bridgewater SYSTEMS

# IMPLEMENTING MOBILITY MANAGEMENT

## INTRODUCTION

Today, network providers need more control over their networks and user access to guarantee that they meet their service level agreements (SLAs) and regulatory requirements. This application brief defines mobility management and describes how it can benefit network providers. It also covers the variety of ways that a mobility management solution could be implemented, the potential technologies involved, and the aspects of the user experience that can be affected. This application will be of interest to those responsible for network operations and deployment.

### QoS for new or congested networks

It is becoming increasingly clear that simple over-provisioning bandwidth alone cannot meet quality of service (QoS) standards and Service Providers' objectives. Instead, extending and refining policy and mobility management mechanisms will help ensure QoS when rolling out new networks like EV-DO or WiMAX or simply maintaining existing networks where market, infrastructure, or cost realities demand better performance.

### Compliance and performance for Wireless Local Loop scenarios

At the same time, there are many markets where government regulation demands that Service Providers implement fine geographic control of user access. This has been particularly true in the case of WiMAX, where rollouts of Wireless Local Loop (WLL) fixed network access must not interfere with functionality specified for 3G networks.

**SERVICE PROVIDERS NEED AN INTELLIGENT MOBILITY MANAGEMENT SOLUTION TO PROTECT THEIR NETWORKS, COMPLY WITH REGULATION, AND ENABLE NEW SERVICES.**

## WHAT IS MOBILITY MANAGEMENT?

Mobility management can include the definition of user access privileges according to one or more of the following criteria:

> **Geographical access point** — When controlled by a particular base station ID (BSID), it can define local, roaming, or other access privileges.

> **Network type** — This can specify technologies and protocols, including CDMA, GSM, UMTS, WiMAX.

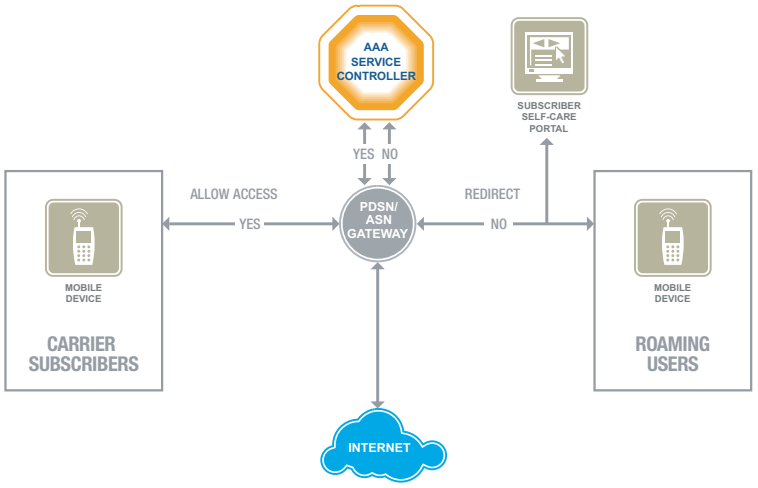
> **Congestion** — This could be defined by the congestion rate at a specific BSID or for specific applications or services.

> **Legal and regulatory** — Mobility and restricted mobility can be inhibited to meet regulatory standards for specific national and regional markets.

Mobility management solutions can restrict subscribers to a particular BSID, network access server (NAS), packet data serving node (PDSN), ASN Gateway, or even customer premises equipment (CPE) like DSL or cable modems and other uniquely identified set-top boxes. Upon initial entry, the user could be limited to a single access point or a list of specific access points, giving fine-grain control of the user's mobility options within a specific area. Mobility management solutions span fixed, mobile, and fixed-mobile networks.

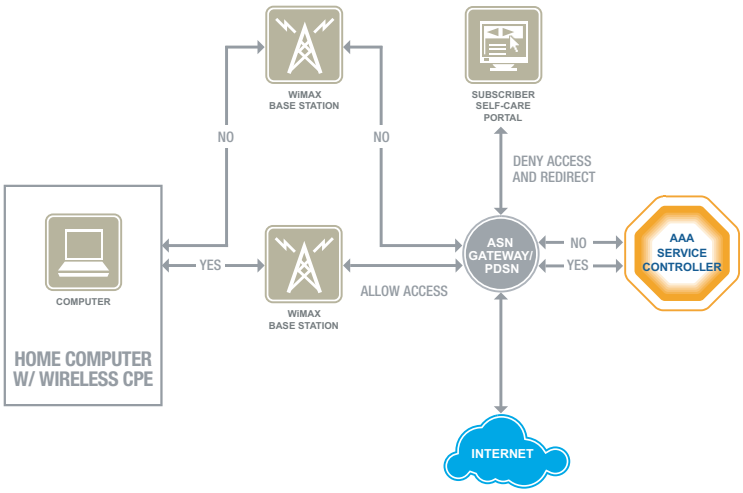
## MOBILITY MANAGEMENT IN ACTION: A NEW EV-DO OR WiMAX NETWORK

A big infrastructure investment can also involve a large risk if there is not sufficient control. A company rolling out a new EV-DO network doesn't want it to become overloaded, potentially violating its SLAs and negatively affecting key customers. By controlling user access and preventing roaming users from other networks from accessing the network, a Service Provider can ensure that a known and controlled number of users are able to access the network, ensuring predictable and manageable network performance.



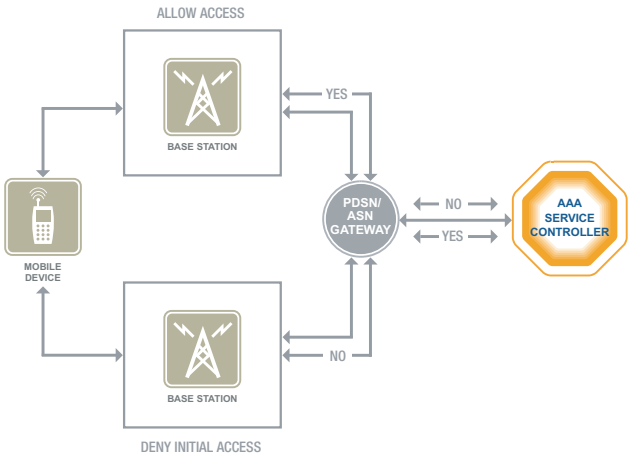

## MOBILITY MANAGEMENT IN ACTION: WIRELESS LAST LOOP WITH EV-DO OR WiMAX

Government regulation can require mobility management for new WLL networks in order not to compete with existing licenses. Bridgewater AAA Service Controller allows carriers to set central mobility management and restriction policies that ensure compliance, allowing subscribers to connect to a WiMAX network from a specified location.




## MOBILITY MANAGEMENT IN ACTION: RESTRICTED WIRELESS ACCESS

Without mobility management capability, users can connect to the network from ANY base station and transfer to other networks easily. With mobility management policies controlled centrally through the Bridgewater AAA Service Controller, wireless network providers can ensure that mobile data services are delivered only to users authorized to a specific region or network. Intelligent mobility management also creates location-based options for new revenue streams. Roaming users who try to access a network or base station that they don't have authorized access to can be forwarded to a portal that gives them service and payment options.



## MOBILITY MANAGEMENT WITH BRIDGEWATER AAA SERVICE CONTROLLER

Bridgewater has provided mobility management capabilities as part of its AAA Service Controller for more than ten years. While other AAA solutions simply regulate, Bridgewater provides a more easily integrated solution that gives a unique and complete view of the customer. This means real-time subscriber state information: how, where, and with what applications subscribers are using the network.

Service Providers implementing mobility management with Bridgewater AAA Service Controller can improve the control and management of the overall subscriber experience. This control makes it easier to:

> Meet legal and regulatory mobility restriction and service requirements.

> Increase subscriber retention with new services.

> Leverage subscriber information to generate new revenue streams and increase ARPU.

### Flexible and powerful control

Policy-based authentication and authorization controls who can access services and when access is allowed. This can be based on the service level or optimized to balance existing resources and current demand for services.

This is all the result of the Bridgewater subscriber-centric approach to policy management. The Service Provider is able to gather information on user state and control subscriber access to both networks as well as services for any device, which enables them to create highly flexible policies that can be tightly aligned to business needs, regulatory requirements, infrastructure realities, and subscriber behavior.

Additional criteria that can be used to determine service levels:

> **Subscriber device** — The type of device could be defined, allowing only capable or preferred devices to be allowed.

> **Subscriber service tier** — Could be defined simply by the service agreement (e.g., premium subscriber or prepaid) or made to interact with other factors like bandwidth and latency at the time and place of request.

> **Time** — Service could be confined to specific time periods, including hours of the day and days of the week.

## ABOUT BRIDGEWATER AAA SERVICE CONTROLLER

The Bridgewater Systems AAA Service Controller is the most proven, scalable, and robust solution of its kind — widely deployed and proven with more than 90 Service Provider customers around the globe. Built around a powerful policy and profile engine, AAA Service Controller allows Service Providers to offer and control access to advanced and differentiated services across all access types and infrastructures.

Today's increasingly complex and distributed networks and the growing subscriber bases they serve demand single-platform, multiprotocol support for the authentication, authorization, and accounting of services across all access types and infrastructures: CDMA2000 1x, EV-DO, GPRS, UMTS, WiMAX, Wi-Fi, Dial, DSL, and Cable. AAA Service Controller provides a modular solution that allows operators to add functionality as they add access networks.

### Proven results

Implementing the Bridgewater AAA Service Controller has been proven to deliver a three-fold performance improvement over the competition.

> Demonstrated scalability in networks from 5,000 to more than 69 million provisioned subscribers and the capability to process more than 21,000 authentications per second.

> Centralizes management and simplifies policy and profile administration, reducing administration costs by as much as 40%.

> Scales vertically, supporting higher transaction rates from a single platform, which simplifies management, lowers costs, and minimizes space usage, lowering the total cost of ownership.

## THE ADVANTAGES OF MOBILITY MANAGEMENT

### Protect the network

The deployment of policy tools is often driven by carriers' need to ensure the reliability of their network, ensuring that they meet their SLAs, even in the face of rapidly growing user bases in developing markets.

### Ensure regulatory compliance

Wireless providers must ensure that they meet regulation that may require full and partial restrictions on mobility and network handovers on a regional or national basis.

### Increase revenue

Mobility management enables new revenue opportunities to increase carriers' average revenue per user (ARPU). Location-related levels of service, home regions, favored countries or cities, and new value-added services can all contribute to a network provider's bottom line.

### Manage the user experience

Network providers with mobility management capabilities have a greater ability to understand subscriber behavior and improve network reporting, allowing them to research service needs before problems arise.

> Established interoperability saves testing and installation time and reduces time to market (typically 3 weeks).

> Delivering consistent results for more than 10 years and installed in more than 90 Service Provider networks worldwide, including those of Verizon Wireless, Sprint, SmartTone-Vodafone, Bell Mobility, and Virgin Mobile USA.

### Expanded features

> Unique Bridgewater **prepaid billing** capabilities integrate with a wide range of prepaid data billing systems and network equipment that Service Providers already have in place. The offering also integrates with applications such as multimedia messaging services (MMS), eliminating the need for application or network upgrades and protecting Service Providers' current investments.

> **Hotlining** allows those accessing the network to be redirected according to defined criteria, including whether prepaid customers still have credit in their account, fraud, and network overuse. Redirection in such cases to a payment portal or self-service portal creates a more continuous and helpful user experience and helps ensure revenue streams through customer satisfaction.

> **Accounting mediation** capabilities provide reliable and scalable transfer, storage, and formatting of critical accounting data. Accounting data is used for billing, usage tracking, and trend analysis for network planning and service roll-out.

> RADIUS-based **IP Address Management** allows addresses to be allocated from predetermined subscriber address pools and filtered based on any incoming attribute, to deliver centralized, policy-based address management. This can reduce service activation costs and deliver faster activation and recovery from network failures.

### Simplified network implementation

The Bridgewater solution offers a one-stop approach to configuring, integrating seamlessly alone as well as with other vendors' products. The complete Bridgewater portfolio features network access control; entitlement control products to manage subscriber access to applications and network resources; accounting mediation support products; and robust subscriber management via a centralized policy and profile repository solution.

> Multi-vendor support.

> Multi-network support, allowing Service Providers to offer new networks, like WiMAX, in conjunction with existing wireless or wireline networks.

> System easily scales up and down, allowing Service Providers to adapt to changing situations.

> Customers can incrementally deploy the functionality they need.

### A solution for today and tomorrow

AAA Service Controller enables Service Providers to address their most pressing operational and business requirements and take full advantage of new and emerging opportunities.

Today, Service Providers cite integrating with legacy OSS/BSS as one of their biggest challenges for deploying policy control measures, a challenge that becomes more serious as the deployment cycle progresses. Bridgewater's intelligent policy management solution and approach to compatibility help alleviate complex standards and interoperability issues.

Future network convergence will push AAA servers to their limits as Service Providers strive to provide a consistent subscriber experience across multiple access technologies. Bridgewater solutions are technology and network-agnostic, allowing them to handle multiple authentication, network, and protocol schemes. For example, Bridgewater AAA Service Controller offers dual-stack (RADIUS and Diameter) support, allowing Service Providers to migrate to IMS by supporting existing and new applications with a future-proof solution. This compatibility enables seamless network convergence, including fixed-mobile convergence, which is a crucial strategic issue across the industry.

## ABOUT BRIDGEWATER SYSTEMS

Bridgewater Systems develops the industry's most advanced subscriber-centric policy management software for fixed, mobile, and converged networks.

Its solutions help global Service Providers launch new services faster and maximize profits by creating a subscriber-centric policy decision point to control and monetize the dynamic subscriber interaction with IP-based services. Vendor-neutral and access-network agnostic, Bridgewater Systems' comprehensive policy management portfolio features network access control products, including authentication, authorization, and accounting (AAA) and dynamic host configuration protocol (DHCP) systems; entitlement control products to manage subscriber access to applications and network resources; and robust subscriber management via a centralized policy and profile repository solution. Bridgewater Systems' proven carrier-class products help Service Providers enrich the subscriber experience and enable extensive revenue capture capabilities and out-of-the-box value that can be deployed in weeks — instead of months.

More than 90 leading Service Providers around the globe, including Verizon Wireless, Sprint, Bell Mobility, and Virgin Mobile USA, trust Bridgewater's technology and business insight to help them deliver world-class services.

Founded in 1997, Bridgewater Systems is a privately held company.



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