The DNP Secure Session Layer

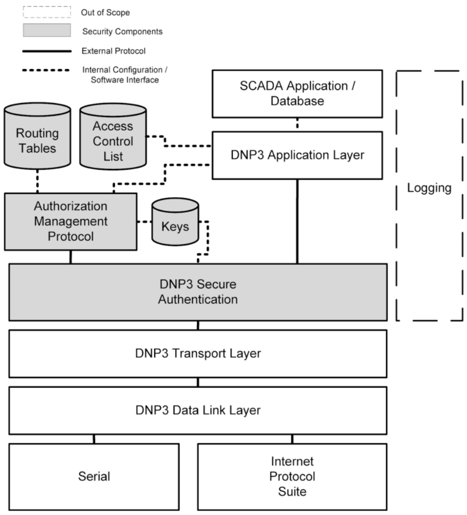
DNP3 Secure Authentication version 6

Developed by the **DNP Cybersecurity Task Force** (CSTF) in collaboration with **IEC Technical Committee 57 Working Group 15** , DNP3 SAv6 is **the DNP Secure Session Layer**.

DNP3 SAv6 is an implementation of the new **IEC 62351-5 International Standard**

Features

- Provides **authentication and integrity** between devices at the application layer
- **Now also supports encryption**
- Uses Hash-Based Message Authentication Codes (HMACs) and/or Authenticated Encryption with Additional Data (AEAD)
- Defined as separate layer that **can be used for other protocols**
- Elliptic curve algorithms to **minimize processing power** while using **strong ciphers**
- **Simplified procedures** and new algorithms in this version
- Authenticates all messages and eliminates previous inefficient challenge-response
- Can co-exist with SAv5

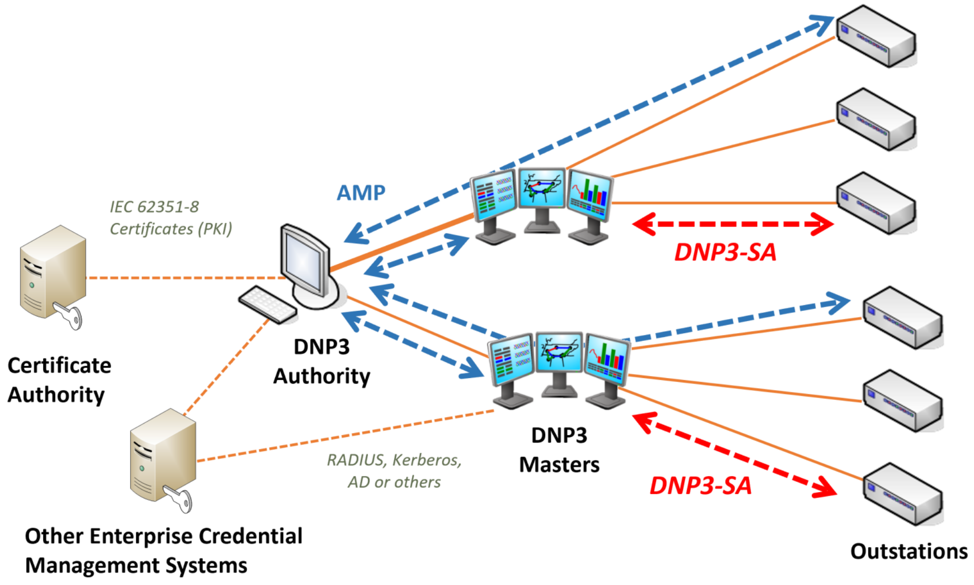


Design principles

- Simple to implement using modern tools.
- No unnecessary complexity.
- Use known, proven, and widely-implemented primitives as much as possible
- Use standard methods, formats and concepts as much as possible, e.g. X.509 certificates
- Does not use pre-set keys, i.e. no human access to any shared secrets

Integration with Public Key Infrastructure (PKI)

- Integrates with the Authorization Management Protocol (AMP) or other PKI
- Can be used stand-alone on point-to-point links using out-of-band enrollment



AMP: the Authorization Management Protocol

Developed by the **DNP Cybersecurity Task Force** (CSTF), the Authorization Management Protocol **Authenticates** devices that implement AMP, **Authorizes** communications between DNP3 Application Layers, and **Manages** security policies.

Features

- Centralized authorization and management of **IP-based, serial, and hierarchical networks**
- Implements an **IEC 62351-5 Central Authority**
- **Role-Based Access Control** (RBAC) including systems with multiple areas of responsibility
- Security managers can promptly revoke authorization and/or privileges to quickly regain control after an attack
- Allows devices to generate their own keys, avoiding personnel viewing security secrets
- **Accommodates redundant connections, Masters, and Authorities**
- Transports defined for AMQP and DNP3-SAv6
- **Can be used separately** with protocols other than DNP3

Authentication

- **Uses X.509 Identity Certificates** for the Authority and devices to authenticate each other
- The Authority can be part of a full **Public Key Infrastructure (PKI)** including an Intermediate Certificate Authority associated with the Authority itself, or can provide the PKI as needed.
- All managed devices have an Authority-signed certificate.
- All AMP messages are digitally signed and most are encrypted

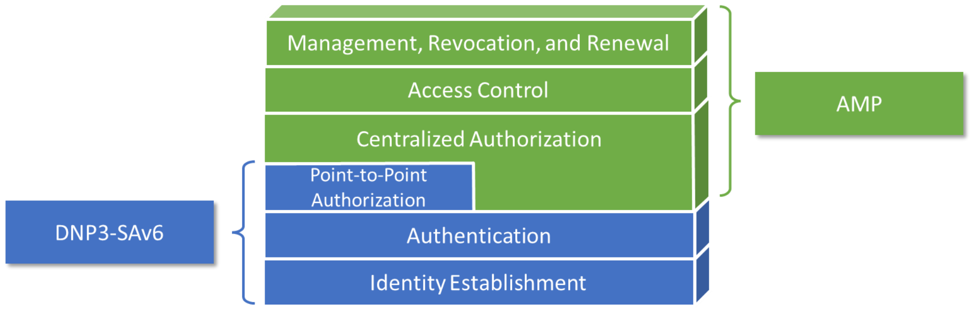
Authorization

- Uses **X.509 Attribute Certificates** to convey RBAC info as well as access authorization
- Implements industry-standard **IEC 62351-8** RBAC definitions
- Can use a single attribute certificate to authorize one or many **Master-Outstation Associations**

Security policy management

- Permits network managers to set and distribute critical **policies for system-wide security management**, e.g. tell each device through the protocol itself:
  - How to identify the Authority
  - How often to update credentials
  - How to behave when the Authority is not available
- **Protects against replay and spoofing of policies**, and keeps policies confidential

Policies enable system availability and continued operation


Management, Revocation, and Renewal
Access Control
Centralized Authorization
Point-to-Point Authorization
Authentication
Identity Establishment
AMP
DNP3-SAv6