Preventing known and unknown attacks based on email as attack vector

Check Point SandBlast ZERO-DAY PROTECTION

About this white paper

This document outlines some key elements for the defense against known and unknown GenV attacks available in the release R80.30. This version is focused on email as an attack vector. A separate document will cover web traffic as an attack vector.

The Infinity architecture allows customers to protect data center and cloud hosted applications as well as roaming users. Security polices can be harmonized and controlled by a central management infrastructure. Cloud services, Cloud hosted applications, data center applications, endpoints and mobile devices all benefit from the Threat Intelligence provided by Check Point Research.

The Infinity architecture is open for integration to 3rd parties and automation processes supported by API's available on the management and gateway components.

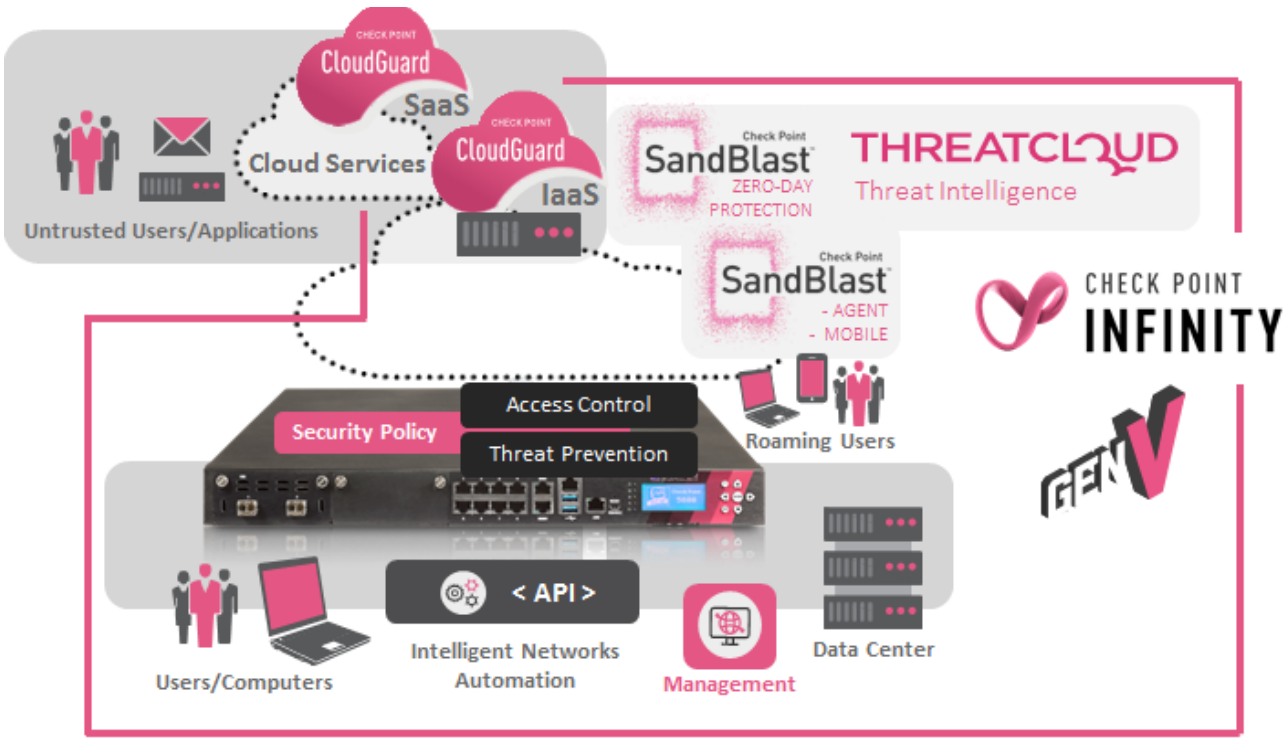
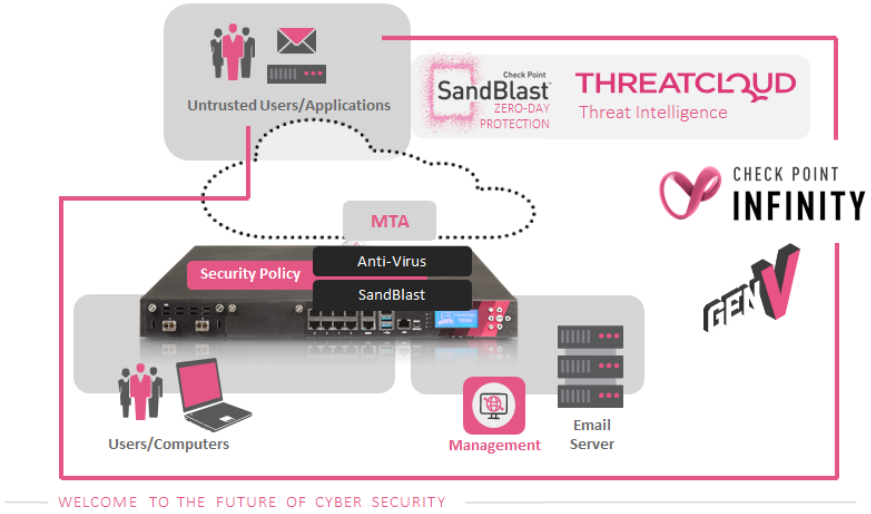


Table of content

Preventing known attacks

The diagram below shows the lab environment this document is based on.



The threat prevention security policy in the lab is based on a source and destination schema which matches the traffic flow. The 'Key Resources' Threat Prevention profile is protecting the web and email server.

Name	Source	Destination	Protection/Site/File/Blade	Action	Track
MTA traffic to Gateway R8030gw	Any	Any	N/A	MTA Security	Log Packet Capture Forensics
Protect important resources	Any	web_server	N/A	Key Resources	Log Packet Capture Forensics

Rule #1 was created automatically by the system when the MTA functionality was enabled on the gateway and originally had the 'Optimized' profile assigned. The profile 'MTA Security' has been built cloning the 'Key Resources' profile.

> **Design guideline**: The IPS Blade protections are applied to traffic handled by the passive streaming engine. The passive streaming engine is not able to intercept encrypted such as SMTPs, but it provides protections such as Anti-Phishing to block known Phishing attacks. See the white paper published at CheckMates about the Context Aware packet processing architecture.

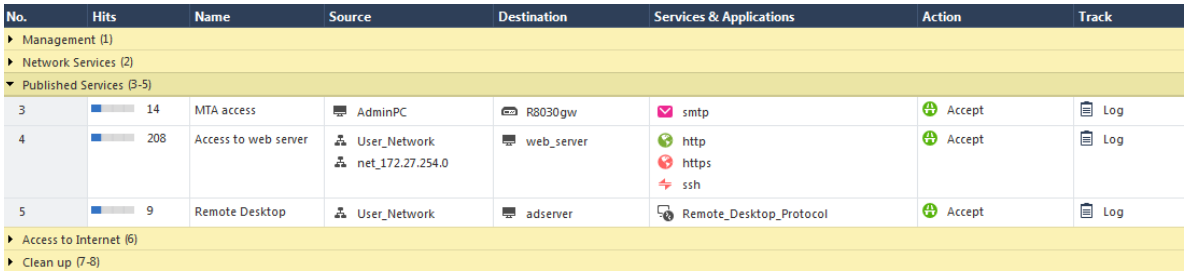
The MTA functionality enabled on the gateway allows the receipt of emails transported over SMTP/SMTPs (SMTP protected by TLS). With the MTA function enabled the Anti-Virus Software Blade allows blocking of known attacks. Customers may decide to activate the Anti-SPAM Software Blade using the configuration guidelines outlined in this document.

> **Design guideline**: Enterprise customers often continue using an Anti-SPAM solution well-tuned over years to meet the requirements of the enterprise. Customers selecting SandBlast as a solution against Zero-Day Attacks intending to continue using their established Anti-SPAM solution must place the Check Point gateway as next hop MTA behind the Anti-SPAM gateway.

Subsequent to actions performed by the Anti-Virus Blade looking for known attacks, the SandBlast Blades perform extraction of potential malicious content and forward attachments to an emulation environment. In this example the emulation is performed by the SandBlast Cloud service but it could as well be executed by a dedicated appliance hosted in the data center.

Access Control Policy

The incoming traffic is first checked against the Access Control Policy before Threat Prevention is performed. Below the extract of the lab policy allowing traffic directed to the MTA in rule #3.

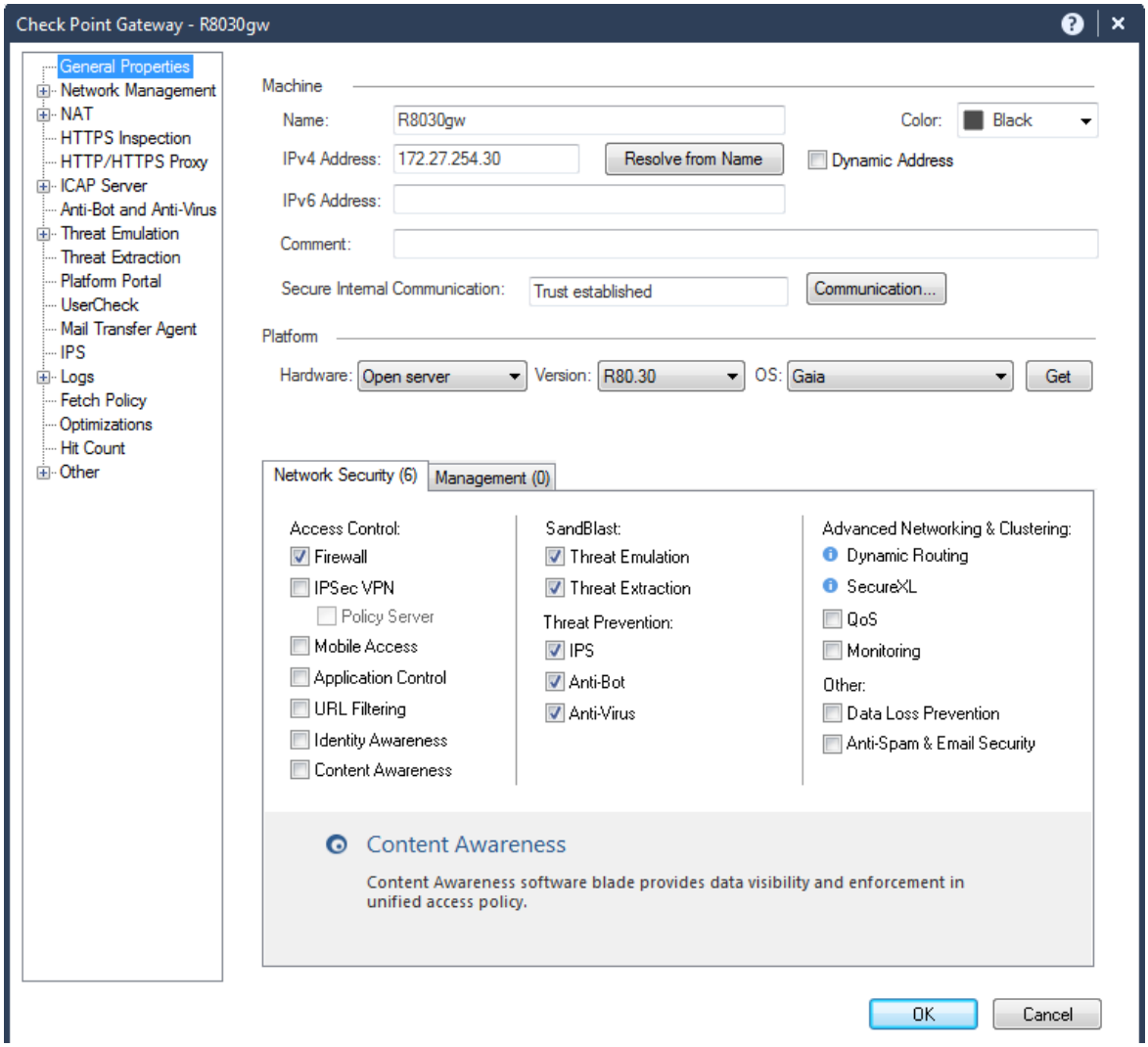


No.	Hits	Name	Source	Destination	Services & Applications	Action	Track
Management (1)							
Network Services (2)							
Published Services (3-5)							
3	14	MTA access	AdminPC	R8030gw	smtp	Accept	Log
4	208	Access to web server	User_Network net_172.27.254.0	web_server	http https ssh	Accept	Log
5	9	Remote Desktop	User_Network	adserver	Remote_Desktop_Protocol	Accept	Log
Access to Internet (6)							
Clean up (7-8)							

Gateway object configuration

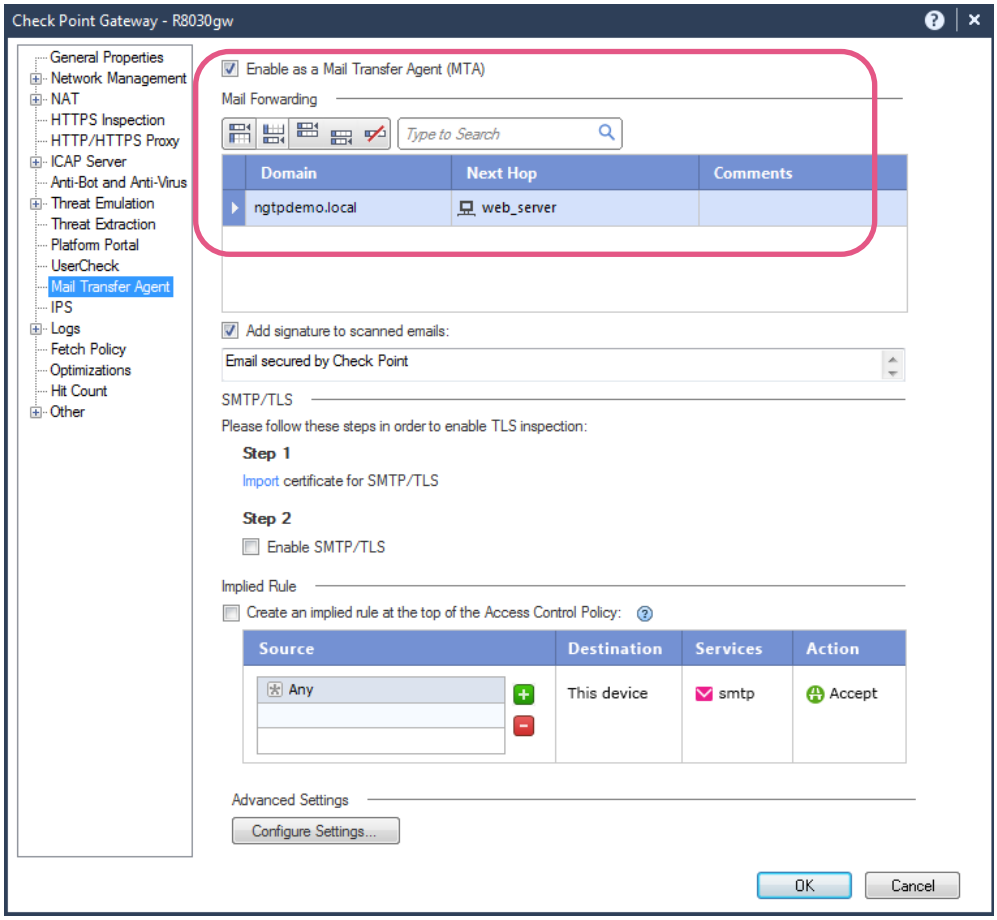
The security gateway is configured to apply Zero-Day Protection using the SandBlast functions and following the protection against known attacks performed by IPS and Anti-Virus Blade. The Anti-Bot functionality is outside the scope of this paper but it plays a key role identifying known attacks intending to spread to other network segments.

> **Design guideline**: When enabling the MTA functionality a threat prevention policy rule will automatically be created applying the 'Optimized' profile on the traffic directed towards the MTA.



MTA configuration

In this lab the MTA is enabled for SMTP traffic only and to forward the traffic to the internal web and email server 'web_server'. It was decided to create a dedicated access control rule (see above) in favor of using an automatically created implied rule.



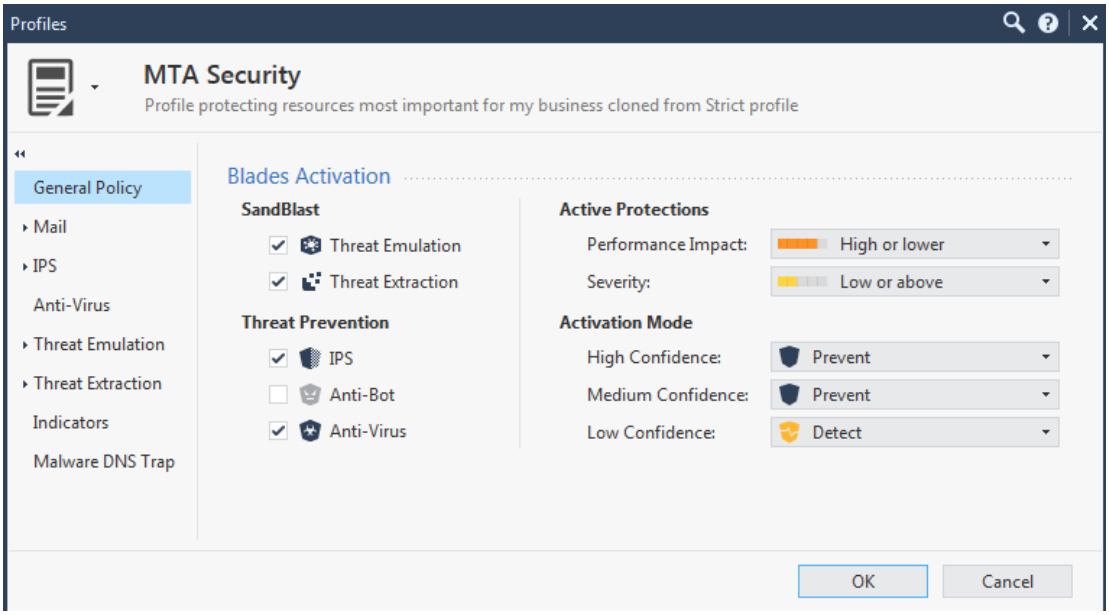
Design Guideline: In case of a need to change the default SMTP port the MTA is working on, administrators can follow the instructions provided in [sk142932] to change the relevant ports.

Details of the Threat Prevention profile applied to the traffic

The profile 'Key Resources' configured in this example describes the actions applied on the traffic matching the Threat Prevention rule.

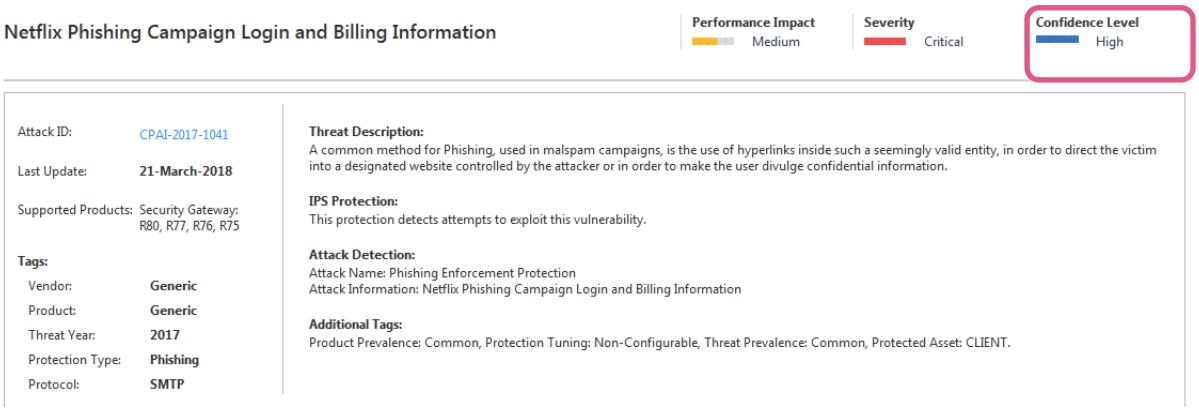
The profile overviews screen defines the settings for activation of protections. In this case, all protections with a performance impact 'high or lower' and the severity level 'low or above' will be activated. Remember that each protection has meta-data describing these two attributes.

Once protections have been selected for activation, protections with their meta-data attribute 'confidence level' set to 'high' or 'medium' will be active in prevent mode. Protections where the 'confidence level' attribute is defined to 'low' will be active in detect mode.



A note about the confidence level attribute: This attribute is assigned by the R&D team in relation to the amount of information obtained about an attack prevented with the protections. The more information can be obtained,the higher the confidence level attribute is defined. Protections are maintained by R&D and the confidence level attribute may change over time.

In this IPS protection example preventing attacks against a Netflix Phishing campaign the confidence level is 'high' as time has passed since the initial outbreak of the campaign.

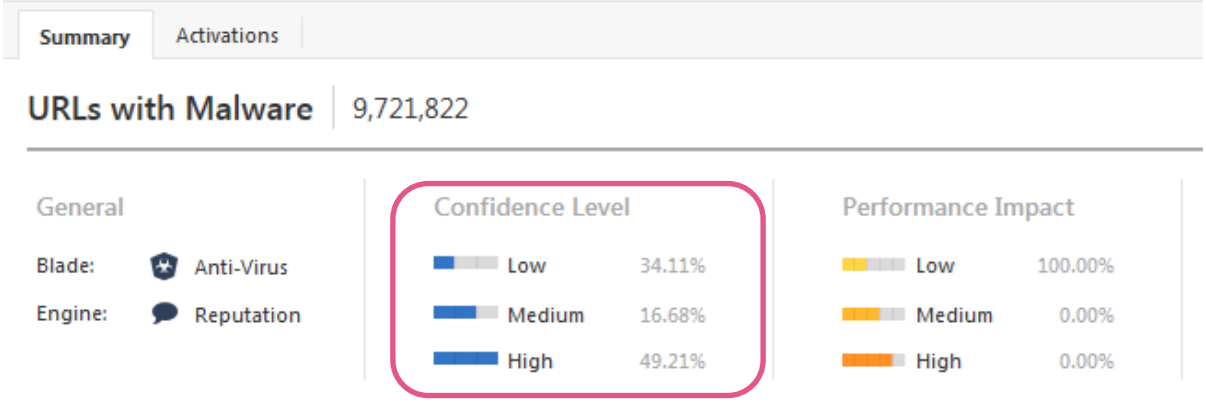


Understanding protections and their confidence level

Use the 'Threat Tools > Protections' menu in SmartConsole to understand the protections provided by the Check Point update and real time online service. IPS protections will be downloaded by the gateway (default since R80.20) while Anti-Bot, Anti-Virus and Threat-Emulation protections are provided as real time service using secured and authenticated queries raised by the gateway against the ThreatCloud database.

See for example the 'URLs with Malware' protection listed below. This protection (updated on the 24th of May 2019) presents more than 9 million URLs. The details window below demonstrates that out of these about 34% have a low confidence level attribute assigned. About 16% are known with a medium level of confidence. The majority of the URLs of 49% are known with a high level of confidence to distribute malware.

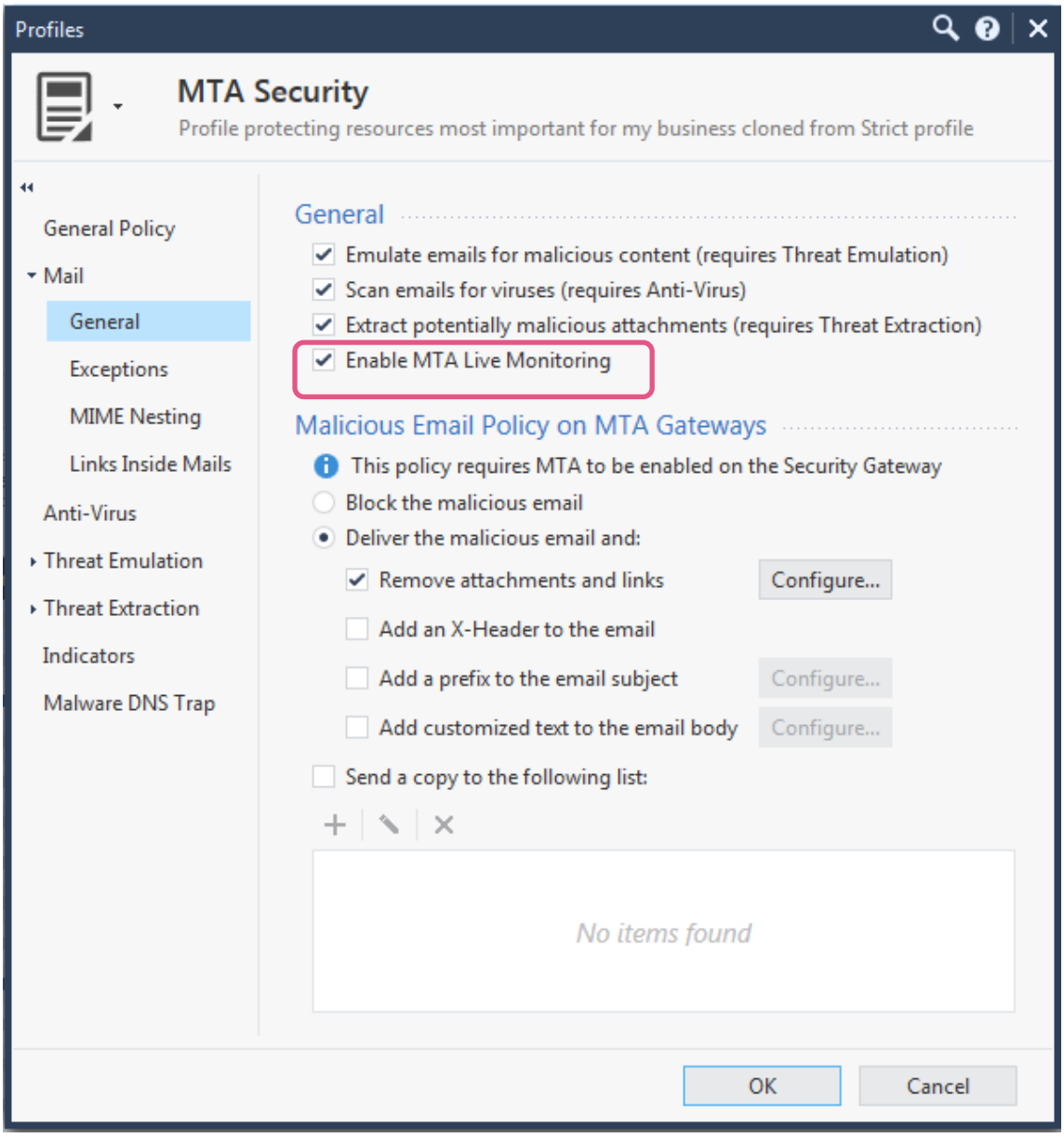
Protection	Blade	Engine	Known Today	Last Update
IPS	IPS	Signatures	10,033	5/23/2019
Reputation IPs	Anti-Bot	Reputation	62,095,265	5/24/2019
Reputation URLs	Anti-Bot	Reputation	243,363,031	5/24/2019
Reputation Domains	Anti-Bot	Reputation	243,857,965	5/24/2019
Mail Activity	Anti-Bot	Suspicious Mail Outbreaks	2,986,726	5/24/2019
Unusual Activity	Anti-Bot	Behavioral Patterns	23	5/24/2019
Malicious Activity	Anti-Bot	Signatures	7,279	5/24/2019
Viruses	Anti-Virus	Signatures	25,834,615	5/24/2019
URLs with Malware	Anti-Virus	Reputation	9,721,822	5/24/2019
File Types	Anti-Virus	File Type	89	5/24/2019
Exploit Detection	Threat Emulation	Exploit Detection	N/A	5/24/2019
Malicious Activity	Anti-Virus	Signatures	N/A	5/24/2019
Unusual Activity	Anti-Virus	Behavioral Patterns	16	5/24/2019
Links Inside Mail	Anti-Virus	Reputation	244,964,547	5/24/2019
Links Inside Mail	Anti-Bot	Reputation	236,009,847	5/24/2019



Mail protections defined in the profile

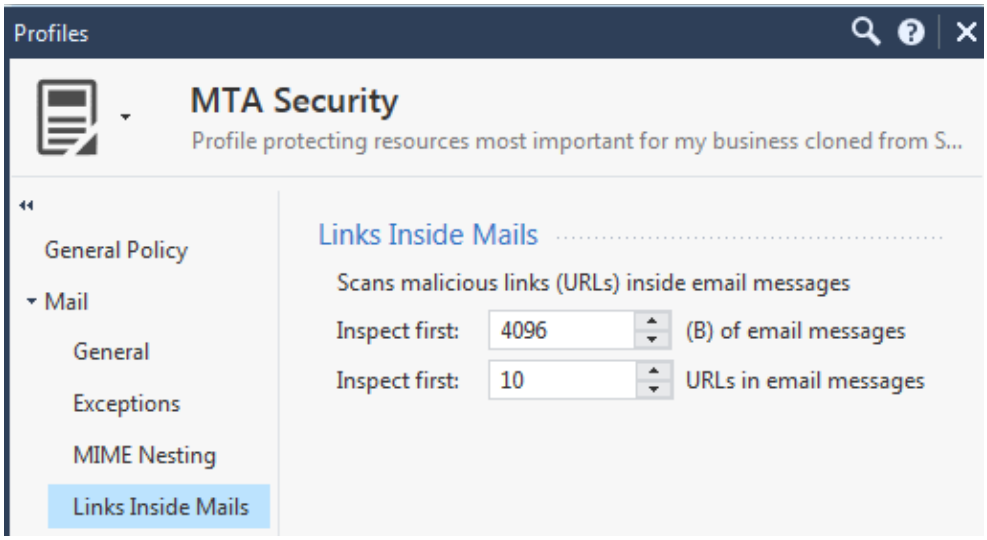
In R80.20 a new view for the mail protection configuration has been introduced and in R80.30 some improvements have been added.

MTA Live Monitoring provides information available in CPVIEW and SmartEvent about emails delivered and the related delay introduced by Zero-Day protection.



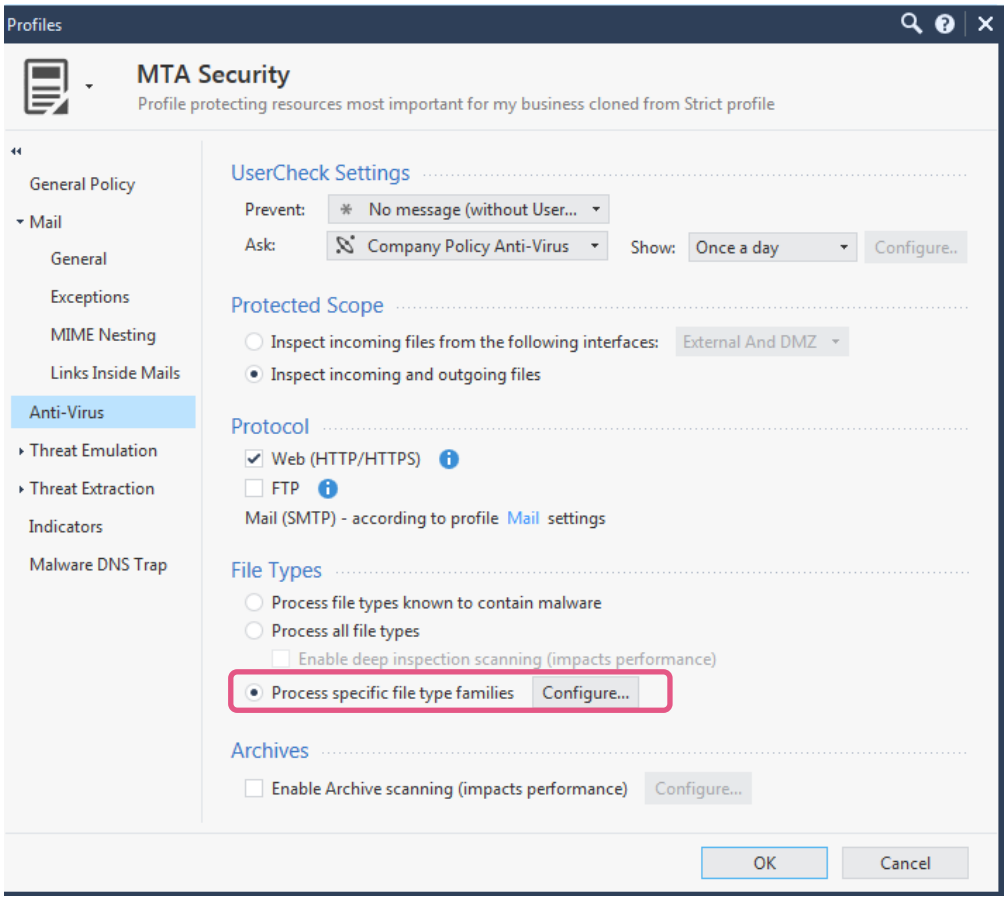
In this example the settings defined in 'exceptions' and 'MIME nesting' have been left to default.

The function ‘links inside email’ applies to the Anti-Virus engine checking links inside the message body.



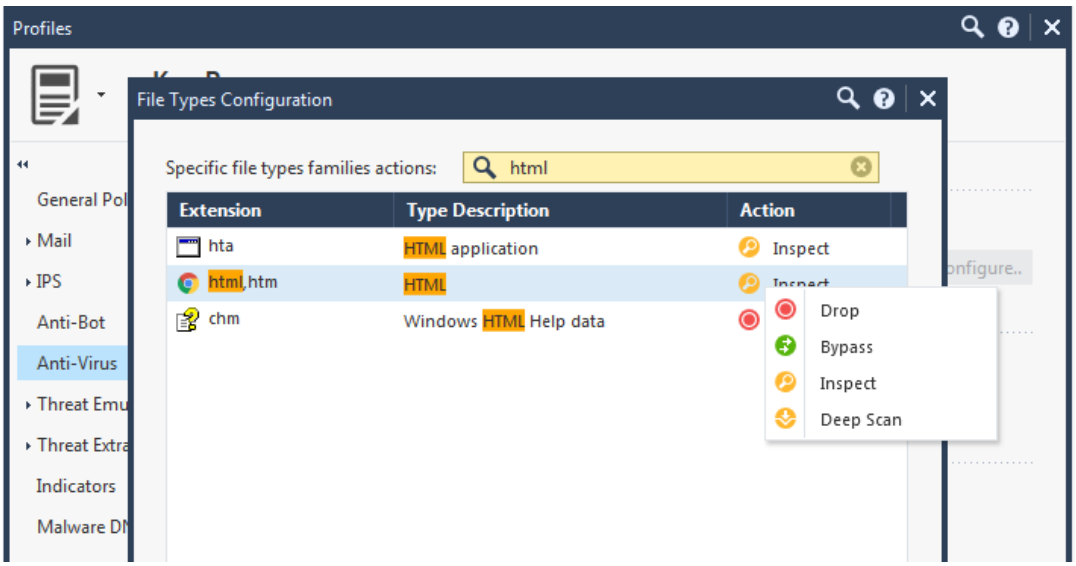
Anti-Virus settings of the Threat Prevention Profile

Known attacks are prevented using the Anti-Virus functionality available on the gateway. In this example only specific file types have been configured for analysis to keep the lab simple and to reduce load.



Decide which file types to be blocked by Anti-Virus

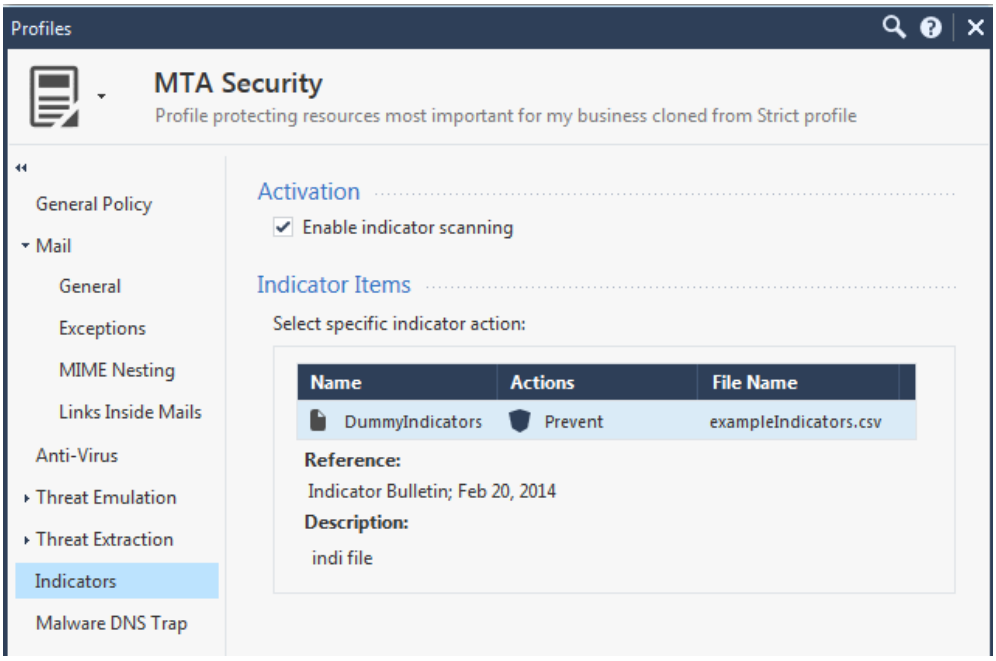
The option ‘process only specific file type families’ allows granular management of file types the Anti-Virus Blade shall inspect. Administrators may want to drop certain file types at this stage to limit the load on emulation services (applies to both dedicated emulation appliances and cloud hosted emulation service).



Design guideline: The ‘Deep Scan’ function may provide additional security to prevent known attacks but experience shows that todays sophisticated Gen V attacks require solutions powered by artificial intelligence and machine leaning such as Check Point SandBlast for prevention. This is why in this lab ‘Deep Scan’ was not used at all.

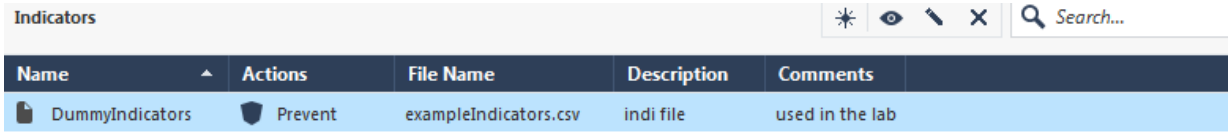
Working with Threat Indicators imported from 3rd party static or dynamic sources

The ‘Indicators’ menu allows selecting imported Threat Indicators from 3rd party source. Starting with R80.30 these indicators are now applied by the Anti-Virus Blade even on traffic handled by the MTA function. In earlier versions indicators have only been applied to traffic handled in streaming mode.



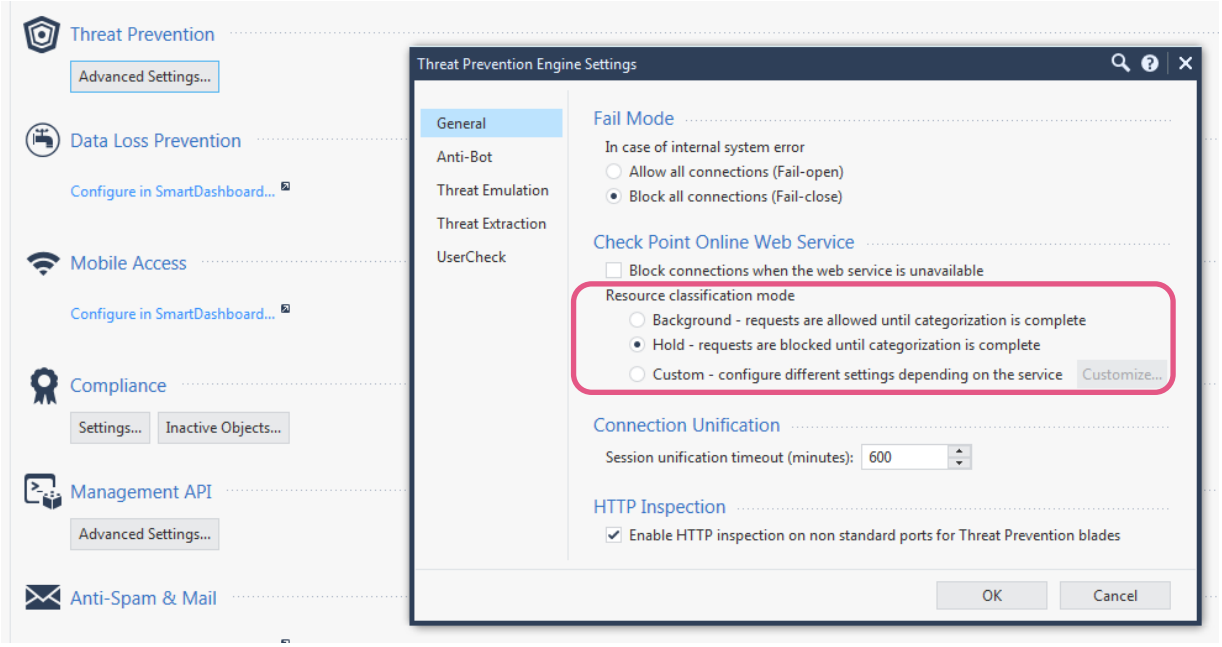
Threat indicators can be imported and maintained using the relevant menu in SmartConsole using formatted csv files. The format of these files is documented in the Threat Prevention Administration Guide.

Since R80.20 custom IoC feeds can even be dynamically updated using the function documented in sk132193 and this white paper posted on CheckMates.



Configure the Anti-Virus Blade to work in hold mode

Even if SMTP traffic will be handled by the MTA, the Anti-Virus Blade should be configured to work in 'Hold' mode. In the advanced settings related to Threat Prevention you can define working in background or hold mode.



Understand the 'Connection Unification' timeout setting will impact the log suppression for Threat Prevention related logs.

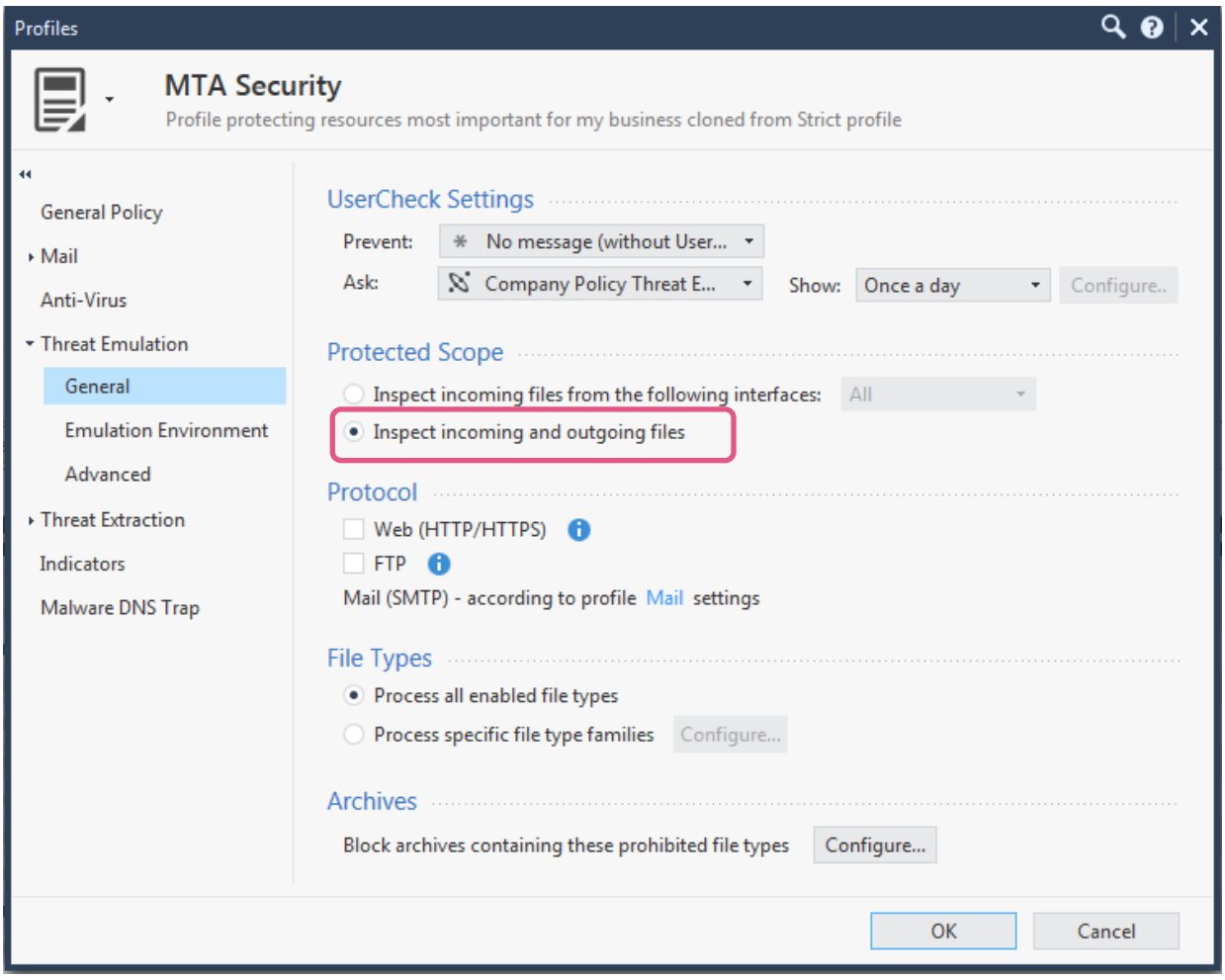
> Design guideline: In R80.30 the streaming engine responsible for applying sequencing and packet stream related security has been improved. In R80.30 and later, 'Hold' mode should be configured, and the 'Fail Mode' set to reflect the business need and risk analysis.

Preventing unknown attacks

In this example the SandBlast cloud services are used to emulate files to disclose malicious activity and clean potential malicious content. In the threat prevention profile you define the actions for Threat Emulation and Threat Extraction to be applied to the traffic.

The improved streaming engine present in R80.30 allows the functions to be executed when the traffic is streamed through the gateway. When using the MTA functionality email traffic will be handled by this instance.

A note about UserCheck: It has not been used in this lab. Understand that UserCheck is based on HTTP Redirect and it can´t be applied when HTTPS traffic is passing the gateway unless you enable HTTPS inspection. The improvements available in R80.30 for HTTPS inspection are out of scope of this document.

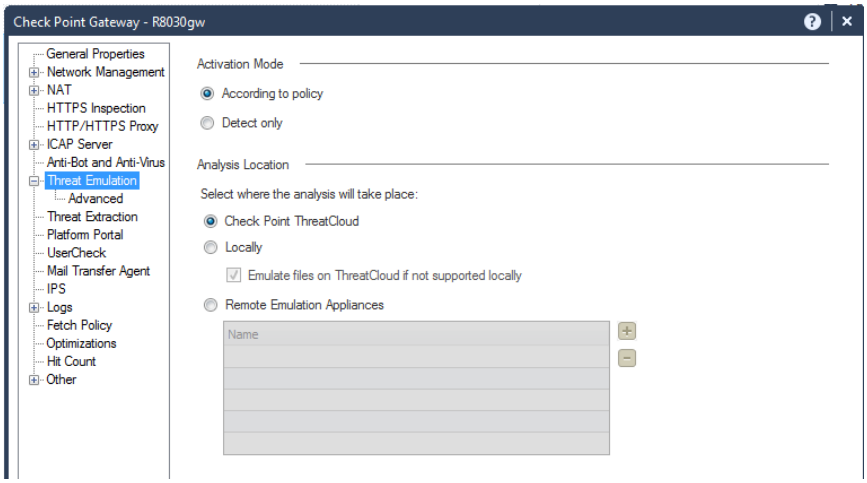


Design guideline: Using ‘inspect incoming and outgoing files’ meets the requirement defined in the threat prevention policy using the source and destination schema.

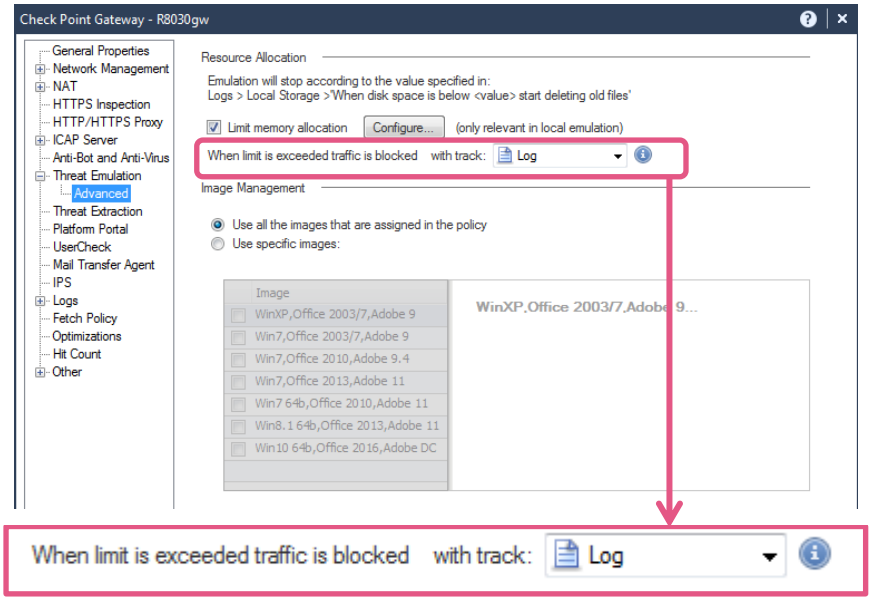
Name	Source	Destination	Protection/Site/File/Blade	Action	Track
MTA traffic to Gateway R8030gw	Any	Any	N/A	MTA Security	Log Packet Capture Forensics
Protect important resources	Any	web_server	N/A	Key Resources	Log Packet Capture Forensics

Gateway settings for Threat Emulation

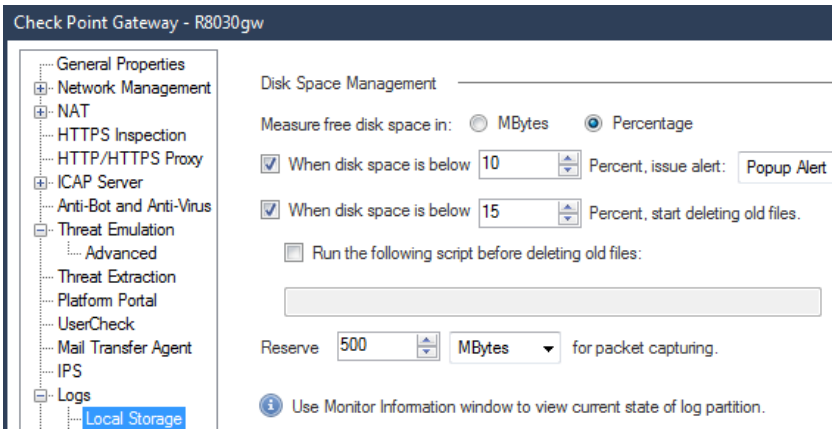
The gateway object has been configured using the cloud services.



The advanced settings have been left to default.

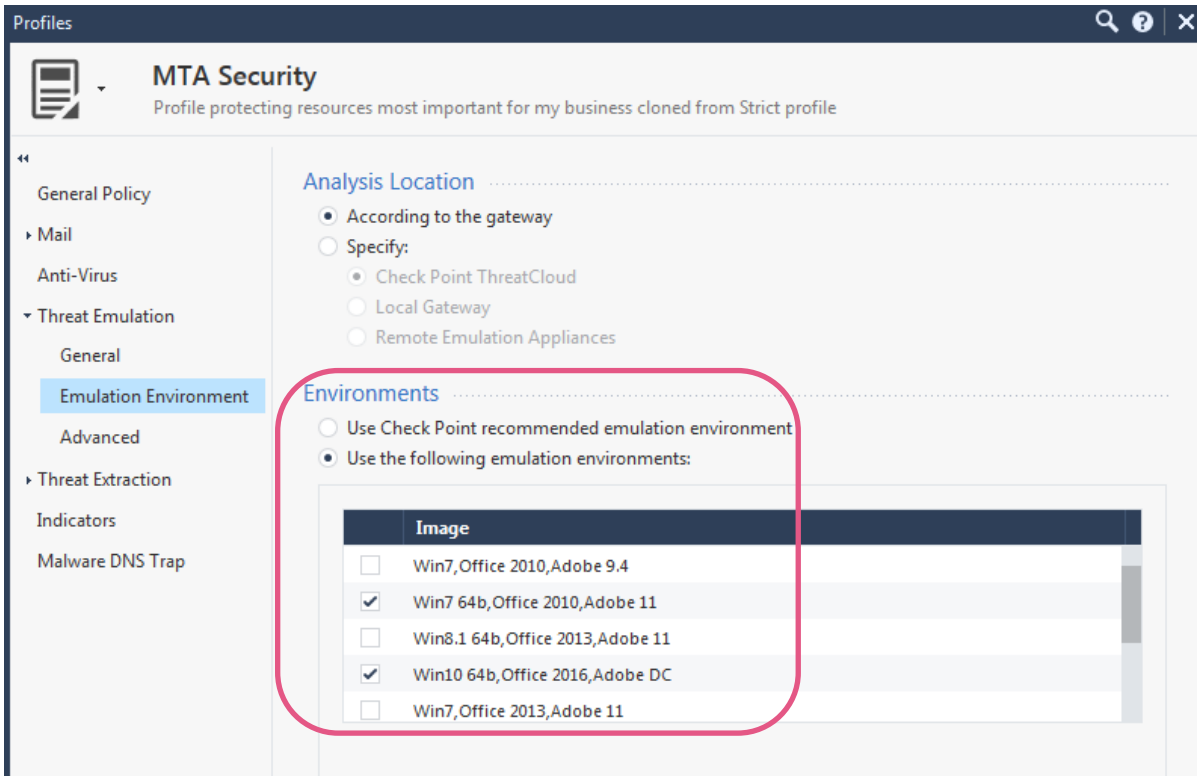


Design guideline: Review the log storage settings of your gateway to ensure that emulation actions are not interrupted if the gateway is running out of disk space.

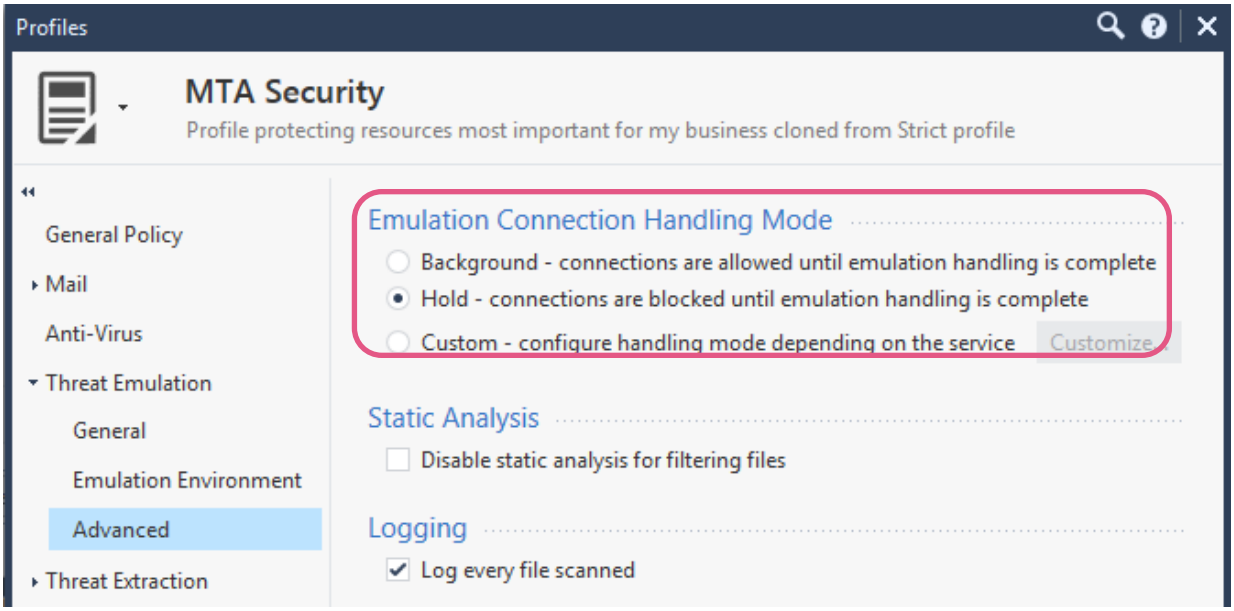


Define the emulation environment(s) and advanced settings

Configure the environment(s) where files are opened for emulation in the relevant menu of the threat prevention profile.



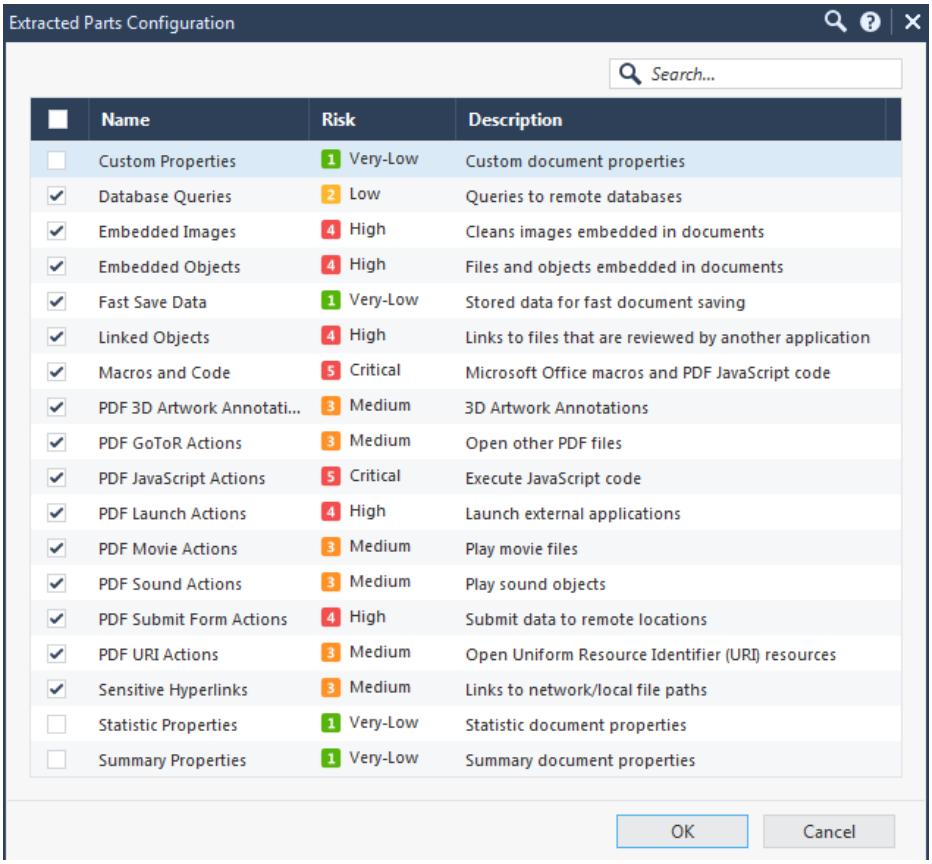
Design guideline: Configure the 'Hold' mode for Threat Emulation to be consistent with the configuration applied to the Anti-Virus Blade. Remember R80.30 has an improved streaming engine. Disabling static analysis will negatively impact the load on the emulation environment and therefore it should not be selected. Logging every file scanned impacts the disk space required on the log server and may be not necessary in a later stage of the operations life cycle.



Removing potential malicious content from files

SandBlast provides the function to extract potential malicious content from files using in office business called Threat Extraction. Starting with R80.30 this function is supported for web traffic in addition to email traffic (see sk145773).

The list of potential malicious content subject for inspection and a potential extraction can be configured in the 'extraction method' settings menu of the threat prevention profile. The list is shown below.



Design guideline: Threat Extraction functions are performed on the gateway itself – not in the cloud services or on a dedicated emulation appliance. You therefore want to evaluate the performance impact this function has when applied to web traffic as documented in sk145773.

Note: Make yourself familiar with the monitoring functionalities introduced in R80.30 for the MTA functionality provided by the SmartEvent and CPVIEW.

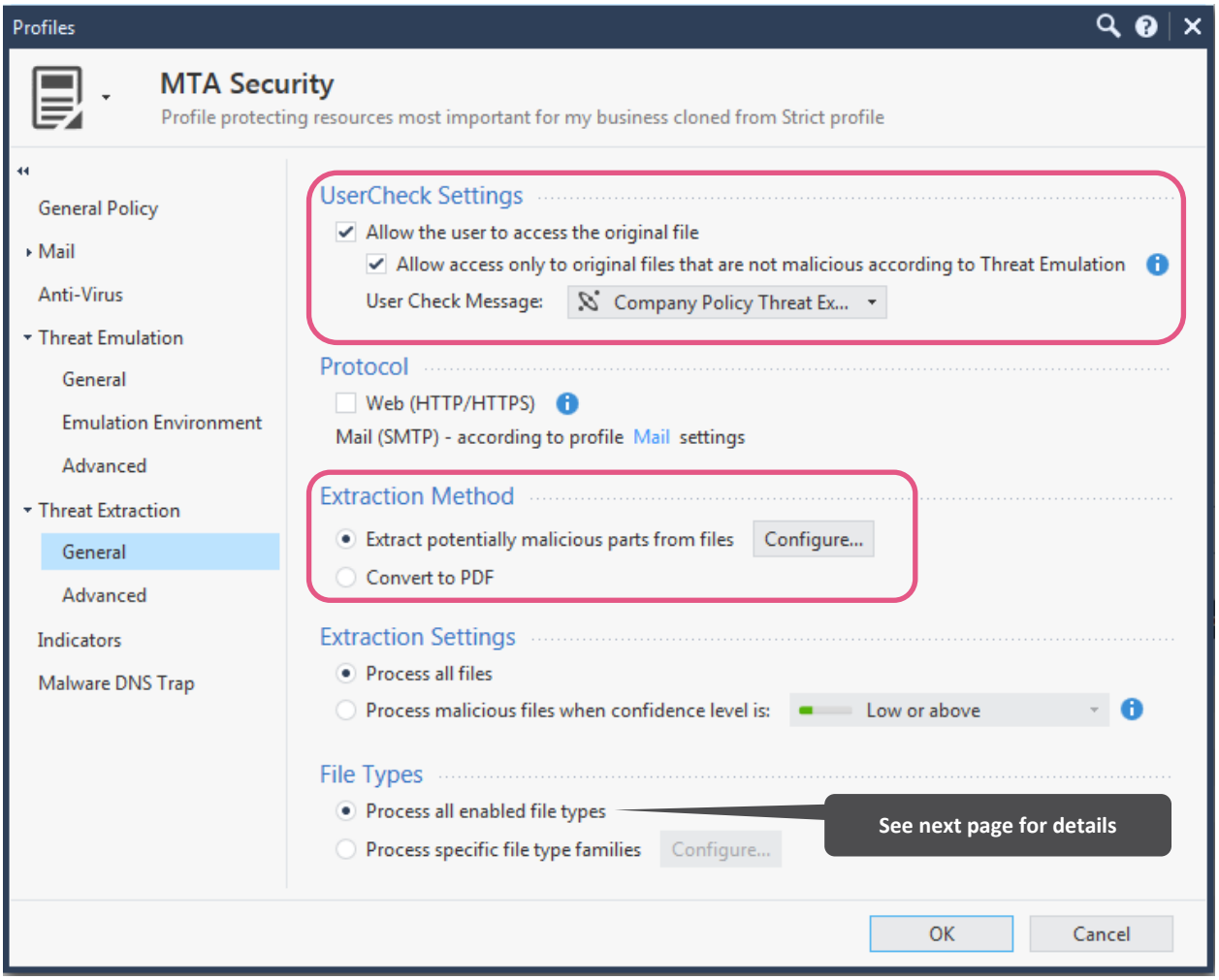
A list of file types supported by Threat Extraction and their related formats is documented in sk101553.

Configuring the threat prevention profile for Threat Extraction

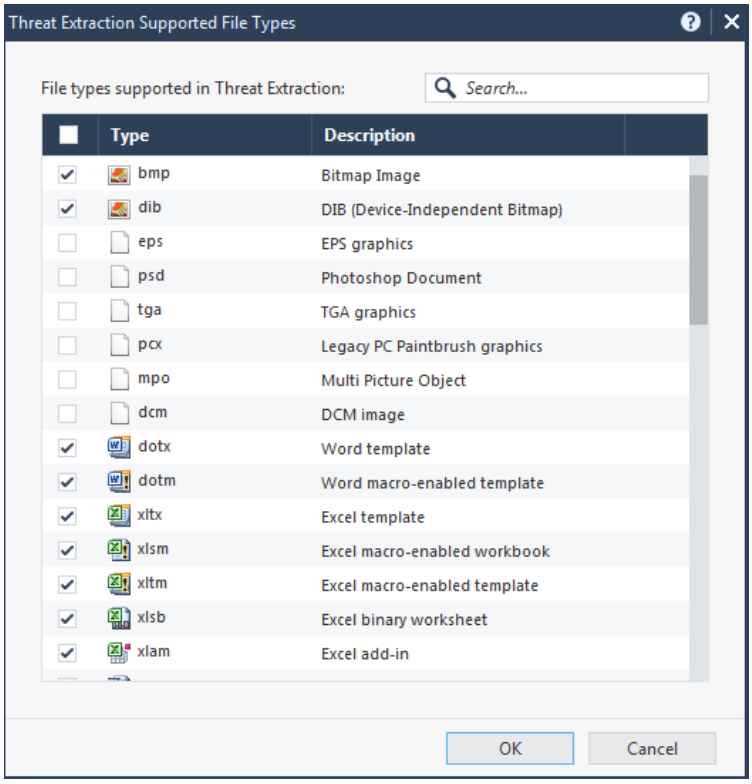
The configuration for the extraction functionality is defined in the profile settings. You can allow users downloading the original file but this setting should be evaluated carefully.

> **Design Guideline**: Allowing users to download the original file may open up your network for potential malicious elements. Administrators should involve all relevant groups in the business organization prior to leave the default setting shown below.

The extraction methods setting configures the gateway either converting documents to PDF or extracting potential malicious elements based on the settings shown on the previous page.

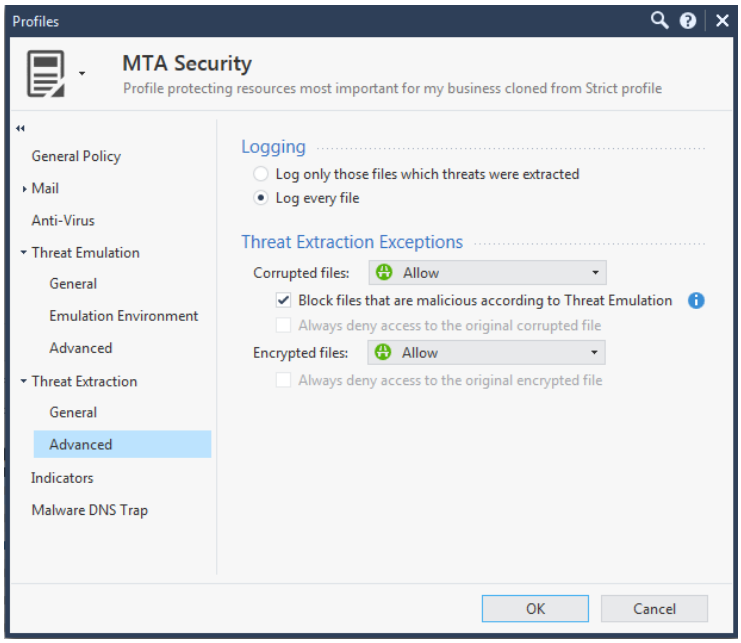


Configure the file types subject to the extraction functionality in the relevant menu.



You may wish to review the default advanced settings to ensure they reflect your business needs. In this lab it was configured to have a log message for every file handled.

Design guideline: Review the configuration for the exceptions as you may want to block corrupted and/or encrypted files instead of leaving the default setting allowing these files.

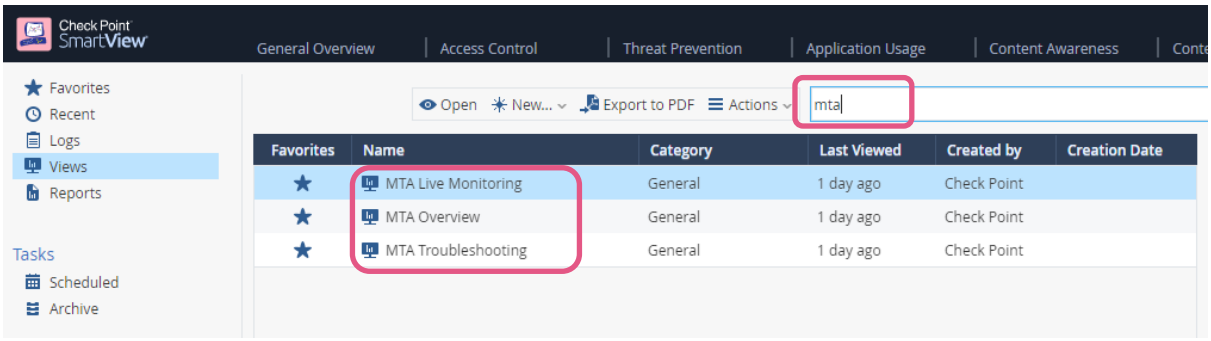


Monitoring the MTA functionality

The R80.30 release improves monitoring functionalities partially introduced in earlier versions. The MTA can be monitored using CPVIEW and SmartEvent.

> **Design guideline:** In case in-depth monitoring and troubleshooting is required the administrator is encouraged to review the documentation in sk120260 and the advanced technical reference guide sk109699.

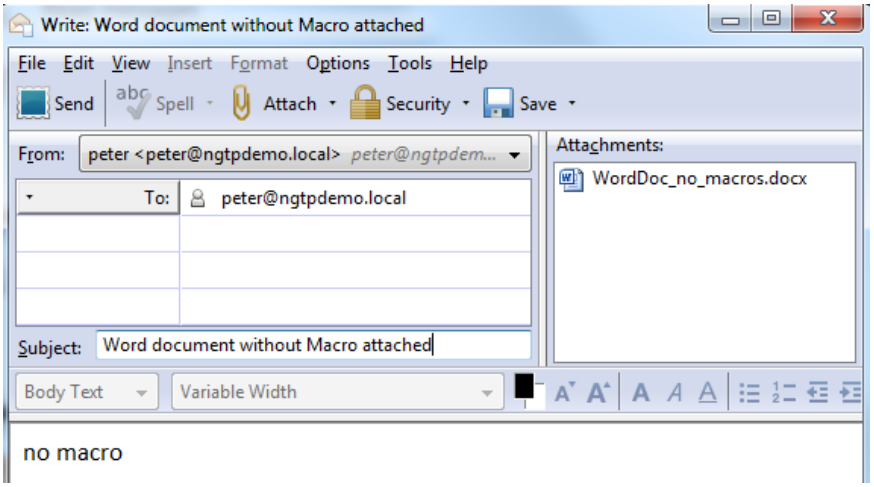
Customers purchasing a SmartEvent license have predefined templates available to view the MTA activities. You can access these templates using the SmartConsole > Logs & Monitor menu or SmartView interface using a web browser. The following screenshots are based on a web browser accessing SmartView.



For the following screenshots some demo email traffic was generated. A Thunderbird portable email client has been configured to use the MTA on the gateway as email server.

> **Note**: When working in a lab environment make sure to have DNS resolution working for the instances taking SMTP protocol. Modifying the /etc/hosts file on the systems may be sufficient depending on the systems used in the environment.

Emails with attached documents with and without macros, documents including links and a Phishing email have been sent multiple times. Keep in mind the gateway maintains a cache of files forwarded for emulation, and that logging about malicious phishing emails is subject to log suppression.

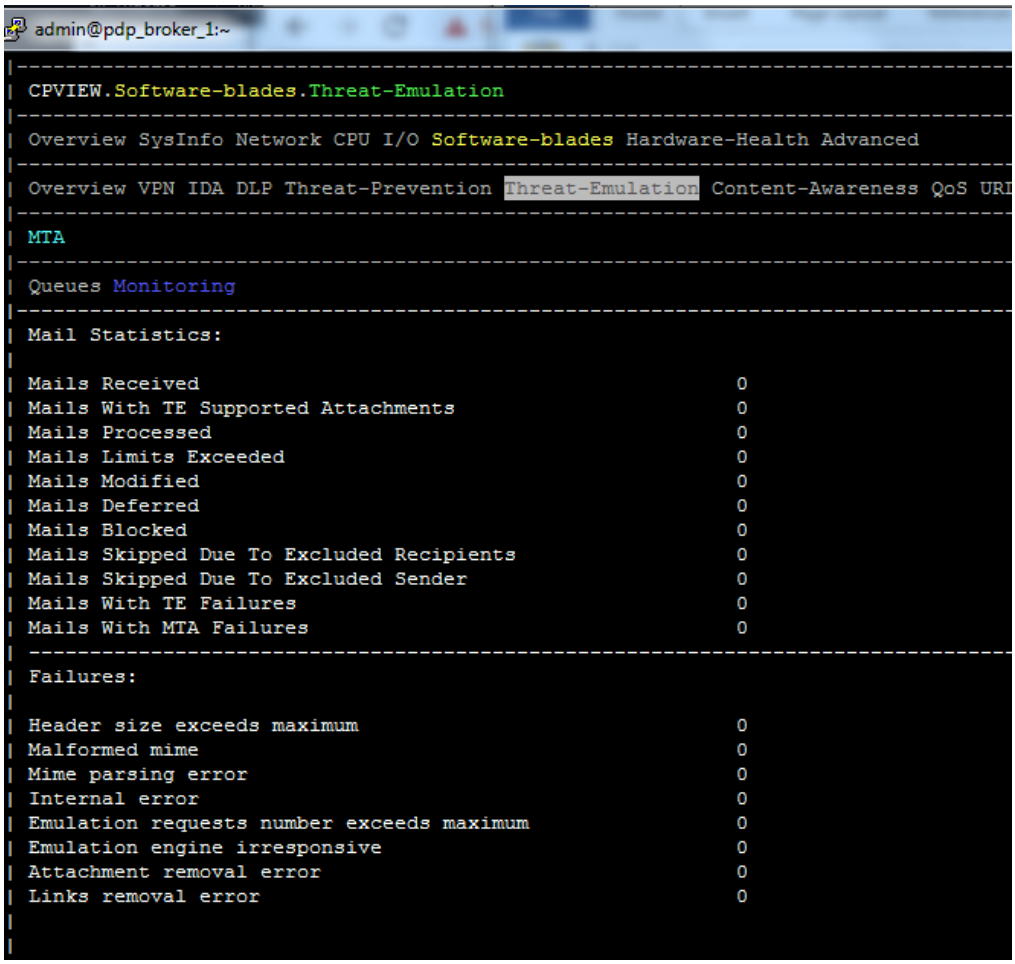


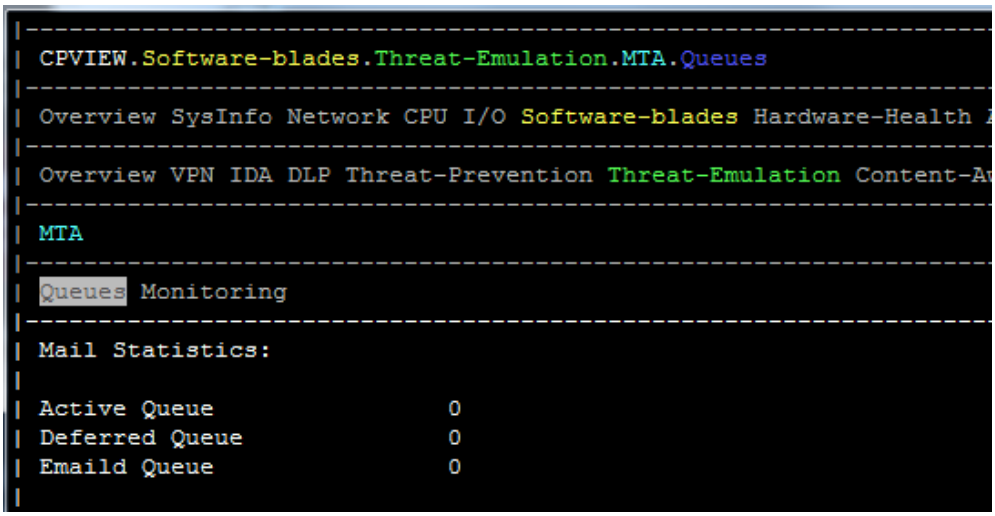
Monitoring the MTA using CPVIEW

While emails are processed by the MTA instance CPVIEW will show the current live activities.

> **Design guideline:** Keep in mind that you can configure CPVIEW to collect historical statistics following the guidelines provided in sk101878.

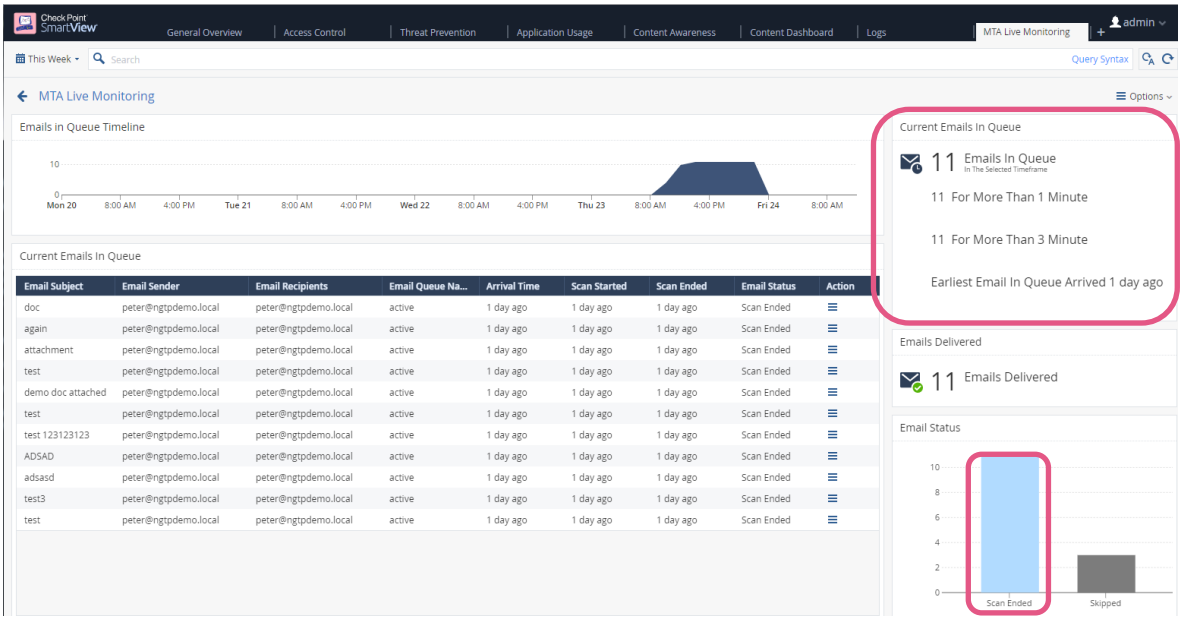
Use the Software-blades > Threat-Emulation menu to see the statistics.



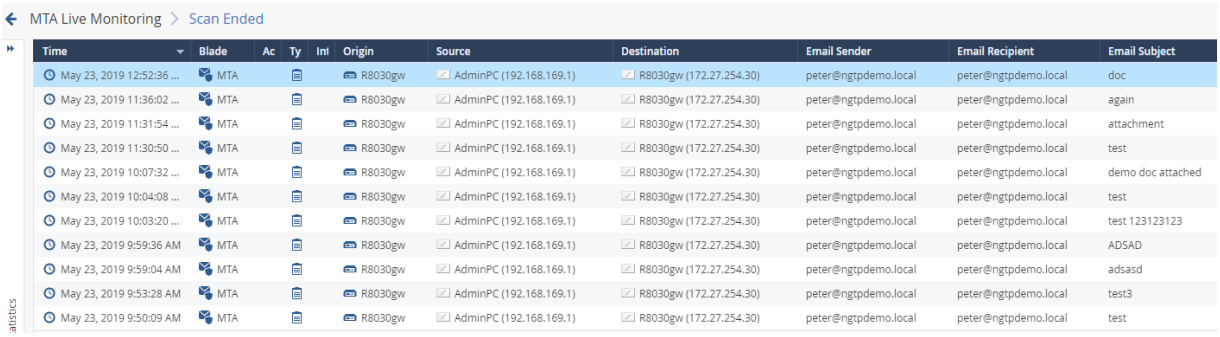


SmartView – MTA Live Monitoring

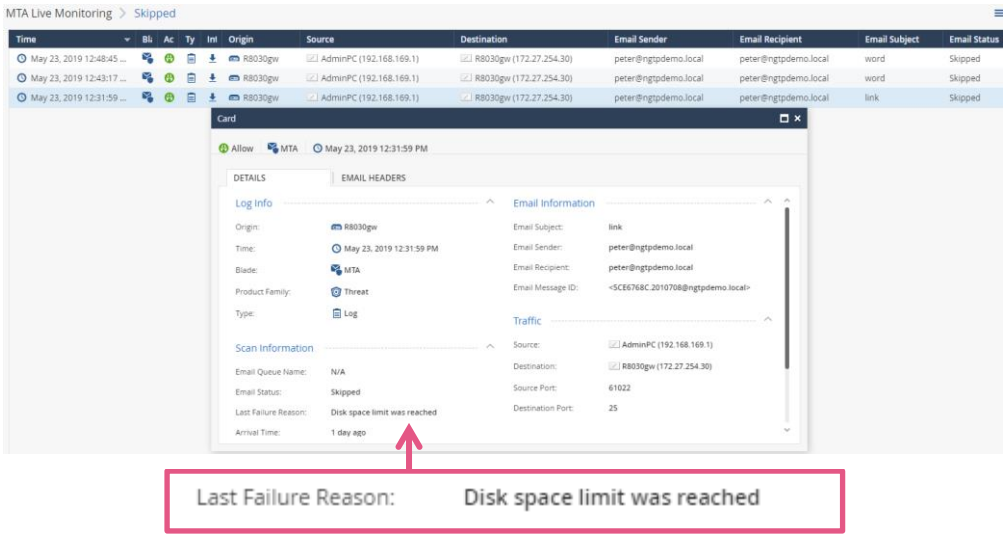
In the below screen you find the overview how long it took to manage the emails in the queue. Keep in mind the lab environment used for these tests has limited resources and a low Internet bandwidth.



You can click on the 'scanned email' bar and see the detailed list below

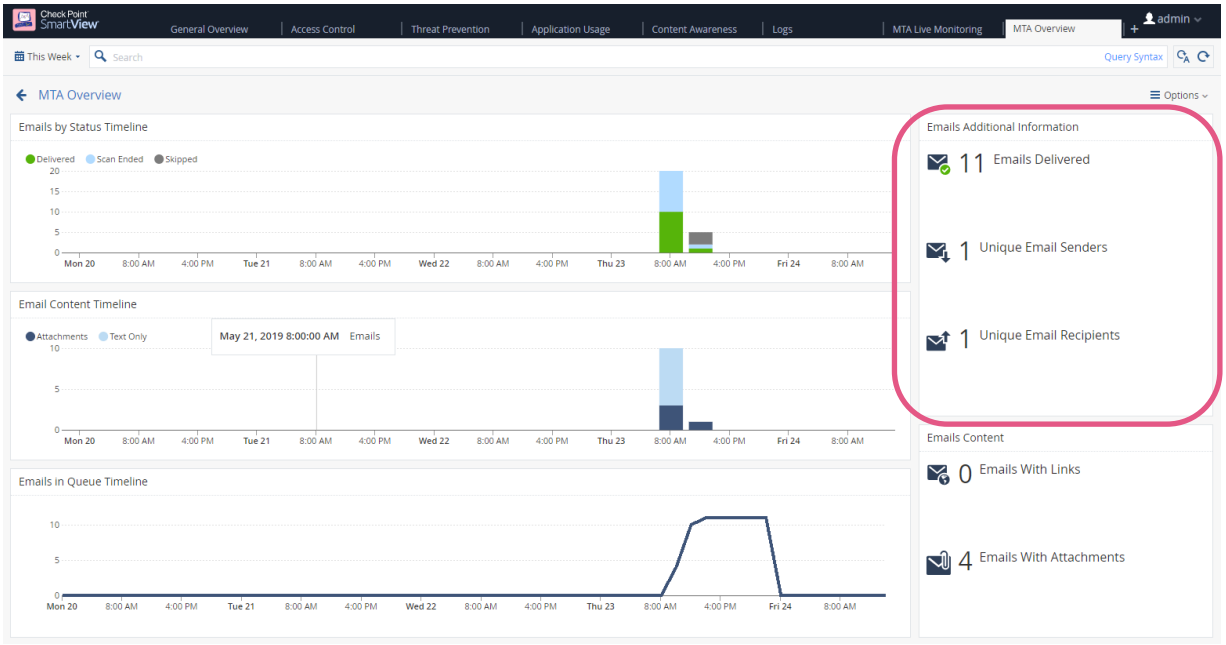


The emails documented with 'skipped' action have been related to an issue with the available disk space.



SmartView – MTA Overview

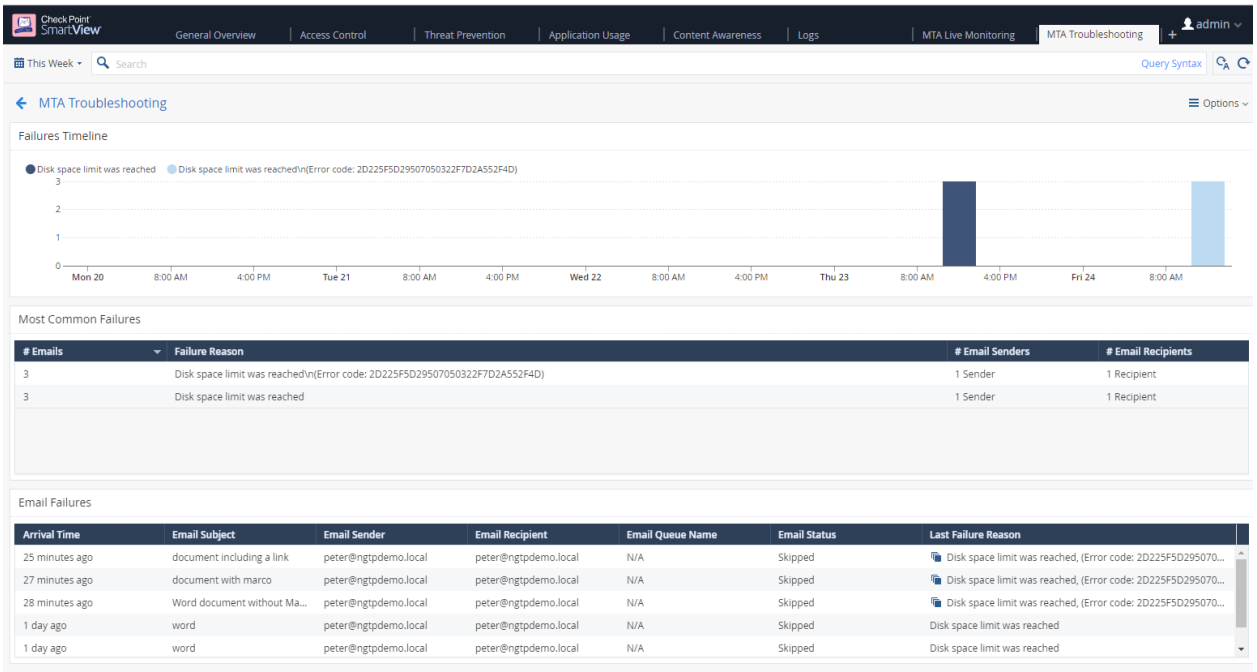
In this view you can see some statistics about the MTA.



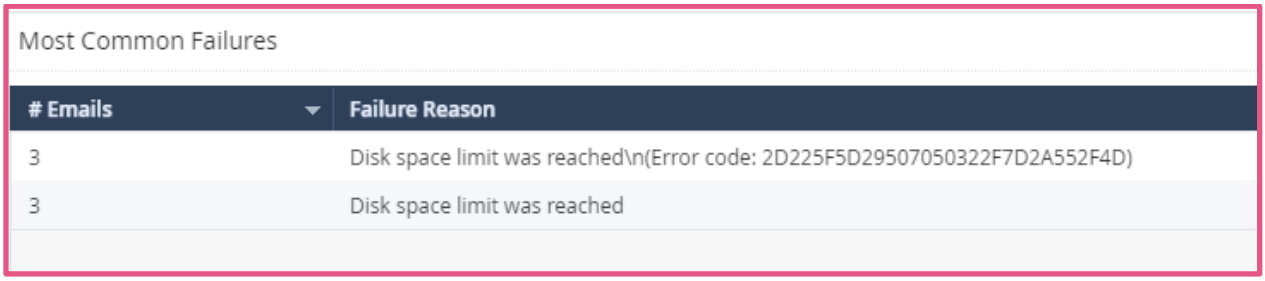
Design guideline: Remember that all views provided in SmartView can be edited to better meet the business needs using the Options menu.

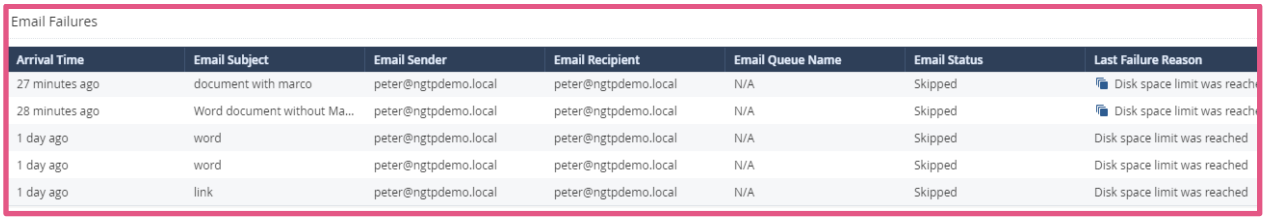
SmartView – MTA Troubleshooting

The troubleshooting view presents overview and details about email delivery failures.



Most common failures are listed as well as details about sender, recipient and the subject of the email.



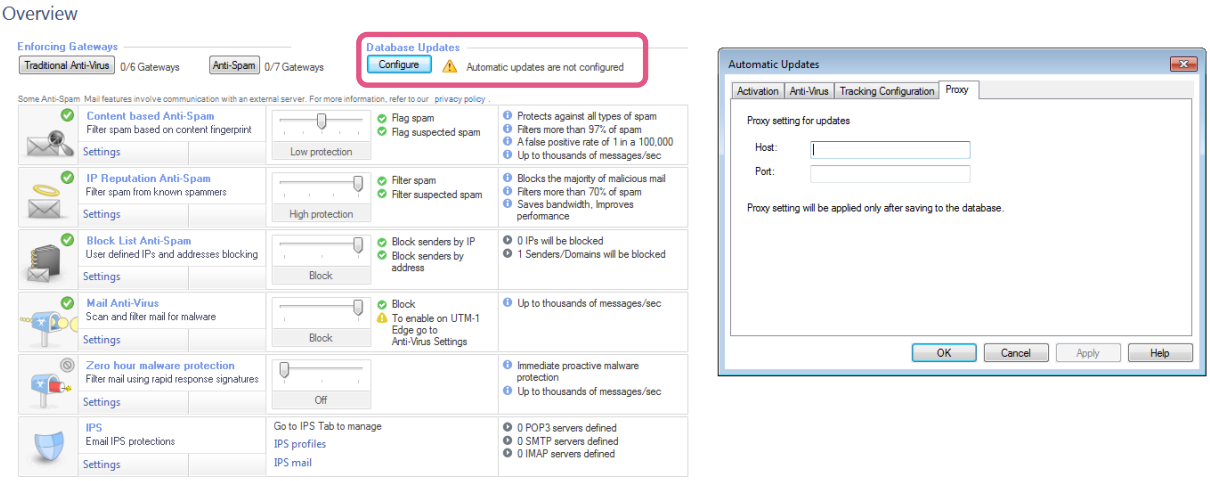


Exporting logs to 3rd party SIEM solutions

Customers can integrate into 3rd party SIEM solutions such as SPLUNK, Arcsight, QRadar or generic Syslog using the Check Point Log Exporter integrated in to R80.30 following the guidelines provided in sk122323.

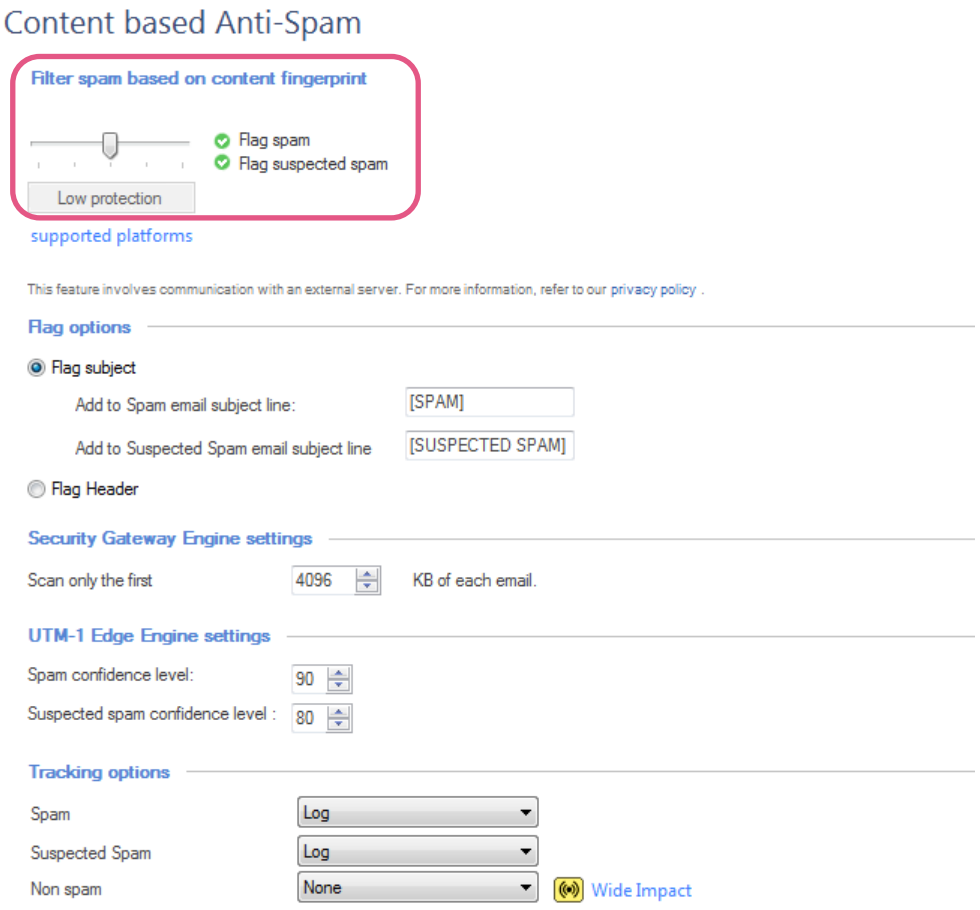
Configuring the Anti-SPAM Blade

In case the customer is looking for enabling the Anti-SPAM functionality on the gateway it is recommended following these guidelines.

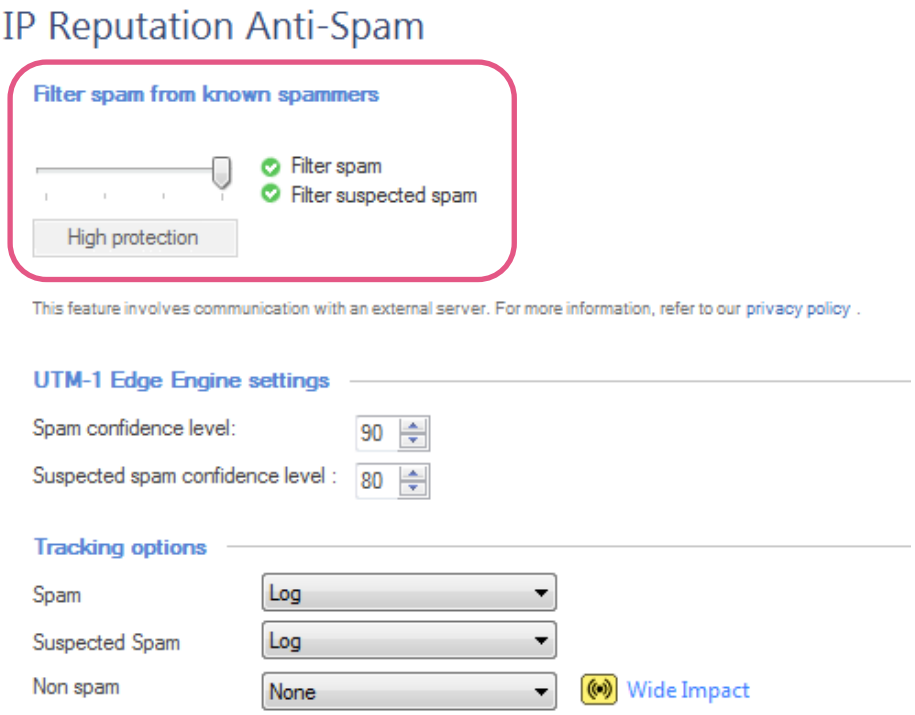


Note: In case the gateway uses a proxy to access the Internet you need to configure the proxy settings in the 'database update' options in addition to other proxy settings.

Define the content based Anti-SPAM only to mark the emails for SPAM.



Define the IP reputation Anti-SPAM using the ‘High protection’.



Recommended SecureKnowledge articles for further studies

Mail Transfer Agent – Advanced Technical Reference Guide sk109699

Configure MTA for load balancing/high availability sk110369

ThreatEmulation – Advanced Technical Reference Guide sk114806

ThreatExtraction – Advanced Technical Reference Guide sk114807