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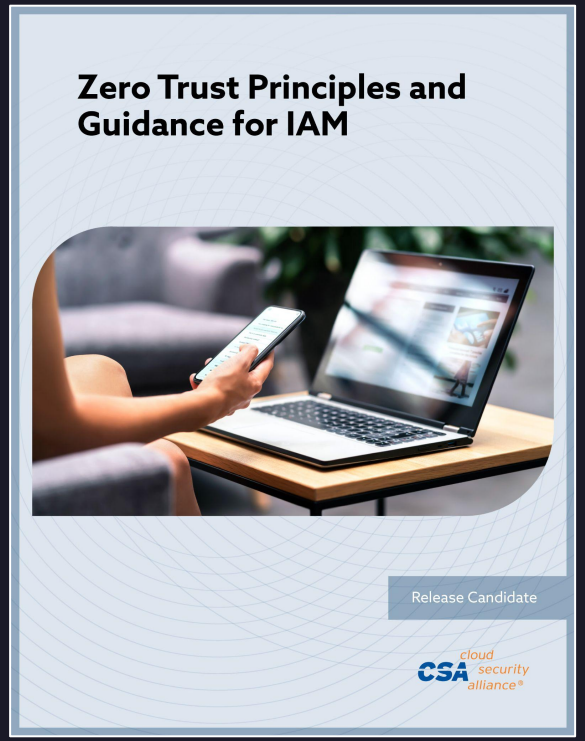
Zero Trust Principles and Guidance for IAM



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Zero Trust Workgroup
Pillar 3: Identity

What is Discussed?

1. Zero Trust Background and Drivers
2. Zero Trust Implementation Methodology
3. Identification of Entities and Attributes
4. Identity Proofing and Validation
5. Signals for Decision
6. Authorization Based on Policy
7. Dealing with Failed Policy Decision
8. Business Value

Zero Trust Background and Drivers

- Various treatises discussed trust as a human and social phenomenon.
- OSSTMM in 2001 labeled 'trust' as a vulnerability in IT.
- Jericho Forum challenged traditional network perimeter security.
- ZTN concepts developed by DoD and evolved into ZTNA and SDP.
- John Kindervag consolidated Zero Trust concepts in 2010.
- DoD embraced Zero Trust in 2019 due to evolving cyber threats.
- Government mandates and guidance from NIST and President Biden.
- Zero Trust principles based on established security concepts.
- Not a prescriptive architecture, but a strategy based on business needs.

Note: Content has been condensed for concise presentation.

Zero Trust Implementation Methodology

- For more detailed information on the 5 step process reference the CSA ZT Implementation Primer: The 5 Step Process and the NSTAC Report to the President on Zero Trust and Trusted Identity Management.

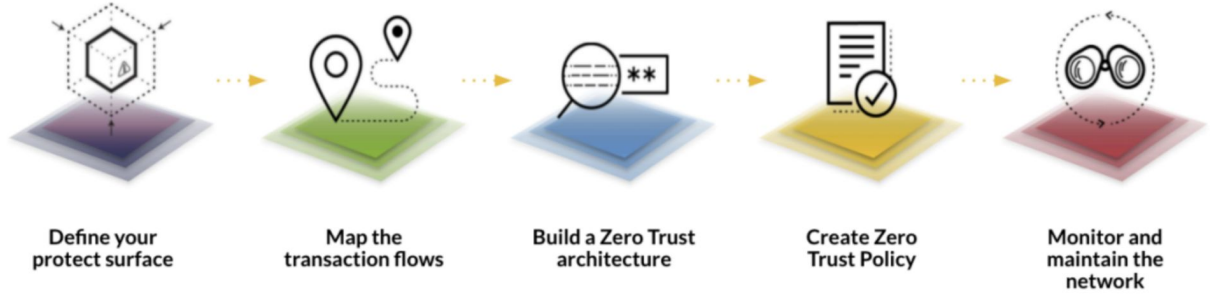

Figure 1: Five-Step Process for Zero Trust Implementation[30]

These implementation steps are designed to be flexible, repeatable, and technology agnostic. This process allows an organization to start with a small, bounded initial protect surface (or set of DAAS elements), work through the rest of the steps with that initial protect surface to establish their approach, and then add additional protect surfaces as their zero trust strategy matures and expands. Table 4 specifies the activities in each of the five steps.

Identification of Entities and Attributes

- Identity is a key element to delivering a Zero Trust security architecture
- In a Zero Trust model, a request is not assumed to be trustworthy based on location, network or asset ownership but rather it is explicitly verified
- Decision to allow access is made after the evaluation of the attributes and signals which should be context-aware and adaptive
- Ideally all access should follow the principle of least privilege
- Instead of relying on static credentials or roles, the system evaluates the context of each request based on dynamic attributes
- System can enforce risk-based granular policies and apply adaptive authorization mechanisms to ensure that only the right entities have access to the right resources at the right time and under the right conditions

Identity Proofing and Validation

- Having a good level of assurance starts with a good proofing and validation process. NIST SP 800-63A defines the flow for identity proofing and enrollment to be a 3 steps process but generally it's more a 5-6 steps process:
  - Resolution where some attributes and evidence are collected
  - Attestation or Validation where the evidence collected are reviewed to determine that they are authentic, accurate, current and unexpired
  - Verification where a comparison between the evidence collected and the identity (entity) behind the future digital identity is done
  - Digital identity provisioning where the digital identity is created into the source of truth (Mostly IdP)
  - Credential provisioning where the digital identity will be associated to one or more authenticators
  - Digital identity deprovisioning where the digital identity is removed from the source of truth

Signals for Decision

- Minimal signals depicted by NIST 800-207:
  - Access Request, Subject Database and History, Asset Database, Resource Policy Requirements, Threat Intelligence and Logs
- Each source's authenticity should be (cryptographically) verifiable and the signals it produces must be reliable, scalable and tamper-proof and have an understandable level of confidence for use within the decision/risk process
- The Five Ws (sometimes referred to as Five Ws and How, 5W1H, or Six Ws, or the Kipling Method) can be used to obtain at least 6 dimensions of context that can be used during the authorization process through a rule's engine
- The rules engine that is part of the Zero Trust authorization process will leverage its algorithm to grant context-aware authorization at potentially all layers of the OSI Model
- The goal of documenting such signals and their corresponding policy code per protect-surface per use case is to allow security engineers to easily design, implement, test and version manage the ZT contextual awareness for a given protect-surface

Authorization Based on Policy

- ZT architecture incorporates concepts from RBAC and ABAC, but transcends them by emphasizing risk-based access controls, moving away from a single organizational source of truth
- When designing a ZT architecture it is crucial to look at existing and new identity and access management solutions from a ZT perspective
- Policies serve as the initial touchpoint for authorization, designed based on transaction flows between the requestor and resources
    - Should be granular policies when implemented on a ZT solution
- Policies define explicit authorizations in a ZT environment and are performed as close to the DAAS elements as possible

Dealing with Failed Policy Decision

- When the conditions to grant access are not met, the following typical solutions may be employed (this is a non-exhaustive list):
  - The entity can be black-holed
  - The entity is informed access has been denied
  - The entity can be put into a queue
  - The entity can be suspended for a period of time
  - Step up authentication can be required
  - Notifications can be sent to the policy administrator to verify the need for policy refinement
  - Relevant data can be sent to the SIEM for further analysis. This data can then be used to refine policies or alert for possible attacks.
  - The entity can be sent to a honeypot

Business Value

- In a zero-trust environment controlling access to data and/or system (resource entitlement) based on identity can provide several business benefits:
  - Improved Security
  - Improved Compliance
  - Reduced Friction
  - Increased Agility
  - Increased Productivity
  - Reduced costs

*This section does not cover the generic business value of Zero Trust. Refer to "The Business Value of Zero Trust" for more details

Conclusion

- Traditional trust-based access, while initially effective, struggles to accommodate cloud services and external collaboration, making the strong perimeter model costly and hard to maintain
- Zero Trust model doesn't inherently trust any entity. It verifies access to data/systems based on risk, considering devices, organizations, code, agents, and service-based identities
- The paradigm shifts from binary trust to adaptive authentication and authorization. Access is based on identity attributes and intelligence signals, evaluated continually depending on application/solution/service/device sensitivity
- Zero Trust potentially enhances security, offers a frictionless IT environment, and can be implemented in phased stages for ease
- Once established, Zero Trust provides valuable telemetry and insights for responsive issue management

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