



A Mobile Data Evolution:

From Flat-Rate Billing to Bandwidth-Reactive and User-Sensitive Charging & Policy Control

**The Case for an End-to-End Software Platform
that Maximizes Revenue & Optimizes
Network Utilization**

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Executive Summary

Mobile operators who rely on flat-rate plans for mobile data services need to rethink their strategy. As mobile data reaches mass markets and bandwidth demands grow, the flat rate model will break because it doesn't connect revenue with the high cost of delivering bandwidth across an expensive radio access network.

The answer is to supplement flat rate billing with bandwidth-reactive charging that maximizes revenue as it optimizes network utilization. Enabling this shift is a more flexible and integrated charging and control platform that coordinates the essential functions of deep packet inspection, charging, policy management, and policy enforcement.

The platform not only allows operators to efficiently allocate bandwidth among users of various different lifestyles, it also enables on-line, in-session dialogues with subscribers that keep off-line customer care costs to a minimum.

Finally, as WiMax and femto cell technologies emerge, distributed charging and control will enable the selective redirecting of high bandwidth traffic to lower cost DSL and cable connections.



Mobile data is a killer app. That's a statement practically all mobile operators can agree on.

But curiously, one thing mobile operators widely *disagree* on is the best way to price, bill or charge for that mobile data.

The telecom world revolves around two basic billing/charging strategies – **usage-based charging** and **flat-rate billing**. Depending on what country your business operates in, you're likely to favor one billing/charging model or another.

In the emerging markets of East Africa, Asia-Pacific, and Latin America, mobile data is primarily **usage-based**: subscribers are charged fees for specific services, applications, and content usage. Yet that's the exact opposite strategy of operators in Western Europe and North America where the mobile data plans tend to be a **flat rate**, all-you-can-eat rate of say, €20 per month.

So who's right and who's wrong?

Why Flat Rate Billing is Not Sustainable in Mobile Data

Analyst company, TRI believes the mobile data world is moving to more usage-based charging. In fact, we'll argue in this paper that operators who rely exclusively on flat-rate billing need to seriously rethink their strategy.

Operators with flat rate plans are doing well today partly because mobile data is still a novelty and early adopters are willing to pay a premium. But these operators may be experiencing the calm before the storm.

A day of reckoning is coming: as mobile data reaches mass markets, as the number of mobile applications explodes, and as users steadily demand higher and higher bandwidth levels (as they have on the internet). When that day arrives, flat rate billing can't make it alone. Why? For the simple reason that flat rate puts a cap on revenue while opening the floodgates to unrestricted bandwidth use.

Let's face it. Physics has dealt mobile a tough hand. Mobile data will never be as cheap to deliver as fiber-optic, cable, or DSL data. Even LTE won't change that.

The radio access network remains a very expensive delivery channel and unless bandwidth can be effectively controlled, operators can't make money from mobile data.

Up to now, of course, mobile handsets have small displays so they present less of a bandwidth issue. However, as soon as you put a wireless adapter or dongle in a laptop and start doing peer to peer computing and video/music downloads, network usage becomes a big issue.

Evidence is growing that when the network side of mobile data is not handled properly, it can torpedo an operator's business.

Telecoms have been lulled into believing that mobile data is "just another wireless service", but when an Indonesian operator recently launched mobile data in 3 weeks it was forced to stop selling it because the service was falling apart.

A Lesson from the Airline Industry

Perhaps the best way to understand the pricing and control problem you face is to look at how other industries have solved similar problems.

The hotel, cruise ship, and airline businesses, for example, are similar to telecom because they all sell a perishable service. You have a one-shot opportunity to sell access to a certain hotel room, airline seat, ship cabin, or bandwidth capacity on a particular day. Yesterday's capacity is gone forever.

To adapt to this reality, the airline industry has built some very sophisticated pricing and aircraft scheduling systems. In fact, the price you pay for an airline ticket goes up or down based on facilities availability: the number of seats left on the flight that you booked and the number of aircraft available to fly.

Here's the key: for British Airways' pricing system to be effective, it needs to be **airline seat-reactive**. It needs to automatically adjust prices or capacity for a certain destination. For example, if 90% of the seats for morning flights from Heathrow to Charles De Gaulle airport are sold 3 weeks in advance, the price of tickets on that flight needs to be raised immediately, or an additional plane (or capacity) needs to be scheduled in.

In a similar way, you as a mobile data operator need to make your pricing/charging and network policy systems as **bandwidth-reactive** as possible because the more you can react to network events, the higher revenue and customer satisfaction you can drive.

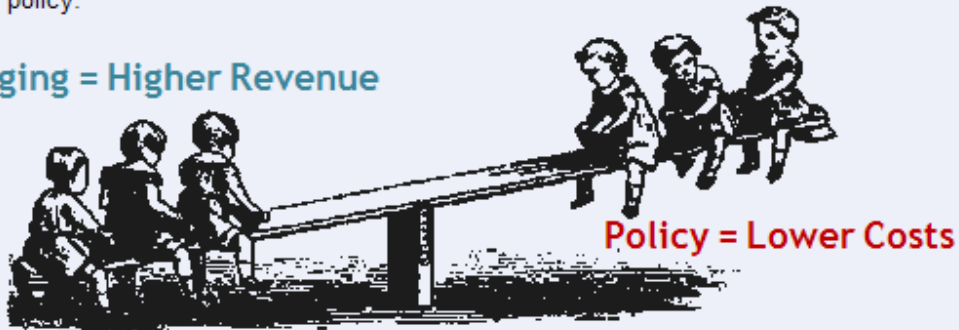
The figure below illustrates the basic challenge of developing a bandwidth-reactive system: the need to successfully balance the conflicting forces of charging and policy.

The Charging vs. Policy Seesaw

To make money from a mobile data network, two opposing forces must be balanced: charging and policy. Charging's role is to maximize revenue. Policy's job is to reduce network costs by managing bandwidth.

Newton's third law of physics applies: for every action is there is an equal and opposite reaction. In a mobile data network, the action is either an abundance or lack of bandwidth for a particular user, application, or portion of the network. An advanced charging and control system reacts in real-time to bandwidth availability, being able to either reduce or increase bandwidth for particular users as directed by policy.

Charging = Higher Revenue



Problems occur when one side of the seesaw has too much weight. When charging is too strong, revenue grows, but the network now needs to support too many users, degrading QoS and the customer experience. When policy is over-emphasised, customers experience high QoS, but revenue suffers and the operator earns a poor return on its network investment.

Telecoms succeed when their systems allow them to flexibly move the seesaw -- to maximize revenue and promote optimal network use. Flat rate plans are mixed with premium offers to stimulate high value, spur of the moment bandwidth boosts. Users receive popup HTML offers for relevant services. Lifestyle plans are developed to expand network use and encourage low value subscribers to use services at off-peak times.

Why You Need to Control Bandwidth at the Subscriber Level

If you're like most mobile data operators, your operations are only marginally bandwidth-reactive today.

During peak hours, it's not uncommon for 5% of network users to be consuming 80% of your bandwidth. However you, as an operator, have little control over exactly who gets to use that precious bandwidth.

A teenager paying \$20 a month is doing peer-to-peer music downloads. . . . and he's preventing the business user paying \$90 a month from sending PowerPoint slides to her colleagues.

While companies like Cisco, Sandvine, Ericsson, and Nokia Siemens supply service controllers that manage bandwidth at the network level, the ability of their systems to manage an individual subscriber's experience is often limited.

The mobile operator often doesn't know what package the user is on or what he's doing on the network. They only know that when the network is oversubscribed, certain high value customer groups shouldn't be shut off. So when the network is congested, the remedy is often to throttle down bandwidth to large **groups** of users. The problem, of course, is that such broad-brush throttling can damage the customer experience for the subscribers who matter most.

In other words, your charging and control system must not only be bandwidth-reactive, but also **user-sensitive** because you need to ensure the experience of your best customers is always a good one.

Another problem with control that resides at the group level is that it limits a mobile data user's choices. Say you subscribe to the Small Business Mobile Data Plan whose bandwidth is limited to 500 Megabytes a day. If this afternoon you wanted to order a temporary boost of bandwidth, if your plan didn't cover that, you'd be out of luck -- until tomorrow.

Now mobile phones are creatures of convenience. They allow us to get things done, which is why we're so addicted to them. So does it make sense to allow subscribers to buy things that are outside their current mobile data plan? Absolutely. Not only that, if a user downloads a new application that requires a boost in bandwidth, you'd like to be able to send the user a popup HTML page with an offer to buy a higher QoS level. Unfortunately, a charging and policy system that's sensitive at the group level can't deliver that user offer.

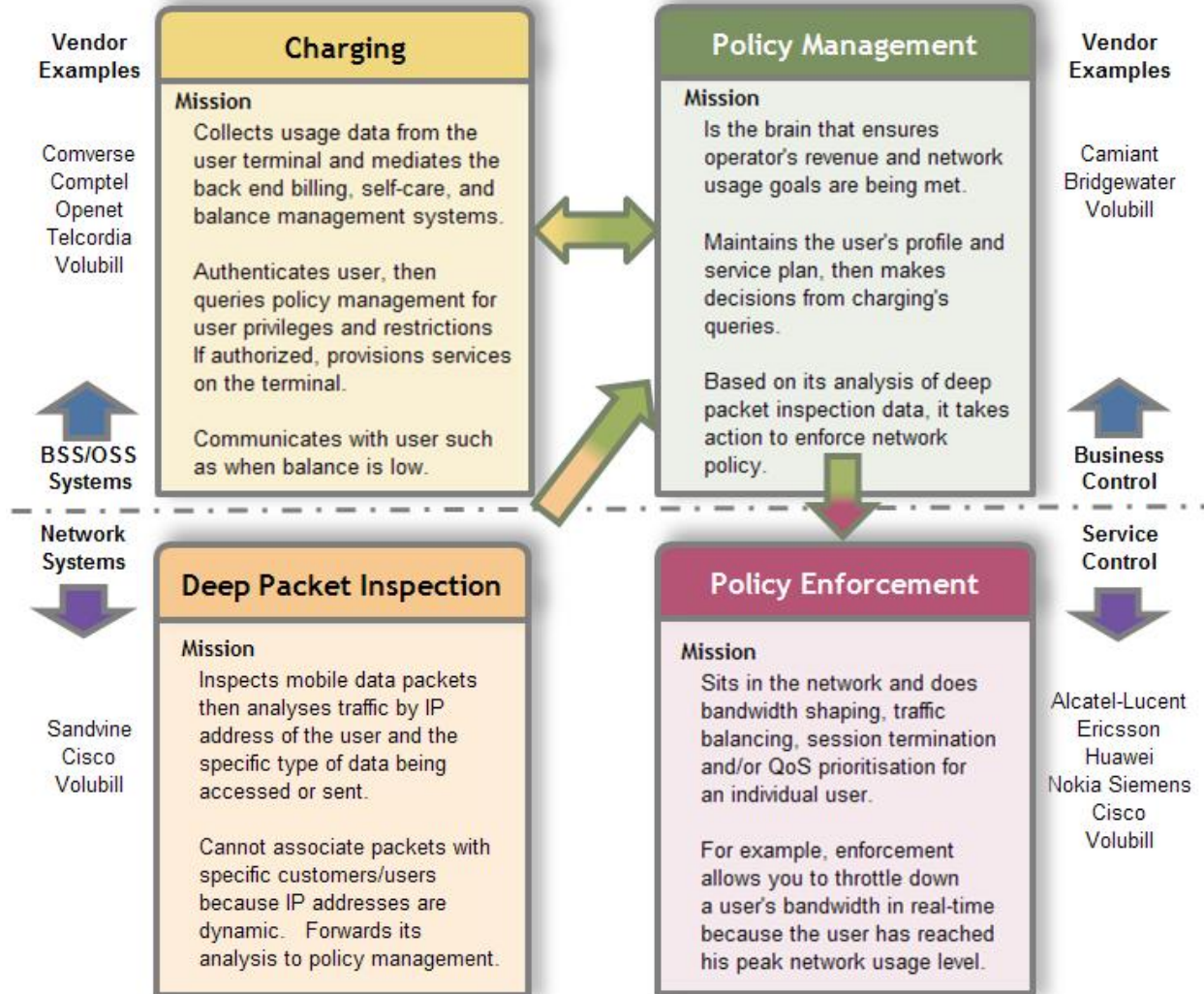
In short, managing access to services at the group or network level is not sufficient. You need fine-grained, **user-sensitive** control to serve your customers well and **bandwidth-reactive** control to optimize use of your network.

The Functions of an End-to-End Mobile Data Charging and Policy Solution

To enable the vision of a bandwidth-reactive, user-sensitive mobile data system requires a very sophisticated charging and policy control platform.

While it takes years to master the nuances of these real-time network systems, the process is basically divided into four functional areas: deep packet inspection, charging, policy management, and policy enforcement as shown in the figure below.

Key Enabling Functions: Mobile Data Charging & Control



The platform fuses a variety of telecom software functions. On the one side you have **charging** from vendors such as Redknee or Comptel. The charging function manages account balances, rating, and authentication of the user and sends queries to the policy manager.

Next is **deep packet inspection**, the function that sits on the wire and classifies IP packets. It's an essential function because you can't do fine-grained policy management unless you have real-time intelligence on what's happening to individual subscribers.

In a voice network, of course, an IN platform has a much simpler task because the service is a phone call. With mobile data, managing the session in real-time is much harder because you need to know what the service is. . . . VoIP, peer-to-peer, email, music download, etc.

Then there's **policy management**, the brain of the system. PM maintains the profile and the service plan. It takes questions from the network and makes a decision based on what the subscriber wants and what his plan allows.

Finally the policy manager directs **policy enforcement** to do things like shape bandwidth, step up the QoS, or terminate a session. The enforcement function very often talks with the GGSN, service delivery platforms, or MMS / multimedia systems.

At the enforcement point, the user's bandwidth can be throttled down because he's reached peak network utilization. In a gaming application, the enforcer also sends control message to allow the game to continue.

The Challenge of a Best of Breed, Integrated Platform

Up to now, every integrated mobile data charging and policy platform in the world is a best of breed system that merges products from various point solutions. Often it's a network equipment provider (NEP) and billing/charging vendor who team up to provide the solution.

Now, the minute you say "solution" rather than "product", it usually implies an expensive customizing of systems for the operator. However, cost really matters here. Many operators can innovate if the cost per product launch is €20,000, but €100,000 per launch puts innovation out of range.

The flexibility of the integrated solution also matters. To be truly agile, your development cycles need to be short, because the more chances you have to iterate and tweak a new user service, the better it gets. However, if your cycle time is consumed by synchronizing multiple vendor products, the market window could close. Cycle time is especially key in emerging markets where operators are cash-strapped and must turn up new services very quickly. Fast time-to-market is also vital for operators deploying mobile data services against an incumbent. That's certainly the case for Orange on the African continent, Digicel in the Caribbean, and Telefonica in Latin America.

Unfortunately, this quest to make charging and policy systems nimble enough to provide fast time-to-market also forces vendors to build relatively simple integrations between their platforms.

Simple interfaces are not a problem until the day an operator needs to offer something out of the ordinary. When that happens, you often need to go back to the solution parties and kick off a new round of professional services.

Another bottleneck in best-of-breed systems is when rating engine and network vendors don't share the data they should because of competitive reasons. What's the motivation for Ericsson to share data with Comverse, for example? Ericsson now owns the billing/charging product of LHS, an arch-rival of Comverse.

Clearly the players with the best capability to build a best of breed solution are the network equipment providers (NEPs).

However operators are cautious to become too dependent on a single NEP.

Today you're likely to have two or more network vendors supplying you GGSNs and even multiple IN environments. The presumption is that if the service control function is owned by one equipment vendor, it's difficult to work with the second or third NEP.

To preserve the peace in its network, the Bharti mobile data network uses the Volubill service control system to mediate between Nokia Siemens and Ericsson. Volubill is a company which we shall be discussing in more detail later on in the report.

The Promise of a Single Vendor End-to-End Charging and Policy System

The forward slash "/" in the term "BSS/OSS" is there for a purpose. It symbolizes a communication wall that exists in telecom organizations.

Billing/marketing experts and network engineers really do think differently and, yes, that often leads to disagreements.

Network focuses on reliability and uptime. Most of its legacy systems are hard-wired, so they are justifiably cautious about opening their doors to outsiders. Billing and marketing, meanwhile, are driving new products and revenue opportunities, so it's natural for them to get impatient when network people slow things down.

Is it any wonder then that tensions rise when someone proposes a system that actually bridges the IT and network divide?

Sadly, a best of breed solution doesn't really solve the people integration issue: IT people are still responsible for the charging side platform and network people still manage the service controller.

Here's where a single-vendor charging and policy control platform can be a catalyst for pulling people together.

When network and IT work on a single-vendor platform, there are no organizational walls to hide behind. Everybody is working off one whiteboard because the battles have hopefully already been fought and settled within the software.

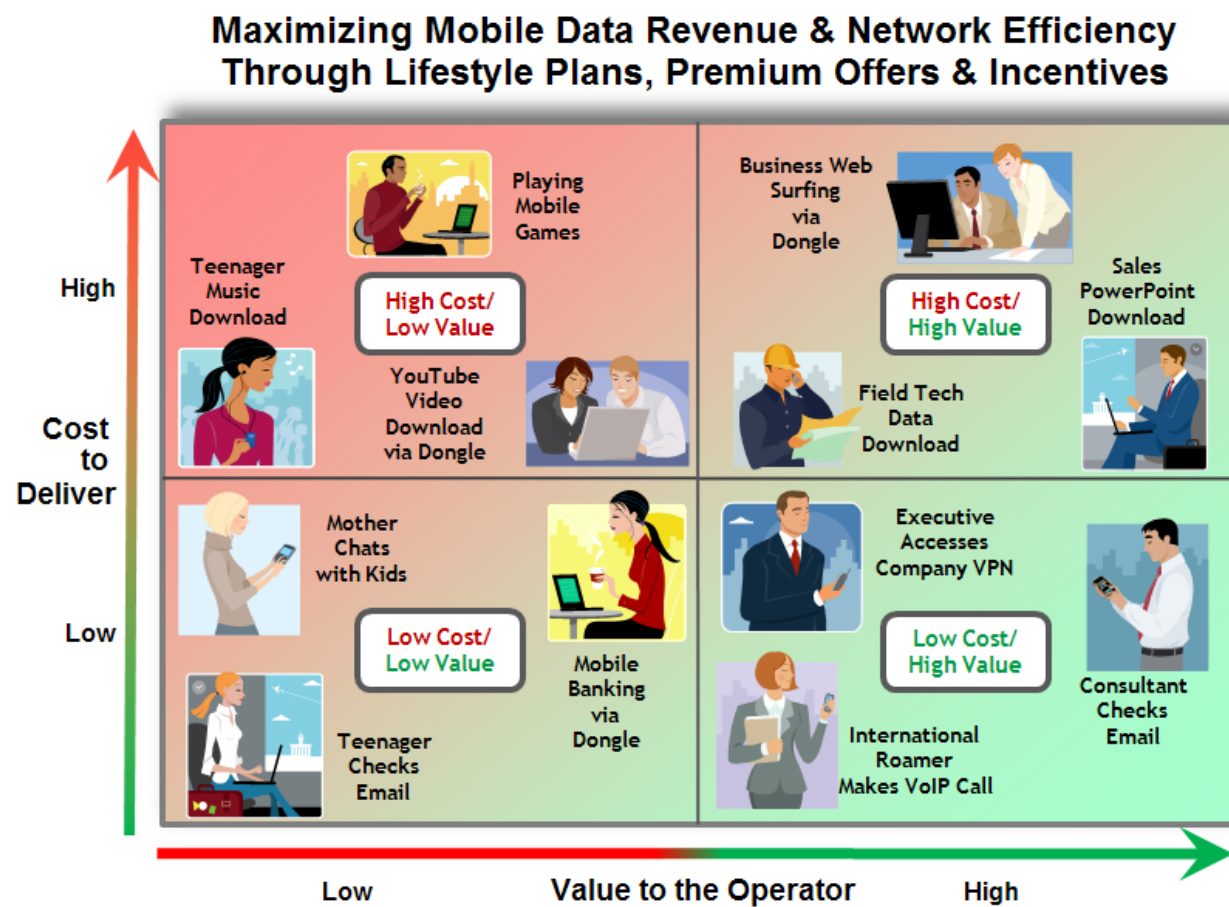
When done right, a single-vendor solution not only creates a more natural and efficient interface between systems, it reduced real-time latency and improves the effectiveness of your telecom organization.

The Marketing Advantages of an End-to-End Charging & Policy Platform

The key benefit of an end-to-end charging and policy platform –both the best-of-breed and single-vendor variety – is that you can finally put user-sensitive and bandwidth-reactive principles into practice.

Marketers love the platform’s ability to get personal with small groups of users and give them treatment packages and ad hoc offers unique to their special needs. Network engineers appreciate the system’s ability to control bandwidth and QoS at a granular level.

Figure 3 illustrates the key problem that needs to be solved: allocating limited bandwidth to users with different usage needs and value to the operator.



The figure compares the “cost of delivery” of various usage scenarios to their actual “value to the operator”. For example, a consultant checking his Blackberry for emails (in lower right quadrant) is a relatively low cost network activity, however because the consultant is a business user, he’s paying a premium and so the operator is probably earning a good margin on this usage.

Conversely, a teenager downloading music (upper left quadrant) is a costly service to deliver in terms of bandwidth. What's more, the teenager is probably an economy user, so is of low value.

One secret to bandwidth-reactive charging is to reward low value users for performing their high bandwidth activities during off-peak hours. For instance, music-loving teenagers could be offered a discount to download music after 10 PM.

Instead of proposing a handful of flat rate plans, you're now able to offer dozens of "lifestyle plans" that are fine-tuned to attract various subscriber types. In turn those plans not only fit the subscriber's usage profile, but are designed to subtly influence behavior to better manage bandwidth costs. Lifestyle plans can also provide a variety of QoS levels. For certain subscribers, you could guarantee high QoS for email and low bandwidth apps, but provide a relatively slow speed for file-sharing, gaming or other high-end apps.

With great system flexibility and control, the full range of marketing promotions is open to you, including techniques that offer a trial price of \$10 the first month, then moving those subscribers to a richer, higher volume plan in month two.

Incremental Revenue without the Customer Care Penalty

A word of caution about on-demand offers: unless you can interactively dialogue with customers about those offers, you could raise your customer care costs beyond what the services are actually worth.

Traditionally, interacting with customers meant sending the subscriber **off-line** SMS messages or allowing him to visit an **in-line** self-care portal.

But with advanced service control, full **on-line** dialogues are now possible where the subscriber receives pop-up message or is redirected to an advertisement, FAQ or advise-of-charge page.

The beauty of on-line interaction is two-fold. First, you can build web pages that explain the full details of your offer. Second, because it all happens within the customer's session, your charging platform already knows who the user is and the application he's using, so all the details you need to fulfill an order are available to you. On-line interaction also takes the handcuffs off your policy manager. In the past, policy had the intelligence to make lots of relevant offers, but SMS and in-line communication really weren't interactive enough to make those offers effective. Now, when you notice the subscriber could use some extra bandwidth for her application, you can send a pop-up message asking: "Would you like to pay an additional \$5 per week to achieve a higher QoS for this application?"

If a subscriber is having trouble with his service, on-line dialogues can also help you head off expensive call center phone calls by popping a message saying: "We understand you're having a problem with your mobile connection. We're taking steps to correct that problem right now and will get back to you shortly."

The Future of Mobile Data Charging and Policy Control

Up to now, we've been discussing charging and policy control as they apply to traditional mobile data networks.

However the industry is abuzz about WiMax, femto cells, and pico cells that would allow mobile data networks to operate across a more distributed architecture.

As we've discussed already, one of the biggest limitations of traditional mobile data networks is that they are not as economical as wireline networks when it comes to high-bandwidth uses.

However, by having your charging and control capability farther out on the network edge, a femto cell could redirect high-bandwidth applications to a local DSL or cable connection and thereby avoid bringing that traffic across the radio access network and mobile core where it's much more expensive to handle.

In this way, the burden of peer-to-peer, video downloads, and other high-cost services is better managed. The key to making it work, though, is a distributed network-resident charging and control system that can make the QoS and policy determinations in real-time.

About Volubill (www.volubill.com)

Volubill, the sponsor of this paper, is one of the fastest growing software vendors in BSS/OSS. The company's heritage is in service control and today it remains a key supplier of deep packet inspection probes and related systems.

Wishing to expand its footprint into the BSS, in 2006 it acquired the DPT rating and charging product from Intec Telecom. It has since become the mobile data charging platform vendor for several operators across Latin America, the Middle East, Africa, and AsiaPac, its largest customer being Bharti Aircell in India.

Its success in charging led Volubill to extend its reach once more, developing a policy management product that would tightly integrate with a beefed-up service controller enabling policy enforcement and bandwidth shaping.

By combining the diverse functions of DPI, service control, rating & charging, and policy management, Volubill has now become the first vendor to offer an end-to-end software product for the charging and policy control of mobile data networks.

Volubill claims it is able to offer its integrated solution at a reduced price point because only one vendor is involved. In addition, the single-vendor solution offers reduced latency and takes away the risk of building a best of breed solution.

Another benefit: the platform can be inserted without integrating with a network equipment provider. In fact, Volubill claims a telecom's marketing group can take full control of its mobile data charging and policy with no third party having to get involved.

To protect an operator's investment, Volubill's fully integrated solution can also be broken up and delivered in functional modules.

About Technology Research Institute

Technology Research Institute (TRI) has been analysing the telecom billing and OSS market since off-the-shelf software first appeared in the early 1990s.

In 1995 TRI published the first widely available market research report on wireless billing solutions. In 1997, TRI's research director, Dan Baker, was the keynote speaker at the first annual Jefferies & Company Telecommunications Billing and Customer Care conference for financial analysts in New York.

TRI's most recent billing report is a 2008 study entitled, THE TELECOM BILLING & CHARGING MARKET: Postpaid, Prepaid, Real-Time, Interconnect, and Merchandising / Lifestyle Marketing Systems for Telecom Carriers.



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