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Telesperience data report

Utilising offloading and traffic shaping to optimise capacity and deliver commercial success

VOLUBILL
CHARGING AND POLICY

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Sponsor's message

An explosion in mobile data usage and the transition to a flatter All-IP mobile network architecture present a challenge to mobile operators, but also create an opportunity to save costs and enhance the end-user experience. How operators can profile and control subscriber usage, how it can be capped or throttled, and how some subscribers can be given priority over others have long been items of discussion in the telecommunications industry.

The research behind this report, commissioned by Volubill and conducted by Telesperience, reaffirmed some of the trends in the adoption of congestion management techniques that, as a policy vendor, we have seen being considered by our customer base – traffic shaping and offload being the most prominent and current.

The research also reinforced that this happens in stages: beginning with the somewhat primitive throttling of the network (at the expense of SLAs), through to a number of more sensitive, dynamic and effective techniques that are now being deployed or considered. In the case of traffic shaping and offload, the former has already seen significant adoption, while the latter appears to be in the next phase.

The decision that a service provider makes regarding its traffic shaping and offload strategies are very much dependent on its size, number of subscribers and geographical location, and it is clear that one solution does not fit all.

At Volubill we have seen many of the issues discussed in this report first hand while supporting our customers' traffic-shaping and offloading projects, and we continue to work in collaboration with partners to assist with the evolving challenges of mobile data usage growth. For more insight into this topic or to find out how we can help you solve these issues as they evolve, please visit www.volubill.com. In the meanwhile we very much hope you enjoy reading this report and find the results of the research thought-provoking and useful.

John Aalbers
CEO, Volubill

Telesperience data report: utilising offloading and traffic shaping to optimise capacity & deliver commercial success

1 Management summary

There has been a lot of talk recently about the capacity crunch and how to deal with it. Initially, CSPs managed the challenges presented due to rising data traffic in mobile networks using reactive, frequently unpopular and fairly blunt instruments such as throttling and capping. More recently, there has been considerable evolution in terms of approaches to, and understanding of, how traffic can be managed optimally. This has seen a certain amount of experimentation, as well as the use of more advanced and combinations of techniques to meet the requirements of individual service providers. More sophisticated approaches are better aligned to optimising network performance while also meeting subscriber needs and desires, and supporting commercial goals such as creating new revenue streams.

CSPs have a range of options available to them in terms of how they choose to manage the effects of rising data traffic on their networks while maintaining profitable services and keeping their customers happy. There is no single "right" option or "right combination". Rather CSPs will pick the options that are right for them according to their circumstances with regard to networks, competitive position, their commercial strategy, customers, suppliers and the legal and regulatory position extant in the markets in which they operate.

CSPs are transitioning as they gain experience from an exclusively internal or operational focus which manifests as needing to optimise network performance, to balancing these goals with commercial ones and meeting the needs of customers. Telesperience believes that CSPs should maintain a customer-focused perspective and put the customer at the heart of their offloading and traffic shaping strategies, in order to ensure their success. We think CSPs need to ensure whatever they do makes both operational and commercial sense. Success in this area depends not just on having the technical know-how and infrastructure to offload and shape traffic optimally; but also the ability to combine this with an effective business and customer strategy.

1.1 Summary of key issues and findings: offloading

Offloading is a relatively new technique and CSPs are less advanced in adopting offloading techniques than traffic shaping techniques. Like traffic shaping, it is not a single technique but a range of techniques that can be used singly or in combination to alleviate the effects of demanding services (such as video) upon the radio network.

CSPs are rapidly evolving their understanding and use of offloading – investigating smarter solutions that offer a more seamless experience for customers. They are also interested in adopting strategies

that maintain their position in the value chain, monetise the offering and ensure they don't simply hand over their subscribers to, for example, rival VoIP providers.

Some offloading techniques are more popular with customers than others, but this is a highly fluid situation and may change depending on exactly how the CSP offers the technique to customers, and other circumstances. For example, many customers object to paying extra for femtocells, but these could eventually be bundled in with the subscription in the same way that WiFi routers are with broadband subscriptions today. Likewise, currently customers are content to offload using fixed broadband capacity because it is often unmetered (so long as it is convenient). If this situation changes – i.e. fixed broadband providers start to meter and charge more for higher usage – then this situation might change.

The success of offloading strategies is highly contingent on having an offer that is seamless and convenient for customers, and makes business sense to all parties.

Key findings from the expert study:

- 20% report currently using offloading – this rises to 73% by the end of 2012
- RoW region currently leads in adoption (31%), with Europe (11%) and North America (13%) trailing
- Europe intends to aggressively adopt offloading strategies – by the end of 2012, 88% of European experts expect to be using it, 77% of RoW experts and 51% of North American experts
- Globally, just over one-quarter (27%) of experts currently have no plans to adopt
- The main drivers to adoption are the desire to optimise current capacity (67%) and to bridge the "capacity gap" until networks can be upgraded (60%)
- Only 3% report offering uploading in order to meet customer demand
- The main barriers to adoption are fear of cost (65%) and worries about integration issues (55%)
- WiFi offload is currently edging ahead as the most common form (33%) against femtocells (30%), and this looks set to continue
- CSPs tend to utilise multiple forms of offload rather than necessarily favouring a single technique.

1.2 Summary of key issues and findings: traffic shaping

What is apparent from Telesperience's ongoing research is that a large proportion of CSPs are rolling out, or intend to roll out, differentiated QoS-based offerings. Such services offer the potential not just of helping them manage the effects of the capacity crunch, but also of creating new revenue streams and meeting the needs of customers. However, this is an area of technology and business practice that is not without controversy, as it is caught up within the bounds of the Net Neutrality Debate which continues to shape the strategies CSPs can use. In the States, there is still regulatory uncertainty and vociferous debate around traffic shaping in particular. Net Neutrality is seen as an issue of "freedom" and the mood amongst consumers is suspicious even when not actively hostile.

In other world regions, however, the debate and attitudes are significantly different. In Europe, for example, many consumers see traffic shaping as a matter of "choice" – allowing them to choose service parameters they need and are willing to pay for. Competition and the ease of changing service provider means that Europeans do not feel quite as concerned about traffic shaping, so long as they understand exactly what they are paying for. Thus transparency is the key concern - both for customers and increasingly for regulators. It was interesting to see, in March 2011, the Broadband Stakeholders Group announcing that UK broadband providers had signed a code of practice that would make subscribers aware of, and understand, the traffic management policies used in delivering

their services. The signatories account for 95% of all fixed line broadband customers and 90% of all mobile customers in the UK. The aim of the initiative is to stave off the need for regulation by providing sufficient information to enable customers to make informed choices about the services they are buying.[1]

Key findings from the expert study

- 47% of CSPs are using traffic shaping techniques today
- 97% of CSPs say they will be using traffic shaping techniques by the end of 2013
- Europe is the most advanced region in adopting traffic shaping (67%) followed by North America (38%) and Rest of World (33%)
- By 2013 all the experts in Europe and Rest of World think they will be using traffic shaping techniques
- The most common barrier cited to adopting traffic shaping techniques was the worry they would not be popular with customers (30%)
- The most common traffic shaping technique today is usage-based tariffs (43% offer)
- The type of traffic shaping technique that CSPs are most interested in offering is differentiated QoS services, with 53% reporting they are currently evaluating or considering. This rises to 83% of the experts we spoke to from the Rest of World region
- Prioritisation by user type is the traffic shaping technique that European operators report most interest in currently – 56% are currently evaluating or considering implementing
- Prioritisation by service type was of great interest to North American CSPs (38% are considering) and Rest of World CSPs (50% are considering)

[1] *See for example: http://www.broadbanduk.org/content/view/479/7/*

2 Alleviating the effects of the capacity crunch using offloading and traffic shaping

2.1 The four main capacity crunch strategies

As data traffic on mobile networks continues to rise, maintaining an adequate quality of service is becoming more challenging. This is not just due to the sheer rise in traffic, but also because today's traffic is different to that we were seeing on our networks only a few years ago. The type of data traffic has transitioned from basic data services (such as email or SMS) to QoS-sensitive and bandwidth-hungry applications such as video. This "ups the ante" in terms of managing and maintaining QoS across mobile networks, because when there is degradation of network quality due to overloading, the effects on applications such as video are immediately apparent at a much lower threshold. In the past, a slight delay in the delivery of an email or SMS would have been unnoticeable to most customers; but a ten second delay in a video stream is obvious and irritating. The risk is that customers will complain and churn as a result, generating additional business challenges and costs. Equally, it may deter customers from using the type of services that CSPs envisage the bulk of future revenues will derive from.

On the network management side of the capacity crunch challenge, CSPs have a number of choices to deal with the consequences of rising data traffic and, like Russian dolls, there are yet more choices nested within each strategy. For example, they can choose to expand network capacity through upgrades; but they must then select how to do this – such as adding more cellsites, upgrading cellsites, rolling out Ethernet in the backhaul and so on. And these choices are also dependent on commercial, regulatory, operational and customer factors such as whether sufficient spectrum is available, how much money they have for upgrades, whether they can easily build or share more towers. In simple terms, however, they have three options: **add**, **optimise** and **avoid**.

Resolving the "capacity gap" in order to maintain network quality is only one facet of the problem, however. The real "killer" issue here is a commercial one: revenues are not rising in line with traffic. This creates what Telesperience terms "the revenue gap". It adds to the challenges because CSPs are faced with rising costs, without receiving compensating revenue rises. This, in turn, constrains their ability to tackle the capacity crunch. To resolve this challenge, CSPs need to find new revenue streams and optimise revenues from existing services. As we show in *Figure 1*, this involves the final element CSPs must include in their capacity crunch strategies – **monetise**.

In this paper we focus on analysing the current status of, attitudes towards, and future plans for one of the key optimisation and monetisation strategies (traffic shaping), as well as an avoidance strategy (offloading).

Figure 1 **Solving the capacity crunch – main options**

Strategy	Examples of options	Timescale	Cost	Popularity with customers	Examples of enablers/barriers
Add	Upgrade network Expand cellsite capacity Add more capacity in backhaul (eg Ethernet) Acquire more spectrum	Largely medium to long term	Medium to high	Generally high	Spectrum availability Sufficient funds for build out or upgrade Ease of adding extra cellsites (e.g. planning permission etc)
Optimise	Traffic shaping (eg time of day or usage-based traffic, throttling or prioritisation by service or user) Content optimisation Optimise downloading & streaming	Short term for traffic shaping and downloading or streaming optimisation; mid to long term for content optimisation	Low to medium	Varies between geographical markets – some traffic shaping techniques are controversial. Important to be transparent when communicating to customers	Policy control and profile mgr are key enablers Billing & realtime charging important Content optimisation requires co-operation of content industry Smart downloading (dynamically adjusting to bandwidth available) requires supporting technology
Avoid	Offloading (e.g. to WiFi, Femtocells or RNC offload) Sideloading	Short term	Low to medium – can be hidden costs for both CSPs and consumers	High to medium (depending on cost and ease of use)	Requires policy control & other technology Requires WiFi and femtocell availability & equipment Sideloading requires fixed broadband access & change in user behaviour
Monetise	Cap or remove flat rate plans Offer time of day tariffs Introduce usage-based tariffing Offer new service options such as paid-for prioritisation, guaranteed QoS, bandwidth boosts etc	Short to mid term	Low to medium	Variable – needs to be carefully presented	Can be as simple as changes to, or enforcement of, terms and conditions Requires billing, charging & policy control technologies Integration between OSS, network systems & data, and BSS systems & data

Source: Telesperience 2011

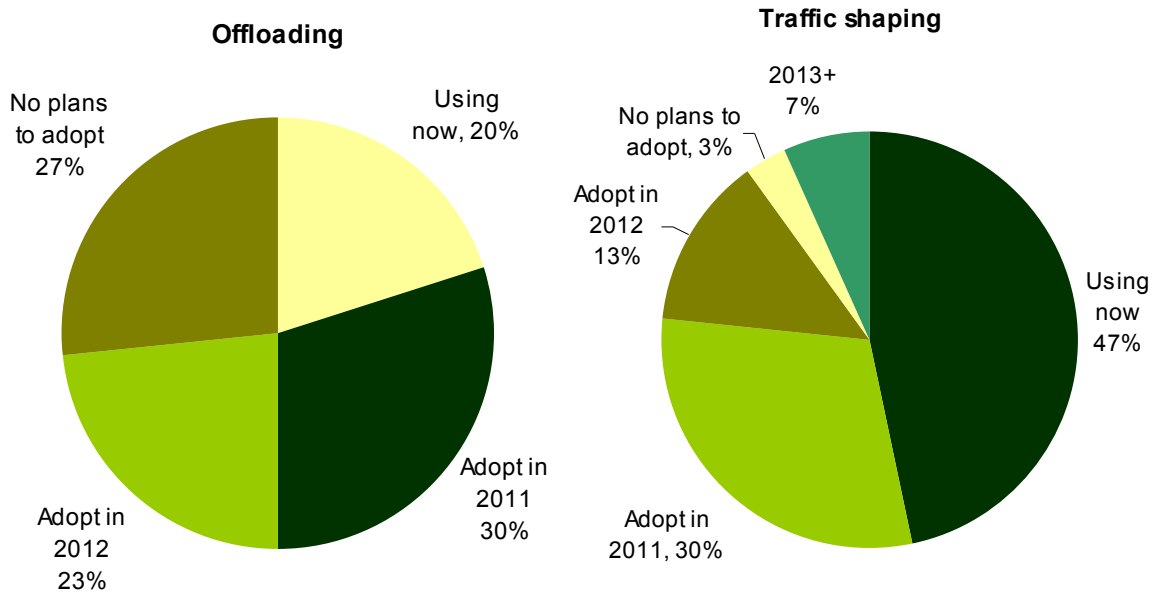
2.2 Status of adoption of offloading and traffic shaping strategies

To find out how useful CSPs thought offloading and traffic shaping strategies were to help them tackle the effects of the capacity crunch, we asked our expert panel if they were currently using either of these strategies. The responses showed that more CSPs were implementing or considering using traffic shaping techniques compared with those currently using or considering offloading:

- 20% reported currently used offloading, but this was set to rise to 73% by the end of 2012
- 47% reported currently using traffic shaping techniques, with this set to rise to 90% by 2012 and 97% by 2013.

It was interesting to see that 27% of operators had no plans to implement offloading at all, compared with only 3% who had no plans to implement traffic shaping (see *Figure 2*).

Figure 2 **Adoption of offloading and traffic shaping techniques 2011-2013**



Source: Telesperience 2011

The global pattern hides some interesting geographical differences (see *Figure 3*). North American CSPs are very similar to European ones in that 11-13 % are using offloading techniques now. However, some 50% of North American CSPs have no current plans to adopt offloading, compared to only 11% in Europe. Elsewhere in the world, more CSPs (31%) are using offloading techniques now, although 23% currently have no plans to adopt at all.

With regards to traffic shaping, 67% of European operators are already using this, and every European expert in the panel expected to be using it by 2013. In North America, adoption is at a lower level currently (38%), and experts expect it to remain at a lower level than Europe (although 75% report they expect to be using in 2013). In the Rest of the World, the level of those using traffic shaping is currently at a similar level to North America, but over the next two years this region intends to aggressively adopt traffic shaping (at an even faster rate than Europe, since they are

starting from a lower current level of adoption), resulting in all experts from this region reporting that they expect to be using these techniques by 2013.

Figure 3 **Regional adoption of offloading and traffic shaping 2011-13**

	Using now	2011	2012+	No current plans
Offloading				
North America	●	◎◎◎◎		○○○○○
Europe	●	◎◎◎	◎◎◎◎◎	○
RoW	●●●	◎◎◎	◎◎◎	○
Traffic shaping				
North America	●●●●	◎◎◎	◎	○○
Europe	●●●●●●●	◎◎	◎	
RoW	●●●	◎◎◎◎	◎◎◎	

Source: Telesperience 2011

● *using* ◎ *plan to implement* ○ *no plans*

2.3 Reasons for adopting traffic shaping and offloading strategies

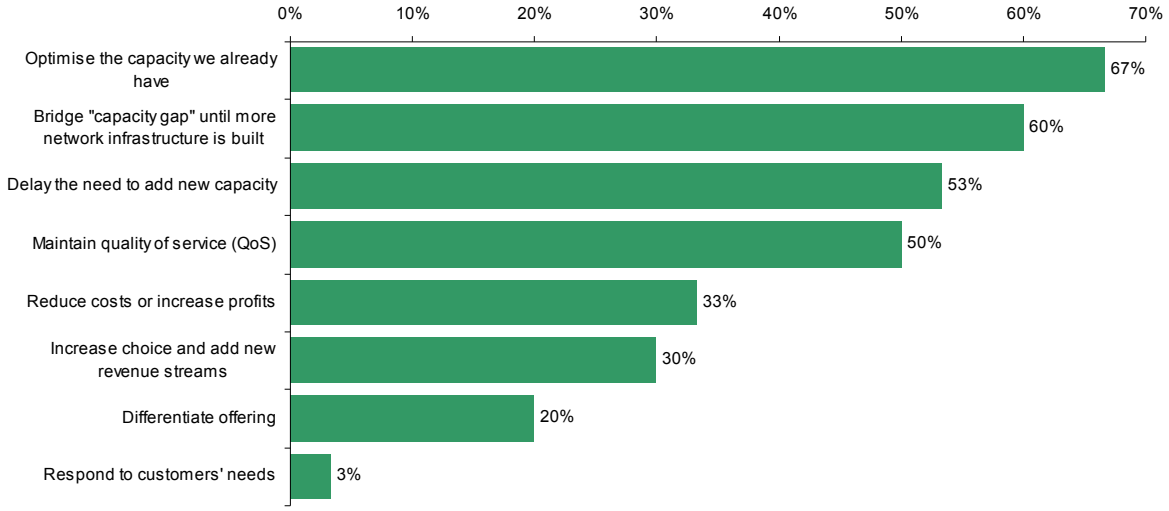
The experts who took part in our research programme told us their primary reasons for adopting traffic shaping and offloading strategies were to optimise their existing capacity (67%) and bridge the gap until they could add extra capacity (60%). Around half (53%) were seeking to delay the cost of adding extra capacity.

Although the results might partly reflect the fact that our experts were from network and IT departments, it is still somewhat disappointing that such a small number recognised the business and customer opportunity within the capacity crunch, and the potential of offloading and traffic shaping to deliver new offers, increase choice and actually delight customers. It was quite surprising that so few (only 3%) said their strategies were motivated by a desire to meet customers' needs (see *Figure 4*). Why are CSPs so focused currently on operational goals? This could be due to:

- lack of end-user demand for subscriber-focused measures or, conversely, lack of understanding of what customers want, or communication of the choices they could have if traffic shaping and offloading techniques are used
- prioritisation of strategies that emphasise internal goals rather than goals that matter to customers. This could be because CSPs feel that these goals are more pressing, or that they understand them better
- achievability - network-focused goals are regarded as being easier to achieve compared with customer focused goals. For CSPs utilising first generation policy management solutions, responding to what customers want, or delivering a more commercially-oriented strategy, could be much harder to achieve with their currently available capabilities than those who have access to more sophisticated solutions.

Telesperience believes that these motivations reflect a relative lack of maturity in both attitudes to offloading and traffic shaping, and approaches being used. We believe smarter and more capable solutions combined with a more sophisticated approach will help CSPs deliver against not just their operational objectives, but also their commercial and customer goals.

Figure 4 **Motivations for adopting traffic shaping and offloading**



Source: Telesperience 2011

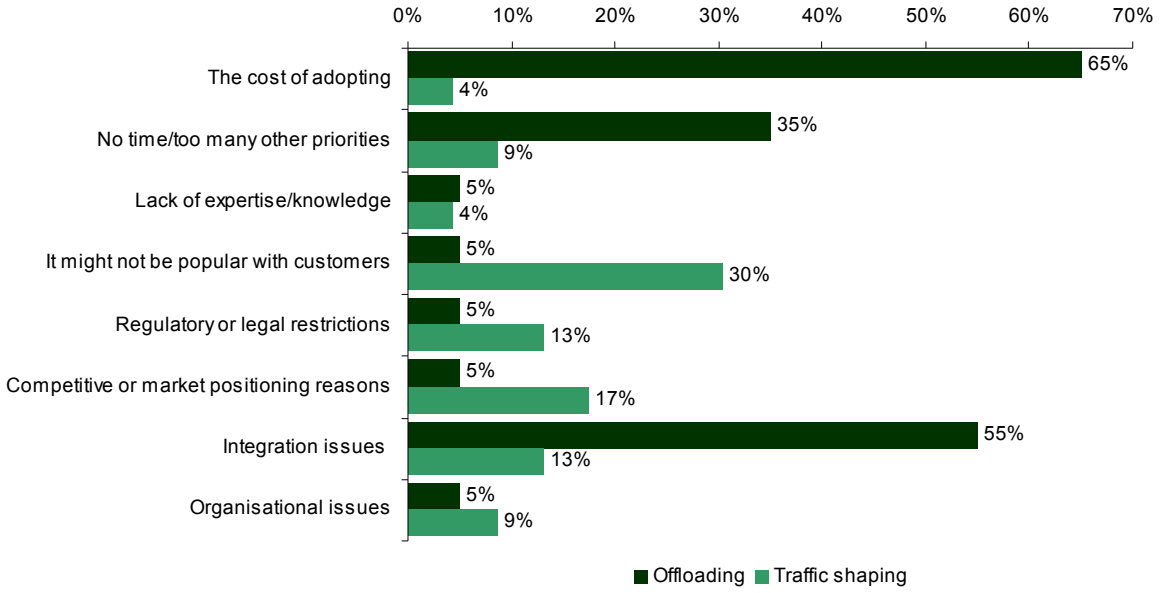
2.4 Barriers to adoption of traffic shaping and offloading

We asked CSPs what concerns them about adopting traffic shaping and offloading techniques (see *Figure 5*). Around one-third said they had no concerns about adopting offloading, and around one-quarter had no concerns about traffic shaping. The study did not reveal why they had no concerns and whether this was due to feeling fully knowledgeable and in control, or ignorant of the complexity and implementation issues. For offloading, however, those expressing "no concerns" correlated to some extent with those who have no current plans to adopt.

Those CSPs that did have concerns expressed different worries regarding the two sets of techniques:

- those considering adopting offloading strategies were worried most by the cost of adopting (65%) and integration issues (55%)
- the most common concern expressed by those considering adopting traffic shaping was whether the strategy would be popular with customers (30%), though readers should note there was a far wider spread of concerns for this strategy. It is possible that CSPs have fewer concerns regarding implementing traffic shaping than offloading, however, because they have more experience of traffic shaping techniques and strategies.

Figure 5 **Barriers to adopting traffic shaping and offloading**



Source: Telesperience 2011
Chart shows the percentage of those CSPs who do have concerns about each technique, excluding the ones who said they had no concerns

3 Adoption of offloading and traffic shaping techniques

3.1 Offloading techniques

The main aim of offloading strategies is to "avoid" having to carry traffic unnecessarily in order to maintain QoS on networks and contain costs – particularly traffic that is causing network congestion without creating any additional, incremental revenue. It involves realtime re-routing of traffic from parts of the network where congestion is occurring to another part of the network, or to another type of network where capacity is available; for example, this could involve rerouting traffic via WiFi or femtocells (miniature 3G cell sites on customer premises).

Some types of offloading can save CSPs tens of millions of dollars per year - for example, by reducing demand on the core network capacity, avoiding the need to add extra capacity and supporting better QoS. Ultimately, well implemented offloading also enhances the customer experience and thus reduces complaints and churn (saving even more money). Offloading is not a single technology: there are a number of "flavours" of offloading that can be used – each of which diverts traffic in a different way as shown in *Figure 6*. Even within each type of offloading there are different ways of achieving it, and different levels of sophistication.

Figure 6 **Offloading techniques**

Type of offload	Description	Comments
WiFi	Uses customer or third-party links such as DSL, DOCSIS, T1/E1 or WISP to divert traffic from the mobile network. There are different types of WiFi offload ranging from scenarios where just data services such as video are offloaded, to those where all services are offloaded while the customer is within range of the WiFi network. More advanced scenarios support seamless roaming from the CSP network to the WiFi network	Although this is commonly covered within the bracket of offloading, it is more properly a network bypass technology. Advantages to WiFi offloading include the widespread deployment of WiFi, and the increasing widespread rollout of smartphones with WiFi capabilities. Some forms of WiFi offload can be insecure and/or drain battery power
Interworking WLAN (iWLAN)	Supports a secure WiFi connection to the core network so that customers can use public IP access networks – combining eg WiFi with 3G networks. The technology is based on the 3GPP Interworking WLAN for Data Offload (IWLAN) standard, which was designed to support rich data services such as streaming audio and video	Works by opening a VPN/IPsec tunnel from the device to the dedicated IWLAN server in the core network. The main advantage offered is security, but a common question raised about iWLAN is whether there is any advantage to routing Internet traffic through the core network
Femtocells	A small cellular base station which is designed to be used in the home or office. It connects to the CSP's network via broadband (such as DSL or cable). As of December 2010 18 operators were reported to have rolled out femtocells. A home node B is the 3GPP's term for a 3G femtocell	The cost of femtocells to customers has retarded rollout. Femtocells are also frequently tied to a particular CSP, so if a customer churns they will require a new femtocell. Although the business case for femtocells may make sense to CSPs, some customers have questioned why they have to "pay twice" for what they see as shortcomings in the mobile network
RNC	This type of offloading separates out internet-bound traffic via a gateway that sits between the RNC and the SGSN. The policy manager sits at the edge of the network, orchestrating content and services at the edge, and thereby freeing up the core. This brings internet content & services closer to the subscriber, reducing latencies associated with connection quality, as well as supporting core capacity transport/upgrade cost avoidance	As with other types of offloading there are both smart ways of performing RNC offloading and less smart ways. When combined with policy management, traffic can also be prioritized according to predefined criteria such as type of service, customer type and so on. Traffic offloaded in this way bypasses the billing functions of the GGSN and therefore if this traffic is to be charged for, RNC offload needs to be combined with realtime charging and policy control technologies
IMB	IMB enables broadcast of content at the cellular transmitter level using 3G or 4G spectrum. It was part of Release 8 of the 3GPP standards and was endorsed as the preferred broadcast standard by the GSMA in late 2009. In October 2010 a three month IMB pilot begun in the UK	IMB is a relatively new type of offloading that is currently being tested by CSPs therefore more analysis of its strengths and weaknesses will become available later in 2011 when the findings from trials are revealed[2]
WiMAX	WiMAX is based on the IEEE standards 802.16d and e. It provides "last mile" wireless broadband access. There are thought to be around 360 WIMAX operators worldwide, although some have announced their intention to move to LTE	Offloading to WiMAX is obviously dependent on there being a WiMAX network available. WiMAX is being used to provide backhaul to meshed WiFI networks, and may be used for backhaul for LTE networks where it is available

Source: Telesperience 2011

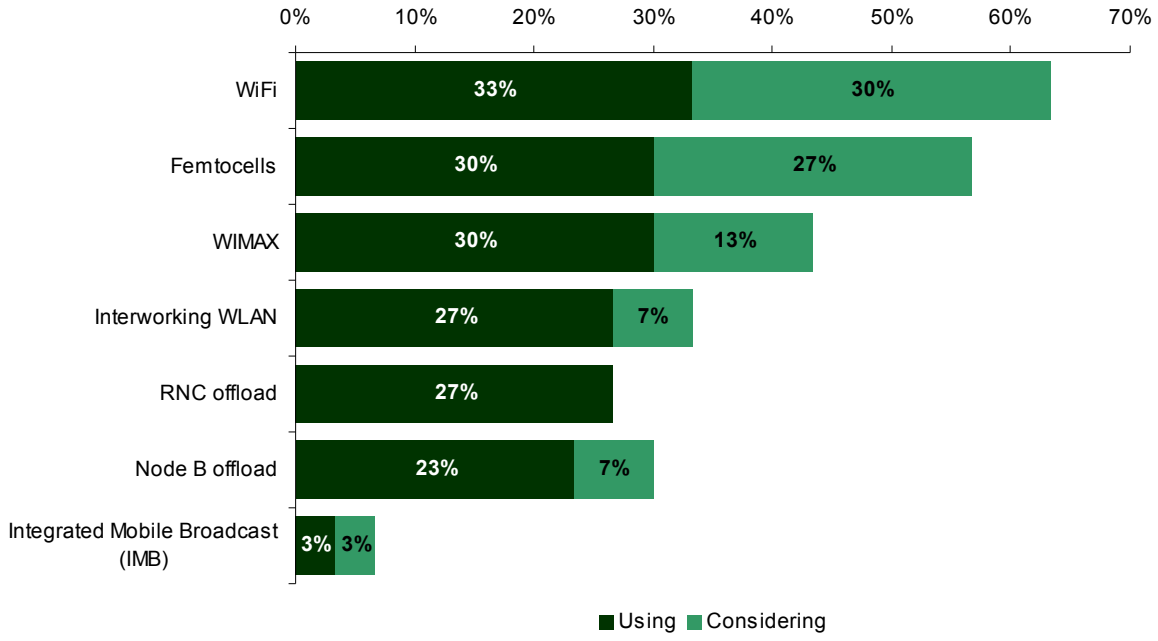
[2] *See for example: http://www.orange.com/en_EN/press/press_releases/cp100622en2.jsp*

3.2 Status of adoption of offloading techniques

We asked experts on our panel which types of offloading they currently used and which they were considering adopting in the next couple of years. As shown in *Figure 7*, the most commonly-used form of offload currently is WiFi (33%), which is slightly ahead of femtocells (30%) and WiMAX (30%). The least popular type of offload currently is IMB, but this reflects its relative immaturity. However, an interesting pattern emerges when we look at the types of offload currently being evaluated, and here WiFi pulls further ahead of femtocells.

This early lead in deployment, and interest in, WiFi offload is reflective of its widespread availability, but Telesperience believes it is also reflective of the fact that as a method it is starting to pull ahead in terms of adoption. There are several reasons for this but a significant one is that on the whole WiFi offload is more appealing to customers, as it does not require them to purchase any additional on-premises equipment.

Figure 7 **Adoption of offloading techniques**



Source: Telesperience 2011

Breaking down the global results by geography showed marked differences, however. Whilst femtocell offload scored highly in the Rest of the World region (58%), only 22% of European experts reported using this currently and no North American operator in our expert panel currently reported using this option. In contrast, WiFi offload was very popular in Europe with about one-third reporting having deployed it and just under half reporting they are considering deploying it. Overall there is a distinct pattern:

- North America is the least advanced of the three regions in adopting offloading techniques; Europe is mid-way in terms of maturity; the Rest of the World region is the most advanced. This reflects the maturity and strategies of the developed Asian markets in particular. It also reflects the availability of, for example, high-bandwidth fixed networks or WiMAX to offload to
- CSPs don't opt for one form of offload or another. Instead they adopt a number of offload strategies in combination

- there is a correlation between size and propensity to adopt offloading – smaller operators are less likely to be adopting offloading currently as they are often not yet seeing such high levels of congestion on their network to require it. In addition, the small operators in this sample are mainly new entrants who therefore have new networks and often excess capacity currently[3]

3.3 Traffic shaping techniques

Traffic shaping (sometimes also called "packet shaping") is a set of techniques used for traffic management. There are two main types of traffic shaping: the first type is used to alter user behaviour to flatten traffic peaks, shift traffic into off-peak periods and thereby alleviate congestion, and largely comprises charging techniques (which optimise and monetise available capacity). The second type of traffic shaping techniques is operational and network-focused. These techniques support better traffic management during periods of congestion in order to maintain QoS. With this type of traffic shaping, rules on how to limit or prioritise traffic during periods of congestion are applied. For example, peer-to-peer file sharing during periods of congestion can result in degradation of service quality overall, and have a negative effect on the experience of all customers. Therefore some CSPs throttle use of such services during peak periods (and some throttle use at all times or for certain customers). As with offloading, CSPs have a number of traffic shaping techniques that they can employ, with some being more sophisticated than others, as shown in *Figure 8*.

Figure 8 **Traffic shaping techniques**

Examples	Description	Level of maturity
Usage-based tariffs	CSPs use usage-based tariffs to monetise capacity and thereby generate revenues to build out extra capacity, but also to restrict usage. Although usage-based tariffing has been used for a long time, many CSPs have employed flat-rate (also called "all you can eat") tariffs when they rolled out mobile broadband data services, thus they are "re-introducing" the element of metering and paying for usage in order to ration supply	Simple (generation 1.0)
Time-based tariffs	This technique was commonly employed with voice calling to shift non-priority calls outside working hours. CSPs essentially use pricing to alter traffic patterns, with more price-sensitive customers taking advantage of cheaper off-peak charges. However, again this is a fairly novel idea for data traffic – and is essentially dependent upon, or rather a refinement of, usage-based tariffing	Simple (generation 1.0)
Throttling	Although the terms "throttling" is used generically to mean limiting available bandwidth in everyday speech, more properly it refers to techniques used to control the volume of traffic sent over the network over a period of time: the network "throttles" the rate at which it accepts data (compare *rate limiting*)	Middle (generation 2.0)

Source: Telesperience 2011

[3] *See Section 5.2 for more information on the demographics*.

Figure 8 **Traffic shaping techniques** (cont)

Examples	Description	Level of maturity for simplest version
Rate limiting	Rate limiting controls the maximum speed at which traffic is sent. Typically during periods of congestion (but sometimes at other times for certain types of services), CSPs slow down the connection speed of specified users (eg heavy users) or those using bandwidth-intensive services (such as BitTorrent, for example). This helps maintain a reasonable average speed for the average user. The CSP may also limit the speed of access once the customer has reached a certain criteria (such as a usage cap), slowing down access for the remaining billing period. More smartly, however, the CSP can offer the customer the opportunity to maintain the rate subject to extra payment	Middle (generation 2.0)
Enforcing fair usage clauses or caps	Although many CSPs have written fair usage clauses and bandwidth caps into their contracts, many were not enforced. Gradually, many CSPs that offered completely unmetered data have introduced caps. If the customer wants to use more data than is provided in the package they either have to buy extra eg by paying per megabyte or moving to a premium package with a higher cap or true unlimited usage; or they may be throttled down to a slower speed for the remaining billing period (eg until the end of that month). Enforcing fair usage clauses and caps was difficult for many CSPs to do until recently	Middle (generation 2.0)
Prioritisation by service	Prioritising certain services is quite normal in mobile networks, with more sensitive services often being prioritised over other, less sensitive services. However, offering more dynamic prioritisation by service type is far more sophisticated, and paid-for prioritisation of services is somewhat controversial (and part of the Net Neutrality debate). The controversy centres on the circumstances where the prioritisation is paid for by the content provider, with worries around anti-competitive behaviour. However, it is possible for the customer to pay for prioritisation of certain types of service either as part of a subscription or on an *ad hoc* basis (see *Prioritisation on an ad hoc basis*)	Middle (generation 2.0)
Prioritisation by user	Traffic from business users, for example, is sometimes prioritised over consumer traffic. However a more sophisticated version is to offer personalised prioritisation which the user opts into	Middle (generation 2.0)
Prioritisation on an ad hoc basis (paid for)	This is related to other types of prioritisation but allows the consumer to receive a faster connection or better QoS for a highly time-limited period. Examples of this type of offering are “bandwidth boosts” and “day passes”	Advanced (generation 3.0)
Offering differentiated QoS services (paid for)	Intelligent traffic shaping enables a guaranteed level of service, which allows the CSP to support different levels of (paid for) QoS to its customers	Advanced (generation 3.0)
Dynamic tariffing according to network load	A more sophisticated, realtime and dynamic version of earlier time-based charging, this enables CSPs to change the cost of using networks dynamically according to network load. When networks are congested, the price rises, and when quieter the price falls	Advanced (generation 3.0)

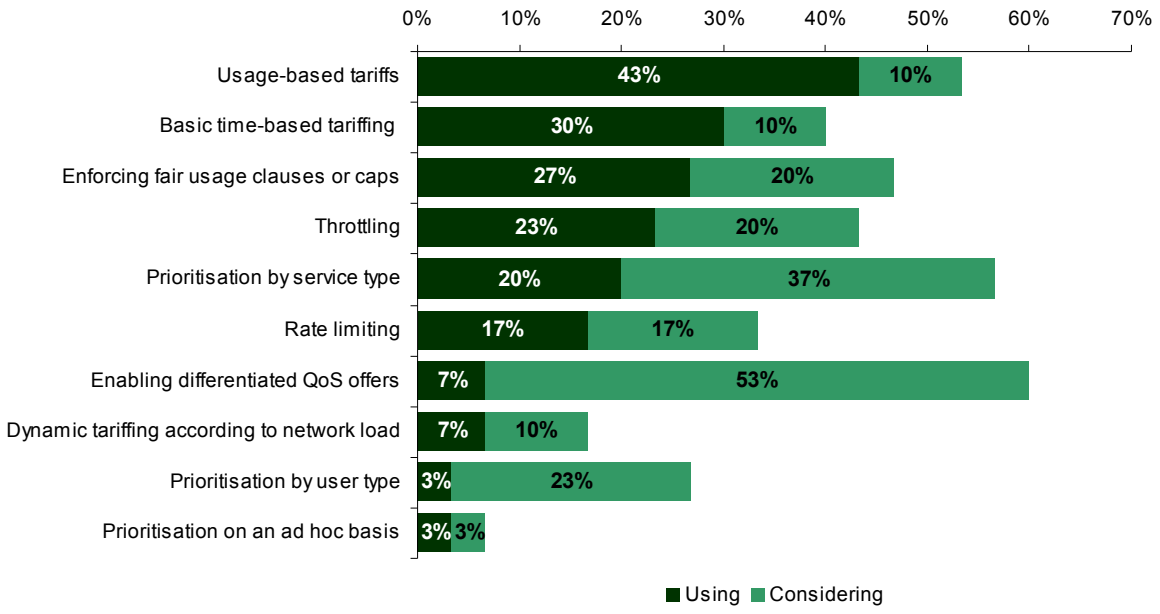
Source: Telesperience 2011

3.4 Status of adoption of traffic shaping techniques

We asked our experts which types of traffic shaping techniques they were currently using or were considering. As shown in *Figure 9*, the types of traffic shaping techniques currently being used map quite closely to their relative sophistication (compare *Figure 8*). Currently, tariffing is the most common way of shaping traffic – either by means of usage-based tariffs (43%) or time-based tariffs (30%). However, our experts reported that the type of traffic shaping techniques they were most interested in adopting were differentiated QoS offers (53%) and prioritisation by service type (37%). If all those currently considering adopting these techniques do so, then these will be the most commonly-used techniques in the near future.

Traffic shaping techniques deliver against both the **monetise** and **optimise** strategies we outlined in *Figure 1*, and the intentions of our experts revealed in *Figure 9* show the continued importance of delivering against both these strategies going forward. In fact, those techniques that are currently purely "optimise" strategies will, in future, become smarter and more sophisticated, enabling a "monetise" dimension to be added. For example, rather than just throttling users, utilising differentiated QoS means customers will be able to select the speed and quality they desire and pay for that. This moves traffic shaping firmly away from just an operational or network focus towards being more customer-centric and more commercial. These more dynamic and sophisticated strategies are enabled by technologies such as policy control combined with realtime charging and realtime control of network management.

Figure 9 **Adoption of traffic shaping techniques**



Source: Telesperience 2011

The global figures shown in *Figure 9* hide distinct regional differences, however. What was interesting was that North American CSPs were fairly coy about revealing the traffic shaping techniques they are currently using – other than those related to charging. In contrast, European CSPs

and those from other world regions are less concerned with talking about the techniques they are using. We know that some North American CSPs are using throttling techniques, but all the North American experts in this sample declined to comment over whether they were currently using such techniques.

We believe that though this is understandable because of the Net Neutrality debate currently in full flow in the US and Canada, and the subsequent poor publicity, lack of transparency is only likely to make the situation worse. Customers should be able to see and understand the conditions of service, and if North American CSPs are not more forthcoming then they are likely to force the hand of regulation while also continuing to experience customer complaints (some of which may be purely due to conspiracy theories related to distrust between customer and CSP, rather than the reality of service). Regulatory uncertainty and the lack of competition in parts of the US market are also factors that appear to be retarding North American uptake of advanced traffic shaping offers.

In contrast, the RoW region is very interested in certain types of traffic shaping, particularly the ability to enable differentiated QoS services. *Figure 10* indicates that Europe and the RoW are beginning to pull away from North America in terms of the relative sophistication of the techniques they are employing.

Figure 10 **Adoption of traffic shaping techniques**

Type	NA using or considering	Europe using or considering	RoW using or considering
Usage-based tariffs	●●●●	●●●●●●	●●●●●◎
Time-based tariffs	●●●●●	●●●●◎	◎
Dynamic tariffing	◎	●◎◎	●
Enforcing fair use clauses or caps	●◎◎◎	●●●	●●●◎◎◎
Throttling	Declined to comment	●●●●	●●●◎◎◎◎
Enabling differentiated QoS	◎◎◎	●●◎◎◎	◎◎◎◎◎◎◎◎
Rate limiting	◎	●●◎◎	●●◎◎
Prioritisation by service	◎◎◎◎	●●●◎	●●●◎◎◎◎◎
Prioritisation by user type	◎	●◎◎◎◎◎◎	◎
Prioritisation on an ad hoc basis	◎	●	No reported usage

Source: Telesperience 2011

● *using* ◎ *considering*

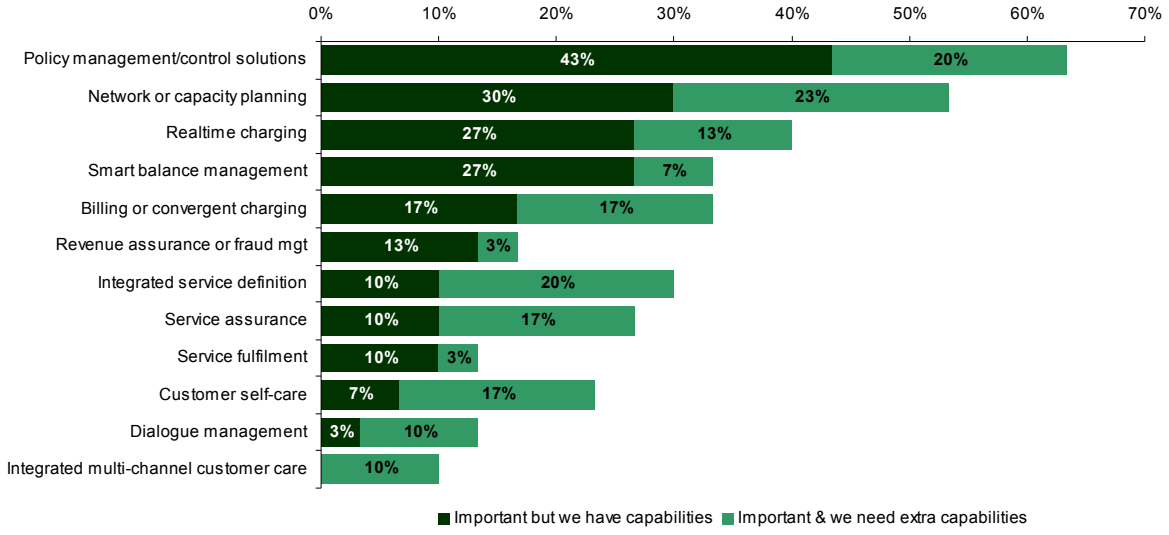
4 How can CSPs deliver effective offloading and traffic shaping strategies?

4.1 Policy control is seen as key enabler of smarter traffic shaping and offloading

Sixty-three per cent of experts in our study reported that the key technology for implementing smart traffic shaping and offloading was policy control solutions. Experts were divided between those who currently had those capabilities (43%) and those who said they needed to invest in extra policy control capabilities (20%). *Figure 11* reveals the relative importance placed on various types of solution in supporting offloading and traffic shaping initiatives:

- policy control (63%), network planning (53%), realtime charging (40%), smart balance management (34%) and billing & convergent charging (34%) are seen as they most important supporting technologies
- the key areas of investment are seen as network planning (23%), policy management (20%) and integrated service definition (20%).

Figure 11 **Key technologies for supporting traffic shaping and offloading**



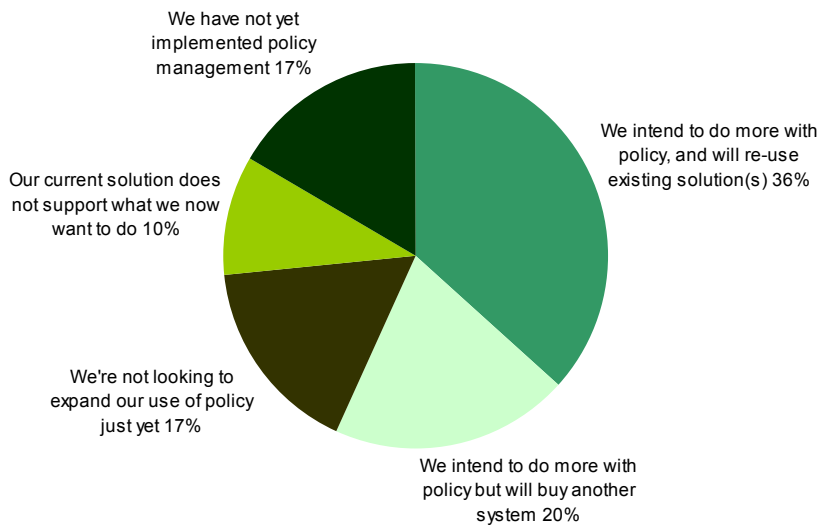
Source: Telesperience 2011

4.2 Plans for future use of policy control

Policy control technology was identified as key to smart offloading and traffic shaping, so we asked experts what their future plans were with regard to using policy (see *Figure 12*).

- 56% reported they intend to do more with policy
- 17% said they hadn't yet implemented a policy control solution
- 17% said they had no current plans to expand their use of policy control
- 30% reported the need to invest in more policy control solutions: 10% because their current solution did not support their plans, and 20% because they intended to buy extra solutions. This latter group often reported that this was due to departmental or even project-based purchasing.

Figure 12 **Future plans for policy control**



Source: Telesperience 2011

4.3 Buying policy management

Experts told us that currently they preferred to buy policy management from ISVs (48%), although 37% were still buying these as best-of-breed point solutions (see *Figure 13*). Given that they acknowledge the importance of combining policy control with other technologies – particularly realtime charging, for example, this is an indication of three things:

- their view of policy is still evolving – there is still a tendency to see policy as network-facing, although there is an emerging understanding that it needs to be commercial- and customer-focused *as well as* operations-focused
- the market is still dominated by point solutions – the market is still relatively immature and is characterised by a relatively large number of small, specialist vendors. As the market matures, CSPs will be able to buy policy more readily from vendors who are able to offer a broader suite of solutions
- who is driving policy control within operators – this is still largely network departments, who are using it primarily for the purposes of managing capacity crunch issues (although this is changing as more business and marketing staff become involved).

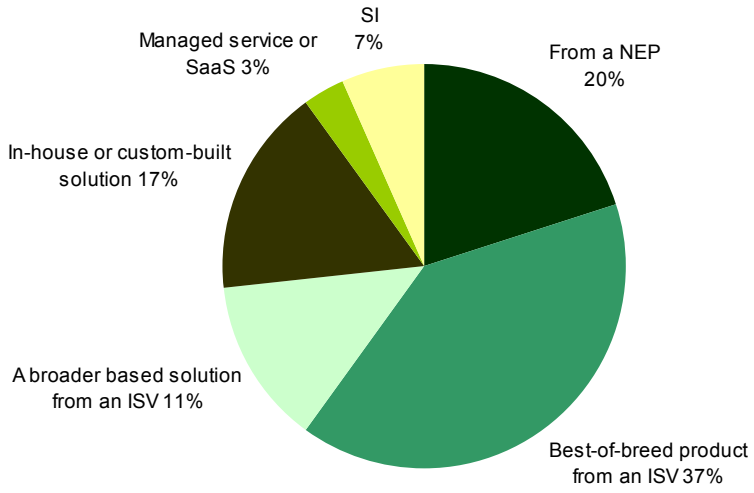
The good news for the 17% of CSPs who have not yet bought policy control, it is possible to "leap frog" early adopters by buying solutions that are more capable and more flexible – thereby supporting network-facing operational goals, as well as customer and commercial goals. Such CSPs have an opportunity to save money by adopting more flexible policy control solutions from the outset, and also by learning from the mistakes and experience of others.

Figure 14 shows that network and OSS staff are primarily driving the early adoption of policy control. This correlates with the finding in *Figure 13* that around one-fifth of CSPs prefer to buy policy control from their network equipment provider, which demonstrates it is still being used primarily for optimisation of capacity.

A key secondary force in adoption of policy control, however, is business-level staff, as well as product marketing and management. This reveals a maturation in thinking and a movement from a

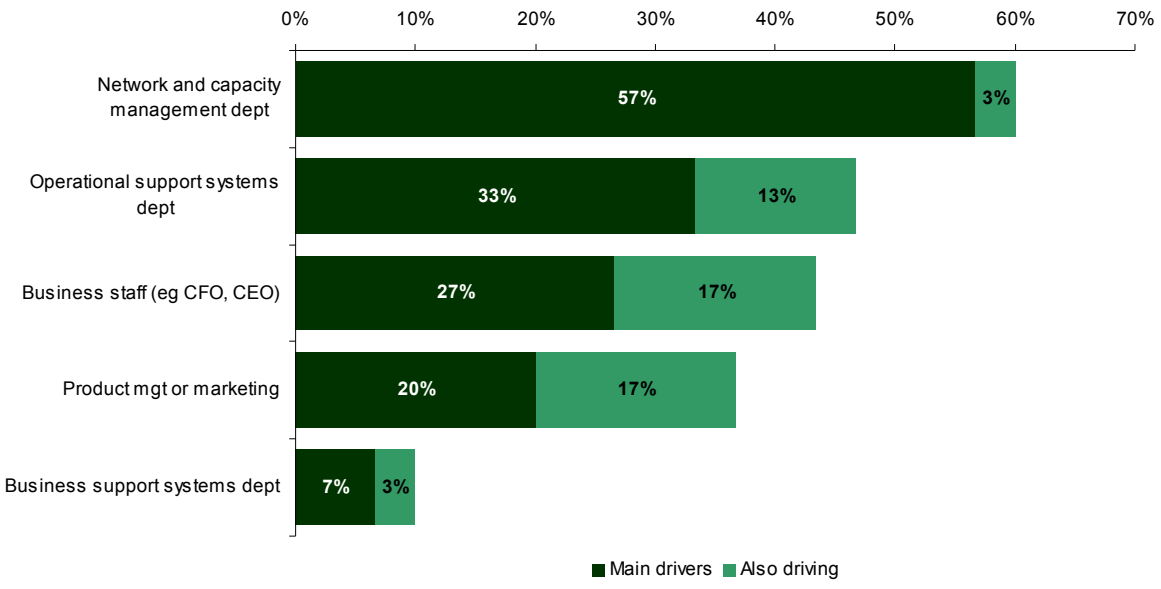
purely operation-focus to a greater focus on commercial goals and customer issues. Sadly, BSS staff are not currently seen as primary driving forces in the adoption of policy control. This may, to some extent, be due to sample bias, because these experts were under-represented in the sample and therefore possibly their role is not fully acknowledged. However, we believe that it also reflects the maturation process in policy and we expect the number of BSS staff involved to rise over time. Their insight is vital for more sophisticated traffic shaping offerings in particular, as to be fully effective, policy control needs to tie in to key BSS systems such as billing, customer service channels and CRM in order to support more sophisticated techniques.

Figure 13 **How CSPs source policy control solutions**



Source: Telesperience 2011

Figure 14 **Who is driving the adoption of policy control technology within CSPs?**



Source: Telesperience 2011

Telesperience's view

Telesperience believes that CSPs recognise and accept the importance of both traffic shaping and offloading techniques to their business. However, they are currently transitioning from purely network- and operations-focused goals achieved using relatively simple blunt implements to a more sophisticated approach that is business- and customer-oriented, more dynamic and smarter. It is important to remember that the capacity crunch is not just about traffic growing faster than available capacity, and the need to alleviate congestion (which we term "the capacity gap"), but is also about the business issues created by the fact revenues are not growing in line with traffic (the "revenue gap"). The good news is that smart offloading and traffic shaping techniques can help resolve both these challenges: ensuring that use of existing capacity is optimised and monetised, and customers enjoy more choice and a better customer experience.

5 Information about the research programme

5.1 Scope of the research

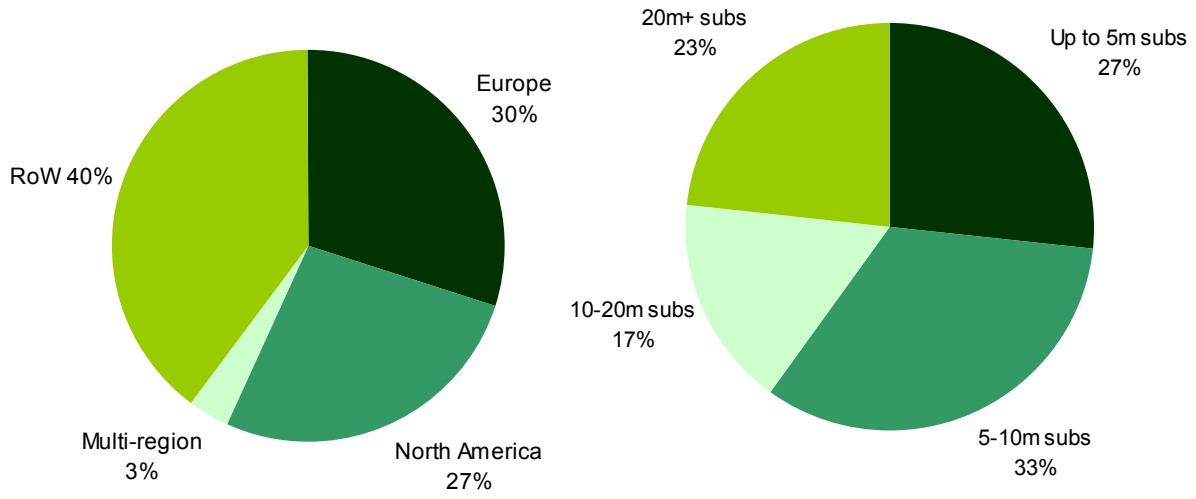
This research programme uses a technique which is sometimes called "the expert panel" or "expert sample". In other words we sought to locate a relatively small number of highly qualified experts who had the knowledge and experience to answer the questions we were researching, and who could represent the views of their peers.

The research was focused solely on understanding the role of offloading and traffic shaping strategies being used or considered in mobile/wireless communications service providers today, plus the experts' views on the underpinning systems needed to effectively deliver against these strategies. This expert panel comprised a mixture of network staff and IT staff to reflect the different departments involved in deploying and utilising policy control technology. The research was conducted in February 2011 and the report prepared for publication in March 2011.

5.2 Demographics of the expert panel

In this programme we spoke to thirty expert network and IT staff from thirty different wireless operators worldwide. *Figure 15* provides a demographical breakdown of the wireless operators these experts currently work for by size of subscriber base and by region of operation. The Rest of World region comprises CSPs from Asia, Asia-Pacific, CALA and MEA. Please note that smaller CSPs in this sample are operating divisions of larger CSPs, or partly- or wholly-owned by larger CSPs: they are not "mom and pop" operators. The majority are recent entrants and often have very modern networks, which may have excess capacity currently because they are still building up their subscriber base.

Figure 15 **Demographics of expert panel**



Source: Telesperience 2011

6 Acknowledgements and further information

Authors

Dr Therese Cory is an Associate Principal Analyst with Telesperience, where she works on our primary research programmes across the BSS and OSS domains. Prior to Telesperience, Therese enjoyed a long and successful career as a telecoms and IT analyst, and is the author of a large number of well-respected reports, papers and articles. She has worked as an Associate Principal Analyst at both Analysys Research and Chorleywood Consulting, covering BSS and OSS topics, and has also written for Juniper Research, International Telecoms Intelligence, Sodan, MaceCorp, and Bloor. She is an affiliate of the British Computer Society and a fluent French speaker.

Teresa Cottam is the Research Director and Founder of Telesperience. She has more than 17 years' industry experience and was previously an Associate Principal Analyst with UK-based telecoms consultancy Analysys Mason, covering the billing, CRM and service delivery sectors. Before that she was Research & Publications Director at Chorleywood Consulting, a specialist BSS/OSS consultancy which was acquired by Informa Telecoms & Media. Prior to this she was Managing Editor at industry analysts Ovum. Teresa has authored numerous influential reports and trends papers during her career, is a regular speaker at telecoms industry events, and is a judge at various industry awards including the GSMA awards 2011 (presented at MWC11). Teresa is passionate about helping CSPs optimise the value of their software, and strongly believes that software will play an increasingly important role in helping CSPs differentiate their offering, operate profitably, and attract & retain customers.

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About Telesperience

Telesperience is a UK-based telecoms analyst firm focused on how software and data helps communications service providers improve their operational efficiency, commercial agility and the customer experience they deliver. We consider where the problems lie with legacy technology, and how companies can transition to provide a more positive telesperience for their customers and a more profitable business for themselves.

Telesperience's open source research programme relies on the goodwill of companies who fund research in order to make it free at the point of delivery. We endeavour to ensure that our research remains objective and independent: the steps we take to do this are outlined on our website, but the most significant is using experienced and respected analysts who have a track record within our industry. Report sponsors are always acknowledged, so readers are aware who is funding the research programme. For more information about Telesperience see www.telesperience.com, check out our blog at www.microsperience.com, or visit our B2B wiki at www.wikisperience.com.

About Volubill

Volubill provides policy management, policy enforcement and charging solutions to telecommunications service providers. With the exponential growth in the volume of mobile data traffic and increasing customer expectation, Volubill's solutions enable operators to maximize revenues, and eliminate revenue leakage and fraud whilst delivering a personalized service experience. Volubill's CHARGE IT™ and CONTROL IT™ manage bandwidth based on subscriber and service centric usage policies & quotas; offer real-time granular charging for any data, content, VoIP or messaging service; and enable service providers to differentiate themselves through innovation. Volubill is global, with over 80 operator customers worldwide.

For more information please visit www.volubill.com.