Distributed NFV Attestation and VNF Supply Chain Trustworthiness and Integrity

Ian Oliver

Security Research
Nokia Bell Labs, Finland

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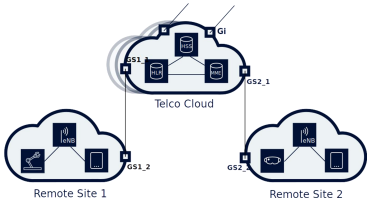
The Vision

Trustworthy Infrastructure for Critical 5G Applications

Remote Surgery:
Critical 5G Use Case

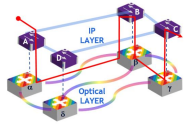
Robot – 5G – VR:
Implementation



Trustworthy NFV+Edge+IoT Infrastructure
for Critical Applications

VNF Supply Chain +
Blockchain Integration

Trusted Computing Base + Attestation with
Run-time Integrity Monitoring



Proactive Network Defense:
SDN + Machine Learning

Key results

- Machine Learning based Network Anomaly detection and mitigation
- End to End Attestation and Trusted NFV, Edge and IoT
- Integrated, Multi-Faceted Security Approach

**Ian Oliver, Yoan Miche, Aapo Kalliola, Silke Holtmanns, Borger Vigmostad,
Gabriela Limonta, Isha Singh, Leo Hippeläinen, Vikramajeet Khatri and Gabriel Waller**
Espoo Cyber Security Team

NOKIA Bell Labs

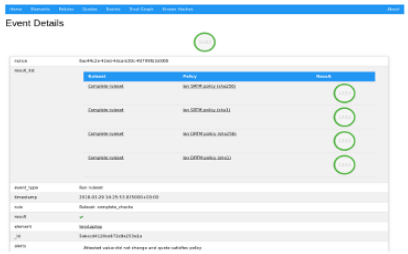
The Trusted Computing Base

- Trusted Platform Module
- Secure, Measured and Trusted Boot (UEFI, tboot, TXT, SRTM, DRTM)
- Run-Time Integrity Checking (Linux IMA/EMA, SELinux)
- CPU Enclaves & Memory Encryption (Intel SGX, Arm TrustZone)
- Remote Attestation

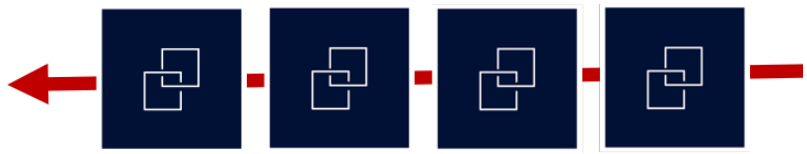
So, what's the problem?

- Works well in the core NFV, but not Edge, IoT
- Attestation is crude, brutal and centralised
- ... VNF/VM/device production/distribution is not centralised
- Global [VNF/VM] Identities
- ...and more

The Vision



Trusted Computing Base + Attestation with Run-time Integrity Monitoring



VNF Supply Chain + Blockchain Integration

The Role of Ledger/Blockchain...

- Ledger Semantics - fits with the [VNF/IoT/Element] supply chain
- Distributed, Auditable, Untamperable, Reliable, Resiliant
- Notarisation *and* History (eg: VNFD & measures, operations)
- Global IDs (cf: Ethereum Contract Addresses)
- PKI, OpenStack, TCB integration, ie: workload orchestration
- Integrity: Signing **and** Measurement
- Revocation is 'easier'
- Trust Graph
- Performance

Demonstration