An Oracle White Paper
December 2013

Policy on the Mobile:
New Use Cases that Optimize Devices for the Network and Generate Revenue
Introduction

Mobile operators can use an approach that integrates Oracle’s Tekelec Mobile Policy Gateway and Policy Server to intelligently orchestrate the subscriber experience around network, subscriber, device, and application awareness.

If policy can treat the mobile device including smartphones, tablets, and machines as both an enforcement point and an application function, it then becomes possible for operators to develop many new use cases, such as

- Network congestion management
- Application firewalling and security
- Application traffic scheduling and management
- Service continuity
- Battery life preservation
- Chargeable services and mobile payments
- Targeted mobile advertising
- Customer self-care

These use cases can help operators move along a continuum focused on cost reduction and network protection as well as more-advanced offerings that directly generate revenue and enhance customer experience.
That evolution is particularly important given the mobile-social nature of today’s subscribers and the intricate relationships surrounding each subscriber, as individuals and as members of social networks. Both negative and positive experiences resonate more quickly and more loudly than ever before. Mobile operators must therefore address those issues that disassociate their brands from what is becoming an increasingly intimate and positive mobile experience. This white paper presents eight use cases that go beyond basic signaling scenarios to enrich subscriber interactions with their devices and enable operators to more intelligently manage network resources, applications, and devices.
Low Subscriber Ratings Challenge Mobile Operators

While smartphone users have an increasingly positive perception of mobile device manufacturers like Apple and Google in surveys done by J.D. Power and Associates and others, their satisfaction with mobile operators has declined enough that operators sit among the lowest-rated service providers in Consumer Reports and other consumer-oriented ratings.

Subscribers have an increasingly positive perception of their smartphones’ operating systems, applications, processing speeds, and video/camera quality, and yet an increasingly negative perception of their network performance, data download speeds, and customer service.

Part of the problem is that misbehaving smartphone applications can cause serious network issues that affect both the radio access and core networks. Another problem has been the imprecise execution of congestion-mitigation strategies. As a result, operators are forced to design networks for peak usage and network underutilization a majority of the time.

Also, some negative customer experience, ironically, links to the strides operators have made in improving network speed and performance. For example, increasing 3G and Long Term Evolution (LTE) speeds have led to instances of bill shock, as people got hooked on online games or streaming videos without realizing how much traffic they consumed. And, performance differences have become more marked as users moved from LTE to 3G coverage.

Well founded or not, the impact on mobile operator brands—and more importantly, future revenues—will be hard to ignore as operators approach what Chetan Sharma has called the “fourth revenue wave” in his paper, Operator’s Dilemma (And Opportunity): The 4th Wave. There, he speaks to the link between future digital lifestyle revenues and a positive customer experience as operators ride out the first three revenue waves of voice, messaging, and data access.

Because of the increasingly enmeshed relationship subscribers have with their devices, there will be more scrutiny by subscribers, who will grow less tolerant of problems like short battery life, SMS spam, weak connections, compromised network performance, bill shock, phone locks, or data caps.

Subscribers will increasingly demand the “ideal” of solid voice connections, ever-faster data speeds, and world-class customer service. The closer operators come to that ideal, the more likely customers will be loyal and purchase future services.

1 J.D. Power and Associates 2013 U.S. Wireless Smartphone Satisfaction Study, Volume 1
2 Consumer Reports 2012 Service Provider Ratings
Marching Toward the Ideal with Policy as the Innovation Engine

As operators transform from where they are toward roles as “digital lifestyle providers,” they have to make decisions about what underlying network and management technologies they need, and what they can retool. They need to ensure that they open their networks as needed to leverage social media, entertainment, rewards programs, mobile advertising, and mobile commerce partners that will help drive innovation.

Because digital lifestyle services will have to be more personalized and dynamic, we believe that existing strategy around policy can be expanded so that innovation comes faster and without a huge cost. If policy’s role is further elevated from monthly quota and fair-use management to boundaries beyond the core network to policy everywhere—as shown in Figure 1—it can become the innovation engine for future services.

![Figure 1. Policy everywhere: Policy moves directly to applications and devices as endpoints.](image)

Policy will extend to subscriber devices, machine-to-machine (M2M) devices, cloud providers, and service delivery and over-the-top (OTT) provider platforms. As that happens, the number of policy enforcement points will mushroom, and policy will have to become centrally defined within an intelligent control layer—one that is independent of the underlying network infrastructure.

When policy is applied globally across networks, devices, and applications, operators will have the intelligence to orchestrate the subscriber experience more effectively.
The Smart Approach: An Integrated Mobile Policy Gateway

If policy is taken directly to the device through a management interface that is turnkey and inexpensive, operators can immediately begin to improve network, device, and application performance and create new services.

The 3GPP’s Access Network Discovery and Selection Function (ANDSF), a new standard that enables Wi-Fi offload, is a solid first step, but it currently stops far too short of the goal.

In order to immediately address the issues currently clouding the customer experience, operators need to infuse the best of what the ANDSF offers with the time-to-market advantages of a commercial-off-the-shelf (COTS) solution.

Rather than rely solely on the still-nascent ANDSF, operators need a unified policy creation environment through which real-time dynamic policy enforcement can be extended to devices. It is within such an environment that operators could also expand the capabilities of Wi-Fi offload use cases and invite altogether new use cases.

The goal is to simplify management by using existing policy provisioning and management interfaces and tools. If operators can create network and device policies from the same platform, they can reduce the chance of policy conflict and increase the scalability and flexibility of their existing policy servers with a Policy and Charging Rules Function (PCRF) and the Diameter signaling routers (DSRs), which route signaling messages to these servers.

As shown in Figure 2, a mobile policy gateway (MPG) addresses these goals by extending the reach of policy to the devices themselves. The MPG enables operators to directly link their policy servers and end-user devices over a Diameter interface, enabling the two devices to interoperate and act as an integrated policy solution.
This holistic framework is the basis of Oracle’s policy solution, with Oracle’s Tekelec Policy Server and Mobile Policy Gateway combining so that policy treats the device as both an enforcement point and an application function, giving mobile operators the ability to enforce policy wherever needed.

Within Oracle’s policy solution, Mobile Policy Gateway also complements existing technologies, such as deep packet inspection (DPI), filling in the gaps in policy coverage. A DPI, for example, cannot identify all applications, especially if data is encrypted. With Mobile Policy Gateway, operators evolve from a policy architecture covering just the network to one where they gain end-to-end control over the entire application flow.

Using Mobile Policy Gateway where needed fosters a policy everywhere environment, where policy moves beyond the network to reach applications and devices as endpoints. Once operators connect those endpoints, they have the management and control to maximize the scope and impact of their policies. These enhanced policies enable operators to create new and innovative service offerings through a series of use cases that transcend congestion management and Wi-Fi offload, as shown in Figure 3.
Evolution of Use Cases: From Cost Reduction to Revenue Generation and Customer Loyalty

The primary value of Mobile Policy Gateway for operators is in both enabling new use cases and in evolving existing use cases so that they can move on the continuum from mainly cost-reduction measures toward areas of network, device, and application management—all of which enhance customer loyalties and revenues.

Use Case 1: Network Congestion Management

**Challenge:** Operators need to design their networks for peak usage rates at high costs, leaving their networks underutilized most of the time.

**Solution:** Add intelligence to existing congestion management solutions by involving the mobile device in congestion mitigation policies.

**Details:** Extending policy to the device allows operators to improve both the power and precision of congestion-mitigation actions.
The ANDSF was introduced to address one specific aspect of congestion management—offload of cellular traffic to Wi-Fi networks. It represents an important first step in extending congestion management policies to the device, but it has two fundamental shortcomings:

1. The ANDSF only allows for static policies. Without connectivity to the Diameter signaling network, the ANDSF cannot implement the types of dynamic, real-time policies that the policy server can provide.

2. The ANDSF is limited to Wi-Fi offload use cases. Other types of congestion management policies are out of scope.

Mobile Policy Gateway addresses both of these shortcomings by integrating directly with the policy server to extend dynamic policies to the mobile device. In addition, Mobile Policy Gateway provides a single management interface that lets operators write comprehensive policies, which can include both core network and mobile device interactions. These policies give operators exceptional flexibility in implementing congestion mitigation use cases such as

- **Smart Wi-Fi offload** that goes beyond what is possible with stock ANDSF use cases. Examples include
  - **Subscriber profile**: tier (gold versus silver); subscriber type (enterprise versus consumer); device type (smartphone versus machine)
  - **Quota status**: offload ‘out-of-credit’ subscribers to Wi-Fi
  - **Application events**: offload OTT videos or content detected by Traffic Detection Functions (TDFs)—for example, content filters, content delivery networks, and caches
  - **Device conditions**: offload based on radio signal strength or GPS location
- Application time and place shifting offers incentives to subscribers to shift usage of high-bandwidth applications to off-peak time periods or locations. Time shifting requests that subscribers delay running an application for a specified amount of time. Place shifting requests that subscribers only run applications inside a certain area. This area can be inclusive (for example, only run the application within your home zone) or exclusive (for example, do not run the application in a congested urban area). The mobile client can be configured to either automatically restart the application or to notify the subscriber to do so once the shift criteria are met. Operators can implement these use cases to reduce network congestion or can offer time or shift placing as a service to third-party application providers that want to address application server congestion.

Use Case 2: Application Firewalling and Security

**Challenge:** Misbehaving applications running on today’s smartphones can negatively affect radio and core network performance and customer loyalty.

**Solution:** Give operators fine-grained control over throttling or blocking device traffic.

**Details:** Application firewalling allows operators to implement policies that quickly react to misbehaving applications. Mobile Policy Gateway can instruct the application firewall to selectively...
throttle or block application traffic by criteria such as time, location, port, or device. Operators can proactively implement policies that detect and throttle misbehaving applications. In addition, if an unforeseen problem occurs, operators are able to rapidly deploy policies to throttle or shut down such applications.

This gives operators an effective stopgap solution until the application providers can push out a fix.

Use Case 3: Application Traffic Scheduling and Management

**Challenge:** Traffic generated by devices and machines that run automated applications have the ability to overwhelm network resources if not scheduled correctly.

**Solution:** Create dynamic traffic scheduling policies that direct automated applications when to utilize the network based on either preconfigured or dynamic network utilization information.

**Details:** Smartphones with background applications pulling data from the cloud, or M2M appliances that push data to centralized collection points, can create a deluge of new data traffic. The rapid growth in devices on the network combined with lower per-device revenues for many M2M devices will compel operators to manage their networks in a more sophisticated manner. They will want to control when and how traffic is generated by automated applications.

To do so in the past, operators had to rely on core network technologies such as DPI to manage application traffic in their networks. While that approach has had some success, it is ultimately constrained by the limited visibility that DPI technology has into the application space. Mobile Policy Gateway will allow operators to break through this constraint by giving policy the ability to manage application traffic on the device, providing direct access to the application endpoint.

Mobile Policy Gateway can talk directly to clients on embedded devices to ensure that traffic from these devices does not affect higher-value network traffic. Mobile Policy Gateway can intelligently configure devices based on many parameters, such as device type, deployment location, and traffic characteristics. For example, it can configure devices that send “bursty” traffic (such as smart utility meters or environmental monitors) to evenly distribute traffic load and avoid busy hours, while configuring devices that stream data (such as inventory trackers or health monitors) to continuously send critical data while deferring less important data until off hours.

Use Case 4: Service Continuity

**Challenge:** Customers want access to the best available network experience, and they want transitions between networks to be seamless (or even transparent).

**Solution:** Enhance the network selection capabilities on the device so that it can steer application traffic to the appropriate networks without user intervention.

**Details:** Many operators have traditionally viewed free Wi-Fi networks as competition to mobile networks that charge for usage. However, as mobile operators evolve from being utility access providers to being digital lifestyle providers, they are finding that it is more important to ensure quality of experience across networks than it is to force data to mobile networks.
Wi-Fi offload is a first step in this direction, but the true value comes when devices have the ability to “just work” when moving between networks. As LTE networks catch up to Wi-Fi data rates, and as streaming applications such as YouTube, Pandora, and FaceTime become ubiquitous, customers have started to expect this type of seamless experience.

This level of interoperability not only requires network intelligence, but also that the network directly work with and manage the network selection capabilities of the device.

Mobile Policy Gateway can realize these goals by giving the network awareness of and control over device network selection events. As devices move between heterogeneous networks, Mobile Policy Gateway can invoke policies to ensure an uninterrupted customer experience. It does so using various methods, including standards-based technologies such as IP Flow Mobility (IFOM) as well as proprietary technologies developed in conjunction with device client vendors.

Use Case 5: Battery Life Preservation

**Challenge:** Subscribers demand improved smartphone performance without having to sacrifice battery life.

**Solution:** Provide a way for operators to update devices with the latest policies to improve battery life, based on both device and network conditions.

**Details:** In 2012, J.D. Power and Associates found battery life to be the least satisfying aspect of smartphones.³

Today, efforts to improve battery life concentrate either on improving the batteries themselves or on improving the power consumption of the device hardware, neither of which is effective for devices that are already in the field. Operating system upgrades can help, but these upgrades are cumbersome to deploy and only provide nominal improvements.

The good news is that there is a promising new avenue for improving battery life. Device manufacturers are continually working on new ways to optimize power consumption on their devices. By combining these insights with device analytics information, operators can use Mobile Policy Gateway to deploy policies that improve battery life on devices in the field today. These policies can take specific criteria into account, such as device model and revision, battery age and remaining charge, application usage patterns, and network conditions.

By applying these criteria, device clients can dynamically change power consumption profiles based on the latest device information, and can update these policies without having to deploy software updates.

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Use Case 6: Chargeable Services and Mobile Payments

**Challenge:** Today’s mobile payment infrastructure is a jumble of proprietary interfaces into charging systems, with little or no core network integration.

**Solution:** A single policy creation interface that enables operators to create holistic policies that can handle the network, charging, and device aspects of mobile commerce use cases.

**Details:** Operators currently face significant obstacles in deploying and managing chargeable services in their networks. The most common way that services such as tier upgrades or day passes are done today is to implement a back-end system that provides a portal for subscriber interaction. This system connects to both charging and policy solutions via external interfaces that, in the case of charging systems, are not standardized and can vary wildly between platforms. Once a subscriber logs into the portal and requests a service, the portal must request and receive authorization from the charging system before it can request the service.

![Figure 4. Integrated Policy Server and Mobile Policy Gateway interface directly to the charging system.](image)

As shown in Figure 4, the PCRF in Policy Server streamlines this scenario by implementing an interface to the charging system using standard Diameter interfaces. This offloads the work of credit authorization from the portal, and eliminates the need for proprietary external interfaces to charging in favor of Diameter interfaces that are implemented by all standards-compliant online and offline charging systems.

Operators can now simply build credit authorization actions into the policies that they are already writing to implement services, simplifying the deployment and management of these services. In addition, service delivery platforms can provide a well-defined external interface to third parties that want to implement mobile payment services. By using OTT application interfaces into policy, mobile payment services can be deployed and managed in the same manner as any other policies, improving time to market for those services and reducing the cost of third-party clearing and settlement services.

Adding Mobile Policy Gateway provides operators with further enhancements to service provisioning and mobile payment use cases. Because Mobile Policy Gateway establishes a secure, authenticated connection to the device, subscribers do not have to log in before ordering services. For added
security, operators can force transaction-related traffic onto the mobile network, protecting subscribers from sending financial data over unsecure Wi-Fi networks. In addition, operators can deploy mobile device clients that implement the user interface by which the subscriber can request services. Requests can then be sent directly from the client to Mobile Policy Gateway, without the need for a portal. This gives the operator end-to-end control over the entire mobile transaction.

Use Case 7: Targeted Mobile Advertising

**Challenge:** Mobile advertising is still a disproportionately small piece of total advertising revenue, and operators want to tap into a greater share of this new revenue stream.

**Solution:** Leverage operators’ unique position in the advertiser-consumer relationship to provide innovative new ways to deliver targeted and personalized mobile advertisements to subscribers.

**Details:** The global advertising market continues to show healthy growth, topping US$500 billion in 2012. However, mobile advertising only captures a small percentage of that revenue, and operators still participate in only a small way. Fortunately, the aggressive uptake in smartphones and tablets is driving a 40 to 50 percent compound annual growth rate in mobile advertising revenues. This increased revenue means more competition and more opportunity for operators to leverage their position as a trusted service provider to participate in this growing market.

Key to leveraging this positioning is using Mobile Policy Gateway in conjunction with mobile device clients to create a direct path from the operator to subscribers. This path can be used as a new avenue for pushing advertisements to subscribers, and can also streamline the conversion process by creating a seamless, integrated interface for subscribers to complete transactions per the previous use case.

The PCRF and Mobile Policy Gateway combination can maximize mobile advertising revenue in the following ways:

- **Zero-rating ad content**—Subscribers are less likely to opt out of advertising if they are reassured that they are not paying for the bandwidth needed to deliver the ads. This also represents a revenue opportunity from third-party advertisers, who are willing to pay operators to zero-rate their own ads.

- **Enhanced ad targeting**—Targeting advertisements to subscribers according to their preferences, circumstances, location/presence and partnerships with preferred businesses could quell angst people currently feel about unwanted ads, and create more trust and loyalty.

- **Monetizing subscriber data**—Operators have extensive data about their subscribers that is not only useful for their own advertising but is also extremely valuable to third-party advertisers. In return for various incentives, subscribers can opt-in to allow operators to share data culled from policy, analytics, and other sources.

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4 2012 Nielsen Global Adview Pulse
5 eMarketer 2012 US Mobile Ad Spend Forecast
• **Contextual advertising and interactive dynamic upsell**—Consumers are much more likely to convert if ads are presented in a relevant context. Mobile Policy Gateway can create policies that present specific ads based on which applications subscribers are using. It can also work in conjunction with device clients to present upsell opportunities within applications, increasing the likelihood of conversion over more-traditional and disruptive marketing mechanisms like e-mail, SMS, or redirects.

**Use Case 8: Customer Self-Care**

**Challenge:** Subscribers are demanding full control of their mobile services and usage.

**Solution:** Evolve the operator customer care model to one that encompasses self-care, reducing the cost of customer interaction while improving customer loyalty.

**Details:** In today’s mobile network landscape, operators have to constantly add new plans and features in order to differentiate themselves from the competition. The complexity of these expanding services is increasing the training and operational burdens on customer care personnel at a time when decreasing average revenue per user pushes operators to cut per-customer support costs. These burdens are compounded by the fact that subscribers are often not aware of new options and plans without expensive marketing and sales campaigns. Figure 5 demonstrates how operators can empower customers to make the choices they want.

![Subscriber self-care improves customer perceptions.](image)

Figure 5. Subscriber self-care improves customer perceptions.
Customer self-care can mitigate many of these issues, but the traditional self-care model that requires subscribers to log into a web portal to configure their account is still more disruptive than subscribers would like. Mobile Policy Gateway enables operators to create a truly seamless customer self-care experience on the device itself.

Integration between Mobile Policy Gateway and self-care clients on the device allows customers to make changes or additions to their services that take effect in real time, reducing the cost of making those changes while improving customer satisfaction. In addition, new and innovative service offerings can be deployed faster and with reduced need to train support personnel. This not only reduces the cost of service rollouts, but also helps operators compete by improving their time to market. The self-care client acts as an additional avenue for upsell at the point where it’s most effective—while subscribers are making changes to their services.

Conclusion

These use cases are just a sample of the types of service offerings that operators can implement using Oracle’s Tekelec Mobile Policy Gateway as part of a total policy solution. The common thread among all of them is that operators can both enhance existing use cases and create new ones simply by extending the reach of policy to the mobile device, making it possible for policy to both push rules to and receive triggers and indications from the device. This empowers mobile operators to enforce policy wherever needed, in a flexible and turnkey fashion that frees them from expensive alternatives.

The value of Mobile Policy Gateway is that it fosters use cases that make operators money and improve customer loyalty. Mobile Policy Gateway addresses the areas of network management, device management, and application management that define the customer experience and long-term loyalties and revenues.

The “ideal” that customers want is one of solid voice connections; faster data downloads; relevant, personalized content; and world-class customer service. To reach that ideal, operators have to consider policy the innovation engine or “brain” of innovative services. Policy has to be elevated to new heights in order to govern access to devices, services, and applications. The changing complexion of policy will set the stage for policy everywhere.

With that power, operators can truly manage and control the end-to-end application flow, transforming their roles from where they are today into one of true digital lifestyle enablement. Policy is at the core of this transformation, helping operators orchestrate the subscriber experience around network, subscriber, device, and application intelligence and awareness.
## Appendix: Acronyms and Initialisms in This Document

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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ANDSF</td>
<td>Access Network Discovery and Selection Function</td>
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<td>COTS</td>
<td>Commercial Off-the-Shelf</td>
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<td>DPI</td>
<td>Deep Packet Inspection</td>
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<td>DSR</td>
<td>Diameter Signaling Router</td>
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<td>HSS</td>
<td>Home Subscriber Server</td>
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<td>IFOM</td>
<td>IP Flow Mobility</td>
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<td>Long Term Evolution</td>
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<td>RAN</td>
<td>Radio Access Network</td>
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