

## What will you learn?

How the architecture and role of telecom billing has changed recently

What new services must retail (B2C) billing support and why performance is key

What are the main challenges in B2B billing and why it must show great flexibility

Why M2M requires advanced billing tools with low TCO

How to combine billing with PCRF

Why traditional billing systems cannot overcome these challenges and need to be transformed

# Telecom billing – time for a change

## The new role of the billing systems and challenges facing CSPs in the billing space

### The new role of telecom billing

In recent years, many changes have shaped the telecom services market. Smartphone usage has skyrocketed, the consumption of data and content has also increased, competition on the market has become stronger than ever before and the focus of operators has moved from networks and products to customer experience.

As a result, the role of billing systems has been redefined. Many modules that used to be part of them, such as product catalogs, customer management and managing product instances, have evolved to become separate tools. Therefore, billing has been pushed to the role of a mere "calculator".

But the new requirements this "calculator" has to meet have become extraordinary large. Currently, a telecom billing system must handle sophisticated services, various types of subscribers, lines of business, payment methods and business models.

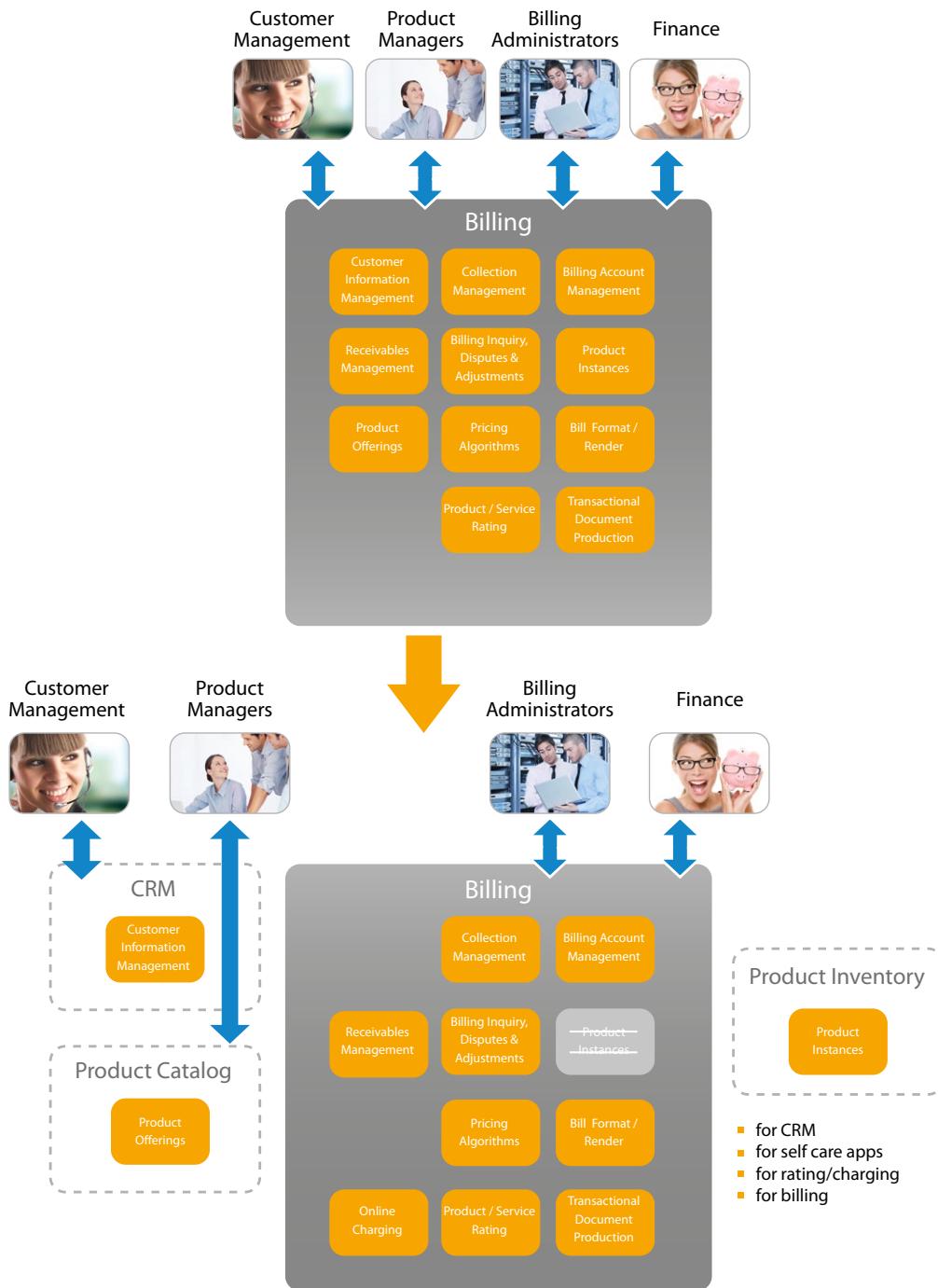
Additionally, it must control services and charge for them, as well as provide information to other applications, and do it all in real-time.

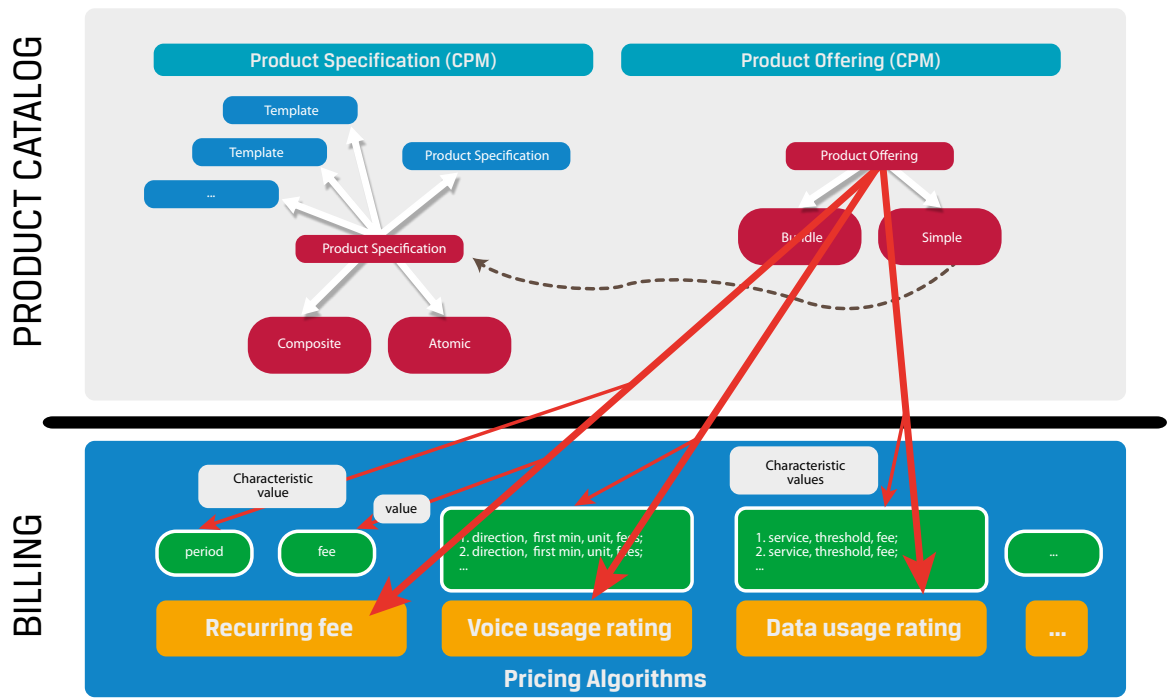
### Traditional billing modules become independent tools

As customer requirements increased, the customer management module in billing systems ceased to be an effective tool. Customer Relationship Management systems took over the role, and are currently the main tool for managing interactions with customers, sales, marketing, customer service and technical support activities. As a result, billing is no longer the master repository of customer data.

The need for service innovation led to increasing the complexity of service offerings – product portfolios became extremely difficult to manage effectively. This in turn entailed moving out product management modules from billing systems and developing modern tools for managing convergent services in the form of product catalogs. These systems are now taking care of all aspects related to managing product offerings, such as defining sales rules, dependencies between products etc.

As a consequence of these changes, pricing algorithms have become the core of billing configurations and, as such, define a billing system's capabilities to handle various price plans, such as usage-based, tiered pricing, periodic fees etc. These pricing algorithms are used by product managers in the product catalog to flexibly define new product offerings.





▲ Figure 1. Pricing algorithms

A billing system needs to properly rate and bill for every product offering available in the product catalog.

Figure 1 shows the product catalog layer and the billing layer.

The structure of the product catalog consist of TMForum's SID entities – product specifications and product offerings. These entities are managed by product managers only and billing departments may have no influence over them.

When a new product offering is created, pricing algorithms must be specified for it. These are defined in the billing system. All characteristic values for defining the particular pricing information, such as final price per minute, the price of recurring fees, commitment periods etc. are specified in the product catalog.

Having lost the function of defining product offerings, billing systems have had to deal with more challenging pricing algorithms since they must be more universal and better designed than before to encompass the above requirements.

Because customer and product management functions were taken out of billing systems, information concerning products was also separated. In modern BSS architectures this is an independent module. It provides information to CRM, Self-Care applications, as well as to all billing purposes, including online charging. It also contains all final prices for particular customers, which is extremely important for creating personalized offers and discounts.

Such a change in the architecture also potentially eliminates situations when information presented via Self-Care or CRM and the information on invoices differ from each other, which in turn leads to an improvement in customer experience.

## Sample products and options in the B2C market

Hybrid products	Shared data plans	Service-based
<ul style="list-style-type: none"> <li>○ <b>Voice, SMS and data</b> with predefined limits</li> <li>○ Customer will not have to pay a bill higher than this <b>limit</b></li> <li>○ After reaching the limit it is still possible to make a call following the <b>top-up</b> like in traditional prepaid models</li> <li>○ <b>Invoices</b> are generated monthly and cover "post-paid" monthly fees</li> <li>○ Good solution for <b>controlling costs</b></li> </ul>	<ul style="list-style-type: none"> <li>○ Bundled voice, SMS and data together in the same <b>family plan</b></li> <li>○ Many devices under a <b>single account</b></li> <li>○ Pricing may depend on                             <ul style="list-style-type: none"> <li>● <b>how many devices</b> are included in the plan</li> <li>● usage</li> </ul> </li> <li>○ Charged in <b>pre-paid, post-paid</b> or <b>mixed/hybrid</b> models</li> </ul>	<ul style="list-style-type: none"> <li>○ Video streaming <b>charged per minute</b> with free minutes in the plan</li> <li>○ Remaining data consumption charged per data usage with monthly limit</li> </ul>

Multi-service bundles	Limit control	Cross-service discounts
<ul style="list-style-type: none"> <li>○ <b>Bundles:</b> <ul style="list-style-type: none"> <li>● e.g. phone + internet + TV</li> </ul> </li> <li>○ <b>One invoice</b></li> </ul>	<ul style="list-style-type: none"> <li>○ Possibility to define <b>customized limits</b></li> <li>○ Leads to higher customer <b>satisfaction</b> and may decrease churn</li> <li>○ <b>Not only for traditional services</b></li> <li>○ Customized notifications</li> </ul>	<ul style="list-style-type: none"> <li>○ For customers ordering <b>multiple services</b></li> <li>○ E.g. it can be a special <b>discount</b> for a mobile broadband product available to all customers paying for specific monthly voice tariffs</li> </ul>

## Billing in the B2C segment – large-scale calls for large-scale performance

The mass market (B2C) has always been the biggest source of revenue for operators. From this perspective, other lines of business, such as the enterprise customer market (B2B) or M2M, are often seen as complementary, but they do remain strategically important. As a result, billing systems serving the B2C market are crucial elements of BSS architectures, and face many challenges. Some of these challenges include:

- **Product types such as hybrid, shared, service-based, as well as advanced discounts and bundles must be fully supported by B2C billing systems.** Advanced limit control with custom notifications is also necessary. For example, customers should have the possibility to set up an SMS notification for when their total spending for data consumption has reached 20 EUR
- **Marketing/product management departments demand highly flexible tools to innovate and compete and a short time-to-market.** If they come up with a new product offering, they expect to be able to implement it and launch it immediately. This is highly challenging for the entire IT architecture, including billing systems
- **Real-time does not only apply to prepaid anymore.** The trend is that everything becomes controlled in real-time. Prepaid or postpaid is only a payment method
- **Huge challenges are related to all real-time processing** and the management of huge numbers of subscribers and invoices

The main challenges in this area are of a technical nature and relate to the performance of the billing system, which is crucial in the B2C.

**Currently, a telecom billing system must handle sophisticated services, various types of subscribers, lines of business, payment methods and business models.**

## Billing in B2B – big customers require big flexibility

The B2B domain in this white paper refers to all telecom services offered to enterprises. While prices for services in B2C are falling, in B2B they remain stable. B2B is becoming a very important area for communication service providers. B2C architectures have already been transformed in the past, whereas many B2B IT architectures (BSS) have still not been modernized. The main challenges that are faced by billing systems serving enterprise customers include:

- › **Enterprises are often large international customers.** And some of them also act as service resellers. The same product offerings must now be offered on the international market with proper multi-country support – including not only multiple languages but also multiple time zones, multiple currencies or various tax regimes supported within the same system
- › **Support for hierarchies and split-billing controlled by the customer is a must in B2B**
- › **When it comes to flexibility, it is even more important here than in the B2C domain.** Products offered to business customers are very personalized. If an offering is defined in the product catalog, it does not necessarily have to be sold in its exact form. The final form of products and prices is constantly being decided during the sales process
- › **Finance departments** may also require some level of flexibility, for instance they may require the possibility to create debt and credit notes or advance invoices
- › While time-to-market was important in the B2C domain, **lead-to-cash time** is important in B2B. When a product is sold it must be delivered as soon as possible
- › **Not only traditional services can be billed for.** Billing may relate to more comprehensive solutions delivered to an enterprise customer or to a specific site (e.g. micro cells)
- › **Sometimes final users, payers and owners of services are not the same departments,** this should also be taken into consideration

In general, delivering services to enterprise customers (and billing for those services) must involve taking the individual specifics of enterprise customers into account and focus on maximum flexibility, as these clients may have very strict requirements resulting from their business strategies, whether organizational or IT specific.

**A modern billing system must be very flexible, which may mean different things in different lines of the telecom business.**

## Billing in M2M – the need for advanced tools with low TCO

There are many promises related to M2M (Machine-to-Machine) communication as a new revenue source for operators. It is still difficult to make it work though because M2M is still in its infancy. Nevertheless, it is important to protect a position on the market, enter it and be ready for growth.

- › **Some aspects related to M2M are similar to the B2B domain.** Customers (in some verticals) are international, which leads to the necessity of full multi-country support for systems, including billing. Products are also very personalized and their final form is decided during the sales process, like in B2B
- › **As a part of revenue assurance, advanced limit control of spending may be required.** In the short history of M2M there have been many instances of fraud related to the misusage of M2M SIM cards. So limits have to be possible to control a group of SIM cards or even particular SIM cards
- › **The biggest technical challenge for billing in the M2M domain is related to its ability to bill not only for telecom services,** such as activation or data usage fees. Depending on the implemented M2M strategy, it may be necessary to be able to bill for services related to verticals such as security, mHealth, smart metering or others
- › **Additionally, M2M is a low ARPU business, which means that using the existing systems of operators can be very difficult.** In many cases, billing services are delivered as part of separate M2M platforms or in an outsourcing model

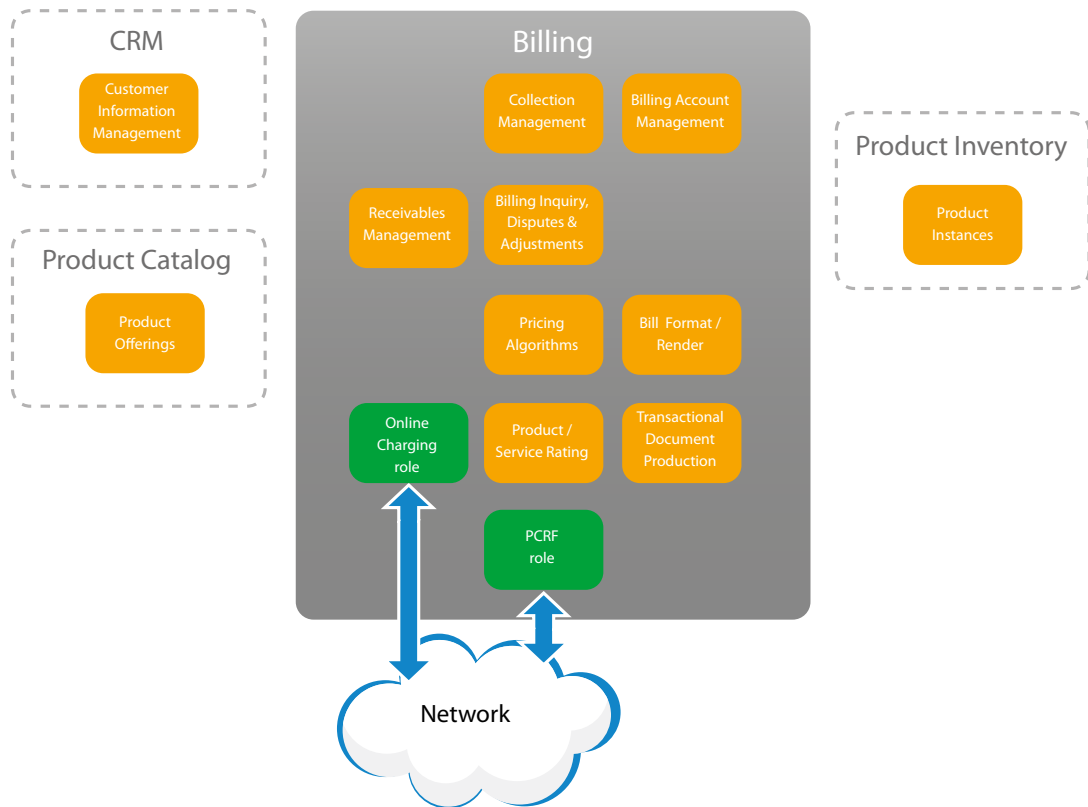
Delivering advanced M2M billing services, their management and billing, while keeping costs low, is a real challenge.

## Billing + Policy Management – desired but complicated

The smartphone revolution, and the increased usage of data transmission has led to the creation of new charging models for data products. Examples include:

- › Tiered pricing
- › Location-based pricing
- › Device differentiation (e.g. in shared data plans)
- › Service-based pricing (e.g. per minute for video streaming and per kb for rest)
- › Quality-based pricing

Such models can be implemented in typical 3GPP architectures, with separate real-time charging and policy management (OCS and PCRF). However, flexibility and a reasonable time-to-market period demanded by marketing departments requires that real-time charging and policy management are better integrated.



▲ *Figure 2. PCRF & OCS convergence*

In bigger installations it is difficult to imagine that the roles of real-time charging and PCRF (Policy Charging and Rules Function) are carried out by the same component. Logically, it seems very reasonable, because it can provide more flexible pricing models related to data services.

Also, a lot of valuable information is gathered by PCRF and OCS. It can be used to make charging and policy decisions. Potentially, OCS would make charging decisions based on information from PCRF and it can also be done the other way round. Recent standardization (Sy interface) helps but it does not solve all problems related to the required level of flexibility.

When it comes to flexible product offerings that are created in the product catalog and are based on policy-related decisions (e.g. an offering with free video streaming minutes) they should be defined in the same way as all other offerings. This means the process should involve the product management department and, potentially, the IT department. Network departments (where standalone PCRF is typically situated) should not be involved in implementing such offerings. It could save a lot of time and costs, which would improve not only time-to-market but also business efficiency.

Unfortunately, it is technically very difficult to implement this scenario, because PCRF must work in the core network regime when it comes to capacity, latency and reliability. Nevertheless, there are many benefits to such an approach.



	B2C / policy management	B2B	M2M
<b>Customer type</b>	<b>Prepaid, postpaid, hybrid</b>	International customers Customers and resellers Multi-country: multi-language, multi-currency, multiple time zones, multiple tax regimes	
<b>Focus on customer experience</b>	<b>Limit control and notifications</b> Shared data plans; cross-service discounts; multi-service bundles Provides information in real-time	Final <b>products are personalized</b> , defined during selling process Hierarchies and split-billing controlled by customer	
<b>Supports revenue assurance</b>	<b>Billing quality control</b>		Advanced limit control: per group or per SIM; for data or money; per zone
<b>Smart</b>	<b>Flexibility and short time-to-market demanded by marketing</b>	<b>Flexibility and short lead-to-cash demanded by sales</b> Flexibility also needed for finance departments: debt, credit notes advance invoices in any time	Billing for connectivity and <b>non telecommunication services</b> – M2M verticals Prepaid model possible on SIM level or reseller level
<b>Convergent</b>	Real-time is not only pre-paid <b>Pre-paid/post-paid is only a payment method</b> Content services <b>Service-based, cross-service discounts, shared</b>	<b>Billing not only for traditional services</b> Billing for site or solution delivered Invoices for enterprise or departments <b>Users, payers and owners of services</b>	
<b>Future proof</b>	Technical challenges: - <b>All-real-time processing</b> - <b>OCS and policy</b> decisions must be made with the <b>core network regime</b> (reliability, latency, capacity) - Large number of subscribers  Organization al challenge: - Traditionally PCRF is a part of network core!	<b>Very business-oriented</b>	Deliver <b>advanced and cost efficient billing services</b> to M2M departments in the organization

▲ Figure 3. Comparison of billing features and challenges in various lines of business

### Traditional billing systems are no longer enough

In transformed BSS landscapes the billing system must cooperate efficiently with CRM in managing all interactions with customers, as well as with the product catalog when managing product offerings and sales rules. It must also be smoothly integrated with an external product inventory, where all information about current customer subscriptions and prices is stored.

**A modern billing tool should be ready to handle more than the typical telecommunication services.**

A modern billing system must also be very flexible, which may mean different things in different lines of the telecom business. A billing system in B2C must support short time-to-market and product catalog flexibility, demanded by marketing departments. In B2B and M2M, it must provide short lead-to-cash time and selling flexibility demanded by sales.

Supporting full convergence is also a must in today's world of innovative, complex service portfolios. The difference between prepaid and postpaid should only be in the payment method and all modern products and options, such as shared data plans or service-based charging should be easily implemented. This moves the role of a telecom billing system far beyond the typical boundaries of billing. From a network perspective, a billing system should take over the roles of OCS and even PCRF.

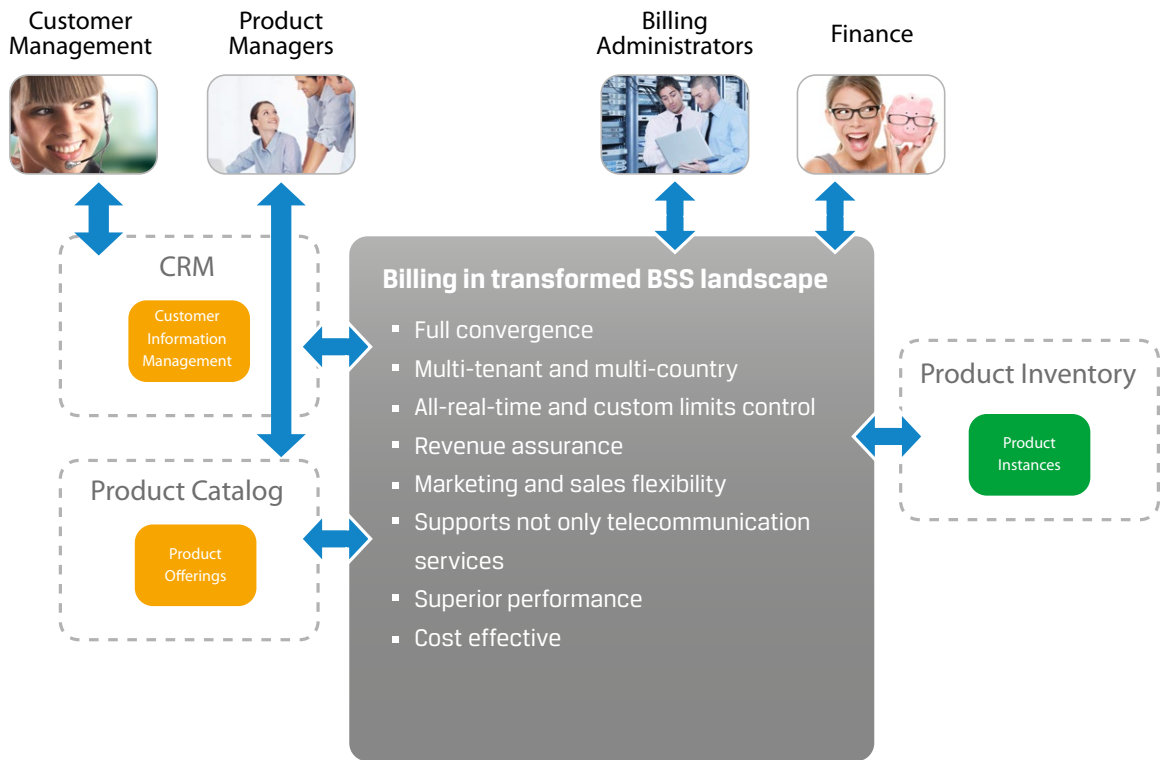
A modern billing tool should also be ready to handle more than the typical telecommunication services – many sophisticated offerings are possible in B2B and M2M, where the potential services to be handled by the billing systems include even those from other industry verticals such as mHealth, smart metering or security.

For large telecom groups, acting in many countries, the challenges are also related to handling international customers with a consistent product offering (same offerings in many countries served by the group). Handling international customers requires multi-tenancy, multiple languages, multiple time zones, multiple tax regimes, all in one version of the system. These are all functions that an effective billing system has to include.

In the era of large data consumption, which is still growing, the performance requirements for a billing systems are also increasing, especially when everything has to be controlled in real-time and service-based charging is a common thing. This is especially visible in the area of B2C.

Costs are also a very important factor to be considered. In low ARPU businesses, such as M2M, billing must be very cost effective. And it doesn't mean that it can be simpler at the same time. Requirements for M2M billing are quite high while TCO must remain low, which poses real challenges for operators.

Last but not least, billing can also strongly influence customer experience. Overall billing quality (proper invoices) is a crucial element of customer experience. Data consistency, which facilitates informing customers and producing invoices based on the same information is crucial to support it. Good spending control should also be made possible to allow customers to control their expenditure by setting up individual limits and notifications. This should apply not only to regulated services (data roaming), but for all services, including content-based ones.



▲ Figure 4. Billing system in a transformed IT landscape

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