DELIVERING SMART HOME AUTOMATION SOLUTIONS WITH LYNX MIND

INTEGRATING LYNX MIND HELPS DEVICE MANUFACTURERS AND SERVICE PROVIDERS DELIVER INNOVATIVE AND ADVANCED IOT SMART HOME AUTOMATION

Lynx MiND™ is an event-driven smart home automation platform designed to be embedded into an “always-on” device, turning it into a smart home hub. Lynx MiND is based on the Open Connectivity Foundation (OCF) standard, designed for heterogeneous device support, allowing OCF certified and other supported devices to be managed together. Lynx MiND provides device discovery, device management, and event driven, rules-based automation even when internet access is unavailable. Although Lynx MiND is a fully functional smart home automation platform, it has been designed to be easily integrated into a provider’s cloud infrastructure, allowing providers to quickly deploy a new smart home automation service without having to commit resources to the in-home management of devices.

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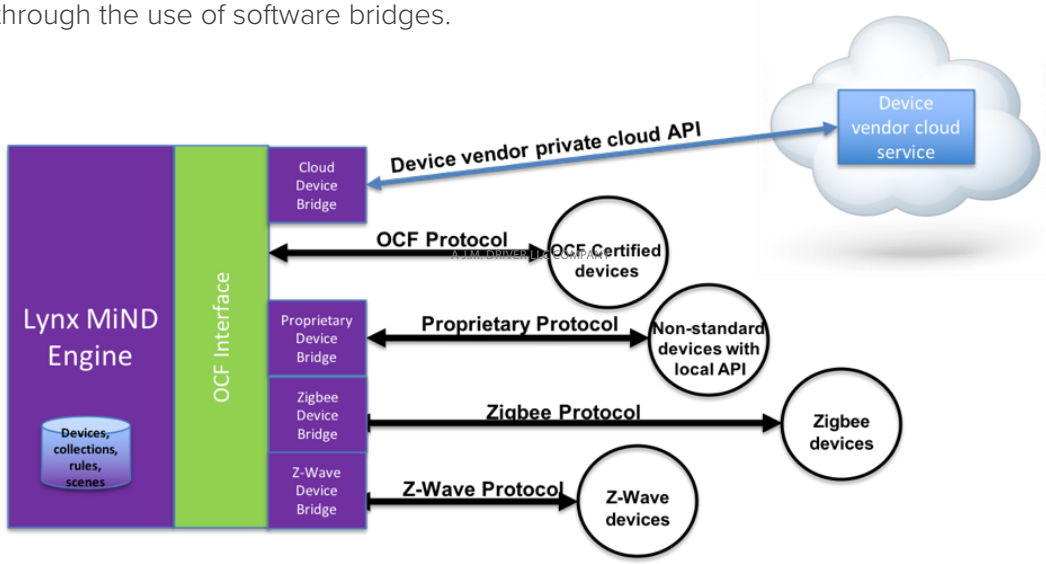
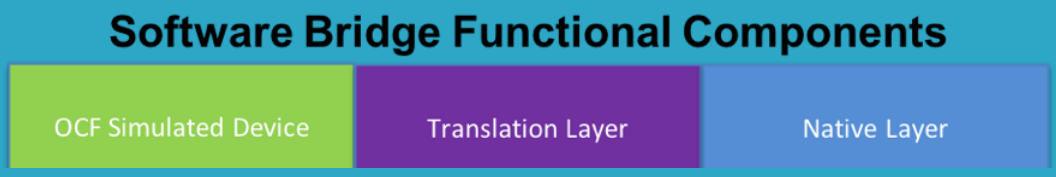
Lynx MiND Device Interoperability

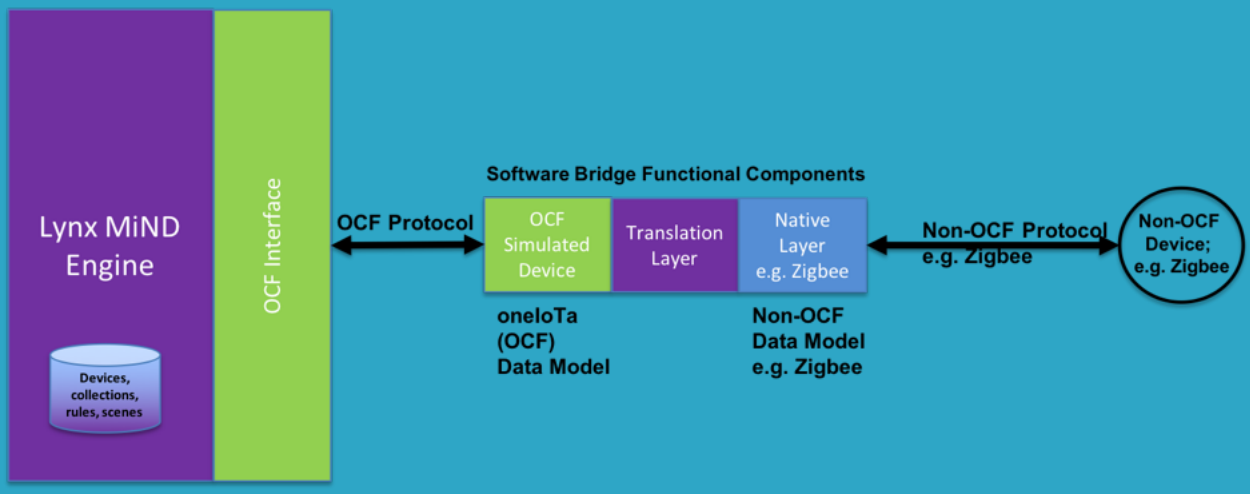
Lynx MiND provides heterogeneous device support and interoperability across multiple smart home protocols. Lynx MiND utilizes multiple methods to discover and manage devices and provides a common management interface, regardless of the device communication method (this assumes the appropriate networking hardware is in place), through the use of software bridges.



Device properties and capabilities are bridged into a common object model, where all device management activity is performed.



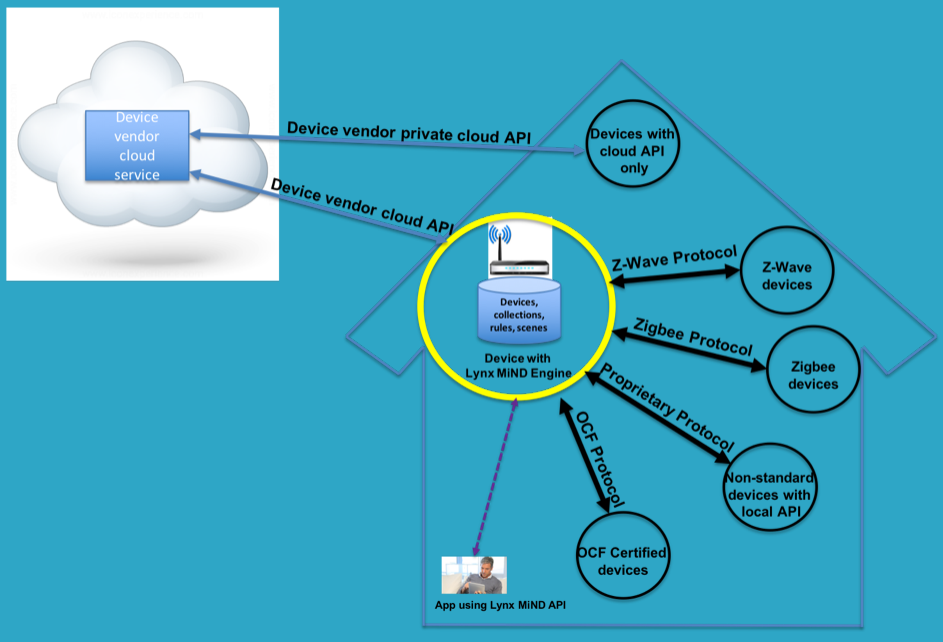
The software bridge consists of a translation layer between the native device interface and a module that presents a simulated OCF device, which can then be communicated with through the OCF interface and utilizing the OCF (OneIoTa) data model.



This allows device types to be managed in the same way, even grouped together and managed with a single user command or rule. For example, a home may have light bulbs in lamps from one vendor and light switches (controlling standard light bulbs) for overhead lights from another vendor. These could be grouped together into a collection called “Lights”, and a single user command could be used to control all of them – all of the bulbs and switches could be turned on or off with one command, even if the switches are WiFi switches and the bulbs are Zigbee bulbs. Combining Lynx MiND’s powerful event driven rules-based automation with its heterogeneous device support and interoperability across protocols results in a vendor-neutral, fully automated smart home.

Lynx MiND Disconnected Mode

Lynx MiND is fully functional, even without an active internet connection. The Lynx MiND Engine is embedded in a device (gateway, router, STB) that resides within the home network and is always on. Since the hosting device is always on, the Lynx MiND Engine is always operating within the home. The Lynx MiND Engine maintains information about all discovered devices in local storage: all collections, rules, and scenes that have been created, in addition to end user information. This permits users within the home network to access the Lynx MiND Engine directly, since an app running on a device in the home network does not use the Internet to communicate with the Lynx MiND Engine. This enables the user to create, edit, or delete collections, scenes, and rules, and to control devices, with response times significantly faster than using the internet. Additionally, because the rules are stored locally, when an event trigger occurs, the corresponding rule(s) will execute even when there is no active Internet connection.



Lynx MiND is fully functional, even without an active internet connection

Lynx MiND Rules Engine

Lynx MiND includes a powerful, consumer configurable rules engine. Lynx MiND not only sends commands to devices, it also monitors the devices for changes in state. This allows the Lynx MiND Rules Engine to "listen" for changes in the smart home and effect new changes based on what events have occurred in the smart home. Because the Lynx MiND Engine is also date and time aware, device status changes can be combined with calendar information to create powerful smart home automation rules. The addition of any number of conditions to a rule enables the consumer to create robust rules, enabling a single trigger event to result in a different set of actions based on calendar information (date, day of week, time of day) and the state of devices in the smart home.

A Lynx MiND rule consists of a trigger, zero or more conditions, and one or more actions.

A Trigger is a defined event that will cause defined actions:
e.g. "motion detected"

Condition(s) define the state that an item be in (device, time, date) and all conditions must be met in order for actions to be executed:
e.g. "nobody home" AND "weekday" AND "after 9:00am" AND "before 5:00pm"

Action(s) are tasks that will be executed when the trigger occurs and all conditions are met:
e.g. "execute alarm scene" AND "notify user Joe"

The rule above executes an alarm scene, and notifies the user named Joe if motion is detected in the home between 9:00am and 5:00pm on weekdays.

Scenes provide a convenient way of defining a desired state for a number of different devices and enabling (activating) the scene sets all of the devices in the scene to the desired states with a single (activate scene) action. In the case above, an alarm scene, which has been previously defined, is activated and notification is to the user named Joe through a separate action. Notifications are supported through the use of the Lynx MiND API in an app, via e-mail or SMS.

A Trigger is a defined event that will cause defined actions:
e.g. "motion detected"

Condition(s) define the state that an item be in (device, time, date) and all conditions must be met
in order for actions to be executed:
e.g. "nobody home" AND "weekday" AND NOT "Wednesday"
"after 9:00am" AND
"before 5:00pm"

Action(s) are tasks that will be executed when the trigger occurs and all conditions are met:
e.g. "execute alarm scene" AND "notify user Joe"

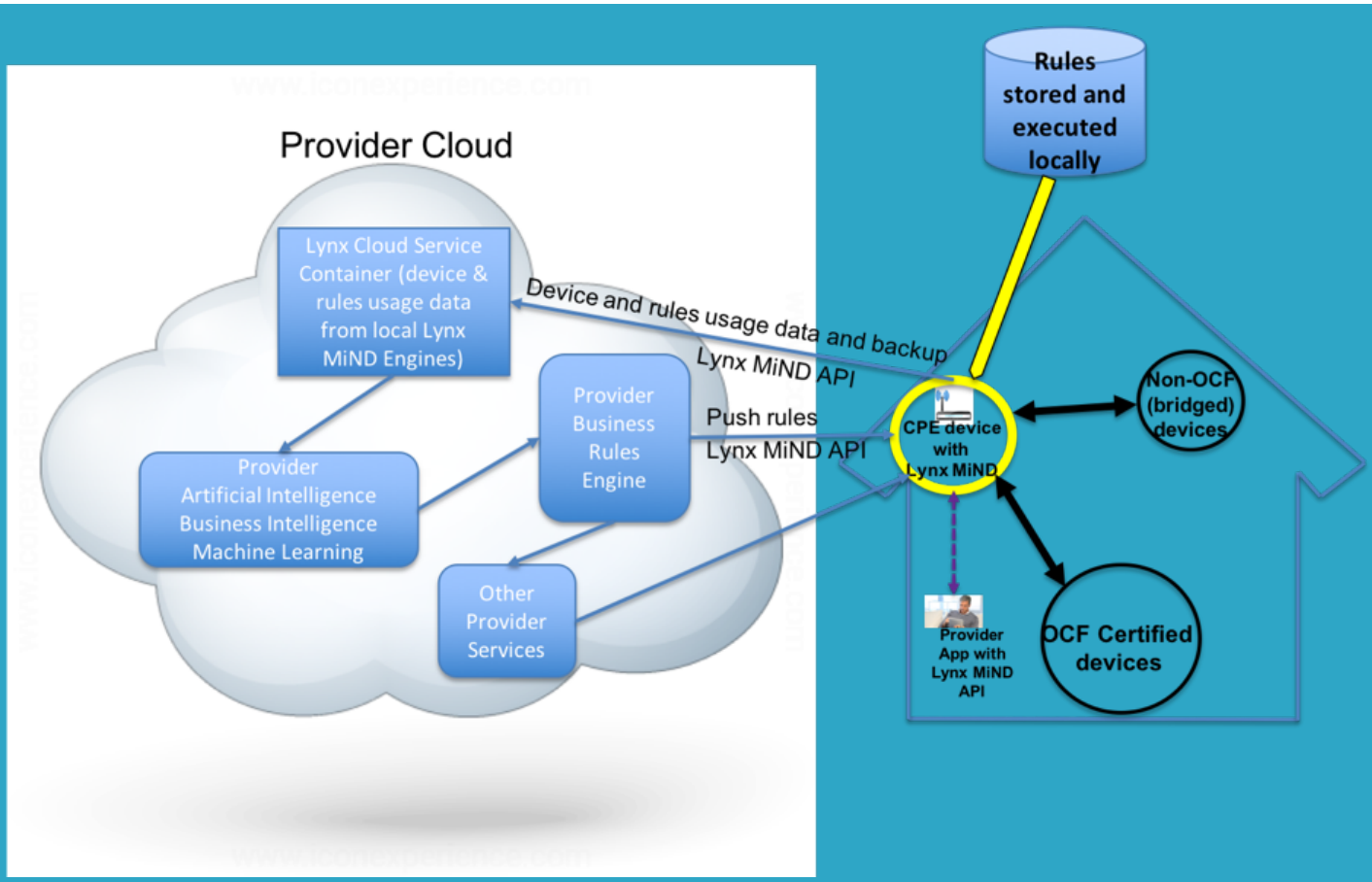
The rule above executes an alarm scene, and notifies the user named Joe if motion is detected in the home between 9:00am and 5:00pm on weekdays, but not on Wednesdays.

Lynx MiND rules also support negation, which makes it easy for a consumer to create a rule and then set a condition to negate the rule when certain conditions are not true. These conditions can be the state of devices in the home, environmental conditions (outside temperature, rain, etc.), even the presence of a user device (like a smart phone running a Lynx MiND enabled app). For instance, the previous rule example could be modified to support the fact that a housekeeper comes in to clean the house on Wednesdays just by adding the negative condition of Wednesday. All rules are stored locally so actions occur almost immediately after an event trigger occurs, without the need for internet connectivity. Lynx MiND provides consumer configurable event driven, rules based smart home automation without requiring internet connectivity.

Lynx MiND Integration into a Cloud Infrastructure

Lynx MiND integration into a provider's infrastructure is accomplished by the use of a microservice or container that is deployed in the provider's cloud infrastructure, which provides access to the Lynx Cloud Service functions. This microservice stores device configuration and rules, as well as device and rules usage information which can be accessed by other components in the provider's cloud infrastructure.

An example of how Lynx MiND can be integrated and used with existing provider capabilities, is that the data from Lynx MiND can be fed into an analysis service (AI/big data/machine learning), which can then be utilized by other provider services. One example of this flow is that the analysis could inform a business logic service which could create a new rule and, using the Lynx MiND RESTful API, push this new rule to the Lynx MiND Engine that is embedded in the gateway in the consumer's home. This also provides the ability to synchronize rules between Lynx MiND and other provider cloud services.



Lynx MiND can be integrated into a provider's cloud infrastructure

A smart home offering with Lynx MiND integrated into a provider cloud can deliver:

» **Integrated Management of Heterogeneous Smart Devices**
- OCF Certified devices
- Non-OCF (bridged) devices
- Provider services

» **Fast Execution of Rules**
- End user created rules stored in Lynx MiND Engine in CPE device
- Rules stored locally on CPE device
- Rules execute locally from CPE device

» **Backup of Configuration and Usage Data**
- Lynx MiND Engine configuration backed up to provider cloud
- Device usage data sent to provider cloud
- Scene usage sent to provider cloud
- Rule usage sent to provider cloud

» **AI Analysis of Usage Data**
- Usage data sent to provider cloud can be analyzed

» **Remote Rule Generation**
- End user generated rules
- AI generated (learned) rules
- New rules pushed to CPE device using Lynx MiND API

» **Event driven, rules-based automation that learns**
- Lynx MiND Engine on CPE device provides event driven, rules-based automation
- Analysis of usage data in provider cloud allows new rules to be learned and implemented
- Rules can be federated between provider cloud and local Lynx MiND Engine on CPE device

Summary

Lynx MiND is a consumer configurable event-driven smart home automation platform, designed to be embedded into an always on device, turning it into a smart home hub. Lynx MiND is based on the Open Connectivity Foundation (OCF) standard, designed for heterogeneous device support, allowing OCF certified and other supported devices to be managed together. Although Lynx MiND is a fully functional smart home automation platform, it has been designed to be easily integrated into a provider's cloud infrastructure, allowing quick deployment of a new smart home automation service without having to commit resources to the in-home management of devices. As a result, providers can deliver advanced smart home automation with faster time to market and a greater return on investment.

To learn more and to speak with a Lynx Technology staff member in your region of the world, contact us at +1 855 LYNXTEC (+1 855 596 9832) or sales@lynxtechnology. com

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