

CASE STUDY

IP ADDRESS MANAGEMENT WITH BRIDGEWATER AAA SERVICE CONTROLLER

THE REGIONAL BUSINESS UNIT OF A LEADING INTERNATIONAL TELECOMMUNICATIONS COMPANY IS ABLE TO QUICKLY LAUNCH NEW IP-BASED DATA SERVICES IN ONE OF ITS MOST COMPETITIVE MARKETS WITH A SOLUTION THAT PROVIDES THE SCALABILITY AND PERFORMANCE FOR FUTURE GROWTH.

CUSTOMER PROFILE

A regional business unit of a tier-1 multinational telecommunications company operates in one of the most competitive mobile markets in the Asia-Pacific region. The government encourages competition, and market features like mobile number portability prevent any single mobile operator from dominating the market. With a high adoption rate for new technologies and services, the market has consistently been strategically important as a vital testing ground for the introduction of both.

The company was one of the first to launch mobile telecommunications networks in the region, and over the last 20 years has built one of the region's largest and most successful 2G mobile networks. The company also launched the market's first 3G network, which rapidly expanded to reach over 99% of the territory. Today, with over two million combined customers, the company is a leading telecommunications business and the number one provider of 3G services in the market.

USING AAA SERVICE CONTROLLER FROM BRIDGEWATER, A KEY REGIONAL SUBSIDIARY OF A TIER-ONE TELECOMMUNICATIONS COMPANY WAS ABLE TO QUICKLY ROLL OUT A HIGH-PERFORMANCE IP ADDRESS MANAGEMENT SOLUTION.

A NEW BUSINESS OPPORTUNITY

In a highly competitive market, differentiation is crucial. The ability to deliver reliable and innovative new services, like 3G, to the entire market is important to customers and critical to the success of the regional business.

THE CHALLENGE

The success of this opportunity hinged on the capability to associate corporate users with a particular application. These applications required special treatment, as there were latency- and performance-sensitive or high transaction systems, such as trading (commodities, stocks, and currency) or streaming video.

The service could be launched using the existing GSM/UMTS network with the ability to exercise a choice of Access Point Name (APN) when a user's application context was established. Once corporate customer traffic was separated by APN, it would be associated with either a fixed or a dynamic internet protocol (IP) address. Fixed IP addresses were required for certain applications that traversed a virtual private network (VPN) tunnel to the target server. This approach allowed the company to secure transactions across the IP network and ensure quality of service through mechanisms like TCP rate limiting. IP addresses needed to be allocated from defined pools with an intelligent and rules-based ability to map the chain from the subscriber, to APN, to global GPRS support node (GGSN), to the required application.

The company's operations team had already implemented a AAA solution, which was used primarily for RADIUS accounting functions within the GSM/UMTS network. In addition, there was a requirement for the final system to stream accounting records associated with corporate user sessions both to the internal billing system and through deep packet inspection (DPI) filters through a centralized configuration management application.

In its current configuration, the incumbent solution could not effectively support RADIUS allocation of IP addresses. It was technically possible to adapt this AAA solution, but a feasibility review found that this would require significant development resources and take far too long. This was a key market segment and the company needed to be able to move fast with this new competitive differentiator.

Wanted: An IP address management solution that could:

- > Provide intelligent, rules-based mapping of corporate organizational groups, including the MSISDN (Mobile Subscriber ISDN number) and IMSI (International Mobile Subscriber Identity) of associated subscribers to IP addresses and APNs to facilitate application access.
- > Integrate with the existing business processes and technology infrastructure.
- > Deploy in weeks — to capitalize on the market opportunity.
- > Provide flexibility, to address evolving requirements.
- > Stream session accounting records to multiple destinations.

OPTIONS FOR IP ADDRESS MANAGEMENT

For the company to roll out this new service on a new system, it was necessary to find a fast and efficient system that could handle IP address management on a GSM/UMTS network. Subscriber IP address allocation is important in GSM/UMTS networks as it allows for the establishment of an end-to-end network path between the subscriber on the radio network and network services and applications on the operator's and partner's IP networks.

3GPP standards define three ways for GSM/UMTS network operators to associate static or dynamic IP addresses with mobile subscribers.

DHCP IP address requests

The GGSN can use Dynamic Host Configuration Protocol (DHCP) to request addresses from DHCP servers on behalf of mobile stations. Unfortunately for many GSM/UMTS operators, the DHCP 4-stage request/response process for address assignment has proven too time-consuming under the peak loads that are common on consumer mobile networks. The quality of experience (QoE) often suffers, with subscribers experiencing unacceptable delays as they attempt to access the wireless network. The issue is further compounded on GSM/UMTS networks, where, after initial network access, new IP addresses can be required on a per-session basis for each application.

GGSN-assigned IP address pools

An alternative method for mobile IP address allocation is for each GGSN to maintain a locally administered pool of IP addresses for the subscribers it serves. The primary role of the GGSN is to provide translation between the air interface on the radio network and the LAN/WAN interface on the IP network. Still, as described in the 3GPP standards, most GGSN manufacturers provide a basic IP address management functionality, allowing the network provider to avoid the longer DHCP address request/response sequence. However, locally administered address pools have their own limitations. Since IP assignment is decentralized, large networks quickly become very complex, and having no single network-wide view of the operator's IP address space leads to higher operational and administration costs. Customer service can also suffer, as customer care efforts are slowed by the complexity of the system, and the address allocation functionality of GGSNs is often too limited to accommodate more complex profile and rules-based IP address allocation scenarios.

Radius IP address allocation

In most implementations, both DHCP address assignment and basic GGSN address assignment lack the ability to make address allocations based on knowledge of subscribers and their entitlements, session state, or available network services. If the RADIUS server has the speed and capabilities, this option can give operators the ability to implement intelligent, state-aware, rules-based address management, which allows them to govern access to discrete service levels and next-generation applications.

THE BRIDGEWATER SYSTEMS SOLUTION

At the core of Bridgewater's IP Address Management Solution is the AAA Service Controller, which provided a platform to enable the delivery of the advanced services the company needed quickly — within a matter of weeks. It allocates IP addresses according to the RADIUS server model and the company could be assured that subscribers were being reliably associated with a valid address from the appropriate address pool both on initial network access and during their session, as applications were requested. The AAA Service Controller's graphical user interface was used to model corporate users against predefined IP address pools and their associated APNs, which were in turn associated with a particular GGSN. (Refer to figure 1.)

Carrier-grade performance

As the company was evolving the network to provide new IP-based services, there was a need for a carrier-class approach to allocating IP addresses that provided the scalability and performance to support the company's growth.

A key component of the solution is the carrier-grade Bridgewater AAA Service Controller, which is 3GPP compliant for intelligently delivering IP addresses and provides robust RADIUS functionality to meet the scalability, performance, and load demands of major wireless operators around the world.

Through the AAA Service Controller, the dynamic assignment of IP addresses can be accomplished with very little latency — scaling up to thousands of addresses per second — compared with traditional IP address management schemes. This improves both the overall scalability of the network and the subscriber quality of experience in using the network by giving them access to the network and applications faster and more efficiently.

Modeling users, resources, and applications

The Bridgewater IP Address Management solution provides a centralized view of all subscriber profiles, including IP addresses across physical and logical network boundaries, enabling highly flexible management of the allocation process. The solution supports a tight integration with other third-party equipment vendors and applications, allowing companies to maintain existing billing and business procedures despite the change in how IP addresses are allocated throughout the network.

A common state repository allows Service Providers to optimize the allocation of the number of available IP addresses in real time by linking the subscriber network state to a subscriber profile. Because IP addresses are returned to the pool as soon as a subscriber leaves the network rather than through lease expiration, the network operator can ensure that the maximum number of IP addresses is available to meet its corporate customer needs. This state persistence allows for flexible policy-based IP address allocation decisions to be implemented in the network, improving

subscriber service activation response. In addition, the company is able to centrally manage how multiple IP address pools are allocated, providing a flexible approach to meeting service commitments with dedicated pools for corporate customers.

The Bridgewater advantage

The company was able to quickly launch large-scale IP-based services with the help of the Bridgewater Systems IP Address Management solution to capitalize on an emerging revenue opportunity. The scalable AAA Service Controller provides intelligent, rules-based mapping of corporate user IP addresses to premium applications via APNs and associated GGSNs.

Like all Bridgewater solutions, the AAA Service Controller integrates with existing technology standards, business processes, and network infrastructure. In addition, the Bridgewater solution uniquely provides real-time awareness of subscriber session state information, which can be used for a diverse range of state-dependent applications, opening up new revenue opportunities like IP Address Management today, and completely new services in the future.

IP ADDRESS MANAGEMENT WITH BRIDGEWATER SYSTEMS AAA SERVICE CONTROLLER

The Bridgewater Systems AAA Service Controller is compliant with the 3GPP TS 29.061 V7.4.0 (2007-06) standard with the ability to deliver both “Framed-IP-Address” and “Framed-IP-Netmask” as part of a RADIUS “Access-Accept” message to the GGSN on behalf of the mobile station.

The Bridgewater Systems IP Address Management solution offers a number of competitive advantages that make it a compelling option for GSM/UMTS network operators, helping them safeguard the subscriber’s QoE.

- > Rapid IP address assignment – the Bridgewater solution scales to thousands of transaction per second, with each individual address transaction executing in milliseconds.
- > Centralized, automated IP address management – gives operators a single view of IP addressing across logical and physical network boundaries.
- > Rules-based IP address management – Operators can use a powerful rules engine to make intelligent address assignments based on service level, roaming profile or other subscriber attributes.
- > State awareness – centralized awareness of all subscriber sessions in progress across all GGSNs, allowing the ability to track network information such as IMSI/MSISDN to IP address mapping and the charging ID that the subscriber is currently using and the network the subscriber is currently connected to.
- > Higher address availability – state awareness also allows for efficient return of addresses to the pool immediately upon the termination of the subscriber’s session, rather than after the elapsed time specified in a DHCP lease.

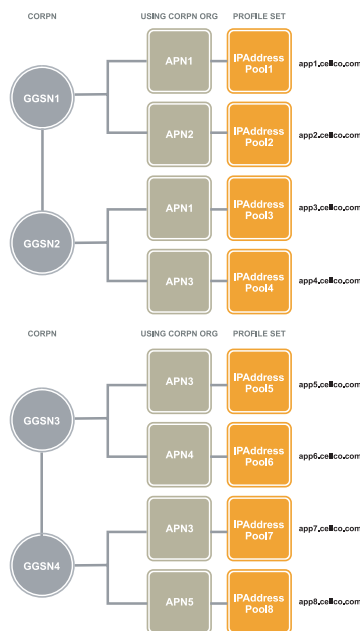


FIGURE 1: Complex relationship between networks, applications, and corporate subscribers. Based on policy capabilities of the AAA Service Controller, it applies rules against these relationships to allocate the appropriate IP address (on a per tool basis).

BRIDGEWATER SYSTEMS

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