



Nymi Functional Specifications

Nymi Enterprise Edition

3.3

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Introduction

This document provides a description of the interfaces, functions, and behaviour of the various software components in the Nymi Enterprise Edition solution.

Nymi creates and maintains this document to provide customers with information about how the Nymi Solution is designed to address user specifications. The user-created User Requirements Specifications document describes the user specifications. The Nymi-defined acceptance criteria for functional requirements provide the source of information for the functional specifications. The Design/Configuration Specification document provides more information about the functional specifications outlined in this document.

Solution components and interfaces.

Nymi Enterprise Edition Components

The Nymi Enterprise Edition environment contains several core components:

- Nymi Band
- Nymi Enterprise Server (NES)
- Nymi Band Application
- Nymi SDK, which includes Nymi Runtime and the *nymi_api.dll* (Nymi API) file.
- BLE adapter and NFC reader

The following figure provides a high level overview of the core components in the Nymi Enterprise Edition environment.

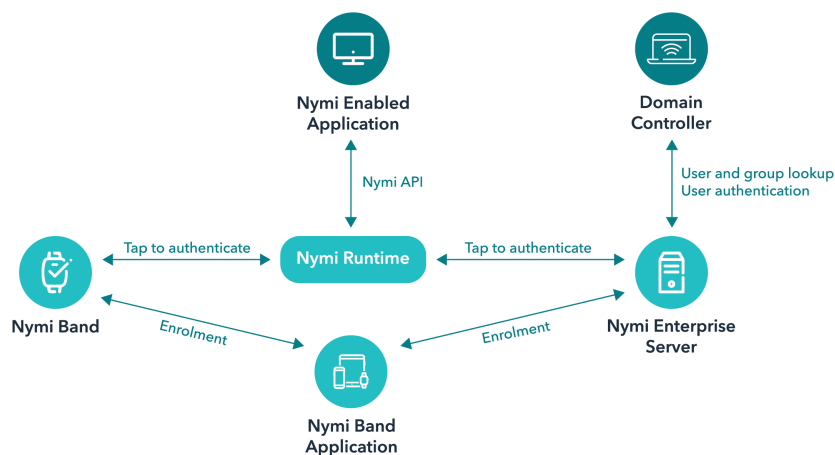


Figure 1: Nymi Enterprise Edition Core Components

Nymi Band

The Nymi Enterprise Edition solution features the Nymi Band – a wearable that combines multi-factor authentication with embedded sensors. Fingerprint biometrics, ECG liveness detection and on-body detection give strong identity assurance of the individual user. Near-Field Communications (NFC) and Bluetooth Low Energy (BLE) technology are incorporated into the Nymi Band to allow for wireless communication between the user and digital systems. The Nymi Band is IP66 and IP67 rated to ensure it will perform in challenging environments.

The Nymi Band communicates securely with an NEA that is built using the Nymi API over BLE and NFC protocols. The Nymi Band provides persistent authentication through on-body detection technology.

A Nymi Band user taps the Nymi Band against the NFC Reader to indicate the intent to perform an operation. For example, a user can tap an authenticated Nymi Band on an NFC Reader that is attached to an user terminal and unlock their session on the machine.

Bluetooth communication

The Nymi Band uses Bluetooth Low Energy (BLE) to interact with the Nymi Bluetooth Endpoint service. The Nymi Band BLE communication does not rely on Bluetooth security. All security is implemented using strong, standard-based cryptography.

Near Field Communication

The Nymi Band supports a number of features over Near Field Communication (NFC). The Nymi Band also supports the *tap-to-authenticate* use case, in which the NFC Universal Identifier (UID) is transmitted over NFC to identify a Nymi Band, and the authentication is performed securely over BLE.

Nymi Band Application

Nymi Band Application is a Windows desktop application that enables end users to enroll their Nymi Band. Enrollment is the process of associating a new user's identity with a Nymi Band. The Nymi Band Application orchestrates user authentication, Nymi Band authentication, enrollment of fingerprint and other authentication credentials, and provides the necessary information to NES and/or the EAM Console for storage to support subsequent management and operation of Nymi Bands.

During enrollment, it is possible to configure the Nymi Band Application to create a corporate credential authenticator in addition to the fingerprint authenticator. With a corporate credential authenticator, a user can use their corporate username and password to authenticate to the Nymi Band instead of their fingerprint.

Nymi Enterprise Server

The Nymi Enterprise Server (NES) is the server component of the Nymi Enterprise Edition solution and is responsible for the deployment, operations, and management of Nymi Bands and other Nymi software components. Primarily, it enables storage and retrieval of information that is necessary for Nymi Band usage and management. Managing security policies, issuing authentication tokens to Nymi-enabled Applications (NEAs) and allowing user authentication between Active Directory and the Nymi Band are all functions of NES.

NES can be configured as a single instance or in a multi-server deployment.

NES makes use of Microsoft Internet Information Service (IIS) and Microsoft SQL Server, and is compatible with Microsoft Windows Server 2012 R2 or Microsoft Windows Server 2016 that has a series of responsibilities:

- Manage the association between the Nymi Band and the corporate credentials
- Manage the enrollment of Nymi components into the ecosystem (for example, registers Nymi Bands, or Nymi-enabled Applications or Nymi Band Application)
- Manage the policies of the Nymi Band ecosystem (for example, when Nymi Bands are required to be authenticated through biometrics)

Nymi SDK

The Nymi SDK serves two purposes:

- Provides access to the Nymi API which enables developers to create NEAs.
- Provides Nymi Runtime (including the Nymi Agent and Nymi Bluetooth Endpoint) that communicates with Nymi Bands.

Nymi-Enabled Applications

Nymi provides an SDK that allows teams to build Nymi-enabled Applications (NEAs), which consists of customer enterprise components. When the NEA is integrated with Nymi Enterprise Edition, the solution can perform tasks such as Windows terminal login / unlock, application login, and electronic signatures.

NEAs can be any web application or native application that makes use of the Nymi Bands's security functions.

Domain Environment

Nymi Enterprise Edition is designed for seamless integration into enterprise Active Directory (AD) environments.

Nymi Enterprise Edition integration with AD is limited to performing authentication of users and computers, lookup of user status and group membership. Nymi Enterprise Edition does not write to AD. The Nymi Enterprise Edition integration uses AD for the following purposes:

- For user authentication by the Nymi Band Application, to enable user management of Nymi Bands (e.g., Nymi Band enrollment).
- For user authentication and authorization during access to NES Administrator Console.
- For verification of user status (for example, to determine if a user account is still active in AD) during an assert identity operation.
- For client authentication when the NAPI DLL needs to access NES for privileged operations.

Nymi Enterprise Server Sub-components

NES manages centralized functionalities that are required for the deployment, operations and management of the Nymi Bands and other Nymi software components. NES has several sub-components that manage different areas of functionality.

Nymi Administration Console: Provides Nymi Band management options and NES security policy configuration.

Enrollment Service: Issues authentication tokens to NEAs by using the Nymi Token Service (NTS).

Authentication Service: Provides authentication functions for enterprise users and machines.

Directory and Policy Service: Allows storage and retrieval of information that is necessary for usage and management of the Nymi Bands and other Nymi software components.

SQL Server: Licensed SQL Server installation is required for production.

IIS Server: NES uses Microsoft Internet Information Service (IIS) to access web services.

Nymi SDK Components

Nymi SDK is composed of the Nymi Runtime and Nymi API (NAPI).

Nymi Runtime

Nymi Runtime—Facilitates communication between an NEA and Nymi Bands. The Nymi Runtime consists of the Nymi Agent and the Nymi Bluetooth Endpoint.

- The Nymi Agent facilitates communication between NEAs and the Nymi Bands, and maintains knowledge of Nymi Band presence and authentication states.
- The Nymi Bluetooth Endpoint is a service that is deployed on individual workstations to provide local BLE communications with Nymi Bands through the Nymi-provided bluetooth adapter.

Assumptions and restrictions

The Nymi Solution makes the following environmental assumptions:

- At least one Windows 7 64-bit or Windows 10 64-bit machine exists in the environment that is used to manage the Nymi Band user accounts and that the Nymi Band users have access to this machine for the purpose of a one time Nymi Band enrollment.
- At least one Windows 2012 R2 or Windows 2016 server exists in the environment that can access the Active Directory server that is used to manage the Nymi Band user accounts.
- For the purposes of NES installation, the system administrator has access to one user account that has domain administrator privileges.
- At least one SQL Server Express 2012, 2016 or 2017 is available to store NES records. NOTE: If an existing SQL server installation does not exist, the NES installation will install an unlicensed version of the SQL Server Express 2012 software locally on the NES machine.

Functions

The following functions represent high level description is broken down into individual functions including performance, safety and security, functions which are configurable, traceability to requirements in the URS and failure conditions, actions, logfiles and diagnostics.

Functions in the Nymi solution include configurations, NES enrollment and the Nymi Software Development Kit.

Configurations

The following table summarizes the functional specifications and related user specifications for configuration requirements.

Table 1: Functional specifications for configuration

URS #	User Specification	FS #	Functional Specification
URS-029	The Solution shall be configured so that there is no single point of failure.	FS-CFG-02	Create a document that describes the steps to deploy Nymi Agent so that it can achieve 99.9% availability

NES configuration and functions

NES configuration and functions include hardware and software requirements, and data storage for NES.

Hardware and Software Requirements

The host on which you deploy the NES software must meet the following minimum software and hardware requirements.

Software requirements

NES has the following software requirements.

- Microsoft Windows Server 2012 R2 or Windows Server 2016
- Microsoft IIS
- Microsoft SQL Server 2012, 2016 or 2017
- Microsoft .NET Framework 4.8

Note: Microsoft SQL Server Express 2012 and Microsoft .NET Framework 4.8 are bundled in the NES installer.

Hardware requirements

The NES hardware requirements differ based on the nature of user operations, load and other software that is deployed on the same server. The following section lists the recommendations for minimum hardware requirements.

- 1-5000 users:
 - 4 Core CPU
 - 8GB RAM
 - 20GB free disk space
- 5000-10000 users:
 - 4 Core CPU
 - 16GB RAM
 - 40GB free disk space

Minimum requirements for the Nymi Band Application

The section summarizes the minimum software and hardware requirements for the Nymi Band Application.

Software requirements

- Windows 10, 64-bit
- Windows 7, 64-bit

Note: It is recommended to use 125% scaling and 1920 x 1080 screen resolution for the terminal hosting the Nymi Band Application.

Hardware requirements

- 4GB RAM
- 5GB free disk space
- 2 core CPU (recommended)
- 1 USB 2.0 port
- Bluegiga BLED112 Bluetooth Low Energy (BLE) Dongle (Bluetooth adapter)

The Nymi Band

General functional specifications for the Nymi Band are summarized in the following table.

Table 2: Nymi Band functional specifications

URS #	User Specification	FS #	Functional Specification
URS-030	An alternative method of authentication for the user shall be available for the operator if the wearable biometric is unavailable.	FS-NB-015	Nymi Enterprise Edition allows authentication to the Nymi Band by biometrics or an external authenticator, such as Active Directory.
URS-013	All passwords which are stored by the Solution are encrypted.	FS-NB-016	Nymi Enterprise Edition solution ensures that the Nymi Band user is valid in Active Directory. Usernames and passwords are not stored by NES.

URS #	User Specification	FS #	Functional Specification
URS-006 URS-017	<p>The wearable biometric device functions under personal protective equipment (PPE) suitable for Class A/B, Class C and Class D environments.</p> <p>The solution shall recognize the wearable biometric on the NFC reader if 3 cm of plexiglass is between the NFC reader and the band.</p>	FS-NB-019	The Nymi Band NFC antennae supports a read-range that allows detection by an NFC reader through protective clothing and plexiglass coverings.

Battery life

Functional specifications for the Nymi Band battery life are summarized in the following table.

Table 3: Functional specifications for battery life

URS #	User Specification	FS #	Functional Specification
URS-007	The wearable biometric authentication device function shall function for the duration of an Operator shift (8-10hrs) on a single charge.	FS-BAT-001	The Nymi Band supports a 3-day battery life, assuming 10-hour shifts, 900 taps total (300 per shift) with one shift per day.
URS-009	The wearable biometric authentication device shall have means for charging.	FS-BAT-005	Nymi Band contains a rechargeable battery and Nymi performs standard benchmark battery life tests that can be used to provide estimations to customers and compare battery life between different firmware releases.

Physical characteristics

Functional specifications for the physical characteristics of the Nymi Band are summarized in the following table.

Table 4: Functional specifications for physical characteristics

URS #	User Specification	FS #	Functional Specification
URS-026	Operators shall be able to visually check the authentication status of the wearable biometric device. (authenticated or de-authenticated)	FS-PHY-007	The Nymi Band has a display which provides information to the user.

Data

Data in which the system works are described and the following aspects should be addressed, access, allowed range of values for all inputs and outputs, required fields, data validation checks, data relationships, data capacity, retention time, data archiving, data integrity and security and data migration.

Data storage for NES

Table 5: Functional specifications for NES data storage

URS #	User Specification	FS #	Functional Specification
URS-011	The Solution supports the backup and restore of any internal database that is used in the Solution.	FS-DAT-002	Backup and restore procedures for database protection follow corporate policies.
URS-010 URS-012	The Solution stores biometric information in an encrypted format. Biometric information for authentication is not stored centrally.	FS-NB-012	The biometric information that is stored on the Nymi Band consists of a fingerprint template, which is securely stored locally on the micro-controller unit (MCU). The biometric information is permanently deleted when the Nymi Band is security wiped. No biometric information is stored in the server and the fingerprint template never leaves the Nymi Band.

URS #	User Specification	FS #	Functional Specification
URS-027	<p>The Solution provides an administrator with the ability to view and print reports that provide information about additions and modifications of users and device associations.</p> <p>The Solution provides the ability to report on an authentication action, the user that performed the action, the date of the action and the time of the action, historically and in real time.</p>	FS-SAF-005	<p>NES maintains an audit log of Nymi Band user assignments</p> <ul style="list-style-type: none"> • A record of each change (create, update, delete) to a system record must be kept, including the date and operator ID. • The audit log must be accessible to the enterprise that deployed the NEE solution, without support from Nymi. • The audit log must be stored in an intelligible, well-defined format, and be available at any time for review, even past the lifetime of NES. • Additional fields can be added to the log later without affecting existing records (e.g. a "reason for change" field could be added later). • The existence of the audit log and a procedure for viewing its administrator. • Nothing in the Nymi system will allow a user to change audit log records after the record has been generated.

Interfaces

Interfaces include application interfaces, NFC reader support, remote application support and MES support.

Table 6: Functional specifications for interfaces

URS #	URS Specification	FS #	Functional Specification
URS-001	The Solution shall operate on standard IT infrastructure. (Windows Server 2016).	FS-CFG-01	The server-side components can be installed on bare metal within the customer's environment (Supported Operating Systems: Windows Server 2012 R2, Windows Server 2016)
URS-002	The Solution supports a deployment of server components in a virtualized environment.	FS-CFG-010	NES and the Nymi Agent are installable on a virtual machine that has connectivity with required components, such as a Domain Controller and AD server. The NES server and Nymi Agent must also have connectivity and access to the user terminals. The Nymi Agent can qualify as a server side component and you can deploy Nymi Agent on a VM.
URS-003	The Solution integrates with single and multi-domain configurations in a single or multi-forest environment, with one-way or two-way trust.	FS-CFG-03	Nymi Enterprise Edition shall be deployable in a way that allows a user's Nymi Band to be enrolled once and able to authenticate to systems in multiple domains.
URS-003	The Solution integrates with single and multi-domain configurations in a single or multi-forest environment, with one-way or two-way trust.	FS-CFG-04	NES shall require only one AD account for all domains for which there are trust relationships (requires two way trust between domains).
URS-025	Operators shall be able to visually check battery charge on the wearable device.	FS-BAT-006	Users can accurately tell whether their Nymi Band's battery is Low, Medium, or High from the battery indicator on the screen.

Application interfaces

Nymi Enterprise Edition provides IT Administrators with interface to manage the Nymi Band and NES.

The following table summarizes the functional specifications and related user specifications for application interfaces.

Table 7: Functional specifications for application interfaces

URS #	User Specification	FS #	Functional Requirement
URS-030	An alternative method of authentication for the user shall be available for the operator if the wearable biometric is unavailable.	FS-APP-001	The Nymi Band Application is a graphical user interface that allows users to enroll a Nymi Band and authenticate their Nymi Band using corporate credentials.
URS-019 URS-024	The Solution provides a self-service administrative interface to associate and disassociate a user with a biometric device. The Solution provides an administrator with the ability to view and modify Policies for the wearable authentication device.	FS-APP-002	The NES Administrator Console is a web-based application that allows administrators to manage NES policies, users and their Nymi Bands.
URS-039	The Solution provides a mechanism to associate Nymi Bands to a single user.	FS-APP-003	The solution supports the use of the Nymi Band in environments where Evidian and NEAs developed with the Nymi SDK coexist.

Remote application support via RDP and Citrix

Nymi Enterprise Edition allows users to access multi-user applications running on a remote RDP-based and Citrix-based environment solution and have multiple user sessions running on it by using an authenticated Nymi Band.

The following table summarizes the functional specifications and related user specifications for remote application support.

Table 8: Functional specifications for remote application support

URS #	User Specification	FS #	Functional Specification
URS-021 URS-022	<p>The Solution supports remote desktop services such as RDP to access and authenticate a remote MES Solution.</p> <p>The Solution supports the use of thin clients to remotely access configuration applications and provide e-signatures over RDP and Citrix sessions.</p>	FS-RDP-005	Administrators can install NEAs on Windows 10 thin clients running Citrix (compatibility requirement).

MES support

The Nymi Enterprise Edition enables users to interface with MES applications by providing a Nymi API.

The following table summarizes the functional specifications and related user specifications for MES support.

Table 9: Functional specifications for MES support

URS #	User Specification	FS #	Functional Specification
URS-014 URS-023	<p>The Solution provides user authentication to Windows and the MES by using AD credentials.</p> <p>The Solution only provides access to authorized users.</p>	FS-MES-001	The Active Directory user status is queried for every user authentication provided by a Nymi Band to Windows and MES login.
URS-004 URS-015	<p>The Solution provides secure communication with endpoints that require credential verification.</p> <p>The Solution provides a configurable login to the MES Applications with a pop-up windows for authentication.</p>	FS-MES-006	Integrate the Nymi API into an MES to support the use of a Nymi Band for login.

Environment

Environment requirements outline that in which the system is to work including physical layout, physical conditions, physical security, power requirements and any special physical or logical requirements.

Table 10: Environment requirements

URS #	User Specification	FS #	Functional Specification
URS-005	The wearable biometric authentication device does not introduce any unacceptable risks to the health and safety risk of the person who wears the device.	FS-ENV-001	The Nymi Band maintains biocompatibility and chemical resistance.
URS-005	The wearable biometric authentication device does not introduce any unacceptable risks to the health and safety risk of the person who wears the device.	FS-ENV-002	<ul style="list-style-type: none"> • The Nymi Band is certified by: <ul style="list-style-type: none"> • FCC (United States) • CE (Europe) • IC (Canada) • The Nymi Band is made of hypoallergenic material.
URS-008	The wearable biometric authentication device function shall be suitable for cleaning with isopropyl alcohol (IPA) 70% wipes	FS-ENV-003	The Nymi Band can be sanitized with an alcohol wipe or spray.

Glossary

Definitions/acronyms used throughout this document are defined below.

Table 11: Glossary

Acronym	Definition
AD	Active Directory. Directory service for domain networks.
MES	Manufacturing Execution System
NEE	Nymi Enterprise Edition
Class A	Class A clean rooms are for high-risk operations (eg. filling zone, stopper bowls, open ampoules and vials and, making aseptic connections). Class A environments are sterile environments
Class B	Class B Clean rooms provide the background environment for grade A zone items needing aseptic preparation and filling.
Class D	Environments for less critical tasks in the manufacturing process.
21 CFR Part 11	Part of Title 21 of the Code of Federal Regulations that establishes the United States Food and Drug Administration regulations on electronic records and electronic signatures.

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