GENIVI®

Software Management

Thursday 4/28 14:00 – 16:00

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SOTA

SOTA / SCOTA / FOTA / OTA

•Delivering updates to vehicles in the field, over the internet
•Urgent requirement for existing and future IVI systems
•Non-differentiating feature - has to work

Existing solutions

•Red Bend (Harman) - feature-rich, fully proprietary
•CarSync (Arynga) - Part of Arynga's proprietary server-side software suite, open source client
•OMA DM / FUMO - Open Standard - complex, some parts available as open source
•The Update Framework [1] - designed to overlay on existing solutions
•"Roll your own" - time consuming, insecure
•JLR commissioned end-to-end open source solution

1. http://theupdateframework.com

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- **OTA Plus – ATS commercially ready OTA solution based on GENIVI SOTA**

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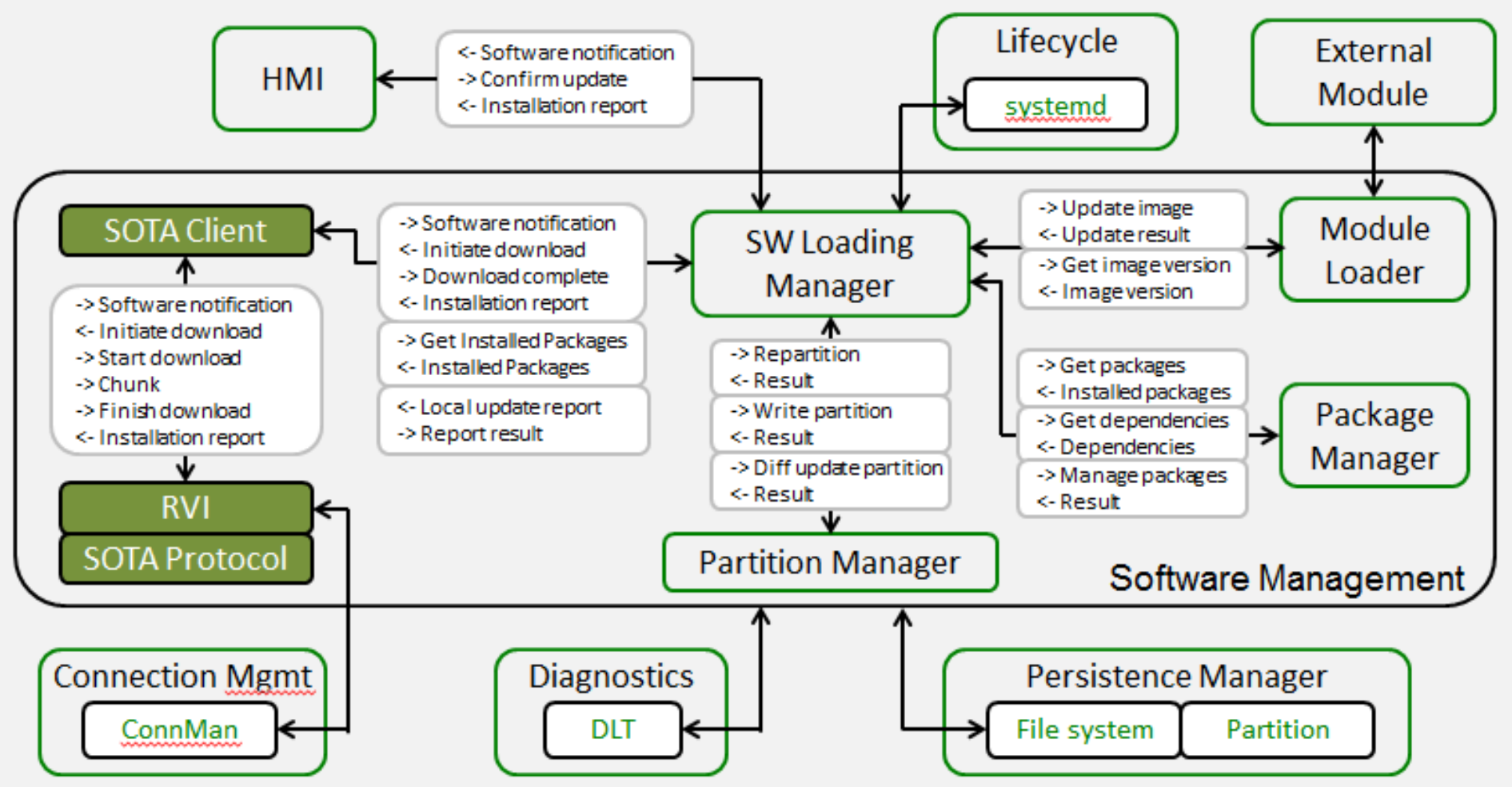
SOTA - PROJECT BACKGROUND



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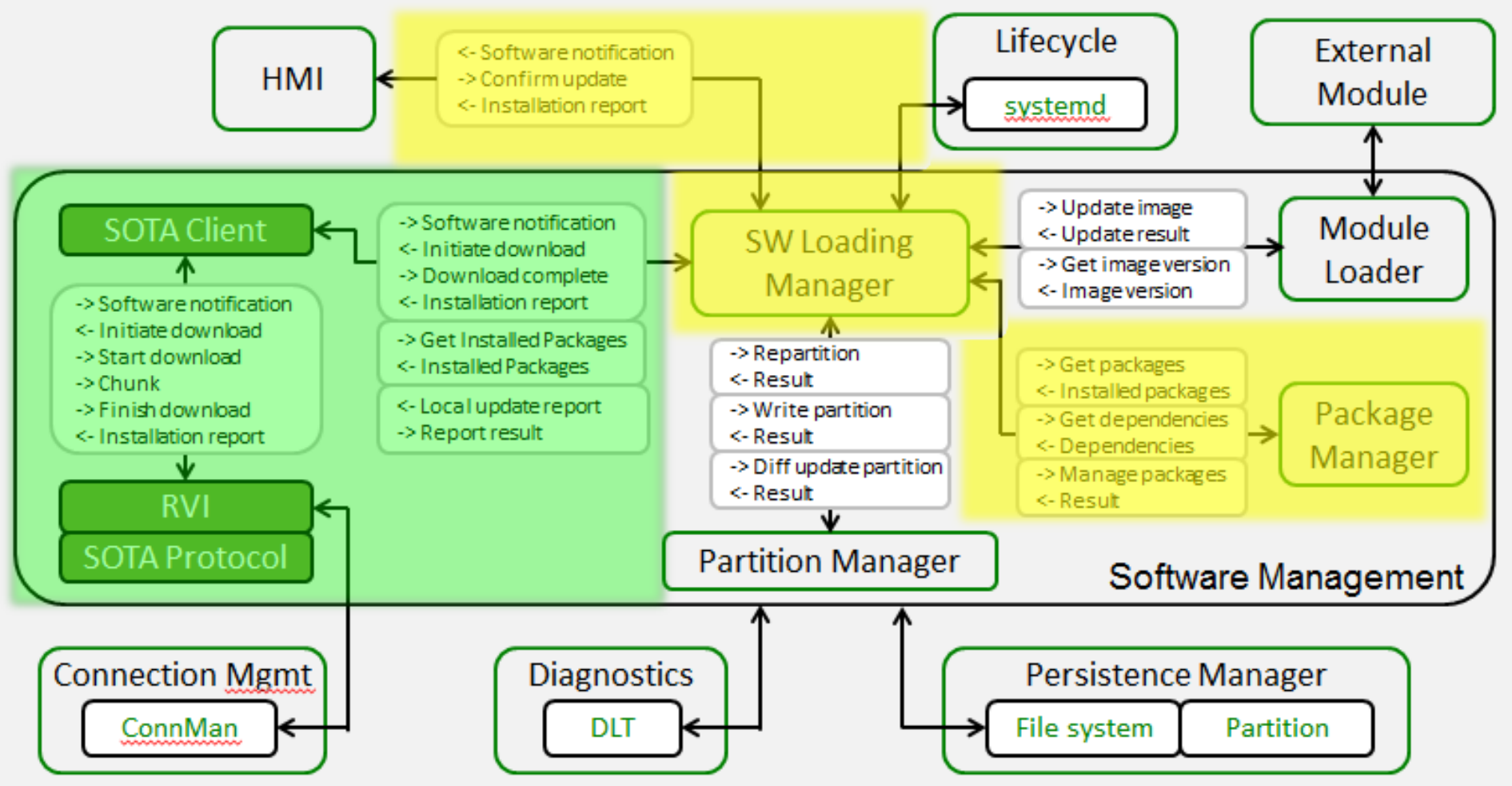

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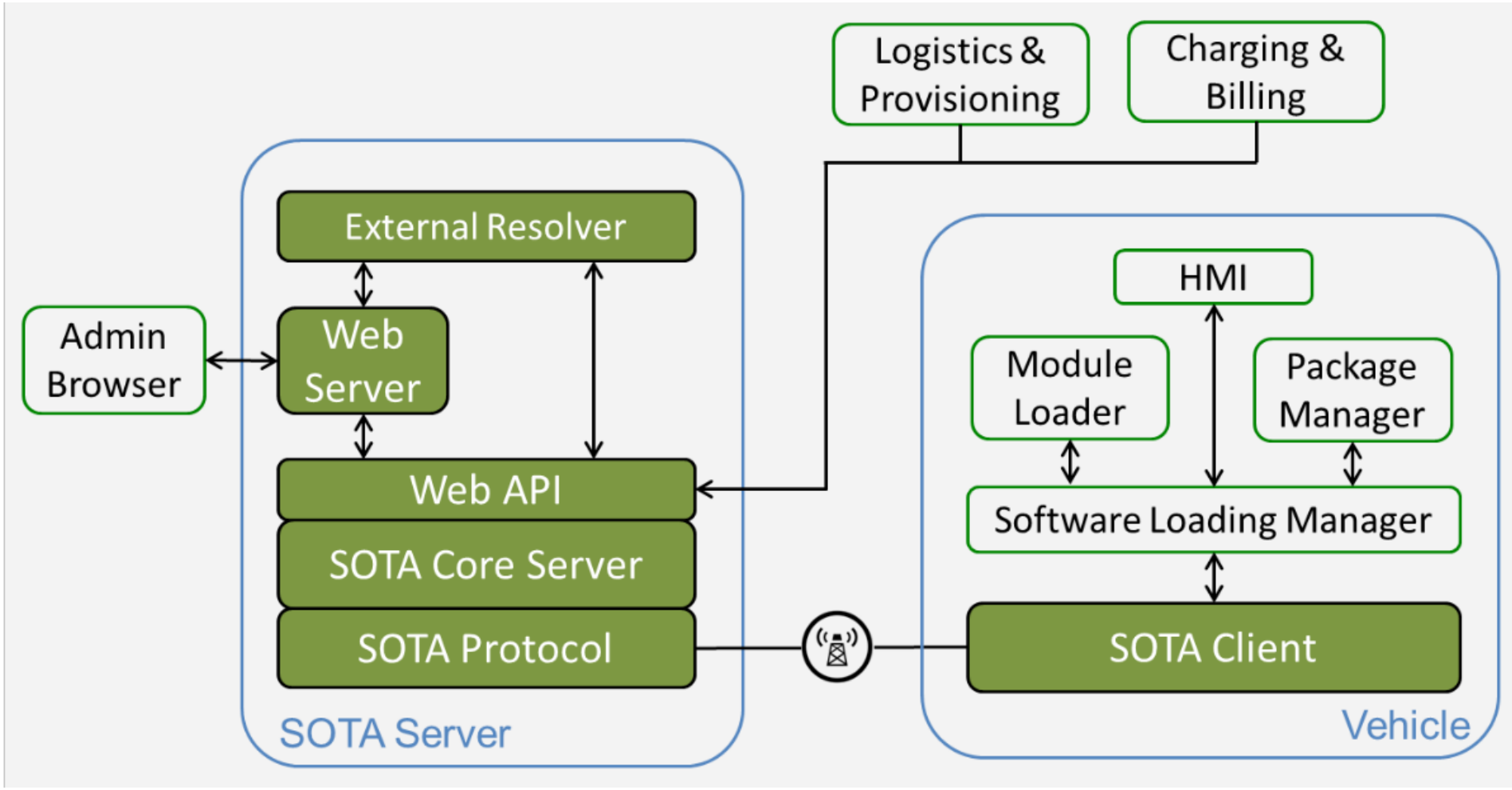

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SOTA - FEATURES

- Package upload
- Software / Firmware / Hardware inventory management by VIN
- Package installation campaign management
  - Filtering
  - Scheduling
  - Tracking
- Package download and installation
  - Reliable delivery by RVI
  - Interface with Software Loading Manager / local package manager
  - Success / Failure reporting to the server

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LIVE DEMO!

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SOTA CORE - ROADMAP

- Multi-tenant, multi-user support
- Standardisation of SOTA Web API with W3C
- HTTPS Transport support
- OAuth2 / SSO integration
- Configuration Management
- File Upload
- Migration to github.com/genivi
- Implementation of Security recommendations from UPTANE / AutoTUF

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SOTA CORE - SECURITY

What do these companies have in common?

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SOTA CORE - SECURITY

They all had a publicly disclosed software update hack!

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SOTA CORE - SECURITY

Repository compromise impact

- SourceForge mirror distributed **malware**.
- Attackers impersonate Microsoft Windows Update to spread Flame **malware**.
- RubyGems **compromised** with RCE.
- Opera users **automatically installed malware** signed by **compromised** key.
- Node Packaged Modules **compromised**.
- **Attacks** on software updaters have massive impact
  - E.g. South Korea faced **765 million dollars** in damages.

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SOTA CORE - SECURITY

Why Are Software Updaters Important?

- Run as root
- Update / change software!
  - Goal of most attacks
- Traditional defenses are ineffective
  - Firewalls / IDSes do not protect against these attacks
- Ubiquitous
- An attack often appears benign
  - Can look like a software repository misconfiguration

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SOTA CORE - SECURITY

Possible Attacks on Software Updates

- Malicious package
  - Crash / DoS / Arbitrary Code execution
- Version attacks
  - Downgrade to vulnerable version
- Metadata attacks
  - Change signatures, add bad dependencies
- Key Compromise
  - TLS root key, code signing key

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SOTA CORE - SECURITY

Path to failure...

- Have everyone build their own “secure” updater

  - the problem is subtle

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SOTA CORE - SECURITY

2010: The Update Framework (TUF)

- TUF is a **secure** software update **framework**.
- Built using some ideas from Thandy.
- Developed by security researchers from NYU
- **Best practices** to protect users from security attacks.
- **Plug-and-play** (like TLS).

"Survivable Key Compromise in Software Update Systems" (**CCS 2010**).

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SOTA CORE - SECURITY

2010: The Update Framework (TUF)

- Standard mitigations and best-practices
- Resilient to Key Compromise
  - Multi-party signatures
  - Roles / Delegation
- Equivocation
  - Detect "back-doored" packages

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SOTA CORE - SECURITY

2016: UPTANE / AutoTUF

- NYU / UMich collaboration, funded by DHS
- Including leading players
  - OEM, Tier 1, OTA Vendors
- GENIVI SOTA will align with UPTANE

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SOTA CLIENT - ROADMAP

- Integration with GENIVI Development Platform
- Integration with AGL / Open IVI
- Support for generic Linux platforms (32-/64-bit RPM/Deb)
- Support for Binary Diffs
- Signature Validation
- Security hardening
- C/C++ implementation?

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SOTA – WHAT WE PROVIDE

- **Server-side**
  - Server implemented in Scala
  - Deployment scripts / instructions for AWS, Docker and developer machines
  - Complete Design, Architectural and API documentation
  - Complete test suite
- **Client-side**
  - Client implemented in Rust
  - Build / installation scripts for GDP
  - Complete test suite
  - Integration with GENIVI Software Loading Manager

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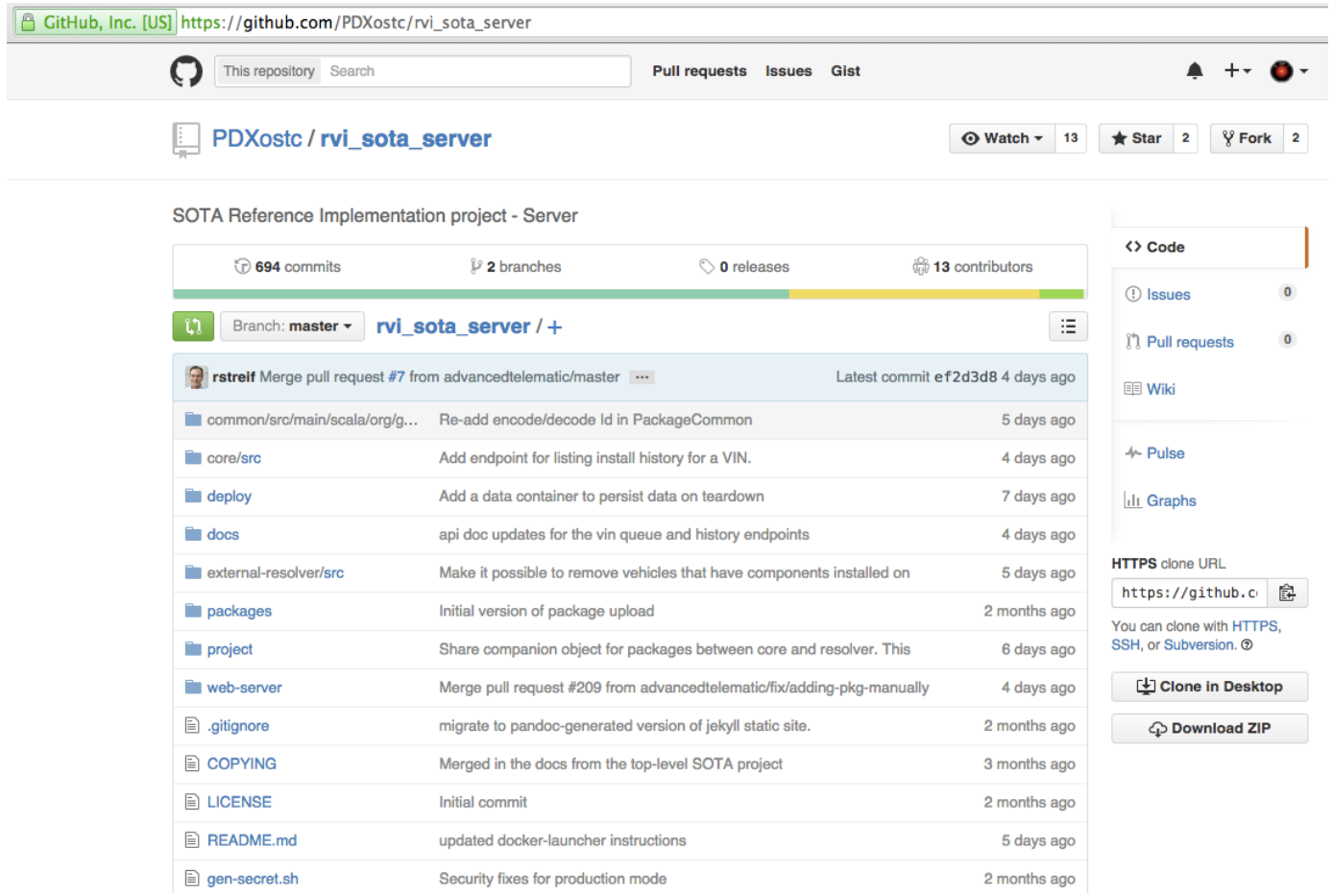
OPEN SOURCE!



All software available under MPL v.2!

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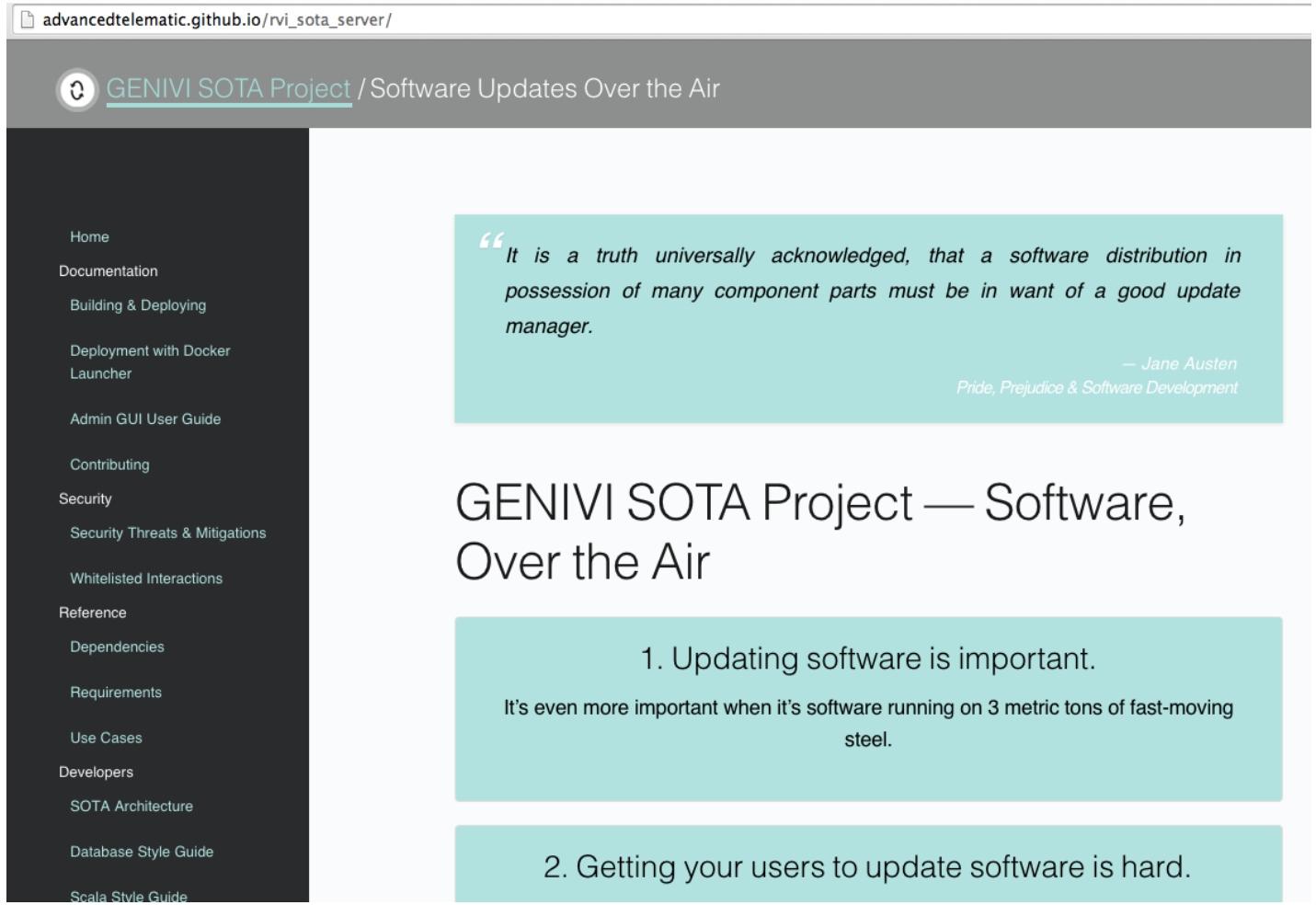

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GET INVOLVED!

Github

https://github.com/genivi/rvi_sota_server
https://github.com/genivi/rvi_sota_client

Mailing lists – GENIVI Projects

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TRY IT OUT!

- Launching this summer: SaaS version of OTA Plus
- Based on GENIVI SOTA
- Minimise develop/build/test/deploy cycle
- Allow engineers to focus on differentiating value
- Support for any GENIVI SOTA Client device

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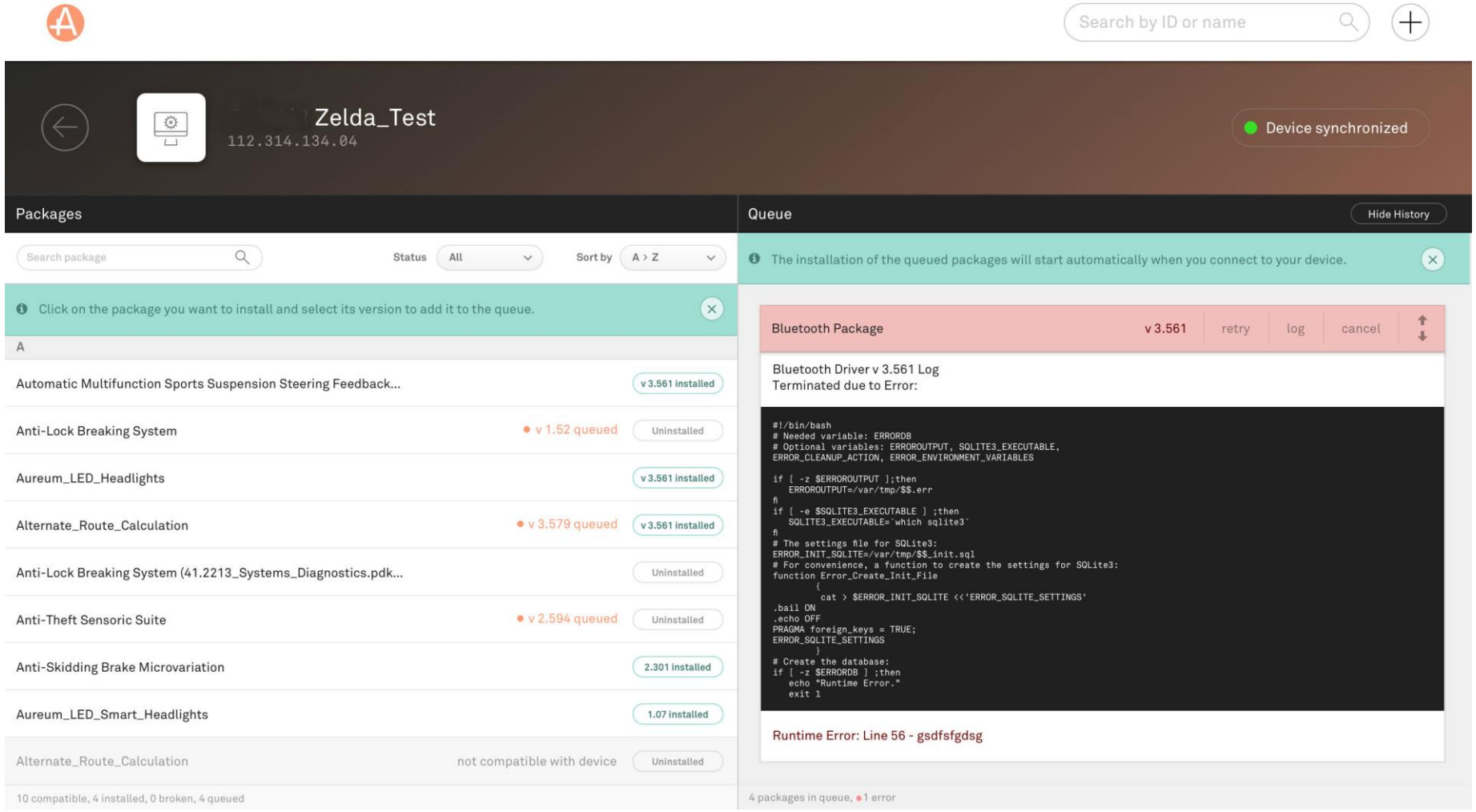
SNEAK PREVIEW



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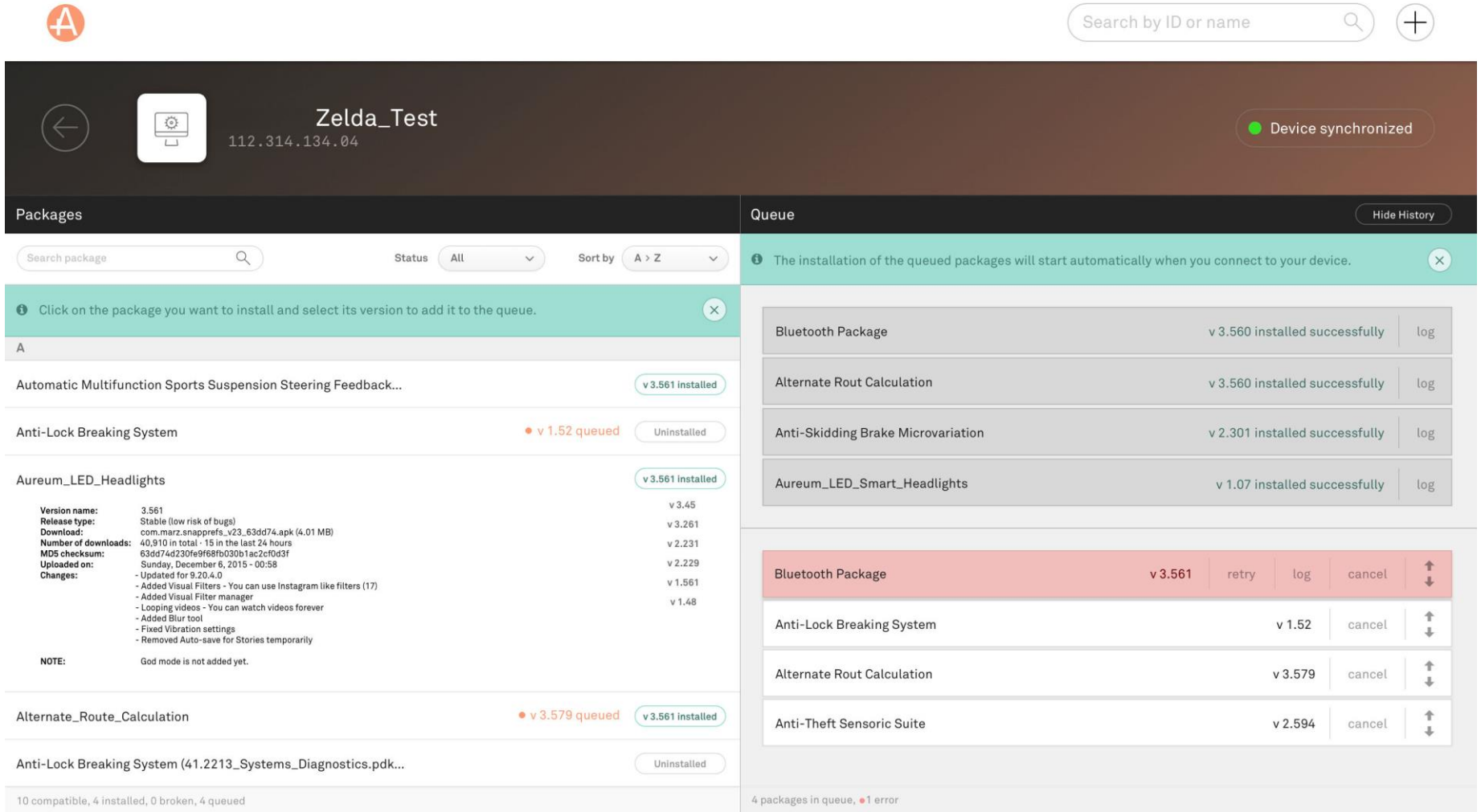

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Q&A

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