OTT MVNO

OTT MVNO — simpler to launch, requires less investment and meets 100% of customer needs

Traditionally, MVNOs were forced to choose between two business models: “full” and “thin”. We review both and discuss the advantages and drawbacks.

We now have a third choice. With the proliferation of 3G / 4G connectivity and maturity of VoIP services, there is a better option: Over-the-Top (OTT) MVNO. It provides an optimal balance of cost, flexibility and time-to-market. We explore this option and provide a study of a real-life, successful launch of an MVNO that converted further into an MVNE with an SaaS platform for multiple MVNOs.

Traditional MVNO Deployments

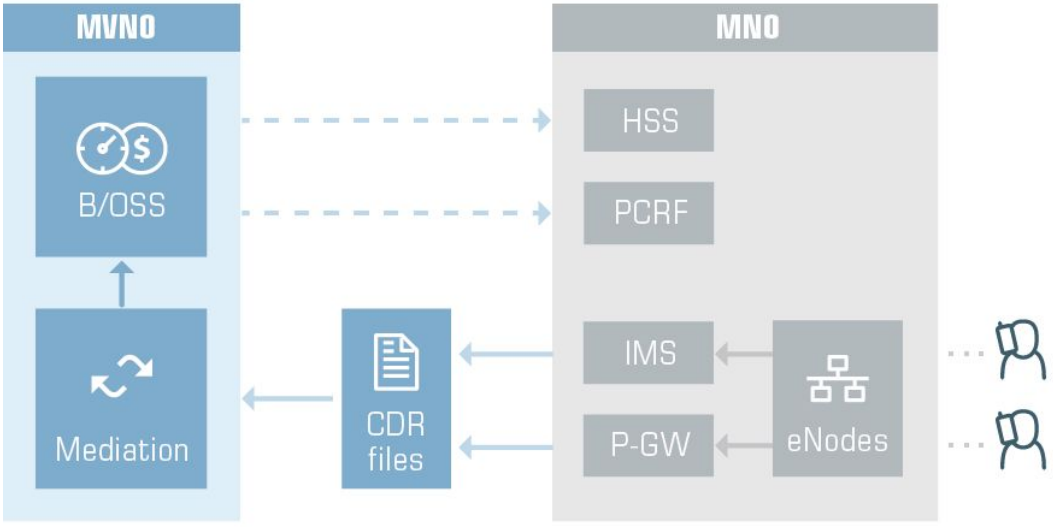
Supplying a service over a mobile network requires, at a minimum, the following components:

- AN (Access Network) — includes antennas, base stations and other equipment necessary to communicate with subscribers' mobile phones.
- CN (Core Network) for 3G networks or EPC (Evolved Packet Core) for 4G — set of components such as HLR (Home Location Register), MSC, GGSN, etc., which provide the actual switching of calls, message delivery, etc.
- B/OSS (Business and Operational Support System) — where customer data is kept such as personal info or service package; B/OSS then provisions the information in CN components to ensure customers can use the service properly.
- OCS (Online Charging System) — performs real-time check of customer's balance, calculation of charged amounts for consumed service (e.g., phone call) to ensure there is no unauthorized usage or balance overdraft.

A Mobile Virtual Network Operator (MVNO) does not own some (or any!) of these. Instead, the MVNO rents from an actual MNO (Mobile Network Operator).

Thin MVNO

The simplest way to launch an MVNO is to use a so-called "thin" model in which most of the infrastructure is supplied by an MNO. There is no capital investment in a mobile core (an EPC) or radio network since these are rented from an MNO. Frequently, an MNO allows the MVNO to implement its own B/OSS (Business and Operation Support System), which includes billing, service provisioning, customer management, etc. B/OSS must be integrated with various EPC components. When a customer's name is entered, a SIM card is activated in HLR / HSS and provisioned in other components (such as PCRF). When the customer uses the service, the MVNO receives usage records (CDRs) into its billing system and processes them there.



Thin MVNO

Sometimes B/OSS is provided by an MNO on a rental basis. This means the MNO has full control over the MVNO service.

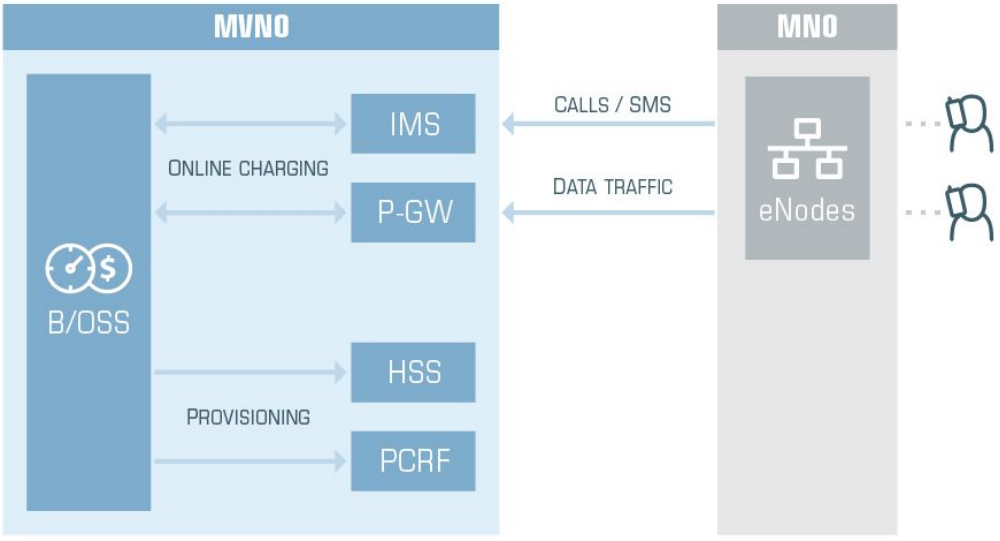
The **main disadvantage** in this scenario is that the set of mobile services and features the MVNO can offer to end-users is completely under the MNO's control. The MNO, for various reasons, might be reluctant to activate or change the service configuration on its side. Reasons include trying to avoid network maintenance or mobile core upgrades—or simply unwilling to make the MVNO's service better than its own.

Another serious disadvantage is that it cannot be used for prepaid services because mediation is not a real-time process and prone to overdraft usage. Even postpaid services without real-time credit control are quite risky in many countries. Although it is possible, in theory, for an MNO to authorize a user's activity, such as calls or SMS via Online Charging System (OCS) operated by MVNO, in practice, MNOs are reluctant to allow external OCS connections because of the complexity of network integration and interop testing.

This model usually has the highest OPEX per user, especially when B/OSS is also rented from an MNO.

Full-scale MVNO

The alternative approach is to deploy a full-scale MVNO, where an MNO provides access to the radio network, but the MVNO has its own mobile core components such as HLR/HSS (user register), PCRF (policy management) and P-GW (gateway) for data services, and IMS (next generation switch) for call and messaging services. In addition to B/OSS, an Online Charging System (OCS) is required for real-time charging and credit control. This drastically increases the CAPEX and requires advanced engineering expertise on the MVNO side.



Full-scale MVNO

An MNO routes data traffic from MVNO users (typically identified by a dedicated APN) to an MVNO P-GW. User calls and SMSes go directly to an MVNO IMS. Those components of an MVNO mobile core become fully responsible for handling data, calls, messages, or any other value-added services.

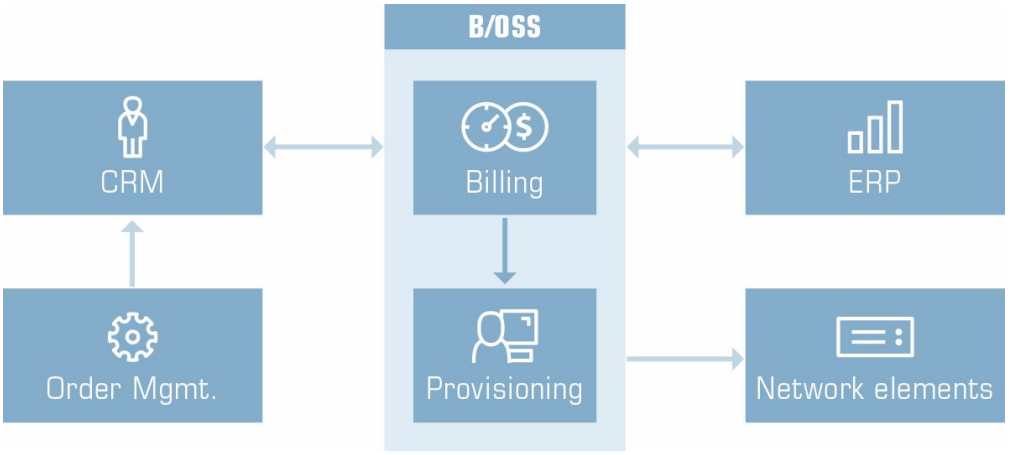
This gives the MVNO virtually unlimited possibilities to construct its service. The only real limitation is the type of AN available—3G or 4G, etc.—and the coverage. It does **require**

significant initial investment in network components and engineering resources to operate these.

The role of B/OSS & OCS

An MVNO, by definition, uses the same underlying access network or core network components as an MNO or other MVNOs. The only possibility to gain a proper competitive advantage centers on the ability to leverage capabilities of the remaining components under an MVNO's control to deliver a better service and be first to the market. So, a robust and flexible MVNO billing platform, which provides product catalog, customer database, configuration management, and a service provisioning framework, becomes an essential tool.

Typically it must be integrated with CRM, ERP, and accounting and/or sales systems in the organization. In addition to traditional criteria of robustness, reliability and scalability, it is worth looking for systems with open architecture that are easy to integrate with.

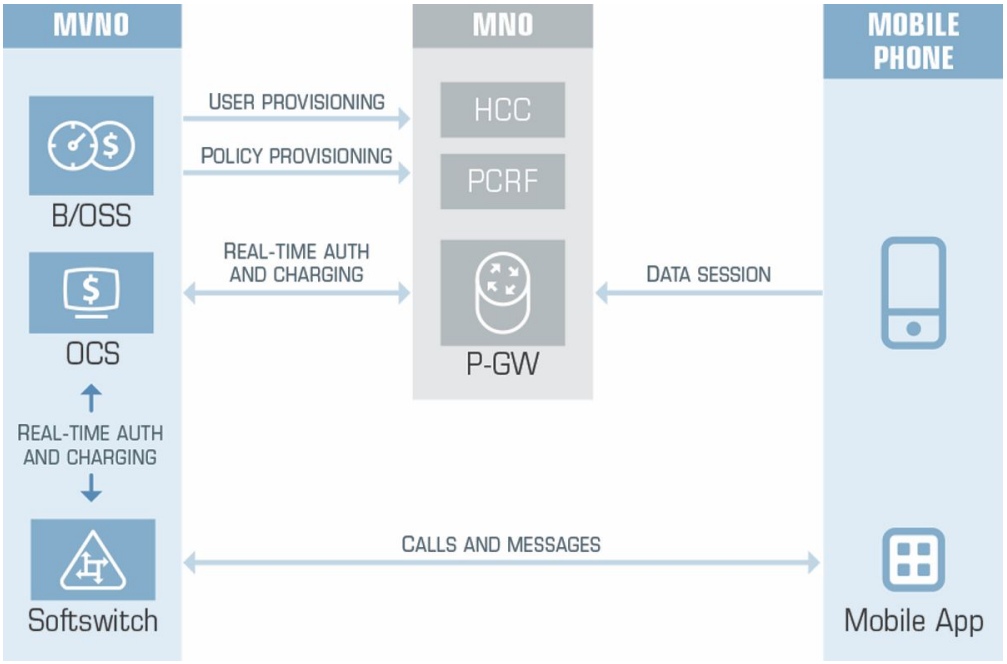


Example of B/OSS integration

OTT MVNO

Now let us consider a different approach to MVNO implementation, which would deliver full control over provided services while keeping costs to a reasonable minimum. The basic idea is to run services, such as voice calls, over an IP network using VoIP applications instead of using complex (and expensive) mobile network components such as MSC or IMS.

In this case, an MNO mobile core is limited to data services, while call and messaging services are provided Over-the-Top (OTT) of MNO infrastructure. OTT calling / messaging requires a VoIP mobile app to be installed on the subscriber's phone and communicating with a VoIP softswitch. But the initial CAPEX of those is nowhere close to the one of the IMS.



OTT MVNO

In this case, MNO mobile core components (P-GW and PCRF) are used for data services only. Once the data connectivity is established, a mobile application can access MVNO VoIP softswitch over an IP network, so call and messaging services are provided Over-The-Top (OTT) of MNO infrastructure.

Besides cost savings for initial investment, the fact that the MVNO has its own VoIP softswitch introduces a whole new level of flexibility for network operations. For instance, one may sign direct contracts with other VoIP carriers and route international and domestic calls to them using least-cost-routing (LCR). This drastically boosts profitability. Another value-added service (VAS), extremely easy to build using VoIP, is availability of phone numbers from different regions or countries. Connecting softswitch to online DID (phone number), marketplaces, such as DIDww or DIDx, allow end-users to obtain additional phone numbers from virtually any country with just a few clicks. A customer is then charged a recurring fee for each such number. This quickly builds up VAS revenue for an MVNO.

VoWiFi

Since the seemingly ubiquitous IP networks are used for communication, it means that the subscriber can use VoWiFi services without any additional configuration or infrastructure expansion on the MVNO side. As soon as the phone connects to a WiFi network in a user's home, calls and messages will travel this route. This allows an MVNO to reduce its operational costs since the wireless infrastructure of an MNO is not used: connection is established over subscriber's ISP line (DSL or fiber). Considering how much time an average user spends at home or at other WiFi-enabled locations, such as office or local Starbucks, overall usage of the mobile network is significantly reduced. VoWiFi also allows customers to save on roaming costs while traveling abroad.

The fact that an additional mobile app needs to be installed on the phone is, indeed, a minor hurdle. It can be addressed by selling mobile phones with the app pre-installed and already configured as a replacement for the iOS / Android default dialer. It does open up the possibility

to drastically improving user experience, since all communication (calls, video calls, instant messaging, SMS) is now accessible at a single location. That application can be further integrated with B/OSS and softswitch to provide features like real-time balance view, displaying a per-minute price for dialed international destinations or remaining minutes/SMS in a monthly bundle, etc.

Also, if MVNOs play their cards right by creating an attractive offer (e.g., offering Mexican phone numbers for customers in the US, so their friends & family can call them via a local call) and solving the task of auto-provisioning the service parameters into the mobile app (so user does not have to manually enter any credentials into the app), this potentially enables them to start selling to subscribers of other MNOs! For example, a customer of a competing MNO uses the data connectivity from their "native" operator, but calls are made through the MVNO using a mobile app. As a result, the MVNO earns most of the profit on voice calls, messaging and VAS.

Required integration steps:

1. Customer provisioning to MNO HSS — to enable data services on the MNO network.
2. Policy provisioning to MNO PCRF — to control quality of service for a specific user. While data services are provided by MNO infrastructure, it is possible to control them by applying different policies.
3. MNO's P-GW communication with MVNO's OCS — for real-time authorization and charging of data sessions. Generally, it enables prepaid services and typically uses the Diameter Gy interface.
4. Automatic provisioning of VoIP credentials into mobile application — for the best customer experience. It fulfills customer expectations that no configuration is needed on the mobile phone before starting to use the services.

The only potential drawbacks of this approach are:

- AN must provide adequate IP bandwidth to ensure voice packets are transmitted without quality degradation. However, currently, even 3G networks mostly satisfy this requirement. On 4G networks, it is definitely not an issue.
- To provide seamless user experience with dialing, messaging, etc., the VoIP app ideally must be integrated to replace the "native" phone dialer. This means that the MVNO probably should pick a set of mobile phone models in which this feature is available and tested then distribute them to end-users with the app pre-installed. Or allow bring-your-own-device (BYOD) for a limited set of models and provide detailed set-up instructions for users to perform the initial configuration on their own. .

In return, this brings significant benefits to the MVNO, specifically:

- Drastic reduction for CAPEX and OPEX. Also engineers with experience in IP networks and VoIP are much, much easier (and less expensive) to hire than specialists in mobile core.
- Ultra fast deployment of new services. This means there is a definite possibility to be "first to the market" before any other "traditional" MVNO.
- A whole new level of flexibility for network operations. An MVNO can save by using its own direct VoIP routes to other carriers or add VAS such as international phone numbers.
- Additional perks available out-of-the-box such as VoWiFi calling.

Comparison of MVNO options

	Thin MVNO	Full MVNO	**OTT MVNO**
CAPEX			
OPEX			
Constraints with definition of new services and features			
Complexity of initial deployment			
Overall score			

OTT MVNO provides the optimal combination of the OPEX/CAPEX, and the flexibility and ability to create an attractive service package.

Case study: OTT MVNO in the US

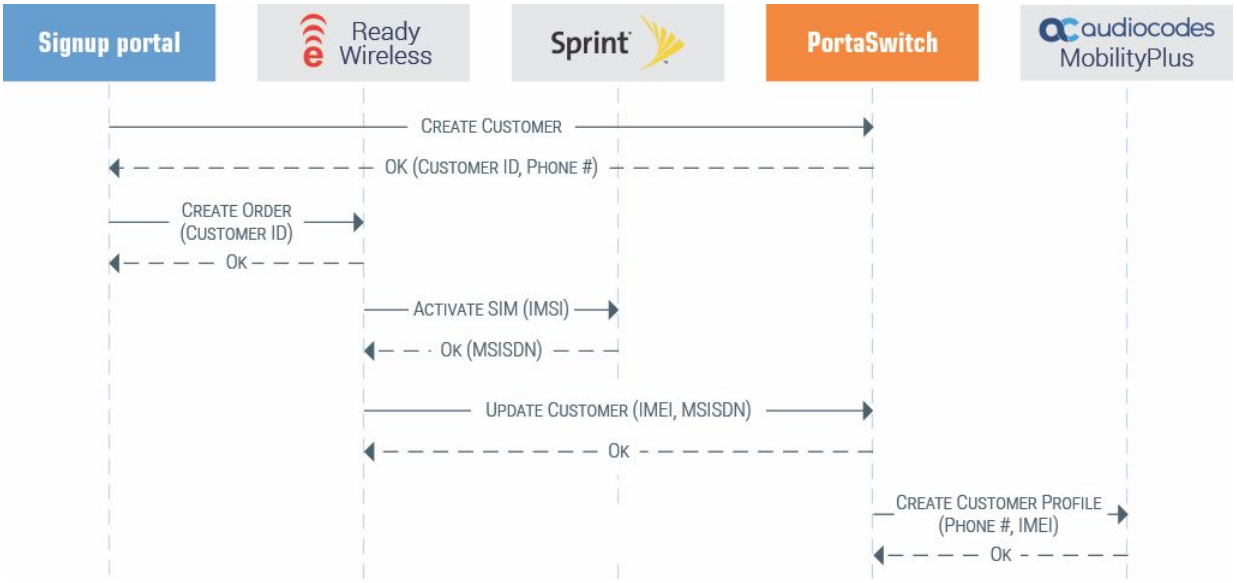
This is a based on a real-life project recently implemented in the US. We were asked not to publish the actual company name here, in return for permission to share “intimate” details regarding the network integration and service provisioning workflows. We refer to the company as “BlackSwan” in the following text.

In 2014, BlackSwan, an existing telecom operator (with its main focus on wholesale voice), decided to enter the MVNO market in the role of Enabler (a company providing infrastructure to MVNOs) and to start with a proof of concept by launching its own MVNO using Sprint as the MNO for data connectivity. A deal was negotiated with Ready Wireless, a company providing integration services into US Tier 1 mobile networks.

The operator chose PortaSwitch as an integrated B/OSS, OCS and softswitch solution, and Audiocodes MobilityPlus as a mobile application. The latter replaced the default dialer application on Android-based mobile phones (ReadyWireless ensured that every phone delivered to an end-user would already have the app installed and activated). The integration work with the MNO and mobile app started in October 2014, and was completed by February 2015. It included customer provisioning to an MNO network and a branded MobilityPlus application.

Service Provisioning

The sequence diagram below explains the provisioning process:



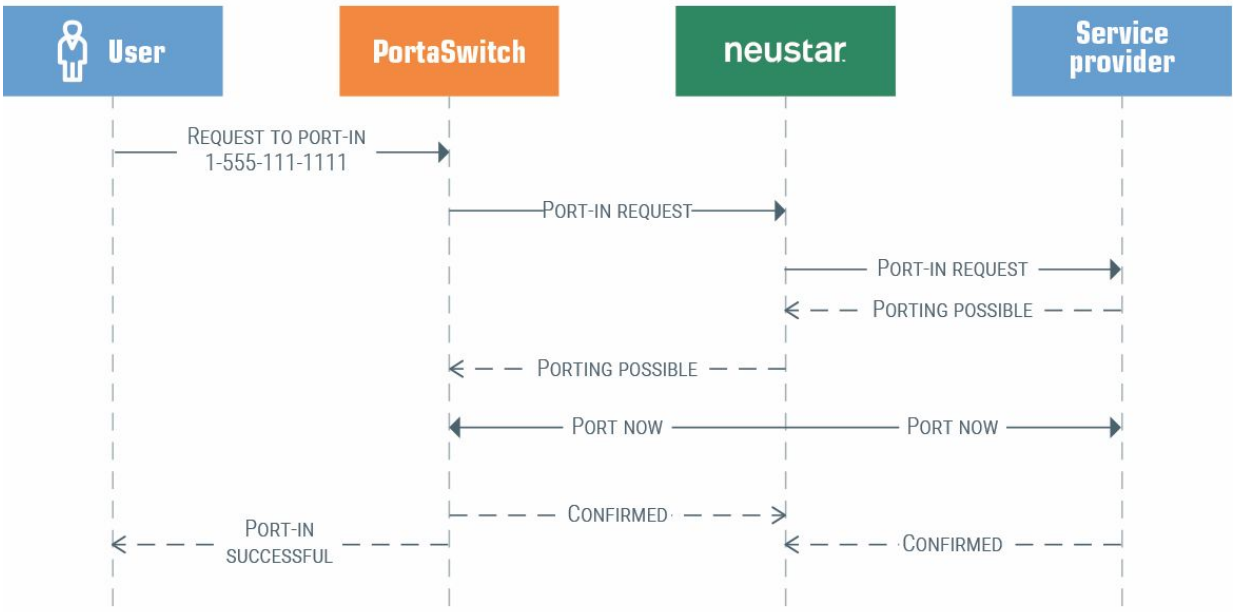
Provisioning sequence

Once a user places an order online, the portal creates a customer record in PortaSwitch (and fills out additional data, such as chosen product/package, phone number in case the customer wants to keep his/her existing number, etc.). The order is then sent to ReadyWireless for execution. This includes sending a physical phone to the customer and activating the SIM card on the Sprint network. When it is done, ReadyWireless updates information in PortaSwitch with user's device ID (IMEI), assigns a mobile number (MSISDN) and SIM card ID (IMSI). PortaSwitch, in turn, provisions that information into Audiocodes MobilityPlus provisioning system. A customer profile is created there that includes service credentials, such as the VoIP username / password, or activation status of specific app features (e.g., MMS).

When the phone is delivered to the end-user and he/she turns it on for the first time, a few things happen. First, the phone itself registers to the mobile network (using the credentials stored on the SIM card). Second, once the connection is established and, in particular, the data service is enabled, the MobilityPlus app connects to the Audiocodes provisioning server and retrieves the additional configuration data, including the assigned phone number or other settings. Third, the MobilityPlus app connects to PortaSwitch VoIP server (using SIP protocol) to receive incoming or make outgoing calls. This seamlessly happens in a matter of seconds, fully transparent to the end-users. They can now use the service.

Number Portability

Another important integration point was support for number portability: this is a crucial feature if an MVNO plans to pull some of its customer base from existing MNOs/MVNOs. Neustar is the leading LNP provider in the USA for calls. NetNumber is the maintainer of North America MVNO subscriber assignment data that is used to efficiently route SMS and MMS messages between over 450 mobile operators (virtual and incumbent) in North America. Integration with both systems was implemented between October 2014 and March 2015. Here is how number porting via Neustar works:



Number porting

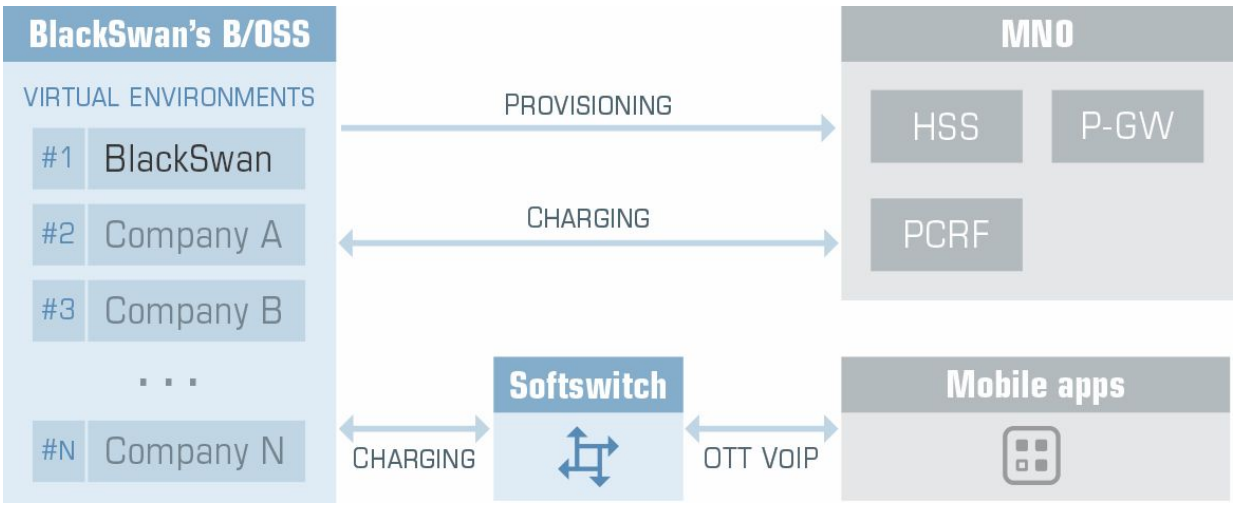
Real-time Charging

The original plan was to use Diameter Gy between P-GW of Sprint and OCS for real-time session authorization and charging. By February 2015, it became clear that Sprint would not have resources to test Diameter interconnection before the desired product launch date. A decision was made to temporarily use import and mediation of data usage records (received in a file) and to send a request to ReadyWireless for data service deactivation when a data cap is reached.

By the end of March 2015, the MVNO service was ready for a soft launch. It took only 5 months (mind the Christmas break) to get everything in place. Later in 2015, PortaBilling OCS passed the certification for charging via Diameter Gy with Sprint. Very soon, operations were switched to perform real-time authorization and billing.

Software-as-a-Service (SaaS) MVNO Platform

This created a “wave of disruption” in the pond of US MVNOs and allowed BlackSwan to migrate some other MVNOs to the BlackSwan’s platform. Thus BlackSwan became a new, next-generation Mobile Virtual Network Enabler (MVNE), providing hosted real-time billing, mobile network service provisioning and customer management. This is a lucrative offer to MVNOs, since they can obtain immediate cost-savings by switching billing for existing customers to this platform. And then for any new product or add-on service, they have an option to use OTT VoIP. Additionally, having a system built on open-architecture (as opposed to a typical “black box” deployed by large mobile operators) allows MVNOs to quickly integrate their back-office applications, customer-facing portals and marketing automation tools via APIs.



Conclusion

Despite the common belief that a big investment and long time to market was required to start serving mobile users, combined cutting-edge technologies and smart architecture provide an easy, short and cost-effective way of launching an MVNO. While the underlying MNO provides connectivity, all other services can be provided over the top of IP network, reducing infrastructure cost while leaving full control over the quality of service in the MVNO hands.

Integrated B/OSS and softswitch like PortaSwitch combined with a mobile VoIP app like Acrobits CloudSoftphone or Audicodes MobilityPlus offer an alternative approach to establishing an MVNO. OTT MVNO makes it possible to significantly reduce both upfront investment and complexity of the initial configuration while still providing high-quality communication services and improved user experience.