Over-the-Air Provisioning for WiMAX Operators

▶ Enable real-time subscription activation and dynamic device management

▶ Improve subscriber experience, while keeping OpEx in check

bridgewater
S Y S T E M S

THE MOBILE PERSONALIZATION COMPANY

Introduction

WiMAX™ promises to bring mobile broadband to the mass market. This is a great opportunity for operators, as long as they are able to address the challenges WiMAX introduces and to leverage its advanced functionality. Subscription activation and device management are two crucial areas where operators can differentiate themselves from their competitors.

WiMAX subscribers increasingly have access to a wide range of devices, such as laptops, smartphones, and consumer electronic devices, and purchase their devices through operator-independent retail channels. Subscribers expect that these new devices will be recognized and work seamlessly within the operator's WiMAX network, without the need to manually adjust the settings or initiate downloads. As a result, operators have to manage more devices, but have less control over them.

At the same time, subscribers want personalized services that meet their unique needs. They want the freedom to activate their subscription at their own convenience and select the plan features they find most attractive, without having to visit the operator's store or call their customer service line.

Over-the-Air (OTA) provisioning allows WiMAX operators to address these new requirements through real-time subscriber self-activation and dynamic device management. This translates into two crucial benefits to operators: an improved subscriber experience, as it is now very easy to do business with the operator; and lower operating expenses (OpEx).

What is Over-the-Air Provisioning?

With OTA provisioning, subscribers can activate their subscription in real time, without the assistance of the operator's customer service representative over the WiMAX network.

New devices are detected at the time of activation and the required firmware can be automatically and remotely installed by the operator. The firmware and device configuration settings are pushed to the device to enable the services that the subscriber has selected.

Additional firmware updates can be automatically downloaded to the device at a later stage to reflect service changes or to support more advanced functionality.

Why is OTA Provisioning Important to WiMAX Operators?

WiMAX employs a progressive, open model of device distribution and support in which subscribers enjoy unprecedented freedom in selecting and purchasing WiMAX devices that will work on any WiMAX network available.

In cellular networks, the operator retains greater control over the devices operating on its network. Most devices are directly supplied to the subscriber by the operator through its retail stores or partners, and they are pre-provisioned with the operator's software or SIM card.

WiMAX will change this. With WiMAX, the distribution and service delivery models are separated. Subscribers buying a laptop or a multimedia player with a built-in WiMAX module are able to choose the model and brand they prefer and buy it from the retailer of their choice. Subscribers will not accept devices tied to a specific network or be confined to limited choices offered by the operator. In turn, WiMAX operators welcome this opportunity as it reduces the pressure to subsidize end-user devices, to maintain extensive inventory, and to sell non-core devices to subscribers.

This new device distribution model has two main consequences.

The first is that most devices are not sold with the operator's firmware pre-loaded. When turned on, the device will look for available service from all operators with network coverage at the device location. To attract new customers, the operator must ensure that potential subscribers can detect the availability of its service and can sign up in real time.

Pre-provisioning allows operators to offer immediate activation without using OTA provisioning. However, this is often not an option for WiMAX providers as they cannot configure and install the required firmware in the device before the subscriber purchases it. Pre-provisioning may also impose limitations on the subscription features and services that subscribers can select, as all devices come pre-loaded with a common set of standard configuration settings.

The second implication is that a wider range of devices can operate on the network, making it more complex for customer support staff to manage. The ability to push firmware directly to the device enables end users to keep their devices consistently updated—reducing customer support workload and cost for the operator.

Furthermore, WiMAX gives operators the opportunity to offer a wider variety of services such VoIP, video conferencing, or Video on Demand (VoD), and to set different priority levels for different applications or subscriber segments through Quality of Service (QoS). Subscribers need the ability to easily select and change their profiles and to automatically download the required configuration settings to their devices.

Advantages of OTA Provisioning

Service Activation

Competition to attract new subscribers is fierce. WiMAX operators introduce new wireless broadband services that compete with offerings from both wireline and wireless operators. Service differentiation is crucial to winning the battle—and it starts with service activation.

A lengthy and complex subscription procedure that requires multiple calls or visits to a store will drive many subscribers away. Subscribers expect a fast, transparent subscription process that leaves them in control, with the flexibility to personalize services and change plan features when needed. Device management, including firmware updates and device configuration, should be tied to plan preferences and to an automated identification of the device. It should be conducted in the background, without impacting the subscriber.

OTA provisioning makes the subscription process more consistent and straightforward, even as the number and type of devices increase. Each device receives the latest firmware available upon activation instead of the version available when the device was manufactured and sent to the store.

With auto-provisioning, the subscriber is empowered to complete the signup process without the assistance of a customer service representative or store salesperson. From the operator perspective, this translates into lower OpEx and the ability of customer service staff to assist subscribers with more complex, non-routine requests.

Device Management

Devices need to receive firmware updates to improve their performance, and to support new features and services. In new technologies like WiMAX, the frequency of firmware updates is likely to be high since the technology is still rapidly evolving.

To take advantage of new functionality and to address any performance or service issues that may arise, WiMAX operators need to be able to effectively and consistently update all the devices on the network. OTA provisioning encourages automatic updates to take place as soon they are available and the device is connected to the network.

If firmware updates require the active involvement of the subscriber, the update process is likely to cover only some devices, will require a longer time to complete, and will entail a higher cost to the operator.

Subscribers without access to OTA updates typically go to the operator store or initiate a firmware download only if they encounter a device-specific issue. Many subscribers will ignore available updates as long as their device works well.

Automated OTA downloads, on the other hand, may address potential issues before the subscriber becomes aware of them.

Advantages of OTA Provisioning to WiMAX Operators

▶ Faster, consistent subscription activation.

▶ Quick implementation of pay-as-you-go service models.

▶ Up-to-date firmware in end-user devices.

▶ Reduced OpEx.

▶ Improved, more personalized subscriber experience

Enabling OTA Provisioning

OTA provisioning eliminates the need for customer service staff to manually activate service, devices and firmware updates. Provisioning and device management can be accomplished using the wireless air interface by intercepting devices requesting authentication, and by redirecting them as required to the service signup portal or to the Open Mobile Alliance Device Management (OMA-DM) server. OMA-DM is a standards-based specification for the management of mobile devices, including firmware and software updates, device configuration, and fault management.

The Authentication, Authorization, and Accounting (AAA) function plays a central role in the WiMAX core network for OTA provisioning. Using information stored in the subscriber database, the Bridgewater® Service Controller determines whether the device can be authenticated and granted network access. Bridgewater's OTA provisioning solution is powered by knowledge of subscriber state, the ability to use this knowledge to re-direct subscribers trying to log in, and by interoperability with the OMA-DM platform.

Subscriber State

To decide whether any provisioning action or firmware update is necessary, the network has to have access to detailed, real-time information about the subscriber, which is known as "state." Subscriber state information includes:

▶ Presence: subscriber ID, connection status, IP address, network access type, QoS settings, and roaming status.

Presence information is collected by the Bridgewater OTA provisioning solution and forwarded to the OMA-DM server as required. The OMA-DM server combines this presence information with its device knowledge (model, manufacturer, firmware installed) to complete the view of subscriber state.

New-User Activation

If service activation is necessary for a new user, the Bridgewater OTA provisioning solution uses hotlining to divert subscriber traffic to the operator's service activation or top-up portal(s).

Hotlining directs subscribers that need to take a particular action, like registering or paying for a new service, before being authenticated

Subscribers can review the options available, make their selection, enter account and payment information, and start using the service immediately. The type of process used to require lengthy, often frustrating phone calls. It can now be completed online by subscribers at any time. Auto-provisioning makes service activation faster, more convenient, and transparent to subscribers while reducing the WiMAX operator's sales and support costs. ...

Device Management for Existing Users

The Bridgewater OTA provisioning solution helps OMA-DM servers manage the device lifecycle of firmware versions for all devices on a network. The OMA-DM platform registers with the OTA provisioning solution whenever a device firmware update is required. In turn, the Bridgewater OTA provisioning solution notifies the OMA-DM server when the device is connected to the network and available for updates.

How Does OTA Provisioning Work?

Provisioning a New Subscriber

When a newly purchased WiMAX device is switched on for the first time, the device attempts to establish a connection to the WiMAX network. A component of the Bridgewater OTA provisioning solution, the Bridgewater Service Controller, assigns an IP address to the device and retrieves the relevant state information from the subscriber database.

Because a new subscriber is accessing the network, the device cannot be authenticated and hotlining is used to direct the subscriber to the operator's specified portal.

The operator's portal allows the subscriber to select a service plan (e.g., monthly access, daily access, or supplementary VoIP services) and preferences and enter payment information.

Once this step is complete, subscriber presence data, including subscriber ID, IP address, and location, is known to the Bridgewater Service Controller. Thus the Bridgewater OTA provisioning solution is able to notify the OMA-DM server that the new device is configured for the network.

The OMA-DM server ensures that the newly connected device has the most up-to-date firmware and configuration settings.

Once the device configuration has been successfully downloaded and installed, the OMA-DM server sends a confirmation message to the Bridgewater Systems OTA provisioning solution that the device has been successfully activated. The subscriber is now authenticated and can start using the service.
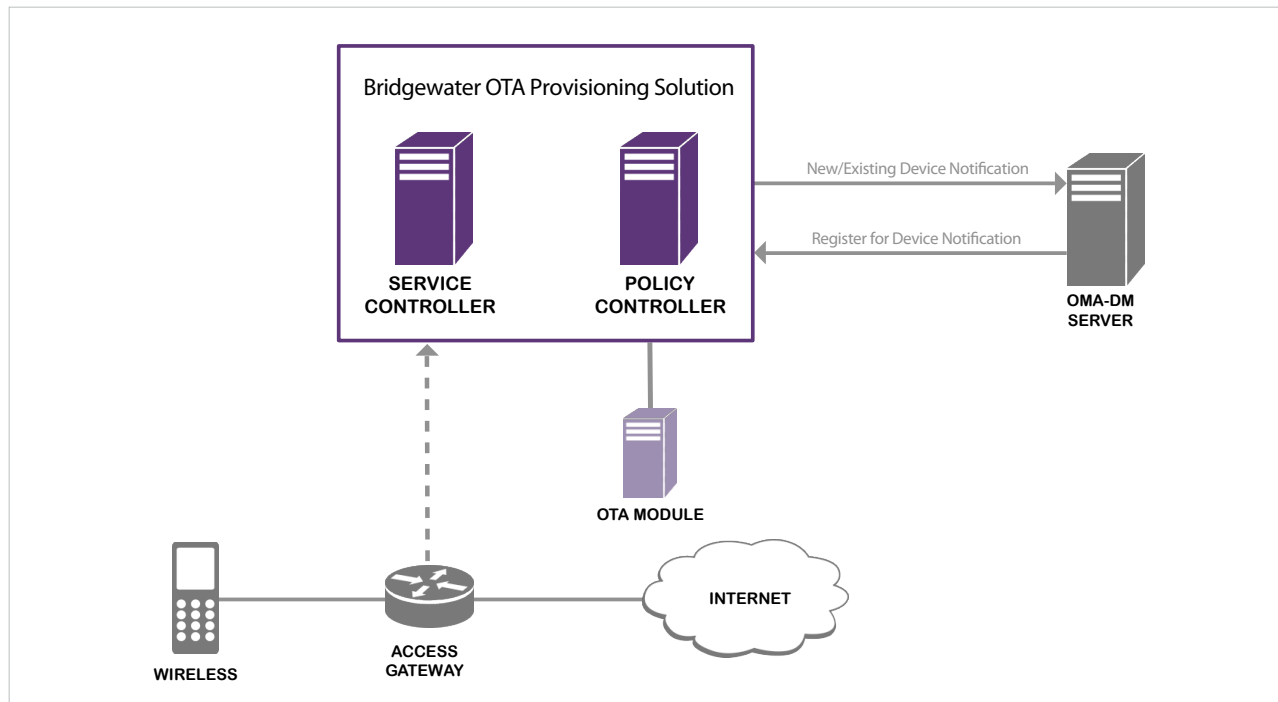
The Bridgewater OTA provisioning solution enables fast and easy activation of full-time and pay-as-you-go subscribers.

Keeping Devices Up To Date

Vendors and operators make firmware updates available as needed to address service or performance limitations, or to add functionality and support for specific applications. To ensure a timely and consistent device management system, devices must be checked against a database of available firmware updates every time they register on the network. The OMA-DM platform stores such a system-wide database that includes all firmware updates for devices supported by the operator. When the OMA-DM server determines that a device requires an update, the Bridgewater Systems solution allows the OMA-DM server to query for the IP address of the device. If the device is online, the OMA-DM server downloads the update to the device. If the device is not on the network, the OMA-DM server requests notification when the device comes online. As soon as the device establishes a connection to the network, the Bridgewater Systems OTA provisioning solution instructs the OMA-DM server to push the update to the device.

If the download and installation of the firmware is successful, the OMA-DM platform acknowledges this in a message to the AAA Service Controller. If the download or the installation does not complete successfully, the OMA-DM platform adds an error entry in its log and takes corrective action as per the parameters defined by the operator regarding the next download attempt.

Making OTA Provisioning Work: The Bridgewater Systems Solution

Bridgewater Systems brings together key elements that a WiMAX operator needs to implement a robust, cost-effective, best-of-breed OTA provisioning solution. They include:

- ▶ Real-time, subscriber state information used to determine when OTA provisioning is required.
- ▶ Hotlining, to redirect the subscriber to the service activation portal or the device management service.
- ▶ An OMA-DM Application Programming Interface (API) that enables the Bridgewater Systems OTA provisioning solution to send firmware download requests to the OMA-DM server.
- ▶ High-performance technology that scales with the size of the customer base and enhances the subscriber experience. The Bridgewater Systems OTA provisioning solution has been developed to address the unique requirements that WiMAX operators face in deploying a new technology, supporting a wide range of service options and an open device distribution and management model.

Conclusions

OTA provisioning enables WiMAX operators to provide the highest level of customer satisfaction for service activation and device management. It offers operators two distinct advantages:

- ▶ The ability to satisfy the growing demand for convenient, personalized subscriber services, and
- ▶ The opportunity to reduce operating expenses.

Bridgewater Systems, the mobile personalization company, enables service providers to efficiently manage and profit from mobile data services, content and commerce. The company's market leading mobile personalization portfolio provides a real-time, unified view of subscribers including entitlements, devices, networks, billing profiles, preferences and context. Anchored by Bridgewater's Subscriber Data Broker™, the portfolio of carrier-grade and standards-based products includes the Bridgewater® Service Controller (AAA), the Bridgewater® Policy Controller (PCRF) and the Bridgewater® Home Subscriber Server (HSS). More than 120 leading service providers including America Movil, Bell Canada, Clearwire, Hutchison Telecom, Iusacell, Scartel, SmarTone-Vodafone, Sprint, Tata Teleservices, Tatung, Telmex, Telstra, and Verizon Wireless use Bridgewater's solutions to rapidly deliver innovative mobile services to over 150 million subscribers. For more information, visit us at **www.bridgewatersystems.com.**

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