White Paper

Permanent Revolution: The New Service Environment, and What It Means for Telcos

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Executive Summary

In previous White Papers*, Heavy Reading has examined the evolution of the policy management market, showing that policy deployments will become a lot more complex as operators seek to transform their service strategies.

In this paper, we are broadening that discussion to look at the wider service and platform context within which policy servers and architectures are being deployed.

In the tumultuous service environment now being created by the ever-faster transition to all-broadband, all-IP networks, a radical reworking of telco network & service platforms is essential if conventional telcos are to remain at the heart of the service value chain.

Telcos face a **"permanent revolution"** in two senses.

- First, the revolutionary changes wrought by the Internet, IP, the Web, broadband, smart devices and app stores are here to stay, and the service environment will never revert back to the former situation in which telcos closely controlled it.

- Second, continual rapid and unpredictable change in the application and services environment is the new reality—and network operators must adapt to it, or become increasingly irrelevant to end users

In **Section 2** of this report, we look at this new and emerging service environment. We show that, while operators increasingly recognize the need to focus on service packaging and enablement (rather than simply building efficient and cost-effective networks), they must also accept that service creation is largely in the hands of third parties. As a result, knowledge of the future service environment is highly imperfect—and this must be the starting point for selecting the new platforms that are needed to deliver those services.

In **Section 3,** we look at the technology implications, which center on flexibility, speed and openness: the service revolution requires a telco network and service infrastructure very different from that of the past.

* *Scaling Up Policy: Balancing Cost & Functionality in the LTE Era*, September 2011; *The New Policy Paradigm: Apps, Not Pipes*, October 2010

Specifically, it will need to be able to:

- handle an ever-wider, ever-shifting range of service & application types, devices and individual customer needs;
- have the ability to handle unpredictable and rapid changes in demand;
- be able to proactively identify customer needs using wide-ranging, automated analytics tools;
- be able to deliver services seamlessly over a range of access networks and devices;
- enable richer, personalized on-demand (self-)service portfolios;
- allow for collaborative service creation between shifting alliances of network operators, developers, content owners, enterprises, and users;
- cost-effectively enable shorter service lifetimes; and
- enable a flexible range of pricing and charging models that match price to value.

This demanding wish-list puts a strong premium on platforms that are highly scalable, fully virtualized, convergent across IT/network and other existing technology boundaries, based on COTS, REST and other industry standard computing approaches, and as open as possible. A shift away from vertical proprietary "service stacks" to Web- and cloud-based services is at the heart of these changes.

In the policy management area that formed the background to this research, these changes imply that solutions must have similar characteristics, since policy is right at the heart of the changing service environment set out in the bulleted list above. Policy products must, in other words, be as open as possible to third parties, including both applications providers and other platform elements (e.g. billing systems or application servers); highly scalable; make it easy to adapt to new policies or to change policies; and be ready for new ideas like the cloud and M2M.

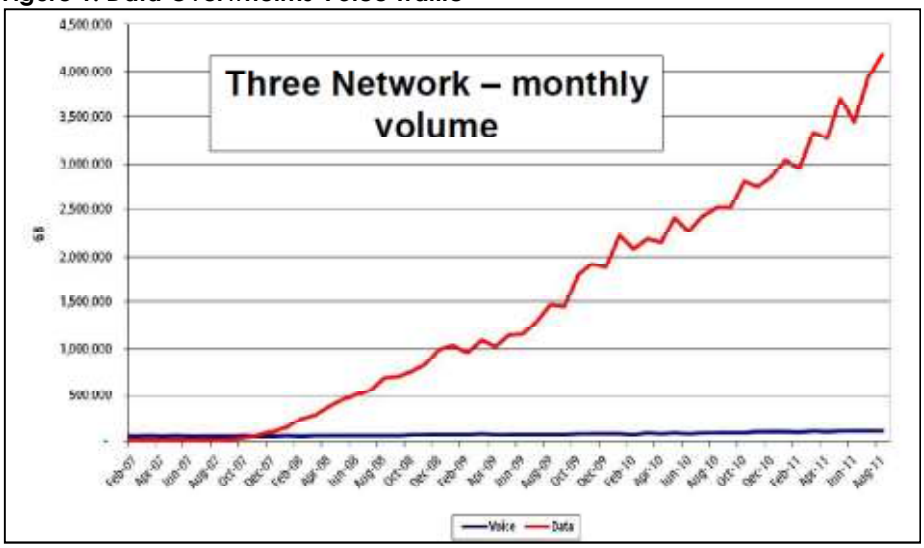
Finally in **Section 4,** we look at some of the new opportunities opened up by this kind of approach (e.g. M2M), and make four or five key recommendations on next-generation platform purchasing.

The New Services Environment

Less than a generation ago, public telecommunications networks were designed and used overwhelmingly for one purpose: to make phone calls.

That world is long gone. Fax, SMS, email, instant messaging, Web search, e-commerce, blogging, video streaming, social networking and more have turned public networks into multi-purpose utilities in which anything that can be digitized will be transmitted, and any device that is digital will be networked. Voice telephony is only one of many services, and far from the most important one: as those other services have exploded,voice has quickly become a trivial source of traffic, as Figure 1 shows.

Figure 1: Data Overwhelms Voice Traffic



Source: Three

Telephony, of course, remains important as a revenue-generator. But except where telcos retain quasi-monopolistic power, prices will gradually become related to the "applications" (including simple connectivity) that end users actually value.

That poses huge challenges for operators. How can they design networks and service packages to maximize that value? And how do operators ensure that the applications that are most highly valued by individual customers do get the right treatment—**and** that operators have a stake in that?

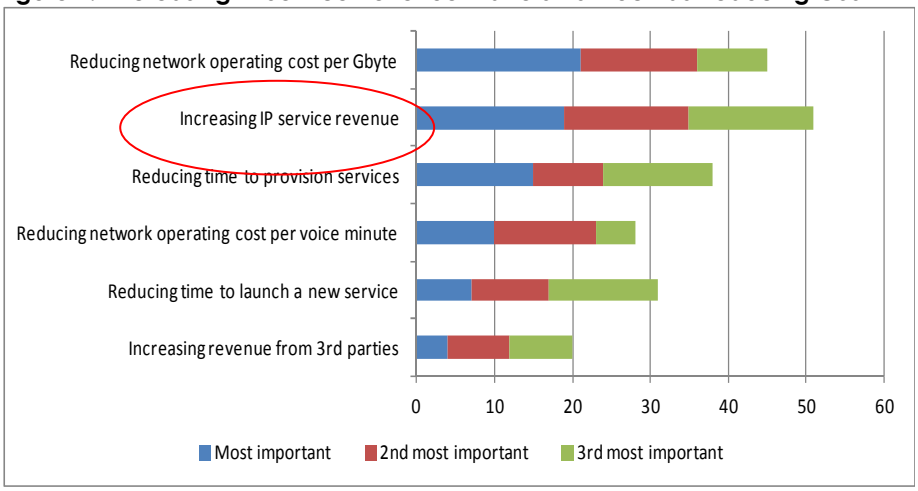
The first stage to success is recognizing that **service** transformation is just as important as **network** transformation, and it's encouraging in this regard that recent survey work by Heavy Reading with network operators shows that many do understand this.

For example, as Figure 2 shows, when we asked in a recent survey what were the most important objectives of an IP transformation program, "increasing IP service revenue" is rated as highly as "reducing network operating cost per Gbyte."

> Increasing IP service revenue is now just as important to telcos as reducing network operating costs

But the dilemma for operators is that, while most operators have a good understanding of how to reduce costs, far fewer have a clear view on how to take an increased slice of end user spending.

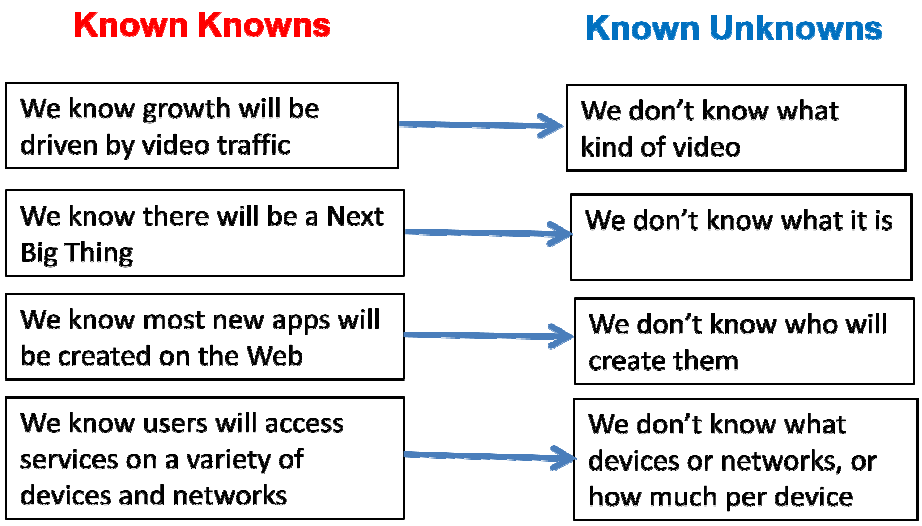
Figure 2: Increasing IP Service Revenue Matters As Much as Reducing Cost



Source: Heavy Reading survey of network operator attitudes to IP transformation, 2010. Question: What are the most important metrics for assessing your company's success as an IP-ready network operator?

Given the transformation that has occurred over the past 15 years, and the fact that this change is accelerating, how can we know what customers will use, value and pay for even five years from now? The honest answer is: we don't. And the fact of our ignorance is an important starting point for strategic thinking about the way forward, as Figure 3 indicates. Network operators need to understand what **can** be known about the future—and equally what **cannot** be known—and design packages and platforms accordingly.

Figure 3: The Network & Platform Service Challenge



Source: Heavy Reading

In particular, operators cannot build and "own" all services themselves: they must cooperate, and accept that creativity largely resides elsewhere. Their aim, in the circumstances, is to facilitate high-quality service discovery, promotion and delivery at a price that reflects delivery cost, users' expressed needs, and their ability to pay.

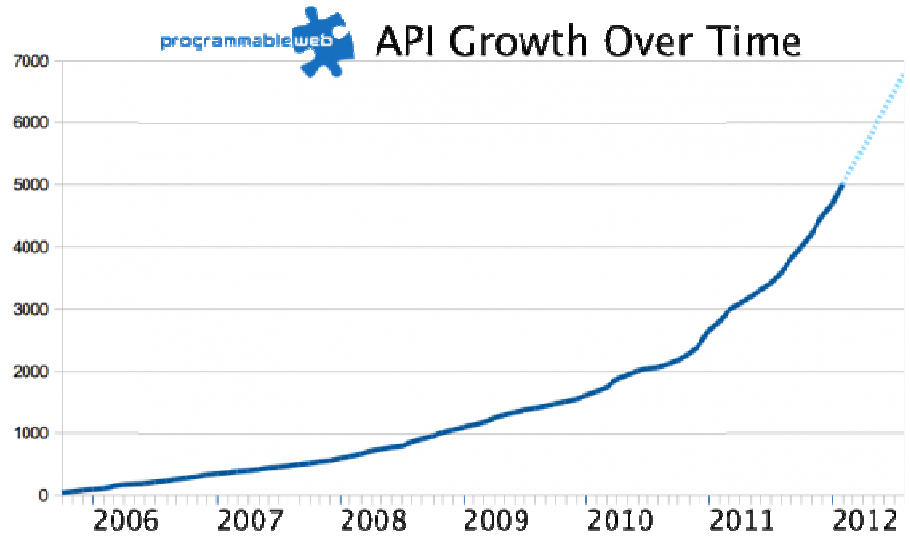
One key way to do that is to open up to the third parties that create the service value, as perceived by users. This approach is at the heart of the API revolution that has swept the Web, and it is open APIs that are at the core of the strategies of the key Web destinations such as Amazon, Facebook, Google and Twitter. By regarding themselves first and foremost as programmable platforms, these companies have ceded control in order to increase reach, relevance and value. And as Figure 4 shows, this revolution in application creation shows no sign of slowing down.

By regarding themselves first and foremost as programmable platforms, major Web destinations have ceded control in order to increase reach, relevance and value.

The good news here is that, again, operators increasingly understand the need to participate. Among those that have made open APIs available to third parties, Orange currently leads the pack with 19 available APIs, followed by AT&T (9), Telenor (6), and DT, Singtel, T-Mobile and Telefonica (5). But none of these companies has yet made a significant dent in the global API popularity chart, where companies like Google, Twitter, YouTube, Flickr, Amazon, Facebook and eBay are all far more widely used by developers. Most ominously, perhaps, the open VOIP company Twilio has seen its API used over 300 times to create an extraordinary array of phone-based services, and is now among the top 10 API destinations—a

role model, perhaps for the approach that operators must themselves begin to adopt.

Figure 4: The API Explosion



Source: Programmable Web, February 2012. Graphic shows total number of APIs notified to Programmable Web.

All of this activity is, in effect, taking place in the cloud, and shifting to the is a related aspect of the service revolution—something which, again, operators now recognize, at least in principle.

In survey work conducted by Heavy Reading in 2011, network operators cited three benefits above all of adding cloud services; that cloud would enable them to reach new customers and markets; that it would support business growth; and that it would improve time to market for new services. But to realize these benefits, operators must absorb key lessons about virtualization, open-ness and flexibility. Service providers have clear opportunities here, both in providing IaaS (where they can exploit their dense networks and local knowledge), and SaaS, where they can use their market power and reach to build partnerships to meet requirements. But competition is already strong, and success depends on a willingness to challenge established orthodoxies about what telcos need to own outright, and what they need to devolve to partners.

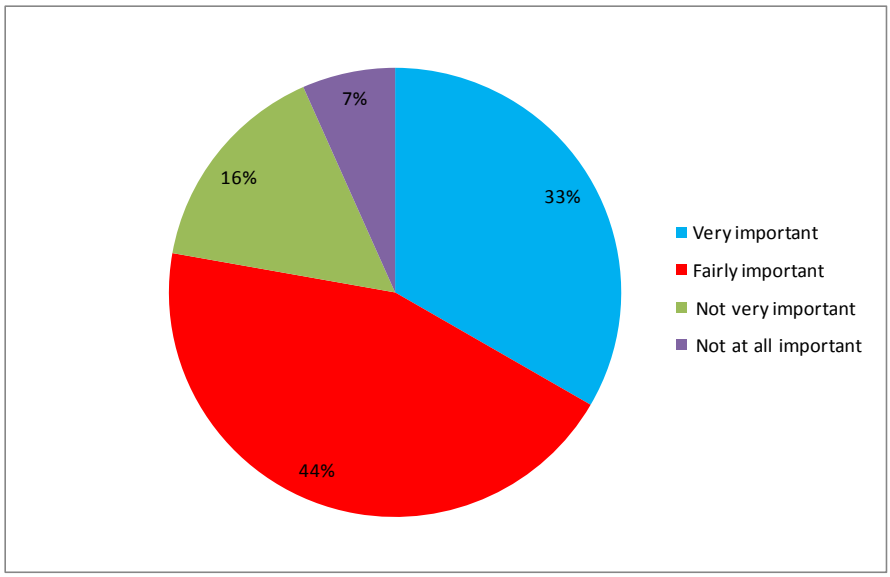
Implications for Policy Management

These changes in the service environment imply a different kind of policy management than that which has been deployed so far. Specifically, we might expect that platforms will need to be open to third parties of all kinds, and be highly programmable—just as the Web-based applications environment is. Policy platforms that are hard-coded, and built on proprietary hardware and proprietary interfaces, will not survive in the long run.

So for example, as Figure 5 shows, many operators are already thinking about how to use policy tools to manage their entry into cloud services—something that has not yet begun but which, our survey suggests, will be very important for pioneering operators, and will increase the need for flexible, scalable, interoperable policy platforms.

> Cloud will be very important for pioneering operators, and will increase the need for flexible, scalable, interoperable policy platforms.

Figure 5: Policy and the Cloud



Source: Heavy Reading survey of network operator plans for policy management, June 2011 (n=84). Question: How important will your policy deployment be in the overall business value proposition for any cloud services offered by your company?

Platforms for the Revolution

What kind of network and service platforms do operators need to best exploit the radical new service environment we have just described? And how far have they got in deploying them?

Important features of these platforms include:

- Ability to cost-effectively handle sudden and unpredictable spikes and troughs in demand, and unanticipated applications;
- Infrastructure that is not dedicated to specific services or service tasks, (e.g to deliver only specific video services), thereby increasing service agility and improving the economics of service delivery;
- Ability to create or enable new applications and add features to existing applications very quickly—in minutes or hours, rather than weeks or months;
- Ability to onboard new third-party or user-created applications very rapidly—within hours or days if necessary, rather than weeks or months;
- Self-installing, self-adapting service packages—giving consumers not only the ability to add and launch services or service features directly from the portal, but also automated marketing of new services and features;
- Automation of all the above, as far as possible, to radically reduce engineering and professional service costs

SOA for Service Delivery

To do this, they first need highly virtualized, converged, programmable, open platforms. At the service delivery level, they must be based on Service-Oriented Architecture (SOA) principles that enable new services to be quickly and easily integrated with OSS/BSS platforms—and allow for the exposure of OSS/BSS functions as services, again using SOA.

Amongst other things, Heavy Reading has identified the following core requirements for SOA-based service delivery:

- Commercial deployment of SOA/Web services interfaces between any OSS systems (eg order capture, provisioning, activation, service assurance) and service innovation and execution platform(s);
- Commercial deployment of SOA/Web services interfaces between any BSS systems (eg billing, rating and charging, CRM, third party management) and service innovation and execution platform(s);
- BPEL-based abstraction and orchestration of the business and operational processes that use these SOA/Web services interfaces, and TM Forum eTOM process model compliance

Implications of the Cloud

Second, operators need to adapt or replace platforms so that they are properly optimized to deliver the cloud services that are coming, as Figure 5 in the last section showed.

The U.S. National Institute of Standards and Technology defines cloud computing in the following way:

"Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources *(e.g., networks, servers, storage, applications and services)* that can be rapidly provisioned and released with minimal management effort or service provider interaction." [our italics]

In fact, NIST's detailed definition (see Figure 6) provides in its way a perfect checklist for operators to gauge their strategic direction and success to date.

Figure 6: What Cloud Means For Service Platforms

- On-demand self-service: so consumers can provision computing capabilities as needed, automatically, without requiring human interaction with the service provider.
- Broad network access, so cloud computing is accessible from different types of networked devices.
- Resource pooling, so multiple consumers can use pooled cloud computing resources in multi-tenant mode, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.
- Rapid elasticity, so cloud computing capabilities can be rapidly provisioned and released in response to demand, again automatically, as far as possible and so that the capabilities appear to the consumer to be unlimited and available to purchase in any quantity at any time.
- Measured service, so operators of a cloud computing model can monitor, control and report on resource usage and meter consumption

Source: NIST definition

Key Steps

Practically speaking, the environment just described is not what most operators have today. Typically, resources are split into three silos (often with further sub-silos within each) of networks, IT platforms and software. Networks include dedicated switches, routers and gateways, network appliances and network application servers. Software may be equally specialized to handle core OSS and BSS tasks, for example. But in an ideal environment, resources would be horizontally layered and comprise a network transport layer, a converged processing platform (virtualized hardware that can handle any kind of IT and network software that was previously tied to specific hardware platform such as switches, applications gateways, etc), and above that higher layer software used to support OSS/BSS and applications, as well as third party apps.

To get to this point, operators need to take a number of steps.

First, they must simplify hardware and software assets by standardizing on a single set of network platforms, processing platforms, and utility software and management tools. This will aid new service delivery and reduce time to launch services. Some have begun to do this, but most have some way to go.

In a second stage, they must adopt virtualization principles at every layer: in the network, as well as in processing platforms and in higher-layer software. The aim is to create highly flexible resources that can be fired up (or down) on demand. Virtualization is not a new concept in telecommunications: VPNs, after all, have a long history. But true virtualization in the modern sense of that word right through the stack remains the exception, especially for conventional infrastructure-heavy telcos serving mass markets. Virtualization of servers used e.g for control remains in its infancy, and legacy concepts such as "load balancing" remain the rule. Virtualization of operating systems, databases and applications is coming fast with the cloud, but telcos have barely begun to exploit the many benefits.

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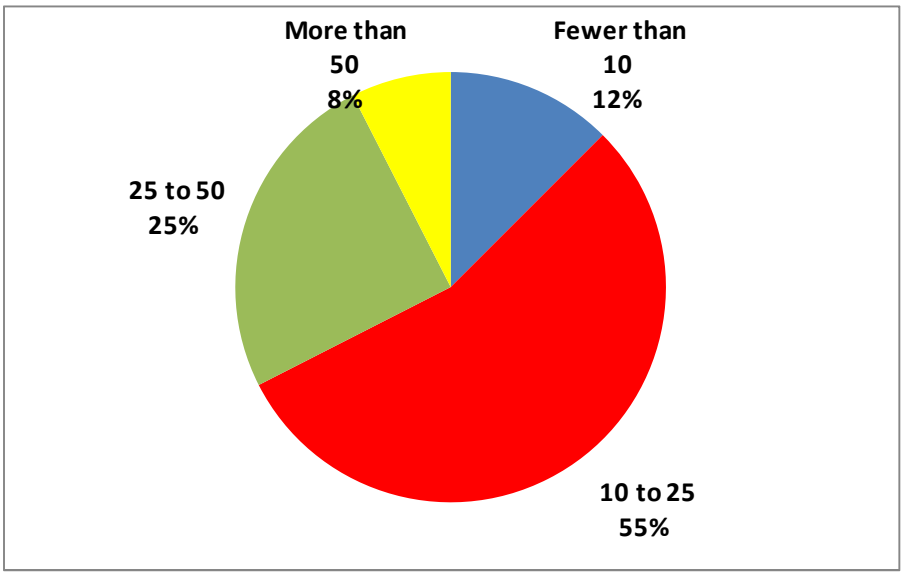
In a third and more revolutionary phase, virtualized network, processing and software resources may be treated as a single pool of compute or storage resources, gradually eliminating the distinction between networks and data centers. These are the implications behind major vendor initiatives such as Cisco's Unified Computing Platform, for example. This phase can reduce service delivery costs and time to provision even further, as well as increasing the range and breadth of services.

One further obvious implication is a shift to COTS-based hardware principles and away from proprietary telecoms- or vendor-specific approaches. Over the past decade, there has been a steady and accelerating shift away from proprietary platforms (though these are still being deployed) and towards more flexible platforms that use blade-based servers, but there is still a long way to go.

Progress to Date

As Figure 7 shows, operators already are already preparing for the new service environment we envisaged in the last section, at least on paper, if their plans in policy management are any guide. The graphic shows that operators expect to scale up policy use cases massively from 2 or 3 today, to 15 or 20, on average within three years—and this is overwhelmingly driven, our survey found, by the need to create more flexible, adaptable, user-driven service packages. That in turn is driving a rethink about the kind of policy platforms that will be required.

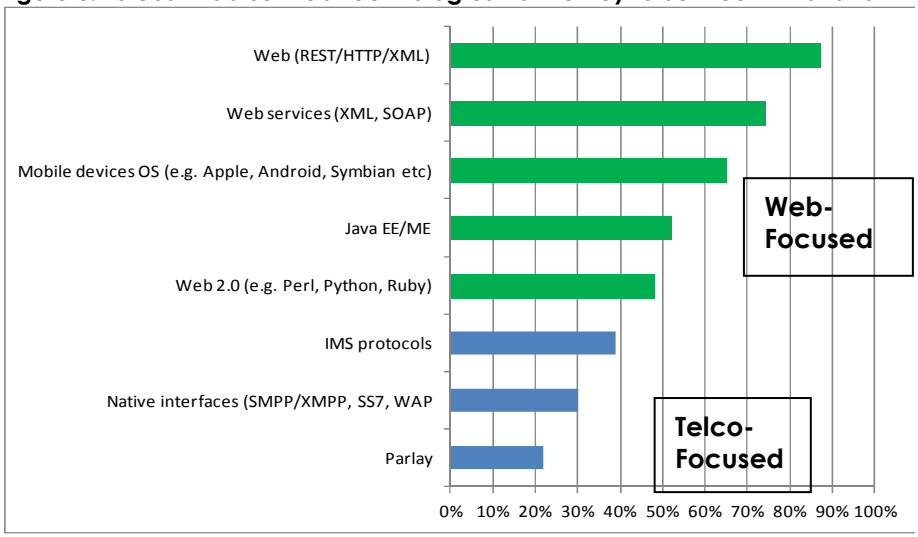
Figure 7: Number of Policy Use Case Will Ramp Up Fast



Source: Heavy Reading survey of network operator plans for policy management, June 2011. Question: Approximately how many different policy use cases do you think your organization will deploy over the next 3 years? Mobile operators respondents only.

In a different Heavy Reading survey, when asked what kind of software architecture is needed to facilitate service innovation, network operators now overwhelmingly cite mainstream Web approaches such as REST —not dedicated telco approaches such as Parlay (see Figure 8). It's worth noting that in an identical survey conducted two years earlier, Web-based approaches such as REST scored 5th, not 1st—suggesting how quickly attitudes have been changing.

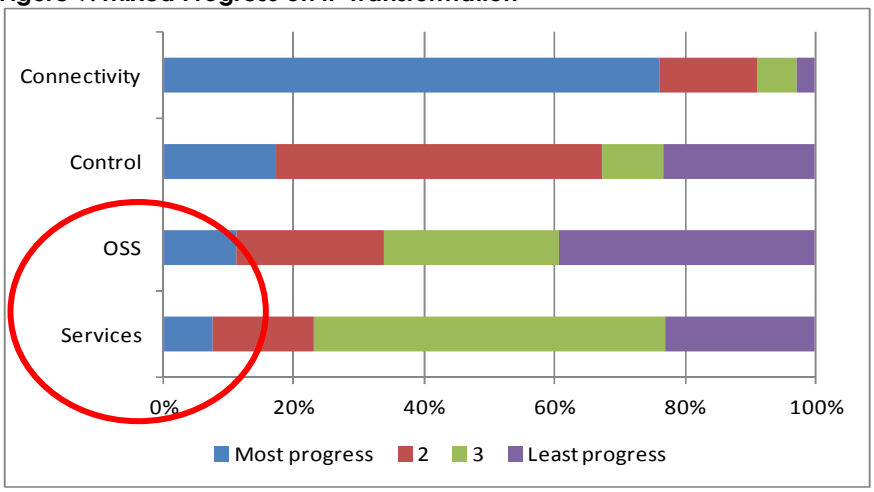
Figure 8: Telcos Endorse Web Technologies As The Key to Service Innovation



Source: Heavy Reading survey of network operator attitudes to service innovation. Question: Which of the following technologies/platforms do you consider important for service innovation? (choose all that apply).

At the same time, however, there is still much to do, as Figure 9 shows. In an earlier graphic (Figure 2), taken from the same survey, we showed that there was a strong awareness that transformation of services matters at least as much as transformation of networks. Yet Figure 9 shows that telcos have made far more

Figure 9: Mixed Progress on IP Transformation



Source: Heavy Reading survey of network operator attitudes to IP transformation. Question: Thinking about your company's progress in migrating to IP throughout the value chain, where do you believe you are making most and least progress?

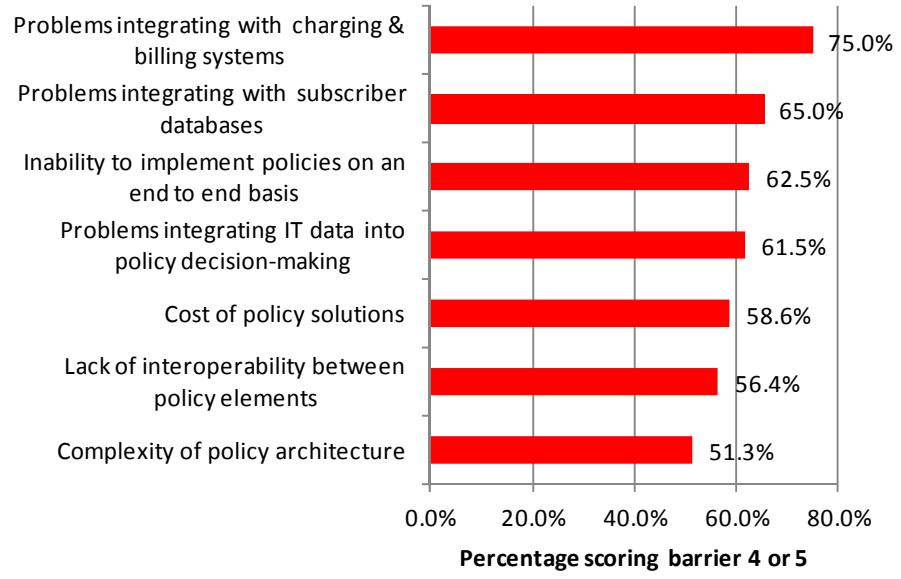
progress in the traditional areas of concern (focused mainly on cost control) than in services.

This picture has not in our view changed substantially since we conducted the survey referenced in Figure 9, and Figure 10, taken from our policy management survey, provides us with strong clues as to why operators are getting snarled up over the services transformation aspect of IP. Because telcos are still tied to a panoply of legacy platforms, they are running into serious difficulties when trying to interoperate between different entities in the policy architecture—especially when they are crossing the networks/IT divide.

Because telcos are tied to a panoply of legacy platforms, they are running into serious difficulties when trying to interoperate different entities in the policy architecture

Although the reasons for this are complex, they include fragmentation of subscriber data stores, inflexible billing and charging systems, and the use of siloed platforms in which making changes is costly and time-consuming—fatal to attempts to become a service innovator running and adding multiple policies.

Figure 10: Difficulties integrating different network and IT platforms is a major obstacle to progress



Source: Heavy Reading survey of network operator plans for policy management, June 2011. Question: On a scale of 1 to 5, with 5 being "major problem" and 1 being "not a problem at all," please rate the following barriers to deployment of policy control & management at your company. Mobile operators only.

Summary and Recommendations

In this White Paper we have described and analyzed the service revolution that is permanently transforming the way networks are used and valued by users, and we have drawn out the implications for operators when they define the service and network platforms they need.

This final section looks briefly at the potential benefits of shifting in this direction, and makes some recommendations on what to look for in hardware and software vendors' products and offers.

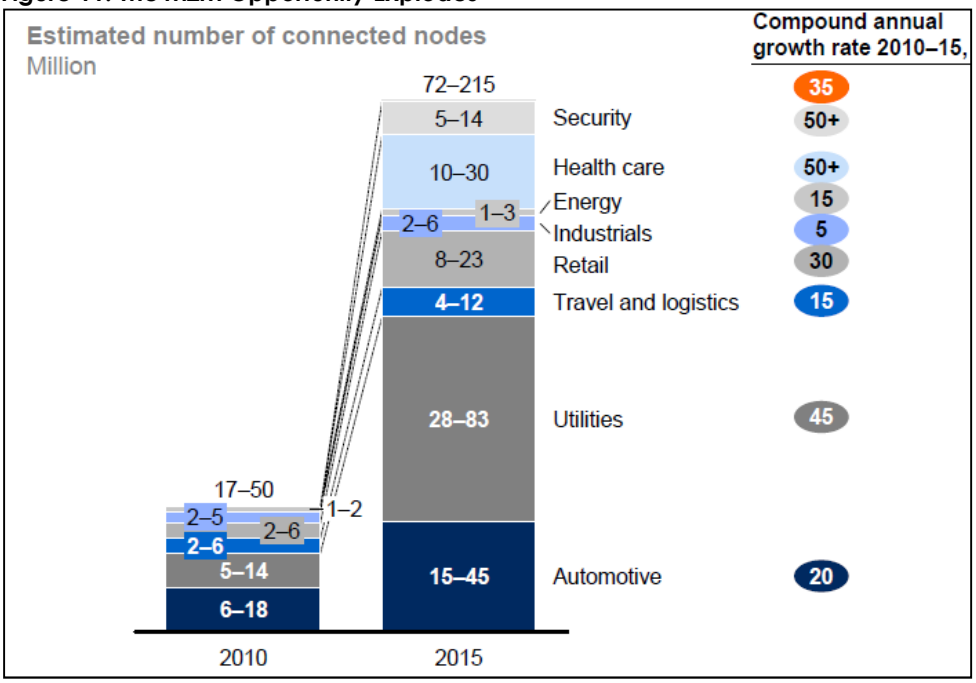
We believe there are seven key ways in which operators can benefit if they implement the kind of open, virtualized, convergent platforms, all underwritten by policy, described in the last section.

- **Serve new customers in new territories:** since they are no longer constrained to service areas defined by legacy network technology, they can reach new customers through the cloud;
- **Serve existing customers more effectively:** on any device, wherever they are, creating new revenue opportunities and increasing customer loyalty;
- **Offer new types of services**: for example, IT service support to consumers and small businesses, following the shift to cloud-based computing;
- **Support customers' valued applications better**: e.g. by partnering with content owners to link quality, delivery, device, location and charging—among other things;
- **Meet customers' needs more precisely:** with the aid of the holistic analytics and customer experience management (CEM) implied here, proactively target both end users and app/content suppliers to bring them together;
- **Serve enterprise customers better:** again taking advantage of the shift to cloud-based computing and virtualization of enterprise services, and offering new categories of services such as M2M MHealth (see below);
- **Offer a broad range of capabilities to third party ISVs and Web developers:** including subscriber demographic information, billing and charging services, targeted advertising, and so on.

These are just examples, and within each category there may be multiple opportunities to be explored.

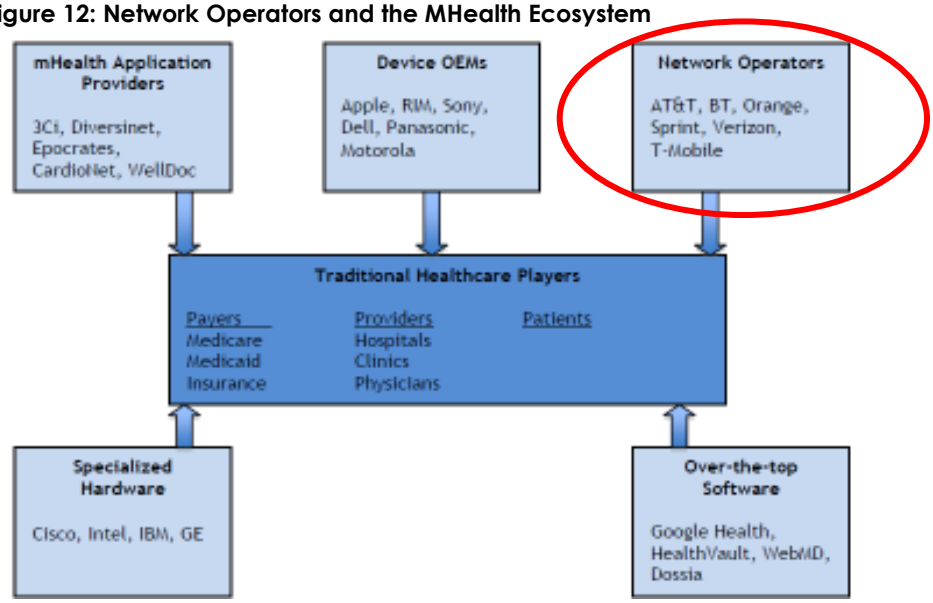
Taking just one area as an example, machine to machine (M2M) services in vertical enterprise sectors are a largely unexploited opportunity, from a telco perspective, yet the potential rewards are both new and significant, as Figure 11 shows. 2012 looks set to be the year when M2M begins to make a much bigger impact.

Figure 11: The M2M Opportunity Explodes



Source: McKinsey Global Institute, "Big data: The next frontier for innovation, competition, and productivity," June 2011

Figure 12: Network Operators and the MHealth Ecosystem



Source: Pyramid Research, "The Machine-to-Machine Market, A high-growth opportunity for MNOs,", October 2011

Yet as Figure 12 shows, the value chain around specific M2M-centric sectors—in this case MHealth—is complex, and will involve multiple partnerships. To be ready to exploit these individual industry ecosystems, telcos will need to be flexible, open and capable of adjusting to rapidly changing opportunities.

Assessing Platform Vendors

In order to take full advantage of the new opportunities, stay relevant in the still-emerging services and applications environment, and resolve the challenges posed by "permanent revolution," operators need to consider the following key points when assessing vendor platforms:

1. What kind of standards compliance is offered?

- Compliance with telecommunications industry standards is no longer enough—what about Web standards compliance?

2. How open is the vendor to interoperating with partners and third party software and hardware suppliers?

- Concrete real-world examples? How many?
- Applications ecosystems, APIs or SDKs offered?

3. Is the platform usable on COTS-based hardware and using an open OS?

- Both are required to enable flexibility and agility

4. Have they adopted virtualization principles?

- At what level?
- With what specific, demonstrable benefits?

5. How much of the vendor's revenue comes from systems integration or professional services work?

- Specifically in connection with integration with other service or network elements, or in creation of new applications

6. How does the platform scale, and at what cost?

- Can it scale reliably by an order of magnitude in the medium-term?