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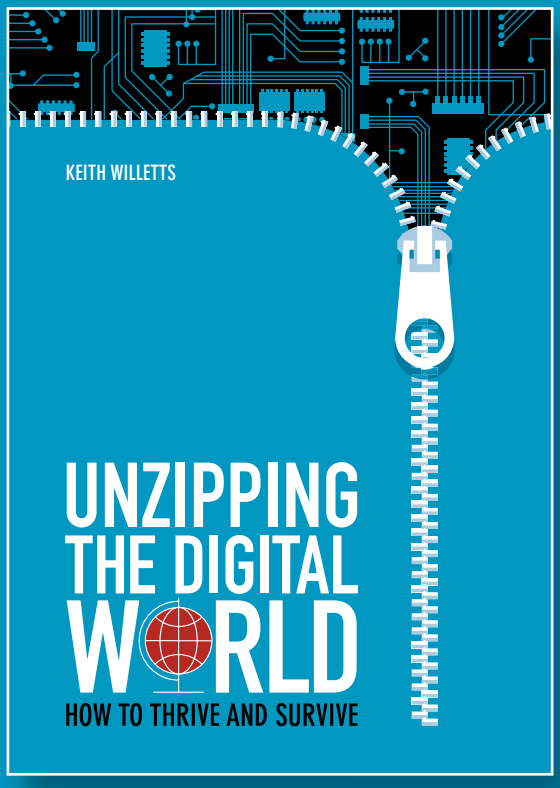
WHY REAL TIME MEANS NOW

UNZIPPING THE DIGITAL WORLD

A NEW BOOK BY KEITH WILLETTS

AUTHOR, TM FORUM CO-FOUNDER AND CHAIRMAN, COMMUNICATIONS WEEK TOP 25 INDUSTRY VISIONARY, BRITISH COMPUTER SOCIETY AND BT GOLD MEDAL AWARD WINNER.



A 'digital tsunami' is feeding on itself driven by cloud, mobile broadband, smart devices and a mushrooming 'internet of things' enabling every sector of every business to rethink how business is done - almost anything that can be digital will be. Willetts unzips the market with a 'no holds barred' picture of what today's giants need to do to thrive and survive in the rapidly expanding digital world and presents a practical series of steps on how to exploit the massive opportunities the digital economy presents.

"TWO THUMBS UP! THE FUTURE FOR OPERATORS WILL COME FROM EXPLOITING NEW SOURCES OF REVENUE IN THE DIGITAL WORLD WHICH ARE SO WELL SET OUT AND EXPLORED IN THIS BOOK."

PAUL BERRIMAN, CHIEF TECHNOLOGY OFFICER, PCCW

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Executive summary

It would be fair to say that in today's world there is a sense of immediacy that marks a dramatic change in people's attitudes and lives compared with 10 years ago. The phenomenal growth in mobile communications in every corner of the globe, through every demographic and into the hands of even the most impoverished socio-economic populations, has brought unprecedented access to information to more than 6 billion of us.

With it has come the growing sense that everything digital is available anytime, anywhere, now. The emergence of the 'now generation' borne out of this real-time, increasingly online experience has changed the way customers consume and pay for their services.

Pressured by time and with a growing focus on managing expenditure, today's consumers look to online service providers to offer maximum choice, at the most competitive price. Instant gratification is most often the name of game. Buy online and customers receive immediate notification (through email or text message) of cost, payment acceptance, product dispatch and delivery date.

With this comes a dependence on data as a commodity, readily supplied by communications service providers via data plans that may have volume limits, tiers (with variable prices at each threshold) and occasionally be to all intents and purposes unlimited.

The issue travellers face with the added dimension of roaming charges and the bill shock phenomena, added considerable impetus to the need for real-time convergent charging (RTCC). Regulators stepped up efforts to force service providers to provide adequate safeguards for their customers, and the service providers themselves are anxious to improve customer experience, avoid negative headlines and prevent churn. RTCC is a critical component of all these aims and every operator worldwide is aware of it.

RTCC has also become the core component for providing a vast range of digital services to customers of the 'now generation', demanding immediacy on pricing, delivery of and payment for those services. Digital service providers, often referred to as over-the-top players, are also looking at RTCC as a means of charging for their services and maintaining a direct connection to their customers.

Section 1 of this report defines what RTCC is and why it is becoming so critical for most service providers. This includes a review of which industries need it, and how it is being utilized.

Section 2 investigates the components and environment required to support RTCC, how it works, a brief background of its journey to this point and what it will look like in future.

Section 3 looks at industry-specific applications of RTCC, the drivers and who key players will be in each space.

Section 4 ties back to how TM Forum's standards-based Frameworx suite of tools and best practices, along with other collateral and activities, can help implement, support and exploit RTCC – as well as looking where the pitfalls may be.

Section 1

Why convergence is the key

In defining exactly what real-time convergent charging (RTCC) means in today's context, it is worth noting that its predecessor, simple real-time charging (RTC), has been around since the earliest phone calls were being made. When the earliest switchboard operators connected a call they wrote down the originating and terminating numbers. These chits were collected and collated periodically to maintain a running total of calls made from any fixed-line number.

Over half a century ago the U.K.'s Post Office became the first RTC vendor. The 1950s' metering system, a rudimentary electromechanical box in the corner of the room, was developed to ensure users of the new 'premium' telephony service could manage their usage. Quite rightly, the telephone companies of the day were worried about the impact of high bills on mass adoption. Sound familiar?

Today, RTC is most often associated with online charging systems (OCS) developed for the prepaid mobile market. It is important to mark the differentiation between the two to explain exactly what RTCC is and how it works.

The TM Forum's Business Process Framework (eTOM), part of the Frameworx suite of standards-based tools and best practices (see page 16) defines that the purpose of charging is to assign a value (monetary or other) to an event or product, or combination (bundle or aggregate) of the above. The charge may be either a credit or a debit and can be handled either online or offline.

Online charging is performed in real time and needs authorization, which could affect how the service is rendered and enables an operator to provide prepaid services to its customers. Offline charging is performed after the service has been delivered, is not needed in real time and generally relates to subscription-based products.

RTC extends this to ensure a subscriber balance, whether monetary or non-monetary, is updated before and/or during service usage. It enables service providers to apply customer-specific rules for rating, discounting, promotions and settlements to better personalize their experience.

This was critical for managing pre-paid subscribers and enabled mobile operators in particular, to service a previously neglected mass market. RTC working in sync with an Intelligent Network (IN), in its simplest form, basically checks a service request from a subscriber against a balance.

It calculates the amount of service that can be consumed for that value and cuts off the service when the value is consumed. The value consumed is deducted from the customer's balance.

However, the OCS cannot do this on its own – it can only instruct the service and/or the policy and charging execution function (PCEF) when the threshold conditions are reached. Simply 'cutting the wire' (just using the PCEF) leads to an abruptly dropped session or call and irate customers.

[1]The growing importance of policy-based management right across the communications industry and particularly in the rapidly evolving world of digital services is spelled out in our Insights Research report, *Policy everywhere: Acting on network intelligence*. It is free to all employees of TM Forum's member companies who register on our website and for non-members to buy from here www.tmforum.org/insightspolicyeverywhere. It is written by Rob Rich, Managing Director, TM Forum Insights Research and published by TM Forum in July 2012.

To avoid this, the service plays the customer a warning when it is notified that the available balance is running low. It can direct the customer to a top-up system or simply warn them by SMS, allowing the user to make their own choice about what action to take. All of this involves the service (and there may be many running in parallel) – so a great deal of extra functionality is needed for services to run in real time and parallel with other services.

Stepping outside the silos

RTCC extends this functionality by opening direct, two-way communication between the network and the IT business support systems (BSS), enabling these systems to respond in real time to things that are happening on the network. The word 'convergent' injects a wider remit into the use and benefits of RTC.

Rather than dealing with established silos individually – such as pre-pay versus post-pay, mobile versus fixed, and/or access versus value added services (VAS) managed by different legacy BSS/OSS (operational support systems) – real-time convergent charging brings this all together into a single point of charging control. Operators are able to offer a simple tiered service with multiple, but optional, service elements to subscribers.

The other key requirements are new levels of performance and availability for the operator's IT infrastructure. For example, when IT systems are managing pre-paid balances, a failure can result in a service outage. The availability of the IT systems must meet the same standards as the network.

Similarly, the IT systems' response times need to be extremely fast. There is no point having all that flexibility and sophistication if customer experience is ruined by call failures caused by overly long round-trip times between the network and the IT systems during the call setup. Performance and availability need to be front and center when designing RTCC systems.

In communications, the adoption of RTCC started primarily in mobile broadband networks (3G) and has extended into many sub-divisions of new mobile such as machine-to-machine, 4G/Long Term Evolution (LTE) and Wi-Fi integration. It has also started to move into fixed broadband networks. Fixed line operators have learned from the revenue innovation in mobility (for example, broadband segmentation) and need to charge for new digital services such as smart TV, media, voice over IP and other on-demand services.

Data is the driver

It is fair to say that data, or more specifically data traffic, is the main driving force behind RTCC. Data and content are enabling service providers to become much more creative in their product marketing. Many of the new

"It is fair to say that data, or more specifically data traffic, is the main driving force behind real-time convergent charging."

offers and services contain real-time elements, such as service tiers, that involve knowing to throttle-back speed when a data allocation has been used, or when to start charging for overages.

Bill shock controls and fair usage policies also need real-time rated usage data with regulators coming down hard on mobile service providers that do not build in safeguards against customers' over-usage. In this scenario pre-paid and post-paid subscribers are being treated just the same. However, that is not always in the best interest of post-paid customers that may have come to expect more flexibility with sophisticated pricing and discounting, expectations that service providers are having to manage prior to issuing bills.

Although RTCC was pioneered and developed primarily in the communications industry, its benefits are being rapidly realized by many other sectors, with service providers and solutions vendors finding themselves in demand.

RTCC methodology is being deployed for banking and finance, utilities, mobile payments/banking, mass transit, mCommerce, retail and all forms of digital service provisioning and delivery. It is a core component of any customer-centric transformation project and, teamed with the data it provides on customer behavior, is central to any enhanced analytics and customer experience management process. This will be explored in detail in Section 2.

"Real-time convergent charging methodology is being deployed for banking and finance, utilities, mobile payments/banking, mass transit, mCommerce, retail and all forms of digital service provisioning and delivery."

Section 2

The communications industry's story – controlling resources to provide better customer experience

Many enterprises in numerous industry sectors are realizing the value of real-time convergent charging (RTCC) but as it is being most actively deployed in the communications sector it is worth taking a deeper dive into what exactly constitutes RTCC.

Previously, most service providers have had two (or more) separate charging systems, typically segregated between network-based online charging for 'prepaid' services, and IT-based offline charging for 'post-paid' services. The convergence of these systems has been a challenge for service providers over the last decade, with network suppliers and billing vendors striving to position themselves as being the best placed to 'own' the convergent charging landscape.

Although service providers have long had some real-time capabilities, the requirements of RTCC mean that almost all components and systems in the order activation, service provisioning, service delivery, policy management, charging and customer experience areas must work together seamlessly. This has been the primary goal of most transformation projects and usually involves integration or retirement of legacy systems as well as the introduction of new components.

Convergence here takes on many meanings. For service providers offering multiple services in triple play or quad play packages or bundles, convergence is about being able to charge for fixed, mobile, video or voice over IP through a common platform. With RTCC, charging for any service in real time becomes the objective.

Involving multiple layers

The key systems needed to support RTCC extend from the network layer through to customer management systems and include:

- Network gateways are the in-network elements that provide a connection to the subscriber (for example, service control point and protocol adapters such as Diameter and Radius, see page 15 for more about both).
- Authentication elements typically ensure the right subscriber is allowed to connect to the network.
- Service management is undertaken by the customer relationship management, business and operating system software B/OSS (IT business support systems), which provide subscribers' information such as their identities, order management, services allocated and provisioning, online mediation and analytics.
- Policy systems ensure the right resources are made available to the subscriber depending on their application (location, content, subscriber type, and so on).
- Online charging systems that charge for the usage of resources and services (or attempts to consume them) where the subscriber is made aware of their balance if it is insufficient to deliver their requests. This uses resource information provided by the network gateway, policy information to manage the service experience and its restrictions, and identity management to ensure it has the right customer to set the charging against, all in real time.

Subscribers' and consumers' access to real-time balance information is becoming critical as service providers strive to provide accurate and meaningful information to their users. This may be through immediate online support and account reporting, but increasingly with real-

time subscriber notification of balance status, updates, advice of charge, advice of service usage and so on.

Cause of misunderstanding

The key thing that is often overlooked and/or misunderstood about RTCC is that the services (whatever they are) need to cooperate with the charging system in real time for them to be charged and to ensure correct behavior when certain balance thresholds are reached (such as the balance expiring).

The instant a service is consumed, the balance or balances concerned must be updated; in fact, during service consumption, balance control and update needs to be performed simultaneously.

This enables customer-facing self-care capabilities such as budgetary control, with notifications and warnings provided to prevent such issues and 'bill shock'. RTCC opens a direct, two-way communication between the network and the IT BSS, enabling these systems to respond in real time to things that are happening on the network. Examples include:

- service usage tracking – to effect service charge, availability and/or quality of service;
- real-time consumer notifications – to advise customer service quotas are being reached;
- real-time service control – for 'throttling' bandwidth, cutting or extending service;
- intelligent campaign delivery – for performing business and predictive analytics.

To illustrate this, let's take a simple example. RTCC enables a mobile operator to inform a post-paid subscriber as soon as they reach 90 percent of their monthly data allowance, and to make an immediate offer. An intelligent BSS platform might offer an upgrade to a higher allowance for an increased monthly fee, with the rest of this month free as an incentive for signing up immediately.

Real-time information about the customer's data usage (from the network) is processed by the online charging system (OCS), which keeps track of the customer's accumulated data usage and triggers a relevant marketing campaign at the appropriate moment.

That example illustrates one-way communication, from the network to the IT-based OCS, but RTCC can do more than this. Through the policy and charging rules function (PCRF), it also enables the IT systems to change the customer experience on the network in real time.

Better customer experience

A classic case is to enforce a fair use policy for data (typically throttling bandwidth when a subscriber crosses a pre-defined threshold). But an intelligent BSS platform can implement more positive scenarios to improve customer experience – for example, an operator might offer an on-demand option (with a one-time charge) for subscribers to upgrade to higher quality of service when watching video.

Another 'convergence' is that pre-paid and post-paid subscribers are treated exactly the same (in fact better than before). In the past, pre-paid usage was tracked in real time, but the network-based systems could not access information from the IT systems immediately. This meant that only simple pricing and marketing options were available to pre-paid users.

Post-paid, on the other hand, offered more flexibility for sophisticated pricing and discounting, but usage was not tracked in real time, thereby ruling out the kind of marketing

responsiveness we saw in the above examples.

RTCC joins the network and the IT systems, enabling sophisticated pricing and real-time context-aware offers for all subscribers, whether pre-paid or post-paid.

BYOD bring challenges

Service providers are offering convergence across several domains as well. For example, bring your own device (BYOD) may require different rating, charging and billing rules depending on whether home or work mode is being used on a device. Multiple device share plans are becoming more popular – these include device convergence – and then there are group and family plans, which offer a shared bucket of data between different people.

Convergence is multi-dimensional with data and content forcing the need for real-time availability of usage data to drive not only the monetization requirements, but also the legal, regulatory, marketing, sales and customer care functions. This doesn't mean that existing billing systems are redundant – far from it.

Service providers still have many post-pay customers who want their bill at the end of the month. They still need real-time data fed to the billing system, so that it can better serve these customers and give information to third-party systems within the service provider's network.

Giving partners timely information

Additionally, business intelligence and multi-party settlements are fast becoming key functions of RTCC. It is common to deliver services via more complex partner value chains, consisting of carriers, content aggregators, content producers, sponsors, advertisers and so on.

The success and effectiveness of particular services and products must be measured and made available almost instantly if a service provider is to innovate and to compete on the hoof, not after the fact – a far less successful approach. It is imperative that charging occurs in real time so enterprises can manage their business as it happens, and have a 'business intelligent' view of the revenue streams.

In a world where traditional revenue streams from voice and messaging are declining at an alarming rate, it's vital that service providers are able to develop new business models such as this, where the value of the services they provide amounts to much more than simply network bandwidth. So RTCC and 'intelligent BSS' look to be vital in enabling service providers to survive and prosper in the new digital economy.

The smart network and service provider can in fact add considerable value and be a key element of the value chain and service delivery through service and bandwidth configuration relating to the actual service being supported. Rather than simply providing bandwidth, they can provide dynamic controlled bandwidth as a chargeable asset.

Bandwidth can be turned up or down as the service demands with guaranteed quality of service controls for different service types, configured and charged for in real time. The user or the application itself can demand and 'pay for' more bandwidth, as it is required.

In Section 3, we look more closely where RTCC is being utilized in other industries but the more ambitious and advanced communications service providers may well be positioned to provide competitive RTCC functionality to a range of potential new 'customers', including wholesale ones.

Section 3

The value of real-time convergent charging to the wider digital world

In mobile there are many applications of real-time convergent charging (RTCC). They range from the relatively simple tiered services and avoiding bill shock, to flexible service pricing and bundling, shared usage plans (across several dimensions), multi-payment offers, direct operator billing and charging. They also provide output data to drive third-party systems, from policy control and real-time outbound marketing to customer care portals.

RTCC enables an operator to cater to its own customers better, offering new services and better customer experience, but its potential extends way beyond these important aims.

With the right IT infrastructure, RTCC can enable the operator to bring extra value to third-party services from over-the-top providers or to vertical industry applications, such as in-vehicle telematics and eHealthcare. The partnering company can make use of real-time notifications, context-aware offers, policy control and the other features enabled by RTCC – for instance, supporting a telematics service that gives drivers an always-on connection to an assistance helpline and a variety of in-car data services.

RTCC is not only critical in the communications market, but also in the entire hyper-competitive digital commerce marketplace. This includes media and entertainment enterprises, cloud service providers (infrastructure, platform or software as a service – IaaS, PaaS and Saas), information service providers, and ecommerce enterprises.

Consumers of all kinds of communications want real-time interactivity with their service providers and are demanding real-time service delivery on their terms, including their timing, context, devices and payment method.

Yet RTCC is not only about the communications domain. Any provider of online services can benefit from real-time charging to provide greater levels of service control, value and relevance to the consumer and their experiences and again, the benefits of RTCC are not restricted to consumers or retail.

There is the rapidly expanding business areas of connected devices and machine-to-machine (M2M) communications, where real-time transaction charging and service control will play a crucial role in monetizing new business models and approaches.

Digital enablers

In his recent book, *Unzipping the digital world, how to thrive and survive*[2], Keith Willetts, Chairman, TM Forum, describes the 'enablers' of the digital economy. He breaks them down into three principal business segments as shown in the figure overleaf.

This shows how the digital economy might evolve with the digital enabler layer being all of the infrastructure services based on hardware, software, computing, communications and storage that any type of higher order digital service may need, plus a range of supporting services such as security, authentication, revenue management and so on.

[2]*Unzipping the digital world, how to thrive and survive* by Keith Willetts, published in May 2012 by TM Forum, can be purchased from: www.tmforum.org/unzippingthedigitalworld either in hardback or Kindle version.

The digital services themselves are any type of application, information, entertainment or other type of service innovation and the digital retailer layer is the customer relationship role.

The three together provide the consumer with business services shown at the top of the diagram, all of which become chargeable entities or revenue streams that need RTCC.

As described earlier, these layers of the ecosystem could also need settlements to be made between the different players or partners and not just at the retail or consumer level where the services are delivered. Indeed the Internet model, which has destroyed some many established ways of making money, from music sales to publishing revenues, has been built on services delivered free-of-charge to the consumer, with other parties, typically advertisers, picking up the bill.

Each type of service will also require different means of charging or pricing adding yet another layer of complexity to the RTCC functionality. Third parties that may either utilize the RTCC capabilities of service providers or look at developing their own will also supply many of these services.

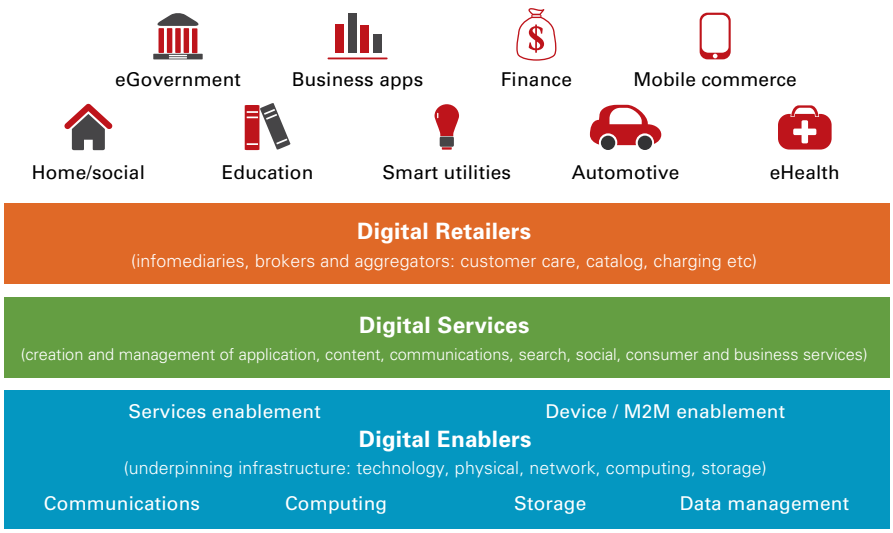
Those supplying RTTC services to the communications sector are already addressing both markets to capitalize on what will be a booming sector, driven by the need to do everything in real time.

Any RTCC solution must be able to support real-time settlements across the entire service delivery value chain, with the consumption of a single service consumption giving rise to multiple simultaneous rates, driving complex hierarchies of balances and account updates.

Industry-specific applications

Here are some examples of industry specific applications of RTCC, their drivers and who are likely to be the key players in each space.

Simplified view of the digital ecosystem



Source: Parhelion Global Communications Advisors

App stores and digital content providers such as sellers of music, videos and so on – these are generally 'pay-now' eCommerce outfits which the customer pays for service delivery on a unitary basis before the delivery starts. The payment can be by debit or credit card, voucher, loyalty points (or on a third-party billing system) and needs to be calculated and debited and/or authorized before the app or content is delivered.

Mass transit – Most real-time, high-volume automated transit and transport systems use near field communication (NFC) or radio frequency identification (RFID) plastic cards. It's all taking much longer than predicted by pundits, but there is a movement towards NFC-based smartphones and other devices that would support managing balances in real-time and the stored value to be displayed on request, rather than having to check the balance at a kiosk or via the Internet.

Service providers would avoid the cost of manufacturing and issuing cards, as well as being greener. Recharging could be effected using the same mobile device by transferring funds from a bank to the card on demand or when a threshold balance is reached.

Smart utilities – There is a massive surge of smart grid and smart meter implementations by utility (electricity, water and gas) companies around the globe, much of it driven by regulation (read our new *Quick Insights* report on smart grid[3]). Although driven to manage energy resources and generation more effectively by monitoring usage in real-time across their distribution grid, they also want to offer extended services to customers in real time, such as running totals of energy spend, the ability to manage and control devices in the home and tracking of energy positive customers that feed electricity back into the grid. However, in many developing markets the ability to provide pre-paid services is a major driver, and with that comes the need for RTCC, much the same as service providers now operate.

Retail – Stored value accounts on phones or cards used for micropayments at vending machines, coffee shops, and so on. The price of items could depend on a prepaid amount stored on the card or type of customer (for example, gold users get 10 percent discount). Charging functionality could also be linked to loyalty management, such as when someone spend $100 with a vendor, they receive a $5 voucher; or when someone buys five cans of drink, they are offered one free.

Financial services – Pre-paid debit cards, stored value cards and credit limit management for credit cards require some sort of RTCC. Banks also charge for transactions such as withdrawals from ATMs, inter-bank transfers, international money orders, and so on, and these fees need to be processed in real time to maintain an accurate balance in the customer's account. Fees vary depending on customers' status and the volume of transactions. Of course, mBanking and mPayments are

[3] *Smart grid: Commonalities, convergence and building new competencies* was written by Vaughan O'Grady and published by TM Forum in September 2012. It is free for all employees of our member companies to download once they are registered on our website and for non-members to buy from: www.tmforum.org/Smartgrid2012

prime RTCC targets, as mentioned. Financial institutions like banks, card issuers and remittance agents, plus network operators make up this ecosystem.

Public sector – 'Citizen services', such as on city cards, typically involve a prepaid account balance which needs to be checked when using the cards for transport and micropayments like entry to leisure centers, overdue library books or waste disposal centers. Also, the amount to be charged must be calculated according to discounts based on the user's status (student, unemployed, old-aged pensioner and so on).

Cloud services – With an ever-increasing trend to providing software as a service (SaaS) come myriad pricing options for users to 'pay as they go'. One option is to pay for usage on a time or event basis debited against a pre-paid balance or monthly account with a value set against a balance in real time or near real time.

Microsoft Azure and Microsoft Office 2013 are examples of the move towards this model as opposed to buying a license, which is the more common today. SaaS gives the option to upgrade or use an additional service.

Providers of images also offer a monthly subscription that deducts the value of an item as soon as it's consumed, giving customers a running balance or the option to top up. Cloud service providers, data centers, software and applications vendors and network operators make up the players in this ecosystem.

Automotive – Location-based services for fleet and workforce managers has been growing for a number of years. Now we are seeing the emergence of vehicle telematics as a growing M2M application. Vehicle manufacturers are embedding SIMs into monitoring devices in vehicles to provide a constant flow of information to a central repository to track the vehicle's performance, service intervals, location in case of theft, problems, even the driving habits of the owner.

Drivers can be given real-time traffic information, weather and parking details at their destination. These could be easily extended to offer other in-vehicle services like entertainment, Internet access and telephony all chargeable via RTCC. For example, the operator could offer its partner marketing and billing capabilities such as "Welcome to France! Get information about local road-signs for just €1; say 'yes' at the prompt."

eHealth – The extension of health services to remote areas for diagnostics and remedial advice. The list of applications is endless, but could include online home care through monitoring of heart patients wearing sensors, medication reminders, blood analysis for diabetes sufferers, continuous positive airway pressure monitoring for those with apnea, and post-operation recovery monitoring.

Taken together, they potentially represent a huge, real-time revenue opportunity that could massively reduce direct healthcare costs. eHealth is a good example of an ecosystem at work and shows how governments, health departments, hospitals, pharmaceutical, medical equipment, care managers and network operators can and must work together to provide solutions to combat skyrocketing healthcare costs.

Security – Home and small business video surveillance as a service is emerging as a potentially massive market with some mobile operators already offering real-time monitoring bundled together with different services like phone, Internet, cable, home automation and packaging security devices such as motion detectors, remote access control and surveillance cameras. Enhanced services like access to home video via smartphones are potential RTCC value-added services.

Section 4

Help with exploiting the full potential of real-time convergent charging

Industry standards for real-time convergent charging (RTCC) have evolved tremendously. In particular, the 3rd Generation Partnership Project (3GPP) charging specifications have provided the foundation on which to build and deliver convergent charging solutions, based on the Diameter Credit Control Application.

The functionality and development of most RTCC products is generally governed by the 3GPP and Internet Engineering Task Force (which oversees development of the Radius networking protocol, which provides centralized authentication, authorization and accounting management), the Institute of Electrical and Electronics Engineers and the European Telecommunications Standards Institute.[4]

The power of process

However, they cover specific, functional viewpoints not business or operational processes. This is the domain of the TM Forum's Frameworx suite of standards-based tools and best practices (see page 16), and in particular, the Business Process Framework (eTOM).

Generally speaking, RTCC implementations by vendors adapt to the processes already adopted by the operator. Where elements of Frameworx have been adopted, and the vendor has achieved Frameworx Conformance Certification (please see page 18), substantial gains in terms of lower implementation costs/tax for customers, improved traction with system integrators or enhanced flexibility and robustness in operational management can be achieved.

Online charging processes are covered in detail in the Business Process Framework while the Application Framework (TAM – again please see page 16) covers business requirements and solution design for online charging applications that are built or procured by an enterprise.

TM Forum Catalyst program

The Catalyst program is TM Forum's rapid prototyping environment where suppliers and systems integrators work together for between three and six months to create solutions for critical industry operational and systems challenges. A key aspect of these projects is that they accelerate development and validate TM Forum best practices and standards, including Frameworx. The solutions are demonstrated live at TM Forum's Management World events.

The *Real-time Charging for High Volume Mobile Data* Catalyst project, showcased at TM Forum Management World 2012 in Dublin, demonstrated real-time user feedback and policy enforcement on user mobile data consumption. Its aim was to find an innovative architecture for real-time charging and rating that could manage the forecasted growth of mobile data traffic. The architecture needed to support a better customer experience while reducing data transaction processing costs.

The methodologies, processes and solutions that emerged from this Catalyst have been fed back to the Billing and Charging group within the TM Forum Collaboration Program for inclusion in future releases of the Frameworx.

For more details, visit www.tmforum.org/RealtimeChargingfor/12921/home.html. For more information on the Catalyst program, or to take part, please contact Nora Doherty, Catalyst Program Manager, TM Forum via ndoherty@tmforum.org

[4]More information about these standards bodies' activities and how TM Forum works with them is available in detail in our *Quick Insights* report, *Standards Development 2012: Maximizing impact across the communications industry*, written by Colin Ashford and published in May 2012. It is available free to all employees of our member companies who register on our website and for non-members to buy from: www.tmforum.org/standards2012

What is TM Forum Frameworx and how can it help you?

TM Forum's Frameworx suite of standards-based tools and best practices provides the blueprint for effective business operations, enabling you to assess and improve performance by using a proven, service-oriented approach (SOA) to operations and integration. It has been adopted by 90 percent of the world's largest service providers – and its take-up is accelerating as service providers recognize it is core to their business. Frameworx helps you:

- Understand your customer through a common customer management information model
- Innovate and reduce time-to-market with streamlined, end-to-end service management
- Cut operating costs by enabling highly efficient, automated, industry standard operations
- Reduce integration costs and risk through standardized interfaces and a common information model
- Lower the risks of transformation by delivering a proven blueprint for your business
- Gain independence and confidence in procurement through conformance certification and procurement guides
- Gain clarity by providing a common, standard language
- Build essential partnerships quickly and easily through common processes, information and terminology.

The suite was developed in the Forum's unique Collaboration Community and continues to evolve through the efforts of the Community to meet changing market needs. It is driven by service providers and available exclusively to members, who represent more than 90 percent of the world's communications subscribers.

Frameworx is made up of four components:

Business Process Framework (eTOM)
The Business Process Framework provides efficient, clear and effective business processes that are critical to delivering innovative services quickly, at the least possible cost. It offers a comprehensive, multi-layered view of these processes and is aligned with ITIL. It is supported by off-the-shelf tools to provide a multi-dimensional catalog of the business processes and includes guidelines and process flows ensuring your processes are streamlined and effective across the enterprise and across partners in a value-chain.

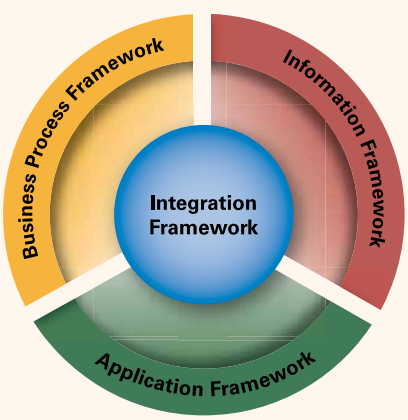
Information Framework (SID)
The end-to-end management of service demands the consistent use of data across an enterprise. The Information Framework provides a comprehensive, industry-agreed definition of the information that flows through an enterprise and between service providers and their business partners. It is supported by off-the-shelf tools and provides a common information model, enabling the definition of standardized integration points.

The Application Framework (TAM)
Understanding how your business processes are implemented in your software architecture is essential. This Framework provides a model for grouping processes and their associated information into recognizable applications. It provides a common language and identification between buyer and supplier for all application areas.

It helps in the design of enterprise architecture through a better understanding of your systems architecture plotted against a standardized map.

The Integration Framework
Automation of business processes enables you to significantly reduce costs and rapidly deploy new services. But automation requires interoperability between systems across the entire enterprise and an extended value-chain of partners. The Integration Framework defines how the processes and information behind these systems can be automated by defining standardized Service Oriented Architecture (SOA)-based interfaces. The Integration Framework includes:

- A taxonomy for services and guidelines for the development of Business Services.
- Model driven tooling for the machine assisted production of standard interfaces.
- A repository of Business Services.



Available on the App Store

Search and navigate Frameworx with the free iPhone/iPad app

Business Metrics
Understanding the performance of your business is a critical aspect of managing transformation. Knowing how you compare to the industry in key operational areas will guide your transformation investment. TM Forum's Business Metrics, mapped to the Business Process Framework, provide a way for you to measure success based on a balanced scorecard that covers:

- Revenue and margin: a view of fiscal performance.
- Customer experience: measures that impact the end-customer's reaction to the service offering.
- Operational efficiency: a view of cost and expense drivers.

(For more information on TM Forum's Business Benchmarking and Analytics program please see www.tmforum.org/InDepth/2145/home.html)

Latest release – Frameworx 12
Frameworx 12 has seen the largest number of updates to the Business Process Framework, with over 800 new processes added, especially for billing, charging, policy management, fraud management and value chain management. Other new additions include:

New security capabilities to provide defense-grade security to commercial networks
Frameworx 12 includes three new security user stories that address denial of service attacks, penetration attacks and application misuse. These user stories were mapped in to the Business Process Framework to create new security processes in five areas that serve as a blueprint for organizations to use in establishing their security practices for network defense.

Software Enabled Services
The Software Enabled Services features in Frameworx provide a set of building blocks to enable standards-driven, model-based software solutions. This facilitates development of Frameworx-compliant IT solutions focused on agile service delivery. Benefits will include a rapid time to market for new services and the ability to manage the complete lifecycle in an SOA.

Cloud Service Level Agreement Handbook
Based on requirements from the Enterprise Cloud Leadership Council, this guides service providers on the expectations from their enterprise customers on service level agreements (SLAs). It provides guidelines to ensure your SLA is commercially viable for cloud and may be used by the enterprise to measure the worth of an SLA offered by a vendor of enterprise cloud services, or by the service provider to ensure that the SLA the service provider they are offering is enterprise-grade. It will be free for TM Forum members to download from our website.

New Quick Start Pack for Fulfillment
This accelerates the ability to streamline fulfillment processes for product and service delivery. It provides a common language for working with partners for delivering services, saving time in defining business interfaces, as well as enabling rapid deployment of new services through well-documented processes and a common language.

Customer Experience Handbook
An overview of Customer Experience Management (CEM) in the industry and a summary of TM Forum work to date that is applicable to CEM. It provides recommendations for service providers on how to develop a roadmap for CEM, how to measure and manage customer experience, and provides recommendations to TM Forum and the industry for future direction in development of standards and best practices.

Model Federation Enablers
Designed to allow the Information Framework (SID) to model any kind of resource, including those where the detail of the resource is defined by someone else. In addition, the interface development tooling in Frameworx generates basic interface capability utilizing the Information Framework. As a result the federation capability of the Information Framework will also by implication allow Frameworx interfaces to provide high level management functionality for any kind of resource.

What can Business Benchmarking do for you?
More than 170 service providers from over 65 countries use performance data from TM Forum's Business Benchmarking Program to improve efficiency and effectiveness.

Participants receive secure, individualized reports showing their performance against each metric and have access to broader results and statistics in the benchmarking database. Aggregated results are available for a fee to non-participating service providers.

For details of upcoming studies or to participate, please contact Chyrssa Dislis, Senior Manager, Business Benchmarking, cdislis@tmforum.org

Collaboration delivers

The TM Forum's Collaboration Program is a virtual research and development consortium made up of our members. Within the broader Business Assurance programs lies a highly active Charging and Billing Collaboration Community project, which is exploring many aspects of RTCC.

It also provides suggestions for enhancements to and the expansion of Frameworx, relevant to charging. For more information about the project and how to get involved, please go to www.tmforum.org/Community/groups/charging-and-billing/default.aspx and/or contact Steve Cotton, Director, Business Assurance programs, via scotton@tmforum.org

Policy everywhere

Many of the most advanced policy controls have a real-time component to their operation, such as throttling, for example. Other rules-based policies that are now being discussed in a Technical Report (TR182) which TM Forum is about to publish, called *Policy* in Context of Charging and Billing, the most recent draft of which, Release 6.0 was published on September 6 2012 and is available to members from www.tmforum.org/policyrelease6.0

In addition, as mentioned in Section 1, all employees of TM Forum's member companies who register on our website can access our *Insights Research* report, *Policy everywhere: Acting on network intelligence*, and non-members can buy it from here www.tmforum.org/insightspolicyeverywhere. It is written by Rob Rich, Managing Director, TM Forum Insights Research and published by TM Forum in July 2012.

Collecting and distributing data

TM Forum's Internet Protocol Detail Record (IPDR) is a standardized interface for collection and redistribution of data found in the IP ecosystem. Its development falls under the auspices of the Next Gen IPDR group within the TM Forum's Collaboration Program.

IPDR has its roots in the cable industry, where it has been providing multi-service operators collected real-time information for more than a decade and in volumes now reaching a Petabyte a year. However it can be applied across many industries and sectors, as its recent adoption by the BroadBand Forum shows.

The BroadBand Forum is supporting the inclusion of IPDR into its installed base of TR69 device and as this use proliferates, broadband providers of all stripes will also be able to benefit from the easier, faster, cheaper integration this standard interface enables to gain greater, immediate business intelligence.

The Business Process Framework

The greatest business benefits of the Business Process Framework are gained when it is used in combination with the other main elements of TM Forum's Frameworx suite of standards). Benefits include:

1. Saving time and money on business process projects by using over 1,200 processes already defined and implemented by service providers – Frameworx 12, the largest release of the Framework, launched in May 2012, has over 800 new processes in the Business Process Framework and 300 new mappings across Frameworks.
2. Reducing operational and procurement costs by using standard terminology and classification schemes to describe business processes.
3. Decreasing time to market by using well-defined processes.
4. Cutting costs and enabling seamless integration between operations and IT through use of embedded ITIL best practices.
5. Helps reduce risk.

We live in times of fast-change, and the communications and associated industry is one of the fastest changing of all, so work continues on evolving Frameworx, including the Business Process Framework, to meet new needs and circumstances. If you would like to influence their development, please go to www.tmforum.org/collaboration to find out more about the potential benefits and how to get started – and benefit from our unique Collaboration Community, sharing the experience and expertise of companies from all over the world, 24 hours a day.

The business impact of standards-based conformance

The success of the global communications industry was built on standards, and the future of digital services relies on them too. TM Forum's Frameworx suite of standard-based tools and best practices (see page 16) is already widely recognized as the standard for business processes, information and applications, and rapid integration.

Our Frameworx Conformance Certification Assessments enable service providers and suppliers alike to verify an implementation, product, or solution's conformance to Frameworx Business Process and Information Frameworks' models and improve the overall efficiency of an organization's procurement processes.

Frameworx Implementation Conformance

The Frameworx Implementation Conformance Assessment provides verification of a service provider's internal business processes and enterprise data model. This independent assessment enables companies to validate and improve the efficiency of their organization, comparing adherence to the proven Frameworx Business Process and Information Frameworks' standards, on a sliding scale.

Implementations which meet the rigorous certification standards are awarded the TM Forum Frameworx Implementation Conformance Mark.

Combined with TM Forum Benchmarking (see page 17), Implementation Conformance Assessments provide a clear indication of how your enterprise-wide operations compare to industry leaders, and where to direct investment for maximum effect.

Frameworx Product and Solution Conformance

An agile service provider needs adaptive software solutions which can be implemented quickly, cheaply, and with the lowest possible risk, not just internally, but across the ecosystem. Furthermore, companies need to be able to innovative with minimal integration effort.

Product Conformance Assessments provide an independent verification of a product's conformance to the Frameworx Business Process and Information models. Since service providers can procure discrete products and/or 'plug and play' integrated, off-the-shelf solutions, the TM Forum also offers Solution Conformance Assessments.

Procurement (RFx) Training and Support

To help simplify the process of procuring Frameworx-conformant products and solutions, TM Forum provides RFx templates and training for procurement staff, and offers a broad range of support and expert advice for service providers striving for Frameworx conformance.

The business benefits for service providers include providing products, solutions and implementations with an independent conformance benchmark. This can help reduce the costs of the procurement process and the risks associated with complex integration projects by providing the information needed to develop an integration roadmap. Conformance certification also simplifies the integration of products through merger and acquisitions, or reorganizations, from the technical and product portfolio perspective.

Conformance certification helps suppliers because it reduces the costs associated with responding to requests for tenders, in part by making it easier to understand what the customers' requirements are more quickly and comprehensively. Undergoing the certification process also demonstrates real commitment to enabling an open and vibrant market of conformant, service management solutions for the industry, and acts as a differentiator.

Sponsored feature

Why real time charging is now an essential ingredient for commercial success

The one certainty of the modern telecoms world is the inevitability of change. It's simply not an option to ignore it. In fact to survive and prosper, service providers increasingly need to demonstrate their adeptness at quickly, reliably and repeatedly identifying and reacting to emerging opportunities, and continually adapting their offering to meet the needs of their customers.

One key difference is that service providers are no longer driving change. In the past, change was something they had much greater control of – something they could schedule. Today, it's increasingly out of their hands – driven by what customers want and are prepared to pay for, at a pace set by them. Change is thus faster, more frequent and becoming one of the everyday challenges the industry faces.

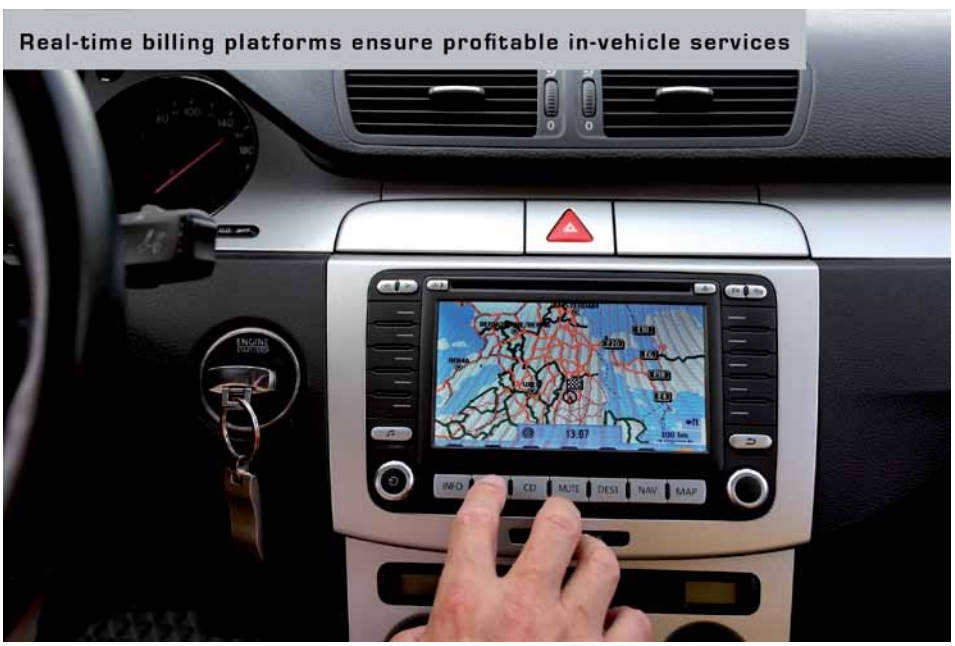
The inevitability of ongoing change means that it's something that has to be accommodated and embraced, rather than feared or avoided. Preparedness is essential for success, enabling service providers to face challenges with confidence, manage risk and uncertainty, and position themselves to exploit the many, varied and evolving opportunities that are being presented.

Order-to-cash processes need to accommodate frequent change in real time.

Being prepared for the new telecoms environment means having the "right infrastructure". This is often taken to mean having the right network capabilities, and while this is undoubtedly the fundamental building block of any telecoms business, the billions committed to new network investment will not in themselves secure service providers' futures, if in the rush to roll them out they overlook critical business and operational processes.

These processes transform excellent network capabilities into revenues, and manage the commercial relationship between customers and their service provider. Order-to-cash processes have to be easy to use, cheap to run, robust and functional. But they also have to be flexible enough to enable innovative offers to be created and rolled out, so that the service provider can readily respond to competitors and keep customers interested and engaged.

Even the nature of competition is changing. Now CSPs are not just competing with increasing numbers of new entrant communication companies, but also with retail brands entering the market as MVNOs and other types of company seeking to stake their own claims in the lucrative new mobile marketplace. This includes so-called OTT players who are seeking to disintermediate the operator and lay claim to the primary customer relationship, as well as automotive and electronics companies and white goods manufacturers who have identified an opportunity to deepen and enrich the customer experience they provide while enhancing their own



Real-time billing platforms ensure profitable in-vehicle services

businesses. In the emerging M2M space, utilities and retailers are just some of the front runners looking to exploit the benefits of the connected world.

All of this represents both opportunity and risk which CSPs need to navigate and accommodate. Key to successfully exploiting these new opportunities is the ability to support a smooth, real time experience. This will hide a great deal of technological complexity deriving from a heterogeneous network and systems environment, with overall performance being determined by the weakest link in the process. Just one bottleneck could result in a significant deterioration in the customers experience of this process.

This means that the entire order-to-cash process has to be automated and convergent, in order to deliver the experience customers desire. If the systems supporting these key processes are not properly integrated and fully real time, then customers will still perceive barriers, delays and mistakes as they try to use, buy and manage their services.

What's more, order-to-cash processes and systems need to support both service provider-initiated changes – such as launching new price plans – as well as customer-initiated changes such as cancelling services, ordering new ones or adjusting limits or controls as they seek to keep services and bundles tuned to their ever-changing needs. Intermittent customer-initiated change such as changing a price plan once a year is quickly going to transform into a continual stream of small and large changes that need to be applied consistently and reflected in charges. This will expose any weaknesses in the order-to-cash process, with customers unlikely to understand or accept an excuse of poor performance due to technical complexity.

Four benefits of innovative real-time order-to-cash solutions

Delight customers
The future telecoms experience is more retail-like, meaning that service providers will need to be more proactive in maximizing their share of the customer's budget. This requires a fully realtime experience with continual changes accommodated and reflected accurately in charges.

Monetize faster
Winners in the new telecoms paradigm will be mindful of how they're going to monetize new network capabilities sooner rather than later, avoiding a revenue gap between network investment and commercialization.

Increase efficiency
Modern order-to-cash systems require less effort to run, removing the bottleneck to change. This frees up skilled staff, which can be redeployed where they will add most value to the business – supporting innovation and the customer experience.

Avoid risk
Canny service providers will transform commercial dangers into opportunities. For example, the volume of new and constantly changing prices and products increases the risk of overspending and bill shock. Price clarity and user-defined spending limits will help mitigate this risk, avoiding the costs associated with complaints and churn, but also helping to encourage usage.

Transforming opportunities into benefits

Although changes in the telecoms environment are increasingly focused upon meeting customer expectations, not all customers want the same thing. In fact customers have very different expectations, along with their ability or propensity to pay.

For example, consumers now expect a real time digital experience. For many, their mobile devices are an essential part of their daily lives and they need them to work in the way they want, when they want and wherever they are. Their online experience with digital retailers means they expect to be able to browse, compare, choose, change, buy and receive their products easily and instantly. Many are becoming savvier and more demanding; others are struggling to understand the new paradigm and may fear the costs involved. Both of these types of customer need to be supported by fast, efficient and accurate order-to-cash services, which ensure that whenever or wherever an order is taken, or a service bundle altered, the change is applied consistently and reflected in the bill or charges.

Enterprises also rely heavily on telecoms services both operationally and commercially in order to improve employee productivity as well as to support their ability to attract, engage and sell to their own customers. There are many emerging opportunities within the business sector that promise lucrative new revenue streams to service providers that can deliver against them. These include support for a wide range of cloud services, as well as the emerging M2M market. In both cases the challenge is not just to create a compelling offer, but also to be able to monetize it.

Transforming opportunity into profit requires service providers to have the right products, prices and marketing, but also an efficient, flexible and real time infrastructure to facilitate commercialization of it.

Sponsored feature

Why real time charging is now an essential ingredient for commercial success

Orga Systems.

#1 choice for real-time charging and billing

Real-time platforms – the driving force behind successful customer-centric offerings

A great example of how accommodating flexibility to enable change can be turned into a differentiating offer is shown by a leading LTE provider in the CIS. It has implemented real time service enablement and premium customer care to transform their customer experience.

When a customer buys a new device they now gain access to the network at full speed. If they're not satisfied with their experience within the first seven days they can return the device for a full refund. If they are satisfied they now have the flexibility to select the speed of their service, with the service provider enabling them to adjust access speed via an easy-to-use visual controller.

This visual controller – a web-based self-care application – enables customers to adjust their service quality and speed at any time in real time. This provides much greater choice to the customer, giving them the ability to tailor the service more precisely to their individual and evolving needs.

Meralco, the largest distributor of electrical power in the Philippines, provides an example of the emerging M2M opportunity.

In order to keep its customers happy, ensure regulatory compliance and maximize its revenues, Meralco implements a new meter-to-cash solution. Using smart meters in combination with Orga Systems' OS.Energy solution, it can then communicate with its customers in real time to notify and advise them of consumption, thresholds, and payment issues. It also offers tiered tariffs, including multilevel thresholds, and has the ability to remotely connect or disconnect customers.

This delivers great benefits, helping Meralco improve its revenue management, resolve performance bottlenecks in rating the data derived from meters, and monetize new value-added services.

Another example of how M2M services can be monetized is provided by a leading European car manufacturer, which is launching in-car service and mobility innovations to improve the driver experience. The new solution will enable the manufacturer to launch and bill for everything from navigation, travel assistance, rich mobility services to on-board infotainment. The solution provides customer care, self-care and order management capabilities for seamless ordering of in-vehicle applications, including compatibility and availability checks, as well as customer incentive schemes.

All of these opportunities are delivered via wireless technology, a flexible and real time order-to-cash platform, and Orga Systems know-how, which together support business optimization, revenue maximization and a better customer experience.

Author
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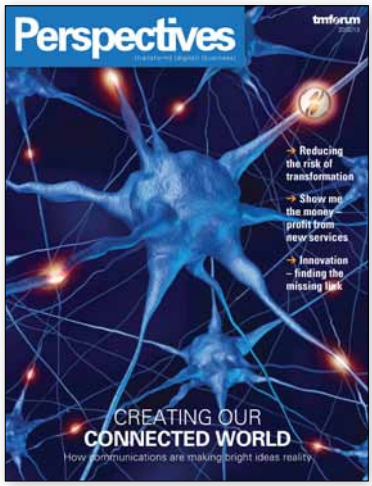
Have you seen our other recent TM Forum publications?

TM Forum's research reports are free to all employees of our member companies and can be downloaded from our website once they've registered. The reports are also available for non-members to purchase online.

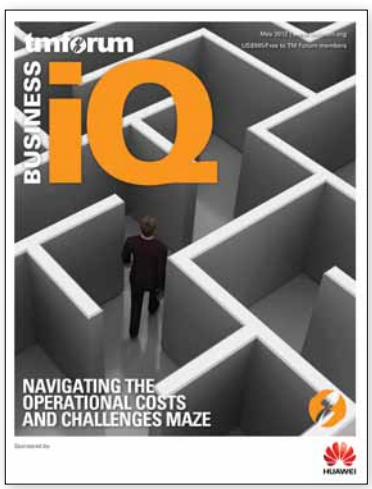


Perspectives 2012

Perspectives is TM Forum's annual publication for senior professionals in the world of digital services.

The theme of this year's edition is our industry's progress to a fully connected digital world. The digital world will impact every business sector on the planet with new business models and markets, which will bring major threats to those who fail to seize the opportunities the digital economy brings. In order to make the most of these opportunities, companies need to be smart and move fast.

With access to some of the industry's leading lights and most sought after journalists and analysts, if you are part of the communications or related industries, whether you sit in the boardroom or stand by the water cooler, make sure that you read *Perspectives 2012*.

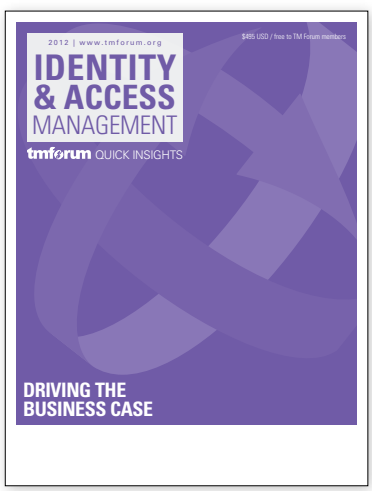


Business IQ: Navigating the operational costs and challenges maze

TM Forum's *Business IQ* explores the business transformation issues facing our industry right now. Standardized, reusable, recyclable processes and flexible systems and platforms are the key to being able to embrace new business models, launch new services fast and open up new revenue streams.

In this issue, we look at the main aspects of operational costs and challenges. We explore some of the highlights of TM Forum's groundbreaking Operational Cost Model Survey Report, interview industry visionary Dr. Hossein Eslambolchi, and show how TM Forum's Frameworx suite of standards has helped Vodafone D2 blaze the transformation trail.

Also, our select virtual panel of experts discusses cross-industry IT trends and explores how service providers' operational expenditure profile is changing.

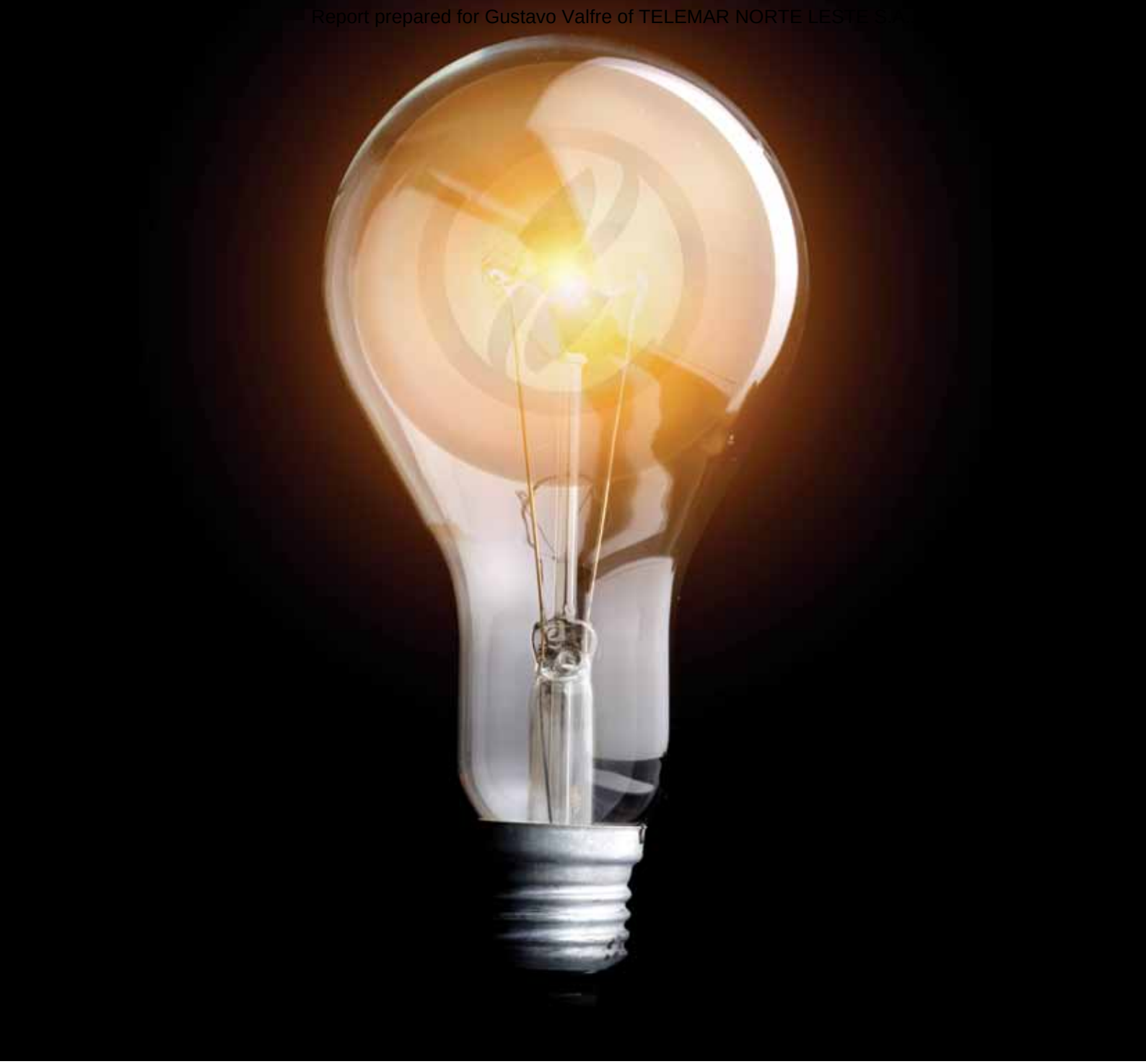


Identity and access management: Driving the business case

Identity and access management (IAM) is a big business, looming large in the security calculations of industry, enterprise, government and even private individuals. ICT, electronic networking and Internet support enable many aspects of modern life around the world. With that comes a greater need to be able to identify and authenticate individuals accessing systems and resources, exchanging information or performing transactions.

In this *Quick Insights* report, we discuss how improving and automating systems can reduce the risk of interference with operations, financial losses and damage to reputation. Implementing better IAM capabilities holds the promise of enhancing enterprise IT efficiencies and quality, lowering operational expenditure, and increasing workforce productivity through wider but controlled access to systems, resources and data. There is also the potential for enhanced customer relationships and satisfaction, and higher revenues.

Visit **www.tmforum.org/researchandpublications** to find out more



ENABLING INNOVATION

The game is changing for communications service providers. Cutting costs is merely a ticket to play, not to grow. The key to growth lies with innovation – underpinned by business agility, smart partnerships and inspired creativity.

As the global industry association focused on simplifying the complexity of running a service provider's business, TM Forum brings together a community of more than 50,000 professionals on the cutting edge of innovation. As a unifying force for the industry, it's time for you to join more than 750 companies across 195 countries collaborating to simplify service innovation.

Visit www.tmforum.org to learn more about TM Forum membership and how we help you enable innovation.