

US Executive Order calls for encrypting DNS

EO14144 January 17, 2025

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Outline

- History – of the prior work
- What's in this EO
 - Cover 3 of the 9 topics
 - Supply chain, securing existing systems, protecting communications
- Timeline
- Speculation (no point in asking me questions!)

A brief history

May 2021

- EO 14028

Feb 2022

- SSDF 1.1

March 2024

- Secure Software Development Attestation

May 2024

- Secure by design pledge

Jan 17, 2025

- EO 14144

EO 14028 – summary from GSA.gov

- Requires service providers share incident and threat information
- Moves the Federal government to secure cloud services, zero-trust architecture, and mandates deployment of MFA and encryption
- Establishes baseline security standards for development of software sold to the government, including requiring developers to maintain greater visibility into their software and making security data publicly available.
- Creates a standardized playbook for cyber incident response
- Improves the ability to detect malicious cyber activity on Federal networks by enabling a governmentwide endpoint detection and response system and improved information sharing within the Federal government.
- Creates cybersecurity event log requirements
- Requires amendments to the FAR to align with requirements in the EO.

NIST SSDF 1.1 - *Recommendations for Mitigating the Risk of Software Vulnerabilities*

Organizations should ensure that their people, processes, and technology are prepared to perform secure software development.

Organizations should protect all components of their software from tampering and unauthorized access.

Organizations should produce well-secured software with minimal security vulnerabilities in its releases.

Organizations should identify residual vulnerabilities in their software releases and respond appropriately to address those vulnerabilities and prevent similar ones from occurring in the future

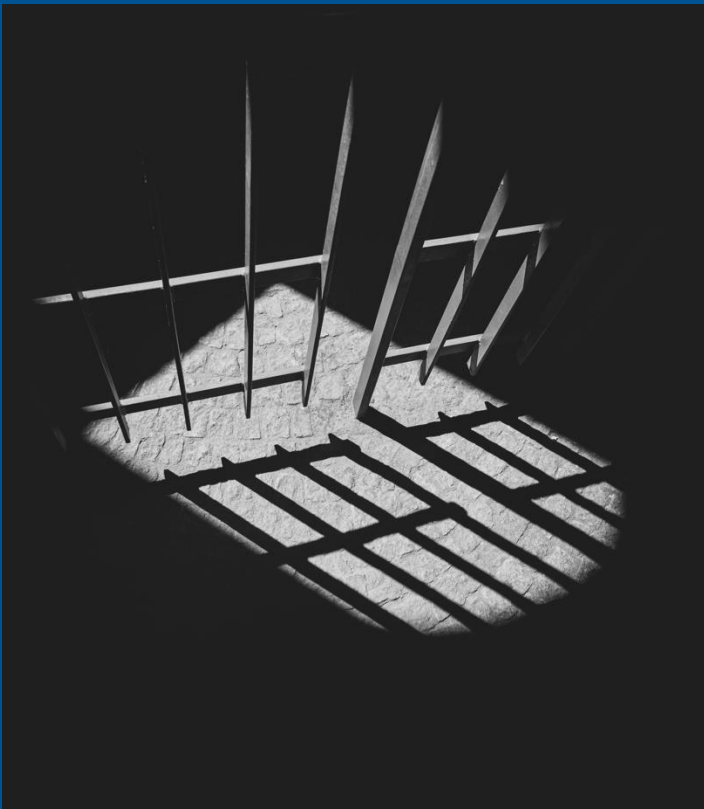
Practices	Tasks	Notional Implementation Examples	References
Configure the Compilation, Interpreter, and Build Processes to Improve Executable Security (PW.6): Decrease the number of security vulnerabilities in the software and reduce costs by eliminating vulnerabilities before testing occurs.	PW.6.1: Use compiler, interpreter, and build tools that offer features to improve executable security.	Example 1: Use up-to-date versions of compiler, interpreter, and build tools. Example 2: Follow change management processes when deploying or updating compiler, interpreter, and build tools, and audit all unexpected changes to tools. Example 3: Regularly validate the authenticity and integrity of compiler, interpreter, and build tools. See PO.3 .	BSAFSS: DE.2-1 BSIMM: SE2.4 CNCFSSCP: Securing Build Pipelines—Verification, Automation EO14028: 4e(iv), 4e(ix) IEC62443: SI-2 MSSDL: 8 SCAGILE: Operational Security Task 3 SCFPSSD: Use Current Compiler and Toolchain Versions and Secure Compiler Options SCSIC: Vendor Software Development Integrity Controls SP80053: SA-15 SP800161: SA-15
	PW.6.2: Determine which compiler, interpreter, and build tool features should be used and how each should be configured, then implement and use the approved configurations.	Example 1: Enable compiler features that produce warnings for poorly secured code during the compilation process. Example 2: Implement the “clean build” concept, where all compiler warnings are treated as errors and eliminated except those determined to be false positives or irrelevant. Example 3: Perform all builds in a dedicated, highly controlled build environment. Example 4: Enable compiler features that randomize or obfuscate execution characteristics, such as memory location usage, that would otherwise be predictable and thus potentially exploitable. Example 5: Test to ensure that the features are working as expected and are not inadvertently causing any operational issues or other problems. Example 6: Continuously verify that the approved configurations are being used. Example 7: Make the approved tool configurations available as configuration-as-code so developers can readily use them.	BSAFSS: DE.2-3, DE.2-4, DE.2-5 BSIMM: SE2.4, SE3.2 CNCFSSCP: Securing Build Pipelines—Verification, Automation EO14028: 4e(iv), 4e(ix) IEC62443: SI-2 IR8397: 2.5 MSSDL: 8 OWASPMASVS: 14.1, 14.2.1 OWASPMASVS: 7.2 PCISSLC: 3.2 SCAGILE: Operational Security Task 8 SCFPSSD: Use Current Compiler and Toolchain Versions and Secure Compiler Options SCSIC: Vendor Software Development Integrity Controls SP80053: SA-15, SR-9 SP800161: SA-15, SR-9 SP800181: K0039, K0070
Review and/or Analyze Human-Readable Code to Identify Vulnerabilities and Verify Compliance with Security Requirements (PW.7): Help identify vulnerabilities so that they can be corrected before the software is released to prevent exploitation. Using automated methods lowers the effort and resources needed to detect vulnerabilities. Human-readable code includes source code, scripts, and any other form of code that an organization deems human-readable.	PW.7.1: Determine whether code review (a person looks directly at the code to find issues) and/or code analysis (tools are used to find issues in code, either in a fully automated way or in conjunction with a person) should be used, as defined by the organization.	Example 1: Follow the organization’s policies or guidelines for when code review should be performed and how it should be conducted. This may include third-party code and reusable code modules written in-house. Example 2: Follow the organization’s policies or guidelines for when code analysis should be performed and how it should be conducted. Example 3: Choose code review and/or analysis methods based on the stage of the software.	BSIMM: CR1.5 EO14028: 4e(iv), 4e(ix) IEC62443: SM-5, SI-1, SVV-1 NISTLABEL: 2.2.2.2 SCSIC: Peer Reviews and Security Testing SP80053: SA-11 SP800161: SA-11 SP800181: SP-DEV-002; K0013, K0039, K0070, K0153, K0165; S0174
	PW.7.2: Perform the code review and/or code analysis based on the organization’s secure coding standards, and record and triage all discovered issues and recommended remediations in the development team’s workflow or issue tracking system.	Example 1: Perform peer review of code, and review any existing code review, analysis, or testing results as part of the peer review. Example 2: Use expert reviewers to check code for backdoors and other malicious content. Example 3: Use peer reviewing tools that facilitate the peer review process, and document all discussions and other feedback. Example 4: Use a static analysis tool to automatically check code for vulnerabilities and compliance with the organization’s secure coding standards with a human reviewing the issues reported by the tool and remediating them as necessary. Example 5: Use review checklists to verify that the code complies with the requirements. Example 6: Use automated tools to identify and remediate documented and verified unsafe software practices on a continuous basis as human-readable code is checked into the code repository.	BSAFSS: TV.2, PD.1-4 BSIMM: CR1.2, CR1.4, CR1.6, CR2.6, CR2.7, CR3.4, CR3.5 EO14028: 4e(iv), 4e(v), 4e(ix) IDASOAR: 3, 4, 5, 14, 15, 48 IEC62443: SI-1, SVV-1, SVV-2 IR8397: 2.3, 2.4 ISO27034: 7.3.6 MSSDL: 9, 10 NISTLABEL: 2.2.2.2 OWASPMASVS: 1.1.7, 10 OWASPMASVS: 7.5 OWASPMASVS: IR1-B, IR2-A, IR2-B, IR3-A PCISSLC: 3.2, 4.1 SCAGILE: Operational Security Tasks 4, 7; Tasks Requiring the Help of Security Experts 10

Secure Software Development Attestation

March 11, 2024, CISA
published the SSDA form and
repository for the forms

Forms must be signed by CEO
or designate

Criminal penalties for false
or misleading statements



Secure Software Development Attestation

1. Sw is developed and built in a secure environment
2. “good-faith effort to maintain trusted source code supply chains”
3. Automated testing, check for vulnerabilities, vulnerability handling process

Secure by Design Pledge



Multi-factor authentication



No default passwords



Reduce classes of vulnerabilities



Increase uptake of security patches



Publish vulnerability disclosure process



Transparent CVE reporting



Facilitate intrusion detection (e.g. logs)

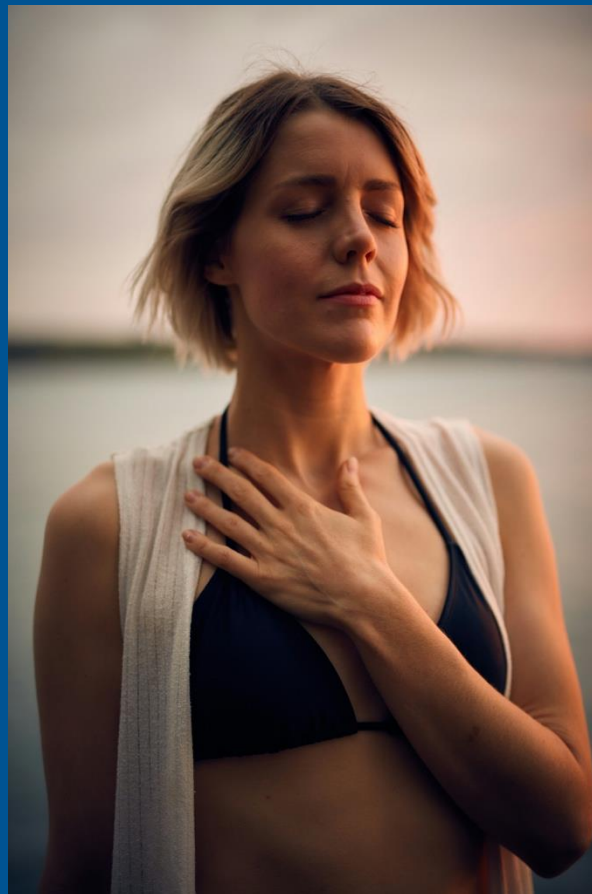


Photo by [Darius Bashar](#) on [Unsplash](#)

EO 14144 – Jan 17, 2025

*Strengthening and Promoting
Innovation in the Nation's Cybersecurity*

The
sections
of the
document
are

1. Policy.

2. Operationalizing Transparency and Security in Third-Party Software Supply Chains.

3. Improving the Cybersecurity of Federal Systems.

4. Securing Federal Communications.

5. Solutions to Combat Cybercrime and Fraud.

6. Promoting Security with and in Artificial Intelligence.

7. Aligning Policy to Practice.

8. National Security Systems and Debilitating Impact Systems.

9. Additional Steps to Combat Significant Malicious Cyber-Enabled Activities

2. Software Supply Chain

1. Require SSD attestations, with artifacts (proof) and a list of Federal customers
2. Implement ... SSDF
3. Deploy patches securely
4. Supply chain risk management
5. Open source standards

3. Cybersecurity of Federal Systems

1. Improve identity and access management
 - Pilot e.g. phishing-resistant authentication options
2. Collect and share threat information
3. Requirements for cloud service providers
4. Space systems

Collecting and sharing and USING threat information

- Lengthy section
- Many considerations, including collaboration, protecting sensitive data, more timely sharing of information
- One of the sections with the longest timeframe to implement

Cyber security in space



4. Securing Federal Communications

Implement ... strong identity authentication and encryption

BGP Security

ROA



Ensure your IP addresses and AS numbers are appropriately registered



Publish ROAs with ARIN



Require ISPs to publish ROAs and do route validation filtering



... updated guidance on route leak mitigation, and source-address validation

Require Encrypted DNS

“...any product that acts as a DNS resolver (whether client or server) for the Federal Government <should> **support encrypted DNS**”

Does not specify DOH or DoT or DoQ

Enable Encrypted DNS

“Within 180 days of the date of this order, FCEB agencies shall enable encrypted DNS protocols wherever their existing clients and servers support those protocols”

Again, no specifics

Encrypt email



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- Encrypt email messages end to end
- Enforce encrypted and authenticated transport for mail client- server communications
- Require *at least* encrypted transport for voice and video conferencing and move towards E2E encryption

Cryptography threats

- Prepare for PQC
- Protect key material (HSMs)

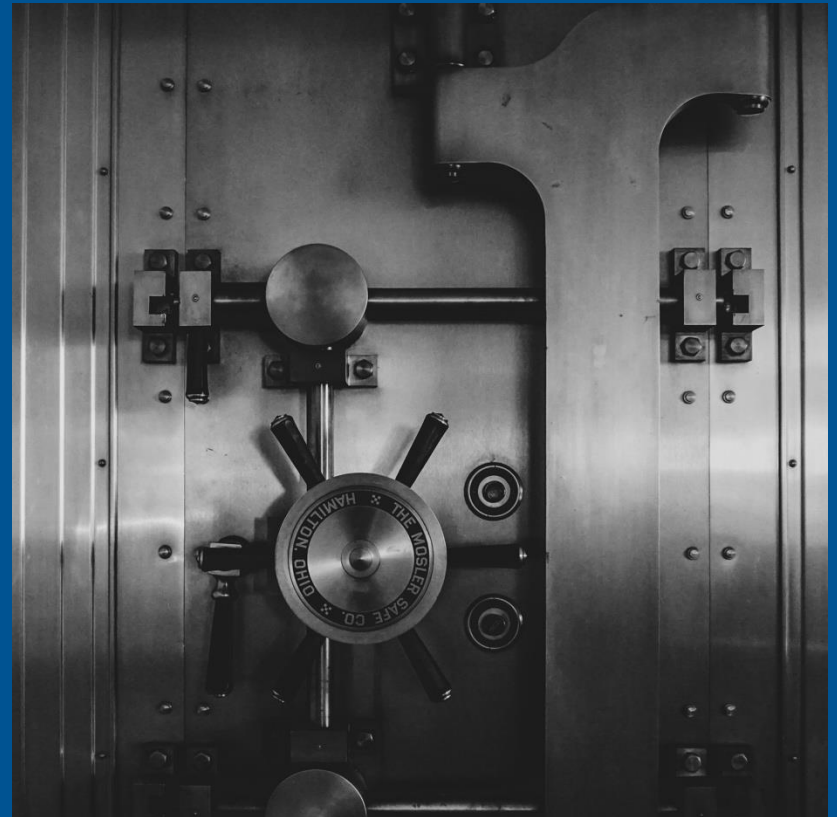


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There is more

1. Policy.

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Implementation timeline

April 2025

- Update SSDF
- Minimum cybersecurity standards for contractors
- Begin transitioning to PQC
- Best practices such as HSMs

May 2025

- Standards for open source
- Enforce encrypted transport for email
- Publish BGP ROAs

July 2025

- Enable Encrypted DNS
- Civil space FAR requirements
- Require, asap adoption of TLS 1.3

October 2025

- Practical implementation guidance for digital IDs

January 2027

- require the Cyber Trust Mark for consumer IOT devices purchased by the US Govt

January 2030

- complete transition to TLS 1.3 (!)

Summary



Supply Chain	Use FAR (federal purchasing system) requirements to encourage software supply chain transparency
Federal Systems	Implement recognized best practices for improved cybersecurity.
Defend	Enhance cyber security & identity systems across Federal agencies, organize to investigate threat data
Communications	Secure Federal Communications, including routing, and encrypt DNS, email and voice/video.

References

- EO 14144 (<https://www.federalregister.gov/documents/2025/01/17/2025-01470/strengthening-and-promoting-innovation-in-the-nations-cybersecurity#h-1>)
- EO 14028 (<https://www.federalregister.gov/documents/2021/05/17/2021-10460/improving-the-nations-cybersecurity>)
- CISA Secure Software Development Attestation (<https://www.cisa.gov/secure-software-attestation-form>)
- CISA Secure by Design Pledge (<https://www.cisa.gov/securebydesign/pledge>)
- NIST Special Publication 800-218 (*Secure Software Development Framework (SSDF)*)
- NIST Special Publication 800-53 (*Security and Privacy Controls for Information Systems and Organizations*)