Mobile Tethering

MARKET OVERVIEW
Mobile smartphone subscribers are buying a variety of devices also designed for mobile Internet access, such as tablets, eReaders, and ultra-compact notebook computers. Even though these devices are small enough to take everywhere, most of them do not have separate cellular data plans that would give their users ubiquitous Internet access. According to IDC, more than 70% of all iPads sold in 2011 were Wi-Fi-only versions. The number of iPads used without a cellular data plan exceeds 90% when you factor in owners who never activated their cellular-ready iPads with a mobile service provider.

Users who own mobile Internet devices in addition to their smartphones are trying to avoid the expense of paying for multiple, mobile service provider data plans. Besides “free” Wi-Fi Internet access, their other option is to use their smartphone as a cellular data modem and connect — or “tether” — to their tablets or notebooks. This allows for a single data plan that can provide Internet access to any of their mobile devices. This “tethering” is usually charged as a service feature or bundled with higher monthly smartphone data plan limits. A smartphone can be tethered to a slave device via cable, Bluetooth, or Wi-Fi connection.

Even though mobile service providers have implemented various pricing models to monetize tethering, mobile subscribers use many different schemes to evade being charged for it. By “jailbreaking” or “rooting” their smartphones they are able to install “unapproved” third-party tethering applications or configure phone settings to enable tethering on lower limit data plans while avoiding charges. To stop these practices and implement revenue assurance measures that preserve the profitability of their core services, service providers need to detect when tethering is occurring and ensure that subscribers are adhering to the terms and conditions of their service plans. This is also critical for operators, who often use the number of dongles versus smartphones to forecast network capacity growth, as a tethered smartphone behaves like a dongle. Even if they are not monetizing tethering, operators need to understand tethering usage to ensure they are managing capacity effectively to deliver high Quality of Experience (QoE). Although 100% tethering detection is not possible, detecting tethering behavior that could cause network problems is possible using Internet Intelligence technology.

MARKET DYNAMICS
There are several key dynamics impacting the market for tethering services:

- **Accelerating demand for mobile Internet devices in all form factors**
  IDC forecasts worldwide shipments in 2012 of more than 600 million smartphones and 100 million tablets, 90% of which are Apple and Android-based tablets. By 2016, IDC expects global shipments of smartphones and tablets to double, reaching over 1.2 billion units and 200 million units, respectively. Smartphones are experiencing high growth due to their versatility and ever increasing applications—including rapid adoption of mobile messaging and social networking—falling prices, faster 3G and 4G networks, increasing price competition among service providers, and the ability of mobile device operating systems to handle newer and faster hardware. Tablets are coming on strong because they offer a more compelling user experience than PCs, to the point where they are starting to replace laptop computers.
• **Surging use of hotspot-capable smartphones across 3G and 4G markets**

Wi-Fi capable smartphones represented 95% of total smartphone sales in 2011 according to Strategy Analytics. This gives smartphones the capability to tether to multiple devices at the same time, creating a personal Wi-Fi hotspot. Strategy Analytics forecasts growth in sales of mobile hotspot handsets will exceed 400% between 2011 and 2016. This capability is already common in Android 4G LTE smartphones and support for it is expected in the next iPhone. Hotspot-capable smartphones will become the preferred way to tether as this capability becomes ubiquitous.

• **Adoption of higher limit, 4G LTE data plans**

Data service plans on LTE networks are currently following the pricing models established in 3G networks. The plans are tiered by monthly data limits, currently ranging from 1GB to 10 GB in the U.S. and Asia and up to 30GB in Europe, with data speeds often throttled and overcharges assessed at different data increments and pricing.

• **Unrestricted or unauthorized tethering will continue to strain mobile operator networks**

With 4G data speeds and data plan limits increasing, mobile subscribers are more likely to take advantage of tethering to maximize use of their plan limits. Service provider 3UK is already reporting that 10% of its network traffic is from tethering and continues to grow in popularity. In order to stop revenue and profitability erosion, service providers need to manage tethering usage. Preventing unauthorized tethering or putting limits on authorized tethering is the only way to prevent excessive, unplanned network usage.

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**Figure 1**

NETWORK USAGE

<table>
<thead>
<tr>
<th>Smartphone Hotspot</th>
<th>3G / 4G Radio Access Network</th>
<th>3G / 4G Mobile Core Network</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Radio Network Controller (RNC) or Serving Gateway (S-GW)</td>
<td>Policy and Charging Control (PCC) / PCRF / OCS</td>
<td>Internet</td>
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<tr>
<td></td>
<td>Gateway (GPRS Support Node (SSGN) or Packet Data Network Gateway (PDN-GW)</td>
<td>IDP Subscriber Manager</td>
<td>Pinterest</td>
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<td></td>
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<td>IDP Real-Time Enforcer</td>
<td>Twitter</td>
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<td>IDP Statistics Collector</td>
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<td>Process Intelligence Delivery Platform</td>
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Sandvine’s products have been deployed in some of the world’s largest mobile operator networks to monitor, manage, or monetize network traffic while attaining industry-leading scalability & reliability.

**SOLUTION NEEDS**

Mobile operators looking to manage and monetize mobile tethering face some fundamental questions:

- Is unauthorized tethering occurring in their network?
- How much data are authorized tethering subscribers using?
- Which devices are their subscribers tethering?
- Must tethering limits be imposed even in the context of unlimited data plans?
- How are tethering features monetized as part of a service bundle?

As they execute their plans for managing and monetizing tethering, mobile operators must consider three key success factors.

**THE SANDVINE SOLUTION**

Sandvine’s products have been deployed in some of the world’s largest mobile operator networks to monitor, manage, or monetize network traffic while attaining industry-leading scalability and reliability. At the heart of the Sandvine solution is our Intelligence Delivery Platform (IDP), comprising:

- IIDP Real-time Enforcer
- IDP Subscriber Manager
- IDP Statistics Collector

These platforms interact with various CDMA, 3G UMTS, and 4G LTE mobile network elements to provide intelligence delivery and policy enforcement. Together, they help mobile operators address the three key success factors for managing and monetizing mobile tethering.
• **Awareness**
The IDP Subscriber Manager is the main component in establishing tethering usage policies. It does this by connecting with 3GPP mobile network Policy and Charging Control (PCC) components—the Policy and Charging Rules Function (PCRF), Online Charging System (OCS), and Offline Charging System (OCFS)—to establish subscriber awareness in the mobile operator’s network. Tethering awareness properties can include subscriber (IMSI) and device (IMEI) identification, location (ULI), service plan information, and subscriber session connectivity with network elements such as the GGSN, S-GW, and PDN-GW. Tethering detection is session based, allowing for detection every time the subscriber initiates a new PDP context later. This mechanism allows the subscriber to restart their phone to receive a new PDP context and continue using authorized data services. All tethering statistics generated by the IDP Real-time Enforcer can be visualized in real time or sent to the IDP Statistics Collector for further reporting and analysis, using Report Studio, to support business planning.

• **Blocking**
The IDP Subscriber Manager feeds the subscriber policies provisioned to the IDP Real-time Enforcer to enforce policies that detect tethering and redirect customers to a portal to purchase a tethering plan, or block it if the user continues to violate the Terms of Service. Tethering policies are enforced by the IDP Real-time Enforcer through Sandvine’s industry-leading Datastream Recognition Definition Language™ (DRDL) technology. The system can also detect illicit modem when a mobile subscriber takes a SIM card provided with an authorized mobile device and inserts it into a modem or dongle to tether with a laptop or a PC. Tethering usage reports can be used to identify subscribers that may be tethering without a service plan and help service providers assess network impacts, aiding capacity planning.

• **Monetization**
The IDP Subscriber Manager integrates tightly with PCC components to enable monetization of authorized tethering services. Many tethering service personalizations are possible with Sandvine’s IDP system, including:
  - Offer tethering as part of an existing data plan with separate data limits
  - Offer tethering as a stand-alone plan
  - Direct subscribers engaged in unauthorized tethering to a captive portal to choose from legitimate tethering options
  - Time-of-day based tethering
  - Limit tethering bandwidth at specific data plans limits

Contact your Sandvine sales representative to find out more about this solution and how it can help you transform your business.

**About Sandvine**
Sandvine helps organizations run world-class networks with Active Network Intelligence, leveraging machine learning analytics and closed-loop automation to identify and adapt to network behavior in real-time. With Sandvine, organizations have the power of a highly automated platform from a single vendor that delivers a deep understanding of their network data to drive faster, better decisions. For more information, visit sandvine.com or follow Sandvine on Twitter at @Sandvine.