

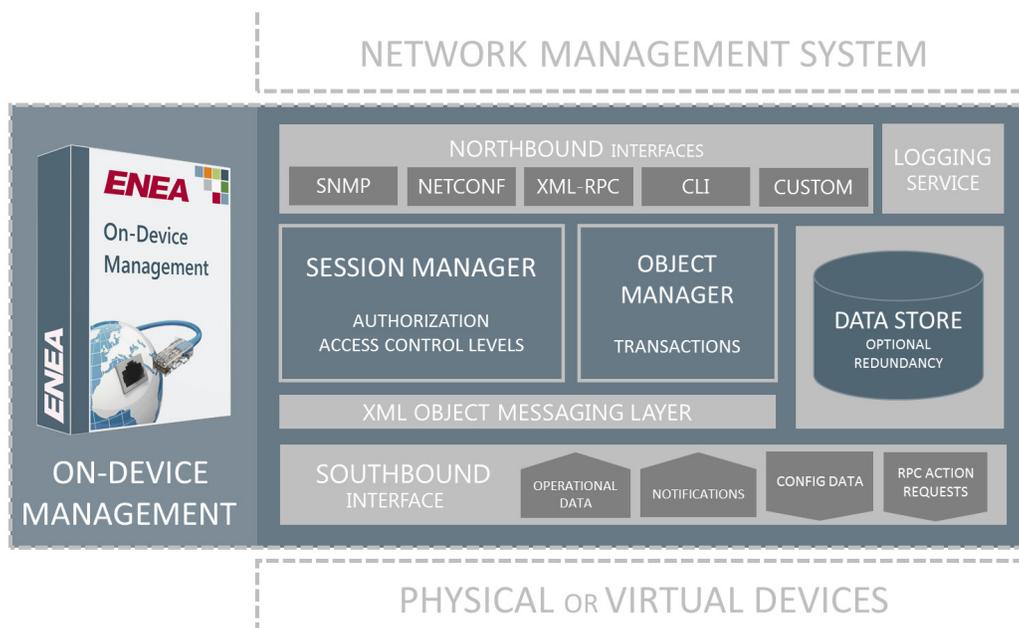
Enea® On-Device Management

Scalable and Secure On-Device Management

On-Device Management involves the ability to configure, monitor and control network devices, also known as Managed Devices. Managed devices can be configured by creating, modifying and deleting device configuration parameters and acted upon by issuing action requests. Monitoring or collecting information when needed can be done by requesting state from a managed device. Listening for unsolicited notifications of events and updates to alarm state removes the need for constant polling.

Enea's On-Device Management is a feature-rich framework that provides all of the management functionality needed within a managed device, whether it is a single node or a distributed system.

All connected and commercially deployed devices and appliances (physical and virtual, including Virtual Network Functions) need to be managed, monitored and controlled.



Northbound Interfaces

Managing entities (i.e. operational staff, management or orchestration systems) use Northbound Interfaces to perform network configuration, monitoring and control. These interfaces are responsible for providing access to Alarm, Performance, Inventory, Provisioning, Configuration and Security related information of managed devices.

Enea's On-Device Management framework provides a rich set of northbound interfaces including: NETCONF, SNMP, XML-RPC and CLI. Standardized interfaces like NETCONF and SNMP 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 without having to write any code.

Data Modeling

Data modeling languages are used to define management models, which are contracts between managing entities and managed devices.

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Enea is a global vendor of Linux and Real-time operating system solutions including middleware, tools, protocols and services. The company is a world leader in developing software platforms for communication-driven products in multiple verticals, with extreme demands on high-availability and performance. Enea's expertise in operating systems and high availability middleware shortens development cycles, brings down product costs and increases system reliability. The company's vertical solutions cover telecom handsets and infrastructure, medtech, automotive and mil/aero. Enea has offices in Europe, North America and Asia, and is listed on NASDAQ OMX Nordic Exchange Stockholm AB. For more information please visit enea.com or contact us at info@enea.com.



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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.

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 the On-Device Management framework. The On-Device Management framework 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 the On-Device Management framework 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.

Add-Ons:

High Availability / Application Lifecycle Management / Live Software Upgrade

For those critical applications and devices that need a higher degree of reliability or availability, the On-Device Management Framework can seamlessly integrate with Enea's Carrier Grade High Availability middleware framework with zero code changes.

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