COMARCH
telecoms.comarch.com

The new role of billing systems in the Internet of Things

The Internet of Things (IoT) can be described as a multitude of connections between various computing devices connected to the Internet. A new kind of connectivity between devices, systems, and services appeared, bringing in a phenomenon much broader than machine-to-machine communications (M2M).

IoT can be useful in many different vertical industries including: automotive, retail & payment, logistics & transportation, consumer electronics, healthcare, industrial & smart business, security & surveillance, energy & utilities, smart city & smart home. According to Gartner, there will be nearly 26 billion devices on the Internet of Things by 2020.

The Variety of Players in the IoT/M2M Ecosystem

In the IoT/M2M market partnering will be a key factor of success because providing services alone will be simply impossible. Over 28% of providers surveyed indicated that these partnerships will be difficult to establish particularly in terms of identifying the right partners for new services, restrictions due to lack of relationships with the main issue being the lack of control over the value chain. (Source: TM Forum Communications Service Provider Digital service Survey 2012)

As the IoT value chain is quite long, the following players can be identified in theIoT ecosystem (take a look at the diagrams below for a bigger picture):

- **Communications Service Provider (CSP)** – provider of the communication service between the end devices, as well between end devices and the management platform. In most cases the technology used for such communication is mobile (2G/3G), so CSPs are playing the role of a Mobile Network Operator (MNO).
- **Provider** – provides the IoT/M2M service. This can be a CSP or a third party. An M2M provider can offer services directly to end users (B2C) or sell via M2M customer / resellers (B2B).
- **Application Provider** – delivers a specialized vertical application used in particular industries or (in more general cases) delivers an application enablement platform that supports the development of vertical applications.

In the IoT / M2M market partnering will be a key to success, because providing these services alone will be simply impossible. In a TM Forum Communications Service Provider Digital Service Survey (2012) over 25% of providers indicated that these partnerships will be difficult to establish, particularly in terms of identifying the right partners for new services, restrictions resulting from lack of relationships and, predominantly, lack of control over the value chain.

- **Device Provider** – assembles devices that can be delivered to end users directly by a device manufacturer, or by a CSP, a third party or a customer / reseller.

- **Third Party Partner** – any company or organization providing additional services in the IoT ecosystem (e.g. an insurance company).

- **Customer / Reseller** – resells IoT/M2M services to end users – it can be simple reselling of services delivered by an IoT/M2M Provider or it can also encompass additional professional services like deployment, maintenance, consultancy or any VAS, offered by an IoT/M2M Customer

- **End User** – a user of an IoT/M2M service.

In the IoT / M2M market partnering will be a key to success, because providing these services alone will be simply impossible. In a TM Forum Communications Service Provider Digital Service Survey (2012) over 25% of providers indicated that these partnerships will be difficult to establish, particularly in terms of identifying the right partners for new services, restrictions resulting from lack of relationships and, predominantly, lack of control over the value chain.

In order to effectively manage IoT / M2M services providers will need to use platforms that include: BSS modules (self-service dashboards, CRM, billing, logistics), OSS modules (connectivity management, service activation), as well as device management and application enablement functionalities. Depending on its role in the ecosystem a provider will implement all or only selected of these elements.

The Business & Pricing Models

Just a short glimpse at the kinds of players in the IoT ecosystem lets you imagine how big the number of relations and settlements between those entities is. In some cases, it could be a very simple selling process, while in others, it can be an extremely complex revenue chain, depending on the provided services and the relations between the involved parties. Examples of processes and relations in this ecosystem include direct sales to end users / customers, billing on-behalf, reselling or branding.

According to the TM Forum's document, Billing and Charging Machine to Machine (M2M) Challenges, there the kinds of pricing in IoT models are obvious:

- Value-based pay-per-use model is based on how devices are being used – e.g. a device may receive data intermittently at irregular intervals, such as in the case of using an eBook reader or a tablet. In this scenario an operator would benefit from a fraction of the purchase price for each item downloaded onto the device .

- Criteria-based flat rate – the CSP receives a fixed monthly or annual fee from the end user (indirectly, via the Customer) for unlimited usage. Although this model is not new, it would now support scenarios where more consistent connectivity is used with minimal bandwidth. The challenge operators will face in this model is having to take into consideration many more variables than in the case of using a simple flat rate model.

- Consumer device models are based on the data package size (5Mb, 1Gb, 5Gb, etc.) with services offered on a first come first served basis. In this model the data becomes the commodity – the pricing model is not device-specific, and provides the ability for any device with a SIM card to select a flat rate plan, based on a predicted amount of data usage.

- Enterprise device model is pricing based on application type. High priority services, such as emergency medical services (EMS), would receive better quality of data than a lower priority service (such as a vending machine). This model's pricing is based on the real value of data.

- Tailored pricing is based on a case-by-case situation, where the model suits particular needs of a given Customer and the service(s) they are providing. A wide range of tariff plans will be needed to allow discounting rules at the Customer and even at the End User level. This pricing model would be used e.g. for direct negotiation of contracts.

Diversity in a Real M2M Case Scenario

Imagine a following scenario in the M2M ecosystem. An M2M Provider (MNO in this case) is selling not only SIM connectivity services, but also many additional value added services: access to an application that manages devices, the devices themselves, insurance, consultancy, support and many more. With such service scope the interconnected network of relationships is quite large and consists of:

- MNO that plays a role of a CSP and a comprehensive M2M services Provider

- Application Provider enables the MNO to use its functionalities to manage devices with SIM cards, access reports, management dashboards and APIs

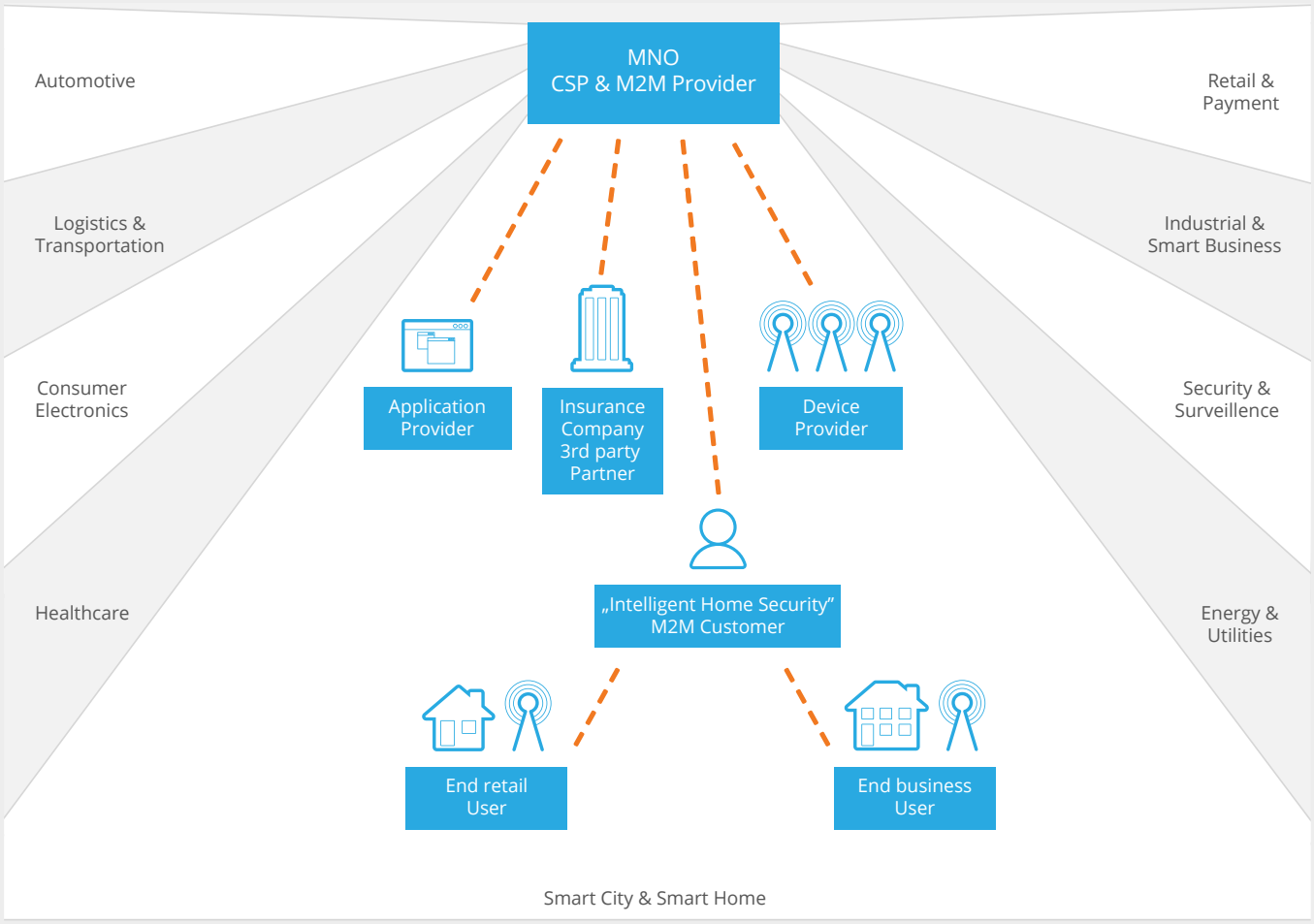


Figure 1. Complexity of relations in an exemplary M2M case scenario

- Device Provider provides the MNO with monitoring devices for home owners, with theft monitoring, fire alarm and temperature monitoring options
- Insurance Company (Third Party Partner) enables a special insurance option in case the M2M device is installed in your home
- M2M Customer sells "Intelligent Home Security" services
- End User – retail end customers (home owners) as well as business end customers (developers)

The M2M Customer can have a direct relation with the Insurance Company, as well as with the Device Provider. On the other hand, the MNO can increase its influence and control and may want to extend its partner network, separately for each vertical in the M2M market. Usually additional contracts with a SIM card manufacturer, billing system / M2M platform vendors and resellers, as well as delivery service providers are needed. Whatever the complexity of relations, we can identify some basic payment flows in our scenario:

- Flow A: the MNO is paying the Application Provider for the use of the Application Platform
- Flow B: the MNO is paying the Device Provider for delivering the devices
- Flow C: the MNO signs agreements with the Insurance Company for insuring devices and SIM cards in the services used by its customers and pays a fee for each agreement

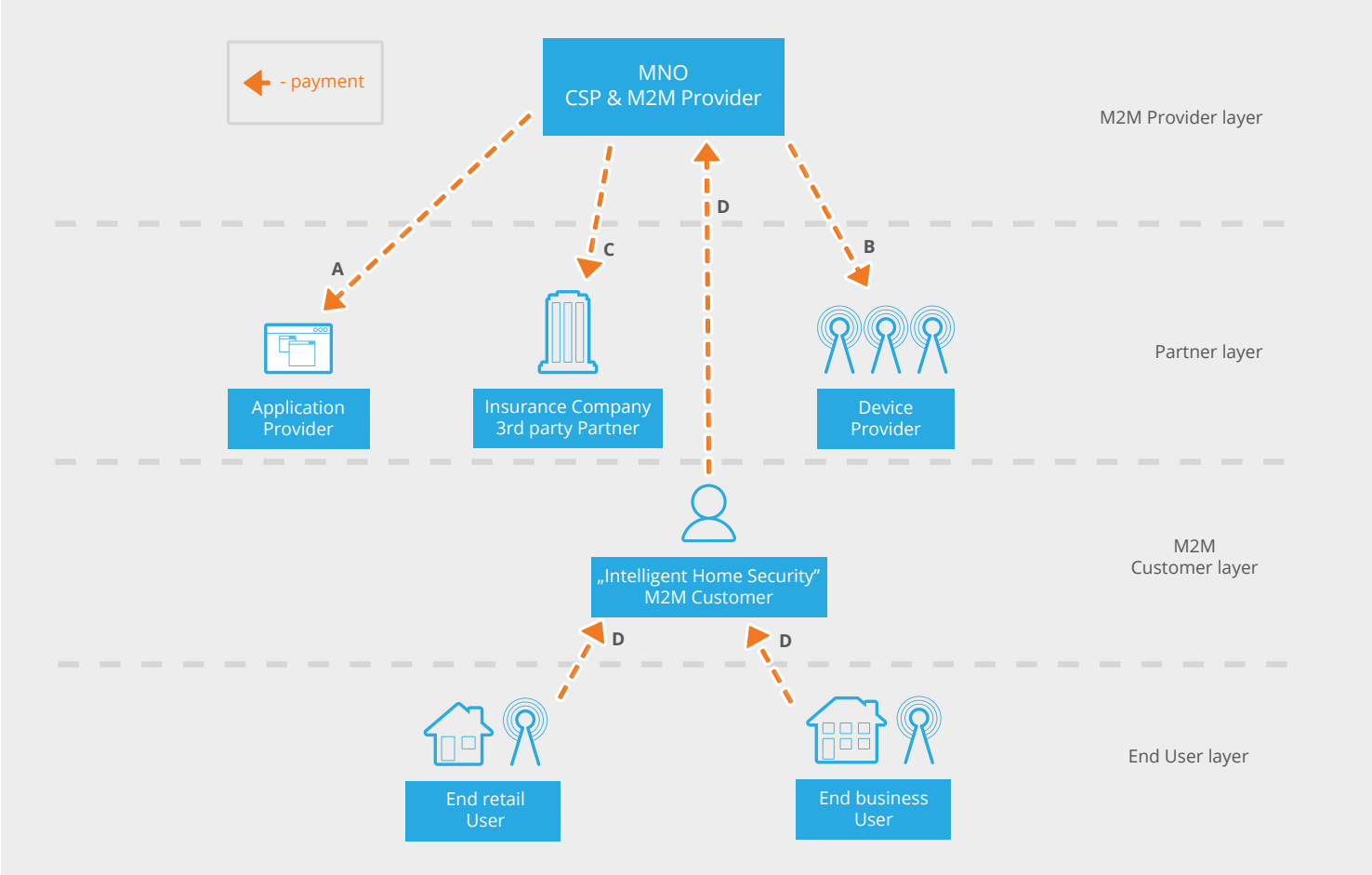


Figure 2. Different models in various verticals

- Flow D: the M2M Customer is paying the MNO for a SIM card, device, application and insurance
- Flow E: the M2M Customer is selling a service, such as Intelligent Home Security, which gives the End User (retail or business) a full bundle of services: device with SIM card, management platform, insurance, consultancy and support

In M2M business we can distinguish different pricing models for each vertical:

- Billing on behalf based on Enterprise Device Model in healthcare
- Direct sales to a Customer based on Flat Rate Model in security & surveillance
- Branding based on Tailored Pricing Model in smart city & smart home.

How Modern Billing Systems Support IoT Complexity

What is crucial for the whole IoT ecosystem, is that billing has to support all relations, levels of charging and processes for the end-to-end billing chain. The whole financial area is quite large and can be described as multi-leveled, multi-tenant, multi-device environment where billing has to take into account SIM & device Lifecycle as well as Customer / Reseller & End User

Lifecycle with different states and transitions between them. Billing support for SIMs, devices and even applications will involve different rules in terms of payments (one time, usage, recurring), source of data, QoS policies and many more while support for partnerships has to gather unlimited numbers of organizations, agreements and settlements. The confidence that billing has to be associated only with a SIM card and a device is not valid any more.

In our case scenario, the billing system should create a kind of a "cloud" over the whole environment:

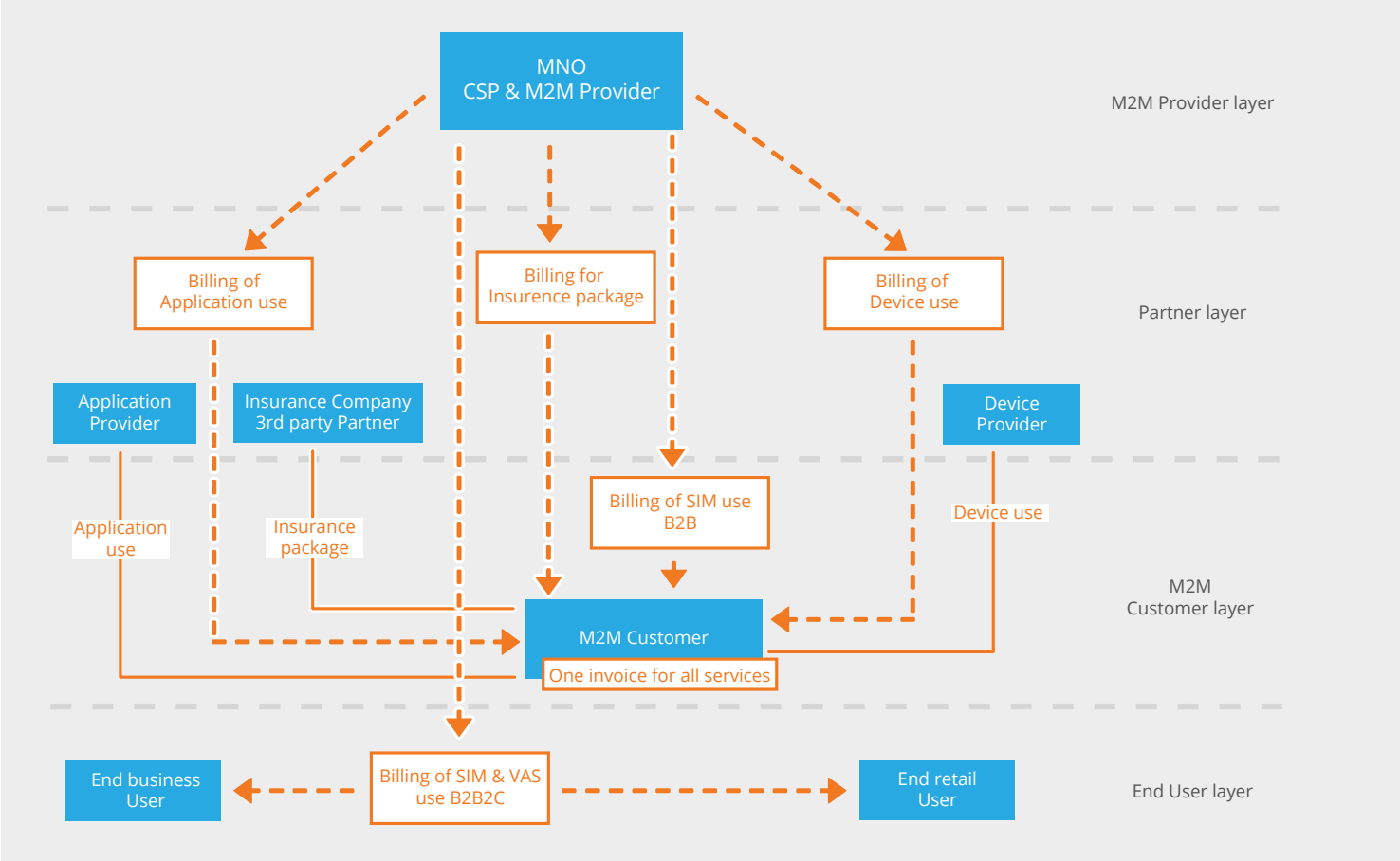


Figure 3. Financial flows in an exemplary case scenario

IoT has changed the way of thinking about billing processes, adding a significant number of new business models and cases. In the past few different kinds of relations had to be handled by billing tools, today the service and player diversity makes them go into hundreds.

Finally, it's not only about relations but especially the big volume of data, not to mention hundreds of different policies and pricing plans, rules and catalogs. In the IoT world new services, prices, relations have to be introduced smoothly and rapidly. And the whole end-to-end value chain can be really long and complex.

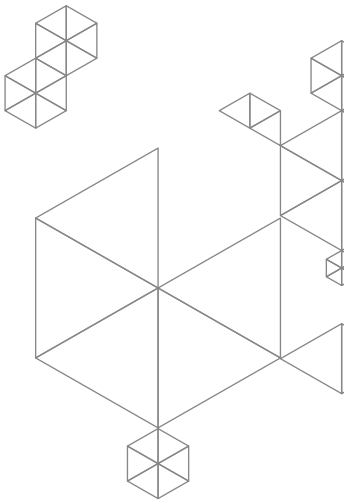
Wojciech Martyniak
Comarch SA
BSS Solution Manager

Stanislaw Zbroja
Comarch SA
BSS Solution Manager

Why Comarch

Having people's devices suddenly start communicating directly with them and sharing unique, relevant content might freak them out. Instead, it is important to gently transition the technology into people's everyday lives and get them used to the fact that their devices can now talk, something that wasn't previously possible.

Jerry Filipiak, CEO of Comarch Inc.



Comarch Headquarters
Al. Jana Pawla II 39 a
31-864 Krakow
Poland
phone: +48 12 646 1000
fax: +48 12 646 1100
e-mail: info@comarch.com

About Comarch

Comarch is a global supplier of IT products and services for the telecommunications industry and has been present on the market since 1993. Comarch provides solutions in the areas of BSS/OSS, M2M and Cloud Service platforms, as well as a range of Managed Services. Comarch's uniqueness lies not only in the compliance of its products with industry standards, but also in the flexibility and high competences of its engineers. Having completed projects for over 50 telecom operators, Comarch has accumulated vast experience in the fields of designing, implementing, and integrating IT solutions. Current customers include Vodafone, T-Mobile, O2, E-Plus, MTS or KPN.