


NATIONAL SECURITY AGENCY
CENTRAL SECURITY SERVICE

COMMERCIAL SOLUTIONS for CLASSIFIED (CSfC)

Mobile Access Capability Package 2.7.0

Version 2.7.0
28 January 2025


CHANGE HISTORY

Title	Version	Date	Change Summary
Commercial Solutions for Classified (CSfC) Mobile Access (MA) Capability Package (CP)	2.7.0	28 January 2025	• Added Composed EUD Requirement. • Added Clarification on Gray Management and Gray Data Network Separation. • Added Requirement for the Government Private Cellular Use Cases to use a Retransmission Device.
Commercial Solutions for Classified (CSfC) Mobile Access (MA) Capability Package (CP)	2.6.0	13 May 2024	• Changed requirements MA-2F-1 through MA-2F-12 from Objective to T=O. • Table 35 Modification. • MA-RD-17 Modifications. • MA-CR-10 Withdrawn. • MA-CR-16 Updated to T=O. • MA-RD-13 Alternative Additions. • MA-RD-31 New Requirement. • MA-RD-32 New Requirement. • Table 17 Modifications to include SHA512. • MA-PS-25 Modifications. • Renamed section 8 from Continuous Monitoring to Supporting Documents. • Added section 8.1 Continuous Monitoring overview. • Added section 8.2 Key Management overview. • Added section 8.3 Enterprise Gray overview. • Minor administrative changes were made in formatting, punctuation and glossary. • Wireless Dedicated Outer VPN added for Tactical use case. • All references to Two-Factor Authentication changed to Multi-Factor. • All 2F requirements renamed to MFA.
Commercial Solutions for Classified (CSfC) Mobile Access (MA) Capability Package (CP)	2.5.1	18 September 2021	• Format Change.

Title	Version	Date	Change Summary
Commercial Solutions for Classified (CSfC) Mobile Access (MA) Capability Package (CP)	2.5	4 August 2021	• Added section on Enhanced Isolation. • Added section on Software Virtualization. • Added section on Enhanced Hardware Isolation Requirements for Retransmission Devices. • Updated Wireless Dedicated Outer VPN to just Dedicated Outer VPN as wireless is now prohibited. • Updated Two Factor Authentication Requirements. • Minor administrative changes were made in formatting and punctuation. • Continuous Monitoring requirements moved to CSfC Continuous Monitoring Annex. • Added Appendix F: EUD Configuration Options. • Explicitly added Government Private Wired Network.
CSfC MA CP	2.1	26 June 2018	• Relocated Key Management Requirements from the CP to a separate "Key Management Requirements Annex." • Updated requirements to use "must" instead of "shall." • Minor administrative changes were made in formatting. • Defined role of Security Administrator.
CSfC MA CP	2.0	November 2017	• Updated based on stakeholder feedback to MA CP v1.8. • Mandated use of Retransmission Device for all black transports except government private wireless and government private cellular. • Moved Retransmission Device within CSfC solution boundary. • Added objective mandatory access control requirements for EUD policy enforcement. • Clarified requirements for EUD connecting to infrastructure supporting multiple security levels. • Updated Test Requirements in new MA CP Annex.

Title	Version	Date	Change Summary
CSfC MA CP release for Public Comment	1.8	March 2016	• Added support for Multiple Security Levels. • Removed Option to terminate Inner Tunnel in the Red Network. • Updated Continuous Monitoring architecture and requirements. • Added support for EUDs with Dedicated Outer VPN with wireless connectivity to Computing Device. • Relocated Threat Section to associated Risk Assessment document. • Updated Key Management sections IAW CNSS AM 02-15. • Temporarily removed Test Section; updated Test Section will be introduced in MA CP v2.0.
CSfC MA CP	1.1	19 June 2015	• Minor update incorporating customer feedback. • Corrected language in requirement MA-CR-9 and made consistent with the MA CP Compliance Matrix.
CSfC MA CP	1.0	2 April 2015	• Removed "Non-MDF Validated" EUD type. • Removed EUD design using two VPN Gateways. • Removed option to use separate computing platform with VPN Client installed to provide Outer layer of encryption. • Changed restrictions on control plane traffic. • Added Tactical Solution Implementation Appendix • Added requirements for End User Device. • Added requirements for RD.
Commercial Solutions for Classified (CSfC) Mobile Access (MA) Capability Package (CP) release for Public Comment	0.8	3 November 2014	• Initial release of CSfC MA guidance for public comment. • Incorporates End User Device (EUD) Solution Designs from VPN version 3.0 CP. • Incorporates content from Mobile Security Guide version 2.3.

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1 INTRODUCTION

The Commercial Solutions for Classified (CSfC) Program within the National Security Agency's (NSA) Cybersecurity Directorate (CSD), publishes Capability Packages (CPs) to provide configurations that empower NSA customers to implement secure solutions using independent, layered Commercial Off-the-Shelf (COTS) products. The CPs are product-neutral and describe system-level solution frameworks documenting security and configuration requirements for customers and/or Integrators.

The NSA delivers this CSfC Mobile Access (MA) CP to meet the demand for mobile data in transit solutions (including Voice and Video) using approved cryptographic algorithms and National Information Assurance Partnership (NIAP) evaluated components. These algorithms, known as the Commercial National Security Algorithm (CNSA) suite, are used to protect classified data using layers of COTS products. In *MA CP Version 2.1* and future versions, the Key Management Requirements have been relocated from this CP to a separate *CSfC Key Management Requirements Annex*. *MA CP Version 2.7.0* takes lessons learned from solution support, a testing environment, and a CSfC Initial Solution that implemented secure voice and data capabilities using the CNSA suite, modes of operation, standards, and protocols.

While CSfC encourages industry innovation, trustworthiness of the components is paramount. Customers and their Integrators are advised that modifying a NIAP-validated component in a CSfC solution may invalidate its certification and require a revalidation process. To avoid delays, customers and integrators who feel it is necessary to modify a component should engage the component vendor and consult NIAP through their Assurance Continuity Process (https://www.niap-ccevs.org/Documents_and_Guidance/ccevs/scheme-pub-6.pdf) to determine whether such a modification will affect the component's certification.

In case of a modification to a component, NSA's CSfC Program Management Office (PMO) requires a statement from NIAP that states the modification does not alter the certification, or the security of the component. Modifications that trigger the revalidation process include, but not limited to: configuring the component in a manner different from its NIAP-validated configuration, and modifying the Original Equipment Manufacturer's code (to include digitally signing the code).

Mobile communication systems (i.e., cellular, Wi-Fi, etc.) are inherently risky. *The CSfC Mobile Access (MA) Capability Package (CP) Version 2.7.0* was developed and approved by the National Manager as a commercial strategy suitable for protecting classified information and National Security Systems (NSS), provided the customer's implementation of the solution is configured, maintained, and monitored as required by the CP. The residual risks for this CP are documented in the *MA CP Version 2.7.0 Risk Assessment*. The National Manager is responsible for ensuring that the design documented in the CP is sufficiently robust to protect classified information and NSS. The Government Authorizing Official (AO) assumes the risk for implementing and deploying the solution in accordance with the requirements in the CP. The AO must consider the operational environment and provide appropriate usage guidance to End Users. End Users must understand the risks and adhere to handling requirements established by the AO for the fielded MA CP system. End Users must maintain positive physical control of the End User device. Further, End Users should consider their environment and ensure adequate physical standoff to

mitigate threats associated with physical proximity. (Recommend a standoff distance of at least 15 feet.)

2 PURPOSE AND USE

This CP provides high-level reference designs and corresponding configuration requirements that allow customers to select COTS products from the CSfC Components List, available on the CSfC web page (https://www.nsa.gov/resources/commercial-solutions-for-classified-program), for their MA solution and properly configure those products to achieve a level of assurance sufficient to protect classified data while in transit. As described in Section 10, customers must ensure that the components selected from the CSfC Components List provide the necessary functionality for the selected capabilities. To successfully implement a solution based on this CP, all Threshold (T) Requirements, or the corresponding Objective (O) Requirements applicable to the selected capabilities, must be implemented, as described in Sections 10 and 12.

Customers who want to use this CP must register their solution with the NSA. Additional information about the CSfC process is available on the CSfC web page (https://www.nsa.gov/resources/commercial-solutions-for-classified-program).

This CP will be reviewed twice a year to ensure that the defined capabilities and other instructions still provide the security services and robustness required. Solutions designed according to this CP must be registered with the NSA. Once registered, a signed Deputy National Manager (DNM) Approval Letter will be sent validating that the MA solution is registered as a CSfC solution validated to meet the requirements of the latest MA CP and is approved to protect classified information. Any solution designed according to this CP may be used for one year and must then be revalidated against the most recently published version of this CP. Top Secret Solutions will be considered on a case-by-case basis. Customers are encouraged to engage their Client Advocate or the CSfC PMO team early in the process to ensure the solutions are properly scoped, vetted, and that the customers understand the risks and available mitigations.

Please provide comments on usability, applicability, and/or shortcomings to your NSA Client Advocate and the MA CP Maintenance Team at Mobile_Access@nsa.gov. MA CP solutions must also comply with the Committee on National Security Systems (CNSS) Policies and Instructions. Any conflicts identified between this CP and the CNSS or local policy should be provided to the MA CP Maintenance Team.

For any additional information on Cross Domain Solutions (CDS) contact the National Cross Domain Strategy Management Office (NCDSMO) at ncdsmo@nsa.gov.

Customers and integrators must adhere to all applicable data transfer policies for their organization when designing and implementing these capabilities within their CSfC solution architecture. For example, DoD customers must follow DoDI 8540.01 when deploying a CDS within a CSfC solution and if any discrepancies are found between the guidance in this document and DoDI 8540.01 report according to the instruction found in this section.

3 LEGAL DISCLAIMER

This CP is provided "as is." Any express or implied warranties, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose are disclaimed.

In no event must the United States Government be liable for any direct, indirect, incidental, special, exemplary or consequential damages (including, but not limited to, procurement of substitute goods or services, loss of use, data, or profits, or business interruption) however caused and on any theory of liability, whether in contract, strict liability, or tort (including negligence or otherwise) arising in any way out of the use of this CP, even if advised of the possibility of such damage.

The user of this CP agrees to hold harmless and indemnify the United States Government, its agents and employees from every claim or liability (whether in tort or in contract), including attorney's fees, court costs, and expenses, arising in direct consequence of Recipient's use of the item, including, but not limited to, claims or liabilities made for injury to or death of personnel of User or third parties, damage to or destruction of property of User or third parties, and infringement or other violations of intellectual property or technical data rights.

Nothing in this CP is intended to constitute an endorsement, explicit or implied, by the U.S. Government of any particular manufacturer's product or service.

4 DESCRIPTION OF THE MOBILE ACCESS SOLUTION

This CP describes a general MA solution to protect classified information as it travels across either an untrusted network or a network consisting of multiple classification levels. The solution supports connecting end-user devices (EUDs) to a classified network via two layers of encryption terminated on the EUD provided that the EUD and the network operate at the same security level. The MA solution uses two nested, independent tunnels to protect the confidentiality and integrity of data (including voice and video) as it transits the untrusted network. The MA solution uses Internet Protocol Security (IPsec) as the Outer Tunnel and, depending on the solution design, IPsec or Transport Layer Security (TLS) as the Inner layer of protection.

Throughout this CP, the term "Inner Encryption Component" is used to refer generically to the component (device or software application) that terminates the Inner layer of encryption. An Inner Encryption Component can be a virtual private network (VPN) Component or a TLS Component that is in the infrastructure or part of an EUD. The term "VPN Component" refers generically to both VPN Gateways and VPN Clients in situations where the differences between the two are unimportant. The term "TLS Component" is used to denote a component that implements TLS between the infrastructure (TLS-Protected Server or Secure Real-time Transport Protocol (SRTP) Endpoint) and EUDs (TLS Client or SRTP Client) in accordance with this CP (see Sections 5.6.2 and 5.6.3 respectively). There are two EUD solution designs: VPN EUD and TLS EUD. The term "EUD" is used to refer generically to both designs where the differences between them are unimportant. Finally, the term "Dedicated Outer VPN" is used to describe a dedicated piece of hardware that can be part of an EUD and terminates the Outer layer of IPsec encryption.

Table 1. Overview of Mobile Access CP Terminology

Component	VPN EUD	TLS EUD
Inner Encryption Component	IPsec provided by VPN Client	TLS or SRTP provided by TLS-Protected Server, SRTP Endpoint, TLS Client, **OR** SRTP Client
Outer Encryption Component	IPsec provided by Dedicated Outer VPN **OR** VPN Client	IPsec provided by Dedicated Outer VPN **OR** VPN Client

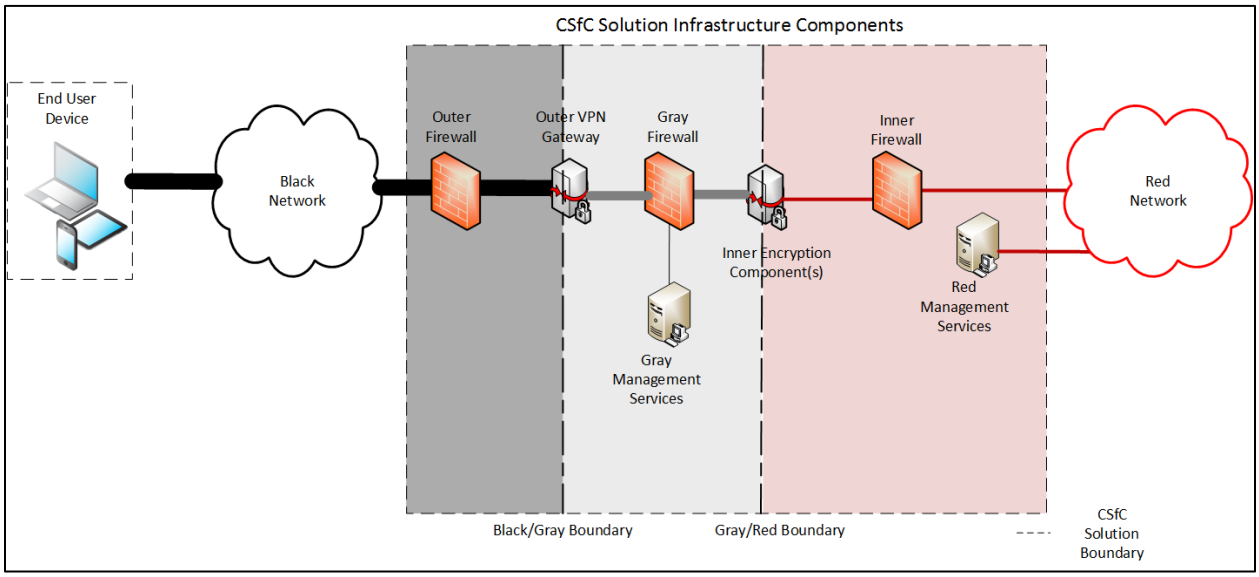

Figure 1. Overview of Mobile Access Solution

As shown in Figure 1, before being sent across the untrusted network, classified data is encrypted twice: first by an Inner Encryption Component, and then by an Outer VPN Component. At the other end of the data flow, the received packet is correspondingly decrypted twice: first by an Outer VPN Component, and then by an Inner Encryption Component.

All Encryption Components are within the CSfC Solution Boundary. The MA CP Version 2.0 and future versions, no longer allows the use of existing Classified Enterprise Network Encryption Components to provide the Inner layer of protection.

MA solution components are managed using Red Management Services for Inner Encryption Components and Gray Management Services for Outer Encryption Components. The Gray Management Services include an administration workstation, a Gray firewall, a Security Information and Event Management (SIEM) Component, Intrusion Detection System (IDS)/Intrusion Prevention System (IPS) and any additional components located between the Outer VPN Gateway and Inner Encryption Components. Gray Management Services may also include a locally run Outer Certification Authority (CA), Certificate Revocation List (CRL), CRL Distribution Point (CDP), and/or authentication server. The Red Management Services include an administration workstation, an Inner Firewall, and other components within the Red Network. The Red Management Services may also manage a locally run Inner Tunnel CA and, optionally, a locally-run Outer Tunnel CA. In addition, the MA CP allows customers to leverage an existing Enterprise Public Key Infrastructure (PKI) to issue certificates to Outer VPN

Components and Inner Encryption Components. To use an existing Enterprise Root CA at least two separate subordinate CAs must be used: one to issue Certificates for Outer VPN Components and the other to issue certificates for Inner Encryption Components.

The EUDs used within the MA CP are form-factor agnostic. They include smart phones, tablets, and laptops. An MA CP EUD can be composed of multiple physical devices (e.g., a Dedicated Outer VPN and a Computing Device) all collectively referred to as the EUD. Although the CP allows flexibility in the selection of the EUD, customers and Integrators must ensure that EUDs meet all applicable requirements for the planned solution design. Section 4.3.1 describes in detail the differences between the VPN EUD and TLS EUD solution design options.

The MA CP instantiations are built using products from the CSfC Components List (see Section 10). Customers who are concerned that their desired products are not yet on the CSfC Components List are encouraged to contact the appropriate vendors and encourage them to sign a Memorandum of Agreement with NSA and commence evaluation against a NIAP approved Protection Profile using the CSfC mandated selections which will enable them to be listed on the CSfC Components List. NIAP Certification alone does not guarantee inclusion on the CSfC Components List. Products listed on the CSfC Components List are not guaranteed to be interoperable with all other products on the CSfC Components List. Customers and integrators should perform interoperability testing to ensure the components selected for their MA Solution are interoperable. If you need assistance obtaining vendor Point of Contact information, please email csfc_components@nsa.gov.

4.1 Rationale for Layered Encryption

A single layer of CNSA encryption, properly implemented, is sufficient to protect classified data in transit across an untrusted network. The MA solution uses two layers of CNSA encryption not because of a deficiency in the cryptographic algorithms themselves, but rather to mitigate the risk that a failure in one of the components, whether by accidental misconfiguration, operator error, or malicious exploitation of an implementation vulnerability, results in exposure of classified information. The use of multiple layers of protection reduces the likelihood of any one vulnerability being used to exploit the full solution.

If an Outer VPN Component is compromised or fails in some way, the Inner Encryption Component can still provide sufficient encryption to prevent the immediate exposure of classified data to a Black Network. In addition, the Gray Firewall can indicate that a failure of the Outer VPN Gateway has occurred, since the filtering rules applied to its external network interface will drop and log the receipt of any packets not associated with an Inner Encryption Component. Such log messages indicate that the Outer VPN Gateway has been breached or misconfigured to permit prohibited traffic to pass through to the Inner encryption component.

Conversely, if the Inner Encryption Component is compromised or fails in some way, the Outer VPN Gateway can likewise provide sufficient encryption to prevent the immediate exposure of classified data to a Black Network. As in the previous case, the Gray Firewall filtering rules applied to its internal network interfaces will drop and log the receipt of any packets not associated with an Inner Encryption Component. Such log messages indicate that the Inner Gateway has been breached or misconfigured to permit prohibited traffic to pass through to the Outer VPN Gateway.

If both the Outer and Inner Gateways are compromised or fail simultaneously, then it may be possible for classified data from the Red Network to be sent to a Black Network without an adequate level of encryption. The security of the MA solution depends on preventing this failure mode by promptly remediating any compromises or failures in one Encryption Component before the other also fails or is compromised.

Diversity of implementation is needed between the components in each layer of the solution in order to reduce the likelihood that both layers share a common vulnerability. The CSfC Program recognizes two ways to achieve this diversity. The first is to implement each layer using components produced by different manufacturers. The second is to use components from the same manufacturer, where the manufacturer has provided NSA with sufficient evidence that the implementations of the two components are independent of one another. The CSfC web page (https://www.nsa.gov/resources/commercial-solutions-for-classified-program) contains details for how a manufacturer can submit this evidence to NSA and what documentation must be provided. Customers that wish to use products from the same manufacturer in both layers must contact their NSA Client Advocate to confirm that NSA has accepted the manufacturer's claims before implementing their solution.

4.2 NETWORKS

This CP uses the following terminology to describe the various networks that compose an MA solution and the types of traffic present on each: Red, Gray, and Black. The terms Red, Gray, and Black refer to the level of protection applied to the data as described below.

4.2.1 RED NETWORK

Red data consists of unencrypted classified data and a Red Network contains only Red data. Red Networks are under the control of the solution owner or a trusted third party.

The Red Network begins at the internal interface(s) of Inner Encryption Components located between the Gray Firewall and Inner Firewall. EUDs access the Red Network through the two layers of nested encryption described in this CP. For example, an Inner VPN Gateway located between the Gray Firewall and Inner Firewall terminates the Inner layer of IPsec encryption from a VPN EUD. Once a successful IPsec connection is established, the EUD is given access to classified services such as web, email, Virtual Desktop Infrastructure (VDI), voice, etc.

In some instances, when the MA infrastructure is designed to support TLS EUDs, the TLS-Protected Server or SRTP Endpoint, which terminates the Inner layer of encryption, will implement a TLS-Protected Server that includes both Gray and Red Network interfaces located between the Gray Firewall and Inner Firewall. This TLS-Protected Server terminates the TLS connection from the EUD and acts as a proxy to Red Services located outside of the CSfC Solution Boundary.

If using user client certificate authentication for the services in your enterprise Red Network, then the Inner TLS-Protected Server acting as a TLS proxy option is NOT recommended. The Inner VPN Gateway option is best in this case. The Inner TLS-Protected Server acting as a TLS proxy option is viable if the services in your enterprise Red Network are using TLS Server Authentication only or are clear text. Please note that the TLS certificate on the TLS EUD that is used to connect to the Inner TLS-Protected Server is a non-person entity (NPE) certificate. Another use case for the Inner TLS-Protected Server

option is replicated services on the gray/red boundary. In this case a user certificate is allowable, but a NPE certificate is still preferred.

A similar situation exists for SRTP when using a Voice over Internet Protocol (VoIP) Gateway/Border Controller to terminate the SRTP traffic for an EUD and relaying the data to the Red Network. Since a VoIP Gateway/Border Controller, located between the Gray Firewall and the Inner Firewall, terminates the Inner layer of SRTP desktop phones in the Red Network are not included in the Solution Boundary.

Red Networks may only communicate with an EUD through the MA solution if both operate at the same security level.

4.2.2 GRAY NETWORK

Gray data is classified data that has been encrypted once. Gray Networks are composed of Gray data and Gray Management Services. Gray Networks are under the physical and logical control of the solution owner or a trusted third party.

The Gray Network is physically treated as a classified network even though all classified data is singly encrypted. If a solution owner's classification authority determines that data on a Gray Network is classified, perhaps by determining the Internet Protocol (IP) addresses are classified at some level, then the MA solution described in this CP cannot be implemented, as it is not designed to provide two layers of protection for any classified information on the Gray Network.

Gray Network components consist of the Outer VPN Gateway, Gray Firewall, and Gray Management Services. All Gray Network components are physically protected at the same level as the Red Network components of the MA infrastructure. Gray Management Services are physically connected to the Gray Firewall and include, at a minimum, an administration workstation. The Gray Management Services also includes a SIEM unless the SIEM is implemented in the Red Network in conjunction with a CDS (refer to *CSfC Continuous Monitoring Annex* as referenced in Section 9.1). The MA CP requires the management of Gray Network components through the Gray administration workstation. As a result, neither Red nor Black Administration Workstations are permitted to manage the Outer VPN Gateway, Gray Firewall, or Gray Management Services. Additionally, the Gray administration workstation is prohibited from managing Inner Encryption Components. These Inner Encryption Components must be managed from a Red Administration workstation.

4.2.3 BLACK NETWORK

Black data is classified data that has been encrypted twice. The network connecting the Outer VPN Components together is a Black Network. Black Networks are not necessarily, and often will not be under the control of the solution owner and may be operated by an untrusted third party.

The MA CP allows EUDs to operate over any Black Network when used in conjunction with a government owned Retransmission Device (RD) or a physically separate Dedicated Outer VPN to establish the Outer IPsec Tunnel.

The government owned RD is a category of devices that includes Wi-Fi hotspots and mobile routers. On the external side, the RD can be connected to any type of medium (e.g., cellular, Wi-Fi, SATCOM, Ethernet) to gain access to a Wide Area Network (WAN). On the internal side, the RD is connected to EUDs either through an Ethernet cable or Wi-Fi. When the RD is a Wi-Fi access point connected to the

EUD (or multiple EUDs), the Wi-Fi network must implement Wi-Fi Protected Access II (WPA2) with Pre-Shared Key (PSK). The EUD must be configured to only permit connections to authorized RDs. RDs are only permitted to establish connectivity to the Black Network, and may not be placed between an Outer Encryption Component and Inner Encryption Component.

The CP also allows connectivity without the use of an RD or Dedicated Outer VPN if any of the following transport networks are used: Government Private Wireless Networks or Government Private Wired Networks. Government Private Wireless Networks denote Wi-Fi connectivity by a Wireless Local Area Network (WLAN) accredited by an AO. These Wi-Fi networks must comply with applicable organization policies. Within the Department of Defense (DoD) the applicable policy is DoD Instruction (DoDI) 8420.01. At a minimum, these Wi-Fi networks must implement WPA2 with PSK; however, WPA2 with certificate-based authentication is preferred for all use cases. When Government Private Wireless Networks use certificate-based authentication, they cannot share the Outer Tunnel CA or Inner Tunnel CA certificate Management Services. WPA2 between the RD and EUD protects the Black Transport Network, but does not count as one of the layers of CSfC data-in-transit encryption. A Wireless Intrusion Detection System (WIDS) is required if a Government Private Wireless Networks is used within the solution. A Wireless Intrusion Prevention System (WIPS) should also be considered. For requirements and information on WIDS and WIPS see the *CSfC Wireless Intrusion Detection System (WIDS)/Wireless Intrusion Prevention System (WIPS) Annex.* Government Private Wired Networks are hardwired networks that are accredited by an AO.

Table 2. Acceptable Black Transport Networks

Use Case	VPN EUD	TLS EUD
Any Black Transport Network or Government Private Cellular	Government RD **OR** Dedicated Outer VPN	Government RD **OR** Dedicated Outer VPN
Government Private Wireless or Government Private Wired	No additional requirements	No additional requirements

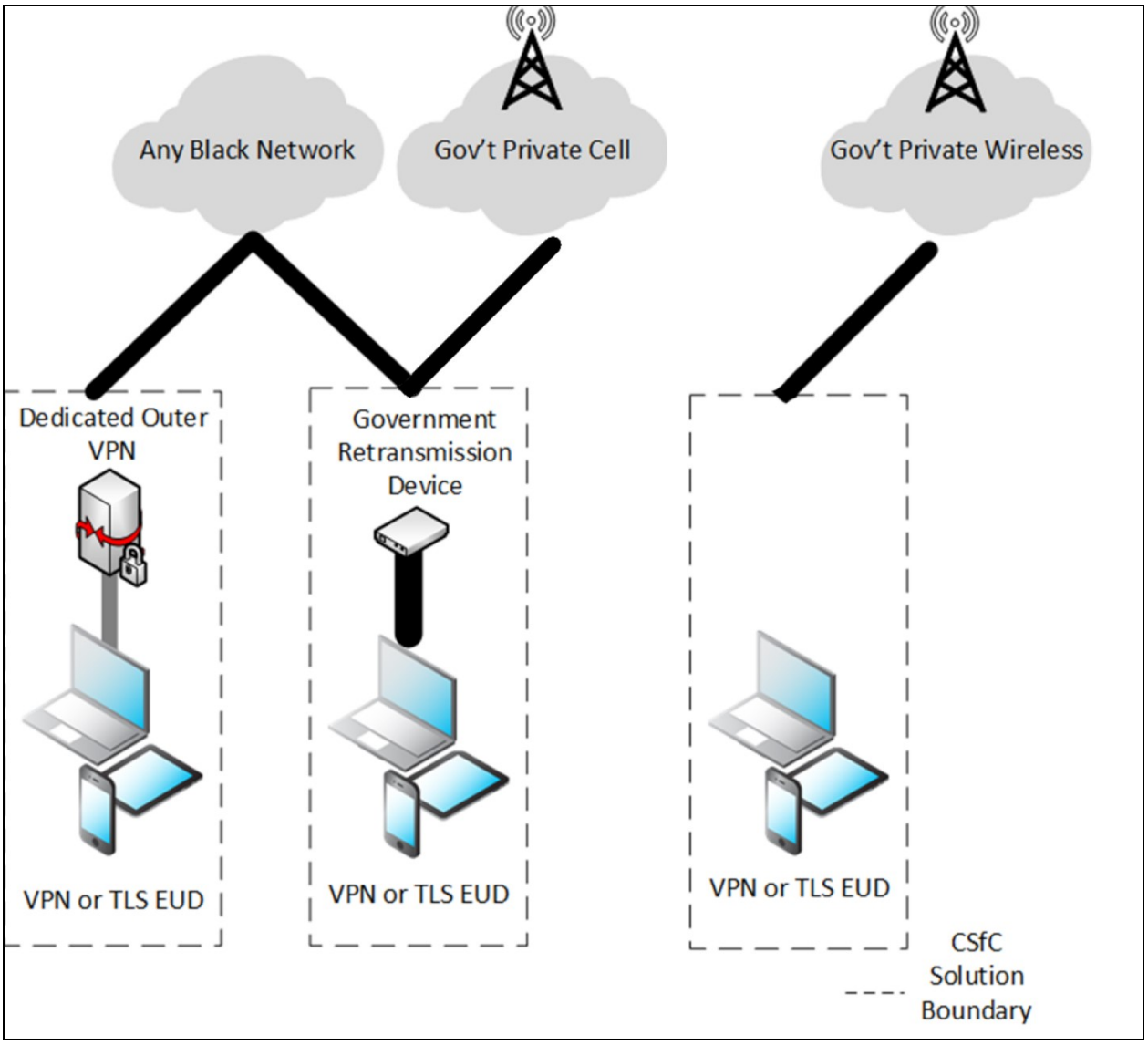

Figure 2. Acceptable Black Transport Networks

As shown in Figure 2, EUD designs can connect to the MA solution over Government Private Wireless Networks or Government Private Wired Networks without the need for a separate Dedicated Outer VPN or RD. When connecting over any other Black Transport Network or a Government Private Cellular network, EUDs must use a Dedicated Outer VPN or a Government RD to connect to the MA solution. When an EUD includes a Dedicated Outer VPN, that VPN is used to establish the Outer layer of IPsec to the government infrastructure and is included within the CSfC Solution Boundary. The Dedicated Outer VPN must be connected to the computing platform using an Ethernet cable (see Section 6.6). The computing platform then terminates the Inner layer of encryption. Although only required as described above, a Dedicated Outer VPN can be used to connect to any transport network for any of the EUD solution designs. Similarly, an EUD can use a Government RD to connect to any transport network. The Government RD is part of the CSfC Solution Boundary, and acts as an intermediary between the desired transport network and the EUD and is to be protected from unauthorized use and tampering. Similar to

the Government RD, the Dedicated Outer VPN must be protected from unauthorized use and tampering.

4.2.4 DATA, MANAGEMENT, AND CONTROL PLANE TRAFFIC

Data plane traffic is classified information, encrypted or not, that is being passed through the MA solution. The MA solution exists to encrypt and decrypt data plane traffic. All data plane traffic within the Black Network is encapsulated within an Outer layer of Encapsulating Security Payload (ESP) and either a second layer of ESP or a layer of TLS or SRTP. All data plane traffic within the Gray Network is encapsulated within ESP, TLS, or SRTP.

Management plane traffic is used to configure and monitor solution components. It includes the communications between an Information System Security Officer (ISSO) and a component, as well as the logs and other status information forwarded from a solution component to a SIEM or similar repository. Management plane traffic on Red and Gray Networks must be encapsulated within the Secure Shell (SSH), ESP, or TLS protocol.

Control plane traffic consists of standard protocols necessary for the network to function. Unlike data or management plane traffic, control plane traffic is typically not initiated directly on behalf of a user or an ISSO. Examples of control plane traffic include, but are not limited to, the following:

- Network address configuration (i.e., Dynamic Host Configuration Protocol (DHCP), Neighbor Discovery Protocol (NDP), etc.)
- Address resolution (i.e., Address Resolution Protocol (ARP), NDP, etc.)
- Name resolution (e.g., Domain Name System (DNS))
- Time synchronization (i.e., Network Time Protocol (NTP), Precision Time Protocol (PTP), etc.)
- Route advertisement (i.e., Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Intermediate System to Intermediate System (IS-IS), Border Gateway Protocol (BGP), etc.)
- Certificate status distribution (i.e., Online Certificate Status Protocol (OCSP), HTTP download of CRLs, etc.)

The MA CP explicitly prohibits the use of most control plane traffic for EUDs that use a single Computing Device to provide both the Inner and Outer layers of encryption. The MA CP does not allow route advertisement or certificate status distribution to ingress/egress from the Black Transport Network for these EUDs. As a result, the implementing organization must implement procedures to handle a situation in which the certificate of an Outer VPN Gateway is revoked. EUDs are configured for all IP traffic to flow through the Outer IPsec VPN Client with the exception of control plane protocols necessary to establish the IPsec tunnel. The control plane necessary to establish the IPsec tunnel is limited to Internet Key Exchange (IKE), address configuration, time synchronization, and in some cases name resolution traffic. EUDs selected from the CSfC Components List use NIAP evaluated configurations to ensure that IP traffic flows through the Outer IPsec VPN Client. Upon establishing the

Outer VPN tunnel, the CP does not impose detailed requirements restricting control plane traffic in the Gray and Red Networks.

Restrictions are also placed on control plane traffic for the Outer VPN Gateway. The Outer VPN Gateway is prohibited from implementing routing protocols on external and internal interfaces. The Outer VPN Gateway must rely on the Outer Firewall to implement any dynamic routing protocols.

Except as otherwise specified in this CP, the use of specific control plane protocols is left to the solution owner to approve. The solution owner must disable or drop any unapproved control plane protocols.

Data plane and management plane traffic must be separated from one another using physical, logically (at the Gray Firewall), or cryptographic separation. Use of a Virtual Local Area Network (VLAN) alone is not sufficient to separate data plane and management plane traffic. As a result, a solution may have a Gray Data network and a Gray Management network which are separate from one another, where the components on the Gray Management network are used to manage the components on the Gray Data network. The Gray Management network is separated from the Gray Data network via the Gray Firewall and no other component, such as a switch, can conduct this separation unless it is a firewall chosen from the CSfC Components list. The Gray Firewall uses an Access Control List (ACL) to ensure that only appropriate Gray Management Services (e.g., administration workstation, SIEM or Network Time Server) can communicate with the WLAN Access System. The Gray Firewall is also responsible for ensuring that Gray Management Services are only capable of flowing in the appropriate direction. For example, SSH traffic is permitted to initiate from an administration workstation to the Outer VPN Gateway, but not from the Outer VPN Gateway to any Gray Management Services. Conversely, system log data is permitted from the Outer VPN Gateway to the Gray collection server, but is not permitted from the Gray Management Services to the Outer VPN Gateway. Given that some control plane traffic is necessary for a network to function, there is no general requirement that control plane traffic be similarly separated, unless otherwise specified.

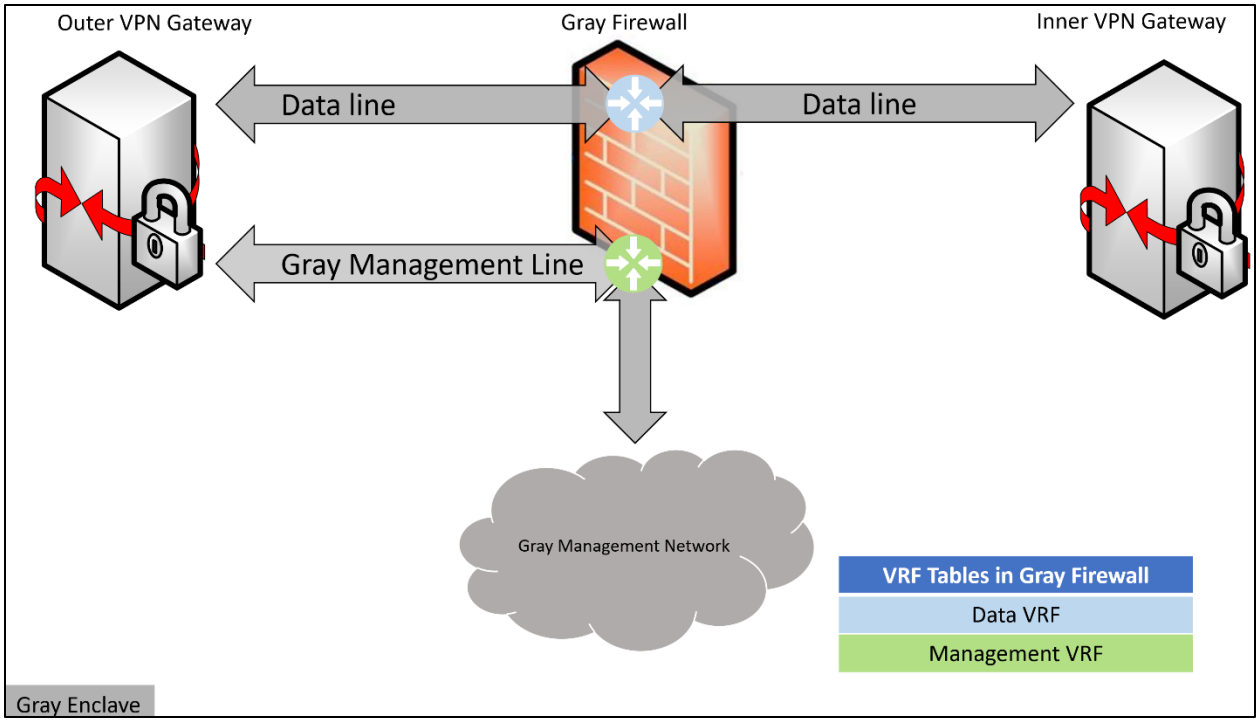

Figure 3. Gray Data and Management VRF Separation

Data and management traffic may be separated using Virtual Routing and Forwarding (VRF) on the Gray Firewall to enhance network security beyond firewall ACL filtering. VRFs are not required but can greatly increase the security posture within traditional static routing networks. Each interface will be assigned to a VRF that is specifically allowed to interact with its respective network plane (Data Plane or Management Plane). In some cases, the implementer may need to import or export routes to establish a VPN tunnel on an interface outside of its respective VRF. The primary use case of importing and exporting routes between VRFs is to allow for the importing of the routes destined for the Inner Encryption Component to travel over its encrypted tunnel. A separate VRF should be used for the local Gray Management Network allowing for separation and for connecting the Gray Firewall to the local Gray Management Network.

4.3 High-Level Design

The MA solution is adaptable to support multiple capabilities, depending on the needs of the customer implementing the solution. The supported EUD capabilities are mutually exclusive; if a customer chooses to implement an EUD using two layers of IPsec, then the Inner TLS Client would not be included as part of that EUD implementation. Similarly, if a customer only needs a secure voice capability, then the Inner IPsec Component would not be included as part of that EUD implementation. Although the EUD solution designs are mutually exclusive, the infrastructure may be configured to support both EUD solution designs (see Appendix D). This enables implementation of both types of EUDs based on use cases and device features. Any implementation of the MA solution must satisfy all of the applicable requirements specified in this CP, as explained in Sections 10 and 11.

4.3.1 END USER DEVICES

This CP uses the concept of an EUD, which is either a single Computing Device, such as a smart phone, laptop, or tablet, or the combination of a Computing Device and a Dedicated Outer VPN. The EUD provides two layers of protection for data in transit to access classified data on the Red Network. EUDs are dedicated to a single classification level and can only be used to access a Red Network of the same classification. EUDs must either be selected from the CSfC Components list or be comprised of selected sub-components listed on the CSfC Components list. For more information see section 6.1.

The two options for selecting a MA EUD from the CSfC Components List are:

1) be listed as a MDF EUD on the CSfC Components list;

2) select sub-components which make up these EUDs listed on the CSfC Components list.

The responsibility of the customer and/or Trusted Integrator for selecting and composing these sub-components into a functioning EUD. The CSfC Program does not guarantee the interoperability of the different sub-components. The sub-components that makeup a composed EUD include the following:

- General Purpose Operating Systems or
- Client Virtualization Systems;
- General Purpose Compute Platform;
- Dedicated Security Component (Optional);
- Hardware Full Drive Encryption or
- Software Full Drive Encryption;

This CP uses the concept of an EUD, which is either a single Computing Device, such as a smart phone, laptop, or tablet, or the combination of the Computing Device and a Dedicated Outer VPN. The EUD provides two layers of protection for data in transit to tunnel through the Black Network and access classified data on the Red Network. In some instances, an EUD encompasses more than one piece of hardware (e.g., Computing Device and Dedicated Outer VPN) each of which perform a layer of encryption. Where more than one piece of hardware is used, each component is included as part of the EUD and are within the CSfC Solution Boundary. EUDs are dedicated to a single classification level and can only be used to access a Red Network of the same classification. There are two EUD designs which can be implemented as part of an MA solution. Each of the EUD designs share many requirements in common, but also have unique requirements specific to that design:

1) **IPsec-IPsec (VPN EUD):** Uses two IPsec tunnels to connect to the Red Network. Such an EUD includes both an Inner VPN Client and Outer VPN Component to provide the two layers of IPsec. Throughout the document this EUD design is referred to as the "VPN EUD." VPN EUDs can be implemented using combinations of IPsec VPN Clients and IPsec Gateways (see Appendix D). For example, a VPN EUD can be implemented on a Computing Device with two VPN Clients running on separate IP stacks. Similarly, the MA CP allows a VPN EUD to use a Dedicated Outer VPN to provide the Outer layer of IPsec encryption and a VPN Client installed on a Computing Device to provide the Inner layer of encryption.

2) **IPsec-TLS (TLS EUD):** Uses an Outer layer of IPsec encryption and an Inner layer of TLS encryption to access the Red Network. Throughout the document this EUD design is referred to as the "TLS EUD." The Outer layer of encryption can be provided by either an IPsec VPN Client or a Dedicated Outer VPN. The Inner layer of encryption is then provided by a TLS Client. The EUD TLS Client includes a number of different options which can be selected, in accordance with the CP requirements, to meet the operational needs of the customer. The EUD TLS Clients include, but are not limited to, web browsers, email clients, and VoIP applications. Traffic between the TLS EUD Client and the TLS-Protected Server is encrypted with TLS or in some instances SRTP.

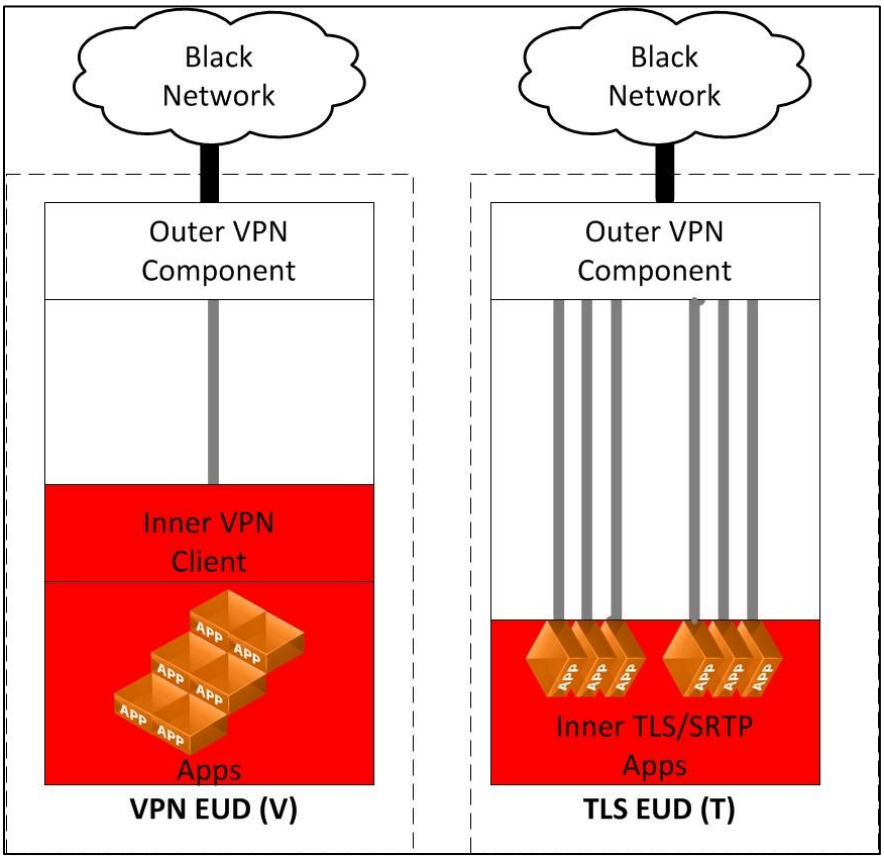

Figure 4. EUD Solution Designs

Figure 4 shows the two EUD solution designs available as part of the MA CP. In each design the Outer VPN Component is used to establish an IPsec tunnel to the Outer VPN Gateway of the MA solution infrastructure. In either EUD design, this Outer VPN Component must be selected from the CSfC Components List and could be either a VPN Client or a Dedicated Outer VPN. If a Dedicated Outer VPN is used to provide the Outer IPsec tunnel, then the computing platform must be connected to the Dedicated Outer VPN using an Ethernet cable.

The Inner layer of encryption for VPN EUDs is provided by a VPN Client. The Inner VPN Client must be selected from the CSfC Components List (see Section 11). If VPN Clients are used for both the Inner and Outer layers of encryption then they should use a different IP stack, and are generally implemented using virtualization.

The Inner layer of encryption for TLS EUDs is provided by either TLS or SRTP. Every application that performs TLS or SRTP must be selected from the CSfC Components List.

The MA CP allows three different deployment options pertaining to the use and handling of an EUD while powered off:

1. **EUD with DAR:** To implement Data-at-Rest (DAR) on an EUD, the DAR solution must be approved by NSA – either as compliant and registered with NSA's DAR CP or approved as a tailored solution for the protection of information classified at the level of the Red Network connected to the EUD. Specification of such a DAR solution is outside the scope of this CP, but can be found in the DAR CP. Continuous physical control of the EUD must be maintained at all times.
2. **Classified EUD:** The EUD can only be used when applying physical security measures approved by the AO. EUDs are not subject to special physical handling restrictions beyond those applicable for classified devices as they can rely on the environment they are used within for physical protection. If this design option is selected, then the EUDs must be treated as classified devices at all times. The EUD in this case must enable the native platform DAR protection (e.g., encryption) in order to protect the private keys and other classified information stored on it from disclosure and increase the difficulty of tampering with the software and configuration. Continuous physical control of the EUD must be maintained at all times.
3. **Thin EUD:** The EUD can be designed to prevent any classified information except for the private keys from being saved to any persistent storage media on the EUD. Possible techniques for implementing this include, but are not limited to: using VDI configured not to allow data from the Enterprise/Red Network to be saved on the EUD, restricting the user to a non-persistent virtual machine on the EUD, and/or configuring the EUD's operating system to prevent the user from saving data locally. Since the EUD does not provide secure local storage for classified data, its user is also prohibited by policy from saving classified data to it. The EUD must have a single layer of CSfC approved DAR protection to protect the private keys stored on it from disclosure, and to increase the difficulty of tampering with the software and configuration. Continuous physical control of the EUD must be maintained at all times.

While powered on, an EUD is classified at the same level of the connected Red Network, since classified data may be present in volatile memory and/or displayed on screen. To mitigate the risk of accidental disclosure of classified information to unauthorized personnel while the EUD is in use, the customer must define and implement an EUD user agreement that specifies the rules of use for the system. The customer must require that all users accept the user agreement and receive training on how to use and protect their EUD before being granted access. There is no limit to the number of EUDs that may be included in an MA solution.

The intent of a continuous physical control requirement for the MA CP is to prevent potential attacks via brief, undetected physical access of an EUD by a nation state adversary. Since MA CP EUDs by their nature are mobile they are frequently transported and operated outside of physically protected

government spaces. As a result, customers must maintain continuous physical control of the EUD at all times.

4.3.2 Independent Site

Figure 5 shows a single Red Network connected to EUDs that operate at the same security level through the MA solution. Here, the Red Network has at least two Encryption Components associated with it: one or more Inner Encryption Components connected to the Red Network, and an Outer VPN Gateway between the Inner Encryption Components and the Black Network. There are two layers of encryption between any EUD communicating with the Red Network: one IPsec tunnel between their Outer VPN Components, and a second IPsec, TLS or SRTP layer depending on the selected EUD design(s).

For independent sites, administration is performed at that site for all components within the Solution Boundary, including the Outer VPN Gateway, Gray Management Services, Inner Encryption Components, Red Management Services, firewalls, and EUDs. Independent sites are not interconnected with other infrastructure sites through the MA solution; therefore, management, data plane, and control plane traffic between solution infrastructure sites are outside the scope of the MA CP. If two or more sites must be interconnected, customers may also register the MA solution against the MSC CP or use an NSA-Certified encryptor.

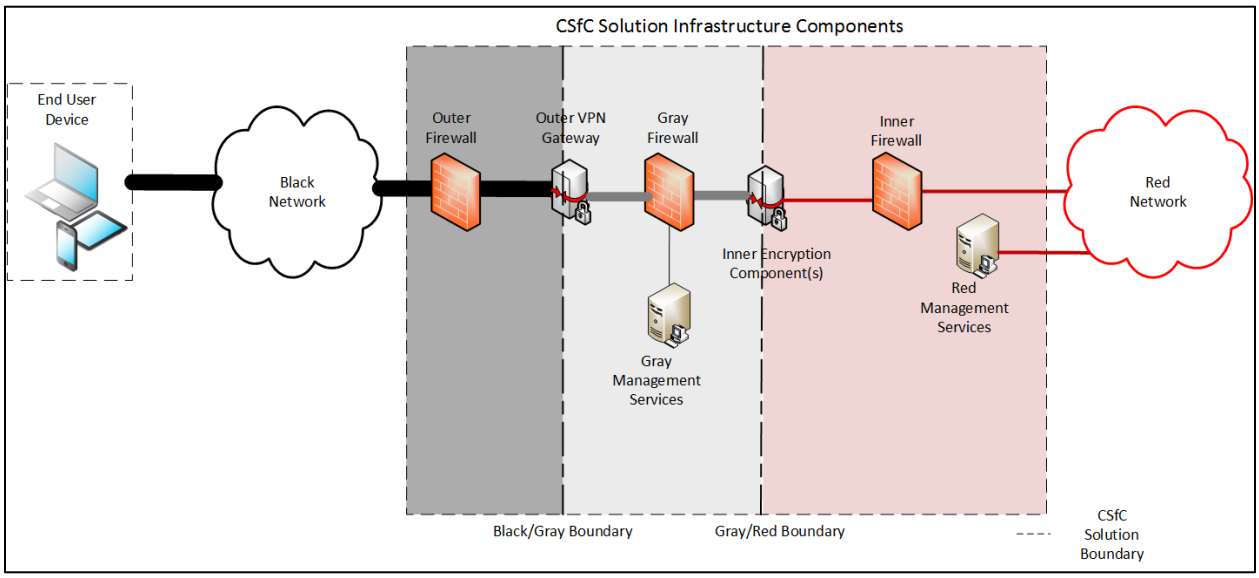

Figure 5. EUDs Connected to Independent Site

While Figure 5 shows only a single EUD, this solution does not limit the number of EUDs being implemented.

4.3.3 Multiple Sites

Figure 6 shows two MA solution infrastructures that an EUD can connect to in order to access different Red Network services. Customers may want to implement multiple solution infrastructures to support Continuity of Operations or provide better performance based on geographic location of EUDs or Red services. The multiple solution infrastructures may be interconnected using an NSA-approved solution such as the MSC CP or an NSA-Certified encryptor; however, connectivity of Solution Infrastructure Components is outside the scope of the MA CP.

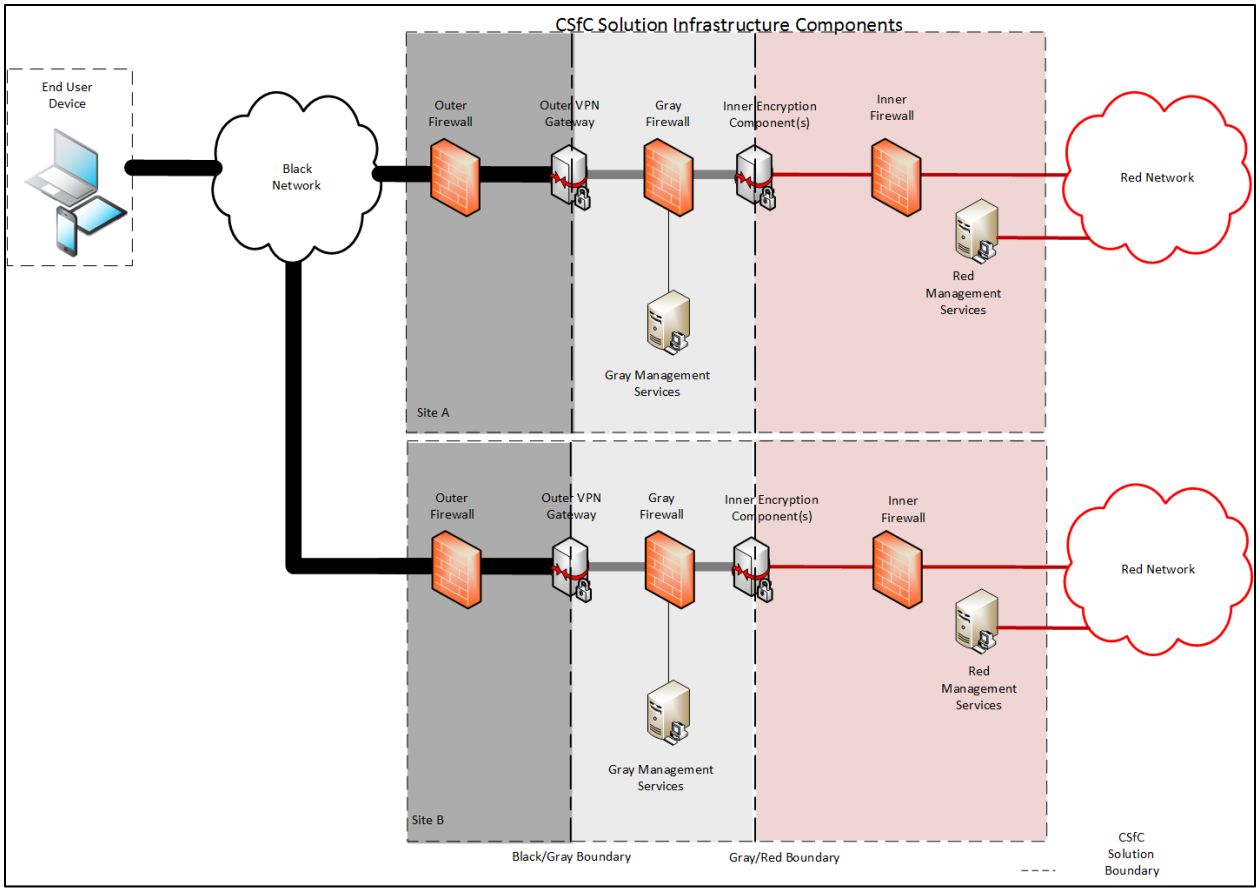

Figure 6. Multiple Mobile Access Solution Infrastructures Supporting EUDs

While Figure 6 only shows two sites, this solution can scale to include numerous sites, with each additional site having the same design as those in Figure 6.

4.3.4 Multiple Security Levels

A single implementation of the MA solution may support multiple Red Networks of different security levels. The MA solution provides secure connectivity between EUDs and the Red Network of the same security level while preventing EUDs from accessing Red Networks of different security levels. This enables a customer to use the same physical infrastructure to carry traffic from multiple networks. EUDs operating as part of a Multiple Security Level solution are still dedicated to a single classification level. Although each Red Network will still require its own Inner Encryption Component(s), a site may use a single Outer VPN Gateway in the infrastructure to encrypt and transport traffic that has been encrypted by Inner Encryption Components of varying security levels. As shown in Figure 7, a SECRET Coalition EUD is only capable of communicating with and authenticating to the Inner Encryption Components for Network 3 – SECRET Coalition. This EUD does not have any connectivity to the Inner Encryption Components of Network 1 and Network 2.

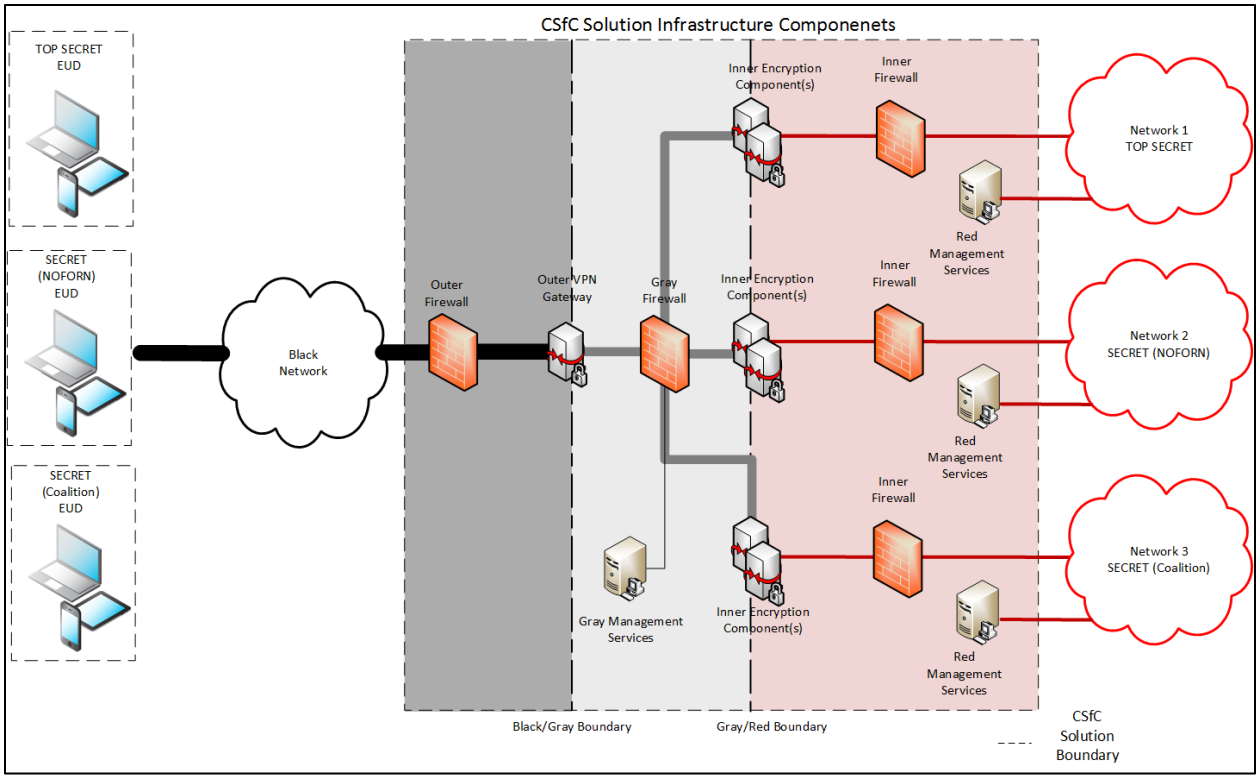

Figure 7. Mobile Access Solution Supporting Multiple Security Levels

There is no limit to the number of different security levels that an MA solution may support.

MA solutions supporting multiple security levels may include independently managed sites (see Section 4.3.2) or multiple sites (see Section 4.3.3). In all cases, separate CAs and management devices are needed to manage the Inner Encryption Components and Inner Firewall at each security level. For example, Figure 7 shows an independent site with multiple security levels. Network 1, Network 2, and Network 3 each have their own CA and management devices which prevent EUDs from being able to authenticate with the incorrect network.

In addition to separate Inner Encryption Components and CAs, an authentication server must be used to allow the use of a single Outer VPN Gateway for multiple security levels. The authentication server resides within the Gray Management network and validates that Outer Tunnel certificates are signed by the Outer Tunnel CA, are still within their validity period, and have not been revoked. The authentication server also parses the certificate for information assigned to a specific inner network (i.e., Organizational Unit (OU) field or policy Object Identifiers (OIDs)) to determine which inner network the EUD is authorized to connect. After successful authentication, the authentication server provides an accept message to the Outer VPN Gateway along with a Vendor-Specific Attribute (VSA). The Outer VPN Gateway uses the VSA to assign the proper network and firewall rules such that an EUD can only reach the appropriate Inner Encryption Components.

4.4 AUTHENTICATION

The MA solution provides mutual device authentication between Outer VPN components and between Inner Encryption components via public key certificates. This CP requires all authentication certificates issued to Outer VPN components and Inner Encryption components be Non-Person Entity (NPE) certificates, except in the case when TLS EUDs are implemented. In addition, NPE certificates issued to Outer VPN Gateways may need to assert the IP address of the Outer VPN Gateway in either the Common Name field of the certificate Distinguished Name, or in the Subject Alternative Name certificate extension. The EUD may be required to check the IP address asserted in the Outer VPN Gateway certificate and ensure it is the same IP address registered in the EUD.

4.4.1 TRADITIONAL AUTHENTICATION

Following the two layers of device authentication, VPN EUDs require the user to authenticate to the network before gaining access to any classified data (e.g., username/password, user certificate). TLS EUDs may use a device certificate or a user certificate. When a device certificate is used, the user must also authenticate to the Red Network before gaining access to any classified data in the same manner as a VPN EUD (e.g., username/password, user certificate). When a user certificate is used, the user certificate authenticates the Inner layer of TLS encryption and authenticates the user for access to the requested classified data. In this latter case, it is recommended that additional access controls, such as Allowlist, be implemented in conjunction with the user certificate to control access to Red Network services.

In addition to authentication for the Outer and Inner layer of encryption, the MA CP requires user-to-device authentication. This authentication occurs between the user and the Computing Device (which processes Red data) of an EUD. In some instances, the Computing Device may be physically separate from the component of the EUD which provides the Outer layer of encryption (for example, a Dedicated Outer VPN Gateway provides the Outer layer of encryption). The MA CP requires EUD components use a minimum of a six-character, case-sensitive, alpha-numeric password to authenticate to the device. This password can be used both for decrypting the platform encryption as well as for unlocking the screen. EUD components, which are selected from the Mobile Platform section of the CSfC Components List, are able to use a relatively short authentication factor since they use a hardware-based root encryption key which is evaluated during the NIAP certification.

4.4.2 MULTI-FACTOR AUTHENTICATION (MFA)

Within this CP a form MFA must be used for a user to access classified data. The current multi-factor authentication options are, ‘something you know’ and ‘something you have.’ There are three forms of MFA one of which must be used within the MA CP:

- User-to-Physical-EUD
- User-to-Inner-Encryption-Component
- User-to-Virtual Desktop Interface (VDI)

4.5 OTHER PROTOCOLS

Throughout this document, when IP traffic is discussed, it can refer to either IPv4 or IPv6 traffic, unless otherwise specified, as the MA solution is agnostic to most named data handling protocols.

Public standards conformant Layer 2 control protocols are allowed as necessary to ensure the operational usability of the network. This CP is agnostic with respect to Layer 2; specifically, it does not require Ethernet. Public standards conformant Layer 3 control protocols may be allowed based on local AO policy, but the default configuration of this solution is for all Layer 3 control protocols to be disabled. Red and Gray Network multicast messages and Internet Group Management Protocol (IGMP) or Multicast Listener Discovery (MLD) may also be allowed depending on local AO policy. Multicast messages received on external interfaces of the Outer VPN component must be dropped.

It is expected that the MA solution can be implemented in such a way as to take advantage of standards-based routing protocols that are already being used in the Black and/or Red Network. For example, networks that currently use Generic Routing Encapsulation (GRE) or Open Shortest Path First (OSPF) protocols can continue to use these in conjunction with the Outer Firewall and Inner Firewall solution to provide routing as long as the AO approves their use.

4.6 AVAILABILITY

The high-level designs described in Section 4.3 are not designed to automatically provide high availability. Supporting solution implementations for which high availability is important is not a goal of this version of the CP. However, this CP does not prohibit adding redundant components in parallel to allow for component failover or to increase the throughput of the MA solution, as long as each redundant component adheres to the requirements of this CP. The CP does not limit the number of Outer VPN Gateways or Inner Encryption components that can be implemented for high availability in a MA Solution.

4.7 IMPLEMENTING CSFC IN A HIGH ASSURANCE GOTS ENVIRONMENT

Customers have the option to use a blended solution that combines a CSfC solution with a High Assurance GOTS solution. While CSfC uses two layers of encryption, this is not required with High Assurance GOTS, where a single layer of encryption is sufficient. For example, a CSfC Campus WLAN solution can be employed in an infrastructure where network High Assurance Internet Protocol Encryptors (HAIPE) are also being used. The WLAN solution is segmented, and its protection is provided by CSfC, while the protection of the network that the information transits is provided by a High Assurance GOTS solution. For additional details or questions about this process, please contact the CSfC PMO office at csfc@nsa.gov.

5 INFRASTRUCTURE COMPONENTS

In the high-level designs discussed in the previous section, all communications flowing across a Black Network are protected by at least two layers of encryption, implemented using an Outer IPsec VPN tunnel and an Inner layer of IPsec, TLS, or SRTP encryption. Mandatory aspects of the solution infrastructure also include administration workstations, IDS/IPS, SIEM, firewalls, and CAs for key management using PKI.

Each infrastructure component is described in more detail below. The descriptions include information about the security provided by the components as evidence for why they are deemed necessary for the solution. Components are selected from the CSfC Components List and configured per NIAP

configuration guidance in accordance with the Product Selection requirements of this CP (see Section 10).

This section also provides details on additional components that can be added to the solution to help reduce the overall risk. However, where indicated in the text, these are not considered mandatory components for the security of the solution; therefore, this CP does not place configuration requirements on those optional components.

5.1 Outer Firewall

The Outer Firewall is located at the edge of the MA solution infrastructure and connected to the Black Transport Network.

The external interface of the Outer Firewall only permits IPsec, IKE, and ESP traffic with a destination address of the Outer VPN Gateway.

The internal interface of the Outer Firewall only permits IPsec traffic with a source address of the Outer VPN Gateway and any necessary control plane traffic. The minimum requirements for port filtering on the Outer Firewall can be found in Section 12.13.

As shown in Figure 5, The Outer Firewall, selected from the CSfC Components List, must be physically separate from the Outer VPN Gateway.

5.2 Outer VPN Gateway

Authentication of peer VPN Components, cryptographic protection of data in transit, and configuration and enforcement of network packet handling rules are all aspects fundamental to the security provided by VPN Gateways.

The external interface of the Outer VPN Gateway is connected to the internal interface of the Outer Firewall. The VPN Gateway establishes an IPsec tunnel with peer Outer VPN Components, which provides device authentication, confidentiality, and integrity of information traversing Black Networks. VPNs offer a decreased risk of exposure of information in transit since any information that traverses a Black Network is placed in a secure tunnel that provides an authenticated and encrypted path between the site and an EUD. The Outer VPN Gateway is implemented identically for all the high-level designs supporting a single security level. When supporting multiple security levels, the Outer VPN Gateway must use a gray authentication server.

Similar to the Outer Firewall, the external interface of the Outer VPN Gateway only permits IPsec traffic. The internal interface of the Outer VPN Gateway is configured to only permit traffic with an IP address and port associated with Inner Encryption Components, Gray Management Services (e.g., SIEM and administration workstation), or control plane component (i.e., DNS and NTP Servers in the Gray).

The Outer VPN Gateway is prohibited from implementing routing protocols on external and internal interfaces and must rely upon the Outer Firewall to provide any dynamic routing functionality. As shown in Figure 5, the Outer VPN Gateway, selected from the CSfC Components List, must be physically separate from the Outer Firewall and Gray Firewall.

Described in Section 4.2.4, The Outer VPN Gateway is implemented in conjunction with a Gray authentication server when multiple security levels are implemented. The Outer VPN Gateway acts as

an EAP pass-through for authentication between the EUD and the authentication server. Upon successful mutual authentication, the Outer VPN Gateway receives an accept message and VSA for that specific EUD. The Outer VPN Gateway uses the VSA to assign the correct IP address and ACL to ensure that the EUD is capable of reaching only the correct Inner Encryption Component.

The Outer VPN Gateway cannot route packets between the Gray and Black Networks; any packets received on a Gray Network interface and transmitted to a Black Network interface must be transmitted within an IPsec VPN tunnel configured according to this CP.

5.3 GRAY FIREWALL

The Gray Firewall is located between the Outer VPN and Inner encryption components. In addition to filtering EUD traffic, the Gray Firewall also provides packet filtering for the Gray Management Services.

The external interface of the Gray Firewall should only accept packets with a source address of the Outer VPN Gateway's IP pool assigned to EUDs. The internal interface of the Gray Firewall should only accept packets with a source address of the TLS-Protected server or the Inner VPN Gateway as part of an established communication session. When supporting multiple security levels, the Gray Firewall must also ensure that only EUDs and Inner Encryption components of the same security level are able to communicate.

In addition to EUD data traffic, the Gray Firewall adjudicates traffic related to both the management of the Gray boundary and EUD control plane traffic. As shown in Figure 5, the Gray Firewall, selected from the CSfC Components List, must be physically separate from the Outer VPN Gateway and Inner Encryption Components.

5.4 INNER FIREWALL

The Inner Firewall is located between the Inner encryption components and the Red Network. The external interface of the Inner Firewall should only accept inbound traffic with a source address of the TLS-Protected server or Inner VPN Component. The internal interface of the Inner Firewall should only allow outbound traffic from the Red enclave to the Inner VPN Component or the TLS-Protected server. The TLS-Protected servers include, but are not limited to: VoIP call managers, mobile device management (MDM) services, VDI, and web server content.

The Inner Firewall, selected from the CSfC Components List, must be physically separate from the Inner Encryption Components.

5.5 GRAY MANAGEMENT SERVICES

Secure administration of components in the Gray Network and continuous monitoring of the Gray Network are essential roles provided by the Gray Management Services. The Gray Management Services are composed of multiple components that provide distinct security to the solution. The MA CP allows flexibility in the placement of some Gray Management Services. All components within the Gray Management Services are either directly or indirectly connected to the Gray Firewall (e.g., multiple Gray Management Services connected to a switch which is connected to the Gray Firewall). The Gray Management Services are physically protected as classified devices.

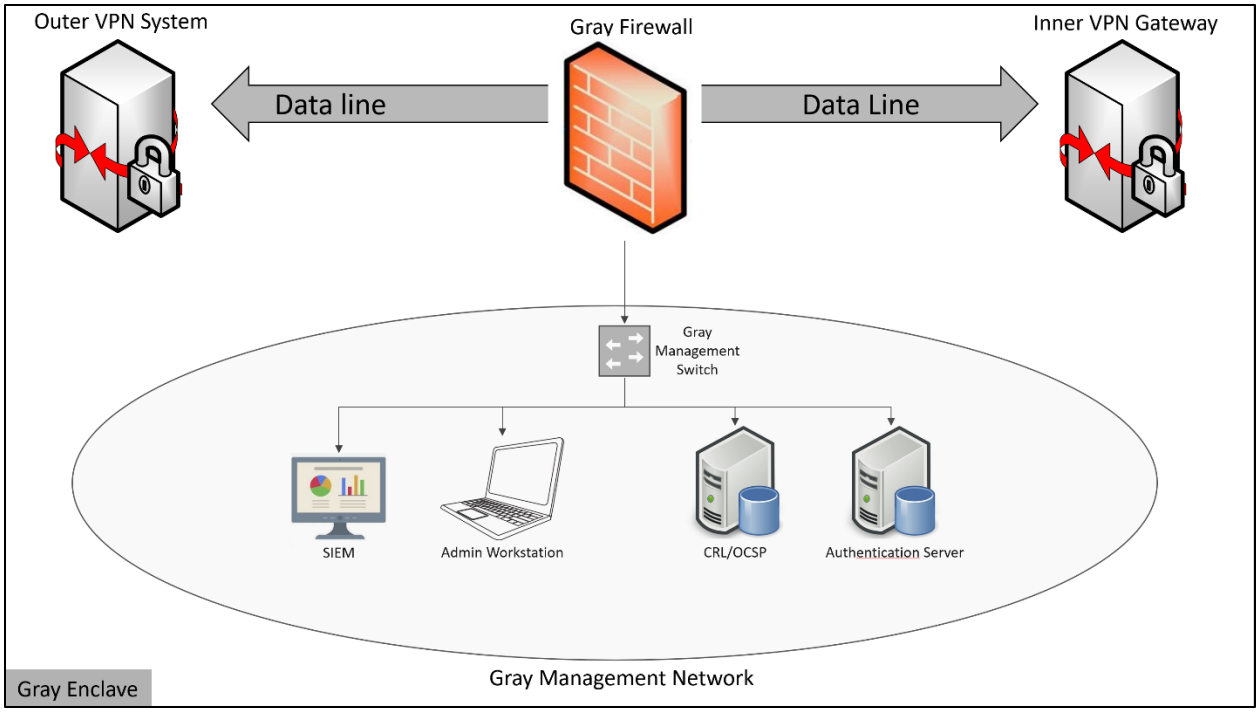

Figure 8. Overview of Gray Management Services

Figure 8 shows the infrastructure components of the Gray Management Services in the MA Solution. Within the Gray Network, which is between the Outer VPN Gateway and Inner Encryption Components, has an Administration workstation, SIEM, Authentication Server, and DNS. Components within the Gray Network are further described below.

5.5.1 Gray Administration Workstation

Gray administration workstations maintain, monitor, and control all security functions for the Outer VPN Gateway, Gray Firewall, and all Gray Management service components. These workstations are not permitted to maintain, monitor, or control Inner Encryption Components or Red Management Services. All MA solutions will have at least one Gray administration workstation. Section 8 provides more detail on management of MA solution components.

5.5.2 Gray Security Information and Event Management (SIEM)

The Gray SIEM collects and analyzes log data from the Outer VPN Gateway, Gray Firewall, and other Gray Management service components. Log data may be encrypted between the originating component and the Gray SIEM with SSHv2, TLS, or IPsec to maintain confidentiality and integrity of the log data. At a minimum, an auditor reviews the Gray SIEM alerts and dashboards daily. The SIEM is configured to provide alerts for specific events including if the Outer VPN Gateway or Gray Firewall receives and drops any unexpected traffic which could indicate a compromise of the Outer Firewall or Outer VPN Gateway respectively. These functions can also be performed on a Red SIEM if a CDS is used as described in the *CSfC Continuous Monitoring Annex*.

5.5.3 GRAY AUTHENTICATION SERVER

The Gray authentication server is only required for solutions supporting multiple security levels. The authentication server is responsible for performing mutual authentication with EUDs using the Outer VPN Gateway as an EAP pass-through. In addition to verifying that certificates are signed by the correct CA, are within their validity period, and are not revoked, the authentication server parses the certificate for information (e.g., OU field or Policy OID) that is associated with the Red Network with which the EUD is permitted to establish an Inner IPsec connection or TLS session. Upon successful authentication of the EUD, the authentication server sends an Access-Accept packet to the Outer VPN Gateway. The Access-Accept packet includes an attribute derived from the OU or policy OID which the Outer VPN Gateway uses to apply ACLs and route the EUDs traffic to the proper Inner Encryption Component.

5.6 INNER ENCRYPTION COMPONENTS

The MA CP allows for the use of up to three different types of Inner Encryption Components: Inner VPN Gateway, Inner TLS-Protected Server, or Inner SRTP Endpoint. Inner VPN Gateways are always located between the Gray Firewall and Inner Firewall. An Inner VPN Gateway will always have at least two interfaces, one external interface connected to the Gray Firewall and one internal interface connected to the Inner Firewall.

Inner TLS-Protected Servers and Inner SRTP endpoints are permitted to use a single data plane interface or multiple data plane interfaces. Similar to the Inner VPN Gateway, Inner TLS-Protected Servers and SRTP endpoints with multiple interfaces have one external interface connect to the Gray Firewall and one internal interface connected to the Inner Firewall. If implemented with a single data plane interface, then that interface establishes the Inner layer of encryption and provides the classified data to the TLS EUD. An example of a TLS-Protected Server with a single data plane interface is a web server located between the Gray Firewall and Inner Firewall that terminates the Inner layer of encryption with Hypertext Transfer Protocol Secure (HTTPS) and directly returns the content to the TLS EUD. The TLS-Protected Servers and SRTP endpoints must be placed between the Gray Firewall and Inner Firewall, but are not required to connect to the Red Network or Inner Firewall if it is acting as the server for the EUDs. Inner VPN Gateways and TLS-Protected Servers are always managed from the Red Management Services. The management interface of the Inner VPN Gateway or TLS-Protected server can either be connected to the Inner Firewall or run directly to a standalone Red Management Services enclave.

An MA solution infrastructure may support both TLS EUDs and VPN EUDs. When supporting both TLS EUDs and VPN EUDs the solution infrastructure will always include an Inner VPN Gateway between the Gray Firewall and Inner Firewall. This Inner VPN Gateway will terminate the Inner layer of IPsec traffic for all VPN EUDs. Additionally, the solution infrastructure will include one or more TLS-Protected Servers. The TLS-Protected Servers are placed between the Gray Firewall and Inner Firewall. The TLS-Protected Server(s) must be placed in parallel with the Inner VPN Gateway such that the TLS-Protected Server is not dependent on the Inner VPN Gateway to reach the Gray Firewall or Inner Firewall (see Appendix D.

For load balance or other performance reasons, multiple Inner Encryption Components that comply with the requirements of the CP are acceptable.

5.6.1 INNER VPN GATEWAY

Similar to the Outer VPN Gateway, the Inner VPN Gateway provides authentication of peer VPN Components, cryptographic protection of data in transit, and configuration and enforcement of network packet handling rules. The Inner VPN Gateway is located between the Gray firewall and the Inner Firewall. The Inner VPN Gateway is required to be implemented if supporting VPN EUDs.

The external interface of the Inner VPN Gateway is connected to the internal interface of the Gray Firewall. The VPN Gateway establishes an IPsec tunnel with peer Inner VPN Components. Similar to the Outer VPN Gateway, the external interface of the Inner VPN Gateway only permits the egress of IPsec traffic and AO-approved control plane traffic. The internal interface of the Inner VPN Gateway is configured to only permit traffic with an IP address and port associated with Red Network services.

The Inner VPN Gateway cannot route packets between Red and Gray Networks. Any packets received on a Red Network interface and sent to a Gray Network interface must be transmitted within an IPsec VPN tunnel that is configured according to this CP. The Inner VPN Gateway, selected from the CSfC Components List, must be physically separate from the Gray Firewall and Inner Firewall.

5.6.2 INNER TLS-PROTECTED SERVER

The Inner TLS-Protected Server(s) uses TLS with select cryptographic cipher suites to provide confidentiality, integrity, and mutual authentication between a TLS EUD and TLS-Protected Server(s). The TLS-Protected Server is located between the Gray Firewall and the Inner Firewall. The MA CP allows the TLS-Protected Server to use any protocol that is encapsulated within TLS.

The TLS-Protected Server should have a different cryptographic library from the one used in the Outer VPN Gateway and must only be managed from the Red Management Services.

The TLS-Protected server can be managed, through a dedicated network management interface, or internally, through a trusted inline interface. If the TLS-Protected Server is managed from the internal interface, the Host-Based Firewall must be configured to allow only those ports and protocols that are required for the solution to operate as specified in this CP (see Section 12.7). Inner TLS-Protected Servers must be managed from the Red Administration workstation. The TLS-Protected Server must also be configured with a Host-Based Firewall. The Host-Based Firewall must have a deny-by-default rule set for both inbound and outbound data plane, control plane, and management traffic. Only ports and protocols that are required for the system to operate, should have an 'explicit allow' enabled in the firewall.

Examples of TLS-Protected Servers include, but are not limited to, web servers, Enterprise Session Controllers (ESC) - formerly known as Session Initiation Protocol (SIP) servers, VDI Servers, and MDM servers. Web servers implemented as part of the MA CP terminate the Inner layer of encryption using HTTPS. EAP over TLS for registration of EUDs and SRTP endpoints, session setup, and session termination. When ESC servers are included, Session Description Protocol Security Descriptions (SDES) is used over the EAP-TLS session for key exchange between TLS EUDs or between a TLS EUD and a SRTP Endpoint. As shown in Figure 5, the Inner TLS Protected-Server, selected from the CSfC Components List, must be physically separate from the Gray Firewall and Inner Firewall.

5.6.3 INNER SRTP ENDPOINT

Inner SRTP endpoints provide cryptographic protection of data in transit. Within the MA solution infrastructure, SRTP endpoints are located between the Gray Firewall and the Inner Firewall. The Inner layer of SRTP encryption can also be terminated between two TLS EUDs (see Section 6.2). Registration, session setup (including authentication and key exchange), and session termination for the SRTP endpoints is performed using ESC over TLS.

All SRTP endpoints that terminate the Inner layer of encryption originating from a TLS EUD reside within the CSfC Solution Boundary and must meet all applicable requirements as described in the MA CP.

The VoIP gateway/border controller terminates SRTP Traffic from a TLS EUD and relays the data to the Red Network. Inclusion of a VoIP gateway/border controller allows integration with existing enterprise voice systems.

As shown in Figure 5, the Inner SRTP endpoint, selected from the CSfC Components List, must be physically separate from the Gray Firewall and Inner Firewall.

5.6.4 RED MANAGEMENT SERVICES

Secure administration of Inner Encryption Components and continuous monitoring of the Red Network are essential roles provided by the Red Management Services. Red Management Services are composed of a number of components that provide distinct security to the solution. The MA CP allows flexibility in the placement of some Red Management Services as described below.

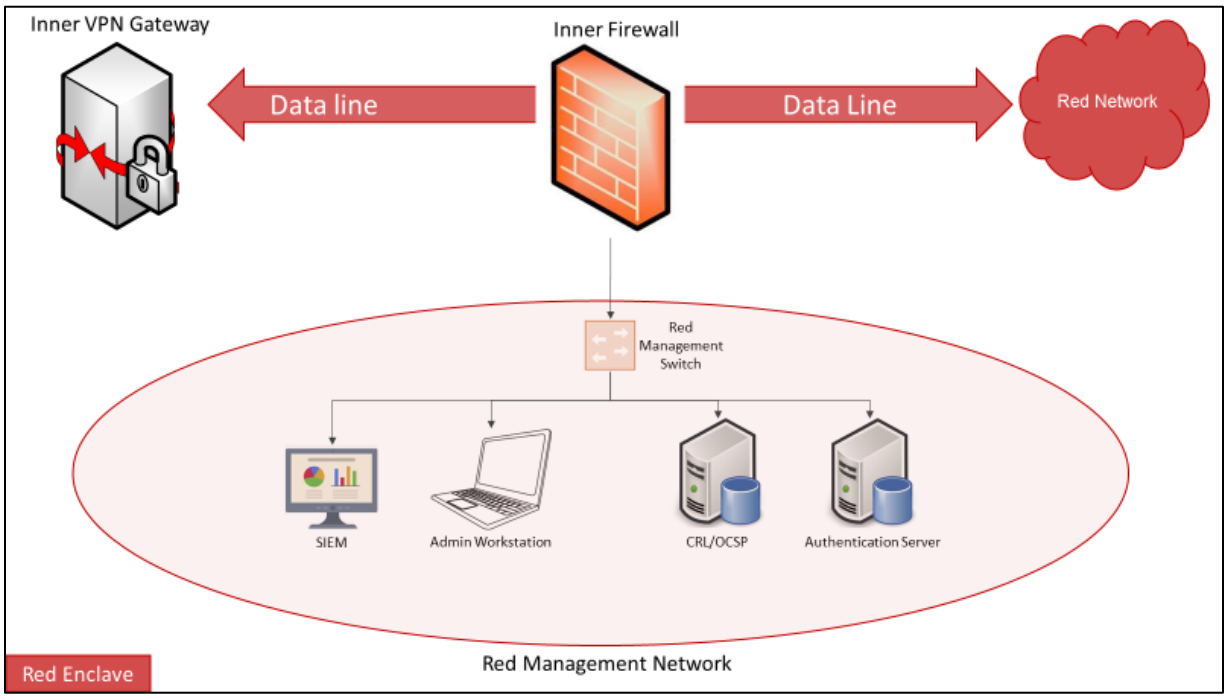

Figure 9. Overview of Red Management Services

Figure 9 shows the infrastructure components of the Red Management Services in the MA Solution. The Red Network, which is located beyond the Inner Encryption Components, has management services components associated with it. Each of the management services components are described below.

5.6.5 RED ADMINISTRATION WORKSTATIONS

The Red administration workstation is responsible to maintain, monitor, and control all security functionality for the Inner Encryption Components, Inner Firewall, and all Red Management service components. The Red administrative workstations are not permitted to maintain, monitor, or control Outer Encryption Components or Gray Management Services. All MA solutions will have at least one Red administrative workstation. Section 8 provides more detail on management of MA solution components.

5.6.6 RED SECURITY INFORMATION AND EVENT MANAGEMENT (SIEM)

Red SIEMs collect and analyze log data and flow data from the Inner Encryption Components, the Inner Firewall, and other Red Management service components. Log data may be encrypted between the originating component and the Red SIEM with SSHv2, TLS, or IPsec to ensure confidentiality and integrity. The SIEM is configured to provide alerts for specific events. Customers are encouraged to leverage existing Enterprise SIEM capabilities to monitor log data from Inner Encryption Components, the Inner Firewall, and Red Management Services. A Red SIEM may also be used to analyze log data from Gray Network components when used in conjunction with an approved CDS as described in the *CSfC Continuous Monitoring Annex*.

5.7 PUBLIC KEY INFRASTRUCTURE COMPONENTS

Key Management Requirements have been relocated to a separate *CSfC Key Management Requirements Annex*.

6 END USER DEVICE COMPONENTS

This section covers the components that make up an EUD and different permutations of these components to create a more secure EUD. There are two broad categories for EUD selection within the MA CP:

1) An MDF EUD that is an EUD listed on the *Mobile Platform* section of the CSfC Components List. These devices are expected to be tablets and smartphones.

2) A Composed EUD, that is an EUD made up of multiple sub-components from the CSfC Components List. The responsibility of selecting and composing these sub-components into a functioning EUD, is up to the customer and/or trusted integrator. These devices are expected to be in the laptop or desktop computer form factor.

The CSfC Program does not guarantee the interoperability of the different sub-components. The sub-components that make up a composed EUD include the following:

- General Purpose Operating Systems or
- Client Virtualization Systems;

- General Purpose Compute Platform;
- Dedicated Security Component (Optional);
- Hardware Full Drive Encryption or
- Software Full Drive Encryption;

A Composed EUD and MDF EUDs can be configured in multiple ways depending on the technology being used to implement the EUD. The following table summarizes these options:

Table 3. EUD Type Summarization

EUD Configuration	Description	Benefit
Base EUD	An EUD built to function within the constraints of a typical OS or MDF platform	Minimum Standard for EUDs within CSfC
Software Separated EUD	An EUD built around a standard OS with a virtualization functionality, containerization engine or kernel separation running to abstract out critical function	Offers more usability but no difference in security than base EUD (Individual deployments may be more secure)
Virtualized EUD: Type 1 Hypervisor with Hardware Abstraction	An EUD built around a Type 1 Hypervisor with hardware abstraction capabilities to separate the critical functions into separate virtual instances	Offers more usability and increases the security of an WLAN EUD with abstraction of the Wi-Fi driver and hardware
Hardware Separated EUD	An EUD with critical functions such as transport, encryption and Red Compute into separate dedicated hardware components	High risk functions are physically separated into separate hardware such as the Dedicated Outer WLAN use case

The MA CP supports two Data-in-Transit (DiT) use cases of EUDs, VPN EUDs and TLS EUDs; however, the EUD must be dedicated as either a VPN EUD or TLS EUD. VPN and TLS EUDs are composed of a Computing Device and optionally include a physically separate Dedicated Outer VPN to provide the Outer layer of IPsec encryption. When a Dedicated Outer VPN is included as part of the EUD it must be physically connected to the computing platform using an Ethernet cable.

An RD is required when connecting to the Black Network, except for the solution designs and use cases specified in Sections 4.2.3 and 6.6.

Appendix F, provides clarification on the various EUD configuration options.

6.1 EUD HARDWARE PLATFORM

For a Composed EUD, the EUD Hardware Platform is the physical hardware that the other sub-components of the EUD operates on. All Composed EUDs must have an EUD Hardware Platform listed on the CSfC Components List as an EUD Hardware Platform. The platform typically is a traditional laptop, computer, tablet, smartphone or other such end user form factor but may be a server or other computing form factor.

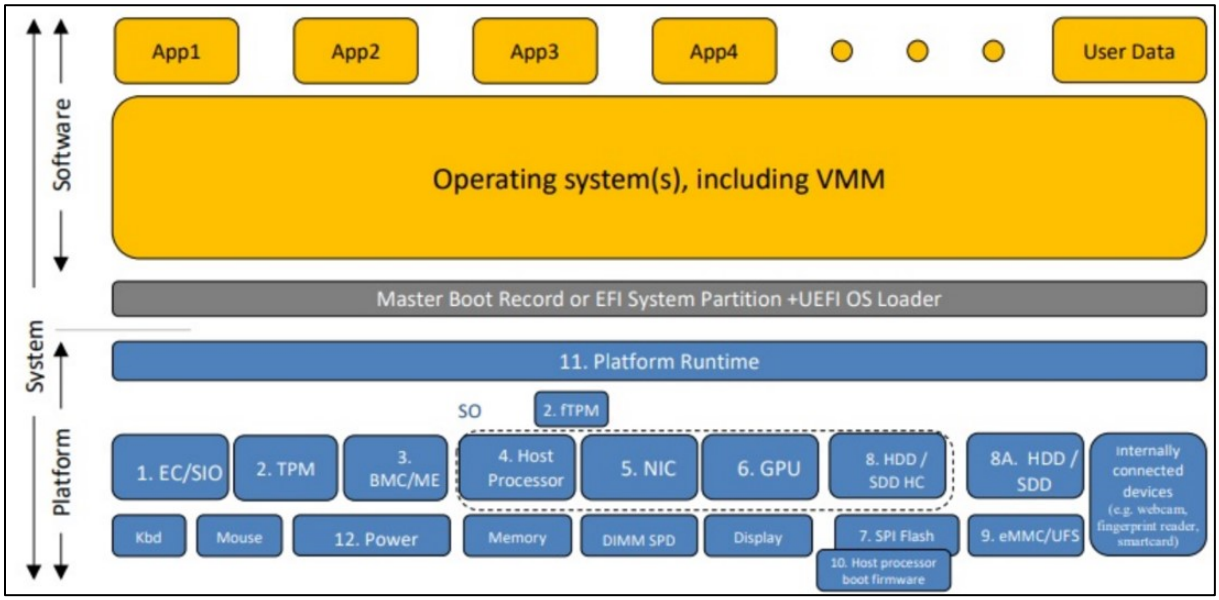

Figure 10. General Purpose Computing Platform

The platform shown in Figure 10 is a collection of hardware devices and firmware that provide the functional capabilities and services needed by tenant software. Such components typically include embedded controllers, trusted platform modules, management controllers, host processors, network interface controllers, graphical processing units, flash memory, storage controllers, storage devices, boot firmware, runtime firmware, human interface devices, and a power supply. The EUD serves as the base for all other EUD components to operate on and includes laptops, tablets servers, and other computing devices.

6.2 DEDICATED SECURITY COMPONENT

The Dedicated Security Component (DSC) is a combination of a hardware component and its controlling firmware that provides a secure execution environment, key storage and/or other security related functionality to the composed EUD. Currently, a DSC is not required but an objective sub-component that further enhances the security of an EUD and is governed by the *Dedicated Security Component cPP.* These DSCs should take the form of Secure Elements (SE), Trusted Platform Modules (TPM), Hardware Security Modules (HSM), Trusted Execution Environments (TEE), and Secure Enclave Processors (SEP). The firmware of these should provide the encompassing platform with services for the provisioning, protection, and use of Security Data Objects (SDOs), which include keys, identities, attributes, and other types of Security Data Elements (SDEs).

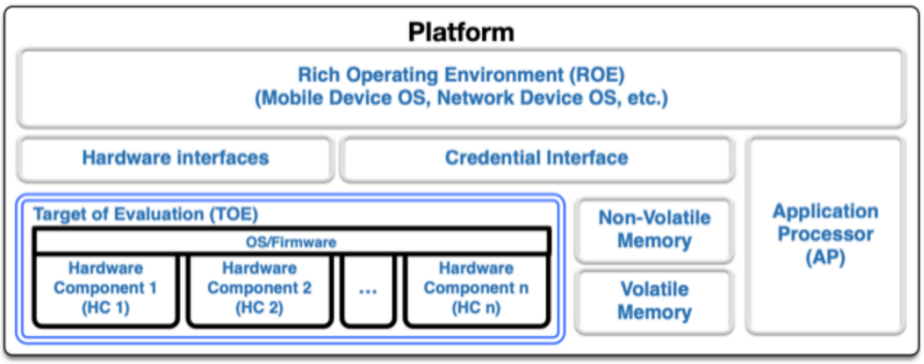

Figure 11. Dedicated Security Component

It is expected that the DSC will be integrated into the EUD Hardware Platform and thus the Hardware Platform will be tested against *Dedicated Security Component cPP* or have an already tested DSC integrated into it. Additionally, *MDF cPP* EUDs can leverage the DSCs to provide the same functionality as the composed EUDs. Long term, the CSfC Program will require that DSCs be validated against the *Dedicated Security Component cPP* and to be integrated into every EUD. As of now having a DSC is an objective design feature for all EUDs.

6.3 Operating System

For Composed EUDs the Operating System is software that manages computer hardware and software resources for end user devices and provides common services for application programs. The hardware it manages may be physical or virtual. The OS encompasses the OS kernel and its drivers, shared software libraries, and some application software included with the OS. Applications included are those that provide essential security services, many of which run with elevated privileges.

6.4 Retransmission Device

This section describes the government owned RDs whose primary purpose is to provide a layer of hardware isolation between the Black Transport Network and EUD. One of the primary use cases of the RD is to provide isolation from the cellular networks and the EUD and whenever a cellular connection is used, including in government private cellular use case, a RD must be used. The internal side, the RD can only be connected to EUDs through a hard-wired connection such as Ethernet or Ethernet over USB. The RD may not use Wi-Fi on the internal side for connection to EUDs and the Wi-Fi must be disabled on the EUDs. The connection between the RD and the Black Transport Network may be any wireless or wired connection approved by the AO. The RD must implement a software or hardware firewall to restrict traffic that is allowed to flow through the device. The chip providing connectivity on the external side must be physically separate from the main processor. The RD must implement a protocol break between the RD and the EUD. The RD must be managed over a wired connection. The ideal form-factor for this device would be a sleeve type design that the EUD slides into.

6.5 Virtual Private Network Client

The Virtual Private Network (VPN) Client, a software application that runs on the OS, establishes a secure IPsec connection between the host platform and a remote system. The VPN client is located outside or inside of a private network and establishes a secure tunnel to an IPsec peer. IPsec peers are defined as:

- VPN gateways
- Other VPN clients
- An IPsec-capable network device (supporting IPsec for the purposes of management)

The tunnel provides confidentiality, integrity, and data authentication for information that travels across a less trusted (sometimes public) network. All VPN clients that comply with this document will support IPsec. The VPN Client is governed by the *PP-Module for VPN Client*.

6.5.1 OUTER VPN COMPONENT

The allowable Outer VPN Components for both the VPN and TLS EUD are identical. Authentication of peer VPN Components and cryptographic protection of data in transit are fundamental aspects of the security provided by the EUD Outer VPN Component.

The Outer VPN Component establishes an IPsec tunnel with the solution infrastructure Outer VPN Gateway, which provides device authentication, confidentiality and maintains the integrity of information traversing Black Networks. The MA CP allows the use of VPN Gateways or VPN Clients to be used as the Outer VPN Component of EUDs.

The classification of private keys and certificates used for the authentication of the Outer VPN Component are considered CUI and must be protected with a FIPS 140-2/3-validated cryptographic module. Customers deploying MA solutions in high-threat environments may also choose to implement controls to mitigate against tampering attacks.

As described in Section 4.2.4, solutions supporting Multiple Security Levels configure EUDs to perform authentication of the Outer IPsec tunnel using an EAP-TLS as part of the IPsec IKE to the Outer VPN Gateway. Mutual authentication occurs between the EUD and the authentication server using the Outer VPN Gateway as an EAP pass-through.

6.5.2 OUTER VPN CLIENT

An Outer VPN Client can be used as the Outer VPN Component for MA EUDs. The Outer VPN Client establishes an IPsec tunnel to the Outer VPN Gateway of the MA solution infrastructure. The tunnel must be configured to automatically be established as part of the EUD's power-on process. A combination of the VPN Client, and the computing platform's operating system, is responsible for providing configuration and enforcement of network packet handling rules for the Outer layer of encryption. The Outer VPN Client is selected from the *IPsec VPN Client* section of the CSfC Components List. The VPN Client is installed on the Computing Device selected from the *Mobile Platform* section of the CSfC Components List.

6.5.3 INNER VPN CLIENT

An Inner VPN Client can be used as the Inner VPN Component for MA EUDs. The Inner VPN Client establishes an IPsec tunnel to the Outer VPN Gateway of the MA solution infrastructure. The tunnel may be configured to automatically be established as part of the EUD's power-on process. The Inner VPN may additionally have a multi-factor authentication layer in addition to the certificate-based authentication as described in section 7.3. A combination of the VPN Client, and the computing platform's operating system, is responsible for providing configuration and enforcement of network

packet handling rules for the Outer layer of encryption. The Outer VPN Client is selected from the *IPsec VPN Client* section of the CSfC Components List. The VPN Client is installed on the Computing Device selected from the *Mobile Platform* section of the CSfC Components List.

6.6 Dedicated Outer VPN

A Dedicated Outer VPN can be used as the Outer VPN Component for EUDs which replaces an Outer VPN Client on the EUD. Using a physically separate VPN as part of the EUD improves security by providing physical separation between the Computing Device and the Outer layer of encryption. When a Dedicated Outer VPN is used as part of an EUD, there is no requirement to use a Government RD. When using a Dedicated Outer VPN, the Outer VPN and Computing Device are collectively referred to as the EUD.

The Dedicated Outer VPN included as part of the EUD must be physically connected to the computing platform using an Ethernet cable. The Dedicated Outer VPN is selected from either the *IPsec VPN Gateway* section or the *IPsec VPN Client* section of the CSfC Components List.

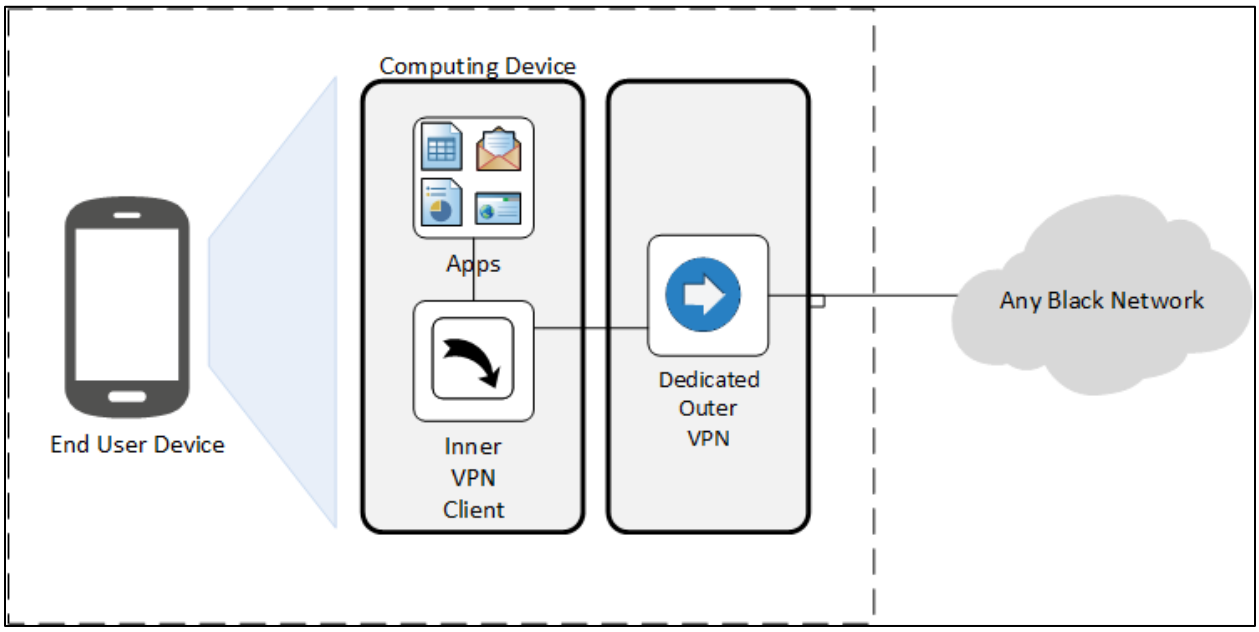

Figure 12. Dedicated Outer VPN

Figure 12 shows when a Dedicated Outer VPN is included as part of an EUD, it provides configuration and enforcement of network packet handling rules for the Outer layer of encryption. The configuration settings of the Dedicated Outer VPN may need to be updated when entering new environments (e.g., updating the Default Gateway). Dedicated Outer VPNs are dedicated to a single security level and can only provide the Outer layer of IPsec for clients connecting to a Red Network of the same security level.

6.7 Transport Layer Security Application

The Transport Layer Security (TLS) Application is a general application that has TLS evaluated, such as a Voice and Video over IP (VVoIP) application or an email application that runs on the OS. The TLS

Application located outside or inside of a solution and establishes a secure connection to an TLS peer. TLS peers are defined as:

- TLS Server
- VoIP Server
- Email Server

The secure connection provides confidentiality, integrity, and data authentication for information that travels across a less trusted (sometimes public) network. The TLS Application is governed by the Protection Profile for Application Software Version and the Functional Package for TLS.

6.7.1 TLS CLIENT

Applications with a TLS client can be installed on the Computing Device and used for the Inner layer of TLS encryption. On TLS EUDs, every application that sends or receives data through the Outer VPN Component must be independent. For example, if a voice application, web browser, MDM agent, and email client are installed on the Computing Device, each application is configured to establish a TLS session to the TLS-Protected Server in the MA solution infrastructure. In some instances, an application may perform both TLS and SRTP encryption. Those applications must be configured to meet requirements for both TLS clients and SRTP clients.

The TLS-client uses a device certificate or user certificate for authentication to the TLS-Protected Server. The certificates are issued by the Inner CA, which may be the same CA that issues certificates to the TLS-Protected Servers (e.g., customer enterprise CA). When a device certificate is used, the user must then authenticate to the Red Network before gaining access to any classified data (e.g., username and password, token). When a user certificate is used, the user certificate authenticates the Inner layer of TLS encryption and authenticates the user for access to the requested classified data. A combination of the TLS Client and Computing Device Operating System is responsible for providing configuration and enforcement of network packet handling rules for the Inner layer of encryption.

6.7.2 SRTP CLIENT

Applications with an SRTP client can be installed on the Computing Device and used for the Inner layer of SRTP encryption. If multiple SRTP clients are installed on the TLS EUD, then each must be configured independently. SRTP Clients are generally used to encrypt real time traffic, such as voice or video. In some instances, an application may perform both TLS and SRTP encryption. Those applications must be configured to meet requirements for both TLS clients and SRTP clients.

SRTP clients use certificates for mutual authentication. In most cases, the SRTP client uses a user certificate for authentication. User certificates are issued by an Inner CA, which may be the same PKI that issues certificates to TLS-Protected Servers (e.g., customer enterprise PKI), which may be different than the Inner CA. Alternatively, the SRTP client can use a device certificate for authentication followed by user authentication (i.e., username and password, token, smartcard, etc.). A combination of the SRTP Client and Computing Device Operating System is responsible for providing configuration and enforcement of network packet handling rules for the Inner layer of encryption.

6.8 HYPERVISOR

The Hypervisor, also referred to as the Client Virtualization, is a virtualization engine that runs on the EUD hardware in place of an OS and its Kernel. It runs additional guest operating systems and their guest kernels. The Hypervisor used is considered to be a Type One hypervisor where the virtualization engine directly runs on the hardware platform instead of running on a separate OS. The Type One Hypervisor has a great deal of high-level separation that includes kernel separation and limited hardware separation. The Hypervisor is governed by the *Protection Profile for Virtualization* and the *PP-Modules for Client Virtualization*.

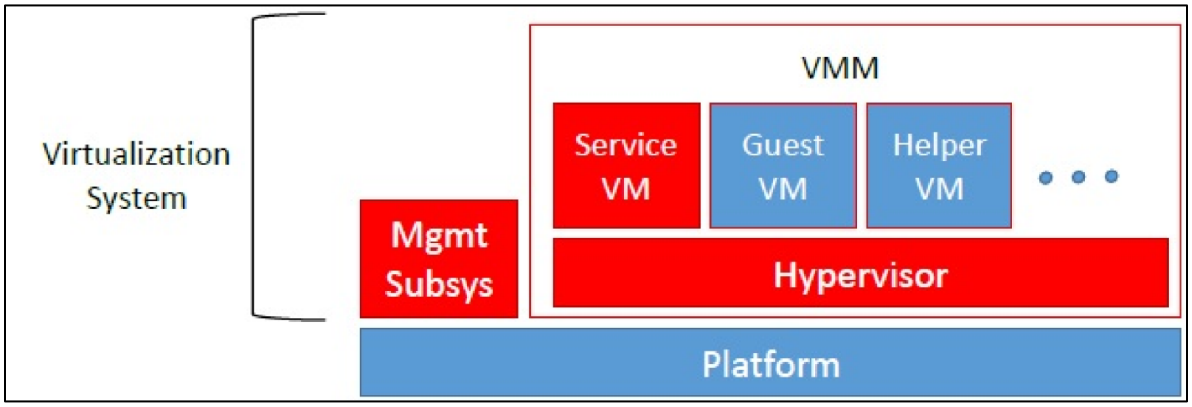

Figure 13. Virtualization Client

6.9 END USER DEVICE FULL DISK ENCRYPTION

A Composed EUD is required to have a single layer of Full Disk Encryption (FDE) enabled to act as a base level of protection to the EUD protecting it from unauthorized modification and data recovery efforts. MDFs EUDs already have a single layer of Platform Encryption as part of the architecture and it is required for this to be enabled for these EUDs as well. For more information on how encryption relates to device handling see section 6.14.

EUD encryption encrypts a set of user-selected data. For ease of explanation, "file" will frequently be used to refer to the encrypted object (however, the encrypted object could be any number of things - folders, volumes, containers, etc.). EUD encryption is another sub-component of the OS and should be paired with the given OS.

Device encryption captures most of the storage medium, including all user files. The FDE collaborative Protection Profiles describe the requirements and assurance activities necessary for the actual encryption/decryption of the data by the Data Encryption Key (DEK). Each PP will also have a set of core requirements for management functions, proper handling of cryptographic keys, updates performed in a trusted manner, audit, and self-tests.

6.10 MDF END USER DEVICE

The MDF EUD is a commercial tablet, smartphone, or similar computing device that supports the VPN EUD and TLS EUD use cases.

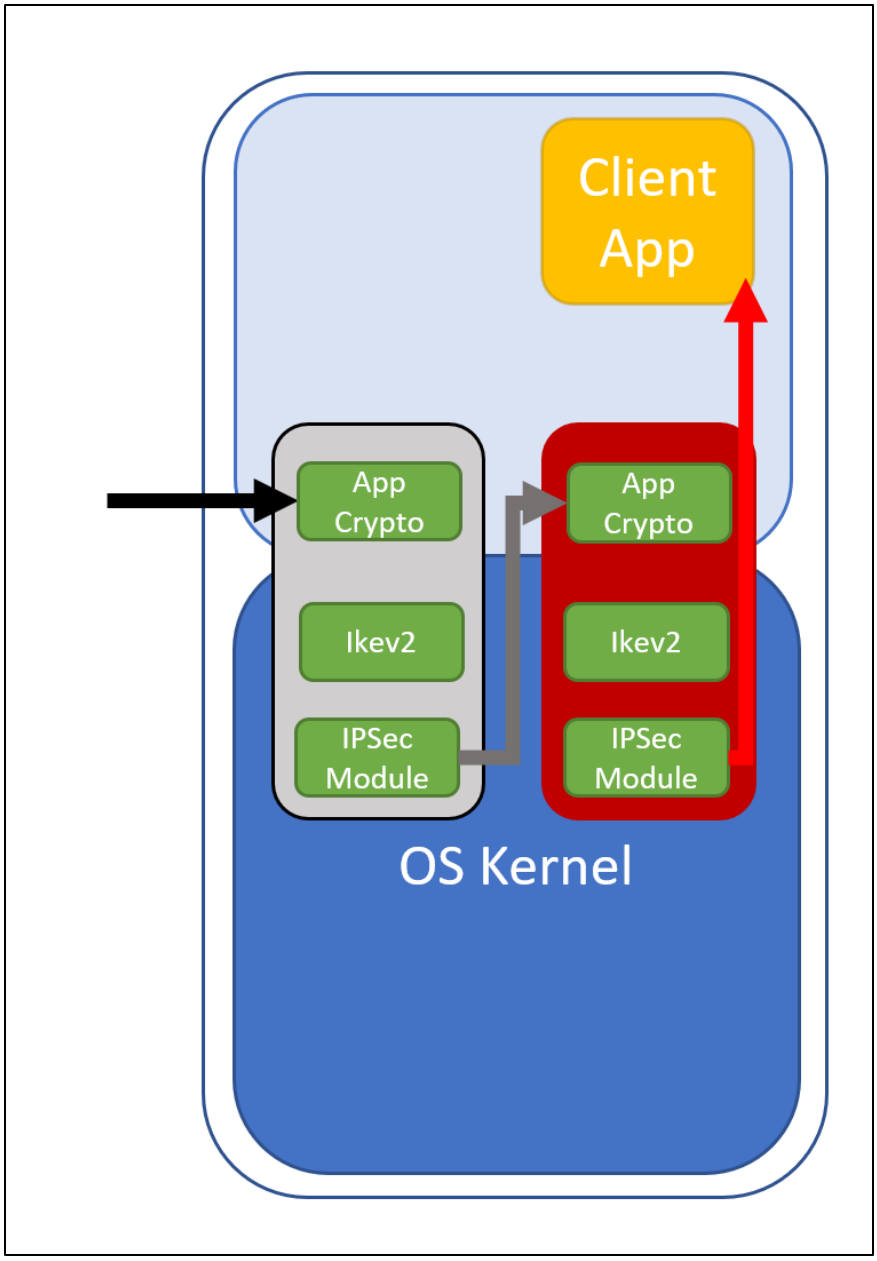

Figure 14. MA MFD EUD Architecture

Figure 14 shows the software architecture of a typical MDF EUD. Two VPN Clients are used to provide encryption run as operating system processes and performs authentication and key establishment for the IPsec modules.

EUDs use an VPN Client to provide the Outer layer of encryption. The connection can be configured to automatically be established as part of the EUD's power-on process. Once the Outer VPN client is connected to the Outer VPN, the EUD can establish the Inner IPsec tunnel. The private keys and certificates used for the authentication of the WLAN Access System are considered Controlled Unclassified Information (CUI) and must be, at a minimum, protected by enabling the native platform DAR protection.

For MDF EUDs the *Mobile Platform* section of the CSfC Components List already includes the required sub-components. A Dedicated Security Component as it currently is an objective design feature of the EUD.

Either a TLS application or VPN Client may be used to connect to an Inner Encryption Component for EUDs. An Inner VPN Client establishes an IPsec tunnel to the Inner VPN Gateway, this tunnel can be configured to automatically be established as part of the EUD's power-on process. A combination of the VPN Client and the Operating System on which it is installed, provides configuration and enforcement of network packet handling rules for the Inner layer of encryption. The Inner VPN Client is selected from the *IPsec VPN Client* section of the CSfC Components list. The VPN Client is installed on the Computing Device selected from the *Mobile Platform* section of the CSfC Components List. A TLS application may connect to a TLS-Proxy, TLS Protected Server or SRTP server acting as the Inner Encryption Component. For both cases the private keys must be classified as determined by the AO and compliant with CNSSI 4005 and certificates used for the authentication of the Inner VPN Gateway are considered CUI and must be, at a minimum, protected by enabling the native platform DAR protection.

When using virtualization, a WLAN Client and Inner VPN Client both reside on the same Computing Device but are operating in two virtual instances to ensure that two separate IP stacks are used. The EUD is to be used exclusively within physically secure environments, such as facilities and tactical environments with physical controls considered appropriate by the AO.

Table 4. MDF EUD Components

Component	CSfC Component Category
EUD Hardware	*Mobile Device Fundamentals EUD*
EUD-Dedicated Security Component (Optional)	*Dedicated Security Component*
Operating System	*Mobile Device Fundamentals EUD*
Outer VPN Client	*VPN Client*
Inner VPN Client	*VPN Client*
Inner TLS Application	TLS Application, Web Browser, or VoIP Applications
EUD Encryption	*Mobile Device Fundamentals EUD*

6.11 Composed End User Device

The Composed EUD is a commercial tablet, laptop computer or similar computing device which supports mobile connections.

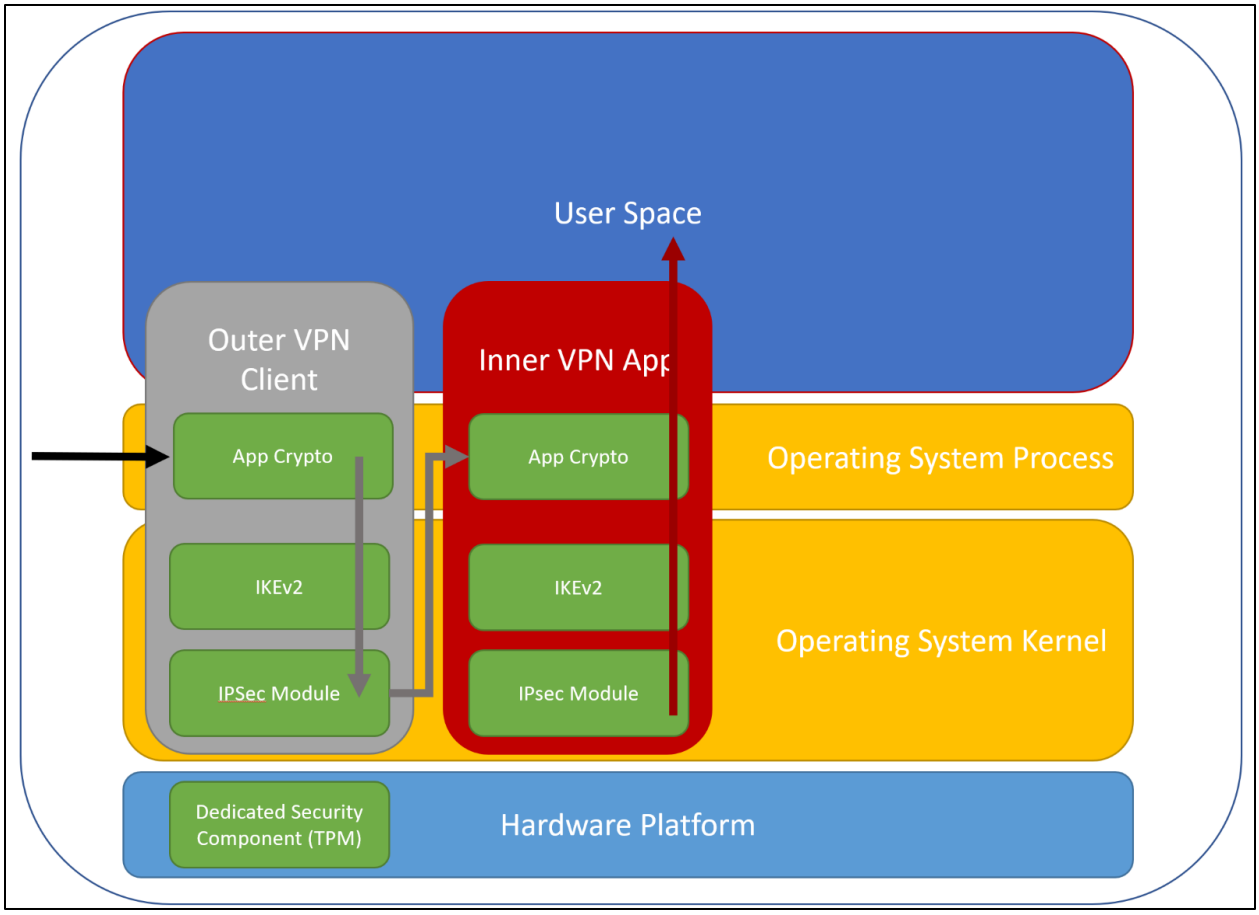

Figure 15. Mobile Access Composed EUD Architecture

Figure 15 shows the software architecture of a typical Composed EUD, also referred to as a base EUD. This section additionally applies to Software Separated EUDs as the component selection is the same. This example is running two VPN Clients as operating system processes and exist to perform authentication and key establishment for the IPsec module using two separate VPN Clients.

IPsec-IPsec EUDs use two IPsec tunnels to connect to the Red Network. Such an EUD includes both an Inner VPN Client and Outer VPN Component to provide the two layers of IPsec. Throughout this CP, the IPsec-IPsec EUD design is referred to as the "VPN EUD." VPN EUDs can be implemented using combinations of IPsec VPN Clients and IPsec Gateways. For example, a VPN EUD can be implemented on a Computing Device with two VPN Clients on the same stacks. The Black Transport for this EUD can be any government owned wireless transport that the AO approves or retransmission device as detailed in the relevant CP.

An example of a Composed EUD for the VPN EUD use case and its relevant CSfC sub-components described in Table 3.

Table 5. Mobile Access VPN EUD Components

Component	Protection Profile
EUD Hardware	*General Purpose Computing Platform*
EUD-Dedicated Security Component (Optional)	*Dedicated Security Component*
OS	*General Purpose Operating Systems*
Outer VPN Client	*VPN Client*
Inner VPN Client	*VPN Client*
EUD Encryption	*Hardware or Software Full Disk Encryption*

The EUD consists of the hardware and software components (Operating System (OS), VPN client, TLS Application, and applications) that provide a variety of security services. The Composed EUD itself is run on physical hardware selected from the CSfC Components list for General Purpose Computing Platform. The hardware may integrate a dedicated security component that is chosen from the CSfC Components List for Dedicated Security Component. The EUD's OS must be chosen from the CSfC Components List for General Purpose Operating Systems. Composed EUDs may rely on virtualization instead of an OS for more information see section 6.6. The VPN Client must be chosen from the CSfC Components List for VPN Client and be deployed on the tested on the EUD's OS. For TLS EUD the TLS application must be chosen from the TLS Application, Web Browser or VoIP Applications. For encryption, the EUD must use an encryptor that is chosen from the CSfC Components list for Software, Hardware, or Platform encryptor. For DAR CP compliant devices refer to DAR CP for all requirements on selecting EUD encryption.

A VPN Client must be used as the Inner VPN Component for EUDs. The Inner VPN Client establishes an IPsec tunnel to the Inner VPN Gateway. The tunnel can be configured to automatically be established as part of the EUD's power-on process. A combination of the VPN Client and the Operating System on which it is installed, provides configuration and enforcement of network packet handling rules for the Inner layer of encryption. The Inner VPN Client is selected from the *IPsec VPN Client* section of the CSfC Components list. The VPN Client is installed on the Composed EUD. The private keys must be classified as determined by the AO in accordance with CNSSI 4005 and certificates used for the authentication of the Inner VPN Gateway are considered CUI.

6.12 VIRTUALIZED EUD

In this CP, the EUD relies on a single operating system to connect to the Outer and the Inner Encryption Component and user space. To create an additional layer of security, this function of the EUD may be isolated on the EUD. This isolation is achieved through the use of hypervisor and virtual machine technologies on the EUD. Both a Composed EUD can leverage virtualization technologies to improve security, usability, or user experience.

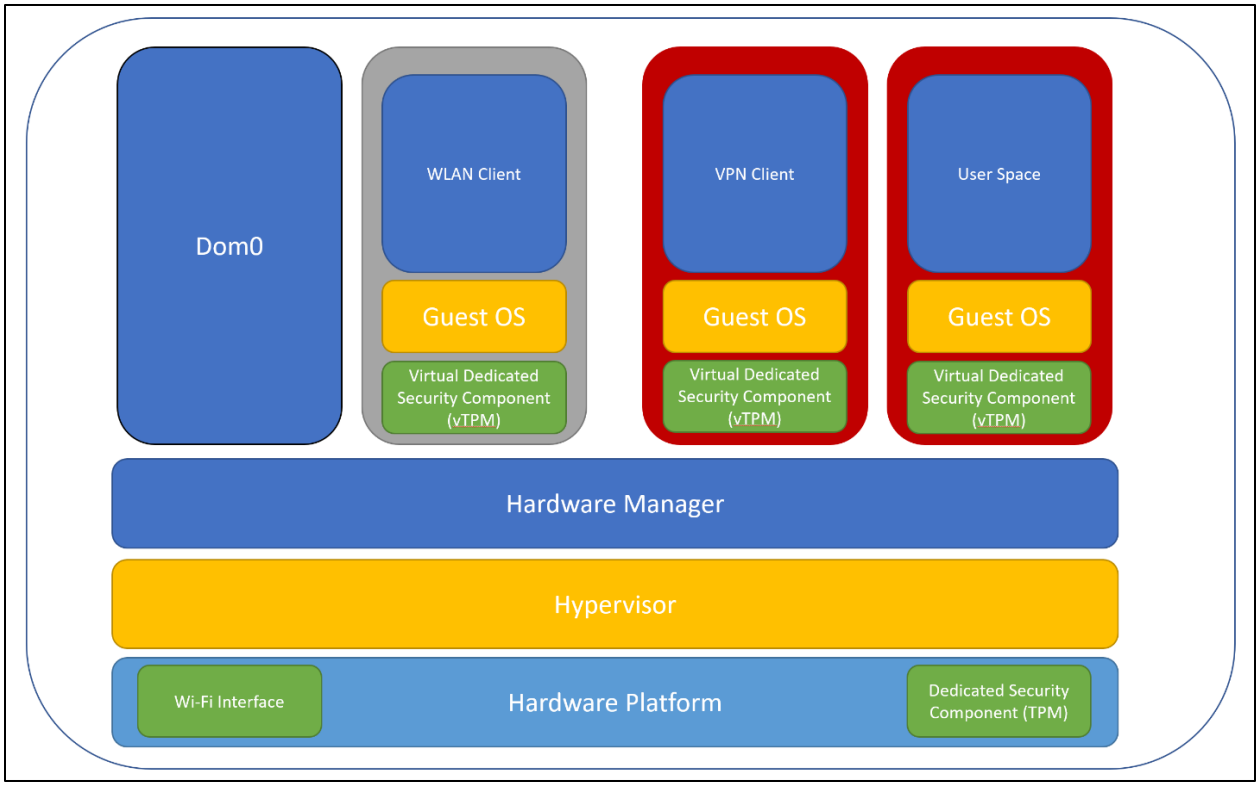

Figure 16. Enhanced Software Virtualization Architecture

Virtualized EUDs use a Type 1 hypervisor running directly on the hardware to create multiple isolated and stand-alone domains on a single EUD. The most common form of one of these domains is a virtual machine (VM). The isolated domains allow multiple parts of an MA CP EUD to be built securely into a single piece of hardware. They also ensure that separate IP stacks are used for each connection layer. The hypervisor also provides the virtual networks that are used by the domains for the internal network connections required for the dual layer MA CP remote connection.

The Hypervisor, also referred to as the Client Virtualization, is a virtualization that runs on the hardware of the EUD in place of an OS and its Kernel. It runs additional guest operating systems and their guest Kernels. The Hypervisor being used is considered to be a Type 1 Hypervisor where the virtualization engine directly runs on the hardware platform instead of running on a separate OS. The Type 1 Hypervisor has a great deal of separation that includes Kernel separation and limited hardware separation. This hypervisor must be listed on the CSfC Components List for Client Virtualization as described in section 6.8. If a virtualization, containerization, or other such software separation technology is used then it must be listed on the CSfC Components List for OS.

Table 6. Virtual EUD Components

Component	Protection Profile
EUD Hardware	*General Purpose Computing Platform*
EUD- Dedicated Security Component (Optional)	*Dedicated Security Component*
Hypervisor	*Client Virtualization*
Outer VPN Client	*VPN Client*
Inner VPN Client	*VPN Client*
Inner TLS Application	*TLS Application, Web Browser, or VoIP Applications*
EUD Encryption	*Hardware or Software Full Disk Encryption*

Virtualized EUD has a virtual OS dedicated to the connecting to the black transport network. When operating in the Government Private Wireless use case this domain may be used to connect to a government owned Wi-Fi Network and it is recommended that this network be dedicated to only the CSfC Solution, and the OS must be chosen from the CSfC Components List for WLAN Clients and OSs. End users should only be able to access end user domains. Other domains should be managed by an administrator. Additional domains/VMs can also be added for device management functions.

EUD with relying on virtualization to isolate domains allows multiple parts of an EUD to be built securely into a single piece of hardware and ensure that separate IP stacks are used for each connection layer. The hypervisor provides the virtual networks that are used by the domains for the internal network connections required for the dual layers of encryption. Each isolated domain should include the following domains: 1) a user domain where the user can interact with the EUD, 2) a transport domain to connect to the Black Transport Network, 3) a transport domain to connect to the Outer Encryption Component, and 4) a transport domain to connect to the Inner VPN Gateway. End users should only be able to access end user domains, and other domains should be managed by an administrator. Additional domains can be added for device management functions. Virtualized EUDs create virtual instance of both kernels and OSs to abstract out applications and functionality of the EUD, such as IPsec Client, WLAN Client, or TLS Client, into a separate name space and their own separate virtualized environment with resource sharing typically limited to the hypervisor-provided virtual networks that are used for communication between domains.

The Outer transport domain should be configured as an Outer VPN Component as described in Section 6.5.1 “Outer VPN Component” and should include an Outer VPN Client as described in Section 6.5.2 “Outer VPN Client.” The Inner transport domain should include an Inner VPN Client as described in Section 7.1.1 “VPN EUD”. The wireless domain’s OS built-in Wi-Fi driver should be used. For Wi-Fi configuration details see Section 4.2.3 “Black Network”.

End users should have persistent access to end user domains, but may be granted temporary access to other domains for the purpose of authentication only. Other domains should be managed by an administrator. Additional domains/VMs can also be added for device management functions.

Virtualization technology is being widely adopted within the CSfC Program to improve the security and capability of the EUDs. Virtualization can be leveraged on either Composed EUDs or on MDF EUDs. This virtualization relies on a Type 1 Hypervisor where the virtualization engine runs directly on the hardware platform instead of running on a separate OS. The Type One Hypervisor has a great deal of high-level separation that includes kernel separation and limited hardware separation. To meet the high bar for this separation a Hypervisor must be on the CSfC Components List for Client Virtualization. If a Hypervisor is not listed, then it is considered a Base EUD that is detailed in 6.11.

The Type 1 hypervisors which meet the NIAP Protection Profile have the following feature sets:

- The capability to dedicate processors for individual virtualized domains
- The capability to separate and dedicate RAM for individual virtualized domains
- The capability to pass through hardware control, such as PCIe connected hardware, into virtualized domains for control

These feature sets allow for a reasonable level in assurances that the virtual domains are separated by the hypervisor and that hardware such as the Wi-Fi Card to be controlled entirely from the virtual domain and not the hypervisor as depicted in Figure 17.

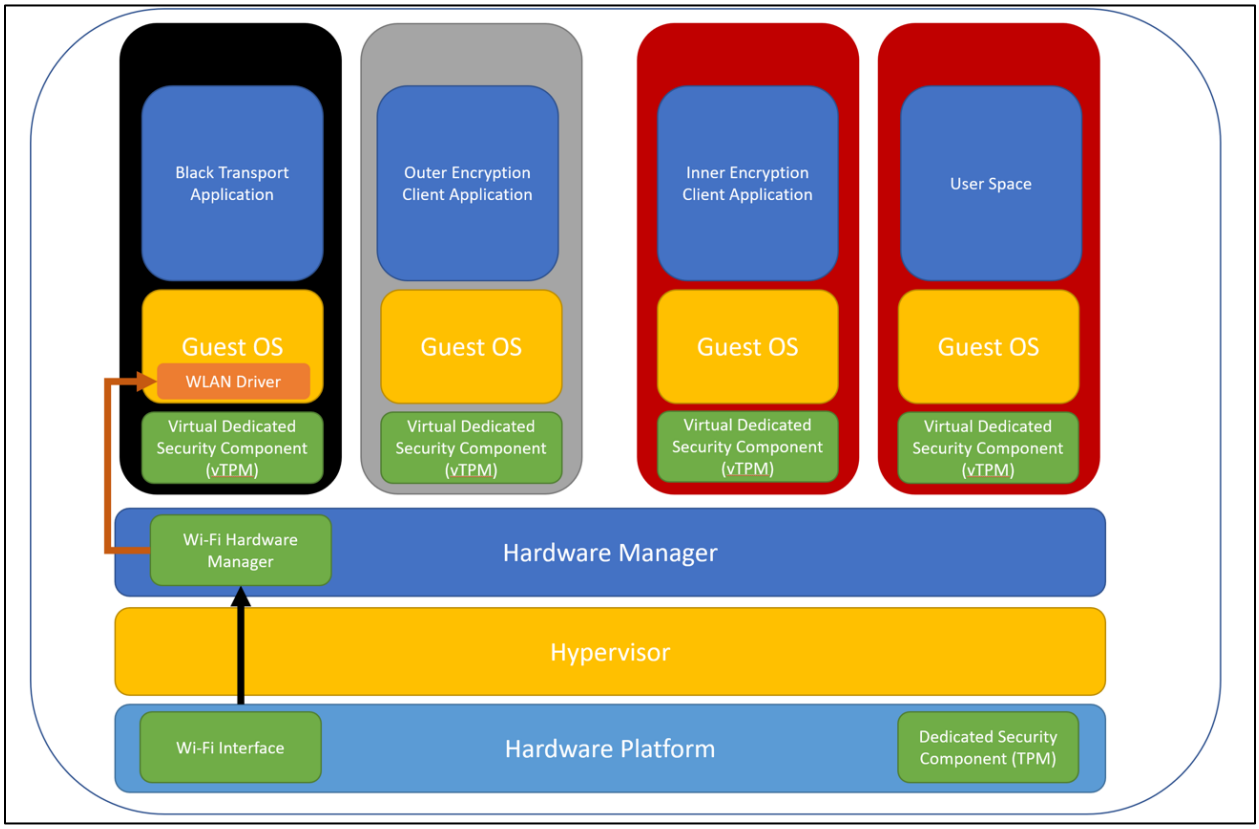

Figure 17. Virtualized EUD Wi-Fi Driver Isolation

Virtualization can be used to enhance the Composed EUDs discussed in Section 6.11 and can additionally be used to enhance MDF based EUDs. Type One Hypervisors provide additional security for the

component by isolating the storage, driver, memory and processing into separate virtual instances. First as shown in Figure 17, the isolation of the Wi-Fi driver into a separate virtual instance that reduces the risk exposure of the Wi-Fi driver to the EUD. Within the MA CP this allows for use of Wi-Fi to connect to a retransmission device instead of tethering the EUD physically.

6.12.1 VM ARCHITECTURE

Within the Composed Virtualized EUDs there are several methods and architectures that may be used to create an EUD that meets the requirements of a Virtualized EUD. This CP will not prescribe any particular architectures but instead present concepts and best practices that should be used in implementation of the Composed Virtualized EUDs. These concepts include:

- VM Interconnectivity
- Limited VMs
- Read Only VMs

6.12.2 VM INTERCONNECTIVITY

The separation that the Type 1 hypervisor adds between the VMs must be considered when doing the interconnection between the VM for the data to make its way from the Black untrusted network to the Red user space. All VMs should have their connection limited to what is necessary for the VMs to function for their given application. Most hypervisors have virtualized switching technology that can be used to allow routing between the VMs and even the hypervisor. These virtual switches should be separated out by the data type handles such as black, gray, and red. For example, there should be a separate virtual switch that handles the Black data, Gray data, Red data, and a dedicated switch to pass data between the Black Network and the Black VM. Figure 18 depicts Virtual EUDs with separate virtual switches allowing for communication between the VMs with each switch dedicated to the type of data transiting the switch.

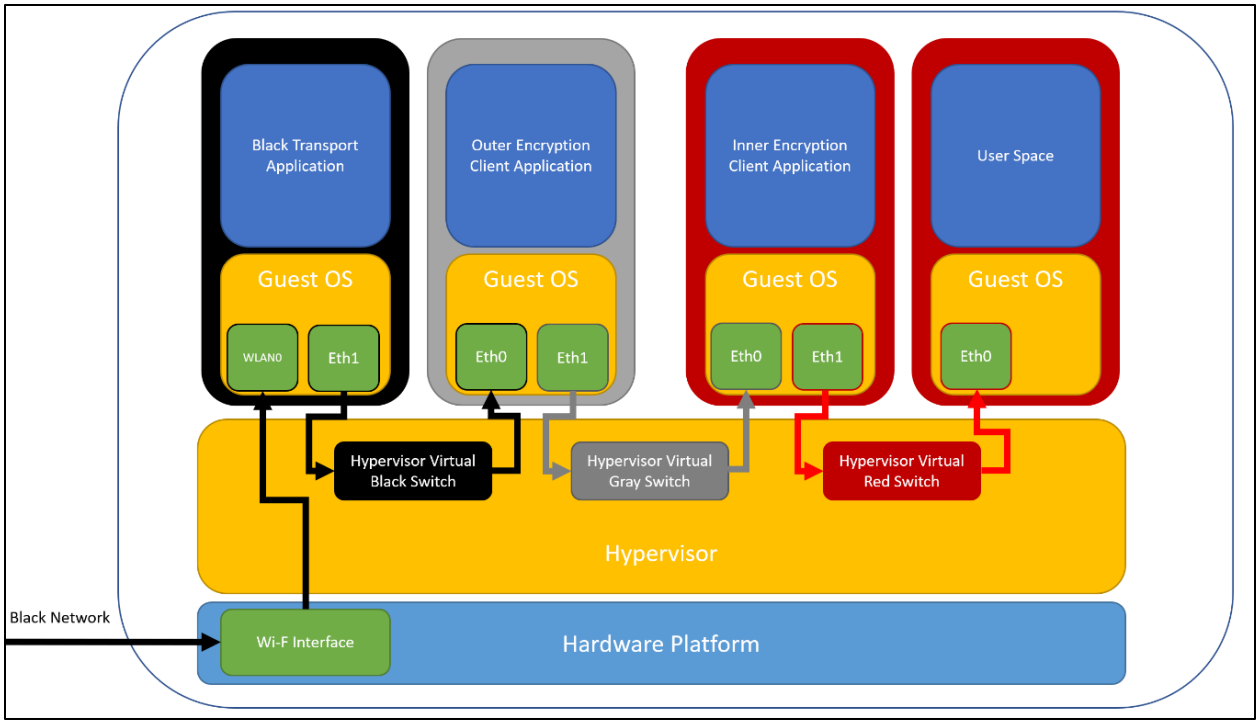

Figure 18. VM Interconnectivity

Another additional function that can be leveraged is for the VMs to run an independent firewall in each guest VM. This limits what the VM can send and receive on its own interfaces and adds an additional layer of network security to the EUD.

6.12.2.1 Limited VMs

VM within a virtual EUD should be limited to only have the necessary core functions required for operation. All other additional functionality should be removed. An example of this is the Outer Encryption VM should only have the outer encryption client, network supplicants, firewall, and any additional supporting libraries and should have any non-essential functionality. Non-essential functionality can include user applications, text editors, and even user interfaces. These principals limited functionality should be applied to all VMs within a virtual EUD to further reduce the attack surface which each VM presents to the virtual EUD.

6.12.2.2 Read Only VMs

Within Virtualization technology is the concept of 'Read Only' VMs where the file system of the virtualized guest OS is in a 'read only' state. In this state, no changes to the guest OS's file system are permanent nor are the changes to these OSs persistent through rebooting the VMs. This guarantees that the VMs will always boot into a known good state and any errors that occur within the VM are not persistent on reboot. These traits are very beneficial for VMs that handles the network functionality of the EUD. Additionally, this prevents any modification to the file system and reduces persistence through reboots. Within CSfC, this technology is not required to be deployed within a Virtualized EUD, but it is recommended that the Integrator consider technologies such as this to reduce the risk of operating the solution and improve the usability of the EUDs.

6.13 HARDWARE SEPARATION EUD

This section expands upon the concept of multiple components making up a single EUD. This concept is exemplified by the Dedicated Outer VPNs and RDs which can be paired with a traditional EUD. This is done to pass along functionality that causes risk to a separate component other than the EUD handling red data or having the separate hardware perform a function that the EUD is incapable of performing. This concept can be expanded on to further enhance the security of an EUD or allow for EUDs which cannot meet the requirements placed on traditional EUDs such as a laptop, smartphone, tablet, or computer.

The concept of multiple EUD components will expand to include both a Dedicated Inner VPN and a Red Compute Hardware. This allows for EUDs that cannot operate the Inner Encryption to still be used with CSfC or to pass along the risk from the Red Compute to the other dedicated component. The Dedicated Outer, Inner and Red Compute Hardware are objective design features within a CSfC Solution and are not required to be implemented by the customer.

Currently, the hardware isolation options remove certain aspects of the solution from the EUD and places them in another component. This component is linked to the EUD either via wireless or direct wire. The various isolation options are used to increase the attack chain and thereby lower the overall risk of the solution. The different options currently supported in the MA CP are discussed below.

- Retransmission devices
- Dedicated Outers

Within this CP, a government owned Black Network is defined as any MA CP solution that uses a Government Private Cellular or Government Private Wireless or Government Private Wired connection, and where a government entity controls all network components between the EUD and Outer VPN gateway. All other implementations are defined as using a public Black Network. All MA CP customers using a public Black Network must implement either the Enhanced Hardware Isolation requirements or the Software Virtualization requirements. Customers using a government owned Black Network can omit these isolation requirements as their networks are already isolated from the public.

6.13.1 DEDICATED INNER VPN (INNER ENCRYPTION COMPONENT)

A Dedicated Inner VPN is a separate component that can be used as the Inner VPN for an EUD. Additionally, a Dedicated Outer VPN is required when a Dedicated Inner VPN is used. These Dedicated Inner VPNs normally are small travel routers or similar network gear. The Dedicated Inner VPN included as part of the EUD must be physically connected to the computing platform using a wired connection preferably an Ethernet cable. A Dedicated Outer and Dedicated Inner may be combined into the same hardware, though for this use case it is preferred to have these to be separate components.

For the first option with the Dedicated Inner VPN being a travel router or other similar component, the Dedicated Inner VPN is selected from either the *IPsec VPN Gateway* section or the *IPsec VPN Client* section of the CSfC Components List. When a Dedicated Inner VPN is included as part of an EUD, it provides configuration and enforcement of network packet handling rules for the Inner layer of encryption. The configuration settings of the Dedicated Inner VPN may need to be updated when

entering new environments (e.g., updating the Default Gateway). Dedicated Inner VPNs are dedicated to a single security level and can only provide the Inner layer of IPsec for clients connecting to a Red Network of the same security level.

When the Dedicated Inner VPN is a composed EUD the OS is selected from the *OS* section of the CSfC Components List. The Dedicated Inner VPN hardware is selected from the *Hardware Platform* section of the CSfC Components List. The Dedicated Inner VPN hardware is selected from the *Hardware Platform* section of the CSfC Components List. Finally, the Dedicated Inner VPN Client is selected from the *IPsec* VPN Client section of the CSfC Components List. Dedicated Inner VPNs are dedicated to a single security level and can only provide the Inner layer of IPsec for clients connecting to a Red Network of the same security level.

6.13.2 RED COMPUTE HARDWARE

The Red Compute Hardware is a dedicated Red Component whose role is to only handle the classified information and not to handle any of the encryption required to connect to a CSfC Solution. This dedicated Red Compute is expected to be Smartphone, Tablet, Laptop, or other standard EUD but may additionally be a non-traditional compute platform which does not fit in the concept of EUDs. The Red Compute must be physically connected to the Dedicated Inner VPN using a wired connection preferably an Ethernet cable.

The Red Compute Hardware must either be a Composed EUD or an MDF EUD. When the Dedicated Inner VPN is a composed EUD the Operating System is selected from the *Operating System* section of the CSfC Components List. The Dedicated Inner VPN hardware is selected from the *Hardware Platform* section of the CSfC Components List. Platform encryption must at minimum be enabled on the hardware component processing the Red Data though it is highly recommended to implement such encryption on the other hardware components when implementing a multi-component EUD.

6.14 ACCESS CDS EUDS

Access Cross Domain Solutions (CDS) are types of CDS that provides access to a computing platform, application, or data residing on different security domains from a single device without any transfer between the various domains. Access CDSs are used within CSfC solutions to fully replace a traditional EUD. Thus, the National Cross Domain Strategy Management Office (NCDSMO) and the CSfC Program have partnered together to provide this guidance. The specific CDS targeted here are Access CDSs that rely of virtualization technologies for separation of different domains. These Access CDSs must go through a validation process and then it may be listed on the CDS Baseline. For any additional information on CDSs contact the NCDSMO at ncdsmo@nsa.gov or local CDS support element.

Reciprocity between the NCDSMO Baseline and the CSfC Components List allows for the NCDSMO Baseline to be equivalent to the General-Purpose Compute Platform and Virtualization Client. All Access CDSs will not be automatically allowed to act as a CSfC EUD, they will only be allowed on a case-by-case basis based on input on the CSfC program and the NCDSMO. To allow for an Access CDS to be used within a CSfC Solution contact the CSfC Program Management Office (PMO), csfc@nsa.gov, to discuss the requirements and necessary information to allow for an Access CDS within CSfC Solutions.

Table 7. Access CDS EUD Components

EUD Component	Components List
EUD Hardware	*CDS Baseline listed Access CDS*
EUD-Dedicated Security Component (Optional)	Dedicated Security Component
Hypervisor	*CDS Baseline listed Access CDS*
WLAN Guest Operating System	General Purpose Operating Systems
WLAN Client	Wireless Local Area Network Client
Outer VPN Client	VPN Client
Inner VPN Client	VPN Client
EUD Encryption	Hardware Full Drive Encryption or Software Full Drive Encryption

The customer must ensure they use a current NCDSMO baseline CDS and is maintained in accordance with NCDSMO requirements. The security related components of the CDS must be maintained as directed by the NCDSMO such as the Hypervisor and EUD Encryption. There are other components that in addition to NCDSMO requirements, must comply with CSfC Program requirements. These include VPN Client, TLS Client, SRTP Client and WLAN Client. The VPN Client, TLS Client, SRTP Client, WLAN Client and security relevant updates for the Guest Operating Systems are expected and required to be updated as part of the CSfC Components lifecycle and updating them will not affect the status of these devices on the CDS Baseline. For questions on this guidance contact the CSfC PMO at csfc@nsa.gov.

7 END USER DEVICE DEPLOYMENTS

MA CP has two options for DiT deployments and three separate deployment options for device handling. The first, DiT deployment option is VPN EUDs where the EUD uses a VPN Client to connect to an authorized VPN Gateway over a black network and a VPN Client to connect to the Inner VPN. In the second deployment option the Inner VPN Client is replaced by a TLS Application that communicates with a TLS Protected Server, Proxy or SRTP server. This deployment option is referred to as the TLS EUD. The three options for device handling effect how and what data is stored on the EUD during operations and what data is exposed on the EUD when powered off. The most recommended option for device handling is to deploy an EUD with a *CSfC DAR Solution* ensuring that all data on the EUD is protected when the EUD is powered off. The other two options revolve around whether the EUD stores classified data or not them being a Thick EUD and a Thin EUD model.

7.1 END USER DIT OPTIONS

MA has two deployment options for DiT which are the VPN EUD and TLS EUD.

7.1.1 VPN EUD

VPN EUDs use IPsec using a VPN Client to provide the Inner layer of encryption. The purpose of the Inner VPN Client is to establish an IPsec tunnel to the Inner VPN Gateway of the MA solution infrastructure. The tunnel can be configured to automatically be established as part of the EUD's power-on process, following establishment of the Outer VPN tunnel. Once the Inner VPN Client

establishes the Inner IPsec tunnel, any application installed on the Computing Device can send and receive classified data with the Red Network. The private keys and certificates used for the authentication of the Inner VPN Component are considered Controlled Unclassified Information (CUI) and must be, at a minimum, protected by enabling the native platform DAR protection.

Appendix D, provides more detail on the allowable configurations of VPN EUDs.

A VPN Client may be used as the Inner VPN Component for VPN EUDs. The Inner VPN Client establishes an IPsec tunnel to the Inner VPN Gateway of the MA Solution Infrastructure. The tunnel may be configured to automatically be established as part of the EUD's power-on process. A combination of the VPN Client and the Operating System on which it is installed, provides configuration and enforcement of network packet handling rules for the Inner layer of encryption. The Inner VPN Client is selected from the *IPsec VPN Client* section of the CSfC Components list. The VPN Client is installed on the Computing Device selected from the *Mobile Platform* section of the CSfC Components List.

Virtualization can be used when an Outer VPN Client and Inner VPN Client both reside on the same Computing Device. Use of virtualization ensures that two separate IP stacks are used.

Appendix D, provides additional guidance implementing EUDs.

7.1.2 TLS EUD

TLS EUDs use TLS clients or SRTP clients to provide the Inner layer of encryption. The Inner layer of TLS or SRTP is implemented by TLS clients and SRTP clients provided by individual applications installed on the Computing Device. Each application that sends and receives data to the Red Network must be selected and configured in accordance with the requirements of the CP. Each application then terminates the Inner layer of encryption to TLS-Protected Servers and SRTP endpoints within the MA solution infrastructure.

The private keys and certificates used for user authentication of the Inner TLS and SRTP clients are determined by the AO. If the private keys and certificates are considered CUI then the EUD component must, at a minimum, implement the native platform encryption. If the private keys and certificates are considered to be classified, then the EUD must be treated as classified at all times or implement an NSA-approved DAR Solution (see Section 7.2).

7.2 END USER DEVICE HANDLING OPTIONS

The MA CP allows three different deployment options pertaining to the use and handling of an EUD while powered off:

- **EUD with DAR:** To implement DAR protection on an EUD, the DAR solution must be approved by NSA, either as a tailored solution or compliant with NSA's *Data-at-Rest CP.* Specification of such a DAR solution is outside the scope of this CP, but can be found in the DAR CP. The NSA requires implementing organizations to define the circumstances in which an EUD is to be considered outside of the continuous physical control of authorized users (i.e., "lost"). AOs will define "continuous physical control" and that definition should align with the intended mission and threat environment for which the solution will be deployed. Organizations must also define the circumstances in which an EUD that is a part of that organization's solution is

to be considered recovered back into the continuous physical control of authorized users (i.e., "found").

- **Thin EUD:** The EUD can be designed to prevent any classified information except for the private keys from being saved to any persistent storage media on the EUD. This allows for the EUD to be treated as Unclassified, or at a high level as determined by the AO, when powered down. Possible techniques for implementing this include, but are not limited to: using Virtual Desktop Infrastructure (VDI) configured to prevent data from the associated Red Network to be saved on the EUD, restricting the user to a non-persistent virtual machine on the EUD, and/or configuring the EUD's operating system to prevent the user from saving data locally. Continuous physical control of the EUD must be maintained at all times.

- **Classified EUD:** The EUD can be used exclusively with physical security measures approved by the AO. EUDs are not subject to special physical handling restrictions beyond those applicable for classified devices since they can rely on the environment they are in for physical protection. If this design option is selected, the EUDs must be treated as classified devices at all times. The EUD in this case must enable the native platform DAR protection to protect the private keys stored on it from disclosure and to increase the difficulty of tampering with the software and configuration. Continuous physical control of the EUD must be maintained at all times.

7.3 MULTI-FACTOR AUTHENTICATION OPTIONS

Within this CP a form of multi-factor authentication should be used for a user to access classified data. The current multi-factor authentication options are, 'something you know' and 'something you have.' There are three forms of multi-factor authentication one of which should be used within MA CP. The three forms are 'User to Physical EUD', in which the user authenticates to the EUD using an additional factor, 'EUD to Infrastructure', in which the user authenticates to the Inner Encryption Component using an additional factor and finally 'User to Virtual Desktop Infrastructure' in which the user authenticates to the Virtual Desktop/Environment session using an additional factor. The authentication token and the EUD must be stored in a physically separate and independently securable storage containers when both devices are securely stored.

7.3.1 USER TO PHYSICAL EUD

This multi-factor use case could apply to either a VPN EUD or TLS EUD. "Physical EUD" is defined as using a second factor of authentication for login to the device in a user's possession. This could be accomplished using a smart card with an identity PKI cert (something you have) and a passphrase (something you know). This could also be accomplished with a passphrase (something you know) and the second factor will be a "something-you-have" factor manifesting as a physically separate token external from the VPN EUD supplying a one-time password for the user to enter. As shown in Table 24, the passphrase in both cases must still meet the complexity and length requirement specified.

7.3.2 User to Inner Encryption Component

This multi-factor use case applies to a VPN EUD or TLS EUD. "Inner Encryption Component" is defined as using a second factor of authentication to the Inner VPN tunnel or TLS Server. This could be accomplished using a smart card with the Inner EUD PKI cert (something you have) and a passphrase (something you know). This could alternatively be accomplished as shown in Table 24, the first factor will be the certificate that is on the device. The second factor will be a "something-you-have" factor manifesting as a physically separate token from the VPN EUD supplying a one-time password for the user to enter. Adding a second factor of authentication to the solution prevents continued access to a network if an EUD is compromised as a result of an attack. If a device has been compromised, it must be assumed that the certificates used to authenticate to the enterprise would be accessible to an adversary to be used on a legitimate device or they could be extracted and used on a different device masquerading as the user. If an adversary has managed to compromise the certificates on an EUD, adding a second authentication factor prevents persistent access to a network.

7.3.3 User to Virtual Desktop Infrastructure (VDI)

This multi-factor use case applies to a Thin EUD. "Virtual Desktop Infrastructure" is defined as a second factor of authentication to log into a Virtual Desktop/Environment session to access Red data. This could be accomplished using a smart card with an identity PKI cert (something you have) and a passphrase (something you know). This could also be accomplished with a passphrase (something you know) and the second factor will be a "something-you-have" factor manifesting as a physically separate token external from the VPN EUD supplying a one-time password for the user to enter. As shown in Table 24, the passphrase in both cases must still meet the complexity and length requirement specified.

TLS EUDs must use either a Government RD or Dedicated Outer VPN to connect to the Black Network, except for the use cases defined in Section 4.2.3 which provides more detail on the allowable configuration of TLS EUDs.

8 MOBILE ACCESS CONFIGURATION AND MANAGEMENT

The MA CP includes design details for the provisioning and management of Solution Components, which requires the use of Security Administrators (SAs) to initiate certificate requests, and Registration Authorities (RAs) to approve certificate requests. The CSfC solution owner must identify authorized SAs and RAs to initiate and approve certificate requests, respectively. The following sections describe the design in detail and Section 12 articulates specific configuration requirements that must be met to comply with the MA CP. For additional details about RAs, please see the *CSfC Key Management Requirements Annex.*

8.1 Solution Infrastructure Component Provisioning

Provisioning is an out-of-band process performed in a physically secured area (e.g., the Red Network) through which MA solution infrastructure components are configured and initialized before their first use. During the provisioning process, the SA configures the Outer VPN Gateway, Gray Management Services, Inner Encryption Components, and Red Management Services in accordance with the requirements of this CP.

During provisioning, the Outer VPN Gateways and Inner Encryption Components generate a public/private key pair and output the public key in a Certificate Signing Request (CSR). The SA delivers the Outer VPN Gateways' CSR to the Outer CA and the Inner Encryption Components' CSR to the Inner CA. The appropriate CA processes the CSR for each encryption component and returns a signed X.509 certificate. The SA then installs the unique signed certificate and the certificate chain, which consists of the signing CA's certificate and the Trust Anchor certificate (e.g., Root CA certificate). The SA may also install an initial CRL.

8.2 EUD PROVISIONING

Provisioning of EUDs can be performed via direct hard-wire connection or over the air using a controlled access wireless network. During the provisioning process, the SA loads and configures the required software for the EUD. The SA instructs the EUD to generate the requisite public/private key pairs for the EUD's Outer VPN Component and Inner Encryption Component as well as output the public keys in a specified CSR format for delivery to the Outer CA and the Inner CA, respectively.

If the VPN EUD uses a Dedicated Outer VPN to establish the Outer IPsec tunnel, the public/private key pairs and CSRs are generated on and output from the Dedicated Outer VPN device. For TLS EUDs that require an enterprise user certificate in addition to the Outer and Inner Tunnel device certificates, the CSR is delivered to the CA in the customer's organization that has the authority to issue enterprise user certificates. This CA may not be the same as the Inner CA.

If the EUD cannot generate its own key pairs or CSRs, then a dedicated management workstation is required to generate the key pairs for the EUD and construct the CSRs for delivery to the Outer CA and the Inner CA. The CAs process the CSRs and return signed certificates to the SA, who installs the certificates onto the EUD, and if required, the Dedicated Outer VPN device. If required, the SA also installs the private keys onto the EUD. The SA then finalizes the security configuration of the EUD before it is used for the first time.

If the MA solution owner is unable to remotely manage EUDs over the two layers of encryption within a MA solution, then the EUDs must be periodically locally re-provisioned in order to receive software and configuration updates. Re-provisioning consists of revoking the EUD's existing certificates and provisioning the EUD using a trusted baseline configuration that does not make use of any retained data originally stored on the EUD (e.g., factory reset and provision as a new device). This CP does not impose a particular frequency for re-provisioning. Without remote management of EUDs, re-provisioning is the only means of applying security-critical patches to EUDs.

Due to the time and effort needed to re-provision EUDs, it is preferable to remotely manage them when possible. With remote management capabilities, updated software (e.g., VPN client, VoIP application) and configuration data (e.g., Mandatory Access Control (MAC) policy, MDM policy) can be provided from a central management site through the MA solution to the EUD after the EUD establishes the two MA solution tunnels (see Section 4.3.1).

8.3 ADMINISTRATION OF MOBILE ACCESS COMPONENTS

Each component in the solution has one or more administration workstations that maintain, monitor, and control all security functions for that component. It should be noted that all of the required

administrative functionality does not need to be present in each individual workstation, but the entire set of administration workstations must collectively meet administrative functionality requirements.

The administration workstation is used for configuration review and management. Implementations employ a SIEM in the Gray Management Services for log management of Gray Infrastructure Components except where AOs use a CDS to move Gray Network log data to a Red SIEM.

Given the architecture of the solution, each layer has its own distinct administration LAN or VLAN; the Inner Encryption Components are managed from the Red Management Services and the Outer VPN Gateway and supporting components are managed from the Gray Management Services.

The Gray Administration Workstation, along with all Gray Management Services, is physically connected to the Gray Firewall. The Gray Firewall maintains separate ACLs to permit management traffic to/from the Gray Management Services, but prohibits such traffic from all other components. These ACLs ensure that approved management traffic is only capable of flowing in the intended direction. This architecture provides the separation necessary for two independent layers of protection.

Administration workstations must be dedicated terminals for the purposes given in the CP. For example, administration workstations are not used as the RA for the CA, a SIEM, or as a general user workstation for performing any functions besides management of the solution. Additionally, Administration workstations cannot be used as an enrollment workstation or provisioning workstation.

Management of all MA solution components is always encrypted to protect confidentially and integrity, except in the case where components are locally managed through a direct physical connection (e.g., serial cable from Gray administration workstation to Outer VPN Gateway). Management traffic must be encrypted with SSH, TLS, or IPsec. When components are managed over the Black Network, a CSfC Solution must be implemented in order to provide two layers of approved encryption. This requirement is not applicable if the MA solution infrastructure components are being managed from the same LAN or VLAN. For example, a Gray administration workstation residing within the Gray Management Services at the same site as the Outer VPN Gateway need not use CNSA Suite algorithms since this traffic does not traverse an untrusted network.

In most cases, Computing Devices are managed over the Black Network by using the Outer layer of IPsec and a MDM server selected from the CSfC Components List. When a MDM server is used to manage TLS EUDs, the MDM server is considered a TLS-Protected Server and the MDM agent is considered a TLS Client. As a result, the MDM server must be placed between the Gray Firewall and Inner Firewall. Like other Inner Encryption Components, the MDM server is managed from the Red administration workstation. As a TLS-Protected Server, the MDM server must be configured to establish a session with the MDM agent in accordance with the requirements in Table 15. Although not mandatory, the use of a MDM enables organizations to dynamically change policies enforced on the Computing Device, allowing more flexibility. Additionally, there are several security advantages by using a MDM including the ability to perform a remote wipe of the EUD.

8.4 EUDs for Different Classification Domains

As specified in this CP, an EUD is only authorized to communicate with Red Networks operating at the same classification level. Implementation of the Multiple Security Levels design does not change the requirement for EUDs to be dedicated to a single classification level. However, the CP does not preclude

the possibility that an approved CDS can be used within an infrastructure to provide cross domain transfer of data between EUDs operating at differing classification levels. It also does not preclude the use of an EUD as an access CDS for multiple enclaves operating at different classification levels if approved through the appropriate CDS approval process.

The requirements for a CDS capable of providing separation between enclaves of two or more classification levels are outside the scope of this CP. If developing a MA solution with a CDS capability, the solution owner must register against this CP and use the appropriate CDS approval processes.

9 SUPPORTING DOCUMENTS

9.1 CONTINUOUS MONITORING

The MA CP allows customers to use EUDs physically located outside of a secure government facility. With this increase in accessibility comes a need to continuously monitor network traffic and system log data within the solution infrastructure. This monitoring allows customers to detect, react to, and report any attacks against their solution. This continuous monitoring also enables the detection of any configuration errors within solution infrastructure components.

Continuous Monitoring requirements have been relocated to the *CSfC Continuous Monitoring Annex*. Figure 19 shows the monitoring points in the *CSfC Continuous Monitoring Annex*.

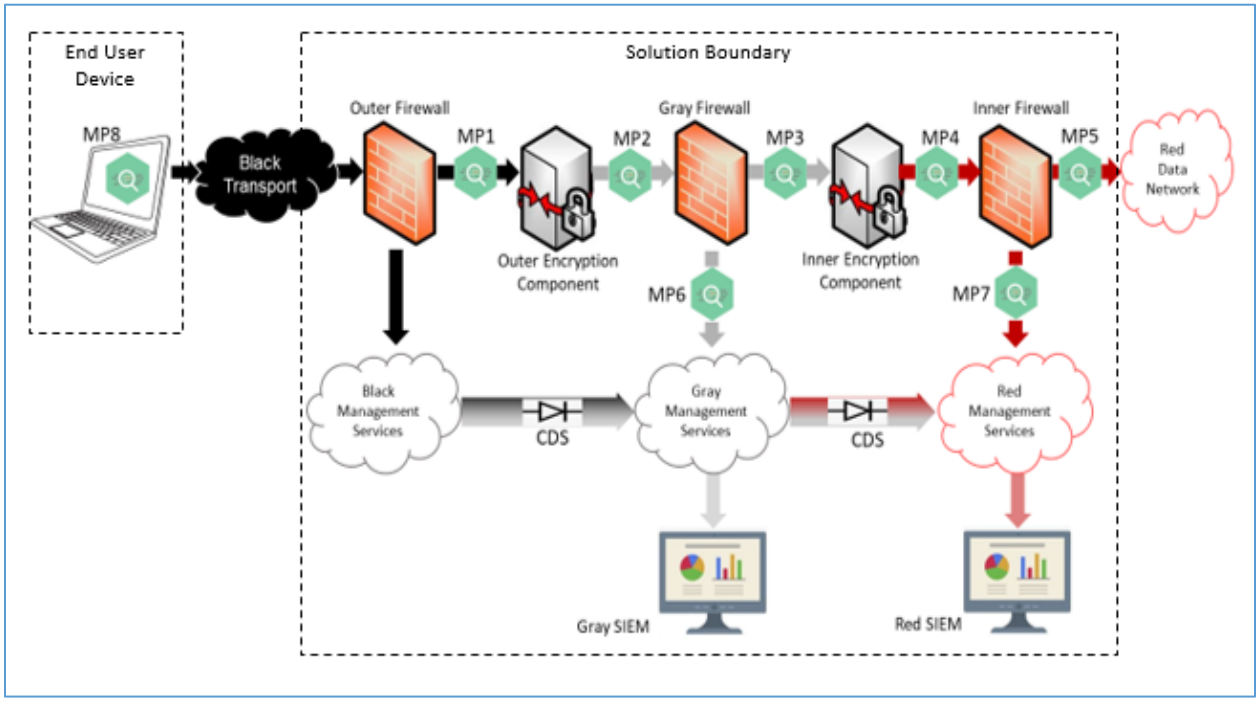

Figure 19. Solution Continuous Monitoring Point

9.2 KEY MANAGEMENT

The Key Management (KM) Requirements have been relocated to a separate *CSfC Key Management Requirements Annex*.

The CSfC Key Management Requirements Annex provides requirements and guidance for implementing the secure use of public key certificates for component authentication to establish the Outer and Inner encryption tunnels of CSfC solutions. At least two Certification Authorities (CAs) are used to issue certificates. One CA (known as the Outer CA) issues certificates to Outer Encryption Components and the other CA (known as the Inner CA) is used to issue certificates to Inner Encryption Components. To ensure that the same certificate cannot be used for authenticating both the Outer and Inner tunnels, the Outer CA and Inner CA are used to validate the Outer Tunnel and Inner Tunnel authentication certificates, respectively.

9.3 ENTERPRISE GRAY

The *CSfC Enterprise Gray (EG) Implementation Requirements Annex* is a supplemental document that enables the following capabilities within a CSfC solution:

- Enhanced scalability
- Centralized management
- Enhanced site survivability
- Ability to implement multiple CPs simultaneously

The Gray Encryption Components are allowed to share routes between each other to streamline the management of shared Gray Data and Gray Management planes in larger CSfC solutions. This dynamic sharing allows for better scaling for these networks and better resilience against network disruptions.

EG allows for interconnected CSfC sites or solutions to share a single Gray Management plane referred to as the Enterprise Gray Network and shared Gray Data plane. This shared Gray Data plane allows sites to access resources hosted at different sites such as Gray Data services and Inner Encryption Components only deployed on specific sites.

Greater interconnection and reliance between sites using the Enterprise Gray Network allows some sites to maintain functionality even if connections to other sites are lost or otherwise unusable. EG covers the utilities and services needed by a site to maintain a site solution while connection is restored.

EG allows for a single CSfC solution to incorporate multiple CPs into the same physical hardware. For example, an Outer Encryption Component being used as both the WLAN Access System as described in the *CSfC Campus WLAN CP* and the Outer VPN Gateway as allowed by the *CSfC Mobile Access CP*.

9.4 DATA AT REST

An MA CP EUD using Data-at-Rest (DAR) requires the DAR solution be approved by the NSA. The documentation for tailoring a NSA approved DAR solution can be found in the *CSfC Data-at-Rest Capability Package*.

The *CSfC Data-at-Rest Capability Package* is a high-level reference design document that enables customers to select products from the CSfC Components List and then to properly configure those products to achieve a level of assurance sufficient for protecting classified data while at rest.

10 REQUIREMENTS OVERVIEW

The following sections (Sections 10 through 14 and the *CSfC Key Management Requirements Annex*) specify requirements for implementations of MA solutions compliant with this CP. However, not all requirements in the following sections will apply to each compliant solution. Sections 10.1 and 10.2 describe how to determine which set of requirements applies to a particular solution. Key Management Requirements have been relocated to a separate *CSfC Key Management Requirements Annex*.

10.1 CAPABILITIES

This CP provides the flexibility needed to implement a variety of designs for the implementation of the MA solution. Although most requirements are applicable to all solutions, some requirements are only applicable to implementations whose high-level designs implement certain features. For example, requirements dealing with TLS EUDs do not include requirements for an Inner VPN Client. Table 8 lists the capabilities covered by this CP and the designators used in the requirements tables to refer to each.

Table 8. Capability Designators

Capability	Designator	Description
TLS Solution	T	Requirement that applies to the MA Solution that connects to the Red Network using IPsec as the Outer layer and TLS or SRTP as the Inner layer, as described in Section 6.
VPN Solution	V	Requirement that applies to the MA solution that connects to the Red Network using two IPsec tunnels, as described in Section 6.
TLS Infrastructure	TI	Requirement that applies specifically to the infrastructure associated with the TLS solution.
VPN Infrastructure	VI	Requirement that applies specifically to the infrastructure associated with the VPN solution.
TLS EUD	TE	Requirement that applies specifically to the EUD associated with the TLS solution.
VPN EUD	VE	Requirement that applies specifically to the EUD associated with the VPN solution.
All Solution Components	All	Requirement that applies to the EUD and to the infrastructure, regardless if it is a VPN solution or a TLS solution.
CDPs	C	Requirement that applies to the MA Solution that includes CDPs, as described in the *CSfC Key Management Requirements Annex*.
Multiple Security Levels	MS	Requirement that applies to MA solution infrastructure which supports multiple security levels thorough the same Outer VPN Gateway.
Connectivity to Dedicated Outer VPN	WC	Requirement that applies to EUDs which include a Dedicated Outer VPN.
Virtual EUD	VZ	Requirement that applies specifically to the EUD with Software Virtualization.
Hardware Isolation	HI	Requirement that applies to EUDs with Enhanced Hardware Isolation Requirements.

Any solution that follows this CP must implement each applicable capability for their solution (e.g., all VPN EUD (VE), VPN Infrastructure (VI), and VPN Solution (V) requirements for a solution supporting only VPN EUDs), and may implement multiple capabilities. The "Capabilities" column in the requirements tables in Sections 11 through 15 identifies which capabilities the requirement applies. A requirement is only applicable to a solution if the "Capabilities" column for that requirement lists one or more of the capabilities being implemented by the solution.

10.2 Threshold and Objective Requirements

Multiple versions of a requirement may exist in this CP, with alternative versions designated as being either a Threshold requirement or an Objective requirement:

- A Threshold (T) requirement specifies a feature or function that provides the minimal acceptable capability for the security of the solution.
- An Objective (O) requirement specifies a feature or function that provides the preferred capability for the security of the solution.

In general, when separate Threshold and Objective versions of a requirement exist, the Objective requirement provides a higher degree of security for the solution than the corresponding Threshold requirement. However, in these cases, meeting the Objective requirement may not be feasible in some environments or may require components to implement features that are not yet widely available. Solution owners are encouraged to implement the Objective version of a requirement, but in cases where this is not feasible, solution owners may implement the Threshold version of the requirement instead. These Threshold and Objective versions are mapped to each other in the "Alternatives" column. Objective requirements that have no related Threshold requirement are marked as "Optional' in the "Alternatives" column.

In most cases, there is no distinction between the Threshold and Objective versions of a requirement. In these cases, the "Threshold/Objective" column indicates that the Threshold equals the Objective (T=O). Such requirements must be implemented in order to comply with this CP, as long as the requirement is applicable per Section 10.1.

Requirements that are listed as Objective in this CP may become Threshold requirements in a future version of this CP. Solution owners are encouraged to implement Objective requirements where possible in order to facilitate compliance with future versions of this CP.

10.3 Requirements Designators

Each requirement defined in this CP has a unique identifier consisting of the prefix "MA," a digraph that groups related requirements together (e.g., KM), and a sequence number (11). Table 9, lists the digraphs used to group together related requirements and identifies the sections in which those requirement groups can be found.

Table 9. Requirement Digraphs

Digraph	Description	Section	Table
PS	Product Selection Requirements	Section 11	Table 10
SR	Overall Solution Requirements	Section 12.1	Table 11

Digraph	Description	Section	Table
CR	Inner and Outer VPN Component Configuration Requirements	Section 12.3	Table 16
IR	Inner VPN Component Requirements	Section 12.4	Table 17
OR	Outer VPN Component Requirements	Section 12.5	Table 18
MS	Multiple Security Level Requirements	Section 12.6	Table 19
TE	TLS-Protected Server & SRTP Endpoint Requirements	Section 12.7	Table 20
RD	Retransmission Device Requirements	Section 12.8	Table 21
HI	Enhanced Hardware Isolation Requirements	Section 12.9	Table 22
WC	Connectivity to Dedicated Outer VPN Requirements	Section 12.10	Table 23
EU	End User Device Requirements	Section 12.11	Table 24
VZ	Enhanced Virtualization Requirements	Section 12.12	Table 25
PF	Port Filtering Solution Component Requirements	Section 12.13	Table 26
CD	Configuration Change Detection Requirements	Section 12.14	Table 27
DM	Device Management Requirements	Section 12.15	Table 28
CM	Continuous Monitoring Requirements	Section 12.16	Table 29
WIDS	Wireless Intrusion Detection System/Wireless Intrusion Prevention System Requirements	Section 12.17	Table 30
AU	Auditing Requirements	Section 12.18	Table 31
KM	Key Management Requirements	Section 12.19	Table 32
MFA	Multi-Factor Authentication Use Case Requirements	Section 12.20	Table 33
GD	Use and Handling of Solutions Requirements	Section 13.1	Table 34
RP	Incident Reporting Requirements	Section 13.2	Table 35
RB	Role-Based Personnel Requirements	Section 14	Table 36
TR	Test Requirements	Section 15.1	Table 37
TI	Tactical Implementation Overlay Requirements	Appendix E	Table 38

11 REQUIREMENTS FOR SELECTING COMPONENTS

In this section, a series of requirements are given for maximizing the independence between the components within the solution. This will increase the level of effort required to compromise this solution.

Table 10. Product Selection Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-PS-1	The products used for the Inner VPN Gateway must be chosen from the list of IPsec VPN Gateways on the CSfC Components List.	VI	T=O	
MA-PS-2	The products used for any Outer VPN Gateway must be chosen from the list of IPsec VPN Gateways on the CSfC Components List.	VI, TI	T=O	
MA-PS-3	The products used for any Inner VPN Client must be chosen from the list of IPsec VPN Clients on the CSfC Components List.	VE	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-PS-4	The products used for any Outer VPN Client must be chosen from the list of IPsec VPN Clients on the CSfC Components List.	TE, VE	T=O	
MA-PS-5	*Requirement relocated to CSfC Key Management Requirements Annex.*			
MA-PS-6	If using a MDF EUD, the EUDs must be chosen from the list of Mobile Platforms on the CSfC Components List.	VE, TE	T=O	**Composed EUD:** MA-PS-34 and MA-PS-35; or **Virtual EUD:** MA-PS-34 and PA-PS-33; or **CDS EUD:** MA-PS-37 and MA-PS-38
MA-PS-7	Intrusion Prevention Systems (IPS) must be chosen from the list of IPS on the CSfC Components List.	VI, TI	O	Optional
MA-PS-8	Products used for the TLS Client must be chosen from the TLS Client sections (i.e., TLS Software Applications, Email Clients, Web Browsers, etc.) of the CSfC Components List.	TE	T=O	
MA-PS-9	Products used for the SRTP Client must be chosen from the list of VoIP Applications on the CSfC Components List.	TE	T=O	
MA-PS-10	If the solution is using a TLS-Protected Server, it must be chosen from the list of TLS-Protected Servers on the CSfC Components List.	TI	T=O	
MA-PS-11	If the solution is using a ESC, it must be chosen from the list of ESC on the CSfC Components List.	TI	T=O	
MA-PS-12	If the solution is using a SRTP Endpoint, it must be chosen from the list of SRTP endpoints on the CSfC Components List.	TI	T=O	
MA-PS-13	Products used for the Outer Firewall, Gray Firewall, and Inner Firewall must be chosen from the list of Stateful Traffic Filtering Firewalls (TFFW) on the CSfC Components List.	VI, TI	T=O	
MA-PS-14	If the solution is using a MDM, it must be chosen from the list of MDMs on the CSfC Components List.	VI, TI	T=O	
MA-PS-15	Withdrawn			

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-PS-16	The Outer VPN Gateway and Inner Encryption endpoints must either come from different manufacturers, where neither manufacturer is a subsidiary of the other, or be different products from the same manufacturer, where NSA has determined that the products meet the CSfC criteria for implementation independence.	VI, TI	T=O	
MA-PS-17	The Outer Firewall, Outer VPN Gateway, Gray Firewall, Inner Encryption Component, and Inner Firewall must use physically separate components, such that no component is used for more than one function (see Figure 1).	VI, TI	T=O	
MA-PS-18	The Outer VPN Gateway and the Inner Encryption endpoints must not use the same Operating System. Differences between Service Packs (SP) and version numbers for a particular vendor's OS do not provide adequate diversity.	VI, TI	T=O	
MA-PS-19	Requirement relocated to *CSfC Key Management Requirements Annex.*			
MA-PS-20	The Gray Network Firewall and the Inner Encryption endpoints must either come from different manufacturers, where neither manufacturer is a subsidiary of the other, or be different products from the same manufacturer, where NSA has determined that the products meet the CSfC criteria for implementation independence.	VI, TI	T=O	
MA-PS-21	The EUD's Outer VPN Component and Inner Encryption Components must either come from different manufacturers, where neither manufacturer is a subsidiary of the other, or be different products from the same manufacturer, where NSA has determined that the products meet the CSfC criteria for implementation independence.	VE, TE	T=O	
MA-PS-22	Requirement relocated to *CSfC Key Management Requirements Annex.*			
MA-PS-23	The cryptographic libraries used by the Outer VPN Component and the Inner Encryption Components must either come from different manufacturers, where neither manufacturer is a subsidiary of the other, or be different products from the same manufacturer, where NSA has determined that the products meet the CSfC criteria for implementation independence.	VE, TE	O	Optional

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-PS-24	Each component that is selected from the CSfC Components List must go through a Product Supply Chain Threat Assessment to determine the appropriate mitigations for the intended application of the component per the organization's AO-approved Product Supply Chain Threat Assessment process (see CNSSD 505 SCRM for additional guidance).	All	T=O	
MA-PS-25	Products selected from the CSfC Components List must be configured to use the NIAP-certified evaluated configuration.	All	T=O	
MA-PS-26	If the solution supports multiple security levels, the authentication server must be chosen from the list of authentication servers on the CSfC Components List.	MS	T=O	
MA-PS-27	If the solution uses a Dedicated Outer VPN as part of an EUD, it must be chosen from the list of IPsec VPN Gateways or IPsec VPN Clients on the CSfC Components List.	VE, TE	T=O	
MA-PS-28	Withdrawn			
MA-PS-29	Black Network Enterprise PKI is prohibited from being used as the Outer or Inner Tunnel CA.	All	T=O	
MA-PS-30	Black Firewall products used for the RD must be chosen from the list of Stateful Traffic Filtering Firewalls (TFFW) on the CSfC Components List.	VE, TE, HI	O	Optional
MA-PS-31	All products used for Solution Components (e.g., the Inner VPN Gateway, Outer VPN Gateway, Inner VPN Client, Outer VPN, Inner and Outer CAs, Intrusion Prevention Systems (IPS), Outer Firewall, Gray Firewall, Inner Firewall, and Mobile Platform EUDs) that contain a Trusted Platform Module (TPM) must provide a Platform Certificate compliant with the latest version of the Trusted Computing Group (TCG) Platform Certificate Profile and a corresponding CA certificate chain. The Platform Certificate must contain components for, at a minimum, the Chassis, Baseboard, CPU(s), RAM, Disk(s), and NIC(s). Component details must include, at minimum, the manufacturer name, model number, serial number for each component. For products that are compliant with the UEFI specification the platform certificate must be stored in the UEFI partition at location /boot/tcg/cert/platform.	All	O	Optional

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-PS-32	All products used for Solution Components (e.g., the Inner VPN Gateway, Outer VPN Gateway, Inner VPN Client, Outer VPN, Inner and Outer CAs, Intrusion Prevention Systems (IPS), Outer Firewall, Gray Firewall, Inner Firewall, and Mobile Platform EUDs) must provide a Reference Integrity Manifest (RIM) Bundle compliant with the latest version of the TCG Reference Integrity Manifest (RIM) Information Model and a corresponding CA certificate chain. For products with a TPM and comply with the UEFI specification must provide a RIM Bundle that is additionally compliant with the latest version of the TCG PC Client Reference Integrity Manifest (RIM) specification and the PC Client Firmware Integrity Measurement (FIM) specification.	All	O	Optional
MA-PS-33	If using a composed EUD, the EUD's Operating System must be chosen from the list of Operating System on the CSfC Components List.	All	T=O	**MDF EUD:** MA-PS-6 **Virtual EUD:** PA-PS-35; or **CDS EUD:** MA-PS-38
MA-PS-34	If using a composed EUD, the EUD's Hardware Platform must be chosen from the list of Hardware Platforms on the CSfC Components List.		T=O	**MDF EUD:** MA-PS-6 **CDS EUD:** MA-PS-37
MA-PS-35	If using a virtualized EUD, the EUD's Hypervisor used must be chosen from the list of Operating Systems on the CSfC Components List.		T=O	**MDF EUD:** MA-PS-6 **Composed EUD:** PA-PS-33; or **CDS EUD:** MA-PS-38
MA-PS-36	The EUD must have a Dedicated Security Component chosen from the list of Dedicated Security Components on the CSfC Components List.		O	Optional
MA-PS-37	If using an Access CDS EUD, the EUD's Hardware Platform must be validated as part of an Access CDS listed on the CDS Baseline.		T=O	**MDF EUD:** MA-PS-6 **Composed and Virtual EUD:** PA-PS-34

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-PS-38	If using an Access CDS EUD, the EUD's Operating System used must be validated as part of an Access CDS listed on the CDS Baseline.		T=O	**MDF EUD:** MA-PS-6 **Composed EUD:** PA-PS-33; or **Virtual EUD:** PA-PS-35
MA-PS-39	The products used for the SWFDE layer must be chosen from the list of SWFDEs on the CSfC Components List.		T=O	MA-PS-40
MA-PS-40	The products used for the HWFDE layer must be chosen from the list of HWFDEs on the CSfC Components List.		T=O	MA-PS-39

12 CONFIGURATION REQUIREMENTS

Once the products for the solution are selected, the next step is setting up the components and configuring them in a secure manner. This section consists of generic guidance on how to configure the components of the MA solution.

12.1 OVERALL SOLUTION REQUIREMENTS

Table 11. Overall Solution Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-SR-1	Network services provided by control plane protocols (such as DNS and NTP) must be located on the inside network (i.e., Gray Network for the Outer VPN Gateway and Red Network for the Inner Encryption Endpoints).	VI, TI	T=O	
MA-SR-2	The time of day on Inner Encryption Endpoints, Inner Firewall, and Red Management Services must be synchronized to a time source located in the Red Network.	VI, TI	T=O	
MA-SR-3	The time of day on the Outer VPN Gateway, Gray Firewall, and Gray Management Services must be synchronized to a time source located in the Gray Management network.	VI, TI	T=O	
MA-SR-4	Default accounts, passwords, community strings, and other default access control mechanisms for all components must be changed or removed.	All	T=O	
MA-SR-5	All components must be properly configured in accordance with local policy and applicable U.S. Government guidance. In the event of conflict between the requirements in this CP and local policy, this CP takes precedence.	All	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-SR-6	Solution components must receive virus signature updates as required by the local agency policy and the AO.	All	T=O	
MA-SR-7	The only approved physical paths leaving the Red Network must be through a MA solution in accordance with this CP or via an AO-approved solution for protecting data in transit.[1]	All	T=O	
MA-SR-8	When multiple Inner Encryption Components are placed between the Gray Firewall and Inner Firewall, they must be placed in parallel.	VI, TI	T=O	
MA-SR-9	Inner Encryption Components must not perform switching or routing for other Encryption Components.	VI, TI	T=O	
MA-SR-10	Infrastructure components must only be configured over an interface dedicated for management.	VI, TI	T=O	
MA-SR-11	DNS lookup services on network devices must be disabled.	All	O	Optional
MA-SR-12	DNS server addresses on infrastructure devices must be specified or DNS services must be disabled.	All	T=O	
MA-SR-13	Automatic remote boot-time configuration services must be disabled (e.g., automatic configuration via Trivial File Transfer Protocol on boot).	All	T=O	
MA-SR-14	All Infrastructure components must implement a password/authentication with entropy of at least 112 bits.	All	T	MA-SR-15
MA-SR-15	All infrastructure components must use an authentication service on their respective network/domain in order to access the Infrastructure component of the respective network/domain.	All	O	MA-SR-14

12.2 ALL VPN COMPONENTS CONFIGURATION REQUIREMENTS

Table 12. Approved Commercial Algorithms (IPsec) for up to Top Secret

Security Service	Approved Algorithms	Specifications
Confidentiality (Encryption)	AES-256	FIPS PUB 197 IETF RFC 9206 IETF RFC 9212 IETF RFC 6460
Authentication (Digital Signature)	RSA 3072 or, ECDSA over the curve P-384 with SHA-384	FIPS PUB 186-4 IETF RFC 9206 IETF RFC 6460

[1] In some cases, the customer will need to communicate with other sites that have the NSA-certified Government off-the-Shelf (GOTS) solutions. In particular, it is acceptable for a given site to have both an egress path via an NSA-certified product solution and an egress path via a CSfC Solution conforming to a CP.

Security Service	Approved Algorithms	Specifications
Key Exchange/ Establishment	ECDH over the curve P-384 (DH Group 20) or, Diffie-Hellman 3072	NIST SP 800-56A IETF RFC 9206 IETF RFC 9212 IETF RFC 6460 IETF RFC 7296
Integrity (Hashing)	SHA-384 or SHA-512	FIPS PUB 180-4 IETF RFC 9206 IETF RFC 9212 IETF RFC 6460

Table 13. Approved Commercial Algorithms for TLS up to Top Secret

Security Service	TLS Cipher Suites	Specifications
Confidentiality (Encryption)	AES-256-GCM	FIPS PUB 180-4 FIPS PUB 186-3 FIPS PUB 197 FIPS 800-56A IETF RFC 5288 IEFT RFC 5289 IETF RFC 8422 IETF RFC 8423 IETF RFC 8446 IETF RFC 8603
Authentication (Digital Signature)	RSA 3072 or, ECDSA over the curve P-384 with SHA-384	FIPS PUB 186-4 IETF RFC 9206 IETF RFC 6460
Key Exchange/ Establishment	ECDH over the curve P-384 (DH Group 20) or, Diffie-Hellman 3072	NIST SP 800-56A IETF RFC 9206 IETF RFC 9212 IETF RFC 6460 IETF RFC 7296
Integrity (Hashing)	SHA-384 or SHA-512	FIPS PUB 180-4 IETF RFC 9206 IETF RFC 9212 IETF RFC 6460

Table 14. Approved Commercial Algorithms for Wireless Connectivity

Security Service	Algorithm Suite	Specifications
Confidentiality (Encryption)	AES-128-CCMP (Threshold) AES-256-GCMP (Objective)	FIPS PUB 197 IETF RFC 9206 IETF RFC 9212

Table 15. Approved Commercial Algorithms for SRTP up to Top Secret

Security Service	Approved Algorithms	Specifications
Confidentiality (Encryption)	AES-256 in Counter Mode (CM)	IETF RFC 3711 IETF RFC 2675 IETF RFC 7714
Integrity	HMAC-SHA1	IETF RFC 3711 IETF RFC 2104
Key Exchange (using ESC Over TLS)	TLS-SDES or DTLS	IETF RFC 4568 IETF RFC 6347

12.3 Inner and Outer VPN Component Configuration Requirements

Table 16. Inner and Outer VPN Component Configuration Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-CR-1	The proposals offered by the Outer and Inner VPN Components in the course of establishing the IKE Security Association and the ESP SA for Inner and Outer Tunnels must be configured to only offer algorithm suite(s) containing the CNSA algorithms listed in Table 12.	All	T=O	
MA-CR-2	Default, self-signed, or proprietary device certificates, which are frequently preinstalled by the vendor, for any Outer and Inner VPN Component, must not be used for establishing SAs.	All	T	MA-CR-3
MA-CR-3	Default, self-signed, or proprietary device certificates, which are frequently preinstalled by the vendor, for any Outer and Inner VPN Component, must be removed.	All	O	MA-CR-2
MA-CR-4	Unique device certificates must be loaded onto the Outer and Inner VPN Gateway along with the corresponding Certification Authority certificates.	VI, TI	T=O	
MA-CR-5	A device certificate must be used for each Outer and Inner VPN Component authentication during IKE.	All	T=O	
MA-CR-6	Authentication performed by Outer and Inner VPN Gateways must include a check that device certificates are valid and not revoked. This check may use a CRL or OCSP responder.	VI, TI	T=O	
MA-CR-7	Outer and Inner VPN Component authentication with device certificates must include a check that certificates are not expired.	VI, TI	T=O	
MA-CR-8	Withdrawn			
MA-CR-9	All IPsec connections must use IETF standards, IKE implementations (RFC 7296).	All	T=O	
MA-CR-10	Withdrawn			

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-CR-11	All Outer and Inner VPN Components must use Cipher Block Chaining for ESP encryption with a HMAC for integrity.	All	T	MA-CR-12
MA-CR-12	All Outer and Inner VPN Components must use Galois Counter Mode for ESP encryption.	All	O	MA-CR-11
MA-CR-13	All Outer and Inner VPN Components must set the IKE SA lifetime to at most 24 hours.	All	T=O	
MA-CR-14	All Outer and Inner VPN Components must set the ESP SA lifetime to at most 8 hours.	All	T=O	
MA-CR-15	All VPN Components must re-authenticate the identity of the VPN Component at the other end of the established tunnel before rekeying the IKE SA.	All	T=O	
MA-CR-16	All Outer and Inner VPN Components must use Galois Counter Mode for IKE encryption.	All	T=O	

12.4 INNER VPN COMPONENTS REQUIREMENTS

Table 17. Inner VPN Components Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-IR-1	The Inner VPN Component must use Tunnel Mode IPsec or Transport Mode IPsec using an associated IP tunneling protocol (e.g., Transport Mode IPsec with GRE).	VI	T=O	
MA-IR-2	The packet size for packets leaving the external interface of the Inner VPN Component must be configured to reduce packet fragmentation and limit performance degradation. This requires proper configuration of the Maximum Transmission Unit (MTU) (for IPv4) or Path MTU (PMTU) (for IPv6) and should consider Black Network and Outer VPN Component MTU/PMTU values to achieve this.	VI	O	Optional
MA-IR-3	The Inner VPN Gateway must not allow any packets received on an interface connected to a Red Network to bypass encryption and be forwarded out through an interface connected to a Gray Network.	V	T	MA-IR-6
MA-IR-4	The Inner VPN Client of EUDs must encrypt all traffic, with the exception of traffic necessary for the EUD to connect to the physical network (e.g., DHCP) and locate the Inner VPN Gateway (i.e., DNS lookup of the VPN Component's IP address), in accordance with this CP.	VE	T=O	
MA-IR-5	The Inner VPN Component must not allow any packets received on an interface connected to a Gray Network to bypass decryption and be forwarded out through an interface connected to a Red Network.	V	T	MA-IR-7

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-IR-6	The Inner VPN Gateway must use MAC policy to not allow any packets received on an interface connected to a Red Network to bypass encryption and be forwarded out through an interface connected to a Gray Network.	V	O	MA-IR-3
MA-IR-7	The Inner VPN Component must use MAC policy to not allow any packets received on an interface connected to a Gray Network to bypass decryption and be forwarded out through an interface connected to a Red Network.	V	O	MA-IR-5

12.5 OUTER VPN COMPONENTS REQUIREMENTS

Table 18. Outer VPN Component Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-OR-1	Outer VPN Components must use Tunnel Mode IPsec.	All	T=O	
MA-OR-2	Outer VPN Components must not permit split-tunneling.	All	T=O	
MA-OR-3	The Outer VPN Component must not allow any packets received on an interface connected to a Gray Network to bypass encryption and be forwarded out through an interface connected to a Black Network.	All	T	MA-OR-11
MA-OR-4	All traffic received by the Outer VPN Component on an interface connected to a Gray Network, with the exception of control plane traffic not prohibited in the CP, must have already been encrypted once.	All	T=O	
MA-OR-5	The Outer VPN Client of EUDs must encrypt all traffic, with the exception of traffic necessary for the EUD to connect to the physical network (e.g., DHCP) in accordance with this CP (see Section 4.2.4).	VE, TE	T=O	
MA-OR-6	If one or more virtual machines are used to separate Outer and Inner VPN Clients on an EUD then the Outer VPN Client must not run on the host operating system.	VE, TE	T=O	
MA-OR-7	The Outer VPN Component must not allow any packets received on an interface connected to a Black Network to bypass decryption.	All	T	MA-OR-12
MA-OR-8	Withdrawn			
MA-OR-9	The Outer VPN Gateways must not use routing protocols (e.g., OSPF, BGP).	VI, TI	T=O	
MA-OR-10	If a Dedicated Outer VPN is used it must be dedicated to a single security level and only provide the Outer layer of IPsec to Computing Devices connecting to a Red Network of the same security level.	VI, TI	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-OR-11	The Outer VPN Component must use MAC Policy to not allow any packets received on an interface connected to a Gray Network to bypass encryption and be forwarded out through an interface connected to a Black Network.	All	O	MA-OR-3
MA-OR-12	The Outer VPN Component must use MAC policy to not allow any packets received on an interface connected to a Black Network to bypass decryption.	All	O	MA-OR-7

12.6 Multiple Security Level Requirements

The following section provides requirements for customers using the same Outer VPN Gateway for multiple security levels as described in Section 4.3.4.

Table 19. Multiple Security Level Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-MS-1	The solution must include an authentication server in the Gray Management Network.	MS	T=O	
MA-MS-2	A unique device certificate must be loaded on the authentication server along with the corresponding CA (signing) certificate.	MS	T=O	
MA-MS-3	The EUD must establish an EAP-TLS session with the Outer VPN Gateway within IKE to exchange credentials.	MS	T=O	
MA-MS-4	The Outer VPN Gateway must act as an EAP pass-through and forward authentication packet between the EUD and authentication server.	MS	T=O	
MA-MS-5	Upon successful authentication the authentication server must send an Access Accept Radius or Diameter packet to the Outer VPN Gateway including an attribute for which network the EUD is associated.	MS	T=O	
MA-MS-6	The Outer VPN Gateway must use unique physical internal interfaces for each enclave of the solution (i.e., VLAN trunking of multiple enclaves is not permitted).	MS	T=O	
MA-MS-7	The Outer VPN Gateway must route EUD traffic over the appropriate interface and network based on the attribute provided by the authentication server in the Access Accept RADIUS or Diameter packet.	MS	T=O	
MA-MS-8	The Outer VPN Gateway must assign a Firewall ACL to EUDs based on the attribute information provided by the authentication server.	MS	T=O	
MA-MS-9	The EUD and Outer VPN Gateway must use approved algorithms from Table 13 and process for key exchange.	MS	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-MS-10	The EUD and authentication server must use X.509 device certificates for mutual authentication.	MS	T=O	
MA-MS-11	The EUD and Outer VPN Gateway must only use TLS Cipher Suites selected from Table 13 for encryption.	MS	T=O	
MA-MS-12	Withdrawn			
MA-MS-13	Gray Network components must be physically protected to the level of the highest classified network.	MS	T=O	

12.7 TLS-Protected Server & SRTP Endpoint Requirements

Table 20. TLS-Protected Server & SRTP Endpoint Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-TE-1	TLS Components must use TLS 1.2 or later.	T	T=O	
MA-TE-2	TLS Solution Infrastructure components must terminate the Inner layer of encryption originating from TLS EUDs.	TI	T=O	
MA-TE-3	TLS Solution Infrastructure components must use X.509 device certificates for mutual authentication with TLS EUDs.	TI	T=O	
MA-TE-4	Default, self-signed, or proprietary certificates, which are frequently preinstalled by the vendor, for the TLS Component must be disabled.	T	T	MA-TE-5
MA-TE-5	Default, self-signed, or proprietary certificates, which are frequently preinstalled by the vendor, for the TLS Component must be removed.	T	O	MA-TE-4
MA-TE-6	Unique device certificates must be loaded onto TLS Components along with the corresponding Certification Authority certificates.	T	T=O	
MA-TE-7	TLS Components must be configured to only offer algorithm suite(s) containing the CNSA algorithms listed in Table 13.	T	T=O	
MA-TE-8	Withdrawn			
MA-TE-9	SRTP Components must only use algorithms selected from Table 15 that are approved to protect the highest classification level of the Red Network Data.	T	T=O	
MA-TE-10	TLS Solution Infrastructure components must not allow any packets received on an interface connected to a Gray Network to bypass decryption and be forwarded out through an interface connected to a Red Network.	TI	T=O	

12.8 RETRANSMISSION DEVICE REQUIREMENTS

Table 21. Retransmission Device Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-RD-1	An EUD must only connect to RDs authorized by a Government AO.	VE, TE, HI	T=O	
MA-RD-2	An RD must provide EUDs with connectivity to the MA Solution infrastructure via any Black Network using Wi-Fi or an Ethernet cable.	VE, TE	T=O	
MA-RD-3	If the RD is configured to be a Wi-Fi access point, the Wi-Fi network must implement WPA2 PSK.	VE, TE	T=O	
MA-RD-4	An RD must not be used to protect Gray data between an Outer VPN Gateway and EUD.	VE, TE, HI	T=O	
MA-RD-5	Withdrawn, covered in the *CSfC Key Management Requirements Annex.*			
MA-RD-6	An RD must only permit connections to devices on a Media Access Control Allowlist.	VE, TE	O	Optional
MA-RD-7	If the RD is configured as a Wi-Fi access point, then the PSK must not be displayed on the RD.	VE, TE	T=O	
MA-RD-8	If the RD is configured as a Wi-Fi access point, then the Service Set Identifier (SSID) must not be displayed on the RD.	VE, TE	T=O	
MA-RD-9	If the RD is configured as a Wi-Fi access point, then the Media Access Control address of connected devices must not be displayed on the RD.	VE, TE	T=O	
MA-RD-10	The Administrator password must not be displayed on the RD.	VE, TE, HI	T=O	
MA-RD-11	The RD must display the number of currently connected devices.	VE, TE, HI	O	Optional
MA-RD-12	If the RD is configured to be a Wi-Fi access point, then Wi-Fi Protected Setup (WPS) must be disabled.	VE, TE	T=O	
MA-RD-13	The RD must be administered using HTTPS.	VE, TE, HI	T=O	MA-RD-31 or MA-RD-32
MA-RD-14	The RD must require authentication with Administrator credentials to make changes to RD settings.	VE, TE, HI	T=O	
MA-RD-15	The RD default Administrator credentials must be changed during provisioning.	VE, TE, HI	T=O	
MA-RD-16	The RD must be configured to allow the fewest number of EUDs required for the mission.	VE, TE, HI	T=O	
MA-RD-17	If the RD is used by more than one EUD and the RD is configured as a Wi-Fi access point, then traffic of multiple EUDs sharing the RD must be separated (commonly referred to as Wi-Fi Privacy Separation or Access Point Isolation).	VE, TE	T=O	
MA-RD-18	If the RD is configured as a Wi-Fi access point, then the RD must disable broadcasting of the Service Set Identifier.	VE, TE	O	Optional

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-RD-19	The RD must only permit charging on USB ports and interfaces.	VE, TE	O	Optional
MA-RD-20	The RD must not permit connected EUDs to access files stored on the RD.	VE, TE, HI	T=O	
MA-RD-21	The RD must require Administrator authentication prior to downloading logs or configuration files.	VE, TE, HI	T=O	
MA-RD-22	The RD must only allow firmware updates signed by the RD manufacturer.	VE, TE, HI	O	Optional
MA-RD-23	The RD must prevent the ability to boot into recovery mode.	VE, TE, HI	O	Optional
MA-RD-24	The RD must require user or Administrator authentication prior to updating firmware.	VE, TE, HI	O	Optional
MA-RD-25	Withdrawn, covered in the *CSfC Key Management Requirements Annex.*			
MA-RD-26	Withdrawn			
MA-RD-27	If the RD is configured to be a Wi-Fi access point, the Wi-Fi network must only use cipher suites selected from the "Confidentiality (Encryption) (Threshold)" row of Table 14.	VE, TE	T	MA-RD-28
MA-RD-28	If the RD is configured to be a Wi-Fi access point, the Wi-Fi network must only use cipher suites selected from the "Confidentiality (Encryption) (Objective)" row of Table 14.	VE, TE	O	MA-RD-27
MA-RD-29	If the RD is connected to a Black Network which requires user interaction (e.g., captive portal wireless, 802.1X user authentication) the EUD must not be used to provide any input.	VE, TE, HI	T=O	
MA-RD-30	Initial provisioning of the RD occurs in a physically secure area.	VE, TE, HI	T=O	
MA-RD-31	The RD must be administered using a hard-wired connection.	VE, TE, HI	T=O	MA-RD-13 or MA-RD-32
MA-RD-32	The RD must be administered using a wireless connection in a physically secure area.	VE, TE, HI	T=O	MA-RD-13 or MA-RD-31

12.9 Enhanced Hardware Isolation Requirements

Table 22. Enhanced Hardware Isolation Requirements

Req #	Requirement Description	Capabilities	Threshold/Objective	Alternative
MA-HI-1	The RD must provide EUDs with connectivity to the MA Solution infrastructure via any Black Network using a hard-wired connection such as Ethernet or Ethernet over USB.	HI	T=O	

Req #	Requirement Description	Capabilities	Threshold/Objective	Alternative
MA-HI-2	The RD must not use Wi-Fi on the internal side for connection to EUDs.	HI	T=O	
MA-HI-3	Wi-Fi must be disabled on the EUD.	HI	T=O	
MA-HI-4	The RD must only permit connections to devices on a Media Access Control Allowlist.	HI	O	Optional
MA-HI-5	The RD must have separate ports for charging and for tethering to the EUD.	HI	O	Optional
MA-HI-6	The RD must be connected via a wired connection on the internal side.	HI	T=O	
MA-HI-7	The RD must implement a firewall either software or hardware.	HI	T=O	
MA-HI-8	The RD must strip and replace the Data-Link Layer protocol headers between the RD and the EUD.	HI	T=O	
MA-HI-9	The chip providing connectivity on the external side must be physically separate from the main processor.	HI	T=O	
MA-HI-10	The RD must be managed over a wired connection.	HI	T=O	
MA-HI-11	For management of the RD, mutual authentication between the RD and the admin device must be required.	HI	O	Optional
MA-HI-12	The RD firewall must be configured to only allow traffic needed for the outer layer of encryption as determined by the AO.	HI	T=O	

12.10 Connectivity to Dedicated Outer VPN Requirements

This section provides requirements for EUDs using a Dedicated Outer VPN connected to the Computing Device.

Table 23. Connectivity to Dedicated Outer VPN Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-WC-1	A Computing Device must only connect to a Dedicated Outer VPN authorized as part of the MA CP solution.	WC	T=O	
MA-WC-2	Withdrawn			
MA-WC-3	Withdrawn			
MA-WC-4	Withdrawn			
MA-WC-5	Withdrawn			
MA-WC-6	Withdrawn			
MA-WC-7	Withdrawn			
MA-WC-8	Withdrawn			
MA-WC-9	Withdrawn			
MA-WC-10	Withdrawn			
MA-WC-11	Withdrawn			
MA-WC-12	Withdrawn			
MA-WC-13	The Dedicated Outer VPN must be managed over a wired interface.	WC	T=O	
MA-WC-14	The Dedicated Outer VPN must comply with all requirements in Tables 16 and 18.	WC	T=O	
MA-WC-15	Withdrawn			
MA-WC-16	Withdrawn	WC	T=O	
MA-WC-17	All EUDs must connect to Dedicated Outer VPN devices with a wired connection.	WC	T=O	
MA-WC-18	Wi-Fi must be disabled on the EUD.	WC	T=O	
MA-WC-19	A Dedicated Outer VPN must only connect to a Computing Device authorized as part of the MA CP solution.	WC	T=O	

12.11 End User Device Requirements

Table 24. End User Device Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-EU-1	EUDs that do not implement an NSA-approved DAR solution and allow a user to store classified information on the EUD must be treated as classified at all times. (See Section 4.3.1).	TE, VE	T=O	
MA-EU-2	EUDs that implement an NSA-approved DAR solution (e.g., Data at Rest CP) must comply with the handling requirements specified for the DAR solution, and may use USB for approved DAR purposes.	VE, TE	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-EU-3	Thin EUDs which prohibit a user from storing classified information must be treated as unclassified, or a higher classification level as determined by the AO, when powered down.	VE, TE	T=O	
MA-EU-4	The Outer VPN Client private key store must be separate from the private key store for the Inner VPN Client.	VE	O	Optional
MA-EU-5	The Inner and Outer VPN Clients on the EUD must be implemented on separate IP stacks. Implementations of IPv4 and IPv6 on the same operating system are considered to be part of the same IP stack.	VE	O	Optional
MA-EU-6	If the EUD is not remotely administered, then it must only be updated and rekeyed through re-provisioning.	VE, TE	T=O	
MA-EU-7	The EUD must not allow split-tunneling.	VE, TE	T=O	
MA-EU-8	Withdrawn, covered in the *CSfC Key Management Requirements Annex.*			
MA-EU-9	Withdrawn, covered in the *CSfC Key Management Requirements Annex.*			
MA-EU-10	An EUD must be de-authorized from the network and submitted for Forensic Analysis if suspected of being compromised.	VE, TE	T=O	
MA-EU-11	An EUD must be destroyed if it has been determined to be compromised through Forensic Analysis.	VE, TE	T=O	
MA-EU-12	Users of EUDs must successfully authenticate themselves to the services they access on the Red Network using an AO-approved method.	VE, TE	T=O	
MA-EU-13	Red Network services must not transmit any classified data to EUDs until user authentication succeeds.	VE, TE	T=O	
MA-EU-14	Withdrawn			
MA-EU-15	All EUD Users must sign an organization-defined user agreement before being authorized to use an EUD.	VE, TE	T=O	
MA-EU-16	All EUD Users must receive an organization-developed training course for operating an EUD prior to use.	VE, TE	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-EU-17	At a minimum, the organization-defined user agreement must include each of the following: • Consent to monitoring • Operations Security guidance • Required physical protections to employ when operating and storing the EUD • Restrictions for when, where, and under what conditions the EUD may be used • Responsibility for reporting security incidents • Verification of Information Assurance (IA) Training • Verification of appropriate clearance • Justification for Access • Requester information and organization • Account Expiration Date • User Responsibilities	VE, TE	T=O	
MA-EU-18	EUDs must be dedicated for use solely in the MA solution, and not used to access any resources on networks other than the Red Network it communicates with through the two layers of encryption.	VE, TE	T=O	
MA-EU-19	EUDs must be remotely administered.	VE, TE	O	Optional
MA-EU-20	The EUD must disable all transmitted Global Positioning System (GPS) and location services except Enhanced 9-1-1 (E911) or those authorized by the AO.	VE, TE	T	MA-EU-60
MA-EU-21	The EUD must disable Firmware-Over-the-Air (FOTA) updates from the cellular carrier.	VE, TE	T=O	
MA-EU-22	The EUD must disable all wireless interfaces (e.g., Bluetooth, NFC, Cellular, 802.11) that do not pass through the Outer VPN component.	VE, TE	T	MA-EU-61
MA-EU-23	The EUD must disable processing of incoming cellular services including voice messaging services that do not pass through the VPN client.	VE, TE	T=O	
MA-EU-24	All EUDs must have their certificates revoked and resident image removed prior to disposal.	VE, TE	T=O	
MA-EU-25	Passwords for user to device (EUD selected from Mobile Platform section of CSfC Components List) authentication must be a minimum of six alpha-numeric case sensitive characters.	VE, TE	T	MA-EU-65
MA-EU-26	Withdrawn			
MA-EU-27	For a VPN EUD that uses a Dedicated Outer VPN, the Dedicated Outer VPN must be the Outer layer of encryption and the VPN client on the Computing Device will be the Inner Layer of encryption.	VE	T=O	
MA-EU-28	Withdrawn			

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-EU-29	If the EUD is using a Dedicated Outer VPN, the communication between the EUD and the Dedicated Outer VPN must be through a wired connection (e.g., Ethernet).	VE, TE	T=O	
MA-EU-30	Withdrawn			
MA-EU-31	If the EUD uses a Dedicated Outer VPN to connect over the Black Transport Network, the Dedicated Outer VPN must be used to establish the Outer layer of encryption.	VE, TE	T=O	
MA-EU-32	If an NSA-approved DAR solution is not implemented on the MDF EUD, the EUD must have the native platform of DAR protection enabled.	VE, TE	T=O	
MA-EU-33	EUDs must use a unique X.509 v3 device certificate, signed by the Outer CA, for mutual authentication with Outer VPN Gateways.	VE, TE	T=O	
MA-EU-34	TLS EUDs must use a unique X.509 v3 device certificate or user certificate, signed by the inner CA, for mutual authentication with TLS-Protected Servers.	TE	T =O	
MA-EU-35	VPN EUDs must use a unique X.509 v3 device certificate, signed by the Inner CA, for mutual authentication with Inner VPN Gateways.	VE	T=O	
MA-EU-36	Withdrawn			
MA-EU-37	EUDs must be configured for all IP traffic, with the exception of IKE, network address configuration, time synchronization, and name resolution traffic required to establish the IPsec tunnel, to flow through the outer IPsec VPN Client.	VE, TE	T	MA-EU-38
MA-EU-38	EUDs must be configured for all IP traffic, with the exception of IKE, to flow through the outer IPsec VPN Client.	VE, TE	O	MA-EU-37
MA-EU-39	The EUD user account password lifetime must be less than 181 days.	VE, TE	T=O	
MA-EU-40	The EUD screen must lock after three minutes or less of inactivity.	VE, TE	T=O	
MA-EU-41	The EUD must perform a wipe of all protected data after 10 or less authentication failures.	VE, TE	T=O	MA-EU-77
MA-EU-42	VPN protection must be enabled across the EUD.	VE, TE	T=O	
MA-EU-43	A security policy (e.g., MAC policy, MDM policy) must be configured on the EUD specific to each permitted RD and/or Government Private Wireless Network and/or Government Private Wired Network.	VE, TE	T=O	
MA-EU-44	During provisioning, all unnecessary keys must be destroyed from the EUD secure key storage.	VE, TE	T=O	
MA-EU-45	During provisioning, all unnecessary X.509 certificates must be removed from the EUD Trust Anchor Database.	VE, TE	O	MA-EU-68
MA-EU-46	All display notifications must be disabled while in a locked state.	VE, TE	O	Optional

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-EU-47	USB mass storage mode must be disabled on the EUDs.	VE, TE	T=O	
MA-EU-48	USB data transfer must be disabled on the EUDs for all purposes except Ethernet over USB.	VE, TE	T=O	
MA-EU-49	Prior to updating the Application Processor system software, the system software digital signature must be verified by the EUD.	VE, TE	T=O	
MA-EU-50	Prior to installing new applications, the application digital signature must be verified.	VE, TE	T=O	
MA-EU-51	The EUD must connect to the Black Network through a Government Private Wireless Network, Government Private Cellular Network, Government Private Wired, Dedicated Outer VPN, or RD.	VE, TE	T=O	
MA-EU-52	If the EUD is using a physically attached RD, the Computing Device must use Ethernet or Ethernet over USB.	VE, TE	O	Optional
MA-EU-53	If EUDs use Government Private Wireless Networks for Black Transport, the Government Private Wireless Network must be accredited by a Government AO.	VE, TE	T=O	
MA-EU-54	The end user must only be able to access the applications that are necessary for the EUDs intended purpose.	VE, TE	T	MA-EU-62
MA-EU-55	The end user must not be able to change security relevant settings on the EUD.	VE, TE	T	MA-EU-63
MA-EU-56	The EUD must not be able to directly access the Black Transport Network. All traffic must pass through the Outer VPN tunnel.	VE, TE	T=O	
MA-EU-57	USB debugging capabilities must be disabled on the EUDs.	VE, TE	T	MA-EU-64
MA-EU-58	All EUDs must display a consent prompt that requires users to accept prior to using the device.	VE, TE	O	Optional
MA-EU-59	An EUD must implement a MAC policy.	VE, TE	O	Optional
MA-EU-60	The EUD must use MAC policy to disable all transmitted Global Positioning System (GPS) and location services except Enhanced 9-1-1 (E911) or those authorized by the AO.	VE, TE	O	MA-EU-20
MA-EU-61	The EUD must use MAC policy to disable all wireless interfaces (e.g., Bluetooth, NFC, Cellular, 802.11) that do not pass through the Outer VPN component.	VE, TE	O	MA-EU-22
MA-EU-62	MAC policy must limit applications to only those necessary for the EUDs intended purpose.	VE, TE	O	MA-EU-54
MA-EU-63	The EUD must use MAC policy to prevent end users from changing security relevant settings on the EUD.	VE, TE	O	MA-EU-55
MA-EU-64	MAC policy must disable USB debugging capabilities on the EUD.	VE, TE	O	MA-EU-57

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-EU-65	Passwords for user to device (EUD selected from Mobile Platform section of CSfC Components List) authentication must be a minimum of 14 alpha-numeric case sensitive characters.	VE, TE	O	MA-EU-25
MA-EU-66	EUD must not use other Computing Devices as a source of power for charging.	VE, TE	T=O	
MA-EU-67	EUDs must prohibit the use of removable media through configuration, policy, or physical modification.	VE, TE	T=O	
MA-EU-68	During provisioning, all unnecessary X.509 certificates must be disabled from the EUD Trust Anchor Database.	VE, TE	T	MA-EU-45
MA-EU-69	If the EUD is using a physically attached Dedicated Outer VPN the Computing Device must use Ethernet or Ethernet over USB.	VE, TE	T=O	
MA-EU-70	SIM card must be removed from EUD.	VE, TE	T=O	
MA-EU-71	ESIM must be disabled in the EUD.	VE, TE	O	Optional
MA-EU-72	EUD must implement the Basic Input/Output System (BIOS) security guidelines specified in NIST SP 800-147.	VE, TE	T=O	
MA-EU-73	The BIOS/Unified Extensible Firmware Interface (UEFI) must be configured to require a password before continuing the boot process.	VE, TE	O	Optional
MA-EU-74	The EUD must have the BIOS/UEFI administrator password enabled with an entropy of at least 112 bits.	VE, TE	T=O	
MA-EU-75	The EUD must only allow authorized boot types as determined by the AO.	VE, TE	T=O	
MA-EU-76	The EUD must be deployed with anti-tamper technologies. (e.g., Bags, Tape).	VE, TE	O	Optional
MA-EU-77	Security policy must administratively lock the account of the EUD user after three consecutive authentication failures. (Administrator intervention is required to unlock).	VE	T=O	MA-EU-41
MA-EU-78	The EUD must be re-booted periodically as required by the local agency policy and the AO.	VE, TE	T=O	
MA-EU-79	The EUD must implement MFA requirements, for Physical EUD authentication, as described in Table 33.	VE, TE	T=O	MA-EU-80 or MA-EU-81
MA-EU-80	The EUD must implement MFA requirements, for Inner Encryption Component authentication, as described in Table 33.	VE, TE	T=O	MA-EU-79 or MA-EU-81
MA-EU-81	The EUD must implement MFA requirements, for Virtual Desktop Infrastructure (VDI), as described in Table 33.	VE, TE	T=O	MA-EU-79 or MA-EU-80
MA-EU-82	If an NSA-approved DAR solution is not implemented on the Composed EUD, the Composed EUD must have a layer of Software Full Disk Encryption or Hardware Full Disk Encryption enabled.	VE, TE	T=O	

12.12 ENHANCED VIRTUALIZATION REQUIREMENTS

Table 25. Enhanced Virtualization Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-VZ-1	The EUD and virtualization architecture must be able to securely isolate hardware components so that only authorized domains can access required components.	VZ	T=O	
MA-VZ-2	The virtualization software must have the ability to create virtual TPMs (vTPMs).	VZ	O	Optional
MA-VZ-3	Each VM in this solution must perform a boot integrity check via a vTPM.	VZ	O	Optional
MA-VZ-4	The Wi-Fi drivers and hardware on the underlying host EUD must only be accessible to the Wi-Fi domain. The other domains (Inner VPN, Outer VPN, and User VM) must not have access to the Wi-Fi drivers and hardware.	VZ	T=O	
MA-VZ-5	The end user may have persistent access to the User Domain, but may be granted temporary access to other domains for the purpose of authentication only.	VZ	T=O	
MA-VZ-6	The hypervisor must allow the configuration of the virtual network infrastructure to other domains within the EUD to support the secure connections between each domain.	VZ	T=O	
MA-VZ-7	The Inner VPN, Outer VPN, and the external Wi-Fi connections must all be implemented on separate IP stacks by using separate domains for each connection on the EUD.	VZ	T=O	
MA-VZ-8	Rekeying of each domains' certificates and associated private keys must be done through re-provisioning prior to the expiration of keys.	VZ	T	MA-VZ-9
MA-VZ-9	Rekeying of a domain's certificates and associated private keys must be done over the MA solution network prior to expiration of keys.	VZ	O	MA-VZ-8
MA-VZ-10	All domains must have their certificates revoked and resident image removed prior to disposal.	VZ	T=O	
MA-VZ-11	If an NSA-approved DAR Solution is not implemented on the user domain, the native platform DAR protection must be enabled.	VZ	T=O	
MA-VZ-12	The Outer VPN domain must use a unique X.509 v3 device certificate, signed by the Outer CA, for mutual authentication with Outer VPN Gateways.	VZ	T=O	
MA-VZ-13	The Inner VPN domain must use a unique X.509 v3 device certificate, signed by the Inner CA, for mutual authentication with Inner VPN Gateways.	VZ	T=O	
MA-VZ-14	The User domain password lifetime must be less than 181 days.	VZ	T=O	
MA-VZ-15	The end user must not be able to change security relevant settings on any of the domains.	VZ	T	MA-VZ-17

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-VZ-16	User domain must display a consent prompt that requires user to accept prior to using the device.	VZ	O	Optional
MA-VZ-17	The User domain must use MAC policy to prevent end users from changing security relevant settings.	VZ	O	MA-VZ-15
MA-VZ-18	Passwords for User domain authentication must be a minimum of 14 alpha-numeric case-sensitive characters.	VZ	T=O	
MA-VZ-19	All domains must generate logs and send to a central SIEM in the enterprise network of the same classification label.	VZ	O	Optional
MA-VZ-20	The hypervisor must be configured with an administrative password if administrative access is possible after provisioning.	VZ	T=O	
MA-VZ-21	The End User must not be able to change any administrative settings in the hypervisor.	VZ	T=O	
MA-VZ-22	The End User must not be able to create nor remove virtual machines on the EUD.	VZ	T=O	
MA-VZ-23	The hypervisor must not allow any of the domains to access any cellular technologies that are integrated into an EUD unless explicitly allowed for a solution that uses a Government owned private cellular network.	VZ	T=O	
MA-VZ-24	The user domain virtual/physical disk must be encrypted. This can be accomplished either by the hypervisor or by the OS running in the user domain.	VZ	T=O	

12.13 PORT FILTERING SOLUTION COMPONENTS REQUIREMENTS

Table 26. Port Filtering Solution Components Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-PF-1	All components within the solution must have all network interfaces restricted to the smallest address ranges, ports, and protocols possible.	All	T=O	
MA-PF-2	All Components within the solution must have all unused network interfaces disabled.	All	T=O	
MA-PF-3	Solution Components must only allow HTTP traffic from authorized CDPs or OCSP responders.	C	T=O	
MA-PF-4	For the Outer VPN Gateway interface connected to a Black Network, traffic filtering rules must be applied to both inbound and outbound traffic, such that only IKE, ESP, and control plane protocols (as defined in this CP) approved by organization-defined policy are allowed.	All	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-PF-5	For the Inner VPN Gateway interface connected to a Gray Network, traffic filtering rules must be applied to both inbound and outbound traffic, such that only IKE, ESP, and management and control plane protocols (as defined in this CP) approved by organization-defined policy are allowed.	VI	T=O	
MA-PF-6	The Inner Firewall must implement an ACL which only permits ingress/egress traffic from/to Inner Encryption endpoints.	All	T=O	
MA-PF-7	Any service or feature that allows an Outer VPN Gateway or an EUD to contact a third-party server (such as one maintained by the manufacturer) must be dropped.	All	T	MA-PF-8
MA-PF-8	Any service or feature that allows an Outer VPN Gateway or an EUD to contact a third-party server (such as one maintained by the manufacturer) must be disabled.	All	O	MA-PF-7
MA-PF-9	Multicast messages received on any interfaces of the Outer VPN Gateway, Gray Firewall, and Inner encryption components must be dropped.	VI, TI	T=O	
MA-PF-10	For solutions using IPv4, the Outer VPN Gateway must drop all packets that use IP options.	All	O	Optional
MA-PF-11	For solutions using IPv4, the Outer VPN Gateway must only accept packets with Transmission Control Protocol (TCP), User Data Protocol (UDP), ESP, or ICMP in the IPv4 Protocol field and drop all other packets.	All	T=O	
MA-PF-12	For solutions using IPv6, the Outer VPN Gateway must only accept packets with ESP, TCP, UDP, or ICMPv6 in the IPv6 Next Header field and drop all other packets.	All	T=O	
MA-PF-13	For all Outer Firewall interfaces, traffic filtering rules must be applied to both inbound and outbound traffic, such that only IKE, ESP, and control plane protocols (as defined in this CP) approved by organization-defined policy are allowed.	VI, TI	T=O	
MA-PF-14	EUDs consisting of a single Computing Device must prohibit ingress and egress of Certificate Revocation traffic (e.g., OCSP queries, HTTP GET to CDPs) on the Black Interface.	VE, TE	T=O	
MA-PF-15	EUDs consisting of a single computing device must prohibit ingress and egress of Name Resolution traffic (e.g., DNS query/response) on the Black Interface.	VE, TE	O	Optional
MA-PF-16	EUDs consisting of a single computing device must prohibit ingress and egress of NTP traffic on the Black Interface.	VE, TE	O	Optional
MA-PF-17	Withdrawn			

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-PF-18	Management plane traffic must only be initiated from the Gray administrative work stations with the exception of logging or authentication traffic which may be initiated from Outer VPN components.	VI, TI	T=O	
MA-PF-19	The Gray Firewall must only permit EUDs traffic to the Inner Encryption Component associated with the appropriate classification level.	VI, TI	T=O	
MA-PF-20	EUDs must prohibit ingress and egress of routing protocols.	VE, TE	T=O	

12.14 Configuration Change Detection Requirements

Configuration Change Detection Requirements have been moved to the *CSfC Continuous Monitoring Annex.*

Table 27. Configuration Change Detection Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-CD-0	Must meet all requirements defined in the *CSfC Continuous Monitoring Annex* that apply to the MA CP.	ALL	T=O	

12.15 Device Management Requirements

Only authorized SAs are allowed to administer the components. The MA solution is used as a transport for the Secure Shell v2 (SSHv2), IPsec, or TLS data from the administration workstation to the component.

Table 28. Device Management Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-DM-1	Administration workstations must be dedicated for the purposes given in the CP and must be physically separated from workstations used to manage non-CSfC solutions.	VI, TI	T=O	
MA-DM-2	The Inner Encryption endpoints must be managed from the Red Network and the Outer VPN Gateway and Gray Firewall must be managed from the Gray Network.	VI, TI	T=O	
MA-DM-3	The Red Management Network must be used exclusively for all management of Inner Encryption endpoints and solution components within the Red Network.	VI, TI	T=O	
MA-DM-4	The Gray Management Network must be used exclusively for all management of the Outer Encryption Component, Gray Firewall, and solution components within the Gray Network.	VI, TI	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-DM-5	The Gray Management Network must not be directly connected to Non-Secure Internet Protocol Router Network (NIPRNet) or any other Unclassified Network not dedicated to the administration of CSfC solutions.	VI, TI	T=O	
MA-DM-6	All administration of solution components must be performed from an administration workstation remotely using an NSA approved solution (e.g., CP or Type 1 encryptor) or by managing the solution components locally.	VI, TI	T=O	
MA-DM-7	SAs must authenticate to solution components before performing administrative functions.	All	T	MA-DM-8
MA-DM-8	SAs must authenticate to solution components with CNSA-compliant certificates before performing administrative functions remotely.	All	O	MA-DM-7
MA-DM-9	SAs must establish a security policy for EUDs per the implementing organization's local policy to include procedures for continuous physical control.	VE, TE	T=O	
MA-DM-10	Withdrawn			
MA-DM-11	SAs must initiate CSRs for solution components as part of their initial keying within the solution.	All	T=O	
MA-DM-12	Devices must use Enrollment over Secure Transport (EST) as detailed in IETF RFC 7030 for certificate management.	All	O	Optional
MA-DM-13	The same administration workstation must not be used to manage Inner Encryption Components and the Outer VPN Gateway.	VI, TI	T=O	
MA-DM-14	Withdrawn			
MA-DM-15	Withdrawn			
MA-DM-16	Withdrawn			
MA-DM-17	Withdrawn			
MA-DM-18	Withdrawn			
MA-DM-19	The CSfC solution owner must identify authorized SAs to initiate certificate requests.	All	T=O	
MA-DM-20	Authentication of SAs must be enforced by either procedural or technical controls.	All	O	Optional
MA-DM-21	The Gray Management and Gray Data Networks must be separated by the Gray Firewall using unique physical interfaces and stateful traffic filtering rules (e.g., ACLs).	All	T	MA-DM-22
MA-DM-22	The Gray Management and Gray Data Networks must be separated by the Gray Firewall using unique physical interfaces and with at least two separate VRFs for the Gray Data Network and Gray Management Network.	All	O	MA-DM-21

12.16 CONTINUOUS MONITORING REQUIREMENTS

Continuous Monitoring Requirements have been relocated to the *CSfC Continuous Monitoring Annex.*

Table 29. Continuous Monitoring Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-CM-0	Must meet all requirements defined in the *CSFC Continuous Monitoring Annex* that apply to the MA CP.	All	T=O	

12.17 Wireless Intrusion Detection System/Wireless Intrusion Prevention System (WIDS/WIPS) Requirements

Wireless Intrusion Detection System and Wireless Intrusion Prevention System Requirements have been relocated to the *CSfC Wireless Intrusion Detection System (WIDS)/Wireless Intrusion Prevention System (WIPS) Annex.*

Table 30. WIDS/WIPS Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-WIDS-0	Must meet all requirements defined in the *CSfC Wireless Intrusion Detection System (WIDS)/ Wireless Intrusion Prevention System (WIPS) Annex* that apply to the MA CP for government private wireless.	All	T=O	

12.18 Auditing Requirements

Auditing Requirements have been relocated to the *CSfC Continuous Monitoring Annex.*

Table 31. Auditing Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-AU-0	Must meet all requirements defined in the *CSfC Continuous Monitoring Annex* that apply to the MA CP.	All	T=O	

12.19 Key Management Requirements

Key Management Requirements have been relocated to a separate *CSfC Key Management Requirements Annex*.

Table 32. Key Management Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-KM-0	Must meet all requirements defined in the *CSfC Key Management Requirements Annex* that apply to the MA CP.	All	T=O	

12.20 Multi-Factor Authentication Requirements

The MA solution requires the implementation of at least one MFA use case according to the requirements in Table 33:

Table 33. Multi-Factor Authentication Use Case Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-MFA-1	A second factor of authentication, such as a token or smartcard, must be implemented for logging into a Physical EUD in a user's possession.	TE, VE	T=O	MA-MFA-2 or MA-MFA-3
MA-MFA-2	A second factor of authentication, such as a token or smartcard, must be implemented for an EUD to authenticate to the Inner Encryption Component.	TI, VI	T=O	MA-MFA-1 or MA-MFA-3
MA-MFA-3	A second factor of authentication, such as a token or smartcard, must be implemented for a user to authenticate into a Red VDI Environment user session.	TE, VE	T=O	MA-MFA-1 or MA-MFA-2
MA-MFA-4	The second factor of authentication must be a physically separate device from the EUD.	All	T=O	
MA-MFA-5	The second factor of authentication must not be used as a replacement for the primary authentication method.	All	T=O	
MA-MFA-6	The second factor of authentication must implement a user generated password and a token generated one-time password.	All	T=O	MA-MFA-14
MA-MFA-7	The management server for the second factor of authentication must be located in the 'Red Management Services' network or the 'Red' network.	All	T=O	MA-MFA-14
MA-MFA-8	The token generated one-time password must implement a time-based algorithm.	All	T=O	MA-MFA-14
MA-MFA-9	In the event of loss of continuous physical control, the token must be considered compromised, reported to the AO/Delegated Approval Authority (DAA), and must not be reused.	All	T=O	
MA-MFA-10	If the second factor of authentication's seed file is compromised, all tokens are considered compromised and must be replaced.	All	T=O	MA-MFA-14
MA-MFA-11	During procurement, the vendor must not be permitted to store backups of seed files.	All	T=O	MA-MFA-14
MA-MFA-12	All seed files must be encrypted during transport.	All	T=O	MA-MFA-14
MA-MFA-13	Authentication tokens must be physically secured in a separate storage container from the EUD.	All	T=O	
MA-MFA-14	The second factor of authentication must implement a user generated password and a PKI based smart card.	All	T=O	MA-MFA-6 MA-MFA-7 MA-MFA-8 MA-MFA-10 MA-MFA-11 MA-MFA-12

13 SOLUTION OPERATION, MAINTENANCE, AND HANDLING REQUIREMENTS

13.1 USE AND HANDLING OF SOLUTIONS REQUIREMENTS

The following requirements must be followed regarding the use and handling of the solution.

Table 34. Use and Handling of Solutions Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-GD-1	All solution infrastructure components, with the exception of the Outer Firewall, must be physically protected as classified devices, and classified at the level of the Red Network.	VI, TI	T=O	
MA-GD-2	Only authorized and appropriately cleared (or escorted) administrators and security personnel must have physical access to the solution infrastructure components.	VI, TI	T=O	
MA-GD-3	Only authorized and appropriately cleared users, administrators, and security personnel must have physical access to EUDs when in a classified state.	VE, TE	T=O	
MA-GD-4	All components of the solution must be disposed of as classified devices, unless declassified using AO-approved procedures.	All	T=O	
MA-GD-5	EUDs using an NSA-approved DAR solution must be disposed of in accordance with the disposal requirements for the DAR solution.	VE, TE	T=O	
MA-GD-6	All EUDs must have their certificates revoked prior to disposal.	VE, TE	T=O	
MA-GD-7	Users must periodically inspect the physical attributes of EUDs for signs of tampering or other unauthorized changes.	VE, TE	T=O	
MA-GD-8	Acquisition and procurement documentation must not include information concerning the purpose of the equipment.	All	T=O	
MA-GD-9	The solution owner must allow, and fully cooperate with, NSA or its authorized agent to perform an IA compliance audit (including, but not limited to: inspection, testing, observation, interviewing) of the solution implementation to ensure it meets the latest version of the MA CP.	All	T=O	
MA-GD-10	The AO will ensure that a compliance audit must be conducted every year against the latest version of the MA CP as part of the annual solution re-registration process.	All	T=O	
MA-GD-11	Results of the compliance audit must be provided to, and reviewed by, the AO.	All	T=O	
MA-GD-12	Customers interested in registering their solution against the MA CP must register with NSA and receive approval prior to operating the solution.	All	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-GD-13	The implementing organization must complete and submit a MA CP requirements compliance matrix to their respective AO.	All	T=O	
MA-GD-14	Registration and re-registration against the MA CP must include submission of MA CP registration forms and compliance matrix to NSA.	All	T=O	
MA-GD-15	When a new approved version of the MA CP is published by NSA, the AO must ensure compliance against this new CP within 6 months.	All	T=O	
MA-GD-16	Solution implementation information, which was provided to NSA during solution registration, must be updated annually (in accordance with Section 15.3) as part of an annual solution re-registration process.	All	T=O	
MA-GD-17	*Requirement relocated to CSfC Continuous Monitoring Annex.*			
MA-GD-18	*Requirement relocated to CSfC Continuous Monitoring Annex.*			
MA-GD-19	*Requirement relocated to CSfC Continuous Monitoring Annex.*			
MA-GD-20	*Requirement relocated to CSfC Continuous Monitoring Annex.*			
MA-GD-21	*Requirement relocated to CSfC Continuous Monitoring Annex.*			
MA-GD-22	*Requirement relocated to CSfC Continuous Monitoring Annex.*			
MA-GD-23	*Requirement relocated to CSfC Continuous Monitoring Annex.*			
MA-GD-24	*Requirement relocated to CSfC Continuous Monitoring Annex.*			
MA-GD-25	Strong passwords must be used that comply with the requirements of the AO.	All	T=O	
MA-GD-26	The implementing organization must test and subsequently apply security critical patches to all components in the solution in accordance with local policy and this CP.	All	T=O	
MA-GD-27	Local policy must dictate how the Security Administrator will install patches to solution components.	All	T=O	
MA-GD-28	Solution components must comply with local TEMPEST policy.	All	T=O	
MA-GD-29	Software, settings, keys, and all other configuration data persistently stored on EUDs must be handled as controlled unclassified information or higher classification as designated by the AO.	All	T=O	
MA-GD-30	All hardware components must be tracked through an AO-approved inventory management process that identifies each component as part of a CSfC Solution.	All	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-GD-31	Users must maintain continuous physical control of the EUD as defined by local policy.	VE, TE	T=O	
MA-GD-32	A baseline configuration for all components must be maintained by the Security Administrator and be available to the Auditor.	All	T=O	
MA-GD-33	The implementing organization or solution owner must validate the TCG Platform Certificate using the certificate path provided for each product obtained for the solution. The validation must include certificate validation (including validation of the holder certificate) and component information checking. The minimum components to check are the Chassis, Baseboard, CPU(s), RAM, Disk(s), and NIC(s). The Platform Certificate must be collected and checked against the product by a third-party Verifier prior to allowing the connection to the Black, Gray, or Red Networks.	All	O	Optional
MA-GD-34	The implementing organization or solution owner must validate the Reference Integrity Manifest using the certificate path provided for each product obtained for the solution. In addition, each individual product must have a TPM Quote collected and checked against the RIM Bundle by a third-party Verifier prior to allowing the connect to the Black, Gray, or Red Networks.	All	O	Optional
MA-GD-35	If a CDS is being leveraged within the solution, then it must adhere with all applicable organizational policy and be on the NCDSMO CDS Baseline. (For example: DoD customers must also adhere to DoDI 8540.01 and the DISN Connection Process Guide).	All	T=O	

13.2 INCIDENT REPORTING REQUIREMENTS

Table 35 identifies incident reporting requirements for reporting security incidents to NSA and must be followed in the event that a solution owner identifies a security incident which affects the solution. These reporting requirements are intended to augment, not replace, any incident reporting procedures already in use within the solution owner's organization. It is critical that SAs and Auditors are familiar with maintaining the solution in accordance with this CP. Based on familiarity with the known-good configuration of the solution, personnel responsible for the operations and maintenance of the solution will be better equipped to identify reportable incidents.

For the purposes of incident reporting, "malicious" activity includes not only events that have been attributed to activity by an adversary but also any events that are unexplained. In other words, an activity is assumed to be malicious unless it has been determined to be the result of known non-malicious activity.

This section only provides requirements directly related to the incident reporting process. Refer to *CSfC Continuous Monitoring Annex* as referenced in Section 12.16 for requirements supporting the detection of events that may reveal that a reportable incident has occurred.

Table 35. Incident Reporting Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-RP-1	Solution owners must report confirmed incidents meeting the criteria in MA-RP-3 through MA-RP-16 within 24 hours of detection via Joint Incident Management System (JIMS) or contacting NSA as specified in the CSfC Registration Letter issued for the solution.	All	T=O	
MA-RP-2	At a minimum, the organization must provide the following information when reporting security incidents: • CSfC Registration Number • Point of Contact (POC) name, phone, email • Alternate POC name, phone, email • Classification level of affected solution • Name of affected network(s) • Affected component(s) manufacturer/vendor • Affected component(s) model number • Affected component(s) version number • Date and time of incident • Description of incident • Description of remediation activities • Is Technical Support from NSA requested? (Yes/No)	All	T=O	
MA-RP-3	Solution owners must report a security failure in any of the CSfC solution components.	All	T=O	
MA-RP-4	Solution owners must report any evidence of a compromise or spillage of classified data caused by a failure of the CSfC Solution.	All	T=O	
MA-RP-5	For all Gray Network interfaces, solution owners must report any malicious inbound and outbound traffic.	All	T=O	
MA-RP-6	Solution owners must report any evidence of an unauthorized device/user gaining access to the classified network via the solution.	All	T=O	
MA-RP-7	Solution owners must report if a solution component sends traffic with an unauthorized destination address.	All	T=O	
MA-RP-8	Solution owners must report any malicious configuration changes to the components.	All	T=O	
MA-RP-9	Solution owners must report any unauthorized escalation of privileges to any of the CSfC solution components.	All	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-RP-10	Solution owners must report if two or more simultaneous VPN connections from different IP addresses are established using the same EUD device certificate.	All	T=O	
MA-RP-11	Solution owners must report any evidence of malicious physical tampering with solution components.	All	T=O	
MA-RP-12	Solution owners must report any evidence that one or both of the layers of the solution failed to protect the data.	All	T=O	
MA-RP-13	Solution owners must report any significant degradation of services provided by the solution excluding connectivity issues associated with the Black Network.	All	T=O	
MA-RP-14	Solution owners must report malicious discrepancies in the number of VPN connections established by Outer VPN Gateways.	VI, TI	T=O	
MA-RP-15	Solution owners must report malicious discrepancies in the number of VPN connections established by the Inner VPN Gateway.	VI	T=O	
MA-RP-16	Solution owners must report malicious discrepancies in the number of TLS connections established by the TLS-Protected Server.	TI	T=O	

14 ROLE-BASED PERSONNEL REQUIREMENTS

The roles required to administer and maintain the solution are defined below, along with doctrinal requirements for these roles.

Information System Security Officer (ISSO) – The ISSO must be responsible to maintain, monitor, and control all security functions for the entire suite of products composing the MA solution. Security Administrator duties include but are not limited to the following:

1) Ensures that the latest security-critical software patches and updates (such as Information Assurance Vulnerability Alerts (IAVAs)) are applied to each product.

2) Documents and reports security-related incidents to the appropriate authorities.

3) Coordinates and supports product logistic support activities including integration and maintenance. Some logistic support activities may require that the Security Administrator escort uncleared personnel.

4) Employs adequate defenses of auxiliary network devices to enable proper and secure functionality of the MA solution.

5) Ensures that the implemented MA solution remains compliant with the latest version of this CP as specified by MA-GD-15.

6) Provisions and maintains EUDs in accordance with this CP for implementations that include them.

Auditor – The Auditor must be responsible to review the actions performed by the SA and CAA and events recorded in the audit logs to ensure that no action or event represents a compromise to the security of the MA solution. Auditor duties include, but are not limited to, the following:

1) Review, manage, control, and maintain security audit log data.

2) Document and report security-related incidents to the appropriate authorities.

3) The Auditor is only authorized access to Outer and Inner administrative components.

Integrator – In certain cases, an external Integrator may be hired to implement an MA solution based on this CP. Integrator duties may include, but are not limited to:

1) Acquire the products that compose the solution.

2) Configure the MA solution in accordance with this CP.

3) Document, test, and maintain the solution.

4) Respond to incidents affecting the solution.

End User –An End User may operate an EUD from physical locations not owned, operated, or controlled by the government. The End User must be responsible for operating the EUD in accordance with this CP and an organization-defined user agreement. Remote User duties include, but are not limited to, the following:

1) Ensure the EUD is only operated in physical spaces which comply with the end user agreement.

2) Alert the SA immediately upon an EUD being lost, stolen, or suspected of being tampered with.

Security Administrator – The SA must be responsible to maintain, monitor, and control all security functions for the entire suite of products composing the MA Solution. In some organizations, the SA may be known as the Information System Security Officer. SA duties include, but are not limited to:

1) Ensure that the latest security-critical software patches and updates (such as Information Assurance Vulnerability Alerts (IAVAs)) are applied to each product.

2) Document and report security-related incidents to the appropriate authorities.

3) Coordinate and support product logistic support activities including integration and maintenance. Some logistic support activities may require that the SA escort uncleared personnel.

4) Employ adequate defenses of auxiliary network devices to enable proper and secure functionality of the MA Solution.

5) Ensure that the implemented MA Solution remains compliant with the latest version of this CP, as specified by MA-GD-15.

6) Provision and maintain EUDs in accordance with this CP for implementations that include them.

Additional policies related to the personnel that perform these roles in a MA Solution are as follows:

Table 36. Role-Based Personnel Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-RB-1	The SA, Auditor, EUD User, and Integrators must be cleared to the highest level of data protected by the solution. Black Network Administrators may be cleared at the Black Network classification level.	All	T=O	
MA-RB-2	The SA and Auditor roles must be performed by different people.	All	T=O	
MA-RB-3	All SAs, EUD Users, and Auditors must meet local IA training requirements.	All	T=O	
MA-RB-4	*Requirement relocated to Key Management Requirements Annex.*			
MA-RB-5	Upon discovering an EUD is lost or stolen, an EUD User must immediately report the incident to their SA and any other reporting channels as dictated by organizational policy dictated by the AO.	VE, TE	T=O	
MA-RB-6	*Requirement relocated to Key Management Requirements Annex.*			
MA-RB-7	The Security Administrator(s) for the Inner Encryption endpoints and supporting components on Red Networks must be different individuals from the SA(s) for the Outer VPN Gateway and supporting components on Gray Networks.	VI, TI	T=O	
MA-RB-8	The SAs must periodically inspect the physical attributes of infrastructure hardware for signs of tampering or other unauthorized changes.	VI, TI	T=O	
MA-RB-9	The Auditor must review all log alerts and dashboards specified in this CP at least once a day.	All	T=O	
MA-RB-10	SAs must initiate the certificate revocation process prior to disposal of any solution component.	All	T=O	
MA-RB-11	Auditing of the Outer and Inner Tunnel CA operations must be performed by individuals who were not involved in the development of the CP and CPS, or integration of the MA solution.	All	T=O	

15 INFORMATION TO SUPPORT THE AO

This section details items that likely will be necessary for the customer to obtain approval from the system AO. The customer and AO have obligations to perform the following:

- The customer, possibly with support from an Integrator, instantiates a solution implementation that follows the NSA-approved CP.
- The customer has a testing team develop a test plan and perform testing of the MA solution, see Section 15.1.

- The customer has system Assessment and Authorization performed using the risk assessment information referenced in Section 15.2.
- The customer provides the results from testing and system Assessment and Authorization to the AO for use in making an approval decision. The AO is ultimately responsible for ensuring that all requirements from the CP have been properly implemented in accordance with the CP.
- The customer registers the solution with NSA and re-registers yearly to validate its continued use as detailed in Section 15.3.
- Customers who want to use a variant of the solution detailed in this CP will contact their NSA Client Advocate to determine ways to obtain NSA approval.
- The AO ensures that a compliance audit must be conducted every year against the latest version of the MA CP, and the results must be provided to the AO.
- The AO ensures that certificate revocation information is updated on all the Solution Components in the solution in the case of a compromise.
- The AO ensures that any Layer 2 or Layer 3 control plane protocols that are used in the solution are necessary for the operation of the network and that local policy supports their use.
- The AO reports incidents affecting the solution in accordance with Section 13.

The system AO maintains configuration control of the approved solution implementation over the lifecycle of the solution. Additionally, the AO must ensure that the solution remains properly configured with all required security updates implemented.

15.1 Solution Testing

This section provides a framework for a Test and Evaluation (T&E) plan and procedures to validate the implementation of a MA solution. This T&E will be a critical part of the approval process for the AO, providing a robust body of evidence that shows compliance with this CP.

The security features and operational capabilities associated with the use of the solution must be tested. The following is a general high-level methodology for developing the test plan and procedures and for the execution of those procedures to validate the implementation and functionality of the MA solution. The entire solution, to include each component described in Sections 5 and 5.7, is addressed by this test plan including the following:

1) Set up the baseline network and configure all components.
2) Document the baseline network configuration. Include product model and serial numbers, software version numbers, and software configuration settings at a minimum.
3) Develop a test plan for the specific implementation using the test requirements from Table 37. Any additional requirements imposed by the local AO should also be tested, and the test plan

must include tests to ensure that these requirements do not interfere with the security of this solution as described in this CP.

4) Perform testing using the test plan derived in Step 3. Network testing will consist of both Black box testing and Gray box testing. A two-person testing approach should be used to administer the tests. During test execution, security and non-security related discrepancies with the solution must be documented.

5) Compile findings, to include comments and vulnerability details as well as possible countermeasure information, into a Final Test Report to be delivered to the AO for approval of the solution.

The following testing requirement has been developed to ensure that the MA solution functions properly and meets the configuration requirements from Section 12. Testing of these requirements should be used as a minimum framework for the development of the detailed test plan and procedures.

Table 37. Test Requirement

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-TR-0	The organization implementing the CP must perform all tests listed in the *MA CP Test Annex.*		T=O	

15.2 Risk Assessment

The risk assessment of the MA solution presented in this CP focuses on the types of attacks that are feasible against this solution and the mitigations that can be employed. Customers should contact their NSA Client Advocate to request this document, or visit the Secret Internet Protocol Router Network (SIPRNet) CSfC site for information. The process to obtain the risk assessment is available on the SIPRNet CSfC web page. The AO must be provided a copy of the NSA risk assessment for their consideration in approving the use of the solution.

15.3 Registration of Solutions

All customers using CSfC solutions to protect information on National Security Systems must register their solution with NSA prior to operational use. This registration will allow NSA to track where MA CP solutions are instantiated and to provide the AOs at those sites with appropriate information, including any significant vulnerabilities that may be discovered in components or high-level designs approved for these solutions. The CSfC solution registration process is available at (https://www.nsa.gov/resources/commercial-solutions-for-classified-program).

Solution registrations are valid for one year from the date the solution registration is approved, at which time customers are required to re-register their solution in order to continue using it. Approved CPs will be reviewed twice a year, or as events warrant. Registered users of this CP will be notified when an updated version is published. When a new version of this CP that has been approved by the Deputy National Manager for National Security Systems is published, customers will have six months to bring their solutions into compliance with the new version of the CP and re-register their solution (see requirement MA-GD-15). Customers are also required to update their registrations whenever the information provided on the registration form changes.

APPENDIX A. GLOSSARY OF TERMS

Authorization (To Operate) – The official management decision given by a senior organizational official to authorize operation of an information system and to explicitly accept the risk to organizational operations (including mission, functions, image, or reputation), organizational assets, individuals, other organizations, and the Nation based on the implementation of an agreed-upon set of security controls. (NIST SP 800-37)

Authorizing Official – A senior (Federal) official or executive with the authority to formally assume responsibility for operating an information system at an acceptable level of risk to organizational operations (including mission, functions, image, or reputation), organizational assets, individuals, other organizations, and the Nation.

Assurance – Measure of confidence that the security features, practices, procedures, and architecture of an information system accurately mediates and enforces the security policy. (CNSSI 4009)

Audit – The activity of monitoring the operation of a product from within the product. It includes monitoring of a product for a set of pre-determined events. Each audit event may indicate rogue behavior, or a condition that is detrimental to security, or provide necessary forensics to identify the source of rogue behavior.

Audit Log – A chronological record of the audit events that have been deemed critical to security. The audit log can be used to identify potentially malicious activity that may further identify the source of an attack, as well as potential vulnerabilities where additional countermeasures or corrective actions are required.

Availability – Ensuring timely and reliable access to and use of information. (NIST SP 800-37).

Black Box Testing – Testing the functionality of a component of the solution, such that testing is limited to the subset of functionality that is available from the external interfaces of the box during its normal operational configuration without any additional privileges (such as given to the Security Administrator or Auditor).

Black Network – A network that contains classified data that has been encrypted twice. (See Section 4.2.3)

BIOS/UEFI Administrator Password – The Administrators passwords limit access to all BIOS/UEFI configuration options. The administrator password locks all BIOS/UEFI features and settings. The user can boot and see the BIOS/UEFI settings, but they cannot modify them unless the correct administrator password is provided to the computer.

BIOS/UEFI System Password – The system password prevents the EUD from booting until the system password is successfully entered (without bypassing or resetting). Users cannot boot the EUD unless the correct system password is provided. In the case where the administrator password is also set on the machine, the administrator password must also be provided to modify the BIOS/UEFI settings.

CP – Guidance provided by NSA that describes recommended approaches to composing COTS components to protect classified information for a particular class of security problem. CP instantiations are built using products selected from the CSfC Components List.

Central Management Site – A site within a MA solution that is responsible for remotely managing the solution components located at other sites (see Section 4.3.3).

Certification Authority (CA) – An authority trusted by one or more users to create and assign certificates. (ISO9594-8)

Certificate Policy (CP) – A named set of rules that indicate the applicability of a certificate to a particular community and/or class of application with common security requirements. For example, a particular CP might indicate applicability of a type of certificate to the authentication of parties engaging in business-to-business transactions for the trading of goods or services within a given price range. (IETF RFC 3647)

Committee on National Security Systems Policy No. 15 (CNSSP-15) – Policy specifies which public standards may be used for cryptographic protocol and algorithm interoperability to protect National Security Systems (NSS).

Computing Device – An EUD such as a phone, laptop, or tablet.

Confidentiality – Assurance that the data stored in, processed by, or transmitted by the system are protected against unauthorized disclosure, and confidence that only the appropriate set of individuals or organizations would be provided the information.

Control Plane Protocol – A routing, signaling, or similar protocol whose endpoints are network infrastructure devices such as VPN Gateways or routers. Control plane protocols carry neither user data nor management traffic.

CRL Distribution Point (CDP) – A web server that hosts a copy of a CRL issued by a CA for VPN Components to download (see Key Management Requirements Annex).

Cross Domain Solution (CDS) – A form of controlled interface that provides the ability to manually and/or automatically access and/or transfer information between different security domains. (CNSSI 4009)

Dedicated Outer VPN - A dedicated piece of hardware that can be part of an EUD and terminates the Outer layer of IPsec encryption.

End User Device (EUD) – A form-factor agnostic component of the MA solution that can include a mobile phone, tablet, or laptop computer. EUDs can be composed of multiple components to provide physical separation between layers of encryption (see Section 4.3.1 for explanation of detailed differences between VPN EUD and TLS EUD solution design options).

External Interface – The interface of the Outer VPN Gateway that connects to the internal interface of the Outer Firewall.

Factory Reset - Removal of user data and any applications not already installed by the vendor. Malicious executables, at the application layer, may still be present after a factory reset.

Federal Information Processing Standards (FIPS) – A set of standards that describe the handling and processing of information within governmental agencies.

Gray Box Testing – The ability to test functionality within a component of the solution, such that full management privileges are granted (i.e., knowing passwords for Security Administrator and Auditor and access to the capabilities associated with those privileges). In addition, the use of any and all testing equipment and/or testing software used inside and outside the developed solution is available.

Gray Network – A network that contains classified data that has been encrypted once (see Section 4.2.2).

Gray Firewall – A stateful traffic filtering firewall placed on the Gray Network to provide filtering of ports, protocols, and IP addresses to ensure traffic reaches the correct Inner Encryption endpoint or is dropped.

Internal Interface – The interface on a VPN Gateway or Inner Encryption Component that connects to the Inner network (i.e., the Gray Network on the Outer VPN Gateway or the Red Network on the Inner Encryption Component).

Locally Managed Device – A device that is being managed by the direct connection of the Administration Workstation to the device in a hardwired fashion (such as a console cable).

Malicious – Any unauthorized events that are either unexplained or in any way indicate adversary activity.

Management Plane Traffic – Any protocol that carries either traffic between an ISSO and a component being managed, or log messages from a solution component to a SIEM or similar repository.

Mandatory Access Control (MAC) - An access control policy that is uniformly enforced across all subjects and objects within the boundary of an information system. A subject that has been granted access to information is constrained from doing any of the following: (i) passing the information to unauthorized subjects or objects; (ii) granting its privileges to other subjects; (iii) changing one or more security attributes on subjects, objects, the information system, or system components; (iv) choosing the security attributes to be associated with newly-created or modified objects; or (v) changing the rules governing access control. Organization-defined subjects may explicitly be granted organization-defined privileges (i.e., they are trusted subjects) such that they are not limited by some or all of the above constraints. Source: CNSSI 4009 & NIST SP 800-53 Rev 4.

Media Access Control - Sublayer of the data link layer (DLL) in the seven-layer OSI network reference model. Media Access Control is responsible for the transmission of data packets to and from the network-interface card, and to and from another remotely shared channel.

Platform Certificate - A Trusted Computing Group (TCG) defined X.509 Attribute Certificate that asserts the platform's security properties and configuration as shipped.

Protection Profile – A document used as part of the certification process according to the Common Criteria. As the generic form of a security target, it is typically created by a user or user community and provides an implementation independent specification of information assurance security requirements.

Public Key Infrastructure (PKI) – Framework established to issue, maintain, and revoke public key certificates.

Registration Authority (RA) – An entity authorized by the CA to collect, verify, and submit information that is to be entered into public key certificates. The term RA refers to hardware, software, and individuals that collectively perform this function.

Red Network - Contains only Red data and is under the control of the solution owner or a trusted third party. The Red Network begins at the internal interface(s) of Inner Encryption Components located between the Gray Firewall and Inner Firewall.

Reference Integrity Manifest (RIM) - A Trusted Computing Group TCG) defined Reference Integrity Manifest contains structures that a Verifier uses to validate expected values (Assertions) against actual values (Evidence).

Retransmission Device (RD) – A standalone piece of hardware used to provide Black Network connectivity to EUDs.

Seed File – A file comprised of multiple one-time password tokens that contain unique identifiers such as token serial number, expiration date, and the internal clock and time synchronized for the authentication server system.

Security Level – The combination of classification level, list of compartments, dissemination controls, and other controls applied to the information within a network.

Split-tunneling – Allows network traffic to egress through a path other than the established VPN tunnel (either on the same interface or another network interface). Split tunneling is explicitly prohibited in MA CP compliant configurations (see MA-OR-2 and MA-EU-7).

SRTP Client – A component on the EUD that facilitates encryption for voice communications.

TLS Client – A component on a TLS EUD that can provide the Inner layer of data in transit encryption.

TLS Component – Refers to both TLS Clients and TLS-Protected Servers.

Trusted Inline Interface – Any controlled management interface external to the virtualized managed device.

Virtual EUD – An EUD that contains at least four virtual machines (End User Domain, Inner Encryption domain, Outer Encryption Domain and a Black Transport Domain) as described in section 6.12.

VPN Client – A VPN application installed on an EUD.

VPN Component – The term used to refer to VPN Gateways and VPN Clients.

VPN Gateway – A VPN device physically located within the VPN infrastructure.

VPN Infrastructure – Physically protected in a secure facility and includes Inner and Outer VPN Gateways, Certificate Authorities, and Administration Workstations, but does not include EUDs.

Wipe – Removal of all user data, applications, and operating system.

APPENDIX B. ACRONYMS

Acronym	Meaning
ACL	Access Control List
AES	Advanced Encryption Standard
AO	Authorizing Official
ARP	Address Resolution Protocol
AU	Auditing
BIOS	Basic Input/Output System
BGP	Border Gateway Protocol
CA	Certification Authority
CDP	CRL Distribution Point
CDS	Cross Domain Solution
CSfC	Commercial Solutions for Classified
CM	Continuous Monitoring
CNSA	Commercial National Security Algorithm
CNSS	Committee on National Security Systems
CNSSI	Committee on National Security Systems Instruction
CNSSP	Committee on National Security Systems Policy
COTS	Commercial Off-the-Shelf
CP	Certificate Policy
CP	Capability Package
CPS	Certification Practice Statement
CRL	Certificate Revocation List
CSfC	Commercial Solutions for Classified
CSR	Certificate Signing Request
CUI	Controlled Unclassified Information
DAR	Data-At-Rest
DAA	Delegated Approval Authority
DEK	Data Encryption Key
DHCP	Dynamic Host Configuration Protocol
DiT	Data-in-Transit
DM	Device Management
DNS	Domain Name System
DoD	Department of Defense
DSA	Digital Signature Algorithm
DSC	Dedicated Security Component
DNM	Deputy National Manager
ECDH	Elliptic Curve Diffie-Hellman
ECDSA	Elliptic Curve Digital Signature Algorithm
EAP	Extensible Authentication Protocol
ESC	Enterprise Session Controller
ESP	Encapsulating Security Payload
EST	Enrollment Over Secure Transport
EUD	End User Device
FDE	Full Disk Encryption
FIPS	Federal Information Processing Standards
GRE	Generic Routing Encapsulation
GOTS	Government Off The Shelf
HAIPE	High Assurance Internet Protocol Encryptor

Acronym	Meaning
HSM	Hardware Security Module
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
IA	Information Assurance
IAVA	Information Assurance Vulnerability Alert
ICMP	Internet Control Message Protocol
IDS	Intrusion Detection System
IETF	Internet Engineering Task Force
IGMP	Internet Group Management Protocol
IKE	Internet Key Exchange
IP	Internet Protocol
IPS	Intrusion Prevention System
IPsec	Internet Protocol Security
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
IS-IS	Intermediate System to Intermediate System
KM	Key Management
MA	Mobile Access
MAC	Mandatory Access Control
MDF	Mobile Device Fundamentals
MDM	Mobile Device Manager
MFA	Multi-Factor Authentication
MOA	Memorandum of Agreement
MLD	Multicast Listener Discovery
MTU	Maximum Transmission Unit
NCDSMO	National Cross Domain Strategy Management Office
NDP	Neighbor Discovery Protocol
NIAP	National Information Assurance Partnership
NIST	National Institute of Standards and Technology
NPE	Non-Person Entity
NSA	National Security Agency
NSS	National Security Systems
NTP	Network Time Protocol
O	Objective
OCSP	Online Certificate Status Protocol
OID	Object Identifier
OS	Operating System
OSPF	Open Shortest Path First
PKI	Public Key Infrastructure
PMTU	Path Maximum Transmission Unit
POC	Point of Contact
PSK	Pre-shared Key
PTP	Precision Time Protocol
RADIUS	Remote Authentication Dial-In User Service
RA	Registration Authority
RD	Retransmission Device
RFC	Request for Comment
RIM	Reference Integrity Manifest
RIP	Routing Information Protocol

Acronym	Meaning
RSA	Rivest Shamir Adelman algorithm
SAs	Security Administrators
SCRM	Supply Chain Risk Management
SDES	Session Description Protocol Security Descriptions
SDE	Secure Data Elements
SDO	Secure Data Objects
SE	Secure Element
SEP	Secure Enclave Processor
SHA	Secure Hash Algorithm
SIEM	Security Information and Event Management
SIP	Session Initiation Protocol
SIPRNet	Secret Internet Protocol Router Network
SP	Service Packs
SRTP	Secure Real-Time Protocol
SSH	Secure Shell
SSHv2	Secure Shell Version 2
SWaP	Size, Weight, and Power
T	Threshold
T&E	Test and Evaluation
TCG	Trusted Computing Group
TCP	Transmission Control Protocol
TEE	Trusted Execution Environment
TLS	Transport Layer Security
TPM	Trusted Platform Module
UDP	User Datagram Protocol
UEFI	Universal Extensible Firmware Interface
USB	Universal Serial Bus
VDI	Virtual Desktop Infrastructure
VoIP	Voice over Internet Protocol
VM	Virtual Machine
VPN	Virtual Private Network
VS	Virtualization System
VSA	Vendor Specific Attribute
vTPM	Virtual Trusted Platform Module
VVOIP	Voice and Video over IP
WIDS	Wireless Intrusion Detection System
WIPS	Wireless Intrusion Prevention System
WLAN	Wireless Local Area Network
WPA2	Wi-Fi Protected Access 2
WPA3	Wi-Fi Protected Access 3

APPENDIX C. REFERENCES

Document	Title	Date
CNSSI 1300	*CNSSI 1300, National Security Systems Public Key Infrastructure X.509 Certificate Policy*	December 2014
CNSSI 4009	*CNSSI 4009, National Information Assurance (IA) Glossary Committee for National Security Systems.* http://www.cnss.gov/Assets/pdf/cnssi_4009.pdf	April 2015
CNSSP 15	*CNSS Policy (CNSSP) Number 15, National Information Assurance Policy on the Use of Public Standards for the Secure Sharing of Information Among National Security Systems Committee for National Security Systems*	October 2016
CNSSD 505	*CNSS Directive (CNSSD) Number 505, Supply Chain Risk Management (SCRM)*	November 2021
DoDI 8420.01	*Commercial Wireless Local-Area Network Devices, Systems, and Technologies.* Office of the CIO of the DOD	November 2017
DoDI 8540.01	Department of Defense Instruction 8540.01: *Cross Domain Policy*	August 2017
FIPS 140-3	*Federal Information Processing Standard 140, Security Requirements For Cryptographic Modules National Institute for Standards and Technology FIPS Publication* http://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.140-3.pdf	March 2019
FIPS 180-4	*Federal Information Processing Standard 180-4, Secure Hash Standard (SHS)*	August 2015
FIPS 186	*Federal Information Processing Standard 186-4, Digital Signature Standard (DSS)*	July 2013
FIPS 197	*Federal Information Processing Standard 197, Advanced Encryption Standard (AES)*	November 2001
FIPS 201-2	*Federal Information Processing Standard 201, Personal Identity Verification (PIV) of Federal Employees and Contractors National Institute for Standards and Technology FIPS Publication* http://csrc.nist.gov/publications/fips/fips201-1/FIPS-201-1-chng1.pdf	August 2013
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NSA Suite B	*NSA Guidance on Suite B Cryptography (including the Secure Sharing Suite (S3))*. http://www.nsa.gov/ia/programs/suiteb_cryptography/index.shtml	November 2010
RFC 2409	*IETF RFC 2409 The Internet Key Exchange (IKE)*. D. Harkins and D. Carrel.	November 1998
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RFC 3711	*IETF RFC 3711 The Secure Real-Time Transport Protocol (SRTP).* M. Baugher and D. McGrew.	March 2004
RFC 4252	*IETF RFC 4252 The Secure Shell (SSH) Authentication Protocol*. T. Ylonen and C. Lonvick.	January 2006
RFC 4253	*IETF RFC 4253 The Secure Shell (SSH) Transport Layer Protocol*. T. Ylonen and C.	January

Document	Title	Date
	Lonvick.	2006
RFC 4254	*IETF RFC 4254 The Secure Shell (SSH) Connection Protocol*. T. Ylonen and C. Lonvick.	January 2006
RFC 4256	*IETF RFC 4256 Generic Message Exchange Authentication for the Secure Shell Protocol (SSH)*. F. Cusack and M. Forssen.	January 2006
RFC 4302	*IETF RFC 4302 IP Authentication Header*. S. Kent	December 2005
RFC 4303	*IETF RFC 4303 IP Encapsulating Security Payload*. S. Kent	December 2005
RFC 4307	*IETF RFC 4307 Cryptographic Algorithms for Use in the Internet Key Exchange Version 2 (IKEv2)*. J. Schiller	December 2005
RFC 4308	*IETF RFC 4308 Cryptographic Suites for IPsec*. P. Hoffman	December 2005
RFC 4754	*IETF RFC 4754 IKE and IKEv2 Authentication Using the Elliptic Curve Digital Signature Algorithm (ECDSA)*. D. Fu and J. Solinas.	January 2007
RFC 5280	*IETF RFC 5280 Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*. D. Cooper, et. al.	May 2008
RFC 5288	*IETF RFC 5288 AES Galois Counter Mode (GCM) Cipher Suite2 for TLS*. J. Salowey, A. Choudhury, D. McGrew	August 2008
RFC 5289	*IETF RFC 5289 TLS Elliptic Curve Cipher Suites with SHA-256/384 and AES Galois Counter Mode (GCM)*. E. Rescorla	August 2008
RFC 5759	*IETF RFC 5759 Suite B Certificate and Certificate Revocation List (CRL) Profile*. J. Solinas and L. Zieglar.	January 2010
RFC 5996	*IETF RFC 5996 Internet Key Exchange Protocol Version 2 (IKEv2)*. C. Kaufman, et. al.	September 2010
RFC 6188	*IETF RFC 6188 The Use of AES 192 and AES 256 in Secure RTP.* D. McGrew.	March 2011
RFC 9206	*IETF RFC 9206 Commercial National Security Algorithm (CNSA) Suite Cryptography for Internet Protocol Security (IPsec)*. L. Corcoran and M. Jenkins.	February 2022
RFC 9212	*IETF RFC 9212 Commercial National Security Algorithm (CNSA) Suite Cryptography for Secure Shell*. N. Gajcowski and M. Jenkins.	March 2022
RFC 6818	*IETF RFC 6818 Updates to the Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*. P. Yee	January 2013
RFC 7030	*IETF RFC 7030 Enrollment over Secure Transport*. M. Pritikin, P. Yee, and D. Harkins.	October 2013
RFC 7296	*Internet Key Exchange Protocol Version 2 (IKEv2)*. C. Kaufman, P. Hoffman, Y. Nir, P. Eronen, T. Kivinen	October 2014
RFC 8422	*Elliptic Curve Cryptography (ECC) Cypher Suites for Transport Layer Security (TLS) Versions 1.2 and Earlier*. Y. Nir, S. Josefsson, M. Pegourie-Gonnard	August 2018
RFC 8446	*The Transport Layer Security (TLS) Protocol Version 1.3*. E. Rescorla	August 2018
RFC 8603	*Commercial National Security Algorithm (CNSA) Suite Certificate and Certificate Revocation List (CRL) Profile*. M. Jenkins, L. Zieglar	May 2019
SP 800-37	*Risk Management Framework for Information Systems and Organizations.* Joint Task Force	April 2021

Document	Title	Date
SP 800-53	*NIST Special Publication 800-53 Rev. 5, Security and Privacy Controls for Federal Information Systems and Organizations*. Joint Task Force Transformation Initiative.	September 2020
SP 800-56A	*NIST Special Publication 800-56A Rev. 3, Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography*. E. Barker, et. al.	April 2018
SP 800-56B	*NIST Special Publication 800-56B, Recommendation for Pair-Wise Key Establishment Schemes Using Integer Factorization Cryptography*. E. Barker, et. al.	March 2019
SP 800-56C	*NIST Special Publication 800-56C Rev 2, Recommendation for Key Derivation through Extraction-then-Expansion*. L. Chen.	August 2020
SP 800-131A	*NIST Special Publication 800-131A, Recommendation for Transitioning of Cryptographic Algorithms and Key Lengths*. E. Barker.	March 2019
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	TCG Platform Certificate Profile, Version 1.1 Revision 15	February 2019
	Trusted Computing Group, TCG PC Client Reference Integrity Manifest Specification, version 0.15.	March 2020
	TCG Reference Integrity Manifest (RIM) Information Model, Version 1.00, Revision 0.13, 2019 TCG Reference Integrity Manifest (RIM) Information Model, Version 1.0, Revision 0.13.	December 2019
	Unified Extensible Firmware Interface Specification (UEFI), Version 2.4 (Errata B) or later.	June 2013
	TCG PC Client Platform Firmware Integrity Measurement, Version 1.0 Revision 24.	December 2019
	CSfC Continuous Monitoring Annex v1.1.0	March 2023
	CSfC Data At Rest Capability Package v5.0	November 2020
	CSfC Key Management Requirements Annex v2.1	May 2022

APPENDIX D. END USER DEVICE IMPLEMENTATION NOTES

VPN EUDs:

The VPN EUD can be set up using a Computing Device with the user's applications, an Inner VPN Component, and an Outer VPN Component. The Inner VPN Component is a VPN Client residing on the same Computing Device as the user's applications. As shown in Figure 20, the Outer VPN Component can be a Dedicated Outer VPN Component or be a VPN Client on the same Computing Device as the user's applications. If a Dedicated Outer VPN component is used it must be connected to the Computing Device using Ethernet. The Dedicated Outer VPN must follow the requirements in Section 12.10 as shown in Table 23. As shown in Figure 21, if all components are on the same device, virtual machines will be required to provide separate IP stacks for the Inner and Outer VPN Clients. An RD will also be required in this case, unless, as noted in Section 4.2.3, the connection is to a Government Private Wireless Network, excluding a Government Private Cellular Network, or a Government Private Wired Network (see Figure 22).

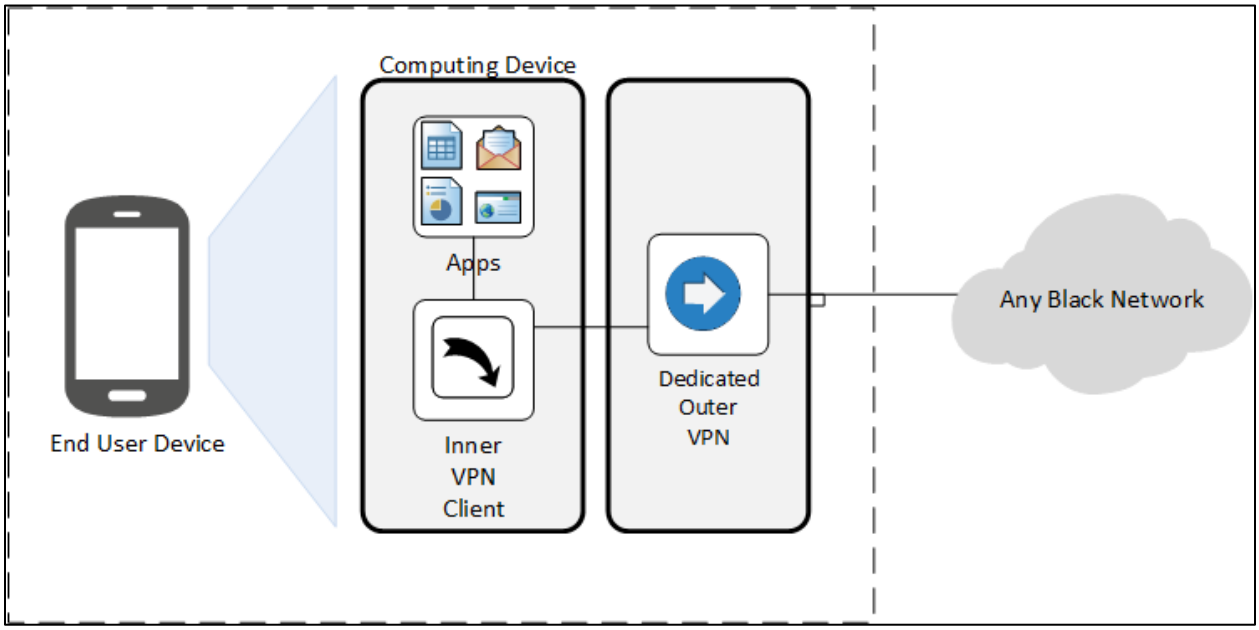

Figure 20. VPN EUD with Inner VPN Client and Separate Outer VPN Gateway

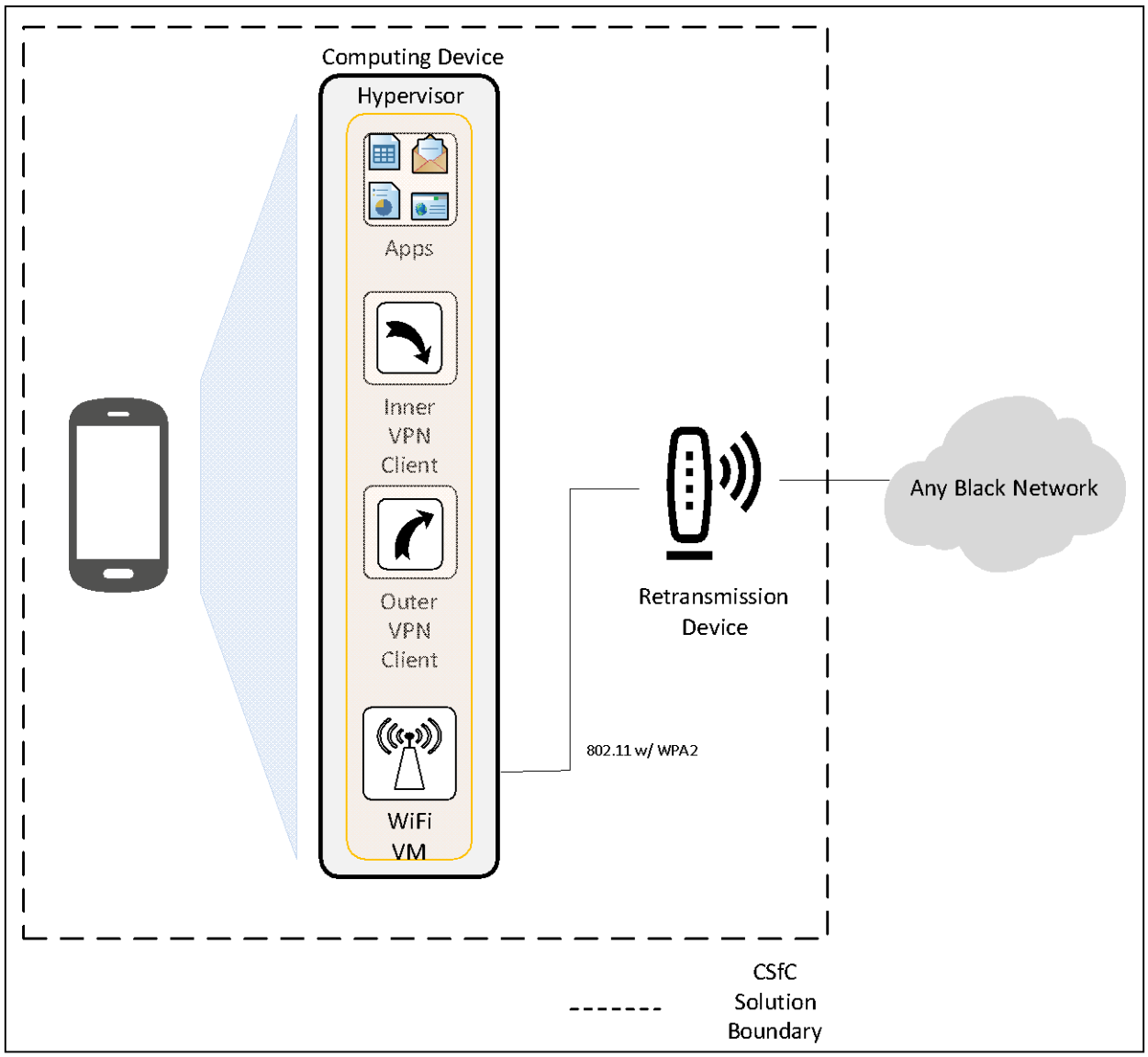

Figure 21. VPN EUD with Inner and Outer VPN Clients in Separate Virtual Machines with Retransmission Device

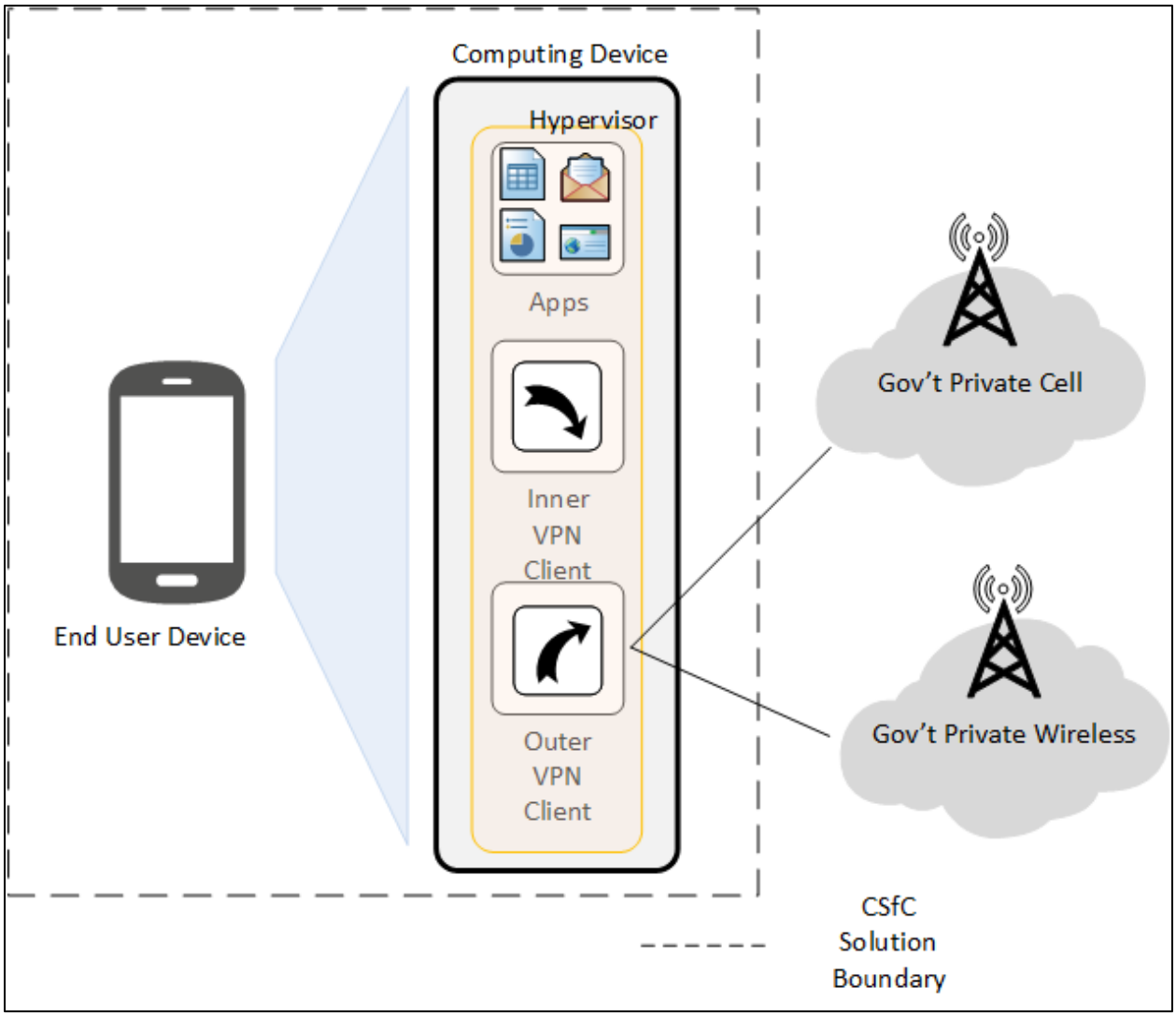

Figure 22. VPN EUD with Inner and Outer VPN Clients in Separate Virtual Machines without Retransmission Device

TLS End User Devices:

The TLS EUDs can be set up using up to two separate components. These components consist of the Computing Device and the VPN Component. The Computing Device sends and receives classified data. The Outer VPN Component is either a VPN Gateway or a VPN Client. Dedicated Outer VPN components are always physically separate from the Computing Device and are selected from the CSfC Components List (see Section 11). VPN Clients are selected from the IPsec VPN Client section of the CSfC Components List. The Inner layer of encryption is always provided by an application on the Computing Device which terminates either TLS and/or SRTP. Each application installed on the Computing Device must be selected from the CSfC Components List. The CSfC Components List provides several sections for which customers can select the TLS Application including Web Browser, Email Client, and VoIP Application.

Physical separation between encryption components provides a number of security advantages, but also is more difficult to implement due to the required hardware users require.

As shown in Figure 23, for TLS EUDs, each application installed on the Computing Device is responsible for terminating the Inner layer of encryption. If a Dedicated Outer VPN component is used it must be connected to the Computing Device using Ethernet. When the Dedicated Outer VPN connects to the Computing Device, the requirements in Section 12.10 must be followed.

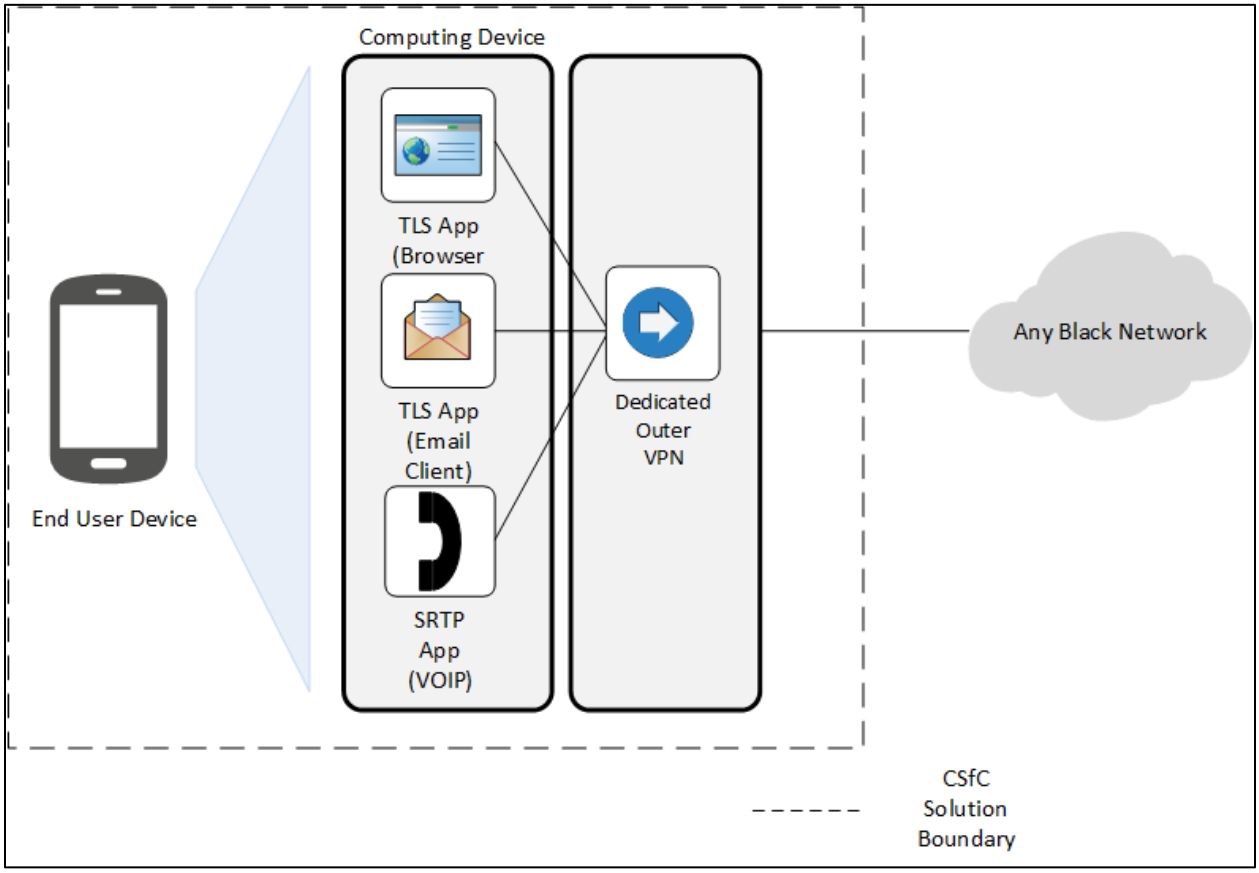

Figure 23. TLS EUD with Separate Outer VPN Gateway

As shown in Figure 24, an Outer VPN Client can be installed within the same Computing Device as the TLS Applications which provide the inner layer of encryption. As shown in Figure 25, an RD will also be required in this case, unless, as noted in Section 4.2.3, the connection is to a Government Private Wireless Network, excluding a Government Private Cellular Network or a Government Private Wired Network.

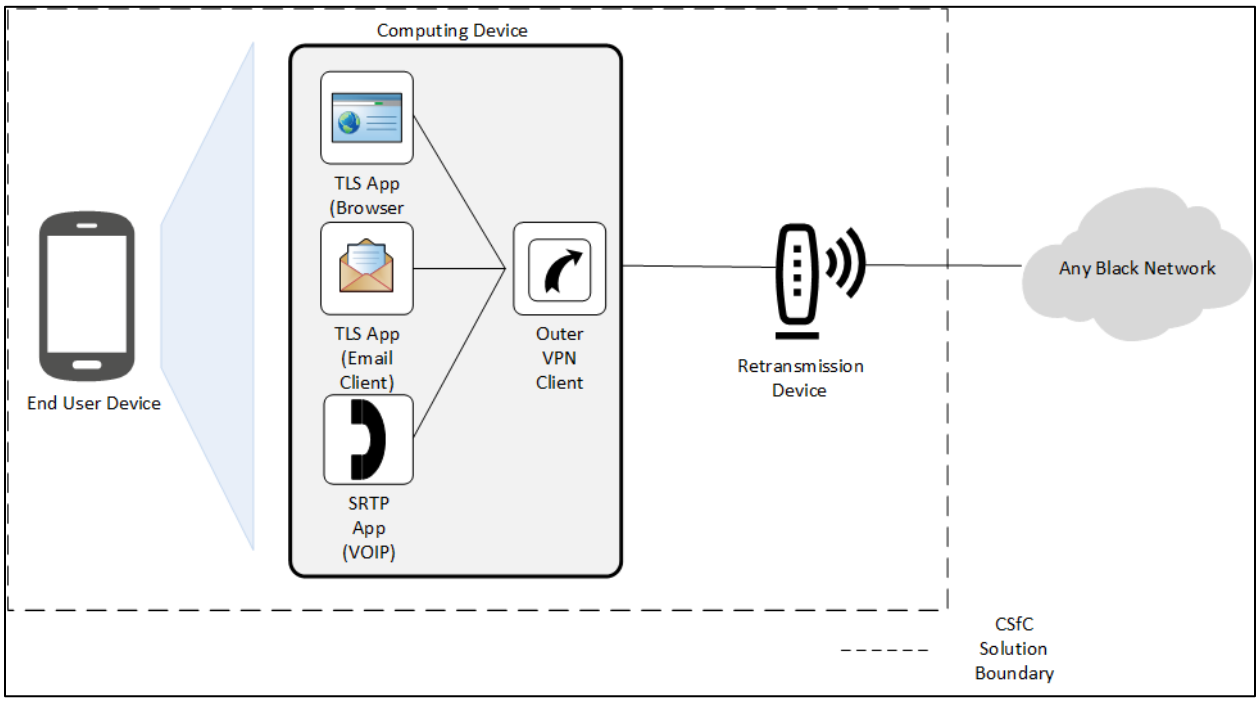

Figure 24. TLS EUD with Integrated Outer VPN Client with Retransmission Device

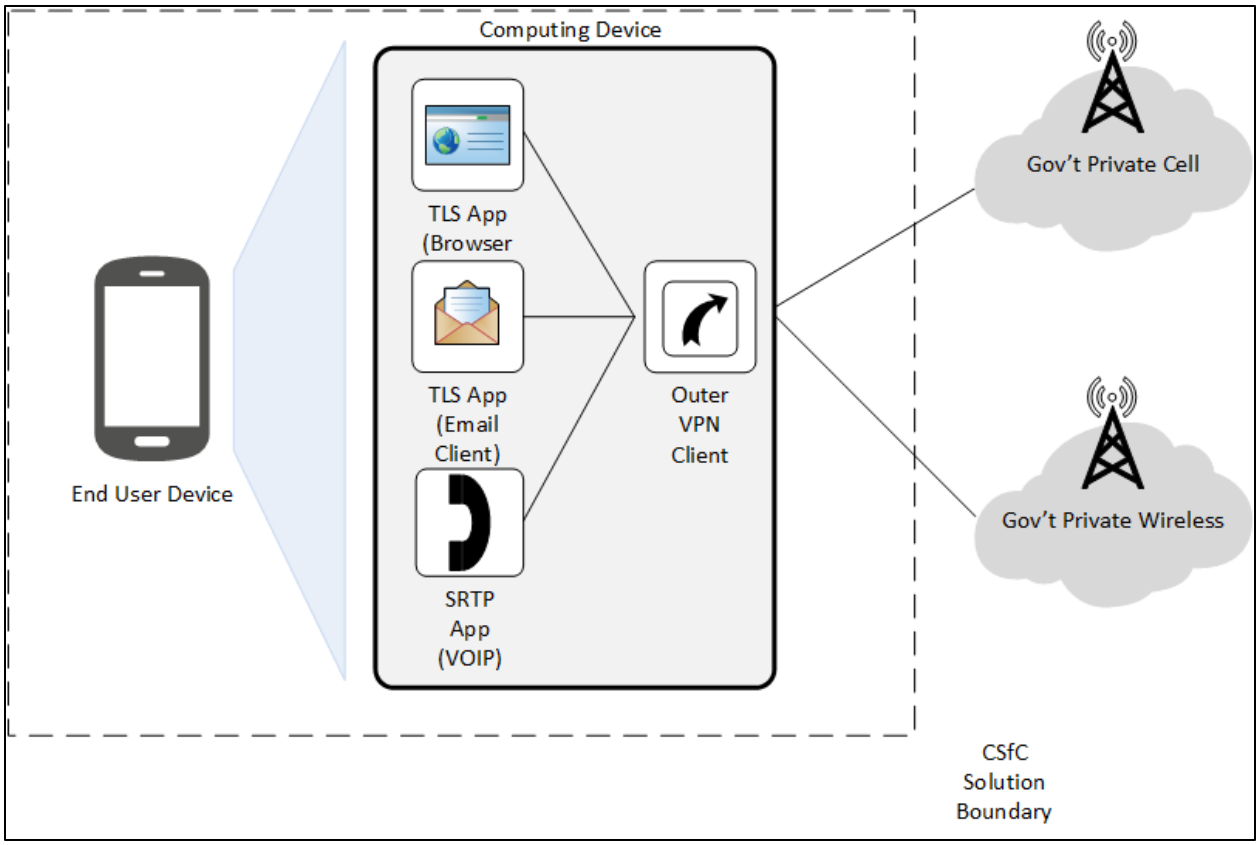

Figure 25. TLS EUD with Integrated Outer VPN Client without Retransmission Device

Retransmission Devices:

A government owned RD includes Wi-Fi Hotspots and Mobile Routers. On the external side, the RD can be connected to any type of medium (e.g., Cellular, Wi-Fi, SATCOM, Ethernet) to gain access to the Wide Area Network. As shown in Figure 26, on the internal side the RD is connected to EUDs either through an Ethernet cable or Wi-Fi.

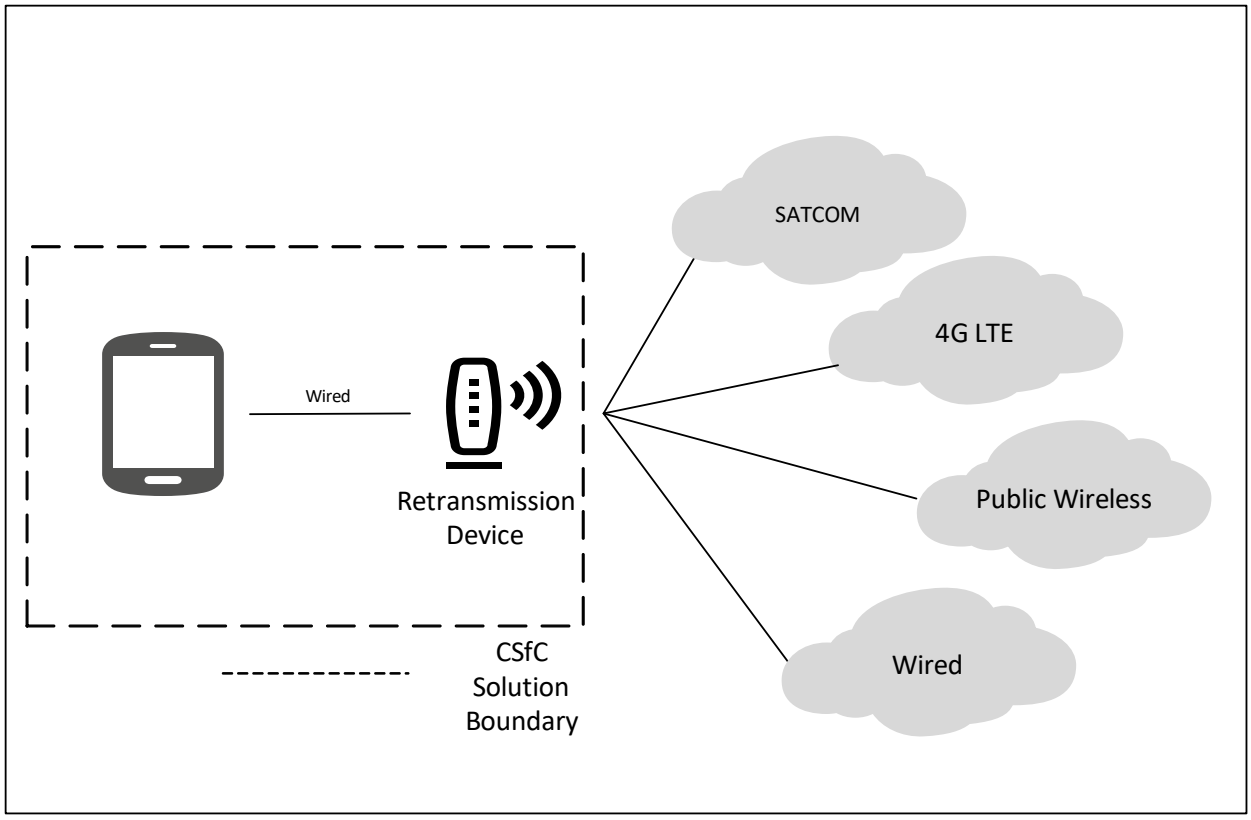

Figure 26. Retransmission Device Connectivity

Solution Infrastructure supporting VPN and TLS EUDs:

When supporting both VPN EUDs and TLS EUDs, the solution infrastructure will always include an Inner VPN Gateway between the Gray Firewall and Inner Firewall (data flow 1 in Figure 27). Additionally, the solution infrastructure will include one or more TLS-Protected Servers. The TLS-Protected Servers are also placed between the Gray Firewall and Inner Firewall (data flow 2 in Figure 27). Each Inner Encryption Component is independent and parallel to other Inner Encryption Components.

Figure 27 shows an MA Solution which supports both TLS EUDs and VPN EUDs.

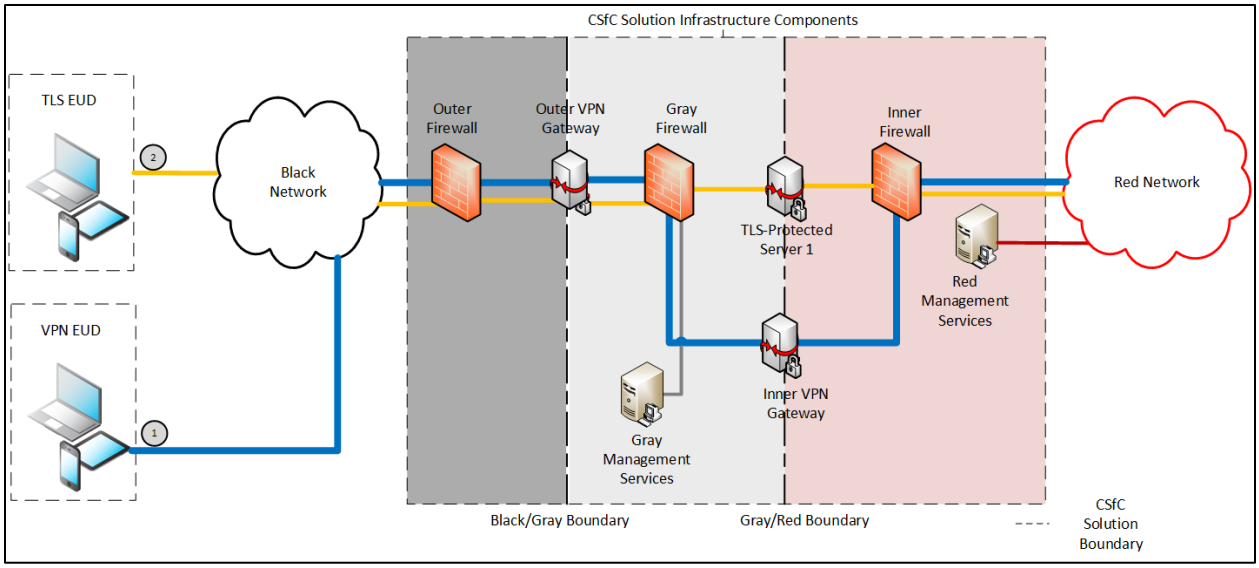

Figure 27. Mobile Access Solution Infrastructure Supporting VPN and TLS EUDs

The following text describes each of the data flows shown above.

1. The Inner VPN Gateway terminates the Inner layer of IPsec traffic for all VPN EUDs, and authenticates the EUD VPN client based on device certificates. There is a physical connection between the Gray Firewall and the Inner VPN Gateway and between the Inner VPN Gateway and the Inner Firewall.
2. The TLS-Protected Server is placed between the Gray Firewall and Inner Firewall. The TLS-Protected Server terminates the Inner layer of TLS traffic for one or more of the services available to TLS EUDs. The TLS-Protected Server could also be a Session Border Controller which terminates SRTP traffic and relays it to the appropriate destination in the Red Network. The TLS-Protected Server authenticates the EUD's TLS client based on user or device certificates. There is a physical connection between the Gray Firewall and the TLS-Protected Server and between the TLS-Protected Server and the Inner Firewall. This connection is in parallel with the VPN Gateway such that the TLS-Protected server is not dependent on the Inner-VPN Gateway to reach the Gray Firewall or the Inner Firewall.

Figure 28 below is a depiction of section 6.12, Virtualized EUD. This is only a high-level diagram and it does not represent how virtualization has to be implemented in all cases. Please reference section 6.12 and Table 25 for the requirements.

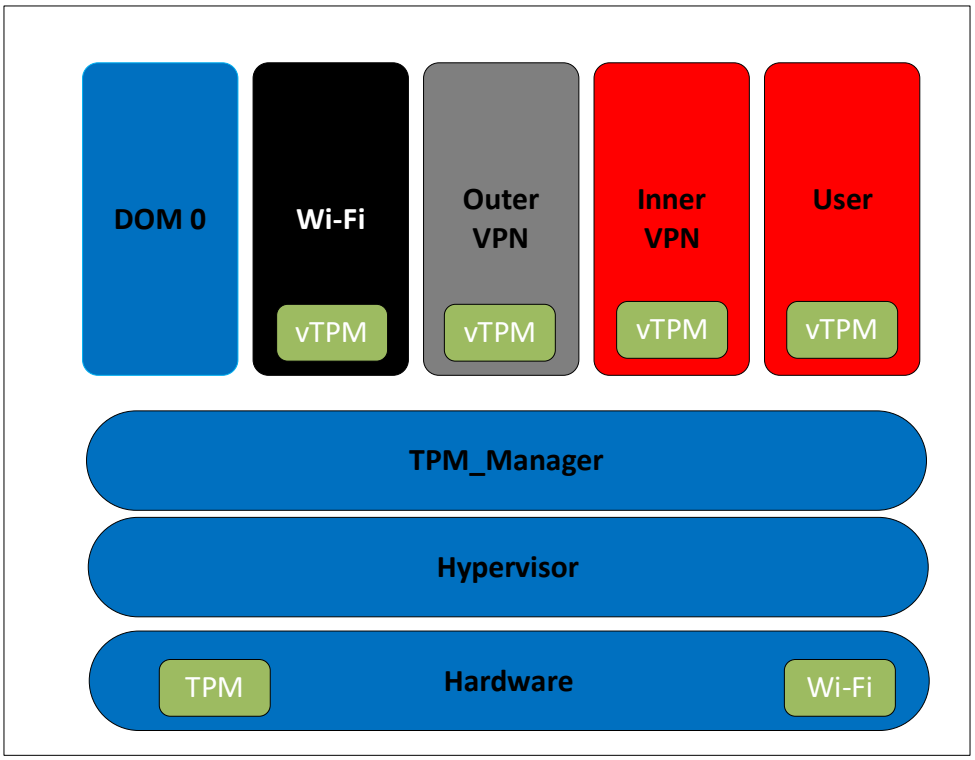

Figure 28. Virtualization High Level Architecture

APPENDIX E. TACTICAL SOLUTION IMPLEMENTATIONS

Although the majority of customers instantiating solutions based on the MA CP will be used for Strategic or Operational Environments, some organizations may deploy the MA CP in Tactical Environments. These Tactical Environments include a specific set of Size, Weight, and Power (SWaP) constraints not found in traditional environments.

Organizations intending to deploy an MA CP Solution for Tactical Environments may use this Appendix, which accommodates the SWaP constraints unique to their environment. This Appendix may only be used to protect Tactical Data classified as SECRET or below. The CP follows CNSSI 4009, which defines Tactical Data as, "Information that requires protection from disclosure and modification for a limited duration as determined by the originator or information owner." In addition to protecting Tactical Data, organizations that register their solution using this Appendix must be deployed at the Tactical Edge. The CP also follows CNSSI 4009, which defines the Tactical Edge as, "The platforms, sites, and personnel (U.S. military, allied, coalition partners, first responders) operating at lethal risk in a battle space or crisis environment characterized by: 1) a dependence on information systems and connectivity for survival and mission success, 2) high threats to the operational readiness of both information systems and connectivity, and 3) users are fully engaged, highly stressed, and dependent on the availability, integrity, and transparency of their information systems."

If an organization's planned solution meets the three criteria above then their solution may be registered using the requirement accommodations in this Appendix. The MA CP Registration form must explicitly state that the solution is being used in Tactical Environments and provide justification on how the above criteria are met. In general, customers registering with this Appendix will be deployed in support of Battalion and below (or equivalent) unit structure. Typically, these Tactical Environments are located in austere environments where communication infrastructure is generally limited. Due to the lack of existing communication infrastructure, the Tactical Environments are also generally characterized by the use of Government owned Black Infrastructure (Government Private Wireless Networks and/or Government Private Wired Networks).

Table 38 defines the Tactical Implementation Overlay Requirements and may be used by customers meeting the criteria above when they configure, test, register, and operate their MA Solution. All other requirements stand as written in the body of the CP. Any questions on the use of this Appendix should be directed to mobile_access@nsa.gov and csfc@nsa.gov.

Wireless Dedicated Outer VPN:

Within Tactical deployment of the MA CP the Dedicated Outer VPN has the additional capability of allowing for EUDs to connect over a wireless link using Wi-Fi with WPA3. The Wi-Fi connection between the computing platform and Outer VPN Gateway must use WPA3 PSK, in the SAE-PK only mode. The Dedicated Outer VPN must additionally support wireless connectivity with the computing platform and must also be selected from the WLAN Access System section of the CSfC Components List. The WPA Personal SAE key (password) must have an entropy of at least 112 bits in strength.

Table 38. Tactical Implementation Overlay Requirements

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
MA-PS-17	The Outer Firewall, Outer VPN Gateway, Gray Firewall, Inner Encryption Component, and Inner Firewall must use physically separate components, such that no component is used for more than one function (see Figure 1).	VI, TI	O	MA-TO-1
MA-TO-1	The Outer VPN Gateway must be physically separate from the Inner Encryption Components.	VI, TI	T	MA-PS-17
MA-EU-8	Rekeying of an EUD's certificates and associated private keys must be done through re-provisioning prior to expiration of keys.	VE, TE	O	Optional
MA-EU-12	Users of EUDs must successfully authenticate themselves to the services they access on the Red Network using an AO approved method.	All	O	Optional
MA-EU-13	Red Network services must not transmit any classified data to EUDs until user authentication succeeds.	VI, TI	O	Optional
MA-EU-47	USB mass storage mode must be disabled on the EUDs.	VE, TE	O	Optional
MA-MR-5	Each IDS in the solution must be configured to send alerts to the SA.	VI, TI	O	Optional
MA-MR-7	The organization must create IDS rules that generate alerts upon detection of any unauthorized destination IP addresses.	VI, TI	O	Optional
MA-PS-28	If the solution uses a Dedicated Outer VPN as part of an EUD with wireless connectivity to a Computing Device, the Dedicated Outer VPN must be chosen from the list of WLAN Access Systems on the CSfC Components List.	WC	T=O	
MA-WC-2	The Dedicated Outer VPN Wi-Fi Network must only use cipher suites selected from the "Dedicated Outer VPN and Wireless Network (Threshold)" row of Table 39.	WC	T	MA-WC-15
MA-WC-3	If the Dedicated Outer VPN is configured using WPA3 PSK, then the WPA-3 Personal SAE Key (password) must have an entropy of at least 256 bits in strength.	WC	T =O	
MA-WC-9	The Computing Device WLAN Client must negotiate new session keys with the Dedicated Outer VPN at least once per hour.	WC	T=O	
MA-WC-10	The Computing Device WLAN Client must be prevented from using ad hoc mode (client-to-client connections).	WC	T=O	
MA-WC-11	The Computing Device WLAN Client must be prevented from using network bridging.	WC	T=O	
MA-WC-12	The Dedicated Outer VPN must only permit connections to Computing Devices on a MAC allow	WC	T=O	

Req #	Requirement Description	Capabilities	Threshold/ Objective	Alternative
	list.			
MA-WC-15	The Dedicated Outer VPN Wi-Fi Network must only use cipher suites selected from the "Dedicated Outer VPN and Wireless Network Objective)" row of Table 39.	WC	O	MA-WC-2
MA-WC-17	All EUDs must connect to Dedicated Outer VPN devices with a wired connection.	WC	O	Optional
MA-WC-18	Wi-Fi must be disabled on the EUD.	WC	O	Optional

Table 39. WPA3 Encryption and EAP-TLS (Approved Algorithms)

Security Service	Algorithm Suite	Specifications
Confidentiality (Encryption)	AES-128-CCMP (Threshold) AES-256-GCMP (Objective)	FIPS PUB 197 IETF RFC 9206 IETF RFC 9212 IETF RFC 6460
Key Exchange/Establishment	ECDH over the curve P-384 Diffie Hellman (DH) Group 20	NIST SP 800-56A IETF RFC 9206 IETF RFC 9212 IETF RFC 6460 NIST SP 800-56A

APPENDIX F. EUD CONFIGURATIONS OPTIONS

Section 6 of the CP provides the detailed information about the various EUD configuration option combinations. This appendix summarizes the information in Tables 40 and 41, which are easy to understand and consolidates the information into one location. The configuration options included are: the type of EUD (VPN, TLS, VPN with Software Virtualization, VPN with Dedicated Outer, and TLS with Dedicated Outer), the type of black transport (Government or Public), if an RD is required, if the RD is required to be tethered, if software virtualization is used, and if a dedicated outer VPN is used. Tables 40 and 41 also include helpful comments to note, including information about: separate IP stacks, when software virtualization is required, software virtualization PP compliance, and notes about Wi-Fi. The tables also conveniently summarize the requirements tables that do and do not apply to each of the various EUD configurations. This appendix was designed to clarify the various EUD configuration options and what is and is not required. These tables should provide customers with all the relevant information available relating to EUD configuration options.

Table 40. EUD Configuration Options Retransmission Device MA-RD

EUD Configuration	Black Transport Network Type	Government Retransmission Device	Enhanced Hardware Isolation Requirements for Retransmission Device - Section 6.5.2 Hard Wired Tethered Connection	Comments	Requirements
VPN EUD	Government Private Wireless/Wired	Not Required	N/A	Separate IP stacks are no longer required (MA-EU-4 and MA-EU-5 are now objective)	
	Government Private Cellular or Public	Required	Required, must be tethered between RD and EUD via Ethernet or Ethernet over USB		Table 21 (HI Capability only) Table 22
TLS EUD	Government Private Wireless/Wired	Not Required	N/A		
	Government Private Cellular or Public	Required	Required, must be tethered between RD and EUD via Ethernet or Ethernet over USB		Table 21 (HI Capability only) Table 22
VPN EUD with Virtualization (Section 6.12)	Government Private Wireless/Wired	Not Required	N/A	Software Virtualization is not required for Government Private Wireless/Wired	
	Government Private Cellular or Public	Required	Not Required - Wi-Fi permitted between RD and EUD	Virtualization products will need to comply with the Virtualization PP and CSfC selections when available	Table 21 Table 24 Table 25

Table 41. EUD Configuration Options Dedicated Outer VPN

Dedicated Outer VPN - EUD Configurations	Black Transport Network Type	Government Retransmission Device	Hard Wired Tethered Connection	Comments	Requirements
VPN EUD with Dedicated Outer VPN	Any	Not required (Dedicated Outer VPN is essentially the RD)	Required: MA-WC-17, MA-WC-18	Wi-Fi between the Dedicated Outer VPN and the EUD is no longer permitted	Table 18
TLS EUD with Dedicated Outer VPN	Any	Not required (Dedicated Outer VPN is essentially the RD)	Required: MA-WC-17, MA-WC-18	Wi-Fi between the Dedicated Outer VPN and the EUD is no longer permitted	Table 18