

Enea Element On-Device Management: Programmability for Network Functions

Network Management with NETCONF and YANG - Enea Element On-Device Management is a model driven network function management agent for Physical and Virtual Network Functions (PNFs and VNFs).

Key Features and Benefits

- ▶ **Model driven** - Devices are modeled in YANG and standardized northbound interfaces are rendered automatically from the models,
- ▶ **Transactions** - Network-wide transactions enable robust management,
- ▶ **VNF and PNF** - Equally suitable for virtual network functions (VNFs) and physical network functions (PNFs),
- ▶ **NETCONF** - NETCONF enables device automation and programmability by design,
- ▶ **Source code** - Enea Element On-Device Management is available with full source code for maximum transparency and future-proofing,
- ▶ **Proven** - A reliable framework proven in use with leading Network Equipment Manufacturers,
- ▶ **Simple programming model** - Speeds up development of management interfaces,
- ▶ **AAA** - Authentication, Authorization and Auditing for strong device security.

Device Management Agent

Enea Element On-Device Management is a feature-rich framework providing all the management functionality needed within a managed device, whether it is a single node or a distributed system.

Develop Management Interfaces Faster

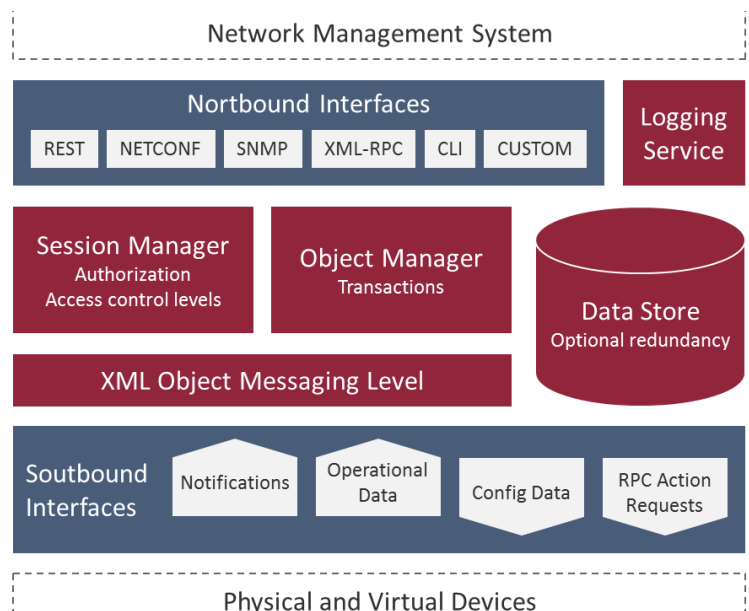
Enea Element On-Device Management makes it quick and easy to add northbound management interfaces to network devices. Thanks to its simple and proven programming model, it allows faster integration with the application software.

Add Automation and Programmability

Using a YANG data model, Enea Element On-Device Management renders standardized northbound interfaces for both human and machine interaction, enabling automation and programmability of network devices at a scale.

Avoid Stove Pipes

Northbound and southbound interfaces are decoupled in Enea Element On-Device Management, minimizing development efforts and allowing devices to connect using any northbound interface without application rewrites.



Model Driven

Enea Element On-Device Management is model-driven with support for these data model languages:

- YANG
- SNMP MIB

The YANG data modeling language is used by the framework to model configuration and state data manipulated by northbound agents as well as actions requested by those agents and asynchronous notifications produced by the managed device.

Northbound Interfaces

Enea Element On-Device Management provides a rich set of northbound interfaces including:

- NETCONF
- REST
- SNMP
- XML-RPC
- CLI

Standardized interfaces like NETCONF and REST enable support for true multi-vendor solutions. The northbound interfaces expose functionality that includes session/transaction/rollback support, RPC operations, and security; while providing a clean separation of configuration and operational (state) data. The CLI is an 'auto rendered' commercial grade command line interface.

Messaging Layer

To support the northbound and southbound interfaces without the typical 'impedance mismatch' between protocol and application, the framework provides an XML Object Message Passing layer that supports complex XML data types representing 'modeled objects' anywhere in the system (in memory, on disk) which can then be sent between threads, processes and nodes. Southbound Clients can register in a 'location transparent' manner with the Object Manager to interact with the data model to:

- receive configuration updates
- perform validation before a commit
- provide operational data
- perform actions

Southbound Interface

A southbound interface enables communications between device specific applications and the 'Object Manager' component of Enea Element On-Device Management. It provides a single interface to applications regardless of the Northbound Agent being used.

Security

Access Control Levels (ACL) provide security at the User/Managed device level. Any remote function (i.e. modeled RPC) can be executed in a secure manner with an ACL policy set. Security at the transport level is provided through an industry standard secure SSH connection.

Logging / Audit Trail

Included with Enea Element On-Device Management is a centralized logging facility that supports audit trails for managed devices. With a feature rich set of logging capabilities for developing distributed applications, the logging supports dynamic filtering at both the client interface and the server (presentation) interface.

Source Code

Enea Element On-Device Management is available with full, buildable source code, providing a reliable and future-proofed solution. The source code transparency also enables improved debugging capabilities and simplifies code auditing.

Independent Software Vendor

Enea is an independent software vendor. Our independence and our software's conformity to open standards protects your network devices from lock-ins and conflicting supplier interests.

Add-ons

High Availability / Application Lifecycle Management / Live Software Upgrade

Enea Element On-Device Management can seamlessly integrate with *Enea Element High Availability*, a carrier grade HA middleware framework.

Element & Network Management System

Enea ElementCenter is a modern EMS/NMS framework with full FCAPS, supporting automation of managed devices through NETCONF/YANG.

Find out more on the
Enea website!



Enea develops the software foundation for the connected society with a special emphasis on reducing cost and complexity at the network edge. We supply open-source based NFVI software platforms, embedded DPI software, Linux and Real-Time Operating Systems, and professional services. Solution vendors, Systems Integrators, and Service Providers use Enea to create new networking products and services faster, better and at a lower cost. More than 3 billion people around the globe already rely on Enea technologies in their daily lives. For more information: www.enea.com