FASTR
Future of Automotive Security Technology Research

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WHAT IS FASTR?

- **Automotive security** is not a problem that can be solved by a single organization or in silos → it **requires an industry-wide effort**

- **Success** in securing tomorrow's vehicles **requires a unified approach** through knowledge exchange and technology-sharing

- FASTR is a non-profit consortium that provides a **neutral, open environment** to enable collaboration across the automotive ecosystem

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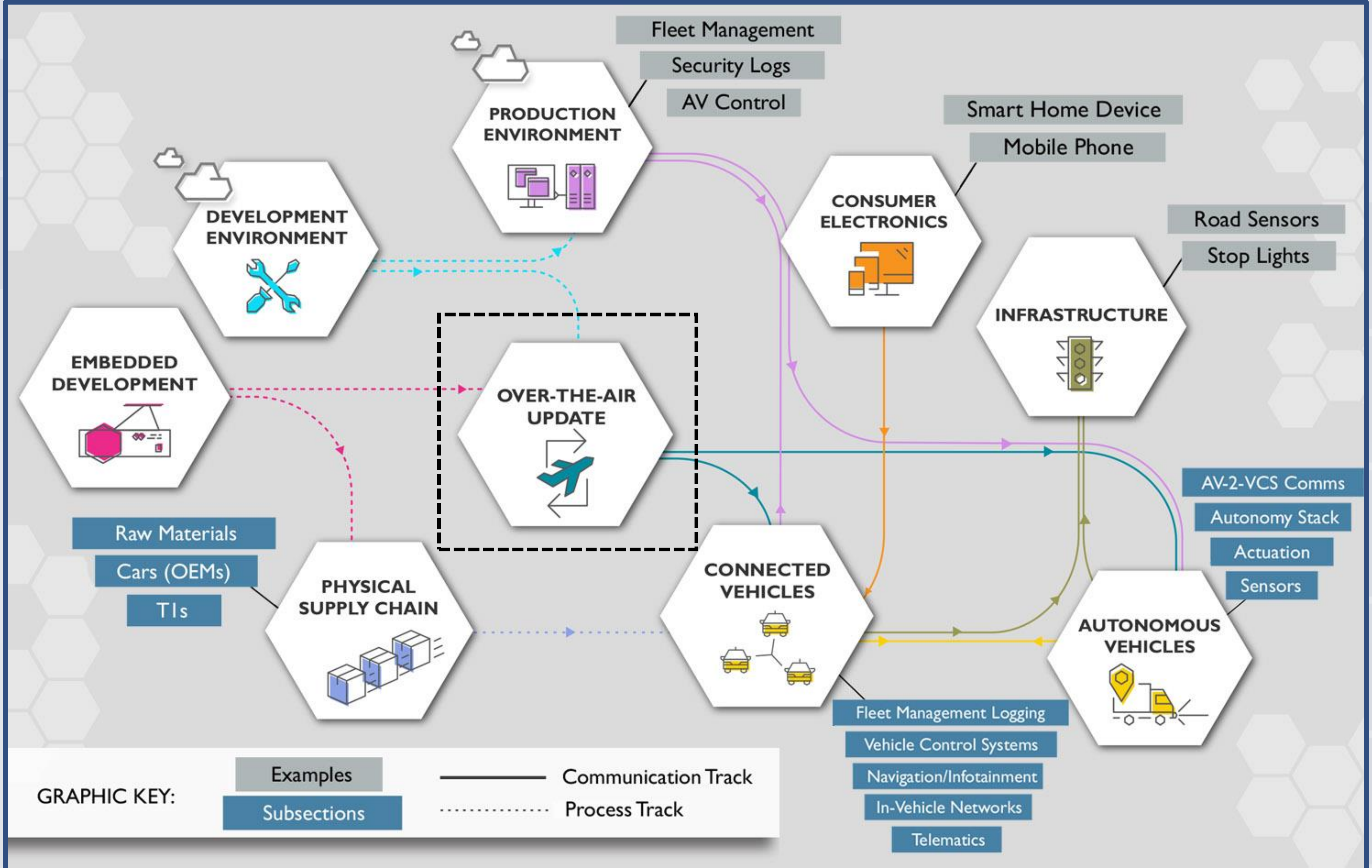
Fleet Management
Security Logs
AV Control
PRODUCTION ENVIRONMENT
DEVELOPMENT ENVIRONMENT
Smart Home Device
Mobile Phone
CONSUMER ELECTRONICS
Road Sensors
Stop Lights
INFRASTRUCTURE
EMBEDDED DEVELOPMENT
OVER-THE-AIR UPDATE
AV-2-VCS Comms
Autonomy Stack
Actuation
Sensors
Raw Materials
Cars (OEMs)
T1s
PHYSICAL SUPPLY CHAIN
CONNECTED VEHICLES
AUTONOMOUS VEHICLES
Fleet Management Logging
Vehicle Control Systems
Navigation/Infotainment
In-Vehicle Networks
Telematics
GRAPHIC KEY:
Examples
Subsections
Communication Track
Process Track

FASTR Guidelines for Secure Over-the-Air Updates

Initial version published by FASTR in November 2017

Intended to assist the automotive industry in evaluating platforms for secure SOTA updates, the guidelines include:

	# of Guidelines
Description of **threat models & guidelines to address** these threats	21
Recommended **cryptographic algorithms**	18
Key management plan	17
A **detailed step-by-step checklist** for evaluating platforms	56

Access the Guidelines here https://fastr.org/guidelines-sota/

Threat Models Considered

SOTA software update systems should be **resistant to any attack that does not physically modify the vehicle**, including

- Spoofing attacks - **emulation of SOTA component(s)**
- Tampering attacks - **install/use modified software**
- Repudiation attacks - **refute claims of proper/improper install**
- Information-leakage attacks - **sensitive info exposure (keys, code)**
- Denial-of-service attacks - **“graceful degradation” to an attack**
- Escalation-of-privileges attacks - **via agent/cloud compromise**

Examples of Guidelines to Address These Threats

- Software updates should **include a signed certificate containing the public key of the entity providing the update**

- Software updates should **include version information to prevent rollback** to genuine but obsolete software versions

- Secure all network transactions with **TLS public key authentication**, and the public keys should be signed by a trusted Certificate Authority

- Compliant SOTA software update systems should **log all important events**, in such a way the log entries cannot be altered later

- Compliant SOTA software update systems should **deliver software updates to authorized devices only**

Recommendations for Cryptographic Algorithms

- Random number generation - **TRNG entropy source**
- Symmetric key encryption - **@ least AES-128 & SHA-256**
- Cryptographic hash algorithm - **@ least SHA-256**
- Digital signature - **@ least ECDSA-256**
- Key agreement - **@ least ECDH-256**
- Digital certificates - **guidance on X.509 certificate fields**
- Network and point-to-point cryptography - **TLS**
- Passwords - **recommend multi-factor authentication**

Detailed Key Management Plan

- List of keys - **nine identified (may not need all for every case)**
- Key and random data generation - **use a TRNG entropy source**
- Storage and backup - **storage strategy is based on key type**
- Key distribution - **distribute keys in a secure manner**
- Usage - **use keys in an appropriate/secure manner**
- Key and certificate updates - **procedures to update keys & certs**
- Key and certificate revocation - **procedures to manage/revoke**

Summary

FASTR has provided this resource and checklist to initiate an industry dialog on these aspects of security

We welcome input, feedback, and collaboration with GENIVI on **utilizing these guidelines**, **identifying joint security research topics**, and **developing new intellectual capital**

Potential topics for joint future research…

- Assessing the **security of 5G and DSRC**
- **Threat models for V2X**
- Standard methodology for **assessing the security of TCUs**
- Security concerns during **potential corner cases**, including
  - Loss of network connectivity
  - Loss of authentication services
  - Loss of GPS / mapping

  Could an attacker take advantage of a disruption event to do things they normally couldn't?

Questions or Feedback?

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