Secure Software Update for Constrained IoT Devices
Computer Science

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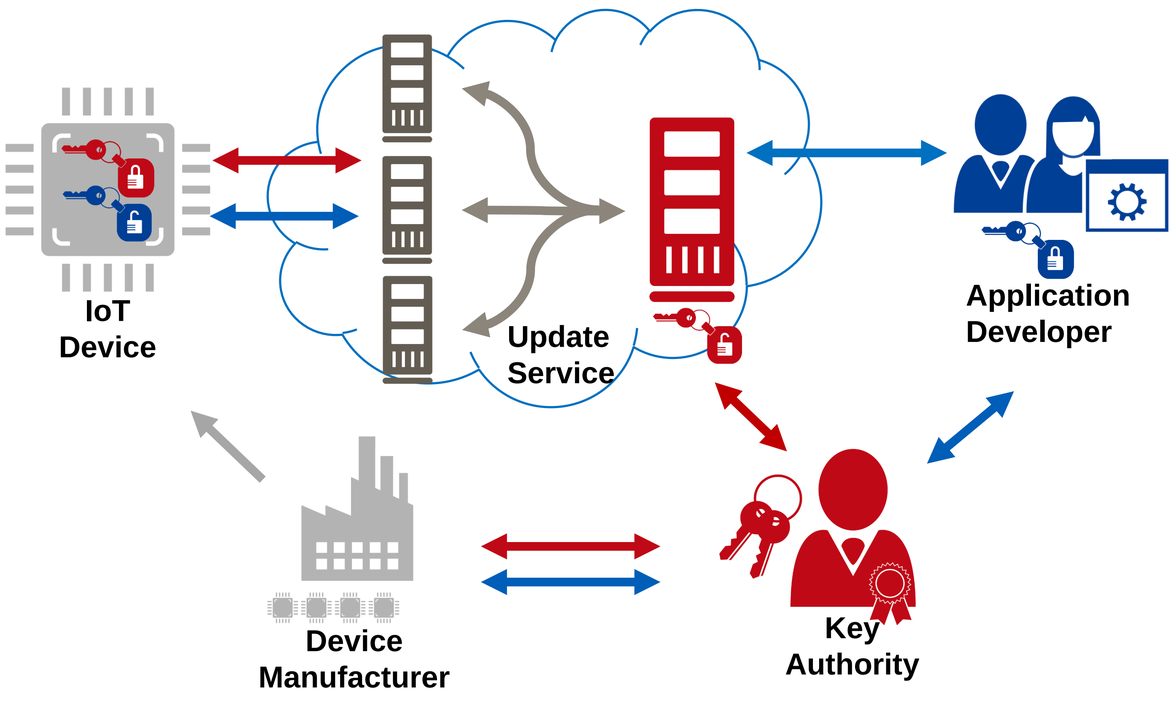
How can cloud computing assist the management and secure software update of tiny IoT devices?

Motivation

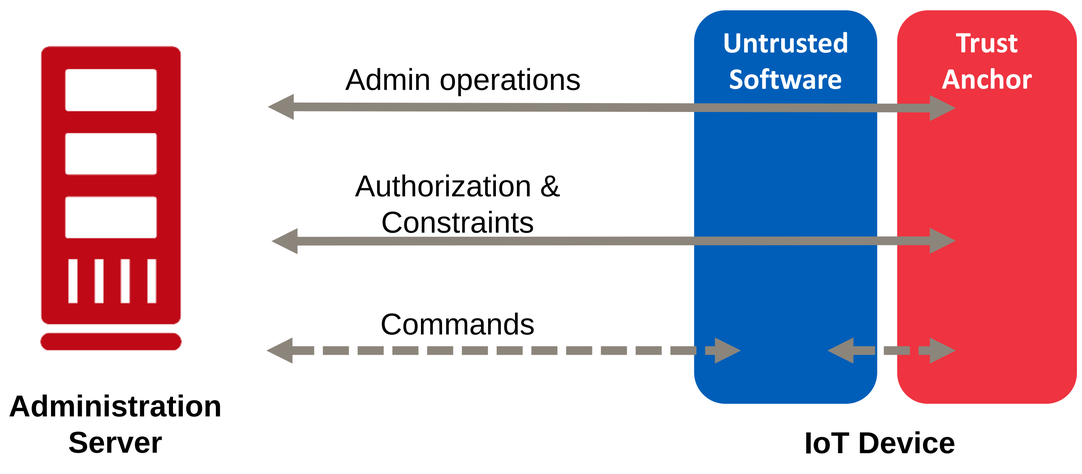
- Resource-constrained IoT devices used in prolonged, possibly unattended in the field
- Updates needed to fix software flaws and enable new features
- No established open standards for over-the-air updates in tiny IoT devices
  - State of the art: Ad hoc proprietory solutions or lack of support for in the field updates



Cloud-assisted management architecture

Research directions

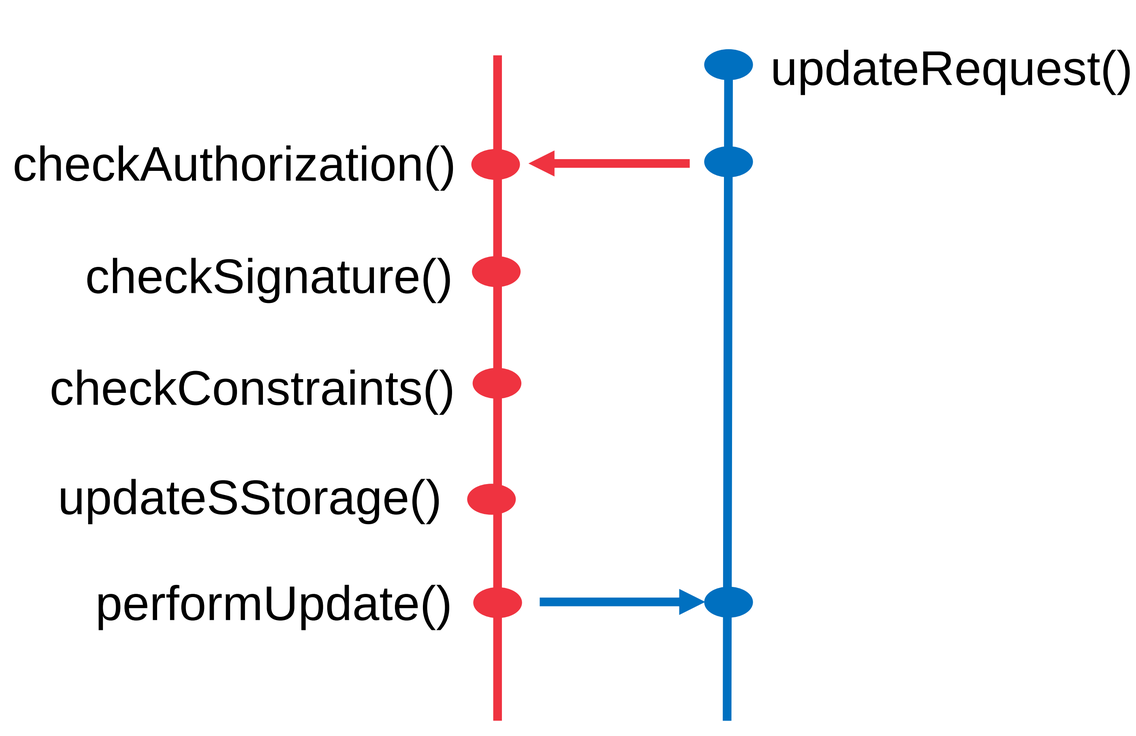
- Utilize hardware-based trust anchors in modern MCUs, e.g. ARM TrustZone-M
- Evaluate proposed open standards:
  - IETF Open Trust Protocol defines PKI and web-centric messages between devices and Trusted Service Managers
  - GlobalPlatform TEE Management Framework defines mechanisms for Security Domains and encapsulation of authorized software and configuration



GlobalPlatform TMF architecture overview

Device concerns and requirements

- Authenticity and integrity of update
- Immutable device identity
- Secure storage for critical data
- Security domains with different constraints and policies
- Rollback protection of software and configuration
- Robustness and operational impact
- Reachability of devices with intermittent connectivity
- Privacy in consumer devices



Trust Anchor and Untrusted Software interaction

Benefits from cloud-assistance

- Pervasiveness enables update deployment monitoring and device analytics
- Scalability of back-end functions to large-scale deployments
- Elasticity for scheduling staged update rollouts, e.g. security critical updates