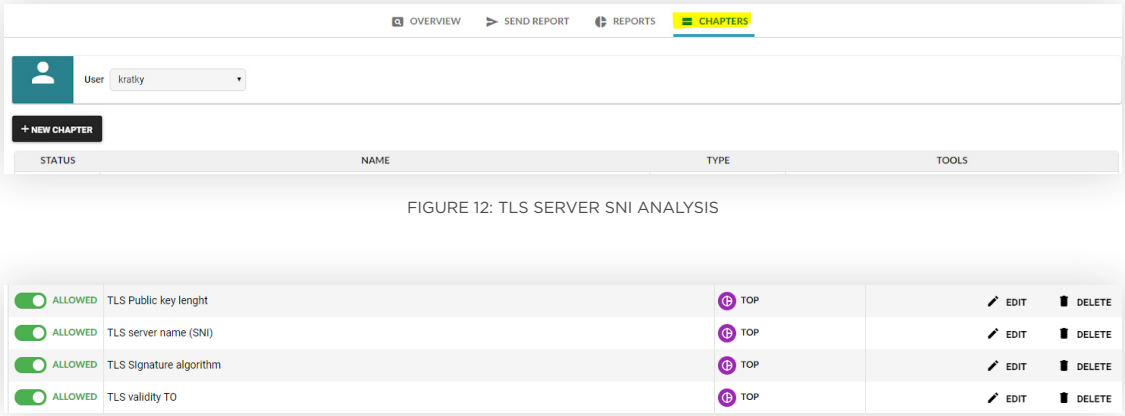


FIGURE 12: TLS SERVER SNI ANALYSIS

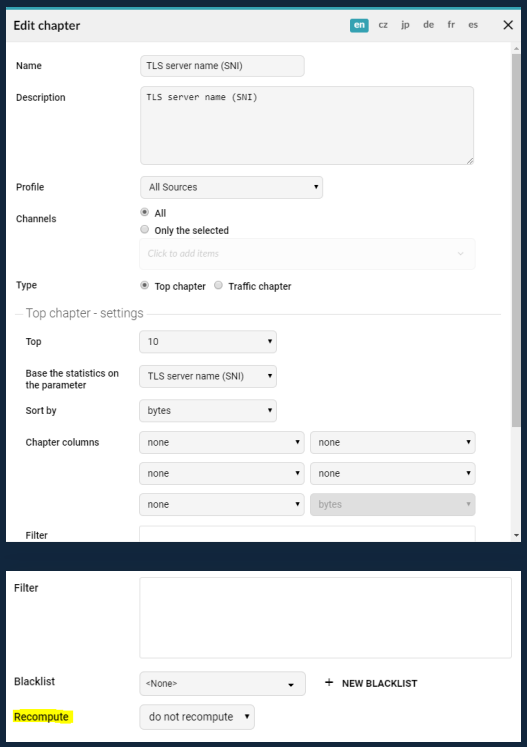


FIGURE 15: TLS SEVER NAME (SNI) CHAPTER SETUP

1. Name and Description of Chapter
2. Source Profile of traffic data
3. Channels selection in profile
4. Type of Chapter (Pie or Linear/ Logarithmic)
5. No. Of TOP values
6. Parameter statistics
7. Sort by value
8. Chapter columns description
9. Filter specification
10. Recomputing of data in time

7. CONCLUSIONS

99% of IT professionals see encrypted traffic as a possible source of security threats. Don't let the encrypted traffic turn into security risk. Gain a scalable visibility of threats in encrypted traffic when preserving privacy and with no impediment to latency for both, Network and Cloud Operation (NetOps) and Security Operation (SecOps) with Flowmon Probes, Flowmon Collectors and Flowmon ADS.