A Framework for Secure Autonomic IoT Device Management in Constrained Networks

Authors: Maryam Hatami, Sandra Céspedes, J. William Atwood | Authors Info & Claims

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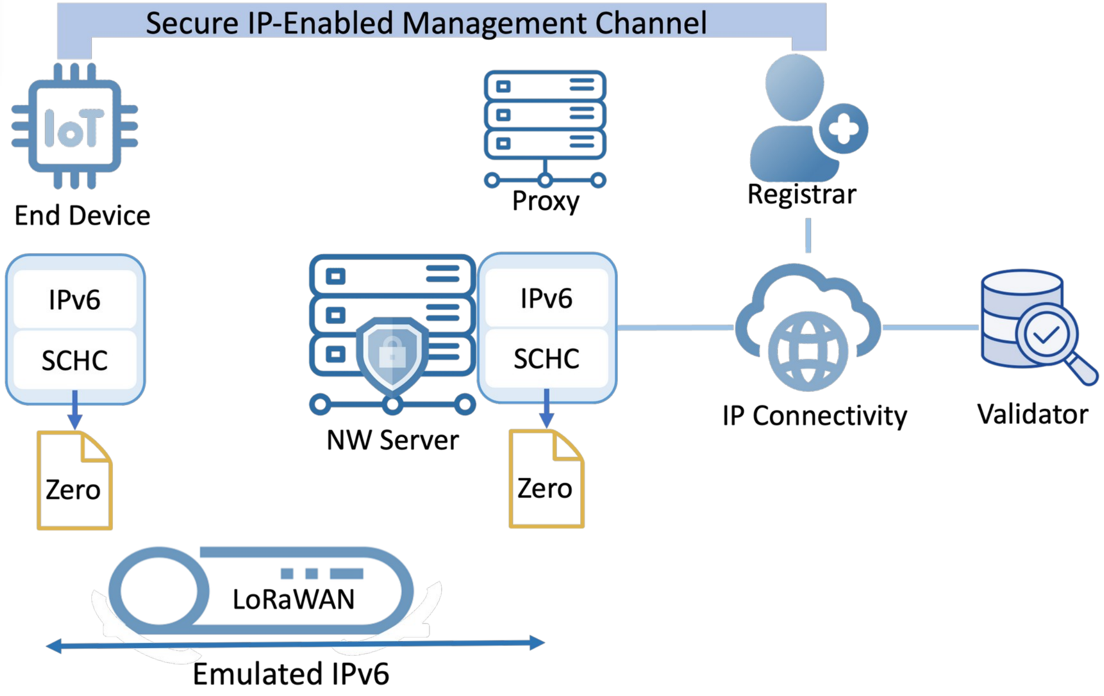
Proposed Framework Overview

- Autonomic onboarding over **constrained LPWANs** (e.g., LoRaWAN)
- Combines **SCHC Zero** (static context) + **BRSKI/cBRSKI**
- Enables **zero-touch, IP-based onboarding** from device startup
- Leverages **pre-installed certificates** and **DTLS-secured** flows
- **SCHC Zero Compression Applied To:**

Enables onboarding traffic over LoRaWAN by compressing headers down to just a few bytes

Message	Header	Fields Compressed by *SCHC Zero*
SLAAC - Neighbor Solicitation	IPv6	IP Version, Traffic Flow Label, Next Header, Hop Limit, IPv6 App Prefix, IPv6 DevIID, Destination Address
	ICMPv6	ICMPv6 Code, ICMPv6 Type
M-Flood	IPv6	IP Version, Traffic Flow Label, Next Header, Hop Limit, IPv6 App Prefix, IPv6 DevIID, Destination Address
	UDP	UDP Dev Port, UDP App Port, UDP Length, UDP Checksum
TLS Handshake	IPv6	IP Version, Traffic Flow Label, Next Header, Hop Limit, IPv6 App Prefix, IPv6 DevIID, Destination Address
DTLS Handshake / Voucher / EST	IPv6	IP Version, Traffic Flow Label, Next Header, Hop Limit, IPv6 App Prefix, IPv6 DevIID, Destination Address
	UDP	UDP Dev Port, UDP App Port, UDP Length, UDP Checksum



Future Work

- More compression methods(ex. COAP compression)
- Dynamic SCHC rule updates (securely in dataplane)
- Extending to **non-IP/non-Ethernet** technologies (e.g., PPP, BLE)
- **Real-world implementation** and energy profiling on LPWAN hardware