T1525: Compromised image

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| --- | --- | --- | --- | --- |
| Date | Who | Current text | Proposed text | Final text |
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Description: An adversary may install a compromised image in a 5G environment to achieve persistence. This could be achieved by either poisoning an image repository, compromising the MANO, or other means.

The 5G Virtual Network Function (VNF) software is either developed in house or supplied by a product vendor. Typically, software is stored in a deployment repository for deployment or for an orchestrator to use as part of an automated workload deployment activity. An adversary may install a compromised image in the repository of 5G VNFs and or VM (Virtual Machine)/Container images to later establish Command and Control (C2) connection and subsequent modification, discovery, and exfiltration operations.

Management and Orchestration (MANO) is a framework for managing and orchestrating network functions virtualization (NFV) infrastructure, resources, and services. It provides a standard approach for the management and orchestration of network services in NFV environments, including the automation of tasks such as network service deployment, scaling, and network function lifecycle management. A poisoned image can be installed using compromised MANO tool set during image acquisition, repository manipulation or deployment and configuration scripts.

Labelling:

* Sub-techniques: N/A
* Applicable Tactics: persistence

Metadata:

* Architecture Segment: Impl-Virtualization, Impl-CSP, Impl-OA&M, Supply Chain
* Platform(s): VM, Container, Azure/AWS, IaaS, SDN
* Access type required: User or Administrative access to repository
* Data Sources: Logs for repository
* Theoretical/Proof of concept/Observed: Theoretical

Procedure Examples:

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| **Name** | **Description** |
| Specific example if known | If there is a documented instance of this technique occurring in earlier generation or a notional example |

Mitigations

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| **Name** | **Description** |
| M1043 | Restricted Permissions to add images to repositories for person and non-person accounts |
| M1049 | Manual or automated image creation and storage must include image hash |
| FGM5090 | Logs from tools and repository must be corelated to ensure unauthorized activity is reported. |
| FGM5089 | In addition to image name, deployment tools must use hash and verify image during deployment |
| FGM5088 | Development and production repositories should be separated to avoid access and image slipovers. Production repositories should be access controlled for accounts responsible for deployments and operations accounts only. |
| M1035 | Access to repositories should be restricted to known networks from where any authorized actions need be executed. |

Pre-Conditions

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| **Name** | **Description** |
| Credential and Access to repository and or image creation tools (i.e. Docker) | An image can be manipulated, or a new image can be introduced to have same impact. Privileged Access to tool or repo is required. |

Critical Assets

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| **Name** | **Description** |
| Core components | An adversary may target the 5G core network domain |
| RAN components | An adversary may target the 5G core network domain |
| SDN components | An adversary may target CI/CD pipeline components |
| System tools | An adversary may target security and operations tools |

Detection

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| **Name** | **Description** |
| FGDS5012 | Analyze logs and other CI/CD events to detect unauthorized activity |
| FGDS5015 | An automated image hash verification should be performed |

Post-Conditions

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| **Name** | **Description** |
| A Compromised Image is deployed in production | A compromised image deployed in the production can lead to variety of adversarial activities depending on what capabilities were added/deleted from the image. |

References:

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| --- | --- |
| Name | URL |
| ENISA THREAT LANDSCAPE FOR 5G NETWORKS, December 2020, section 6.2. Accessed April 13, 2021 | https://www.enisa.europa.eu/publications/enisa-threat-landscape-report-for-5g-networks/ |
| Docker Documentation, Security, Content in Trust | https://docs.docker.com/engine/security/trust/ |