

Managing Mobile data growth

How intelligent connection management can lower your costs and increase your ARPU



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2. Introduction

Mobile Network Operators (MNO) are looking for a full range of solutions & services from Connection Management software, Policy Control, Advanced Charging Services, to Cloud Computing. Not only do they want to allow end-users to connect with their devices in the best possible way, but also in the most cost efficient way. Connectivity solutions & services have to fit into a wide range of mobile broadband enabled devices such as traditional laptops and netbooks, but also e-readers, MID's, portable navigation devices, and cameras.

This document will first highlight the increasing complexity of the mobile data market and dive more thoroughly into the more specific challenges mobile network operators are facing. How can they sustain profitability and stay in balance in a market that is exploding and where end-user expectations are continuously evolving?

2.1. The Mobile Data market

Telecom operators around the world face the challenge of maintaining growth and profitability while increasing competition is causing higher churn rates and continues to erode pricing.

In general, MNO's want solutions that deliver an optimized and cost efficient network which allows users to connect in the best possible way and secures maximum recurring revenue.

At the same time, end-users just want a simple way to get connected to the best available network at a known cost.

This document focuses on the two major components of the mobile data eco-system:

- > Mobile Network Operators, trying to maintain growth and profitability at a controlled cost.
- > End-users, trying to get high quality of services and usability at a known cost.

Market Complexity



“89.4 Million MM modules in 2012 with a 5.4 \$ Billion manufacturer revenue”
(ABI Research, 2007)

“A trillion connected devices in 10-15 years”
(The economist, 2007)

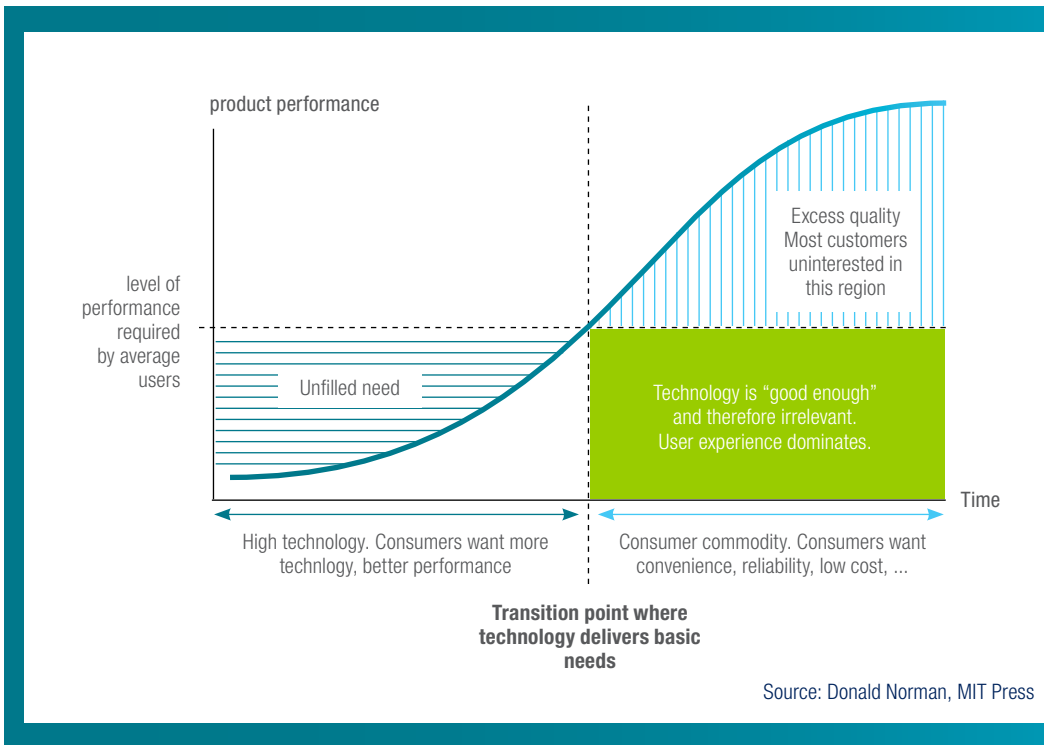
“Mobile Data traffic will increase by factor 20”
(Unwired Insight, 2009)

“Video driving rapid growth in mobile internet traffic”
(The economist, 2007)

“500% wireless penetration is possible”
(Verizon, 2009)

“HSDPA subscriptions have grown by 200% since 2008”
(Global Insight, 2009)

“At least 20 billion connected devices by 2020 and a 300- fold increase in traffic”
(Intel, 2009)



In the last few years, the mobile data market has experienced a dramatic shift. Previously, mobile data was very technology driven. Mobile data cards were sold between € 250 and € 350 and mobile data tariff plans were very high in price (e.g. 50 MB = € 100/month). Data speeds were 512 Kb/s on the first 3G networks. It was primarily adopted by businesses where its value and the sophistication of the customers allowed the barriers of complexity and high price to be overcome. When the HSDPA 3.6 Mb/s upgrades were deployed, the business segment was prepared to pay the premium for higher speeds, lower latency and better service.

Since 2008, with the launch of the USB mobile data stick, the mass market has embraced mobile data, fueled by new, aggressively priced data plans from the operators. “All you can eat” data plans have emerged. Initially MNO’s concentrated on technology upgrades; differentiating from each other by being the first with the very latest new available technology (e.g. from 512 Kb/s to HSDPA 3.6 Mb/s to HSUPA, etc...). However, over time network operators have come to realize that mass market customers have different needs to business customers.

Speed, while important, does not carry the same value as it did for business users, who were ready to pay the premium. When 3.6 Mb/s HSDPA was widely deployed, consumers were more than happy with this speed; most end users only had 1 to 2 MB/s at

Home for Internet access on Broadband (DSL/ADSL). Just as in the fixed broadband market, actual speeds experienced by end users differ dramatically from the theoretical maximum speeds used to market products and services leading to customer skepticism about claimed speeds. Technology and speed are not primary differentiators anymore for Mobile Network Operators. So, what is the key product attribute which still allows differentiation?

It’s all about usability...

One of the most important quotes on usability is the one from Don Norman:

“When technology delivers basic needs, user experience dominates”

Source: Donald Norman, MIT Press

This quote perfectly describes what the mobile industry has rediscovered several times over its history: technology only delivers value to customers when it is easy to use.

The next chapter elaborates on the current challenges network operators and end-users are confronted with since the huge swing of the mobile data industry into the mass market.

2.2. The Mobile Data challenge

3G traffic volumes have increased drastically since 2007, and the trend is set to continue with many drivers for further growth. As 3G traffic volumes increase, 3G Mobile Network Operators face serious challenges. There is a danger that networks will quickly become swamped by traffic.

Impact on MNO

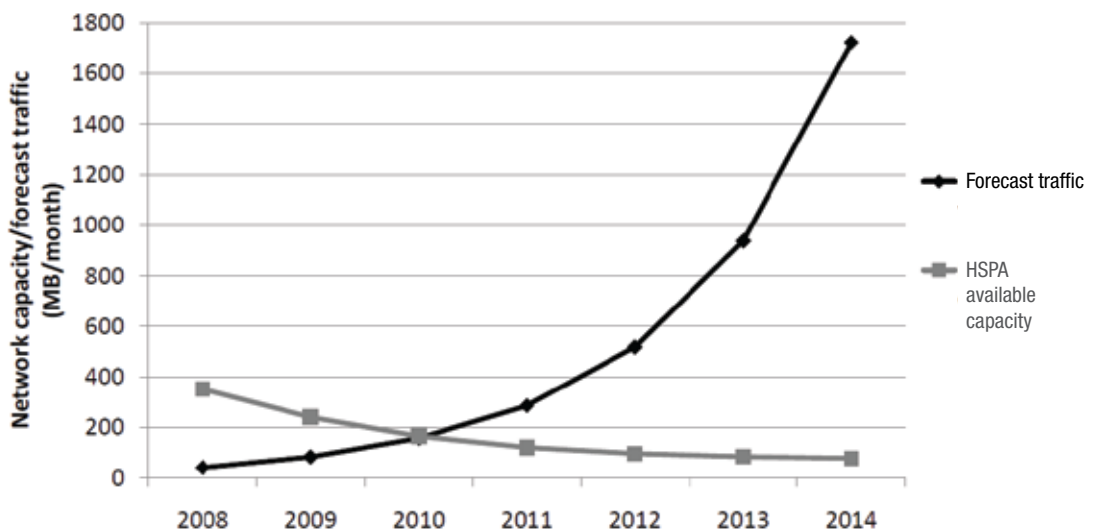
This increase in data usage has a serious impact on the Mobile Network Operators's daily business:

- > More pre-paid data subscriptions
- > Network congestion
- > Increased data traffic vs. declining revenue
- > Unmanaged connected devices
- > Bad user experience
- > Increased churn rate

3G operators need to look for complementary ways to deliver services to mobile users, such as making effective use of WLAN access points and side-loading.



MNOs run out of capacity



Sources: Unwired Insight, 2009

2.2.1. Network Congestion

Because of the increase of mobile data usage, network operators are facing network issues like network congestion which leads to a bad user experience and churn.

Video streaming seems to be the killer service for consumers, unfortunately it is literally also a “killer” for the Mobile Network Operators:

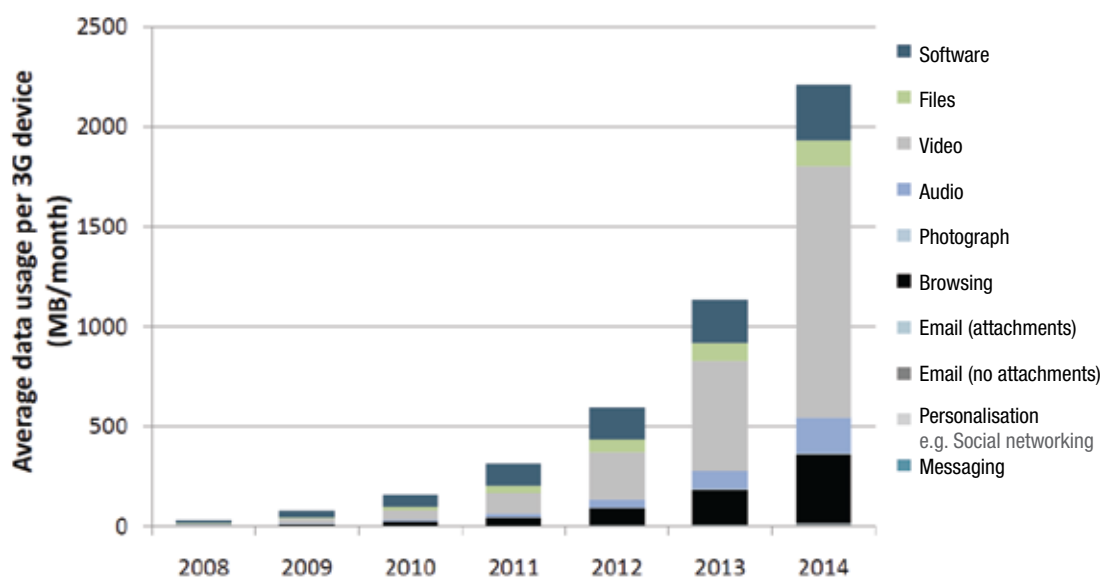
In 2014, the mobile data usage could increase by factor 20, of which video streaming will be the biggest part. The single largest factor leading to cell congestion remains P2P file-sharing which accounted for 34% of bandwidth utilization in the top 5% of utilized cells. This is nearly three times P2P's bandwidth utilization of 12% in the average cell (Source: Allot Communications, Mobile Trends, H2 2009).

FCC concerned about Apple iPad causing 3G network congestion

Apple's iPad announcement has set off a new round of reports of networks overburdened by a data flow they were not built to handle. These problems are reminiscent of the congestion dialup users experienced following AOL's 1996 decision to allow unlimited internet use. For months users had trouble connecting and, once they did connect, experienced frequent service outages. The FCC even held hearings on the problem.

Source: Federal Communications Commission's Broadband.gov blog

Increase by a factor of 20



Sources: Unwired Insight, 2009

Key Findings from H2, 2009

The most striking result to emerge from the Allot MobileTrends Report is how streaming video has become a mainstream medium and is the single most influential factor driving the need for increased network capacity. The exponential global and regional growth in video streaming indicates that much of this increase is due to a shift towards more real time, user-generated, on-demand content where the user is both broadcaster and viewer. This is most clearly highlighted with YouTube, which with 10% of global bandwidth, is clearly a major player in the future of mobile broadband.

Mobile broadband networks are still facing the same challenges as fixed networks – growing bandwidth demands, congestion, enhancing the user experience and the ability of a few subscribers to negatively impact network resources.

Source: Allot Mobile Trends, H2 2009

2.2.2. Connection Management

Network operators and end-users are confronted with many different connection managers with each newly launched USB data stick and/or operating system each with a very different user interface. This can cause a bad user experience resulting in increased churn rates.

As an example of the complexity an operator can face with connection manager software, we take an example of operator group who has presence in 10 countries/regions and has 25 different brands (including MVNO brands). In theory, they will have a connection manager for every country that could come from different suppliers, having different languages and different brands. In addition, most also have another supplier for their MAC OS connection manager. In total that makes $10 \times 25 = 250 \times 2$ (MAC) = 500 different connection manager builds the product marketing, support and test departments of that operator group has to manage. This complexity results in very high costs, not only in development and testing, but also in support and maintenance.

All these different variants of connection manager software have a serious impact on the support organization of an operator. Support centers need to be trained for every variant. The fix for each problem reported or user issue to be fixed may have to be duplicated across multiple different code bases. Minor changes to support new network features become major, complex projects. This complexity increases the risk of a huge amount of end-customer calls with the launch of every new product or variant.

Furthermore, end-users are confronted with many different versions of connection managers, each having a slightly different look-and-feel and inconsistent terminology and features. This causes a bad user-experience translating into an increased churn rate.

2.2.3. “Bill Shock Syndrome”

Mobile data use has increased not only nationally, but also internationally and new challenges have arisen, like the “bill shock syndrome”.

A “bill shock,” can be defined as the paralyzing, panicky feeling you have when you get your wireless bill and are stunned to see a multiple of your usual data plan (national and/or in roaming).

Last year the European Union required wireless carriers to inform mobile data users when they are close to reaching their data limit (which is set by default at € 50) on their monthly data plan and cut them off when it is reached.

In the US, some wireless carriers already offer similar services, but the FCC is investigating putting in place a requirement for carriers to offer this. The FCC opened a public comment period to discuss, amongst other things, whether or not to impose stricter rules forcing wireless carriers to give consumers more warnings about pending charges.

Avoiding bill shock is good for consumers and ultimately good business for wireless carriers as well since making charges predictable for customers encourages usage.

The EU legislation is also a potential trap for operators. If consumers are just cut off at € 50 then for some this will interrupt an important activity that they would have been prepared to pay for and for others the limit may already be too high.

“French café owner gets
46,000 euro phone bill”

(Der Spiegel, November 16 2009)

“Oh look, another insane 3G
data bill. \$ 62,000 to download
Disney’s Wall-E via laptop card”

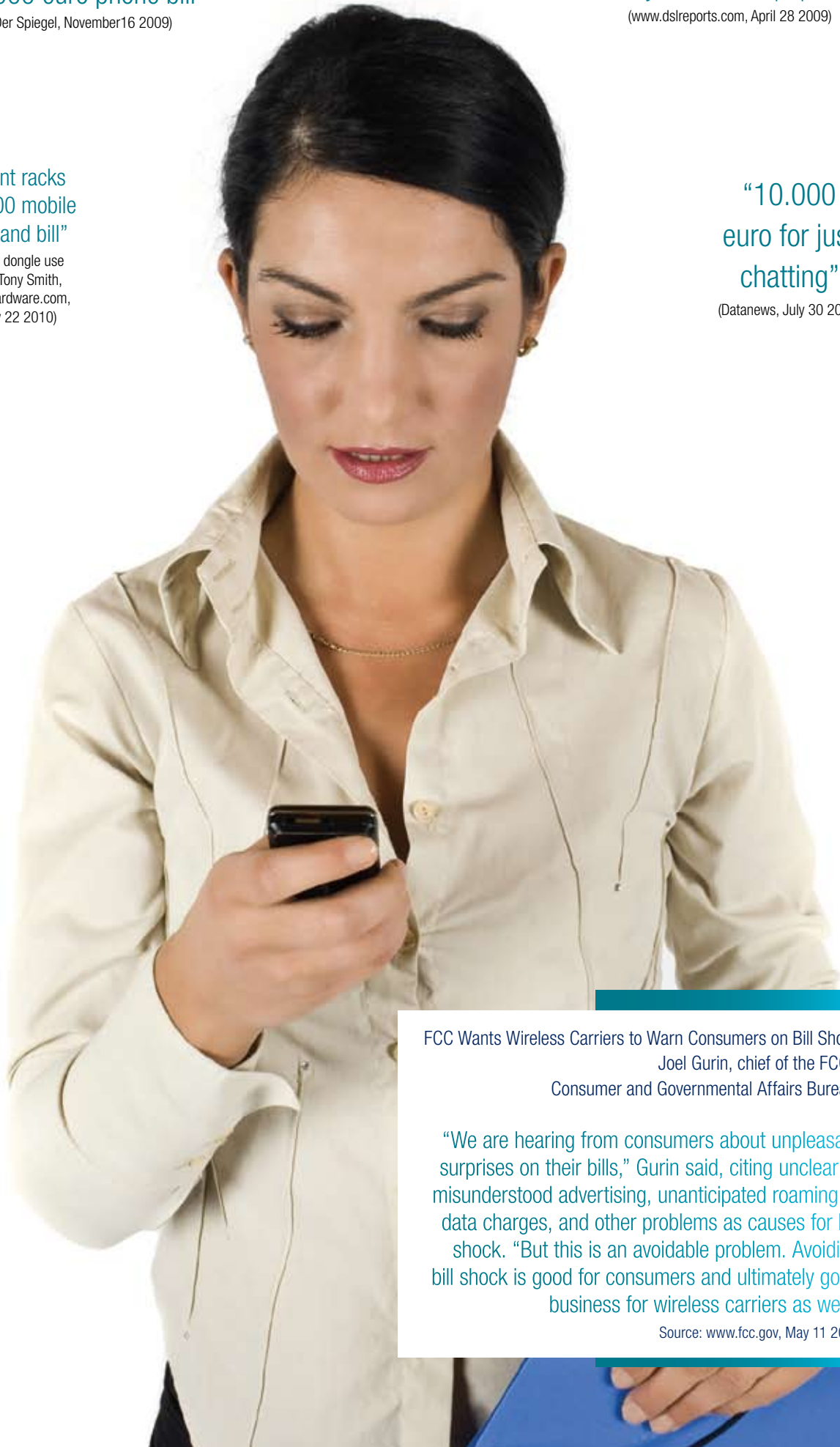
(www.dsireports.com, April 28 2009)

“Student racks
up £8000 mobile
broadband bill”

(Overseas dongle use
warning, Tony Smith,
www.reghardware.com,
February 22 2010)

“10.000
euro for just
chatting”

(DataneWS, July 30 2009)



FCC Wants Wireless Carriers to Warn Consumers on Bill Shock
Joel Gurin, chief of the FCC’s
Consumer and Governmental Affairs Bureau:

“We are hearing from consumers about unpleasant surprises on their bills,” Gurin said, citing unclear or misunderstood advertising, unanticipated roaming or data charges, and other problems as causes for bill shock. “But this is an avoidable problem. Avoiding bill shock is good for consumers and ultimately good business for wireless carriers as well.”

Source: www.fcc.gov, May 11 2010

EU Regulation on roaming

As from 1 July 2009, costumers roaming in another EU Member State will not only benefit from lower prices for making and receiving calls but also for texting when abroad and using data services. As required by the current roaming regulation, the Commission and national regulators have closely monitored price developments for text messages and data services. On the basis of such monitoring, the Commission reviewed the Regulation and decided to include text messages and data services.

Source: extract from EU website New proposal for reducing roaming prices

EU regulation on roaming has already addressed this issue in 2009.

What is the EU roaming regulation?

The new rules will:

- > Protect consumers from “Bill shocks”
- > Impose a € 50 spending limit

3. Turning challenges into opportunities

3.1. Unified Connection manager

Option's μ CAN® Connect is the first truly cross platform connection manager. It is built from one single code base across multiple different operating systems and versions. μ CAN® Connect was developed with a modular approach; its unique Smart-Skinning engine allows it to adapt automatically to your customer's needs. The Smart-Skinning engine loads separate hierarchical customization files that can modify every element of the customer experience; including logo, background, buttons, hyperlinks, languages and help files. The customization can dynamically change responding, for example, to a specific inserted product or SIM card, enabling the product to fully reflect MNO operating company, corporate customer or specific resale channel branding and identity. The simple insertion of a specific operator SIM card causes the Smart Skinning engine to automatically change the GUI to match that operator's logo, colours, language, APN, buttons, hyperlinks and help files. The help system even automatically adapts to both the SIM and connectivity product being used by the customer showing relevant information with correct product images.

The combination of μ CAN® Connect's Smart Skinning and Cross Platform Codebase allows operators to have one single software version, supporting different operating systems and including all its different affiliate brands and languages.

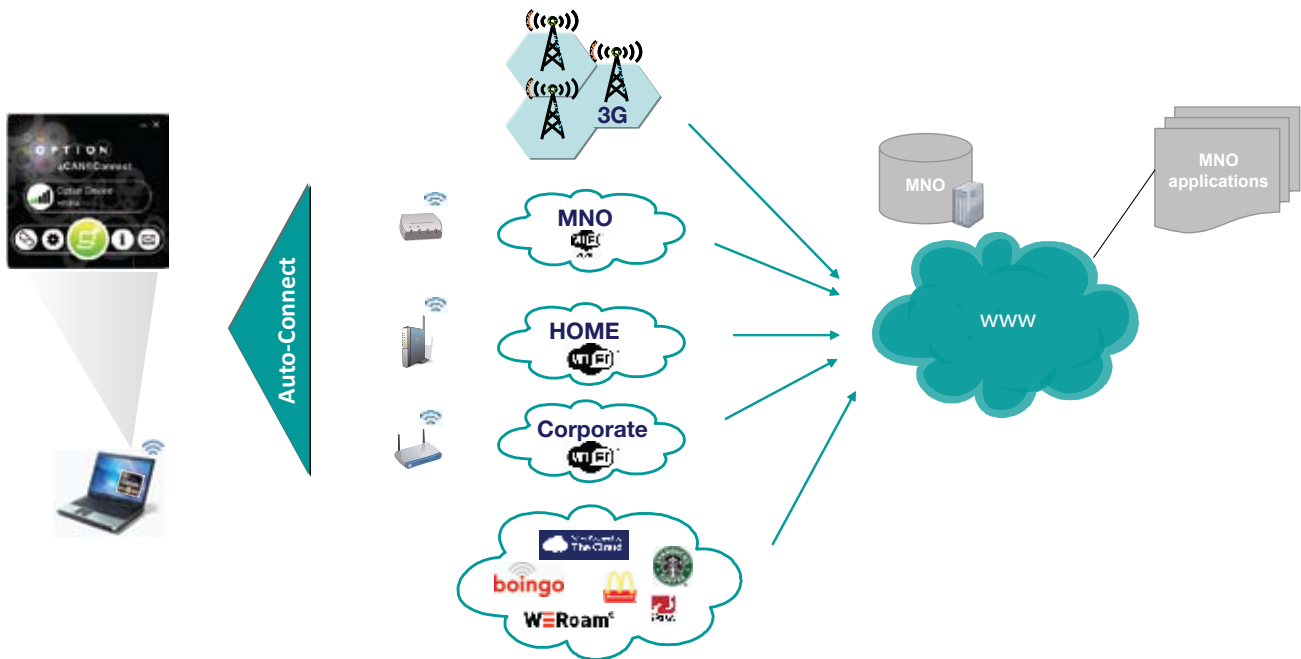
This has a dramatic effect in reducing training, development, support and supply chain costs.

μ CAN® Connect can grow in features as an operator's needs evolve. It was designed right from the start to be modular. The following sections look at some of the feature packs that can be added to μ CAN® Connect.

True Cross-platform: same user interface and single code base (Linux, Mac & Windows)



WiFi Offloading



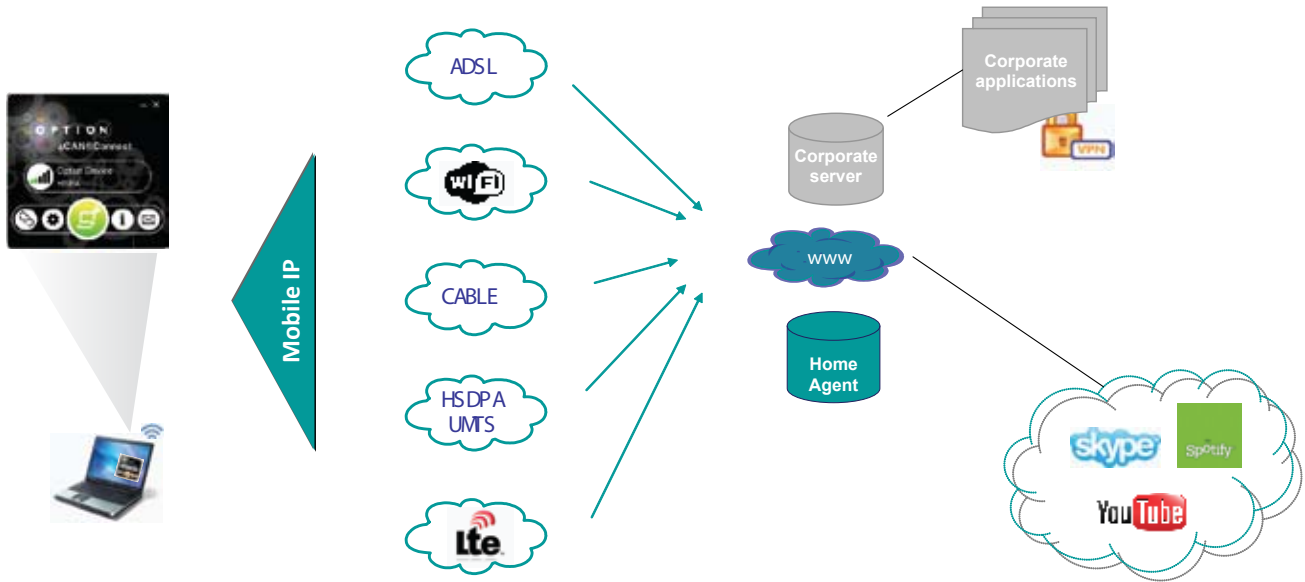
3.2. Mobile data seamless connection – WiFi Offloading

The key is to ensure a seamless user experience while selecting the most efficient and lowest cost network connection.

In general, the most straight forward solution is to offload data in an automated way via WiFi access. This allows the service provider to deliver a seamless and secure user-experience when moving between network technologies.

Option's *uCAN*[®] Connect is able to manage WiFi access to any network in an automated way switching automatically and seamlessly between different mobile broadband technologies (delivered over HSPA, 3G UMTS or EDGE), WiFi hot-spots and DSL. The end-user's broadband connection will be transparently off-loaded once one of the defined WiFi access points is recognized by the Connection Manager. Authentication across these different access technologies is handled automatically by WiSPi or EAP-SIM technologies, eliminating the need for customers to manually log in to different networks.

Zero Click Connectivity



Zero Click Connectivity

Along with the WiFi Off-load manager, uCAN® Connect also provides the option of Seamless Connectivity based on Mobile IP technology. This preserves the customer's experience by making the continuous process of delivering the best possible connection to the operator's end-customer device completely transparent to the customer's applications, even masking temporary drop-outs in the network.

Option's Mobile IP feature is interoperable with most common Mobile IP servers in the market (e.g. Cisco's HomeAgent).

Significantly with Off-loading and mobile IP, Option's connection manager provides network handovers that are seamless and transparent to any applications being used by the customer.



The end-user will get a pop-up warning message
 “You have reached your limit”



3.3. Bill shock prevention – Policy management

Option’s uCAN® Control is a service that informs roaming customers with uCAN® Control about:

- > The different rates in the roaming country per operator
- > The actual usage per service
- > Reaching their threshold
- > Furthermore, it will redirect the customer free of charge to a landing page when the cut-off limit is reached with the possibility to extend its roaming limit

The service reports data in real time with 99.9% accuracy but uses little bandwidth on the network.

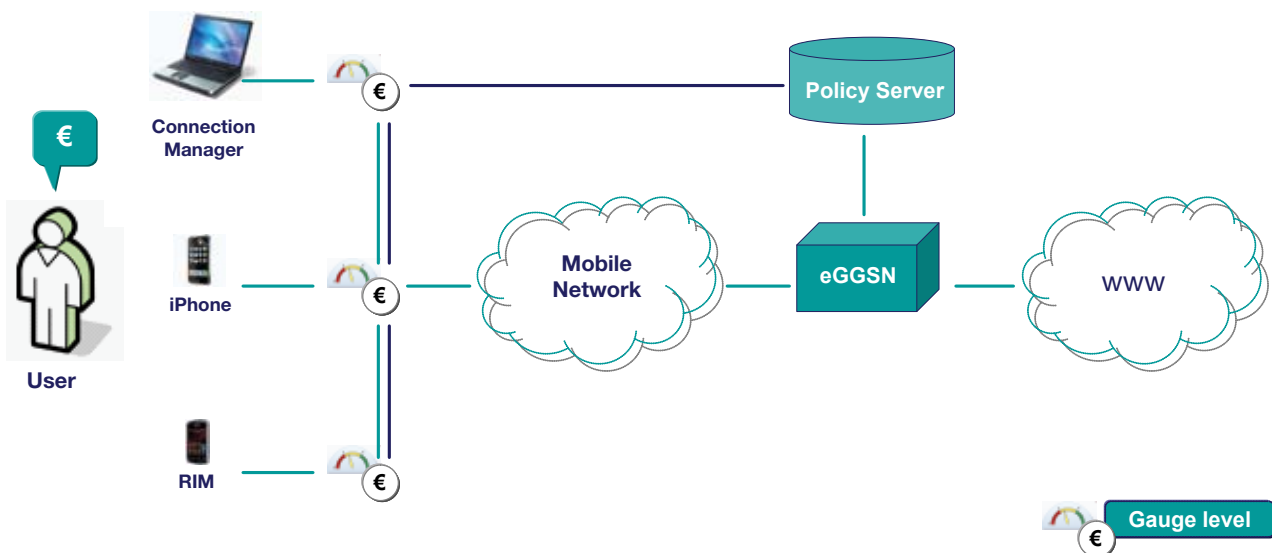
Option’s uCAN® Control service is a full end-to-end solution which requires minimal integration into network components (e.g. GGSN, SMSC ...).

The Option solution includes:

- > A Policy Control server with PCRF for data usage (national & roaming)
- > A fully integrated user interface in Option’s Connection Manager uCAN® Connect (Windows, Linux & MAC)
- > An independent Smartphone client for end-users (Symbian, iPhone, Android, Blackberry...).
- > An SDK that allows other ISVs or service providers to have the uCAN® Control feature incorporated into their own connection manager

uCAN® Control reduces support calls and costs associate with bill shock issues and encourages usage by giving end users clear, up to date information about how much they are being charged.

Solution overview:



3.4. Focus on usability and a growth platform for future

A connection manager doesn't just stop at connection management. It can breed a new ecosystem of valuable end user services. By grouping these services inside the connection manager platform with a consistent user interface, MNO's can improve their customer's experience and improves stickiness and for reduces churn.

These services can generate new recurring revenue streams for mobile operators. *uCAN® Connect's* open partner SDK allows partners to tightly integrate their service into the connection manager user experience.

For example Option has partnered with www.Soonr.com to offer a best in class cloud backup and storage service. Combining a high end cloud service into the connection manager offers end users the possibility of securely storing files in the cloud and to back up and restore files at any time. The cloud service also allows end users to print, fax, share files within a project team and access all content via most available smart phones.

Option is also building the ability to deliver personalized marketing campaigns with location based services into *uCAN® Connect*. *uCAN® Connect's* licensing and update servers deliver a new dimension in connection manager and device management and provide valuable insight about customer behavior allowing support departments to be more pro-active and reducing customer care costs.

Option's *uCAN® Connect* is more than just a connection manager it is a powerful platform that delivers a next generation customer experience.

4. Option's Advantages

The key advantages of the *uCAN® Connect* platform:

- > True Cross-platform: same source code & user interface for MAC, Linux and Windows
- > Smart-Skinning: auto switch by SIM insertion (logo, color, language, hyperlinks, application buttons, etc. . .) or manual.
- > Modular extensions
- > Multi-Network Interworking: Auto-connect through 3G & WiFi
- > WiFi Offloading: Auto-Connect (WISPr, EAP-SIM. . .)
- > Seamless Connectivity: Session continuity on multi-networks (Mobile IP on 3G, WiFi, DSL, ADSL. . .)
- > *uCAN® Control*: inform the end-user with 99.99% accuracy of their data plan usage and warn when roaming
- > Launch external applications directly from user interface

A Policy Control & PCRF Management service platform:

- > Inform the customer on:
 - the different rates in the roaming country per operator
 - the actual usage per service
- > Warn in case a threshold is reached
- > Redirect the customer
 - free of charge to a landing page when the cut-off limit is reached with the possibility to extend its roaming limit
- > Independent Client available for desktop and most common Smartphone's
- > Incorporated into the Connection Manager (*uCAN® Connect* or any other connection manager via SDK)

5. Conclusion

Option delivers the full solution to allow operators to enhance the usability of their services, increase customer satisfaction while controlling costs. It provides a solution now and a growth path for the future.

When the desired software & service has been selected, Option can further assist with the integration and operation tasks you need to bring your mobile broadband experience to the next level. Whether you are looking for standard connectivity or highly customized connection management & services, Option is the right choice to make.

The information presented in this document can serve as an initial guideline to the portfolio of available software & services. For a more detailed discussion, please contact sales@option.com.

6. About Option®

Option®, the wireless technology company, is committed to bringing mobile broadband solutions to market that can help you acquire new customers, retain your existing ones and enable reductions in supply chain and customer support costs.

A pioneer in wireless data communications since 1986, Option is headquartered in Leuven, Belgium. Our Research & Development is carried in Leuven. Our specialist software development team is located in Augsburg, Germany, while our logistics facility is based in Cork, Ireland. We also have sales offices in Europe, US, Asia, Japan and Australia.

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