

## TURNING SUBSCRIBER STATE INTO PROFIT

- Deliver the *right* subscriber experience
- Deliver the *right* services more successfully
- Increase ARPU, lower churn

## INTRODUCTION

For network subscribers — who, with new technologies in handsets and readily available content and applications, expect to enjoy high-value multimedia applications regardless of the network or device they use — experience is everything.

Expectations are high and subscriber loyalty is fleeting, so providing the best possible user experience demands that Service Providers completely understand what is going on in their networks, and what subscribers are doing — or trying to do. To effectively manage the subscriber experience, Service Providers must be on top of network resources as they relate to subscriber demand. This awareness allows Service Providers to plan more successfully for the launch of new applications and technology on the network. To gain this awareness Service Providers need to be able to track how the subscribers are using the network and what applications and services the subscriber is requesting in real time. This real-time subscriber awareness or context is known as *state*.

This paper defines state information and describes how to use it in the most effective and profitable manner. Service Provider marketing and business managers can use the information to help plan for future network evolution and employ best practices to implement new services.

## WHAT IS STATE INFORMATION?

State information identifies and defines network sessions, which are tied to subscribers. It includes:

- > Information about the **network**, such as the IP address that the subscriber is currently using and what network the subscriber is currently connected to.
- > **Device** information, such as the device being used and the version of software, which enables multimedia applications to optimize the quality of the delivered content and services based on device.
- > Information about the **subscriber**, including location, if the subscriber is roaming, and services being used or requested.
- > **Unique** state information — that is, state information that is provided by the network but not necessarily covered by current standards. This unique data can be used in many ways based on Service Provider-specific architectures.

With a comprehensive awareness of how, where, and with what applications subscribers are using the network in real time, Service Providers can better control and manage the subscriber experience. By providing that awareness information to applications, content, and services, Service Providers can improve subscriber retention, drive new revenue streams, and increase average revenue per user (ARPU).

## Why Subscriber-Centric Policy Management

State information is a key enabling element for subscriber-centric policy management, which allows operators to create an intelligent decision point in the network to manage subscriber access to networks, applications, and resources. Subscriber-centric policy management provides the foundation for rapid deployment, management, and monetization of IP services. It enables support for service creation and business models such as retail, wholesale, mobile virtual network operator (MVNO), and partnerships with third-party application providers — important capabilities for Service Providers vying for an increased share of the subscriber data services spend in today's highly competitive market.

## How It Works

Subscriber-centric solutions pull key subscriber information — static profile details related to entitlements, dynamic real-time state information, and subscriber history (both static and dynamic) — to build a unified view of the subscriber in real time.

As a result, Service Providers can create highly flexible policies tightly aligned to business needs and subscriber entitlements, which helps improve subscriber retention and increase ARPU.

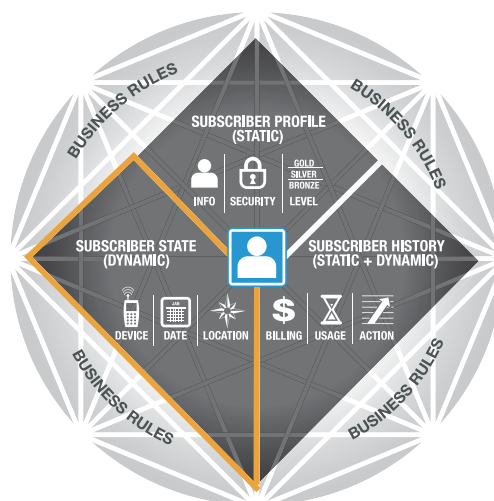
## WHAT IS SUBSCRIBER STATE?

**Determines what the subscriber is doing at a specific moment**

- > Is he on the network?
- > Which network is he using?
- > What is he doing — which application?
- > Which device?
- > Is he roaming?
- > Time of day, day of week data

### Business Value

- > Enrich the application experience
- > Create new services based on subscriber state
- > Prevent fraud



## NETWORK INFORMATION

### IP Address

When a wireline or wireless subscriber requests an application — say, `bridgewater.com` — the proxy or application server (managing the access) sees only an IP address requesting a URL. That proxy server has no information about the actual identity of the subscriber requesting access. Network state information tells the internet proxy which subscriber is using that IP address for that session — an extremely important piece of information for the Service Provider to bill for usage. For Service Providers, knowledge of the subscriber associated with an IP address is critical for billing, personalization, and facilitating optimal application use.

### Network Access Type

Certain applications work well only on specific network types. For example, if a subscriber wants to use a multimedia application that requires a lot of bandwidth and the transmission of a large file, it would be best not to attempt to serve it over a wireless network. The ability to understand exactly where and how the subscriber is accessing the network is paramount, particularly in a converged network where many device and network types interact. This understanding will enable the delivery of the right application, in the right format, on the right network, resulting in an improved subscriber experience, decreased churn, and increased new application uptake.

### Quality of Experience

If the application server is aware of the current quality of service (QoS) setting that a subscriber has been assigned — based on profile, preferences, etc. — it can make a decision on how and if it wants to deliver the content.

For example, if a bronze-level subscriber (a profile that may offer relatively low QoS) requests a streaming video, the application server may be aware enough to know that if it serves the content with a low QoS level, then the subscriber is likely to get slow delivery, resulting in a bad user experience. In that case, it might be better to redirect the subscriber to a portal that advises him to upgrade his tier of service before requesting the application, rather than trying to stream it down to a low-bandwidth QoS.

## DEVICE DETECTION

For many multimedia applications to offer subscribers an optimal experience, they need to know two types of information about the device:

- > The type of device being used.
- > The version of client software on the device.

This device state information is critical for content and application transcoding and optimization. For instance, if the application is sending images, then the application needs to know how to transcode that media so that it is appropriate for the subject device's screen size, pixel size, etc. Knowing device state information enables applications to make decisions about media delivery, ensuring that the most appropriate media is delivered to the current device.

For example, a subscriber can type in any URL on a cell phone. If she types in the URL for a video teleconferencing application, the Service Provider likely does not want to deliver that service to a cell phone; however, if she connects with a laptop, the Service Provider may want to give her that service.

Currently the application gets the device state information through actual session information or by caching it via RADIUS accounting. The challenge this presents is that application servers deal with many performance issues, and when they try to collect and store device state information in their own individual repositories it results in a greater performance hit on them. It makes much more sense to have this state information stored in a central location.

## SUBSCRIBER STATUS

All of the state information described above is actually subscriber state information — that is, information about the state of the subscriber's interaction with the network, applications, and devices. However, there are also a couple of areas that are specific to the subscriber rather than the subscriber's interaction with the network. They include:

- > The subscriber's roaming status.
- > The services the subscriber is currently using or requesting.

## Current Subscriber Status

State information also enables Service Providers to understand what services the subscriber is currently using or requesting. This information is not as beneficial to application servers, but very useful to Service Providers for trending information, historical tracking, and planning. For example, if a Service Provider launches a new video streaming application and statistics show that this application is used mostly during major sports events (Super Bowl, World Cup Soccer, etc.), then the Service Provider may want to launch similar services with unique event-based billing to maximize revenue.

## UNIQUE STATE INFORMATION

A comprehensive session state management solution can track, store, and make available any session state information that the network provides, even if the capture of that information is not covered by current standards. The session represents the most granular look at subscriber actions and identifies every action that the subscriber engages in on the network. If a network element provides unique state information, it can be tracked, which opens the door to many unique and customizable uses for such information and allows Service Providers to expand and tailor their own business rules and definitions.

Actions that are typically captured can be tied to session information, which enables unique business rules and planning. For example:

- > Service Providers might track a subscriber's unique billing ID and relate that ID to session activity, enabling granular and unique billing scenarios.
- > Location-based subscriber information is valuable for location-specific applications, such as weather, time-based applications, restaurant locators, and mapping applications. It is also vital for location-based offers, enabling the Service Provider to test regional market demand for new applications, create a "sticky" subscriber experience, and capture incremental revenues in real time.
- > Centralized location information also allows the Service Provider to optimize the subscriber experience both on the network and while the subscriber is roaming. Originating SGSN Address

## STATE-DRIVEN SERVICE EXAMPLES

STATE INFORMATION	ENABLED SERVICES
IP Address	Application- and content-based billing.
Access Type	Access-specific multimedia content delivery (the right application, in the right format, on the right network).
Device Type	Weather, locators, mapping, regional offers, etc.
Subscriber Activity	Parental controls, historical tracking and trending, service upgrade offers, etc.
Time (of day, of week, of year)	Seasonal offers, promotional offers, birthday offers, limited-time event offers, etc. For example, free plays of online soccer game during World Cup.

identifies a roaming subscriber on a GSM network. This ability provides options that the Service Provider can implement to optimize the network and reduce the cost of roaming for the subscriber.

## SINGLE, CENTRALIZED VIEW

In many networks today, all application servers track and store state data. However, there are several points in the network that require elements of this information to successfully enable a solid user experience. On the other hand, by maintaining state information in a central location Service Providers have a single point that lets them understand what's going on in the network at any given moment. Centrally stored state information gives all application servers a single point from which to retrieve that information, eases integration of new technologies, and makes state information available to all existing servers along with any servers or applications that may be implemented in the future.

## TURNING STATE INTO PROFIT

Offering the best user experience possible translates to lower churn and increased ARPU. Increasing business agility (the ability to respond quickly) means accelerated time to market and lower operational and support costs. The intelligent use of state information makes this possible. Firm control of their network and a good understanding of subscriber context enables Service Providers to extend that understanding out to applications to ensure a high-quality user experience, better insight into user trends, and a comprehensive view for policy and access controls.

The ability to dynamically manage subscribers' experiences while allowing them control and choice over certain aspects of the available experiences enables Service Providers to:

- > Offer new applications and content to increase ARPU.
- > Enable network control to ensure a quality subscriber experience.
- > Provide a managed and maximized subscriber experience to reduce subscriber churn.

## 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 80 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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