Cloud infrastructure actual security challenges ...from Telecom perspective

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Challenges and transformation of cloud security

Technological transformation towards cloud nativeness & business model evolution

- legacy bare metal (DSPs, ATCA) →virtualization →cloudification→container infrastructure (embedded into VMs or bare metal)
- Convergence towards IT (also on application level)
- Wide usage of OSS (Open Source Software)
- Degradation in security perception when transforming from VM based to container based architecture
- Moving from private to public cloud →
- Paradigm shift: Perimeter protection + DMZ → zero trust philosophy →each product as a standalone component must be secure enough

5G relevance: cloud native (CNF based + orchestrated) productized also for public-cloud deployment, wide usage of OSS components

Cloud security - Infrastructure vs. application-level security

- Infrastructure layer:

Wide usage and convergence* of Telco infrastructure in Telco environment: (virtualization techniques, cloud platforms, containerization)

Using the IT-based environments in Telco also inherits their vulnerabilities

Most of the known vulnerabilities are targeting the infrastructure layer

  - low hanging fruit, huge install base
  - prerequisite for the more sophisticated, application-level attacks
  - widely documented, automated tools available

- Application layer:

Requires special, application and/or environment specific information and knowledge

  - vulnerabilities typically not shared within the general security community
  - telco standards and architectures
  - signalling protocols
  - solution specific implementation details (topology & architecture)

A real sophisticated cyberattack typically involves both the infrastructure layer and the application level.

*Telco applications might need some improvement in commodity IT infrastructures (e.g., real-time scheduling requirements, HA- improvements)

Quick case study – highly sophisticated attack methods

Spectre & Meltdown

Hardware vulnerabilities allow programs to steal data which is currently processed on the computer.

https://meltdownattack.com/

(hyperthreading – protection method in the hypervisor – performance penalty of protection vs. thread level – exploiting the stolen data – decision for mitigation based on the business model transformation)

L1TF: A speculative execution side channel cache timing vulnerability, potentially allowing unauthorized disclosure of information residing in the L1 data cache.

https://www.intel.com/content/www/us/en/architecture-and-technology/l1tf.html

Foreshadow – Intel CPUs Affected By L1TF Vulnerabilities - Swascan

Quick case study – Erosion of trust because of legacy protocols

SS7 attacks: Compromise and intercept voice and SMS communications on a cellular network. Legacy protocols designed for isolated environments. Later moved to convergent infrastructure.

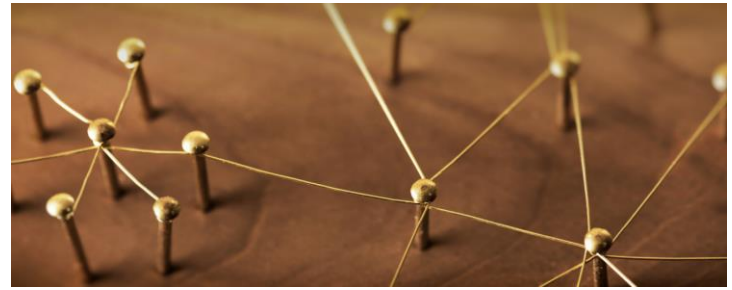
- A Step by Step Guide to SS7 Attacks - FirstPoint (firstpoint-mg.com)

Syniverse: Handles 740 billion text messages annually for carriers around the world including Vodafone, AT&T, T-Mobile, Verizon and China Mobile.

- Syniverse quietly admits it was hacked for five years | Light Reading
- Who is Syniverse, anyway?. One of the world's largest SS7 hubs was… | by David Allen Burgess | Telecom Expert | Oct, 2021 | Medium

→Still trusting in SMS based Multi-factor authentication?

The Facebook story (no indication for being a victim of an attack, but BGP is used by other clouds as well, hosting telco applications) & **poisoning** (ARP-, BGP -, etc) type of attacks



- https://www.theverge.com/2021/10/4/22709260/what-is-bgp-border-gateway-protocol-explainer-internet-facebook-outage
- Beginner's Guide to Understanding BGP (cdemi.io)
- An Internet-Scale Feasibility Study of BGP Poisoning as a Security Primitive | DeepAI

OSS - Curse or blessing?

Benefits of using OSS software: https://flosshub.org/sites/flosshub.org/files/Benefits%20and%20Drawbacks.pdf

Focusing on security related drawbacks:

Attractive target for cyber attacks:

-usage of outdates SW

-OSS included everywhere (infra + application)

-public documentation of vulnerabilities (pros+cons)

+widely available vulnerability scanners working based on vulnerability databases (e.g. CVEs*)

-SLA challenges (directly included OSS vs. re-packaged OSS)

-extremely fast inflation of being vulnerability-free

https://en.wikipedia.org/wiki/Open_Source_Initiative

“You become responsible, forever, for what you have tamed.”

→Need for SVM (Software Vulnerability Management) and for systematic hardening

*The mission of the **CVE** Program is to identify, define, and catalog publicly disclosed cybersecurity **vulnerabilities**

CVE - CVE (mitre.org)

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Thank You