IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

NETWORK SECURITY TECHNOLOGIES, LLC, Plaintiff, v. MCAFEE, INC., Defendant.	**Civil Action No. _____** **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Network Security Technologies, LLC ("Network Security" or "Plaintiff"), for its Complaint against Defendant McAfee, Inc., ("McAfee" or "Defendant") alleges the following:

NATURE OF THE ACTION

1. This is an action for patent infringement arising under the Patent Laws of the United States, 35 U.S.C. § 1 *et seq*.

THE PARTIES

2. Plaintiff is a limited liability company organized under the laws of the State of Delaware can be served through its registered agent at 717 North Union Street, Wilmington, Delaware 19805.

3. Upon information and belief, McAfee is a corporation organized and existing under the laws of Delaware, with a place of business at 2821 Mission College Blvd., Santa Clara, California 95054, and can be served through its registered agent, The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801. Upon information and belief, McAfee sells and offers to sell products and services throughout the United States, including in this judicial district, and introduces products and services that into the

stream of commerce and that incorporate infringing technology knowing that they would be sold in this judicial district and elsewhere in the United States.

JURISDICTION AND VENUE

4. This is an action for patent infringement arising under the Patent Laws of the United States, Title 35 of the United States Code.

5. This Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

6. Venue is proper in this judicial district under 28 U.S.C. §1400(b). On information and belief, Defendant is incorporated in the State of Delaware.

7. On information and belief, Defendant is subject to this Court's general and specific personal jurisdiction because Defendant has sufficient minimum contacts within the State of Delaware and this District, pursuant to due process and/or the Del. Code. Ann. Tit. 3, § 3104 because Defendant purposefully availed itself of the privileges of conducting business in the State of Delaware and in this District, because Defendant regularly conducts and solicits business within the State of Delaware and within this District, and because Plaintiff's causes of action arise directly from Defendant's business contacts and other activities in the State of Delaware and this District. Further, this Court has personal jurisdiction over Defendant because Defendant is incorporated in Delaware and has purposely availed itself of the privileges and benefits of the laws of the State of Delaware.

COUNT I – INFRINGEMENT OF U.S. PATENT NO. 8,234,705

8. The allegations set forth in the foregoing paragraphs 1 through 7 are incorporated into this First Count.

9. On July 31, 2012, U.S. Patent No. 8,234,705 ("the '705 patent"), entitled "Contagion Isolation and Inoculation," was duly and legally issued by the United States Patent and Trademark Office. A true and correct copy of the '705 patent is attached as Exhibit 1.

10. The claims of the ’705 patent are directed to technical solutions to technical problems related to network security. Network security is a tremendous concern for modern enterprises, since a breach of an internal network can have severe repercussions, including major financial losses, data theft, disclosure of sensitive information, network disruptions, and data corruption—any of which could have devastating consequences to a business, at any scale. While a network security appliance can be extremely adept at keeping unwanted external intrusions into the network out, it is well known that perhaps the most exploitable component of a network is the human element. Information technology (IT) professionals may be able to keep on-site systems secure and up to date, but a worker’s personal laptop or mobile device is a significant security risk that would allow attackers (or just unwanted malware) access into a business’s network, bypassing IT security measures. The technology of the ’705 Patent closes this loophole by verifying that any device attempting to access a company’s network meets the company’s standards for network security and will not introduce dangerous programs into the company’s network. Through this technology, as implemented by companies including the Defendant, businesses can increase security of vulnerable elements of their networks.

11. The claims of the ’705 patent do not merely recite the performance of some business practice known before the pre-Internet world along with the requirement to perform it on the Internet. Instead, the claims of the ’705 patent are rooted in improvements to computerized network security technology in order to overcome problems specifically arising in the realm of computerized network security.

12. The claims of the ’705 patent recite subject matter that is not merely the routine or conventional use of network infrastructure. Instead, the claimed inventions are directed to particularized methods of assessing and responding to an external network access request such

that network integrity is maintained. The '705 patent claims specify how a secure network can assess and respond to an external network access request without jeopardizing network integrity.

13. The claims of the '705 patent do not preempt all ways of using network security technology, nor do they preempt any other well-known or prior art technology.

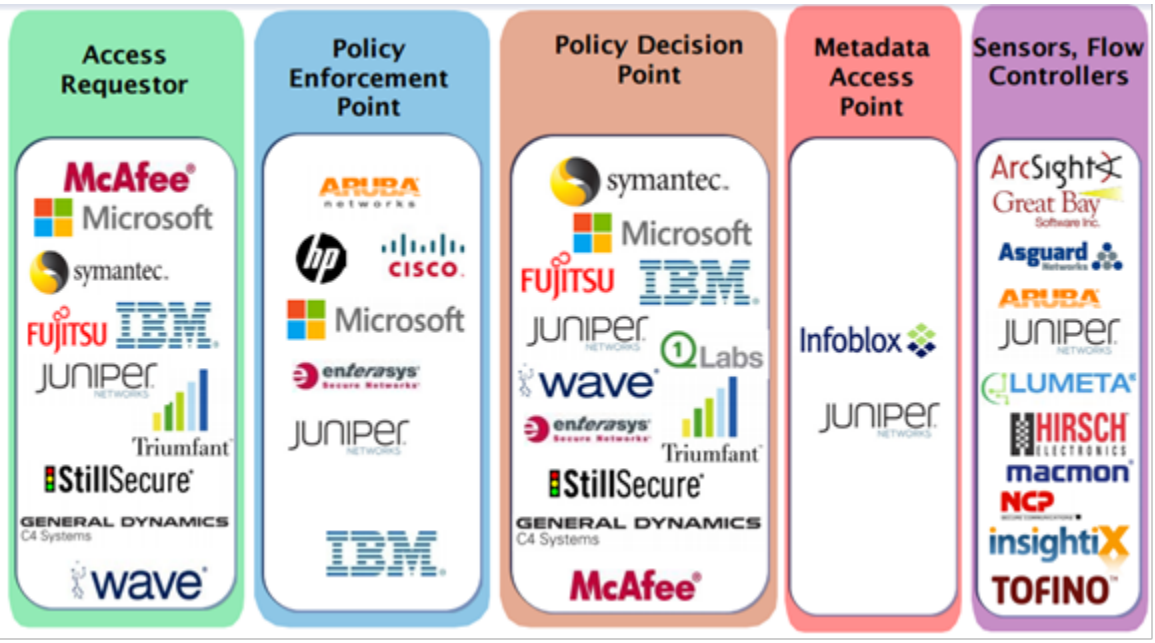
14. Each claim of the '705 patent recites a combination of elements that amounts to significantly more than a patent on an ineligible concept.

15. Plaintiff is the assignee and owner of the right, title and interest in and to the '705 patent, including the right to assert all causes of action arising under said patent and the right to any remedies for infringement of said patent.

16. Upon information and belief, Defendant has directly infringed and continues to directly infringe at least claim 1 of the '705 patent by making, using, offering for sale, selling, or importing products that perform (including but not limited to Defendant's Network Access Control Solution) or services related to methods for isolating potential network contagions and inoculating networks against the isolated contagions (the "Accused Instrumentalities").

17. On information and belief, the Accused Instrumentalities leverage Trusted Network Connect (or Trusted Network Communications) (TNC) open architecture promulgated by the Trusted Network Connect Work Group of the Trusted Computing Group (TCG). *See, e.g.*, TCG Trusted Network Communications TNC Architecture for Interoperability, Specification Version 1.5, Revision 4, published May 7, 2012 (hereinafter the "TNC Specification") at page 9, available at https://trustedcomputinggroup.org/wp-content/uploads/TNC_Architecture_v1_5_r4.pdf. On information and belief, Defendant adopted the TNC standards at least as of 2013. *See, e.g.*, Trusted Computing Group's Trusted Network

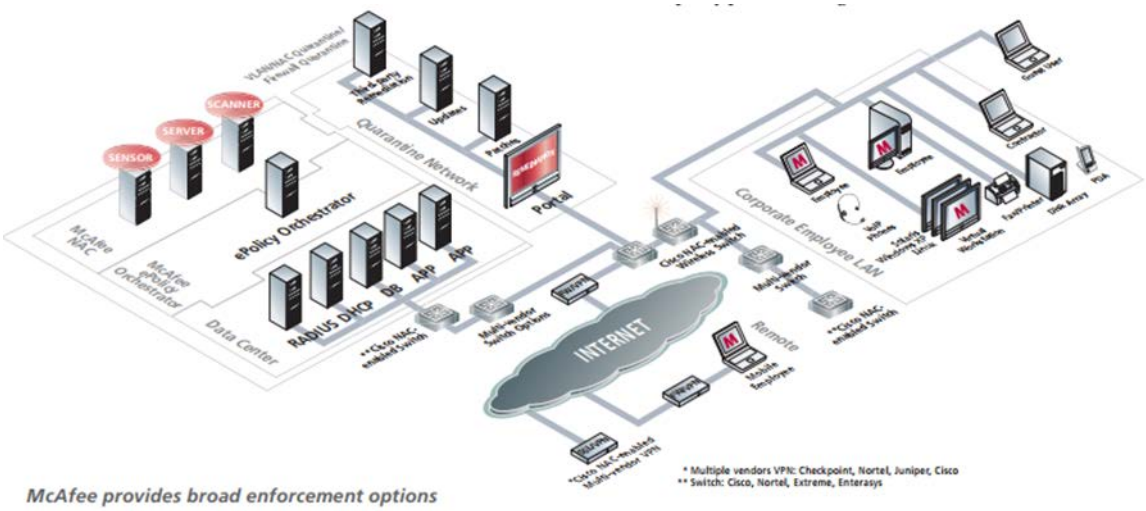
Connect Standards for Network Security presentation available at https://trustedcomputinggroup.org/wp-content/uploads/TNC-Briefing-2013-12-10.pdf.



18. Upon information and belief, Defendant makes, uses, offers for sale, sells, and/or imports the Accused Instrumentalities. *See, e.g.*, McAfee Network Access Control at pages 1 and 2 available at http://itprotect.com.au/McAfee/PDF/M-E/08-NAC/1-sps-nac-002-0507p.pdf ("McAfee NAC simplifies every step of your NAC process: (1) define policy, (2) detect devices, (3) assess systems, (4) enforce at network, and (5) remediate automatically").

Manage Risk by Enabling Policy Compliance

McAfee NAC simplifies every step of your NAC process: (1) define policy, (2) detect devices, (3) assess systems, (4) enforce at network, and (5) remediate automatically. This process covers all key aspects of NAC. It is a vital part of security risk management since it prevents at-risk systems from entering your network. With McAfee NAC, you can choose from a rich set of compliance checks that let you determine not only if security software is present, but also if the system is misconfigured and already infected with the most critical threats, which could propagate throughout your network. Other NAC solutions focus only on basic compliance checks for security software, which is insufficient. What if your anti-virus is running but you are already infected? What good is a basic NAC compliance check then?



McAfee provides broad enforcement options

See also, MacAfee Policy Enforcer at pages 1 and 2 available at http://image1.cc-inc.com/en_ideamall/en_vendor/network_associates/cd/files/ds_policy_enforcer.pdf ("McAfee Policy Enforcer is a vital part of McAfee's total network access control (NAC) solution", "…quarantining and remediating non-compliant systems", and "McAfee's NAC strategy is to complement and extend third-part enforcement frameworks like…Trusted Network Connect (TNC) 802.1x")

You wouldn't let just anyone walk in your front door, and you shouldn't let just any system into your network.

McAfee® Policy Enforcer protects you by making sure that only systems that comply with your security policies are granted access to your network. McAfee Policy Enforcer is a vital part of McAfee's total network access control (NAC) solution. It complements and extends leading products and technologies to provide an open, flexible system that grows with your needs. And McAfee combines Policy Enforcer with our proven system and network protection—and professional services—for a comprehensive solution.

Protecting your company's information assets against internal and external threats requires constant vigilance. You have to challenge every system that enters the trusted corporate network. McAfee Policy Enforcer mitigates the risk to corporate assets by automatically quarantining and remediating non-compliant systems. Designed for businesses of all sizes, McAfee Policy Enforcer combines extremely powerful and flexible policy control with a wide range of enforcement options protecting all network access points from any type of system.

Flexible Enforcement

Host-based enforcement is an option for systems managed by ePO. Switch-based enforcement works well for guest systems. McAfee Policy Enforcer can also use IPSec and SSL VPN enforcement for systems connecting remotely. McAfee's NAC strategy is to complement and extend third-party enforcement frameworks like Cisco Network Admission Control (CNAC), Microsoft® Network Access Protection (NAP), and Trusted Network Connect (TNC) 802.1x. Because we support multiple enforcement methods, you get complete enforcement today without a costly infrastructure upgrade. McAfee Policy Enforcer is an effective solution for both your current network infrastructure and for the future as well.

19. Claim 1 of the '705 patent recites a method for protecting a network, comprising: detecting an insecure condition on a first host that has connected or is attempting to connect to a protected network, wherein detecting the insecure condition includes contacting a trusted computing base associated with a trusted platform module within the first host, receiving a response, and determining whether the response includes a valid digitally signed attestation of cleanliness, wherein the valid digitally signed attestation of cleanliness includes at least one of an attestation that the trusted computing base has ascertained that the first host is not infested, and

an attestation that the trusted computing base has ascertained the presence of a patch or a patch level associated with a software component on the first host; when it is determined that the response does not include a valid digitally signed attestation of cleanliness, quarantining the first host, including by preventing the first host from sending data to one or more other hosts associated with the protected network, wherein preventing the first host from sending data to one or more other hosts associated with the protected network includes receiving a service request sent by the first host, serving a quarantine notification page to the first host when the service request comprises a web server request, and in the event the service request comprises a DNS query, providing in response an IP address of a quarantine server configured to serve the quarantine notification page if a host name that is the subject of the DNS query is not associated with a remediation host configured to provide data usable to remedy the insecure condition; and permitting the first host to communicate with the remediation host.

20. As demonstrated in the exemplary images and text below, Defendant has directly infringed and continues to directly infringe at least claim 1 of the ’705 patent by making, using, offering for sale, selling, and/or importing the Accused Instrumentalities, which perform a method for protecting a network, comprising: detecting an insecure condition on a first host that has connected or is attempting to connect to a protected network, wherein detecting the insecure condition includes contacting a trusted computing base associated with a trusted platform module within the first host:

> The Accused Instrumentalities detect when an Access Requestor (AR) client (a first host) is attempting to connect to the protected network, but has not yet passed the integrity-verification (thus is in insecure condition). *See, e.g.,* the TNC Specification at pages 20 and 26 available at https://trustedcomputinggroup.org/wp-content/uploads/TNC_Architecture_v1_5_r4.pdf.

When a network connection attempt is triggered (automatically or by user request), the NAR at the AR (client) initiates a connection request at the link and network layers.

Isolation: If the AR has been authenticated and is recognized to be one that has some privileges on the network but has not passed the integrity-verification by the IMV, the PDP may return instructions to the PEP to redirect the AR to an isolation environment where the AR can obtain integrity-related updates.

As shown in the figure below, detecting the insecure condition includes using the PTS (Platform Trust Service) Protocol to contact a trusted computing base, the Policy Decision Point (PDP), to use the PTS Integrity Measurement Collector of the first host. *See*, the TCG Attestation PTS Protocol: Binding to TNC IF-M Specification, Version 1.0, Revision 28, published August 24, 2011 (hereinafter "IFM PTS") at page 10 available at https://www.trustedcomputinggroup.org/wp-content/uploads/IFM_PTS_v1_0_r28.pdf.

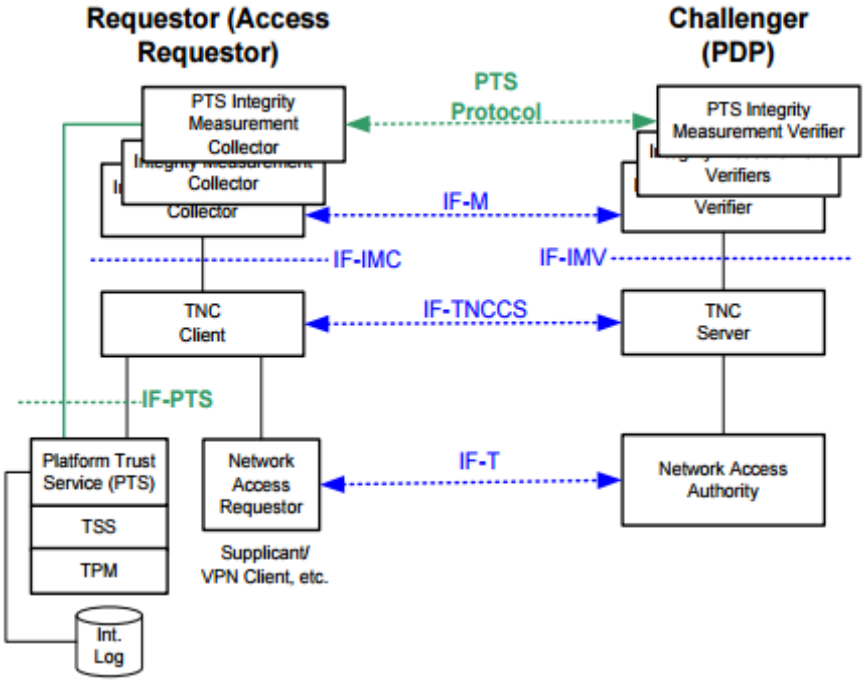
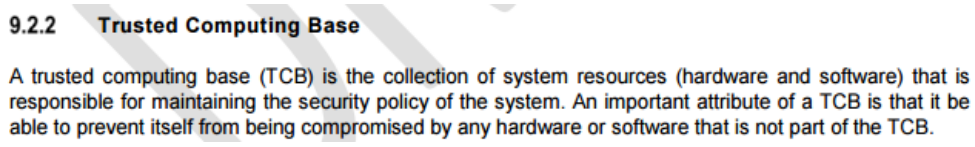


Figure 1: PTS Protocol Integration with TNC Architecture

Notice that the TNC Architecture contains several layered protocols (IF-T, IF-TNCCS and IF-M). The PTS Protocol will be carried within the payloads of the IF-M protocol, so would layer hierarchically on top of the IF-M protocol. The PTS Protocol operates between the PTS-IMC and PTS-IMV to enable PTS-based attestation leveraging the underlying TPM. The PTS-IMC uses a local IPC channel to the PTS (discussed in the IF-PTS specification) to obtain the necessary attestation evidence. Use of the IF-PTS interface and the TSS middleware stack components are optional so implementations might leverage the PTS or TPM in other ways (e.g. the PTS could have other techniques for interacting with a TPM to obtain measurements).

See also, the TCG's Trusted Platform Module Library, Part 1: Architecture, Family 2.0, Level 00 Revision 01.07 draft published March 13, 2014 (hereinafter,

> "TPM Library") at page 23 available at https://www.trustedcomputinggroup.org/wp-content/uploads/TPM-Rev-2.0-Part-1-Architecture-01.07-2014-03-13.pdf.



9.2.2 Trusted Computing Base

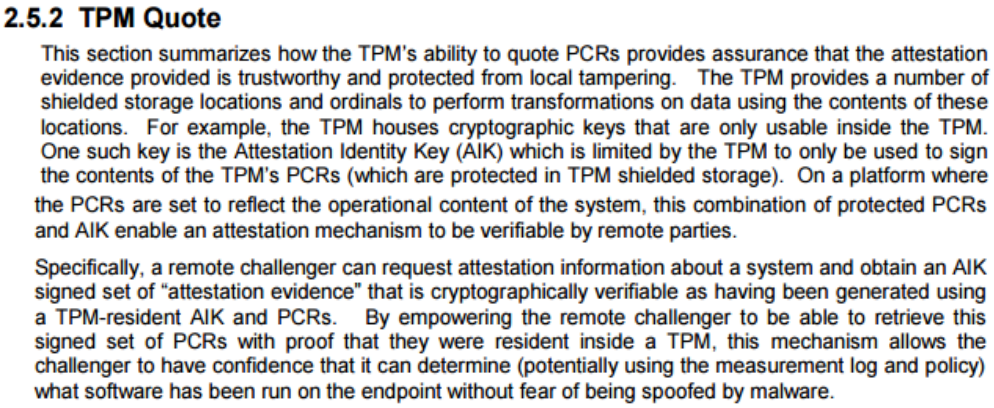
A trusted computing base (TCB) is the collection of system resources (hardware and software) that is responsible for maintaining the security policy of the system. An important attribute of a TCB is that it be able to prevent itself from being compromised by any hardware or software that is not part of the TCB.

receiving a response:

> The response is then received in the form of "attestation information." *See, e.g.*, the IFM PTS at pages 14-15 available at https://www.trustedcomputinggroup.org/wp-content/uploads/IFM_PTS_v1_0_r28.pdf. (Discussed further below).

and determining whether the response includes a valid digitally signed attestation of cleanliness, wherein the valid digitally signed attestation of cleanliness includes at least one of an attestation that the trusted computing base has ascertained that the first host is not infested:

> If the remote challenger is clean, the "attestation information" will include a signed (and cryptographically verifiable) set of "attestation evidence" which is an attestation of cleanliness. *See, e.g.*, the IFM PTS at pages 14-15 available at https://www.trustedcomputinggroup.org/wp-content/uploads/IFM_PTS_v1_0_r28.pdf.



2.5.2 TPM Quote

This section summarizes how the TPM's ability to quote PCRs provides assurance that the attestation evidence provided is trustworthy and protected from local tampering. The TPM provides a number of shielded storage locations and ordinals to perform transformations on data using the contents of these locations. For example, the TPM houses cryptographic keys that are only usable inside the TPM. One such key is the Attestation Identity Key (AIK) which is limited by the TPM to only be used to sign the contents of the TPM's PCRs (which are protected in TPM shielded storage). On a platform where the PCRs are set to reflect the operational content of the system, this combination of protected PCRs and AIK enable an attestation mechanism to be verifiable by remote parties.

Specifically, a remote challenger can request attestation information about a system and obtain an AIK signed set of "attestation evidence" that is cryptographically verifiable as having been generated using a TPM-resident AIK and PCRs. By empowering the remote challenger to be able to retrieve this signed set of PCRs with proof that they were resident inside a TPM, this mechanism allows the challenger to have confidence that it can determine (potentially using the measurement log and policy) what software has been run on the endpoint without fear of being spoofed by malware.

and an attestation that the trusted computing base has ascertained the presence of a patch or a patch level associated with a software component on the first host:

The attestation information provided by the Accused Instrumentalities includes measurements of the client's integrity (ascertained that the first host is not infested) and the software versions (the presence of a patch or a patch level associated with a software component on the first host). *See*, *e.g.*, the TNC Specification at page 15 available at https://trustedcomputinggroup.org/wp-content/uploads/TNC_Architecture_v1_5_r4.pdf.

> *Integrity Measurement Collector (IMC)*: The IMC function is a software component that runs on an AR, measuring security aspects of the AR's integrity. Examples include the Anti-Virus parameters on the Access Requestor, Personal Firewall status, software versions, and other security aspects of the AR. Note that the TNC Architecture is designed for multiple IMCs to interact with a single (or multiple) TNC Client/TNC Server, thereby allowing customers to deploy complex integrity policies involving a range of vendors products.

This process is performed when clients attempt to connect to the protected network, to prevent outside infections from getting in and to ensure the integrity has not fallen below expectations—such as new updates not being installed—since a previous connection. A Use Case Walkthrough provided by the Trusted Computing Group illustrates a standard procedure for new connection attempts. *See* pages 55-59 of the TCG TNC IF-IMV Specification, Version 1.0, Revision 3, published May 3, 2005 (hereafter "TNC IF-IMV Specification") available at https://www.trustedcomputinggroup.org/wp-content/uploads/TNC_IFIMV_v1_0_r3.pdf.

7.4 Network Connect

1. The endpoint's NAR attempts to connect to a network protected by a PEP, thus triggering an Integrity Check Handshake. There are other ways that an Integrity Check Handshake can be triggered, but this will probably be the most common. For those other ways, the next few steps may be significantly different.
2. The PEP sends a network access decision request to the PDP (NAA or TNCS). Depending on configuration, the PEP may contact the NAA first or the TNCS. The ordering of user authentication, platform authentication, and integrity check is also subject to configuration. Here we present what will probably be the most common order: first user authentication, then platform authentication, then integrity check.
3. The NAA performs user authentication with the NAR. Based on the NAA's policy, the user identity established through this process may be used to make immediate access decisions (like deny). If an immediate access decision has been made, skip to step 16. User authentication may also involve having the NAR authenticate the NAA.
4. The NAA informs the TNCS of the connection request, providing the user identity and other useful info (service requested, etc.).
5. The TNCS performs platform authentication with the TNCC, if required by TNCS policy. This includes verifying the IMC hashes collected during TNCC Setup. If an immediate access decision has been made, skip to step 16. Platform authentication may be mutual so the TNCC can be sure it's talking to a secure server.
6. The TNCC uses IF-IMC to fetch IMC messages.
7. The TNCS uses IF-IMV to inform each IMV that an Integrity Check Handshake has started. **[IF-IMV] If this is a new network connection, the TNCS calls `TNC_IMV_NotifyConnectionChange` with the `newState` parameter set to `TNC_CONNECTION_STATE_CREATE` to indicate that a new network connection has been created. Then the TNCS calls `TNC_IMV_NotifyConnectionChange` with the `newState` parameter set to `TNC_CONNECTION_STATE_HANDSHAKE`.**

8. The TNCC passes the IMC messages to the TNCS. This and all other TNCC-TNCS communications can be sent directly but they will often be relayed through one or more of the NAR, PEP, and NAA.
9. The TNCS passes each IMC message to the matching IMV or IMVs through IF-IMV (using message types associated with the IMC messages to find the right IMV). If there are no IMC messages, skip to step 13. **[IF-IMV] The TNCS delivers the IMC messages to the IMVs by calling `TNC_IMV_ReceiveMessage`. The IMVs may call `TNC_TNCS_SendMessage` before returning from `TNC_IMV_ReceiveMessage` if they want to send a response. When the TNCS has delivered all the IMC messages to the IMVs, it calls `TNC_IMV_BatchEnding` to inform them of this fact. The IMVs may call `TNC_TNCS_SendMessage` before returning from `TNC_IMV_BatchEnding` if they want to send a message to an IMV.**
10. Each IMV analyzes the IMC messages. If an IMV needs to exchange more messages (including remediation instructions) with an IMC, it provides a message to the TNCS and continues with step 11. If an IMV is ready to decide on an IMV Action Recommendation and IMV Evaluation Result, it gives this result to the TNCS through IF-IMV. If there are no more messages to be sent to the IMC from any of the IMVs, skip to step 13. **[IF-IMV] As described in the previous step, IMVs send messages by calling `TNC_TNCS_SendMessage` before returning from `TNC_IMV_ReceiveMessage` and `TNC_IMV_BatchEnding`. IMVs give their results to the TNCS by calling `TNC_TNCS_ProvideRecommendation` at any time.**
11. The TNCS sends the messages from the IMVs to the TNCC.
12. The TNCC sends the IMV messages on to the IMCs through IF-IMC so they can process the messages and respond. Skip to step 8.
13. If there are any IMVs that have not given an IMV Action Recommendation to the TNCS, they are prompted to do so through IF-IMV. **[IF-IMV] The TNCS gives this prompt by calling `TNC_IMV_SolicitRecommendation`. The IMVs provide their recommendations by calling `TNC_TNCS_ProvideRecommendation`.**
14. The TNCS considers the IMV Action Recommendations supplied by the IMVs and uses an integrity check combining policy to decide what its TNCS Action Recommendation should be.
15. The TNCS sends its TNCS Action Recommendation to the NAA. The NAA may ignore or modify this recommendation based on its policies but will typically abide by it.
16. The NAA sends a copy of its final network access decision response to the TNCS. The TNCS may send a copy of the network access decision to the TNCC. The TNCS also informs the IMVs of the network access decision response via IF-IMV. **[IF-IMV] The TNCS calls `TNC_IMV_NotifyConnectionChange` with the `newState` parameter set to**

    `TNC_CONNECTION_STATE_ACCESS_ALLOWED`,
    `TNC_CONNECTION_STATE_ACCESS_ISOLATED`, or
    `TNC_CONNECTION_STATE_ACCESS_NONE`.
17. The NAA sends its network access decision response to the PEP.
18. The PEP implements the network access decision response. During this process, the NAR is typically informed of the decision. The TNCC may be informed by the NAR or may discover that a new network has come up.
19. If step 6 was not executed, the network connect process is complete. Otherwise, the TNCC informs the IMCs of the network access decision response via IF-IMC.
20. If the IMCs need to perform remediation, they perform that remediation. Then they continue with Handshake Retry After Remediation. If no remediation was needed, the use case ends here.

The Accused Instrumentalities perform the TNC process. *See, e.g.*, McAfee Policy Enforcer at pages 1 and 2 available at http://image1.cc-inc.com/en_ideamall/en_vendor/network_associates/cd/files/ds_policy_enforcer.pdf

Policy controls are the foundation of your access control system. They determine the proper enforcement action—allow, block, or quarantine. To act intelligently, security policies need to address your unique risks. Are any high-risk viruses, worms, or malware present? What is the minimum version required for security patches? Which anti-virus, firewall, and host intrusion prevention systems are required? What version of the anti-virus definitions is mandated? Are particular systems, like storage servers or printers, exempt from enforcement policies? With McAfee Policy Enforcer, you can choose from a rich set of compliance checks that help you quickly define flexible and powerful compliance policies and rules.

Reduce Risk

Your challenge as an enterprise security manager is to allow network access to employees, contractors, and guests without compromising business availability or increasing risk. McAfee Policy Enforcer performs a deep assessment of systems that connect over the LAN, WAN, IPSec VPN, or SSL VPN to determine whether the systems comply with your network access policies. When you create comprehensive policies, assess systems, and remediate non-compliant systems against policy, you can ensure application and patch compliance and avoid high-risk viruses and threats. With McAfee Policy Enforcer, you protect your networks from non-compliant systems and benefit from new ways to view, enforce, and report on compliance from a single management console.

Key Features

- Discovers managed and unmanaged systems
- Comprehensive agent and agentless system assessment includes checks for infections, patches, and McAfee and third-party security applications
- Broad enforcement methods
- Flexible remediation
- Integrated, centralized management with ePO

See also, McAfee Network Access Control Product Guide at pages 10 and 40 available at https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCUMENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf ("Assessors: A component that evaluates the health of a system based on policies that describe or identify required software, patches, services, registry keys, and numerous other conditions that can be described by a rule")

Table 1-1 McAfee NAC components

Component name	Description
Network Access Control manager	The central management portion of McAfee NAC that provides policy management, exemption management, system classification, action triggers, component deployment, and data processing and storage.
Detectors	A component that identifies systems that connect to a network. A detector can be software only, or a combination of hardware and software. Detectors can be centralized or distributed as client-side agents.
Assessors	A component that evaluates the health of a system based on policies that describe or identify required software, patches, services, registry keys, and numerous other conditions that can be described by a rule.
Enforcers	A component that restricts a system's access to network resources according to a mapping of network access zones to health levels. Enforcers are typically health-based, but can use other criteria for restricting a system's network access.
Remediators	A component that automatically attempts to bring an unhealthy system back into compliance with the policies you have defined for a healthy system.

Table 3-5 Assessor operations

Assessor	Operational description
McAfee NAC client	Provides a health level assessment for managed systems, according to one or more assigned system health policies. The McAfee NAC client assessor reports the following information to the McAfee NAC manager: • Assessed health level • Details about benchmarks and rules • Status of the assessment (scan) — whether it failed, or was successful • Version of content and policy that was used • Report the network access zone that the host is enforced to • Post remediation results if enabled
McAfee NAC guest client	Provides a health level assessment for unmanaged systems, according to a single unmanaged system policy. The guest client assessor reports the following information to the McAfee NAC manager: • Assessed health level • Details about benchmarks and rules • Status of the assessment (scan) — whether it failed, or was successful • Version of content and policy that was used

Table 3-6 Assessor input and output

Assessor	Input	Output	Output used by
McAfee NAC client	• Managed system health policies • A McAfee NAC client policy • Benchmark content (checks and rules) • Network access policy	• A health level descriptor • Network access zone	The reporting service of the McAfee NAC manager, and any supported enforcer for a managed system. Remediators use the command associated with rule or benchmark, when a specific rule fails and the host becomes non-compliant.
McAfee NAC guest client	• A single unmanaged system policy • Benchmark content (checks and rules)	A health level descriptor	The reporting service of the McAfee NAC manager, and any supported enforcer for an unmanaged system. Currently, a McAfee® Network Security Sensor is the only supported enforcer for an unmanaged system. There is no automated remediator at this time for unmanaged systems.

when it is determined that the response does not include a valid digitally signed attestation of cleanliness, quarantining the first host, including by preventing the first host from sending data to one or more other hosts associated with the protected network:

> The Accused Instrumentalities use the Assessment Phase to determine the client's integrity status. Once this determination is made, the Integrity Measurement Verifier (IMV) "can make one of three IMV Action-Recommendations (Allow, Isolate or Block)." *See, e.g.*, the TNC Specification at page 27 available at https://trustedcomputinggroup.org/wp-content/uploads/TNC_Architecture_v1_5_r4.pdf.

5.2 Assessment Phase

In the Assessment Phase, the TNC Client reports its current integrity status to the TNC Server. Upon receiving the client integrity status, the IMVs with the aid of the TNCS perform an assessment of the AR based on the set of policies defined by the network administrator. The IMV can make one of three IMV Action-Recommendations (Allow, Isolate or Block) or it can make no recommendation.

> A client AR that fails integrity variation is isolated (quarantined) onto an "Isolation Network." "This protects the AR from the full network and vice versa, preventing the spread of viruses and worms."

5.3 Isolation Phase

An important tool in the effort to remediate ARs that fail integrity verification is the isolation of that AR to a separate network – referred to here as the Isolation Network – in order to provide remediation services to the AR. This protects the AR from the full network and vice versa, preventing the spread of viruses and worms. There are a number of technical approaches today to achieve network isolation for the AR. Two of these are as follows:

(a) *VLAN Containment*: VLAN containment permits the AR to access the network in a limited fashion. Typically the primary purpose of the limited access is to allow the AR to access on-line sources of remediation data (e.g. virus definition file updates, worm removal software, software patches, etc). In some cases, no remediation is offered and the AR is instead offered access to limited services, in such a fashion as to limit the potential for impact to the network or other attached hosts. RADIUS provisions VLAN containment using the Tunnel-Private–Group-ID attribute, as specified in RFC3580 [21].

(b) *IP Filters*: In the case of IP filters, the PEP is configured with a set of filters which defines network locations reachable by the isolated AR. Packets from the AR destined to other network locations are simply discarded by the PEP. RADIUS selects filter rules for application to a network access session using the Filter-ID attribute (see RFC2865 and RFC3580) [21].

wherein preventing the first host from sending data to one or more other hosts associated with the protected network includes receiving a service request sent by the first host:

> This isolation network provides "limited or quarantined access" which prevents the host from sending data to other hosts associated with the protected network. This will require "remediation instructions" be provided in place of standard responses to service requests. *See, e.g.*, pages 13-15 of the TNC IF-IMV Specification available at https://www.trustedcomputinggroup.org/wp-content/uploads/TNC_IFIMV_v1_0_r3.pdf.

2.6.3 Remediation and Handshake Retry

In several cases, it is useful to retry an Integrity Check Handshake. First, an endpoint may be isolated until remediation is complete. Once remediation is complete, an IMC can inform the TNCC of this fact and suggest that the TNCC retry the Integrity Check Handshake. Second, a TNCS can initiate a retry of an Integrity Check Handshake (if the TNCS or IMV policies change or as a periodic recheck). Third, an IMC or IMV can request a handshake retry in response to a condition detected by the IMC or IMV (suspicious activity, for instance). In any case, it's generally desirable (but not always possible) to reuse state established by the earlier handshake and to avoid disrupting network connectivity during the handshake retry.

To support handshake retries, the TNCS MAY maintain a network connection ID after an Integrity Check Handshake has been completed. This network connection ID can then be used by the TNCS to inform IMVs that it is retrying the handshake or by an IMV to request a retry (due to policy change or another reason).

Handshake retry may not always be possible due to limitations in the TNCC, NAR, PEP, or other entities. In other cases, retry may require disrupting network connectivity. For these reasons, IF-IMV supports handshake retry and requires IMVs to handle handshake retries (which is usually trivial) but does not require TNCSs to honor IMV requests for handshake retry. In fact, IF-IMV requires an IMV to provide information about the reason for requesting handshake retry so that the TNCS can decide whether it wants to retry (which may disrupt network access).

Note that remediation instructions are delivered from IMVs to IMCs through standard IMV-IMC messages (see section 2.6.4, "Message Delivery"). There is no special support in IF-IMV for this feature. IMVs SHOULD send remediation instructions to IMCs before returning an IMV Action Recommendation and IMV Evaluation Result to the TNCS so the instructions are delivered before the handshake is completed.

2.6.4 Message Delivery

One of the critical functions of the TNC architecture is conveying messages between IMCs and IMVs. Each message sent in this way consists of a message body, a message type, and a recipient type.

The message body is a sequence of octets (bytes). The TNCC and TNCS SHOULD NOT parse or interpret the message body. They only deliver it as described below. Interpretation of the message body is left to the ultimate recipients of the message, the IMCs or IMVs. A zero length message is perfectly valid and MUST be properly delivered by the TNCC and TNCS just as any other IMC-IMV message would be.

The message type is a four octet number that uniquely identifies the format and semantics of the message. The method used to ensure the uniqueness of message types while providing for vendor extensions is described below.

The recipient type is simply a flag indicating whether the message should be delivered to IMVs or IMCs. Messages sent by IMCs are delivered to IMVs and vice versa. All messages sent by an IMV through IF-IMV have a recipient type of IMC. All messages received by an IMV through IF-IMV have a recipient type of IMV. The recipient type does not show up in IF-IMC or IF-IMV, but it helps in explaining message routing.

The routing and delivery of messages is governed by message type and recipient type. Each IMC and IMV indicates through IF-IMC and IF-IMV which message types it wants to receive. The TNCC and TNCS are then responsible for ensuring that any message sent during an Integrity Check Handshake is delivered to all recipients that have a recipient type matching the message's recipient type and that have indicated the wish to receive messages whose type matches the message's message type. If no recipient has indicated a wish to receive a particular message type, the TNCC and TNCS can handle these messages as they like: ignore, log, etc.

WARNING: The message routing and delivery algorithm just described is not a one-to-one model. A single message may be received by several recipients (for example, two IMVs from a single vendor, two copies of an IMC, or nosy IMVs that monitor all messages). If several of these recipients respond, this may confuse the original sender. IMCs and IMVs MUST work properly in this environment. They MUST NOT assume that only one party will receive and/or respond to a message.

IF-IMV allows an IMV to send and receive messages using this messaging system. Note that this system should not be used to send large amounts of data. The messages will often be sent through PPP or similar protocols that do not include congestion control and are not well suited to bulk data transfer. If an IMC needs to download a patch (for instance), the IMV should indicate this by reference in the remediation instructions. The IMC will process those instructions after network access (perhaps isolated) has been established and can then download the patch via HTTP or another appropriate protocol.

All messages sent with `TNC_TNCS_SendMessage` and received with `TNC_IMV_ReceiveMessage` are between the IMC and IMV. The IMV communicates with the TNCS by calling functions (standard and vendor-specific) in the IF-IMV, not by sending messages. The TNCS should not interfere with communications between the IMC and IMVs by consuming or blocking IMC-IMV messages.

A particular example of the message delivery provided by IF-IMV is the communication of remediation instructions from the IMVs through the TNCS to the TNCC/IMCs. This is one application of IMC-IMV message delivery and in all cases follows the normal IMV-IMC communications path. IF-IMV provides support for communicating remediation instructions to an endpoint using this mechanism. Since the normal IMC-IMV communications path is used to communicate remediation instructions, this specification will not address further the details of how remediation itself is done.

2.6.7 IMV Action Recommendation

One of the assumptions of the TNC architectural model is that IF-IMV provides a means for IMVs to recommend action information to the TNCS, so that isolation can properly be supported on the network. The TNCS then will combine these IMV Action Recommendations using some logic (defined by the TNCS implementers) to come up with an overall TNCS Acition Recommendation. Note that the TNCS may choose to ignore any IMV Action Recommendation, but each IMV must be able to recommend an action. Potential choices for IMV Action Recommendations include: recommend full (normal) access; recommend isolation (limited or quarantined access); and recommend denial (no access). The mandatory function `TNC_TNCS_ProvideRecommendation` is the mechanism within IF-IMV for an IMV to indicate its IMV Action Recommendation.

serving a quarantine notification page to the first host when the service request comprises a web server request, and in the event the service request comprises a DNS query, providing in response an IP address of a quarantine server configured to serve the quarantine notification page if a host name that is the subject of the DNS query is not associated with a remediation host configured to provide data usable to remedy the insecure condition:

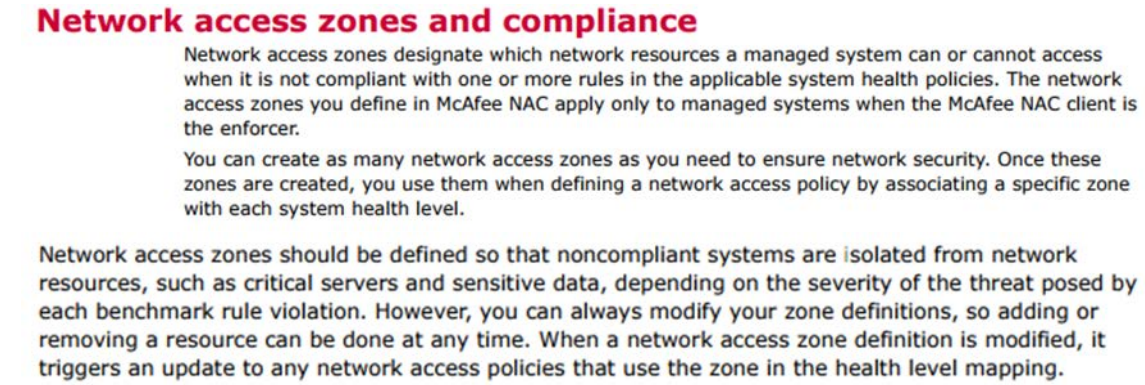
> As an example of Defendant's implementation of this process in the Accused Instrumentalities, see the following explanation of an "enforcer" which illustrates that it "…restricts a system's access to network resources according to a mapping of network access zones to health levels." *See* McAfee Network Access Control Product Guide at page 10 available at https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCUMENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf

Table 1-1 McAfee NAC components

Component name	Description
Network Access Control manager	The central management portion of McAfee NAC that provides policy management, exemption management, system classification, action triggers, component deployment, and data processing and storage.
Detectors	A component that identifies systems that connect to a network. A detector can be software only, or a combination of hardware and software. Detectors can be centralized or distributed as client-side agents.
Assessors	A component that evaluates the health of a system based on policies that describe or identify required software, patches, services, registry keys, and numerous other conditions that can be described by a rule.
Enforcers	A component that restricts a system's access to network resources according to a mapping of network access zones to health levels. Enforcers are typically health-based, but can use other criteria for restricting a system's network access.
Remediators	A component that automatically attempts to bring an unhealthy system back into compliance with the policies you have defined for a healthy system.

> *See also*, page 62 of https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCUMENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf

("Network access zones designate which network resources a managed system can or cannot access when it is not compliant with one or more rules in the applicable system health policies", and "Network access zones should be defined so that noncompliant systems are isolated from network resources, such as critical servers and sensitive data, depending on the severity of the threat posed by each benchmark rule violation")



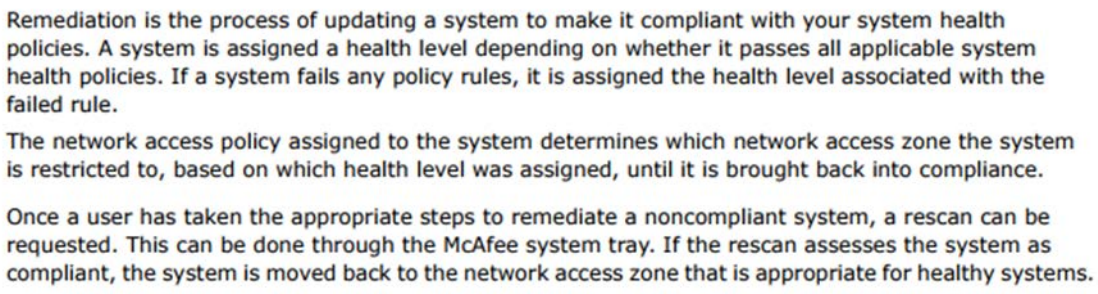
Network access zones and compliance

Network access zones designate which network resources a managed system can or cannot access when it is not compliant with one or more rules in the applicable system health policies. The network access zones you define in McAfee NAC apply only to managed systems when the McAfee NAC client is the enforcer.

You can create as many network access zones as you need to ensure network security. Once these zones are created, you use them when defining a network access policy by associating a specific zone with each system health level.

Network access zones should be defined so that noncompliant systems are isolated from network resources, such as critical servers and sensitive data, depending on the severity of the threat posed by each benchmark rule violation. However, you can always modify your zone definitions, so adding or removing a resource can be done at any time. When a network access zone definition is modified, it triggers an update to any network access policies that use the zone in the health level mapping.

See also, Defendant discusses the implementation of remediation at pages 77, 79, 80 and 81 of https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCUMENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf ("Remediation instructions that specify how the user's system is noncompliant, and the steps necessary to correct the problem", "A list of what must be installed for the system to be compliant (for example, resources, patches, and applications)", and "Remediation web pages: One or more web pages that provide users with information about your corporate security policies, the steps they must take to correct the situation, and links to resources they must install to correct problems"). This illustrates the use of a quarantine notification page, provided in response when the client issues a web server request or a DNS query ("display remediation instructions").



Remediation is the process of updating a system to make it compliant with your system health policies. A system is assigned a health level depending on whether it passes all applicable system health policies. If a system fails any policy rules, it is assigned the health level associated with the failed rule.

The network access policy assigned to the system determines which network access zone the system is restricted to, based on which health level was assigned, until it is brought back into compliance.

Once a user has taken the appropriate steps to remediate a noncompliant system, a rescan can be requested. This can be done through the McAfee system tray. If the rescan assesses the system as compliant, the system is moved back to the network access zone that is appropriate for healthy systems.

Manual remediation

For manual remediation, you can establish a remediation portal and provide one or more pages containing information for users who need to remedy problems with their systems.

Remediation portal

Typically, your managed systems can be remediated using automatic remediation. However, your circumstances might require manual remediation for managed systems. Any unmanaged systems on your network must be remediated manually.

An important aspect of manual remediation is making sure you inform users of the remediation portal's location. Both managed system health policies and the unmanaged system policy have a Noncompliance message option that is displayed through the system tray icon on client systems. This message is the preferred and most reliable method of providing users with your remediation portal's location.

A remediation portal should always provide users with this information:

- A description of the corporate network security policy
- Remediation instructions that specify how the user's system is noncompliant, and the steps necessary to correct the problem
- A list of what must be installed for the system to be compliant (for example, resources, patches, and applications)
- Instructions for rescanning the noncompliant system once the user has corrected the problems
- A link to the guest client installer (for unmanaged systems)

Elements needed for manual remediation

To allow users to fix their systems through use of a remediation portal, you need to set up and make available certain elements.

Remediation element	Description
Remediation portal	A web server that hosts one or more pages, which provide users with the resources they need to fix an unhealthy system.
Remediation web pages	One or more web pages that provide users with information about your corporate security policies, the steps they must take to correct the situation, and links to resources they must install to correct problems.
Noncompliance message in system health policies (optional, but recommended)	A message that displays on a user's system after a scan determines that a rule has failed. A specific message can be written for every system health policy.
Access to the McAfee NAC guest client (for unmanaged systems)	One of the pages on your remediation portal should provide a link for downloading the guest client. This is only important for unmanaged systems. Managed systems use their installed McAfee NAC client for scanning.

Remediation resources users must access

Your network access zones must provide access to the remediation resources needed by noncompliant systems.

In the resource list of each "Allow Access" type zone, be sure to include:

- Your default IP gateway
- The web server hosting your remediation portal pages
- All file servers and other systems that have links from your portal

See also page 63 of
https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCU

MENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf ("No matter how you define a network access zone, systems always have access to a core whitelist of network resources that consists of: DNS servers…")

Network access resources

A network access zone's resource list can specify an internal or external network resource. *Internal resources* are ones that are not accessible from the Internet, and must be specified by an IP address. *External addresses* can be either a fully-qualified domain name (FQDN) or an IP address.

No matter how you define a network access zone, systems always have access to a core whitelist of network resources that consists of:

- DNS servers
- DHCP servers
- The ePolicy Orchestrator server
- The local system

and permitting the first host to communicate with the remediation host:

The Accused Instrumentalities permit the client to communicate with the remediation host. This enables limited access to the network to access data and resources to enable the client to attain an acceptable state. *See, e.g.*, the TNC Specification at pages 27-28 available at https://trustedcomputinggroup.org/wp-content/uploads/TNC_Architecture_v1_5_r4.pdf.

VLAN Containment: VLAN containment permits the AR to access the network in a limited fashion. Typically the primary purpose of the limited access is to allow the AR to access on-line sources of remediation data (e.g. virus definition file updates, worm removal software, software patches, etc). In some cases, no remediation is offered and the AR is instead offered access to limited services, in such a fashion as to limit the potential for impact to the network or other attached hosts. RADIUS provisions VLAN containment using the Tunnel-Private–Group-ID attribute, as specified in RFC3580 [21].

5.4 Remediation Phase

The TNC Architecture in Figure 4 accommodates a number of schemes for remediation. The intent of remediation is generally universal, namely that of performing updates to the software and firmware of the AR to help it comply with the current network policy.

The general aim of remediation is to bring the AR up to date in all integrity-related information, as defined by the current policy for authorization. Examples include OS patches, AV updates, firmware upgrades, etc. Section 5.5 below discusses the TNC approach to remediation in further detail.

After remediation has been completed, the IMCs can ask the TNCC to retry the Integrity Check Handshake, which results in another Assessment Phase. This second phase may be shorter than the first since the IMCs may be able to send only the data that has changed (if supported by the IMVs).

In addition, *see, e.g.*, pages 13 and 15 of the TNC IF-IMV Specification available at https://www.trustedcomputinggroup.org/wp-content/uploads/TNC_IFIMV_v1_0_r3.pdf.

2.6.3 Remediation and Handshake Retry

In several cases, it is useful to retry an Integrity Check Handshake. First, an endpoint may be isolated until remediation is complete. Once remediation is complete, an IMC can inform the TNCC of this fact and suggest that the TNCC retry the Integrity Check Handshake. Second, a TNCS can initiate a retry of an Integrity Check Handshake (if the TNCS or IMV policies change or as a periodic recheck). Third, an IMC or IMV can request a handshake retry in response to a condition detected by the IMC or IMV (suspicious activity, for instance). In any case, it's generally desirable (but not always possible) to reuse state established by the earlier handshake and to avoid disrupting network connectivity during the handshake retry.

To support handshake retries, the TNCS MAY maintain a network connection ID after an Integrity Check Handshake has been completed. This network connection ID can then be used by the TNCS to inform IMVs that it is retrying the handshake or by an IMV to request a retry (due to policy change or another reason).

Handshake retry may not always be possible due to limitations in the TNCC, NAR, PEP, or other entities. In other cases, retry may require disrupting network connectivity. For these reasons, IF-IMV supports handshake retry and requires IMVs to handle handshake retries (which is usually trivial) but does not require TNCSs to honor IMV requests for handshake retry. In fact, IF-IMV requires an IMV to provide information about the reason for requesting handshake retry so that the TNCS can decide whether it wants to retry (which may disrupt network access).

Note that remediation instructions are delivered from IMVs to IMCs through standard IMV-IMC messages (see section 2.6.4, "Message Delivery"). There is no special support in IF-IMV for this feature. IMVs SHOULD send remediation instructions to IMCs before returning an IMV Action Recommendation and IMV Evaluation Result to the TNCS so the instructions are delivered before the handshake is completed.

2.6.7 IMV Action Recommendation

One of the assumptions of the TNC architectural model is that IF-IMV provides a means for IMVs to recommend action information to the TNCS, so that isolation can properly be supported on the network. The TNCS then will combine these IMV Action Recommendations using some logic (defined by the TNCS implementers) to come up with an overall TNCS Acition Recommendation. Note that the TNCS may choose to ignore any IMV Action Recommendation, but each IMV must be able to recommend an action. Potential choices for IMV Action Recommendations include: recommend full (normal) access; recommend isolation (limited or quarantined access); and recommend denial (no access). The mandatory function `TNC_TNCS_ProvideRecommendation` is the mechanism within IF-IMV for an IMV to indicate its IMV Action Recommendation.

Communication with the remediation host is essential to enable remediation. This allows the host to improve its integrity and subsequently gain access to the protected network. *See id*. at page 57.

20. If the IMCs need to perform remediation, they perform that remediation. Then they continue with Handshake Retry After Remediation. If no remediation was needed, the use case ends here.

7.5 Handshake Retry After Remediation

1. When an IMC completes remediation, it informs the TNCC that its remediation is complete and requests a retry of the Integrity Check Handshake through IF-IMC.
2. The TNCC decides whether to initiate an Integrity Check Handshake retry (possibly depending on policy, user interaction, etc.). Depending on limitations of the NAR, the TNCC may need to disconnect from the network and reconnect to retry the Integrity Check Handshake. In that case (especially if the previous handshake resulted in full access), it may decide to skip the handshake retry. However, in many cases the TNCC will be able to retry the handshake without disrupting network access. It may even be able to retain the state established in the earlier handshake. If the TNCC decides to skip the retry, the use case ends here.
3. The TNCC initiates a retry of the handshake. Skip to step 1, 3, or 5 of the Network Connect section above, depending on which steps are needed to initiate the retry.

Defendant's use of the remediation server (remediation portal containing resource links) is described in McAfee Network Access Control Product Guide at pages 79, 80 and 81 available at https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCUMENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf ("Remediation web pages: One or more web pages that provide users with information about your corporate security policies, the steps they must take to correct the situation, and links to resources they must install to correct problems" and "All file servers and other systems that have links from your portal").

Manual remediation

For manual remediation, you can establish a remediation portal and provide one or more pages containing information for users who need to remedy problems with their systems.

Remediation portal

Typically, your managed systems can be remediated using automatic remediation. However, your circumstances might require manual remediation for managed systems. Any unmanaged systems on your network must be remediated manually.

An important aspect of manual remediation is making sure you inform users of the remediation portal's location. Both managed system health policies and the unmanaged system policy have a Noncompliance message option that is displayed through the system tray icon on client systems. This message is the preferred and most reliable method of providing users with your remediation portal's location.

A remediation portal should always provide users with this information:

- A description of the corporate network security policy
- Remediation instructions that specify how the user's system is noncompliant, and the steps necessary to correct the problem
- A list of what must be installed for the system to be compliant (for example, resources, patches, and applications)
- Instructions for rescanning the noncompliant system once the user has corrected the problems
- A link to the guest client installer (for unmanaged systems)

Elements needed for manual remediation

To allow users to fix their systems through use of a remediation portal, you need to set up and make available certain elements.

Remediation element	Description
Remediation portal	A web server that hosts one or more pages, which provide users with the resources they need to fix an unhealthy system.
Remediation web pages	One or more web pages that provide users with information about your corporate security policies, the steps they must take to correct the situation, and links to resources they must install to correct problems.
Noncompliance message in system health policies (optional, but recommended)	A message that displays on a user's system after a scan determines that a rule has failed. A specific message can be written for every system health policy.
Access to the McAfee NAC guest client (for unmanaged systems)	One of the pages on your remediation portal should provide a link for downloading the guest client. This is only important for unmanaged systems. Managed systems use their installed McAfee NAC client for scanning.

Remediation resources users must access

Your network access zones must provide access to the remediation resources needed by noncompliant systems.

In the resource list of each "Allow Access" type zone, be sure to include:

- Your default IP gateway
- The web server hosting your remediation portal pages
- All file servers and other systems that have links from your portal

21. On information and belief, the Accused Instrumentalities are used, marketed, sold, or otherwise provided by or for Defendant's partners, clients, customers and end users across the country and in this District.

22. Defendant was made aware of the '705 patent and its infringement thereof at least as early as the filing date of this Complaint.

23. Upon information and belief, since at least the filing date of this Complaint, Defendant induced and continues to induce others to infringe at least one claim of the '705 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Defendant's partners, clients, customers, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least one claim of the '705 patent.

24. Defendant's actions that aid and abet others, such as its partners, customers, clients, and end users, to infringe include, since at least the filing date of this Complaint, advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services related to the Accused Instrumentalities. On information and belief, Defendant has, since at least the filing date of this Complaint, engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendant has had actual knowledge of the '705 patent and knowledge that its acts were inducing infringement of the '705 patent since at least the filing date of this Complaint.

25. Upon information and belief, Defendant is liable as a contributory infringer of the '705 patent under 35 U.S.C. § 271(c) by offering to sell, selling, and/or importing into the United States the Accused Instrumentalities for use in practicing the '705 patent knowing, at least as early as the filing date of this Complaint, that the Accused Instrumentalities are especially made or adapted for use in an infringement of the '705 patent. The Accused Instrumentalities include a material component for use in practicing the '705 patent and are not a staple article or commodity of commerce suitable for substantial non-infringing use.

26. Plaintiff has been harmed by Defendant's infringing activities.

COUNT II – INFRINGEMENT OF U.S. PATENT NO. 9,516,048

27. The allegations set forth in the foregoing paragraphs 1 through 26 are incorporated into this Second Count.

28. On December 6, 2016, U.S. Patent No. 9,516,048 ("the '048 patent"), entitled "Contagion Isolation and Inoculation via Quarantine," was duly and legally issued by the United States Patent and Trademark Office. A true and correct copy of the '048 patent is attached as Exhibit 2.

29. The claims of the ’048 patent are directed to technical solutions to technical problems related to network security. Network security is a tremendous concern for modern enterprises, since a breach of an internal network can have severe repercussions, including major financial losses, data theft, disclosure of sensitive information, network disruptions, and data corruption—any of which could have devastating consequences to a business, at any scale. While a network security appliance can be extremely adept at keeping unwanted external intrusions into the network out, it is well known that perhaps the most exploitable component of a network is the human element. IT professionals may be able to keep on-site systems secure and up to date, but a worker’s personal laptop or mobile device is a significant security risk that would allow attackers (or just unwanted malware) access into a business’s network, bypassing IT security measures. The technology of the ’048 Patent closes this loophole by verifying that any device attempting to access a company’s network meets the company’s standards for network security and will not introduce dangerous programs into the company’s network. Through this technology, as implemented by companies including the Defendant, businesses can increase security of vulnerable elements of their networks.

30. The claims of the ’048 patent do not merely recite the performance of some business practice known from the pre-Internet world along with the requirement to perform it on the Internet. Instead, the claims of the ’048 patent are rooted in computerized network security technology in order to overcome problems specifically arising in the realm of computerized network security.

31. The claims of the ’048 patent recite subject matter that is not merely the routine or conventional use of network infrastructure. Instead, the claimed inventions are directed to particularized methods of assessing and responding to an external network access request such

that network integrity is maintained. The ’048 patent claims specify how a secure network can assess and respond to an external network access request without jeopardizing network integrity.

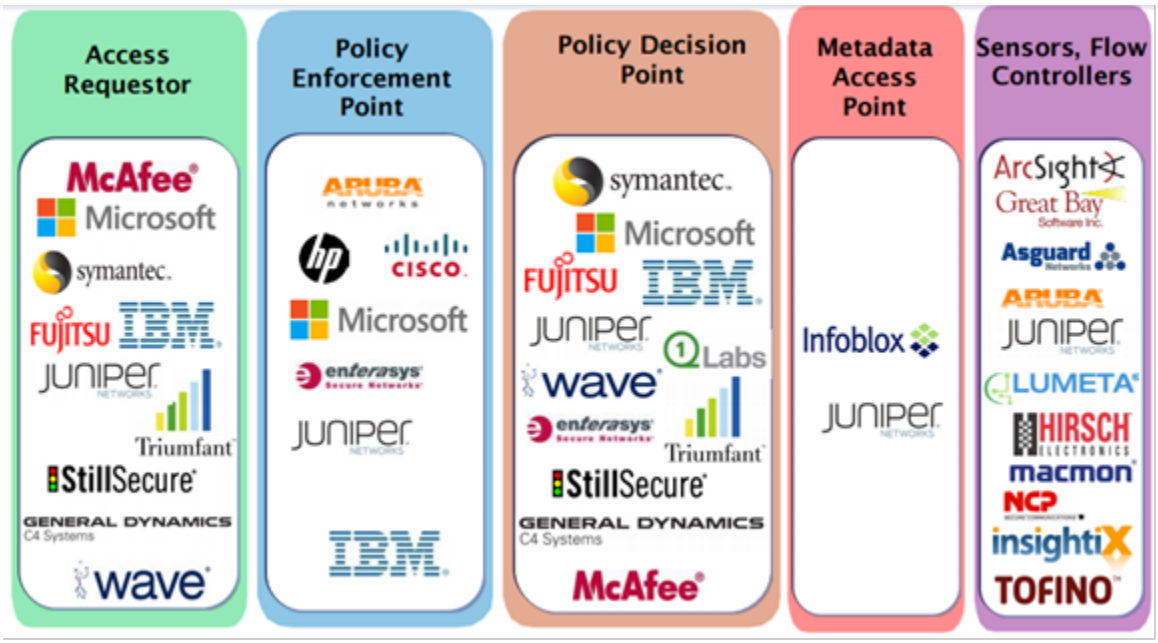
32. The claims of the ’048 patent do not preempt all ways of using network security technology, do not preempt any other well-known or prior technology, and do not impermissibly block future developments.

33. Each claim of the ’048 patent recites a combination of elements that amounts to significantly more than a patent on an ineligible concept.

34. Plaintiff is the assignee and owner of the right, title and interest in and to the ’048 patent, including the right to assert all causes of action arising under said patent and the right to any remedies for infringement of said patent.

35. Upon information and belief, Defendant has directly infringed and continues to directly infringe at least claim 1 of the ’048 patent by making, using, offering for sale, selling, and/or importing the Accused Instrumentalities.

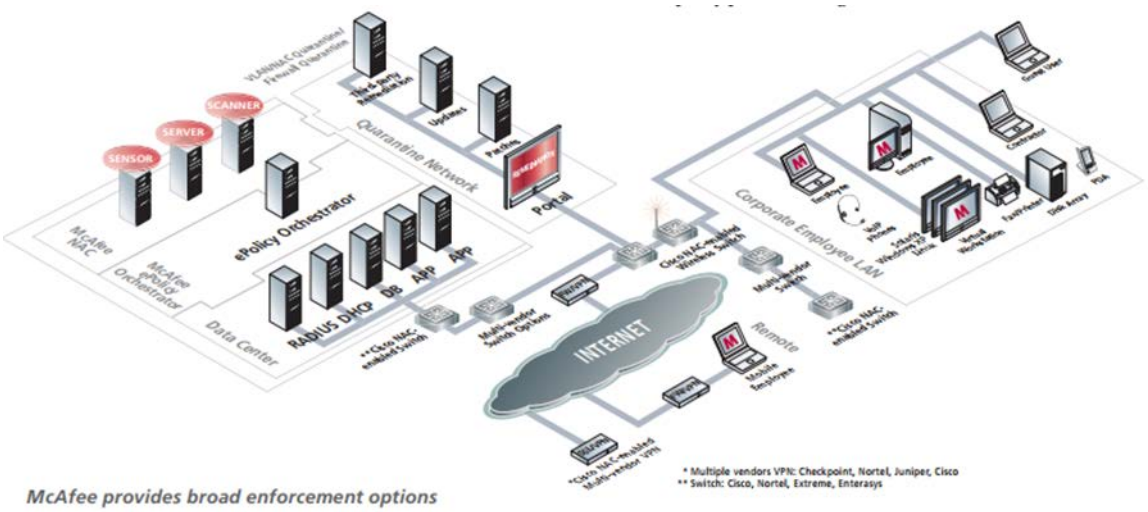
36. On information and belief, the Accused Instrumentalities leverage Trusted Network Connect (or Trusted Network Communications) (TNC) open architecture promulgated by the Trusted Network Connect Work Group of the Trusted Computing Group (TCG). *See, e.g.*, TCG Trusted Network Communications TNC Architecture for Interoperability, Specification Version 1.5, Revision 4, published May 7, 2012 (hereinafter the “TNC Specification”) at page 9, available at https://trustedcomputinggroup.org/wp-content/uploads/TNC_Architecture_v1_5_r4.pdf. On information and belief, Defendant adopted the TNC standards at least as of 2013. *See, e.g.*, Trusted Computing Group’s Trusted Network Connect Standards for Network Security presentation available at https://trustedcomputinggroup.org/wp-content/uploads/TNC-Briefing-2013-12-10.pdf.



37. Upon information and belief, Defendant makes, uses, offers for sale, sells, and/or imports the Accused Instrumentalities. *See, e.g.*, McAfee Network Access Control at pages 1 and 2 available at http://itprotect.com.au/McAfee/PDF/M-E/08-NAC/1-sps-nac-002-0507p.pdf ("McAfee NAC simplifies every step of your NAC process: (1) define policy, (2) detect devices, (3) assess systems, (4) enforce at network, and (5) remediate automatically").

Manage Risk by Enabling Policy Compliance

McAfee NAC simplifies every step of your NAC process: (1) define policy, (2) detect devices, (3) assess systems, (4) enforce at network, and (5) remediate automatically. This process covers all key aspects of NAC. It is a vital part of security risk management since it prevents at-risk systems from entering your network. With McAfee NAC, you can choose from a rich set of compliance checks that let you determine not only if security software is present, but also if the system is misconfigured and already infected with the most critical threats, which could propagate throughout your network. Other NAC solutions focus only on basic compliance checks for security software, which is insufficient. What if your anti-virus is running but you are already infected? What good is a basic NAC compliance check then?



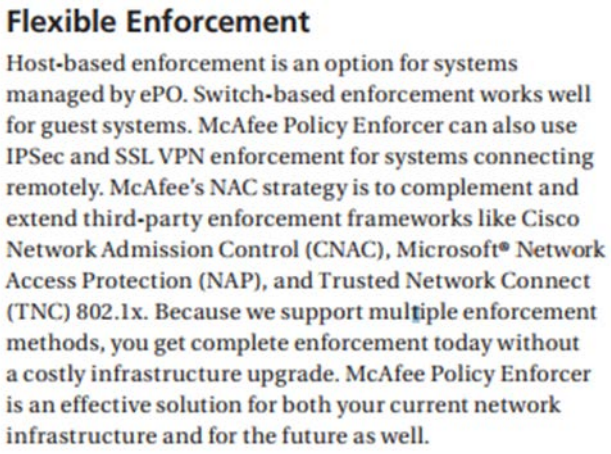
McAfee provides broad enforcement options

See also, MacAfee Policy Enforcer at pages 1 and 2 available at http://image1.cc-inc.com/en_ideamall/en_vendor/network_associates/cd/files/ds_policy_enforcer.pdf ("McAfee Policy Enforcer is a vital part of McAfee's total network access control (NAC) solution", "…quarantining and remediating non-compliant systems", and "McAfee's NAC strategy is to complement and extend third-part enforcement frameworks like…Trusted Network Connect (TNC) 802.1x")

You wouldn't let just anyone walk in your front door, and you shouldn't let just any system into your network.

McAfee® Policy Enforcer protects you by making sure that only systems that comply with your security policies are granted access to your network. McAfee Policy Enforcer is a vital part of McAfee's total network access control (NAC) solution. It complements and extends leading products and technologies to provide an open, flexible system that grows with your needs. And McAfee combines Policy Enforcer with our proven system and network protection—and professional services—for a comprehensive solution.

Protecting your company's information assets against internal and external threats requires constant vigilance. You have to challenge every system that enters the trusted corporate network. McAfee Policy Enforcer mitigates the risk to corporate assets by automatically quarantining and remediating non-compliant systems. Designed for businesses of all sizes, McAfee Policy Enforcer combines extremely powerful and flexible policy control with a wide range of enforcement options protecting all network access points from any type of system.



Flexible Enforcement

Host-based enforcement is an option for systems managed by ePO. Switch-based enforcement works well for guest systems. McAfee Policy Enforcer can also use IPSec and SSL VPN enforcement for systems connecting remotely. McAfee's NAC strategy is to complement and extend third-party enforcement frameworks like Cisco Network Admission Control (CNAC), Microsoft® Network Access Protection (NAP), and Trusted Network Connect (TNC) 802.1x. Because we support multiple enforcement methods, you get complete enforcement today without a costly infrastructure upgrade. McAfee Policy Enforcer is an effective solution for both your current network infrastructure and for the future as well.

38. Claim 1 of the ’048 patent recites a method, comprising: detecting an insecure condition on a first host that has connected or is attempting to connect to a protected network, wherein detecting the insecure condition includes contacting a trusted computing base associated with a trusted platform module within the first host, receiving a response, and determining whether the response includes a valid digitally signed attestation of cleanliness, wherein the valid digitally signed attestation of cleanliness includes at least one attestation selected from the group consisting of an attestation that the trusted computing base has ascertained that the first host is not infested, and an attestation that the trusted computing base has ascertained the presence of a patch or a patch level associated with a software component on the first host; when it is determined that the response does not include a valid digitally signed attestation of cleanliness, quarantining the first host, including by preventing the first host from sending data to one or more other hosts associated with the protected network, wherein preventing the first host from sending data to one or more other hosts associated with the protected network includes receiving a service request sent by the first host, determining whether the service request sent by the first host is associated with a remediation request, and when it is determined that the service request sent by the first host is not associated with a remediation request, serving a quarantine notification page that provides remediation information to the first host if the service request sent

by the first host comprises a web server request, wherein serving the quarantine notification page to the first host includes re-routing by responding to the service request sent by the first host with a redirect that causes a browser on the first host to be directed to a quarantine server configured to serve the quarantine notification page; and permitting the first host to communicate with a remediation host configured to provide data usable to remedy the insecure condition.

39. As demonstrated in the exemplary images and text below, Defendant has directly infringed and continues to directly infringe at least claim 1 of the ’048 patent by making, using, offering for sale, selling, and/or importing the Accused Instrumentalities, which perform a method, comprising: detecting an insecure condition on a first host that has connected or is attempting to connect to a protected network, wherein detecting the insecure condition includes contacting a trusted computing base associated with a trusted platform module within the first host:

> The Accused Instrumentalities detect when an Access Requestor (AR) client (a first host) is attempting to connect to the protected network, but has not yet passed the integrity-verification (thus is in insecure condition). *See, e.g.*, the TNC Specification at pages 20 and 26 available at https://trustedcomputinggroup.org/wp-content/uploads/TNC_Architecture_v1_5_r4.pdf.
>
> When a network connection attempt is triggered (automatically or by user request), the NAR at the AR (client) initiates a connection request at the link and network layers.
>
> *Isolation*: If the AR has been authenticated and is recognized to be one that has some privileges on the network but has not passed the integrity-verification by the IMV, the PDP may return instructions to the PEP to redirect the AR to an isolation environment where the AR can obtain integrity-related updates.
>
> As shown in the figure below, detecting the insecure condition includes using the PTS (Platform Trust Service) Protocol to contact a trusted computing base, the Policy Decision Point (PDP), to use the PTS Integrity Measurement Collector of the first host. *See*, the TCG Attestation PTS Protocol: Binding to TNC IF-M Specification, Version 1.0, Revision 28, published August 24, 2011 (hereinafter “IFM PTS”) at page 10 available at https://www.trustedcomputinggroup.org/wp-content/uploads/IFM_PTS_v1_0_r28.pdf.

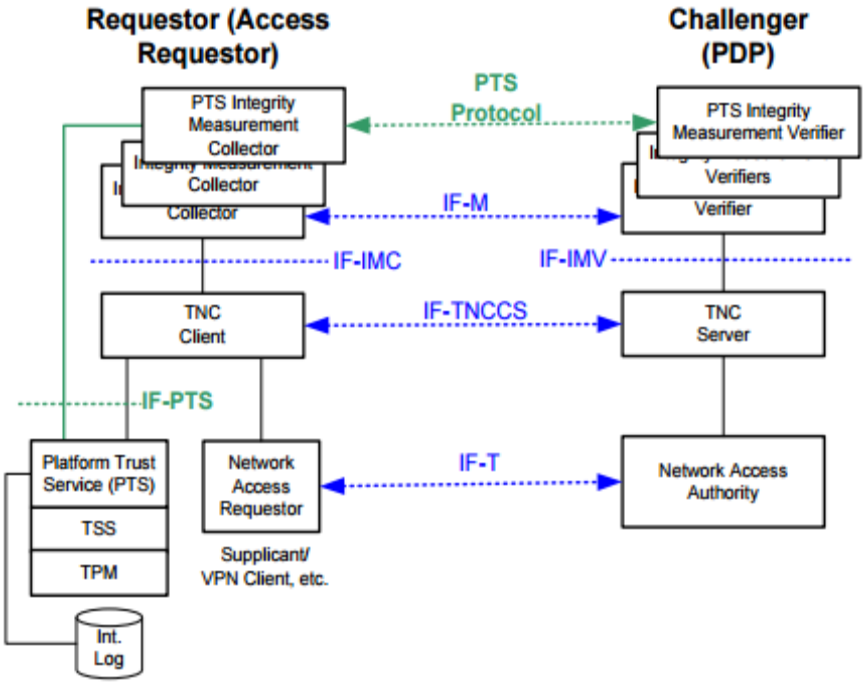


Figure 1: PTS Protocol Integration with TNC Architecture

Notice that the TNC Architecture contains several layered protocols (IF-T, IF-TNCCS and IF-M). The PTS Protocol will be carried within the payloads of the IF-M protocol, so would layer hierarchically on top of the IF-M protocol. The PTS Protocol operates between the PTS-IMC and PTS-IMV to enable PTS-based attestation leveraging the underlying TPM. The PTS-IMC uses a local IPC channel to the PTS (discussed in the IF-PTS specification) to obtain the necessary attestation evidence. Use of the IF-PTS interface and the TSS middleware stack components are optional so implementations might leverage the PTS or TPM in other ways (e.g. the PTS could have other techniques for interacting with a TPM to obtain measurements).

See also, the TCG's Trusted Platform Module Library, Part 1: Architecture, Family 2.0, Level 00 Revision 01.07 draft published March 13, 2014 (hereinafter, "TPM Library") at page 23 available at https://www.trustedcomputinggroup.org/wp-content/uploads/TPM-Rev-2.0-Part-1-Architecture-01.07-2014-03-13.pdf.

9.2.2 Trusted Computing Base

A trusted computing base (TCB) is the collection of system resources (hardware and software) that is responsible for maintaining the security policy of the system. An important attribute of a TCB is that it be able to prevent itself from being compromised by any hardware or software that is not part of the TCB.

receiving a response:

The response is then received in the form of "attestation information." *See, e.g.*, the IFM PTS at pages 14-15 available at https://www.trustedcomputinggroup.org/wp-content/uploads/IFM_PTS_v1_0_r28.pdf. (Discussed further below).

and determining whether the response includes a valid digitally signed attestation of cleanliness, wherein the valid digitally signed attestation of cleanliness includes at least one attestation selected from the group consisting of an attestation that the trusted computing base has ascertained that the first host is not infested, and an attestation that the trusted computing base has ascertained the presence of a patch or a patch level associated with a software component on the first host:

> If the remote challenger is clean, the "attestation information" will include a signed (and cryptographically verifiable) set of "attestation evidence" which is an attestation of cleanliness. *See*, *e.g.*, the IFM PTS at pages 14-15 available at https://www.trustedcomputinggroup.org/wp-content/uploads/IFM_PTS_v1_0_r28.pdf.

2.5.2 TPM Quote

This section summarizes how the TPM's ability to quote PCRs provides assurance that the attestation evidence provided is trustworthy and protected from local tampering. The TPM provides a number of shielded storage locations and ordinals to perform transformations on data using the contents of these locations. For example, the TPM houses cryptographic keys that are only usable inside the TPM. One such key is the Attestation Identity Key (AIK) which is limited by the TPM to only be used to sign the contents of the TPM's PCRs (which are protected in TPM shielded storage). On a platform where the PCRs are set to reflect the operational content of the system, this combination of protected PCRs and AIK enable an attestation mechanism to be verifiable by remote parties.

Specifically, a remote challenger can request attestation information about a system and obtain an AIK signed set of "attestation evidence" that is cryptographically verifiable as having been generated using a TPM-resident AIK and PCRs. By empowering the remote challenger to be able to retrieve this signed set of PCRs with proof that they were resident inside a TPM, this mechanism allows the challenger to have confidence that it can determine (potentially using the measurement log and policy) what software has been run on the endpoint without fear of being spoofed by malware.

> The attestation information provided by the Accused Instrumentalities includes measurements of the client's integrity (ascertained that the first host is not infested) and the software versions (the presence of a patch or a patch level associated with a software component on the first host). *See*, *e.g.*, the TNC Specification at page 15 available at https://trustedcomputinggroup.org/wp-content/uploads/TNC_Architecture_v1_5_r4.pdf.

Integrity Measurement Collector (IMC): The IMC function is a software component that runs on an AR, measuring security aspects of the AR's integrity. Examples include the Anti-Virus parameters on the Access Requestor, Personal Firewall status, software versions, and other security aspects of the AR. Note that the TNC Architecture is designed for multiple IMCs to interact with a single (or multiple) TNC Client/TNC Server, thereby allowing customers to deploy complex integrity policies involving a range of vendors products.

> This process is performed when clients attempt to connect to the protected network, to prevent outside infections from getting in and to ensure the integrity has not fallen below expectations—such as new updates not being installed—since a previous connection. A Use Case Walkthrough provided by the Trusted

Computing Group illustrates a standard procedure for new connection attempts. *See* pages 55-59 of the TCG TNC IF-IMV Specification, Version 1.0, Revision 3, published May 3, 2005 (hereafter "TNC IF-IMV Specification") available at https://www.trustedcomputinggroup.org/wp-content/uploads/TNC_IFIMV_v1_0_r3.pdf.

7.4 Network Connect

1. The endpoint's NAR attempts to connect to a network protected by a PEP, thus triggering an Integrity Check Handshake. There are other ways that an Integrity Check Handshake can be triggered, but this will probably be the most common. For those other ways, the next few steps may be significantly different.
2. The PEP sends a network access decision request to the PDP (NAA or TNCS). Depending on configuration, the PEP may contact the NAA first or the TNCS. The ordering of user authentication, platform authentication, and integrity check is also subject to configuration. Here we present what will probably be the most common order: first user authentication, then platform authentication, then integrity check.
3. The NAA performs user authentication with the NAR. Based on the NAA's policy, the user identity established through this process may be used to make immediate access decisions (like deny). If an immediate access decision has been made, skip to step 16. User authentication may also involve having the NAR authenticate the NAA.
4. The NAA informs the TNCS of the connection request, providing the user identity and other useful info (service requested, etc.).
5. The TNCS performs platform authentication with the TNCC, if required by TNCS policy. This includes verifying the IMC hashes collected during TNCC Setup. If an immediate access decision has been made, skip to step 16. Platform authentication may be mutual so the TNCC can be sure it's talking to a secure server.
6. The TNCC uses IF-IMC to fetch IMC messages.
7. The TNCS uses IF-IMV to inform each IMV that an Integrity Check Handshake has started. **[IF-IMV] If this is a new network connection, the TNCS calls `TNC_IMV_NotifyConnectionChange` with the `newState` parameter set to `TNC_CONNECTION_STATE_CREATE` to indicate that a new network connection has been created. Then the TNCS calls `TNC_IMV_NotifyConnectionChange` with the `newState` parameter set to `TNC_CONNECTION_STATE_HANDSHAKE`.**

8. The TNCC passes the IMC messages to the TNCS. This and all other TNCC-TNCS communications can be sent directly but they will often be relayed through one or more of the NAR, PEP, and NAA.
9. The TNCS passes each IMC message to the matching IMV or IMVs through IF-IMV (using message types associated with the IMC messages to find the right IMV). If there are no IMC messages, skip to step 13. **[IF-IMV] The TNCS delivers the IMC messages to the IMVs by calling `TNC_IMV_ReceiveMessage`. The IMVs may call `TNC_TNCS_SendMessage` before returning from `TNC_IMV_ReceiveMessage` if they want to send a response. When the TNCS has delivered all the IMC messages to the IMVs, it calls `TNC_IMV_BatchEnding` to inform them of this fact. The IMVs may call `TNC_TNCS_SendMessage` before returning from `TNC_IMV_BatchEnding` if they want to send a message to an IMV.**
10. Each IMV analyzes the IMC messages. If an IMV needs to exchange more messages (including remediation instructions) with an IMC, it provides a message to the TNCS and continues with step 11. If an IMV is ready to decide on an IMV Action Recommendation and IMV Evaluation Result, it gives this result to the TNCS through IF-IMV. If there are no more messages to be sent to the IMC from any of the IMVs, skip to step 13. **[IF-IMV] As described in the previous step, IMVs send messages by calling `TNC_TNCS_SendMessage` before returning from `TNC_IMV_ReceiveMessage` and `TNC_IMV_BatchEnding`. IMVs give their results to the TNCS by calling `TNC_TNCS_ProvideRecommendation` at any time.**
11. The TNCS sends the messages from the IMVs to the TNCC.
12. The TNCC sends the IMV messages on to the IMCs through IF-IMC so they can process the messages and respond. Skip to step 8.
13. If there are any IMVs that have not given an IMV Action Recommendation to the TNCS, they are prompted to do so through IF-IMV. **[IF-IMV] The TNCS gives this prompt by calling `TNC_IMV_SolicitRecommendation`. The IMVs provide their recommendations by calling `TNC_TNCS_ProvideRecommendation`.**
14. The TNCS considers the IMV Action Recommendations supplied by the IMVs and uses an integrity check combining policy to decide what its TNCS Action Recommendation should be.
15. The TNCS sends its TNCS Action Recommendation to the NAA. The NAA may ignore or modify this recommendation based on its policies but will typically abide by it.
16. The NAA sends a copy of its final network access decision response to the TNCS. The TNCS may send a copy of the network access decision to the TNCC. The TNCS also informs the IMVs of the network access decision response via IF-IMV. **[IF-IMV] The TNCS calls `TNC_IMV_NotifyConnectionChange` with the `newState` parameter set to**

    `TNC_CONNECTION_STATE_ACCESS_ALLOWED`,
    `TNC_CONNECTION_STATE_ACCESS_ISOLATED`, or
    `TNC_CONNECTION_STATE_ACCESS_NONE`.
17. The NAA sends its network access decision response to the PEP.
18. The PEP implements the network access decision response. During this process, the NAR is typically informed of the decision. The TNCC may be informed by the NAR or may discover that a new network has come up.
19. If step 6 was not executed, the network connect process is complete. Otherwise, the TNCC informs the IMCs of the network access decision response via IF-IMC.
20. If the IMCs need to perform remediation, they perform that remediation. Then they continue with Handshake Retry After Remediation. If no remediation was needed, the use case ends here.

The Accused Instrumentalities perform the TNC process. *See, e.g.*, McAfee Policy Enforcer at pages 1 and 2 available at http://image1.cc-inc.com/en_ideamall/en_vendor/network_associates/cd/files/ds_policy_enforcer.pdf

Policy controls are the foundation of your access control system. They determine the proper enforcement action—allow, block, or quarantine. To act intelligently, security policies need to address your unique risks. Are any high-risk viruses, worms, or malware present? What is the minimum version required for security patches? Which anti-virus, firewall, and host intrusion prevention systems are required? What version of the anti-virus definitions is mandated? Are particular systems, like storage servers or printers, exempt from enforcement policies? With McAfee Policy Enforcer, you can choose from a rich set of compliance checks that help you quickly define flexible and powerful compliance policies and rules.

Reduce Risk

Your challenge as an enterprise security manager is to allow network access to employees, contractors, and guests without compromising business availability or increasing risk. McAfee Policy Enforcer performs a deep assessment of systems that connect over the LAN, WAN, IPSec VPN, or SSL VPN to determine whether the systems comply with your network access policies. When you create comprehensive policies, assess systems, and remediate non-compliant systems against policy, you can ensure application and patch compliance and avoid high-risk viruses and threats. With McAfee Policy Enforcer, you protect your networks from non-compliant systems and benefit from new ways to view, enforce, and report on compliance from a single management console.

Key Features

- Discovers managed and unmanaged systems
- Comprehensive agent and agentless system assessment includes checks for infections, patches, and McAfee and third-party security applications
- Broad enforcement methods
- Flexible remediation
- Integrated, centralized management with ePO

See also, McAfee Network Access Control Product Guide at pages 10 and 40 available at https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCUMENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf ("Assessors: A component that evaluates the health of a system based on policies that describe or identify required software, patches, services, registry keys, and numerous other conditions that can be described by a rule")

Table 1-1 McAfee NAC components

Component name	Description
Network Access Control manager	The central management portion of McAfee NAC that provides policy management, exemption management, system classification, action triggers, component deployment, and data processing and storage.
Detectors	A component that identifies systems that connect to a network. A detector can be software only, or a combination of hardware and software. Detectors can be centralized or distributed as client-side agents.
Assessors	A component that evaluates the health of a system based on policies that describe or identify required software, patches, services, registry keys, and numerous other conditions that can be described by a rule.
Enforcers	A component that restricts a system's access to network resources according to a mapping of network access zones to health levels. Enforcers are typically health-based, but can use other criteria for restricting a system's network access.
Remediators	A component that automatically attempts to bring an unhealthy system back into compliance with the policies you have defined for a healthy system.

Table 3-5 Assessor operations

Assessor	Operational description
McAfee NAC client	Provides a health level assessment for managed systems, according to one or more assigned system health policies. The McAfee NAC client assessor reports the following information to the McAfee NAC manager: • Assessed health level • Details about benchmarks and rules • Status of the assessment (scan) — whether it failed, or was successful • Version of content and policy that was used • Report the network access zone that the host is enforced to • Post remediation results if enabled
McAfee NAC guest client	Provides a health level assessment for unmanaged systems, according to a single unmanaged system policy. The guest client assessor reports the following information to the McAfee NAC manager: • Assessed health level • Details about benchmarks and rules • Status of the assessment (scan) — whether it failed, or was successful • Version of content and policy that was used

Table 3-6 Assessor input and output

Assessor	Input	Output	Output used by
McAfee NAC client	• Managed system health policies • A McAfee NAC client policy • Benchmark content (checks and rules) • Network access policy	• A health level descriptor • Network access zone	The reporting service of the McAfee NAC manager, and any supported enforcer for a managed system. Remediators use the command associated with rule or benchmark, when a specific rule fails and the host becomes non-compliant.
McAfee NAC guest client	• A single unmanaged system policy • Benchmark content (checks and rules)	A health level descriptor	The reporting service of the McAfee NAC manager, and any supported enforcer for an unmanaged system. Currently, a McAfee® Network Security Sensor is the only supported enforcer for an unmanaged system. There is no automated remediator at this time for unmanaged systems.

when it is determined that the response does not include a valid digitally signed attestation of cleanliness, quarantining the first host, including by preventing the first host from sending data to one or more other hosts associated with the protected network:

> The Accused Instrumentalities use the Assessment Phase to determine the client's integrity status. Once this determination is made, the Integrity Measurement Verifier (IMV) "can make one of three IMV Action-Recommendations (Allow, Isolate or Block)." *See, e.g.*, the TNC Specification at page 27 available at https://trustedcomputinggroup.org/wp-content/uploads/TNC_Architecture_v1_5_r4.pdf.

5.2 Assessment Phase

In the Assessment Phase, the TNC Client reports its current integrity status to the TNC Server. Upon receiving the client integrity status, the IMVs with the aid of the TNCS perform an assessment of the AR based on the set of policies defined by the network administrator. The IMV can make one of three IMV Action-Recommendations (Allow, Isolate or Block) or it can make no recommendation.

> A client AR that fails integrity variation is isolated (quarantined) onto an "Isolation Network." "This protects the AR from the full network and vice versa, preventing the spread of viruses and worms."

5.3 Isolation Phase

An important tool in the effort to remediate ARs that fail integrity verification is the isolation of that AR to a separate network – referred to here as the Isolation Network – in order to provide remediation services to the AR. This protects the AR from the full network and vice versa, preventing the spread of viruses and worms. There are a number of technical approaches today to achieve network isolation for the AR. Two of these are as follows:

(a) *VLAN Containment*: VLAN containment permits the AR to access the network in a limited fashion. Typically the primary purpose of the limited access is to allow the AR to access on-line sources of remediation data (e.g. virus definition file updates, worm removal software, software patches, etc). In some cases, no remediation is offered and the AR is instead offered access to limited services, in such a fashion as to limit the potential for impact to the network or other attached hosts. RADIUS provisions VLAN containment using the Tunnel-Private–Group-ID attribute, as specified in RFC3580 [21].

(b) *IP Filters*: In the case of IP filters, the PEP is configured with a set of filters which defines network locations reachable by the isolated AR. Packets from the AR destined to other network locations are simply discarded by the PEP. RADIUS selects filter rules for application to a network access session using the Filter-ID attribute (see RFC2865 and RFC3580) [21].

wherein preventing the first host from sending data to one or more other hosts associated with the protected network includes receiving a service request sent by the first host, determining whether the service request sent by the first host is associated with a remediation request:

> This isolation network provides “limited or quarantined access” which prevents the host from sending data to other hosts associated with the protected network. This will require “remediation instructions” be provided in place of standard responses to service requests. *See, e.g.*, pages 13-15 of the TNC IF-IMV Specification available at https://www.trustedcomputinggroup.org/wp-content/uploads/TNC_IFIMV_v1_0_r3.pdf.

2.6.3 Remediation and Handshake Retry

In several cases, it is useful to retry an Integrity Check Handshake. First, an endpoint may be isolated until remediation is complete. Once remediation is complete, an IMC can inform the TNCC of this fact and suggest that the TNCC retry the Integrity Check Handshake. Second, a TNCS can initiate a retry of an Integrity Check Handshake (if the TNCS or IMV policies change or as a periodic recheck). Third, an IMC or IMV can request a handshake retry in response to a condition detected by the IMC or IMV (suspicious activity, for instance). In any case, it's generally desirable (but not always possible) to reuse state established by the earlier handshake and to avoid disrupting network connectivity during the handshake retry.

To support handshake retries, the TNCS MAY maintain a network connection ID after an Integrity Check Handshake has been completed. This network connection ID can then be used by the TNCS to inform IMVs that it is retrying the handshake or by an IMV to request a retry (due to policy change or another reason).

Handshake retry may not always be possible due to limitations in the TNCC, NAR, PEP, or other entities. In other cases, retry may require disrupting network connectivity. For these reasons, IF-IMV supports handshake retry and requires IMVs to handle handshake retries (which is usually trivial) but does not require TNCSs to honor IMV requests for handshake retry. In fact, IF-IMV requires an IMV to provide information about the reason for requesting handshake retry so that the TNCS can decide whether it wants to retry (which may disrupt network access).

Note that remediation instructions are delivered from IMVs to IMCs through standard IMV-IMC messages (see section 2.6.4, "Message Delivery"). There is no special support in IF-IMV for this feature. IMVs SHOULD send remediation instructions to IMCs before returning an IMV Action Recommendation and IMV Evaluation Result to the TNCS so the instructions are delivered before the handshake is completed.

2.6.4 Message Delivery

One of the critical functions of the TNC architecture is conveying messages between IMCs and IMVs. Each message sent in this way consists of a message body, a message type, and a recipient type.

The message body is a sequence of octets (bytes). The TNCC and TNCS SHOULD NOT parse or interpret the message body. They only deliver it as described below. Interpretation of the message body is left to the ultimate recipients of the message, the IMCs or IMVs. A zero length message is perfectly valid and MUST be properly delivered by the TNCC and TNCS just as any other IMC-IMV message would be.

The message type is a four octet number that uniquely identifies the format and semantics of the message. The method used to ensure the uniqueness of message types while providing for vendor extensions is described below.

The recipient type is simply a flag indicating whether the message should be delivered to IMVs or IMCs. Messages sent by IMCs are delivered to IMVs and vice versa. All messages sent by an IMV through IF-IMV have a recipient type of IMC. All messages received by an IMV through IF-IMV have a recipient type of IMV. The recipient type does not show up in IF-IMC or IF-IMV, but it helps in explaining message routing.

The routing and delivery of messages is governed by message type and recipient type. Each IMC and IMV indicates through IF-IMC and IF-IMV which message types it wants to receive. The TNCC and TNCS are then responsible for ensuring that any message sent during an Integrity Check Handshake is delivered to all recipients that have a recipient type matching the message's recipient type and that have indicated the wish to receive messages whose type matches the message's message type. If no recipient has indicated a wish to receive a particular message type, the TNCC and TNCS can handle these messages as they like: ignore, log, etc.

WARNING: The message routing and delivery algorithm just described is not a one-to-one model. A single message may be received by several recipients (for example, two IMVs from a single

vendor, two copies of an IMC, or nosy IMVs that monitor all messages). If several of these recipients respond, this may confuse the original sender. IMCs and IMVs MUST work properly in this environment. They MUST NOT assume that only one party will receive and/or respond to a message.

IF-IMV allows an IMV to send and receive messages using this messaging system. Note that this system should not be used to send large amounts of data. The messages will often be sent through PPP or similar protocols that do not include congestion control and are not well suited to bulk data transfer. If an IMC needs to download a patch (for instance), the IMV should indicate this by reference in the remediation instructions. The IMC will process those instructions after network access (perhaps isolated) has been established and can then download the patch via HTTP or another appropriate protocol.

All messages sent with `TNC_TNCS_SendMessage` and received with `TNC_IMV_ReceiveMessage` are between the IMC and IMV. The IMV communicates with the TNCS by calling functions (standard and vendor-specific) in the IF-IMV, not by sending messages. The TNCS should not interfere with communications between the IMC and IMVs by consuming or blocking IMC-IMV messages.

A particular example of the message delivery provided by IF-IMV is the communication of remediation instructions from the IMVs through the TNCS to the TNCC/IMCs. This is one application of IMC-IMV message delivery and in all cases follows the normal IMV-IMC communications path. IF-IMV provides support for communicating remediation instructions to an endpoint using this mechanism. Since the normal IMC-IMV communications path is used to communicate remediation instructions, this specification will not address further the details of how remediation itself is done.

2.6.7 IMV Action Recommendation

One of the assumptions of the TNC architectural model is that IF-IMV provides a means for IMVs to recommend action information to the TNCS, so that isolation can properly be supported on the network. The TNCS then will combine these IMV Action Recommendations using some logic (defined by the TNCS implementers) to come up with an overall TNCS Acition Recommendation. Note that the TNCS may choose to ignore any IMV Action Recommendation, but each IMV must be able to recommend an action. Potential choices for IMV Action Recommendations include: recommend full (normal) access; recommend isolation (limited or quarantined access); and recommend denial (no access). The mandatory function `TNC_TNCS_ProvideRecommendation` is the mechanism within IF-IMV for an IMV to indicate its IMV Action Recommendation.

and when it is determined that the service request sent by the first host is not associated with a remediation request, serving a quarantine notification page that provides remediation information to the first host if the service request sent by the first host comprises a web server request, wherein serving the quarantine notification page to the first host includes re-routing by responding to the service request sent by the first host with a redirect that causes a browser on the first host to be directed to a quarantine server configured to serve the quarantine notification page:

> As an example of Defendant's implementation of this process in the Accused Instrumentalities, see the following explanation of an "enforcer" which illustrates that it "…restricts a system's access to network resources according to a mapping of network access zones to health levels." See, McAfee Network Access Control Product Guide at page 10 available at

https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCUMENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf

Table 1-1 McAfee NAC components

Component name	Description
Network Access Control manager	The central management portion of McAfee NAC that provides policy management, exemption management, system classification, action triggers, component deployment, and data processing and storage.
Detectors	A component that identifies systems that connect to a network. A detector can be software only, or a combination of hardware and software. Detectors can be centralized or distributed as client-side agents.
Assessors	A component that evaluates the health of a system based on policies that describe or identify required software, patches, services, registry keys, and numerous other conditions that can be described by a rule.
Enforcers	A component that restricts a system's access to network resources according to a mapping of network access zones to health levels. Enforcers are typically health-based, but can use other criteria for restricting a system's network access.
Remediators	A component that automatically attempts to bring an unhealthy system back into compliance with the policies you have defined for a healthy system.

See also, page 62 of https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCUMENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf ("Network access zones designate which network resources a managed system can or cannot access when it is not compliant with one or more rules in the applicable system health policies", and "Network access zones should be defined so that noncompliant systems are isolated from network resources, such as critical servers and sensitive data, depending on the severity of the threat posed by each benchmark rule violation")

Network access zones and compliance

Network access zones designate which network resources a managed system can or cannot access when it is not compliant with one or more rules in the applicable system health policies. The network access zones you define in McAfee NAC apply only to managed systems when the McAfee NAC client is the enforcer.

You can create as many network access zones as you need to ensure network security. Once these zones are created, you use them when defining a network access policy by associating a specific zone with each system health level.

Network access zones should be defined so that noncompliant systems are isolated from network resources, such as critical servers and sensitive data, depending on the severity of the threat posed by each benchmark rule violation. However, you can always modify your zone definitions, so adding or removing a resource can be done at any time. When a network access zone definition is modified, it triggers an update to any network access policies that use the zone in the health level mapping.

See also, Defendant discusses the implementation of remediation at pages 77, 79, 80 and 81 of https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCUMENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf ("Remediation instructions that specify how the user's system is noncompliant, and the steps necessary to correct the problem", "A list of what must be installed for the system to be compliant (for example, resources, patches, and applications)", and "Remediation web pages: One or more web pages that provide

users with information about your corporate security policies, the steps they must take to correct the situation, and links to resources they must install to correct problems"). This illustrates the use of a quarantine notification page, provided in response when the client issues a web server request or a DNS query ("display remediation instructions").

Remediation is the process of updating a system to make it compliant with your system health policies. A system is assigned a health level depending on whether it passes all applicable system health policies. If a system fails any policy rules, it is assigned the health level associated with the failed rule.

The network access policy assigned to the system determines which network access zone the system is restricted to, based on which health level was assigned, until it is brought back into compliance.

Once a user has taken the appropriate steps to remediate a noncompliant system, a rescan can be requested. This can be done through the McAfee system tray. If the rescan assesses the system as compliant, the system is moved back to the network access zone that is appropriate for healthy systems.

Manual remediation

For manual remediation, you can establish a remediation portal and provide one or more pages containing information for users who need to remedy problems with their systems.

Remediation portal

Typically, your managed systems can be remediated using automatic remediation. However, your circumstances might require manual remediation for managed systems. Any unmanaged systems on your network must be remediated manually.

An important aspect of manual remediation is making sure you inform users of the remediation portal's location. Both managed system health policies and the unmanaged system policy have a Noncompliance message option that is displayed through the system tray icon on client systems. This message is the preferred and most reliable method of providing users with your remediation portal's location.

A remediation portal should always provide users with this information:

- A description of the corporate network security policy
- Remediation instructions that specify how the user's system is noncompliant, and the steps necessary to correct the problem
- A list of what must be installed for the system to be compliant (for example, resources, patches, and applications)
- Instructions for rescanning the noncompliant system once the user has corrected the problems
- A link to the guest client installer (for unmanaged systems)

Elements needed for manual remediation

To allow users to fix their systems through use of a remediation portal, you need to set up and make available certain elements.

Remediation element	Description
Remediation portal	A web server that hosts one or more pages, which provide users with the resources they need to fix an unhealthy system.
Remediation web pages	One or more web pages that provide users with information about your corporate security policies, the steps they must take to correct the situation, and links to resources they must install to correct problems.
Noncompliance message in system health policies (optional, but recommended)	A message that displays on a user's system after a scan determines that a rule has failed. A specific message can be written for every system health policy.
Access to the McAfee NAC guest client (for unmanaged systems)	One of the pages on your remediation portal should provide a link for downloading the guest client. This is only important for unmanaged systems. Managed systems use their installed McAfee NAC client for scanning.

Remediation resources users must access

Your network access zones must provide access to the remediation resources needed by noncompliant systems.

In the resource list of each "Allow Access" type zone, be sure to include:

- Your default IP gateway
- The web server hosting your remediation portal pages
- All file servers and other systems that have links from your portal

See also page 63 of https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCUMENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf ("No matter how you define a network access zone, systems always have access to a core whitelist of network resources that consists of: DNS servers…")

Network access resources

A network access zone's resource list can specify an internal or external network resource. *Internal resources* are ones that are not accessible from the Internet, and must be specified by an IP address. *External addresses* can be either a fully-qualified domain name (FQDN) or an IP address.

No matter how you define a network access zone, systems always have access to a core whitelist of network resources that consists of:

- DNS servers
- DHCP servers
- The ePolicy Orchestrator server
- The local system

and permitting the first host to communicate with a remediation host configured to provide data usable to remedy the insecure condition:

The Accused Instrumentalities permit the client to communicate with the remediation host. This enables limited access to the network to access data and resources to enable the client to attain an acceptable state. *See, e.g.*, the TNC Specification at pages 27-28 available at https://trustedcomputinggroup.org/wp-content/uploads/TNC_Architecture_v1_5_r4.pdf.

VLAN Containment: VLAN containment permits the AR to access the network in a limited fashion. Typically the primary purpose of the limited access is to allow the AR to access on-line sources of remediation data (e.g. virus definition file updates, worm removal software, software patches, etc). In some cases, no remediation is offered and the AR is instead offered access to limited services, in such a fashion as to limit the potential for impact to the network or other attached hosts. RADIUS provisions VLAN containment using the Tunnel-Private–Group-ID attribute, as specified in RFC3580 [21].

5.4 Remediation Phase

The TNC Architecture in Figure 4 accommodates a number of schemes for remediation. The intent of remediation is generally universal, namely that of performing updates to the software and firmware of the AR to help it comply with the current network policy.

The general aim of remediation is to bring the AR up to date in all integrity-related information, as defined by the current policy for authorization. Examples include OS patches, AV updates, firmware upgrades, etc. Section 5.5 below discusses the TNC approach to remediation in further detail.

After remediation has been completed, the IMCs can ask the TNCC to retry the Integrity Check Handshake, which results in another Assessment Phase. This second phase may be shorter than the first since the IMCs may be able to send only the data that has changed (if supported by the IMVs).

In addition, *see, e.g.*, pages 13 and 15 of the TNC IF-IMV Specification available at https://www.trustedcomputinggroup.org/wp-content/uploads/TNC_IFIMV_v1_0_r3.pdf.

2.6.3 Remediation and Handshake Retry

In several cases, it is useful to retry an Integrity Check Handshake. First, an endpoint may be isolated until remediation is complete. Once remediation is complete, an IMC can inform the TNCC of this fact and suggest that the TNCC retry the Integrity Check Handshake. Second, a TNCS can initiate a retry of an Integrity Check Handshake (if the TNCS or IMV policies change or as a periodic recheck). Third, an IMC or IMV can request a handshake retry in response to a condition detected by the IMC or IMV (suspicious activity, for instance). In any case, it's generally desirable (but not always possible) to reuse state established by the earlier handshake and to avoid disrupting network connectivity during the handshake retry.

To support handshake retries, the TNCS MAY maintain a network connection ID after an Integrity Check Handshake has been completed. This network connection ID can then be used by the TNCS to inform IMVs that it is retrying the handshake or by an IMV to request a retry (due to policy change or another reason).

Handshake retry may not always be possible due to limitations in the TNCC, NAR, PEP, or other entities. In other cases, retry may require disrupting network connectivity. For these reasons, IF-IMV supports handshake retry and requires IMVs to handle handshake retries (which is usually trivial) but does not require TNCSs to honor IMV requests for handshake retry. In fact, IF-IMV requires an IMV to provide information about the reason for requesting handshake retry so that the TNCS can decide whether it wants to retry (which may disrupt network access).

Note that remediation instructions are delivered from IMVs to IMCs through standard IMV-IMC messages (see section 2.6.4, "Message Delivery"). There is no special support in IF-IMV for this feature. IMVs SHOULD send remediation instructions to IMCs before returning an IMV Action Recommendation and IMV Evaluation Result to the TNCS so the instructions are delivered before the handshake is completed.

2.6.7 IMV Action Recommendation

One of the assumptions of the TNC architectural model is that IF-IMV provides a means for IMVs to recommend action information to the TNCS, so that isolation can properly be supported on the network. The TNCS then will combine these IMV Action Recommendations using some logic (defined by the TNCS implementers) to come up with an overall TNCS Acition Recommendation. Note that the TNCS may choose to ignore any IMV Action Recommendation, but each IMV must be able to recommend an action. Potential choices for IMV Action Recommendations include: recommend full (normal) access; recommend isolation (limited or quarantined access); and recommend denial (no access). The mandatory function `TNC_TNCS_ProvideRecommendation` is the mechanism within IF-IMV for an IMV to indicate its IMV Action Recommendation.

Communication with the remediation host is essential to enable remediation. This allows the host to improve its integrity and subsequently gain access to the protected network. *See id*. at page 57.

20. If the IMCs need to perform remediation, they perform that remediation. Then they continue with Handshake Retry After Remediation. If no remediation was needed, the use case ends here.

7.5 Handshake Retry After Remediation

1. When an IMC completes remediation, it informs the TNCC that its remediation is complete and requests a retry of the Integrity Check Handshake through IF-IMC.
2. The TNCC decides whether to initiate an Integrity Check Handshake retry (possibly depending on policy, user interaction, etc.). Depending on limitations of the NAR, the TNCC may need to disconnect from the network and reconnect to retry the Integrity Check Handshake. In that case (especially if the previous handshake resulted in full access), it may decide to skip the handshake retry. However, in many cases the TNCC will be able to retry the handshake without disrupting network access. It may even be able to retain the state established in the earlier handshake. If the TNCC decides to skip the retry, the use case ends here.
3. The TNCC initiates a retry of the handshake. Skip to step 1, 3, or 5 of the Network Connect section above, depending on which steps are needed to initiate the retry.

Defendant's use of the remediation server (remediation portal containing resource links) is described in McAfee Network Access Control Product Guide at pages 79, 80 and 81 available at https://kb.mcafee.com/resources/sites/MCAFEE/content/live/PRODUCT_DOCUMENTATION/23000/PD23869/en_US/MNAC4_0_Product_Guide.pdf ("Remediation web pages: One or more web pages that provide users with information about your corporate security policies, the steps they must take to correct the situation, and links to resources they must install to correct problems" and "All file servers and other systems that have links from your portal").

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An important aspect of manual remediation is making sure you inform users of the remediation portal's location. Both managed system health policies and the unmanaged system policy have a Noncompliance message option that is displayed through the system tray icon on client systems. This message is the preferred and most reliable method of providing users with your remediation portal's location.

A remediation portal should always provide users with this information:

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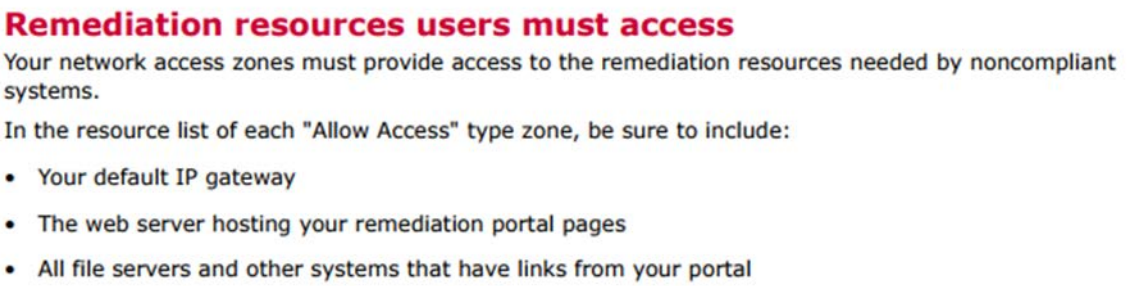

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- All file servers and other systems that have links from your portal

40. On information and belief, the Accused Instrumentalities are used, marketed, sold, or otherwise provided by or for Defendant's partners, clients, customers and end users across the country and in this District.

41. Defendant was made aware of the '048 patent and its infringement thereof at least as early as the filing date of this Complaint.

42. Upon information and belief, since at least the filing date of this Complaint, Defendant induced and continues to induce others to infringe at least one claim of the '048 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Defendant's partners, clients, customers, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least one claim of the '048 patent.

43. Defendant's actions that aid and abet others such as its partners, customers, clients, and end users to infringe include, since at least the filing date of this Complaint, advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services related to the Accused Instrumentalities. On information and belief, Defendant has, since at least the filing date of this Complaint, engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendant has had actual knowledge of the '048 patent and knowledge that its acts were inducing infringement of the '048 patent since at least the filing date of this Complaint.

44. Upon information and belief, Defendant is liable as a contributory infringer of the ’048 patent under 35 U.S.C. § 271(c) by offering to sell, selling, and/or importing into the United States the Accused Instrumentalities for use in practicing the ’048 patent knowing, at least as early as the filing date of this Complaint, that the Accused Instrumentalities are especially made or adapted for use in an infringement of the ’048 patent. The Accused Instrumentalities include a material component for use in practicing the ’048 patent and are not a staple article or commodity of commerce suitable for substantial non-infringing use.

45. Plaintiff has been harmed by Defendant’s infringing activities.

JURY DEMAND

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, Plaintiff demands a trial by jury on all issues triable as such.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff demands judgment for itself and against Defendant as follows:

A. An adjudication that Defendant has infringed the ’705 and ’048 patents;

B. An award of damages to be paid by Defendant adequate to compensate Plaintiff for Defendant’s past infringement of the ’705 and ’048 patents, and any continuing or future infringement through the date such judgment is entered, including interest, costs, expenses and an accounting of all infringing acts including, but not limited to, those acts not presented at trial;

C. A declaration that this case is exceptional under 35 U.S.C. § 285, and an award of Plaintiff’s reasonable attorneys’ fees; and

D. An award to Plaintiff of such further relief at law or in equity as the Court deems just and proper.

Dated: October 24, 2017

DEVLIN LAW FIRM LLC

/s/ Timothy Devlin

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