Trusted Cyber Technologies

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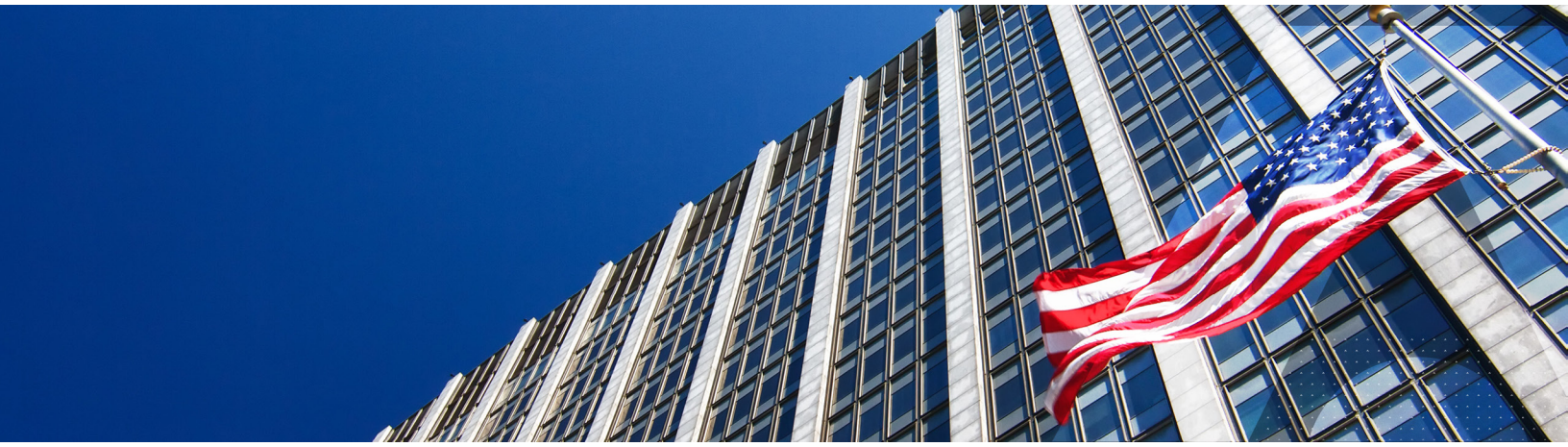
Best Practices for Implementing the White House Executive Order on Improving the Nation's Cybersecurity Infrastructure



White Paper

President Joe Biden signed an Executive Order on May 12, 2021 which paves the way to implementing new policies aimed to improve national cybersecurity posture. The Executive Order was signed in the wake of several notable cybersecurity catastrophes in 2020 and 2021, such as the ransomware attack targeting the Colonial Pipeline, the Microsoft Exchange server vulnerabilities that affected more than 60,000 organizations, and the SolarWinds hack that compromised many federal agencies.

The Executive Order underscores the importance of protecting the Federal Government's "computer systems, whether they are cloud-based, on-premises, or hybrid" and extends the scope to include systems that process data and run vital machinery paramount to the nation's safety. To accomplish this, the Executive Order outlines several decisive steps needed to modernize its approach to cybersecurity including:

- Sec 3: Modernize Federal Government Cybersecurity
  - Adopt Security Best Practices
  - Encrypt data at rest and in transit
  - Employ multi-factor authentication
  - Secure cloud services
  - Advance towards zero trust architecture
- Sec 4: Enhance Software Supply Chain Security
  - Protect integrity of critical software that performs functions critical to trust
  - Employ encryption of data

Zero Trust Architecture

Implementing a zero trust approach to data security is one of the best ways for agencies to protect their data. The principles of zero trust eliminates the binary trust/don't trust approach applied to users and assets in yesterday's on-premises, perimeter-centric environments. The main concept of zero trust starts with the notion that networked devices should not be trusted by default, even if they are connected to a managed corporate network and were previously verified. In short, agencies must act under the assumption that their networks have already been compromised. There are numerous ways to put a zero trust plan into action. A good plan starts with taking a data-centric approach to security. This means focusing on what needs to be protected—the files containing sensitive information—and applying the appropriate form of protection no matter where the data happens to reside. To be effective, this must happen automatically; sensitive information should be identified as soon as it enters an organization's IT ecosystem and should be secured with policy-based protection that lasts throughout the data lifecycle.

Securing Cloud Services

According to results from the Federal Edition of the Thales 2020 Data Threat Report, "74% percent of U.S. Federal Government agencies store sensitive data in Software as a Service applications, 47% store data in Infrastructure as a Service, and 46% store data in Platform as a Service environments." Government agencies should focus on implementing solutions that can simplify the data security landscape and reduce complexity across multiple clouds and legacy environments, as well as modern, cloud-based digital transformation technologies. Agencies should consider data security solutions that enable protection of data moving between clouds and out of the cloud to on-premises environments and should leverage centralized security solutions that orchestrate data security across multiple cloud platforms. In a shared responsibility model, organizations cannot rely on cloud service providers for data security measures as data security remains the responsibility of the organization. Organizations must additionally consider all the security elements which directly or indirectly impact the security of their data such as identity management, encryption and tokenization.

Supply Chain Security

The Executive Order directly addresses enhancing supply chain security. Bad actors exploit weak links in the supply chain. Effective immediately, the National Institute of Standards and Technology (NIST) will collaborate with federal agencies, private industry, and academia to develop guidelines that can be used to evaluate software security, include criteria to evaluate the security practices of the developers and suppliers themselves, and identify innovative tools or methods to demonstrate conformance with secure practices. As an industry leader in cryptography, data security and delivering products via a secure supply chain, Thales TCT collaborates with NIST on several initiatives including cryptographic algorithms and Zero Trust Security.

Thales TCT Solutions for Modernizing Federal Government Cybersecurity

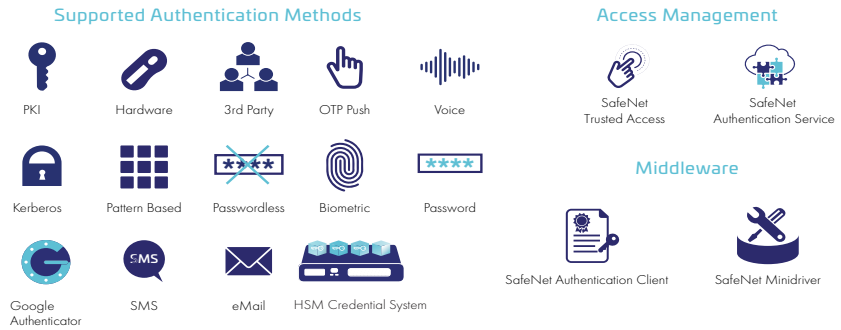
Section 3 of the Executive Order explicitly states that "within 180 days of the date of this order, agencies shall adopt multi-factor authentication and encryption for data at rest and in transit, to the maximum extent consistent with federal records laws and other applicable laws." Thales TCT, a U.S. based provider of government high-assurance data security solutions, offers multi-factor authentication, data at rest encryption, and data in transit encryption solutions that address the requirements outlined in the Executive Order. Our data protection solutions easily integrate with existing IT infrastructures and deliver the same level of security whether deployed in enterprise, tactical or cloud environments. Our solutions enable federal agencies to meet their immediate data protection needs while investing in a solution that provides robust security, a growing ecosystem, and the scalability needed to build a trusted framework for the future.

Multi-Factor Authentication

Section 3.d of the Executive Order requires the implementation of multi-factor authentication. Multi-factor authentication ensures that a user is who they claim to be. The more factors used to determine a person's identity, the greater the trust of authenticity. Because multi-factor authentication requires multiple means of identification at login, it is widely recognized as the most secure method for authenticating access to data and applications.

Thales TCT offers the broadest range of authentication methods and form factors. Our solutions address numerous use cases, assurance levels, and threat vectors with unified, centrally managed policies—managed from a central platform delivered in the cloud or on-premises.

Supported authentication methods include context-based authentication combined with step-up capabilities, OOB, one-time password (OTP) and X.509 certificate-based solutions. All authentication methods are available in numerous form factors, including smart card, USB token, software, mobile app, and hardware tokens.



Thales TCT Authentication Solutions

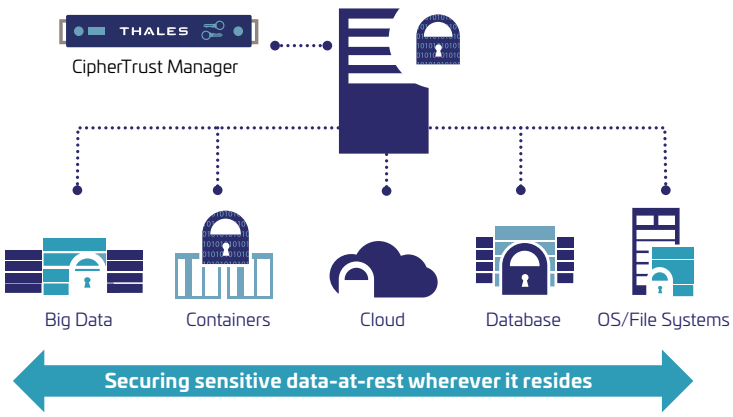
From traditional high assurance to commercial-off-the-shelf authentication solutions to first-of-a-kind hardware security module-based identity credentials, Thales TCT offers the most secure, certificate-based authentication platforms available to the U.S. Federal Government.

- **High Assurance Authentication** that brings multi-factor authentication to applications and networks where security is critical.
- **Commercial-off-the-Shelf Multi-factor Authentication** that offers the broadest range of authentication methods and form factors, Thales TCT allows customers to address numerous use cases, assurance levels, and threat vectors with unified, centrally managed policies—managed from one authentication back end delivered in the cloud or on premise.
- **Access Management** through strong authentication services that enable agencies to pursue consistent authentication policies across the organization by automating and simplifying the deployment and management of a distributed estate of tokens, while securing a broad spectrum of resources, whether on-premises, cloud-based, or virtualized.

Data at Rest Encryption

Section 3.d of the Executive Order requires the implementation of encryption for data at rest. Data at rest encryption with privileged user access controls significantly improves security posture and not only protects data at rest, but also encrypted workloads in the cloud. Role-based access policies enable a zero trust architecture by controlling who, what, where, when and how data can be accessed. Granular access controls enable administrative users to perform their duties while restricting access to encrypted data.

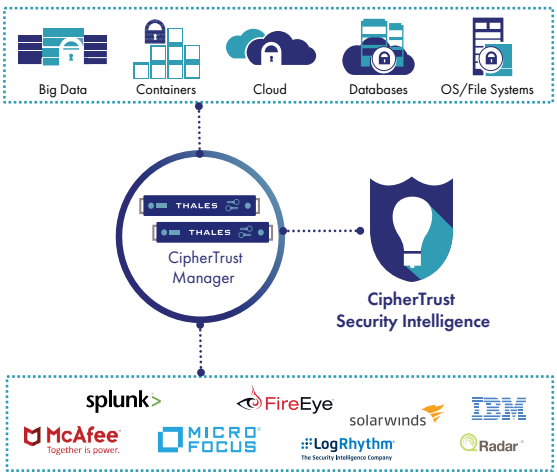
Thales TCT offers data at rest encryption solutions that deliver granular encryption and role-based access control for structured and unstructured data residing in file servers, databases, applications, and storage containers. With centralized key management and a hardened root of trust with a full U.S. supply chain, agencies can ensure their master keys are protected and data remains secure.



Detect Threats and Issue Alerts

Additionally, agencies need awareness of who and what is accessing sensitive data, including privileged users masquerading as other users. Every time a user attempts to access a resource under the protection of Thales TCT's encryption solutions, rich logs of whom, when, where, which policies applied, and the resulting action can be generated.

These logs provide deep visibility into data access, which can be used to alert administrators to unauthorized access attempts to protected data that may represent a threat, and to build typical access patterns when combined with other infrastructure and access information. For instance, a user that typically accesses information in small quantities from within a local network, if seen to be accessing large volumes of data from a remote location, would represent a threat that should generate an alert and be investigated.



CipherTrust Data Security Platform

CipherTrust Data Security Platform unifies data discovery, classification, data protection, and unprecedented granular access controls with centralized key management – all on a single platform. This results in less resources dedicated to data security operations, ubiquitous compliance controls, and significantly reduced risk. CipherTrust Data Security Platform is available for sale to the U.S. Federal Government exclusively through Thales TCT.

The platform includes:

- **CipherTrust Transparent Encryption** delivers data at rest encryption, privileged user access controls and detailed data access audit logging. Connectors protect data in files, volumes and databases on Windows, AIX and Linux OS's across physical and virtual servers, in cloud and big data environments.
  - **Live Data Transformation Extension** provides zero-downtime encryption and data rekeying.
  - **CipherTrust Security Intelligence** logs and reports streamline compliance reporting and speed up threat detection using SIEM systems.
- **CipherTrust Application Data Protection** delivers crypto functions for key management, signing, hashing and encryption services through APIs, so that developers can easily secure data at the application server or big data node.
- **CipherTrust Tokenization** is offered both vaulted and vaultless, and can help reduce the cost and complexity of complying with data security mandates.
- **CipherTrust Database Protection** solutions integrate data encryption for sensitive fields in databases with secure, centralized key management and without the need to alter database applications. CipherTrust Database Protection solutions support Oracle, Microsoft SQL Server, and IBM DB2 and Teradata databases.

Secure Cryptographic Keys

For encryption to successfully secure sensitive data, the cryptographic keys used to encrypt and decrypt data must be secured, managed and controlled by your organization and not a third-party solution or cloud provider. As agencies deploy ever-increasing numbers of siloed encryption solutions, they find themselves managing inconsistent policies, different levels of protection, and escalating costs.

Critical to the success of deploying encryption to protect sensitive information is the security of the encryption keys. In order for the encryption to be effective, the keys must be secured separate from software and stored in a tamper-resistant hardware security module.

Thales TCT offers enterprise key management solutions that enable agencies to manage encryption keys centrally, provide granular access control and configure security policies. Our solutions manage key lifecycle tasks including generation, rotation, destruction, import and export, provide role-based access control to keys and policies, support robust auditing and reporting, and offers developer friendly REST API. Our enterprise key management solutions can utilize a FIPS 140-2 Level 3 validated hardware security module with a U.S. supply chain as a root of trust.

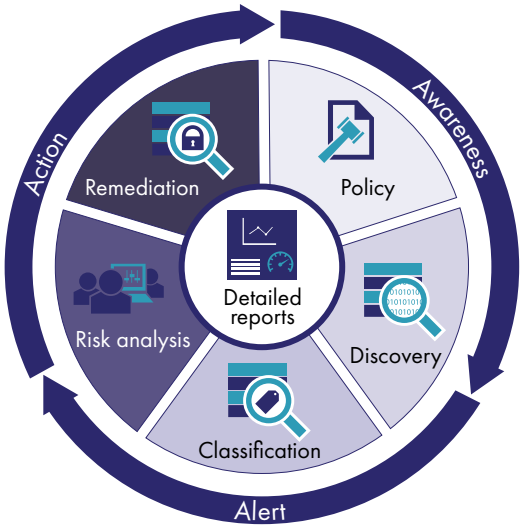
CipherTrust Manager

- **CipherTrust Manager** centrally manages encryption keys, provides granular access controls and configures security policies. It manages key lifecycle tasks including generation, rotation, destruction, import and export, provides role-based access control to keys and policies, supports robust auditing and reporting, and offers developer friendly REST APIs. CipherTrust Manager also delivers enterprise key management solutions that streamline bring your own keys (BYOK) for multiple cloud environments, supports TDE key management for Oracle and Microsoft SQL Servers, and centralizes key management for a variety of KMIP clients, such as tape archives, full disk encryption, big data, virtual environments and more.
- **Luna T-Series Hardware Security Modules** store, protect, and manage cryptographic keys used to secure sensitive data and critical applications. Meeting government mandates for U.S. Supply Chain, the high-assurance, tamper-resistant Luna T-Series HSMs are designed, developed, manufactured, sold, and supported in the United States.

Identify and Classify Sensitive Data

Section 3.c of the executive order emphasizes the need to "prioritize identification of the unclassified data considered by the agency to be the most sensitive and under the greatest threat". Sensitive data is often spread across on-premises, virtual, and multi-cloud environments.

Thales TCT offers a data discovery and classification solution that enables agencies to get complete visibility of sensitive data with efficient data discovery, classification, and risk analysis across cloud, big data, and traditional environments.



- **CipherTrust Data Discovery and Classification** locates regulated sensitive data, both structured and unstructured, across the cloud, big data, and traditional data stores. A single pane of glass delivers understanding of sensitive data and its risks, enabling better decisions about closing security gaps, prioritizing remediation actions, and securing your cloud transformation and third-party data sharing.

Data in Transit Encryption

Protecting network transmitted data against cyber-attacks and data breaches is imperative. High-assurance network encryption features secure, dedicated encryption devices that protect data in transit. In order to be truly high assurance, these devices must use embedded, zero-touch encryption key management; provide end-to-end, authenticated encryption and use standards-based algorithms.

Thales TCT offers network encryption solutions that provide a single platform to encrypt everywhere— from network traffic between data centers and the headquarters to backup and disaster recovery sites, whether on premises or in the cloud. Rigorously tested and certified, our network encryption solutions have been vetted by such organizations as the Defense Information Systems Agency (DoDIN APL) and NATO. Only through Thales TCT's high-assurance network data encryption can you be assured your data is rendered useless in unauthorized hands and that it will remain secure beyond the data's useful life.

Network Encryption Use Cases:

Protecting Big Data In Motion

Data Center Interconnect

Securing Microwave and Satellite Uplinks

Traffic Flow Security

SCADA and Industrial Control

Secure Connectivity to the Cloud for Government

High-Definition CCTV Networks

Defense Network Communications

Thales TCT Network Encryption Solutions

Thales's comprehensive network traffic encryption solutions use Layer 2 and 3 encryption to ensure security without compromise. Ensuring maximum throughput with minimal latency, our solutions allow customers to better protect data, video, voice, and metadata from eavesdropping, surveillance, and overt and covert interception. Thales network encryption solutions are available for sale to the U.S. Federal Government exclusively through Thales TCT.

- **CN9000 Network Encryptors**: Delivering 100 Gbps of high assurance and secure encrypted data, the CN9000 Series provides mega data security (100 Gbps), with the lowest latency in the industry (<2µs).
- **CN6000 Network Encryptors:** Offering variable-speed licenses from 100 Mbps to 10 Gbps. The CN6140 has a multi-port design that makes this encryptor variable, with speed licenses up to 40 Gbps (4x10 Gbps), highly flexible and cost effective.
- **CN4000 Network Encryptors**: Versatile and compact, offering 10 Mbps-1 Gbps encryption in a small-form factor (SFF) chassis. The CN4000 series is ideal for branch and remote locations, offering high-performance encryption, without comprising network performance.
- **CV1000 Virtual Encryptor**: The first hardened virtual encryptor, is instantly scalable and may be deployed rapidly across hundreds of network links, providing robust encryption protection for data-in-motion. The Thales CV1000 Virtual Encryptor is a Virtual Network Function (VNF) that delivers an agile network and reduces capital expenditure requirements. Ideal for organizations that are virtualizing network functions and taking advantage of Software Defined Networking (SDN).

About Thales Trusted Cyber Technologies

Thales Trusted Cyber Technologies, a business area of Thales Defense & Security, Inc., protects the most vital data from the core to the cloud to the field. We serve as a trusted, U.S. based source for cyber security solutions for the U.S. Federal Government. Our solutions enable agencies to deploy a holistic data protection ecosystem where data and cryptographic keys are secured and managed, and access and distribution are controlled.

For more information, visit www.thalestct.com

3465 Box Hill Corporate Center Drive, Suite D, Abingdon, MD 21009 • 443-484-7070 • info@thalestct.com
thalestct.com