Enhancing Security and Privacy with In-Network Computing

https://www.ietf.org/id/draft-fink-coin-sec-priv-01.txt

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Enhancing Security & Privacy with INC - Recap

- (Legacy) devices are increasingly connected to the Internet
  - Sensitive data & processes

- Lack of security & privacy mechanisms on devices
  - Financial and safety threats

- Potential to retrofit functions efficiently within the network

Basic Protection Mechanisms
- Encryption, integrity checks, authorization, authentication, privacy mechanisms

Efficient Enforcement of Network Policies
- E.g., Manufacturer Usage Description [RFC2805]

Intrusion and Anomaly Detection
- E.g., dead man switch

Incident Investigation
- Efficient network monitoring

In-Network Vulnerability Patches

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Protection Mechanism: In-Network Vulnerability Patches

- Problem: Resource-constrained devices are hard to update
  - Device vulnerabilities often cannot be fixed after deployment

- Idea: Define fine-granular rules to describe known attack patterns
  - Basically signature-based IPS
  - Efficient but flexible enforcement at switches at line-rate

- “Patches” easy to distribute
  - (Automatic) software updates of capable networking devices

Evaluation of potential and performance benefits in comparison to traditional IPS systems needed
Conclusion

- Potential of In-Network Computing for retrofitting and enhancing security & privacy
  - Protection mechanisms, anomaly detection, incident investigation
  - Update: Efficient signature-based intrusion prevention
- Reduce hardware costs and processing overhead
  - Especially beneficial for time-sensitive contexts, e.g., industrial networks, and resource-constrained devices

Current research:
- In-network policy enforcement w.r.t. industrial devices
- Enhancing incident investigation by providing efficient network monitoring

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Your thoughts?!