Recommendations document on national roaming access terms and conditions, as well as MVNO access terms and conditions

Based on Agreement No 2407/01

Final

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GEORGIAN NATIONAL COMMUNICATIONS COMMISSION

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Final report:

Georgian National Communications Commission – Consultancy on and development of national roaming access terms and conditions, as well as MVNO access terms and condition

Agreement number: No 2407/01

To:

Georgian National Communications Commission

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List of abbreviations

Abbreviation	Explanation
2G	Second generation network
3G	Third generation network
4G	Fourth generation network
ARPU	Average Revenue per User
AUC	Authorization centre
BSC	Base station controller
BSS	Base station subsystem
BTS	Base transceiver station
EIR	Equipment identity register
GMSC	Gateway mobile service switches center
GNCC	Georgian National Communication
HLR	Home location register
LRIC	Long-run Incremental Costs
MNO	Mobile network operator
ME	Mobile equipment
MS	Mobile station
MSC	Mobile switching centre
MVNE	Mobile virtual network enabler
MVNO	Mobile virtual network operator
NR	National roaming
NRA	National regulatory authority
OMC	Operation and maintenance center
PSTN	Public switched telephone network
RAC	Radio Access Controller
SIM	Subscriber identity number
VAS	Value added services
VLR	Visiting location register

Introduction

The document "*Recommendations document on national roaming access terms and conditions, as well as MVNO access terms and conditions*" was prepared as part of the project Consultancy services and developments of national roaming access terms and conditions, as well as MVNO access terms and conditions. The implementation of the project is governed by the Agreement on State Procurement concluded between the Georgian National Communication ("GNCC") and PricewaterhouseCoopers Advisory, s. r. o. ("PwC"), dated 1st of August 2019.

The GNCC foresees the rising demand for National Roaming ("NR") and also, the opportunities for establishment of Mobile Virtual Network Operator ("MVNO") which will need an access to existing mobile operator's infrastructure that would complement the objectives of the GNCC, which are set out in Article 11. of The Law of Georgia on Electronic Communications ("Telecommunication Law"):

- to establish, maintain and develop a competitive environment in the field of provision of electronic communications networks and facilities and electronic communications service;
- to ensure that electronic communications service provide authorised undertakings provide users (including disables users) with services of good quality, a wide range of electronic communications services and affordable tariffs;
- to encourage authorised undertakings owning electronic communications networks and facilities to efficiently invest in innovative technologies;

by among other things by access regulation to electronic communications network elements and/or technical, economic and legislative relations.

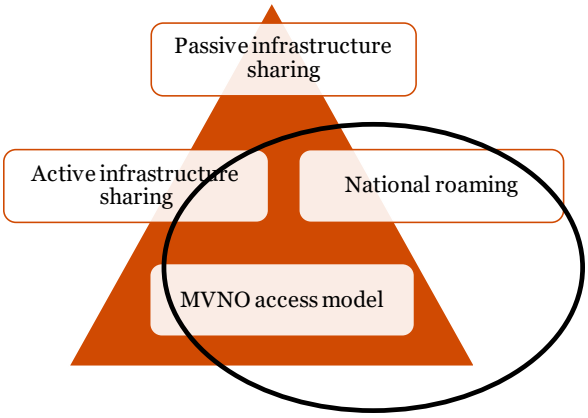
Currently both relevant markets for Mobile call termination and mobile call origination are regulated by GNCC's decision and tariffs on these wholesale services are calculated by cost oriented bottom-up costing model using Long term incremental costs methodology ("BU-LRIC").

The purpose of this document is to provide regulatory support and guidance to GNCC related to the development of the fair, non-discriminatory obligations for NR and MVNO access terms and conditions. The document can be divided into three main sections:

1. General assessment of the National roaming, including definition of the service, examples of the cases of NR in EU/UK member states, and definition of pricing principles.
2. General assessment of the MVNO, including definition of the MVNO, different types of the MVNOs, examples of the MVNOs that operate in EU/UK member states or in other parts of the world and review of regulatory approaches used by the regulatory authorities in selected countries.
3. Recommendations and development of "cost model" for MVNO's tariffs/rates for wholesale voice and data services based on the Retail minus methodology for voice, SMS and data services.

The telecommunications sector is characterized by high investments to technology and infrastructure, which is also the case for the mobile network operators. The mobile infrastructure consists of many different network elements, such as towers, masts and poles, infrastructure for electronic equipment, cables, antennas, radio and transmission equipment and much more. The mobile network operator ("MNO") has to invest significant amount of his resources in the infrastructure to be able to provide the voice, SMS and data services in a certain geographical area.

Figure 1 - Different levels of infrastructure sharing and/or roaming agreements



The MNO has several options how to reduce the costs of the “network roll-out”:

- **Mobile infrastructure sharing** - or “facility sharing” is the process when at least two mobile network operators share mobile network infrastructure and/or facilities essential in their operations

- **National roaming** - Access to frequencies to extend coverage, whereby a mobile network operator offers a roaming service to another mobile network operator

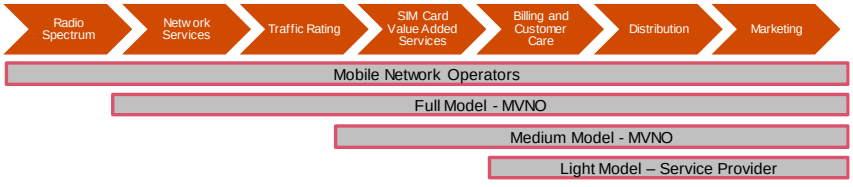
Currently all three main mobile operators in Georgia own their own infrastructure to provide the services to end users. The GNCC forsees the the future demand for national roaming and MVNO access from existing mobile operators, providers of internet services and other retail services providers in Georgia. As mentioned previosly this document will focus on the NR and MVNO regulatory frameworks.

Roaming (either national or international) is a form of sharing, allowing customers of a mobile network operator to use mobile services of other operator when they are in an area that is not covered by their operator. The international roaming evolved naturally, as the home operator cannot deploy his network in foreign countries, where it is not licensed to perform mobile telecommunication services. The national roaming is used on the domestic market mainly for two reasons i) to entend the coverage in the country and ii) to increase a competiton on the national mobile market.

The national roaming may represent an effective tool for regulatory authority to grant a competitive position to a new „greenfield“ entrant on the market of mobile services and to promote coverage extension for the existing operators. In case of new market entrant, it allows the National Regulatory Authority („NRA“) to facilitate market entry with the aim of reducing market concentration and incresing competition. Is provides to the new entrant a nationwide coverage right fro the start. The new entrant operator is usually given a certain period of time during which it can offer nationwide service without having completed its own national network. In these cases, the duration of national roaming should be restricted, as a prolonged duration may distort competition by giving the new entrant unfair advantage over the infrastructure owning operators. The national roaming can be also used as tool to allow existing operators to provide their services in extended areas, usually rural areas. The main focus of this national roaming scheme is to facilitate smaller operators to provide national wide services without incurring costs of building an infrastructure. This is the case for GNCC how to promote coverage extensions for existing operators in Georgia. In Section 1 of this document the NR is defined, and the principles of NR arrangements are analysed using examples from selected countries.

For the purpose of this document the MVNO is defined as a licensed service provider and network operator, which leases the radio access network from the Mobile network operator (“MNO”). The MVNO are not assigned any radio frequency spectrum by the regulator and may not establish their own radio access or transmission networks. Radio access is necessary in order to connect MVNO’s subscribers to MVNO’s mobile switching centre (“MSC”). The MVNO should be required to provide detailed billing and customer care services including addressing customer complaints and abide by all GNCC regulations.

Figure 2 - Illustrative example of differentiation between MVNO types



The concept of the MVNO has developed after MNOs in saturated and mature markets such as in Europe faced stagnating profits and increasing rivalry with existing competitors. Oppositely MVNOs have the ability to focus on previously unreachable market segments. In addition, continuing advances in network equipment performance, usability, and deployment costs, in tandem with maturing markets, provides the basis for specialization within the industry value chain to occur. It led to the emergence of dedicated players that may provide particular functions within the value chain more efficiently. Lastly, the auctioning of 4G and nowadays also 5G radio spectrum left many potential players without a license and the few licensees with tremendous amounts of debt. The new service infrastructure deployment presented a unique opportunity for MNOs to achieve growth.

Economic reasoning for MNOs to host MVNOs implies an ability to sell excess capacity, benefit from economy of scale, and address otherwise unprofitable segments (effective customer segmentation and price discrimination). From the regulatory perspective, MNOs have forced the opening of incumbents’ networks to new entrants.

The main purpose the Section 2 and 3 of this document, is to define the regulatory framework and to provide guidance for the GNCC in future consultations with the MNOs and potential MVNOs.

The Retail minus methodology is developed for the calculation of the wholesale prices of both NR and MVNO access services on the mobile network. The general principles of the Retail minus method as well as the recommendation of its application is based on international best practice. The actual use of the methodology (e.g. as a measure to promote the competition), or use of its sections, is subject to the relevant decision of the GNCC. In this report the general principles of the methodology are defined, the wholesale services for voice, SMS and data service are described, with definition of necessary data inputs.

1. National roaming

1.1 Definition of national roaming

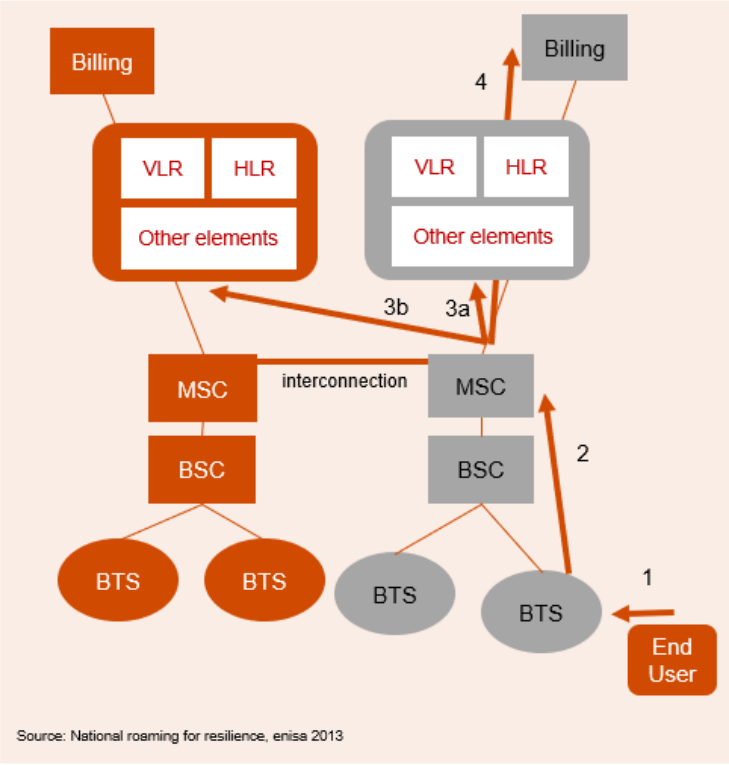
Roaming (either national or international) is a form of sharing and ranging the coverage, allowing customers of a mobile network operator to use another mobile network when they are in an area not covered by its own operator. Roaming is also used to virtually extend the geographic coverage of an operator by allowing its subscribers to use another operator's network. National roaming refers to an agreement among operators to use each other's networks to provide services in geographic areas where they have no coverage. Such arrangements effectively multiply any one carrier's ability to cover the entire country, without having to deploy infrastructure everywhere.

International roaming evolved naturally, as the home operator cannot deploy his network in foreign countries, where is not licensed to perform mobile services. National roaming is roaming on networks of operators within the same country. This happens in case the end-user can't reach a base station of its home operator.

NR has been and regulatory policy instrument since 1980's and 1990's when a traditional view of telecommunications sector was changed from natural monopoly to liberalized sector with increased competition. As such, it has been used by the most countries, and particularly in the Europe, in support to new entrants. Also, the NR is tool for increasing the mobile network coverage in large, geographically diverse countries that initially had few national mobile operators.

The Roaming is functioning on these principles:

Figure 3 - General architecture of National roaming (2G/3G)



- Mobile device of end user finds mobile base station (BTS) of another operator in reach (the grey component) and requests to connect, by sending IMSI of its SIM to BTS to register (on the device, the selection of an operator's network could be either in manual or automatic mode; mobile device selects a network based on different lists classified in priority order).
- BTS pushes the request to base station controller (BSC), and BSC forwards the information to mobile switching center (MSC) of the visited network.
- MSC firstly tries to find IMSI in their network's HLR (3a) if not able MSC tried to find home network of end user based on roaming agreements. Data is stored in visiting location register (VLR) and it creates temporary profile for end user for the purpose of roaming (3b).
- A mobile device of end user periodically tries to connect to its home network or any other high priority networks. This is automatic process defined configured on SIM card.

For the LTE there is no BSC, the core networks are connected directly to the eNode-B, possibly via IP aggregation and switching.

1.2 National roaming schemes

Four main types of national roaming schemes can be defined, based on experience from EU/UK. While national roaming leads to a certain level of uniformity between operators, it is important to analyse to what extent this uniformity leads to a significant restriction of competition.

Table 1. Reasons for national roaming

Reason of NR	Description
Support new entrant	The national roaming scheme aims to increase the competition on the mobile telecommunication market thought facilitating the new entrant in the market. The new entrant agrees on national roaming agreements with other operator/s to have a full geographic coverage without high investments. Agreements are usually temporary with definition conditions on network development and coverage of new entrant. Commonly national roaming agreements allow use of older existing networks during the time new entrant is rolling out its own infrastructure. Legal framework for imposing national roaming obligations to SMPs to improve and stimulate competition in the market is in Article 12 1(g) of Access Directive (2002/19/EC). The new entrant usually supports competition resulting in lower prices, increased 3G/4G coverage and greater services options, lower investment costs. **Examples:** UK, Germany, Norway, Italy, New Zeeland, Czech Republic, Slovakia
Extend national coverage	In this scheme the mobile provider extends its coverage to scarcely populated (rural) areas using national roaming agreements with other operators. It allows subscribers to use the same number throughout the country – greater competition. Smaller operators can provide the services in rural areas with lower costs. The note Article 4 of the directive No 128/1999/EC provides a legal framework for this using the 2G network. “Member states may, where necessary, take action, in accordance with Community law, to ensure the coverage of less populated areas”. **Examples:** Canada, France, India, Australia
Extend underserved areas	This is the case if the country has a regional license, it allows smaller operators to provide a national service, without increased cost and investments. Lower switch-over cost for subscribers (removes duplicate SIM cards). Allows operators to decrease the investment costs and to lower the environmental impact. **Examples:** France, Bhutan, UAE
Emergency communications	Coverage, traceability of emergency calls in all areas of the country. **Examples:** USA, UK, Czech Republic

1.3 Use cases of national roaming in EU/UK

In the following use cases, we can observe how the national roaming was implemented and how the conditions were set up.

New entrants in mature mobile telecommunication sector face several large barriers to entry, with high investments to the national coverage, which is usually required before commercial launch of mobile services.

The example can be shown on **use case of Slovakia**, where 3rd operator was entering market in 2006 after assigning the license for 20 years in GSM and UMTS 900, 1800, 2800/2900 MHz. There were several conditions on investment to the network for new entrant Telefonica O2 defining number of BTS and % of national coverage being specified. The national roaming agreement with T-Mobile Slovakia consisted of technical requirements, quality of service and economic requirements. Telefonica switched off the national roaming in 2011 and shifted towards its own network.

Relevance to GNCC: There are 3 dominant operators in Georgian mobile market with each of the owning their network infrastructure. GNCC do not foresee the rising demand for national roaming that could lead to 4th mobile operator, but to promote expansion of coverage of existing operators through the national roaming. The detailed market analysis of the competitive situation would need to be performed to assess how NR would change the market and what conditions would be set during licensing of operators.

Extend national coverage the example of a country that used national roaming to extend mobile coverage throughout a country, specifically its rural regions, is France. France has implemented the national roaming as part of a program to provide Universal service. In 2003, the French NRA – ARCEP (Electronic Communications and Postal Regulatory Authority) launched a program called “program zone blanche” - “white zone program”. The target of the program was to increase coverage by mobile telephony signal to include the 3,000 rural French towns which were not covered by either of the three mobile operators. The coverage of 99% of country was the aim. Both site sharing and national roaming were main tools how to achieve the objective. The obligation was incorporated to the license conditions which were allowing national roaming in white and grey areas. Public funds were applied to infrastructure investments. Currently the national roaming is not regulated as ARCEP analysed that they depressed investment.

Relevance to GNCC: The licensing in Georgia is national, and there are no reasons preventing operators to build full coverage. In case of similar project as in France “white zones” NR could be applied.

From the examples mentioned in previous sections of the document in many cases, the regulation of national roaming is usually “light touch” or not regulated and the national roaming is agreed on a commercial basis. If the NRA decided to impose an obligation on the SMP market players it is usually during spectrum licencing, a SMP definition, or as in Austrian case it may be among the conditions set to approve a merger between operators.

1.4 Price control mechanisms

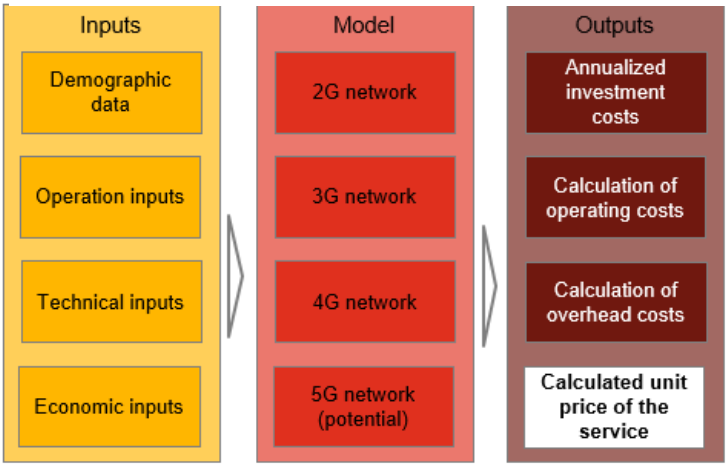
If price controls, at the wholesale level or the retail level, are imposed by regulatory authorities several methodologies in order to establish the regulated price for both MVNO and NR services can be considered. These options range from fully allocated costs (FAC) and long run incremental costs (LRIC) models, benchmarking, retail minus costs model and others such as margin squeeze test, accounting separation etc.

The new entrants on the market can improve the competition, however they face difficulties due to the existing market players and high investment costs associated with the entry. The regulatory authority may impose an obligation on the existing market players to provide the use of their network to the new entrant. The price of the access to the network of the MNO must be determined either by the regulatory authority, or by a commercial agreement between the new entrant and the MNO. If the NR access seeker or MVNO and MNO are not able to reach a commercial agreement, the authority may set maximum price based on the several regulatory approaches that are described below. The unit prices of the service “Access to the network” would be reflected in the obligation imposed on the MNOs and in the reference offer of the MNOs.

In this section, we will describe in general principles of three methods that can be applied on the Georgian market to calculate the prices of the NR services and wholesale access for MVNOs.

- **Development of cost model based on the long-term incremental costs (LRIC) approach**, which would utilise the current LRIC model for calculating the mobile termination and origination rates. This bottom up cost model is calculating costs of theoretically efficient operator ("TEO") with and without defined wholesale services and divides the difference by that traffic volume to provide the incremental cost of defined services per minute including any reasonable rate of return at a level, which promotes investment and innovation. In general, the LRIC approach aims to determine the prices paid by competitors for the services of theoretical effective operator on the market. The calculation process consists of several steps that are shown in the Figure 4. In the first step the modeled services need to be defined, then the market assumptions (geographical coverage, annualization standard, network elements and more), the equipment types have to be determined with estimation of costs of each element in the local conditions. After the finalization of the collection of data inputs the technical and economical modelling calculates the total costs of each of the defined services and the unit costs or services are calculated.

Figure 4 - Illustrative example of BU LRIC cost model



The current LRIC model used for calcualtion of the mobile termination and origination rates was build in 2016 and includes the 2G/3G/4G network elements. The rates are applied to the operators since 2018. We would recommend in future to update the current LRIC model to be able to calculate the prices of NR services. The update of the model will require the review of the current model, update of network elementes and forecasts of traffic demand, addition of the NR services for voice, SMS and data to the model and matching them with network elements in the model routing matrix and data collection process with the operators. On annual basis GNCC should collect relevant data from operator to recalculate the wholesale services prices.

- **Calculation of the NR prices by using Retail minus methodology**. The retail minus method is one of the most accepted methodologies of regulating wholesale prices with the aim of increasing the competition and providing additional benefits to retail end-users. The retail price of a particular service, as determined by the Retail minus method, is based on the revenue that the regulated entity, the wholesale provider, receives for the provision of the type of service in question in the retail market. Prices set using the Retail minus methodology incorporate the opportunity cost to the interconnection provider of customers lost to the entrant. This includes any contribution to shred and common costs and any foregone profits. Although it facilitates productive efficiency, it does not necessarily facilitate allocative efficiency.[1] The main advantages of the Retail Minus approach are the flexibility in pricing of services, where there is a dynamic nature of the market, it also prevents the "margin squeeze" by ensuring that the margin between retail and wholesale services is large enough and is it less complex to be developed that the cost model as LRIC. We recommend the use of the Retail minus methodology, that is described in detail in Section 4 of this document.

- **Benchmarking** is based on the comparison of relevant retail rates or wholesale costs considering best national and international practices and experiences. Analysing the prices through comparison to benchmark can be a useful tool for regulators, regardless of the extent to which the regulator is actually involved in price-setting. The main disadvantage of the benchmarking method is the need of comparable data and the over-complication through excessive effort to improve relevance and the accuracy of the

[1] ICT Regulation Toolkit, ITU

benchmarks. They may serve as a proxy for cost-based prices, as a short-term measure while a more detailed cost model is constructed. The best practice divides the calculation using the benchmarking approach into 7 steps:

- Selecting the benchmark countries;
- Standardising the services and prices that are to be compared;
- Data collection;
- Converting the prices into a consistent data set;
- Establishing the basic benchmark;
- Adjusting the differences in national operating conditions;
- Analysing the results to inform price regulation.[2]

We recommend GNCC to focus on Retail Minus methodology. In future GNCC should review the approaches and modify the mobile LRIC model to include also the services of NR and wholesale access.

[2] A Practical Guide on benchmarking telecommunication prices, ITU, 2014

2. Mobile virtual network operator

2.1 Definition of MVNO

On an international level, regulatory bodies have come to adopt various definitions of MVNO. For our purposes, MVNO is defined as a network operator, which leases radio access from its hosting MNO. Radio access is needed in order to connect MVNO's subscribers to MVNO's mobile switching centre (MSC). MVNO is able to connect its network to the networks of other operators and to establish interconnection agreements with them.

The concept of the MVNO has developed after MNOs in **saturated and mature markets** such as in Europe faced stagnating profits and increasing rivalry with existing competitors. Oppositely MVNOs have the ability to market to previously unreachable market segments. In addition, continuing **advances in network equipment** performance, usability, and deployment costs, in tandem with maturing markets, provides the basis for specialization within the industry value chain to occur. It led to the emergence of dedicated players that may provide particular functions within the value chain more efficiently. Lastly, the auctioning of 3G radio spectrum left many potential players without a license and the few licensees with tremendous amounts of debt. The **new service infrastructure deployment** presented a unique opportunity for MNOs to achieve growth.

Economic reasoning for MNOs to host MVNOs implies an ability to sell excess capacity and to benefit from economy of scale. Another reason is to address otherwise unprofitable segments (effective customer segmentation and price discrimination). From the **regulatory perspective**, it is important to strengthen the competition on the market by imposing the wholesale access obligation to open the incumbent's network to new entrants.

However, there are also certain **risks** associated with hosting of MVNOs. As MNOs may, at some point in time during the development of an MVNO, see the MVNO as a threat to their business, there is inherent risk of MVNO cannibalising. Furthermore, there is a thread of backlash by MVNO poor performance and adverse selection of MVNO for partnering purposes.

The rapidly growing number of the mobile service providers/virtual mobile operators both in Europe and other parts of the world is mostly boosted by tightening competition between licensed mobile networks (as a consequence of mobile number portability) along with competition increased free network capacity. Eventually, it had led to increased price competition but also brought more traffic to the networks of licensed mobile operators.

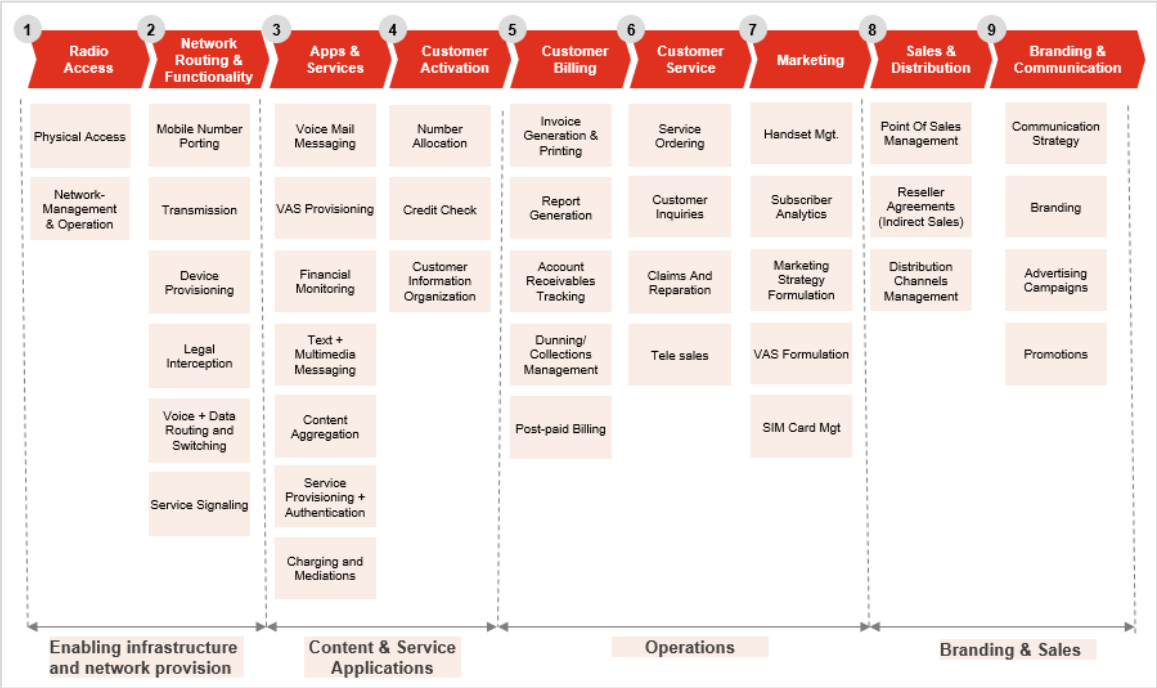
Within the EU, national regulatory authorities are obliged to determine whether operators have significant market power. An undertaking shall be deemed to have significant market power if, either individually or jointly with others, it enjoys a position equivalent to dominance. In this case, specific obligations must be imposed to protect the competition in the relevant market.

2.2 Types of MVNO

NRAs refers to a variety of MVNOs based on their ability to possess and have control over mobile network elements. The high-level mobile service delivery model is illustrated below and based on the provision of services aggregated into 9 groups such as radio access, network routing and functionality, apps and activations, customer billing, customer service, marketing, sales and distribution, branding and communication as shown in Figure 5.

There appear to be three generic categories of MVNOs – **Light MVNO (brand reseller)**, **medium MVNO** and **full MVNO**, with each having a different mix of infrastructure and operational tasks depending on the breadth and depth of its relationship with its host network, the MNOs . Every MVNO can choose the most suitable business model to build the required infrastructure over the MNO.

Figure 5 - Mobile Service Delivery Model (source: MVNE Business Model Analysis. Booz & Company, 2009)



In international practice, the medium MNVO category is split into two models:

- **service provider MVNOs** – compared to light MVNOs, these types of operators also manage all the processes regarding the customer relations services and the billing services for the services provided
- **value-added service (VAS) provider MVNO's / enhanced service provider**– comparing to service provider MVNOs, enhanced service provider MVNOs hold certain infrastructure elements, which ensure control over the services provided. These MVNOs can easily provide value-added services such as voice messages, missed call notifications, virtual private networks (VPN) etc.

Figure 6 - Illustrative example of Business models of MVNO (Source: MVNO Business Essentials. NEREO, 2010)

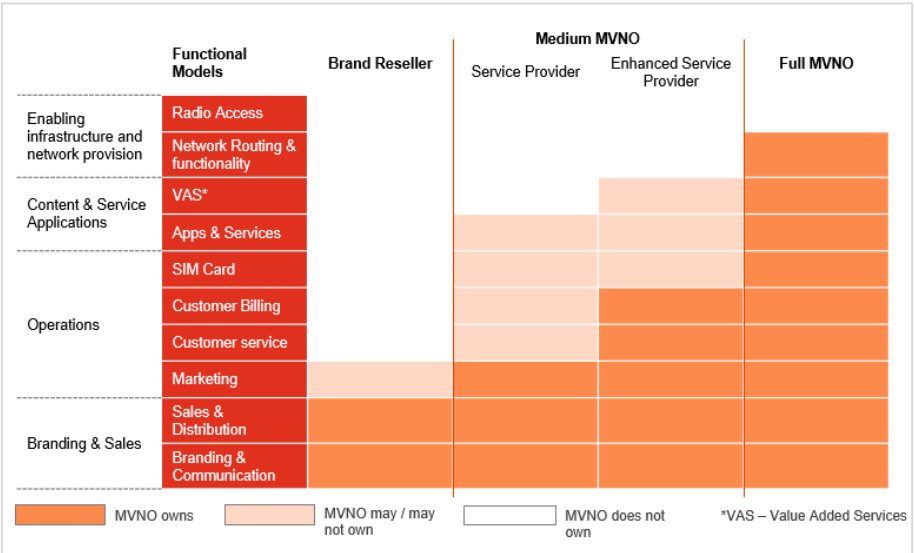
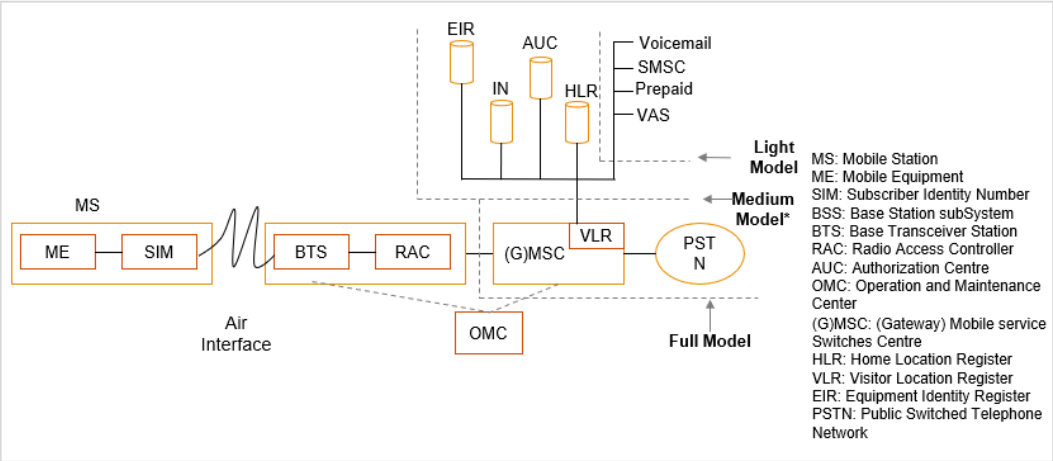


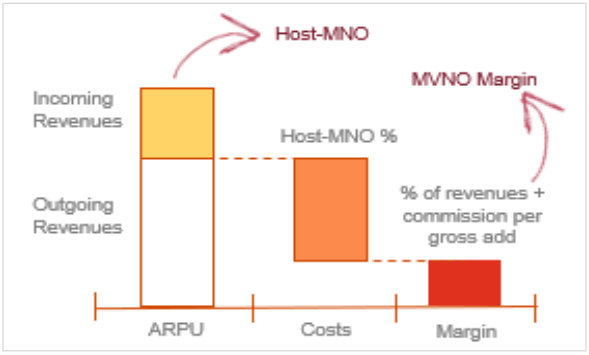
Figure 7 - Network architecture of MVNO and MNO (Source: OECD definition of Light, Medium, Full MVNO model ,2007)



The Figure 7 shown above illustrates the technical architecture of the defined MVNO types, where the light MVNO owns only systems for marketing and the customer care. The medium model of MVNO usually has own HLR, EIR, IN and AUC systems. The full model of MVNO in addition have on VLR and MSC.

Light MVNO – reselling services offered by the host MNO and potentially offering its own value-added services with limited options to differentiate its mobile services at the retail level. A reseller MVNO will either operate under its own brand or co-branded with the mobile network operator (MNO).

Figure 8 - Economic Implication of the basic MVNO model



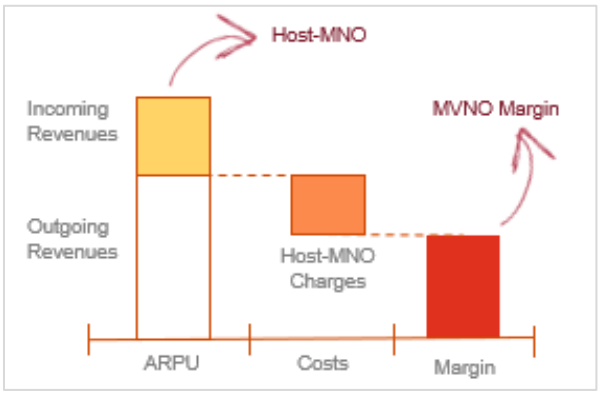
It is often the easiest MVNO type to get MNO to accept, as the MNO stays in control over most of the processes.

MVNO, in this case, possesses no core infrastructure and only holds the means that ensure the control of the relationship with the user, e.g. the branded reseller brings a brand, distribution channels and/or a large existing customer base to the table, from which it can leverage its sales. In addition, it has no capability to set prices and has no ownership of the client.

The reseller MVNO is primarily responsible for the costs of marketing, sales, and distribution. The revenue is shared with the MNO. Typically, a certain gross margin over the existing retail offer from the MNO, and in some cases receive a commission per active subscriber acquired.

The **service provider MVNO**, will either operate under its own brand or co-branded with the host operator. In best cases, the MVNO brings a concept, brand, distribution channels or a large existing customer base to the table, from which it can leverage its sales, or differentiate from the competition.

Figure 9 - Economic Implication of the service provider MVNO model



The service provider also doesn't own any core network infrastructure, however, can potentially have a VS platform. It also is capable to set prices and might have ownership of the client.

The Service Provider MVNO is normally responsible for the customer care processes, including the customer relationship management (CRM), support, billing

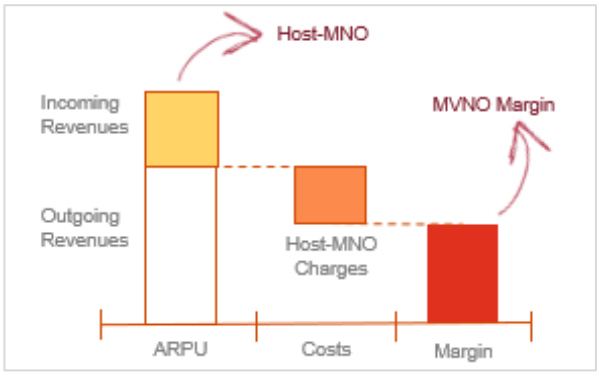
processes and billing platform (BSS), tariffs, bundles and promotion packages, costs of marketing, sales, and distribution, as well as the OPEX and CAPEX associated with the IT platforms.

Revenue is generated from the traffic of its own customers (owns the customers, but not the IMSI's). Costs include:

- Wholesale rates, marketing, sales, distribution, OPEX/CAPEX associated with the IT platforms.
- Wholesale rates may vary with the type of Voice/Data/SMS/MMS e.g. National or International (Origin/destination).
- Revenues from incoming traffic (Interconnection) belongs to the mobile network operator (MNO).

Enhanced MVNO operates under its own brand with its own SIM cards and can obtain its own numbering range/mobile network code, although not completely independent from the host operator's numbering plan. The MVNO can add its own value-added services, to leverage sales, or differentiate from the competition. It has no core network infrastructure, yet owns VAS and billing platforms, customer care and has ownership of the client. Some may own their own home location register (HLR), which allows control of the Mobile Station International Subscriber Directory Number (MSISDN) which is a number used to identify a mobile phone number internationally.

Figure 10 - Economic Implication of the enhanced MVNO model



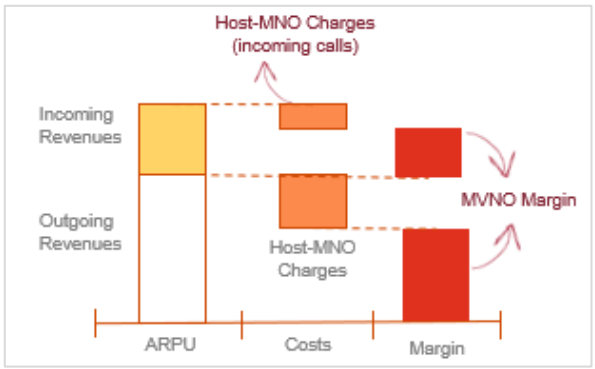
The Enhanced Service Provider is responsible for the customer care processes, including the customer relationship management (CRM), support, billing processes and billing platform (BSS), tariffs, bundles and promotion packages, costs of marketing, sales, and distribution, as well as the OPEX and CAPEX associated with the IT platforms.

The revenue of the enhanced service providers is generated from the traffic of its own customers. Costs comprise:

- Wholesale rates, marketing, sales, distribution, OPEX and CAPEX associated with the IT platforms.
- Wholesale rates may vary with the type of Voice/Data/SMS/MMS e.g. National or International (Origin/destination).

The full MVNO is responsible for the whole infrastructure, operations, customers, and data. These give it full control over all the services and products it offers in the market, as well as flexibility in designing and deploying new services, except for the Business Support system. It operates in a very similar way to an MNO (technically, not businesswise), but it does not own radio spectrum.

Figure 11 - Economic Implication of the full MVNO model



Typically, heavy MVNOs are able to offer a wider range of service offerings either developing retail services volumetrically or from a fixed wholesale allocation of radio network capacity, because they must own a suite of retail service platforms This allows the MVNO to develop its own services and manage its own data capacity, as well as potentially switch host MNOs to obtain improved wholesale access terms.

Revenues of full MVNOs are generating from the traffic of its own customers and revenues from incoming traffic (Interconnection). Costs include:

- Wholesale rates, marketing, sales, distribution, OPEX and CAPEX associated with the IT platforms

- Wholesale rates may vary with the type of Voice/Data/SMS/MMS e.g. National or International (Origin/destination).

Table 2. Advantages & Disadvantages of different MVNO models

MVNO type	Advantages	Disadvantages
Light model: Brand Reseller	• Time to market and low start-up costs as no investment in MVNO infrastructure is needed • Use the MVNO to drive an uplift in the core business.	• No control. Customers, user data, post-sale interaction, SIMs, and infrastructure belongs to the MNO, who is also responsible for the setting of tariffs • The brand may not translate well to mobile • Possible lack of telecom experience by a reseller
Medium model: Service provider	• Self-owned SIMs, possible customer ownership and relationship as well as the ability to set tariff bundles and packages independently from the retail prices set by the MNO • Use the MVNO to capture share in the mobile market and generate telecoms revenues -or to drive an uplift in the core business (bundles) • Focus on addressing a particular niche or segment.	• Costs on OPEX and CAPEX associated with the IT platforms • Limited access and control to network routing capabilities • Owns the customers and SIMs, but not the International mobile subscriber identity (IMSI).
Medium model: Enhanced MVNO	• Self-owned SIMs, customer ownership and relationship possible as well as the ability to set tariff bundles and packages independently from the retail prices set by the MNO • Use the MVNO to capture share in the mobile market and generate telecoms revenues -or to drive an uplift in the core business (bundles) • Focus on addressing a particular niche or segment • The MVNO can add its own VAS platform to upsell or differentiate from the competition, on apps, data, and content services	• Costs on OPEX and CAPEX associated with the IT platforms • Interconnect and IMSI comes from and is controlled by the MNO • The MVNO cannot negotiate traffic wholesale interconnection agreements with other operators
Full MVNO	• Self-owned SIMs, customer ownership and relationship possible as well as the ability to set tariff bundles and packages independently from the retail prices set by the MNO • Use the MVNO to capture share in the mobile market and generate telecoms revenues -or to drive an uplift in the core business (bundles) • Focus on addressing a particular niche or segment • The MVNO can add its own VAS platform to upsell or differentiate from the competition, on apps, data, and content services	• Costs on OPEX and CAPEX associated with the needed IT platforms. • Needs a certain level of telecom know-how and understanding.

Source: PwC analysis

The appropriate business models in positioning, branding, marketing and partnership appeals as key factors for success. As we could see, the length of control and ownership of MVNO over its business depends on the working relationship it establishes and builds with its MNO. In some cases, there is also another entity arising between the MVNO and MNO, which is usually a business model specialising in supporting the network-operator-side for the MVNO that is the services of the Mobile Virtual Network Enabler (MVNE).

The Mobile Virtual Network Enabler (MVNE) is a new, relatively recent type in the mobile communications market which significantly differs from previous models. It offers the would-be MVNOs core network and

infrastructure elements, and/ or solutions for various services, ranging from the provision of core network elements to ensuring administrative and operational support. An MVNE acts essentially as an intermediate between the MVNOs that offer publicly available mobile communications services and the host mobile network operator. It has no contact with the end-user at all. The key success factors for MVNE are seeking first-mover advantage, implement a flexible MVNE platform, focus on prepaid offerings, pursue high-value brands, build sales and marketing capabilities, adopt a lean and efficient organization, offer a diverse service portfolio, and lock strong partnerships with MNOS.

Mobile Virtual Network Aggregator is similar to MVNE but tries to adapt its services to specific needs of particular sector. An example is ACME MVNA, which got MVNO agreements, created football-focused services and resold them to football clubs. Advantaged and disadvantages of the described above players are summarized in the table below.

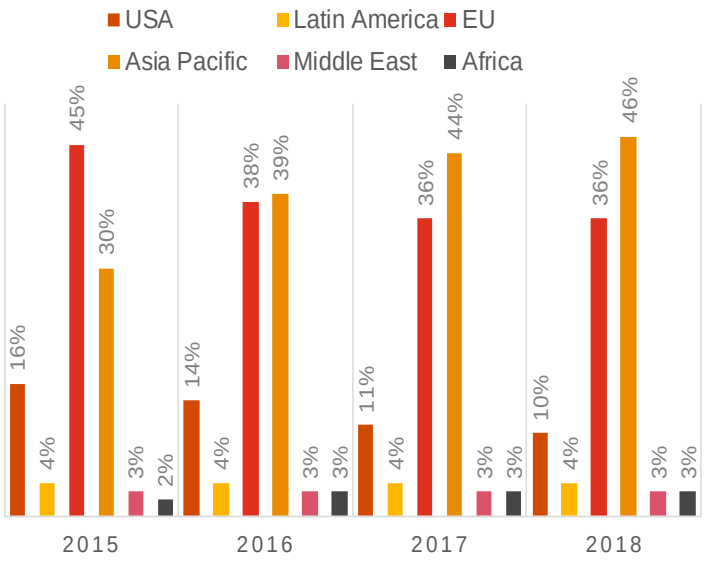
Table 3. MNO, MVNE, and MVNO

Player	Pros	Cons
MNO	Outsource development of MVNOs to MVNEs in order to target specific segments Outsource non-core activities	Lower share of the revenues No control of MVNO activities Higher reselling risk
MVNE	Achieve scale and efficiency of MVNE platform Higher share of the revenues Long-lasting position on VC	Complexity Bad debt risk
MVNO	Service differentiation Best time to market, (1-3 months) Lower up-front cost	Lower share of the revenues Dependent on MVNE

Historically, MVNOs have been initiated in the regions of Europe and North America. MVNO agreements with network operators date back to the 1990s, when the European telecom market experienced market liberalization, new regulatory frameworks, better 2G network technology, and a subsequent rise in wireless subscriber numbers.

With the launch of one of the first MVNOs such as “Virgin Mobile UK” in Europe in 1999, there has been significant growth in the number of MVNOs in Europe. The regulator in Denmark also saw the promise in the MVNO model as a cost-effective route for telecom companies to enter the market, and in May 2000 legislation had passed requiring network operators with significant market power to open access to their infrastructure (Tele2 signed an agreement with the mobile network operator Sonofon in Denmark).

Figure 12 - MVNO Market share illustration between 2015 – 2018 (PwC Analysis)



The MVNO concept has taken Europe by storm with over 600 MVNOs operating currently, similarly as in U.S. territory, which has over 113 MVNOs operational. The main reasons for it is the fact that the wireless industry in Europe has reached 80% of penetration level and because European incumbent mobile operators have embraced MVNOs as a means of deriving revenue to offset enormous cost of building 3G networks. Europe has been providing conducive environment for the MVNO business through pro-competitive measures and potentially mandating wholesale access. Initially, most regulators maintained a “watchdog” position; that is, they carefully

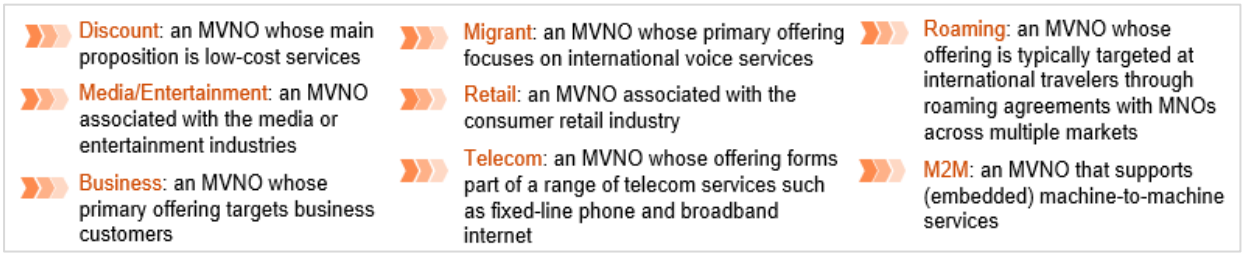
monitor the interactions between MNOs and MVNOs. Later, regulatory interventions have been practiced, where required.

EU Member States/NRAs have included wholesale access obligations in radio spectrum assignment proceedings notably in Germany and in Ireland. Also, recent French 4G spectrum assignment proceedings were a sort of an auction, in which candidates could win points by committing to providing Full MVNO access. Strong focus is placed in the MNO licence conditions on the ability for full MVNOs to be able to switch between host MNO networks, relay on multiple hosts in parallel, have full commercial autonomy and own their customer base without being subject to restrictions. Full MVNO access was also mandated by National Regulatory Authorities in other EU/EEA Member States, by way of findings of single and joint Significant Market Power (SMP). In addition, Full MVNO access was mandated as part of antitrust proceedings of EC DG Competition, in Austria, Ireland, Spain and Belgium in the 2012-2016 timeframe.

In various European countries, MVNOs' revenues have been greatly affected by the decisions and actions of national regulators and the European Union. In a handful of countries, most notably the United Kingdom, operators opened their networks to MVNOs entirely voluntarily, with no regulatory intervention sought or required. However, in other countries, the national regulator has taken steps to force the MNOs to sell capacity to MVNOs, citing competition issues. This has been the case in countries such as Denmark where the legislation passed in mid-2000 obliged SMP providers to conclude MVNO agreements.

MVNOs in the European mobile market employ a variety of business models which are the best suited to the local market and business environment.

Figure 13 - Possible sub-brands of the MVNO



Source: GSMA Intelligence

The table below summarizes examples of successful MVNOs in Europe.

Table 4. MVNOs in Europe

EURO INFORMATION TELECOM	**Euro Information Telecom** Country: France Founded: 1999	The MVNO partners with Orange, SFR and Bouygues Telecom. EI Telecom is a 95% owned subsidiary of the French banking group Crédit Mutuel-CIC. It sells pre- and post-paid packages under three main brand names: NRJ Mobile, Crédit Mutuel Mobile and CIC Mobile, in particular through the group's 4500 bank branches.
CUBIC TELECOM THE SMART NETWORK	**Cubic Telecom** Country: 180 countries Founded: 2005	The fully licensed MVNO and M2M platform provider focused on enabling global connectivity solutions for the IoT and enterprise customers. The company works with tablet and notebook manufacturers, retailers, and M2M and automotive companies.
Lycamobile Call the world for less	**Lycamobile** Country: 23 countries Founded: 2006	Since 2006 Lycamobile has become one of the most successful MVNO operator to focus on cheap international calls to over 15 million customers across 23 countries including Australia, Belgium, United Kingdom, Russia, Ukraine and more. Lycamobile provides pay-as-you-go SIM cards and develops distinct business structures such as MVNA arrangements in different countries.
freenet GROUP	**The Freenet group** Country: 180 countries Founded: 2005	The Freenet Group is an MVNO that offers services on mobile voice and TV markets. The company also develops applications that relate to home automation and security, health, data security. The Freenet group operates on Vodafone, Telefónica and Deutsche Telekom's networks through three light MVNOs – Mobilcom-an, Klarmobil and Callmobile.

	Voiceworks Country: Netherlands Founded: 1994	Full MVNO for the business market, providing mobile, fixed and fixed-mobile convergence solutions.
	PosteMobile Country: Italy Founded: 2007	PosteMobile is MVNO serving more than 3.300.000 clients and is a branch of the postal and banking services company Poste Italiane.
	Mobile Vikings Country: Belgium Founded: 2008	The MVNO was the first Belgian provider to offer specific tariff plans focused on mobile internet. Mobile Vikings have been using Orange's network since the spring of 2019.
	Transatel Country: global Founded: 2000	Transatel is a European MVNE/A and has over 170 MVNOs. The company offers cellular solution for global, multi-local data connectivity with eSIM capabilities, to address the IoT market of connected devices, such as laptops, tablets, trackers, as well as cycles, vehicles and aircraft.
	Ventocom Country: Austria Founded: 2013	Ventocom is an MVNE who owns "HoT" and "Allianz SIM" brands. Ventocom, as an independent service provider, supplies the development of mobile products and tariffs, CRM, Customer Service, Billing, and Logistics.
	Sky Country: UK Founded: 2016	Sky is Europe's leading entertainment company. The MVNO offers mobile as part of its bundles of TV, home phone and broadband services. It leases wireless telephone and data spectrum from major carriers EE, O2, Three, and Vodafone for resale.

Source: MVNO Europe

2.3 Regulatory approaches to MVNO

The regulatory approach towards MVNOs differs across jurisdiction depending on how open it is to network access. On the one hand, regulation of the sector ensure access to the radio spectrum which is the bottleneck facility and enforce an access obligation on the existing operator, which creates downward pressure on prices. On the other hand, opponents of the regulator interference claim there is no empirical evidence of market failure in the segment and that mobile market is competitive by its nature.

The level of intervention varies from heavy-handed market interference to purely commercial negotiation and creating a more favorable entry setting. The example of the international approaches to the regulation of MVNOs is shown in the table below.

Table 5. Approaches to MNVOs regulation

Level of regulation	Key aspects	Country Example
No regulation	No specific MVNO regulation Regulator intervenes only if restrictive or anticompetitive practices identified	Australia Singapore UK USA Denmark
Regulatory guidelines	Voluntary regime, promotion of MVNOs by providing following guidance on, e.g.: Authorization Regime Numbering Guidance for agreements to access to the Mobile Network Guidance for interconnect agreements	Malta Malaysia Romania
MNOs must allow access to potential MVNO	MNOs have to negotiate with MVNOs wholesale agreements MVNOs non-discrimination obligation	Germany Hong Kong Japan Norway
MVNO reference offer	Obligation to allow MVNOs access at pre-defined conditions in the reference offer (e.g. at regulated price)	Czech Republic (for 4G data), Austria

Source: Regulators websites and press releases, PwC analysis

2.4 Use cases of the MVNO regulation

Romania

In **Romania** regulatory guidelines for MVNO were approved in 2012 by the National Authority for Management and Regulation in Communication ("ANCOM"). Prior the acceptance of the guidelines there were no MVNOs on the mobile communications market. Currently there are two MVNO active in the mobile market – Lycamobile Romania (since 2015), Digital Cable Systems (AKTA).

Regulatory guide for the MVNO operating on the Romanian electronic communications market aims at presenting general regulatory framework regarding the activity of the providers that intend to offer their own publicly available mobile electronic communications services without holding a radio access network and therefore, they have to use the network of another mobile operator in order to provide these services.

In the document the MVNO are defined as entities who:

- have their own customers, being the only ones responsible for their relationships with the end-users and holding all the legal rights and obligations in relation to these users, as well as to the regulatory authority – ANCOM – pursuant to the regulatory framework;
- establish and launch to the market their own retail offer, which may be different from the one presented by the mobile network operator hosting the MVNO, a retail offer that defines a distinct business strategy.

Implementation of the general authorization regime defines how the ANCOM has to be notified by all entities that intend to perform activities within the MVNO concept.

The guidelines define the numbering process, responsibilities of MVNO and MNO during the agreement negotiation, Interconnection Agreements and payment for the radio spectrum usage.

Austria

The application procedure of MVNO in **Austria** is conducted in three stages:

In the first stage an interested party should submit a completed and signed Request Form and send by email to the H3G. The Request Form should be accompanied by:

- Confirmation of being a Requesting Party (the form can be retrieved from the website)
- Request to enter into negotiations with the H3G
- Consent to a copy of the Request Form being given to the Monitoring Trustee
- Current copy of the company's record at the companies register

The second stage consist of negotiation process - Following the receipt of a Request Form, H3G will provide the MVNO with a copy of agreement prepared on the basis of the principles set out in the Reference Offer. After that, the good faith negotiation will start.

The last stage is signing of MVNO Agreement - The MVNO starts providing its services on the "ready for service" date, meaning that technical implementation is completed.

The MVNO Agreement is based on the Reference Offer. It contains wholesale access offer, charges, Implementation and implementation fee, non-discrimination obligation, forecasts, access to and use of MVNO customer information numbering, privacy and data protection, use of the h3g network, intellectual property and branding, compliance with all applicable laws, limitations of liability and warranties, term and termination, and governing law and jurisdiction.

Within the European Union, the EC investigated the influence of mergers on national mobile markets competition. EC has supported the entry and expansion of MVNOs. In **Austrian** case the H3G/Orange case the EC had concerns that the elimination of one out of four MNOs in Austria could lead to less competition and higher prices to end-users.

H3G was obligated with several remedies whereby in committed to provide wholesale access to its network for up to 30% of its capacity to up to 16 MVNOs for the coming 10 years. Furthermore, H3G undertook not to complete the acquisition of Orange before it had entered into and MVNO agreement.[3]

Malaysia

Structure of guideline on regulatory framework for 3G MVNOs in Malaysia consists of the following parts: objective, introduction, background, definition of MVNO, proposal of Telekom Malaysia Bhd, proposal of UMTS (Malaysia) Sdn. Bhd, licensing requirements for MVNOs, numbering, regulatory intervention, and contacting MCMC.

Even though the guidelines are prepared for the MVNO operation, the Malaysian NRA does not regulate the terms and conditions of access for MVNOs due to the lack of evidence that there is market failure.

The use of the case defined guidelines in Romania and Malaysia have increased the number of MVNOs in both countries

[3] Economic impact of competition policy enforcement on the functioning of telecoms markets in the EU (EC, 2017)

3. Review of selected regulatory approaches and recommendations

Currently there is legislative definition or specific framework dedicated to the terms and conditions of national roaming and MVNO operation in Georgia there, but the Electronic Communication law (Article 2, 19 and 34) define access to the network elements and statutory obligation to all operators (the defined SMPs and also operators with no significant power) to allow access seekers to access physical and virtual network.

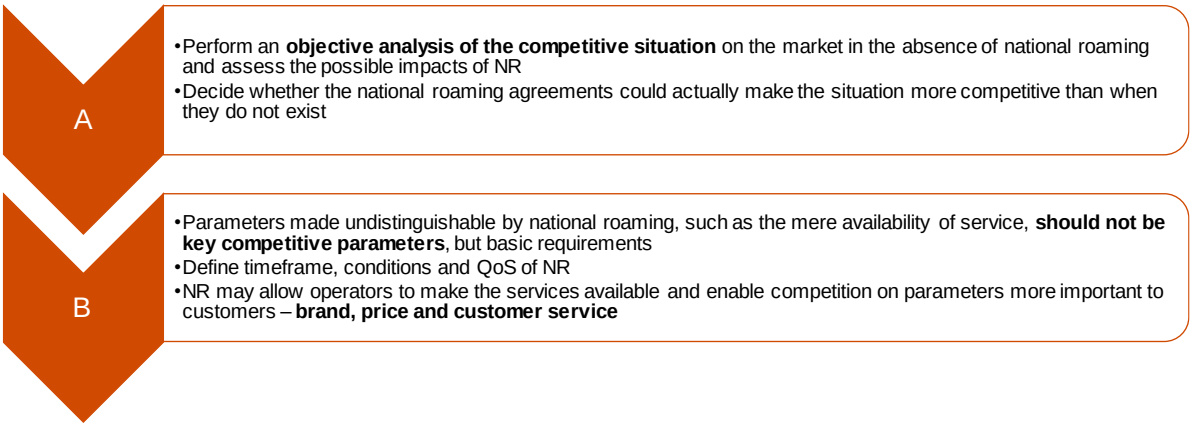
The GNCC has right to impose specific obligation on operators with significant power in relevant markets based on Methodical Rules for Determining service segments of relevant markets and competitiveness analysis, which was developed as part of Georgia – ICT Development project. It is be in line with eh EU recommendations that aim to increase a harmonization of regulation across the EU and to limit ex ante regulation to those relevant telecoms markets where law cannot remedy persistent market failure. The process of the EU regulation framework consists of three stage process:

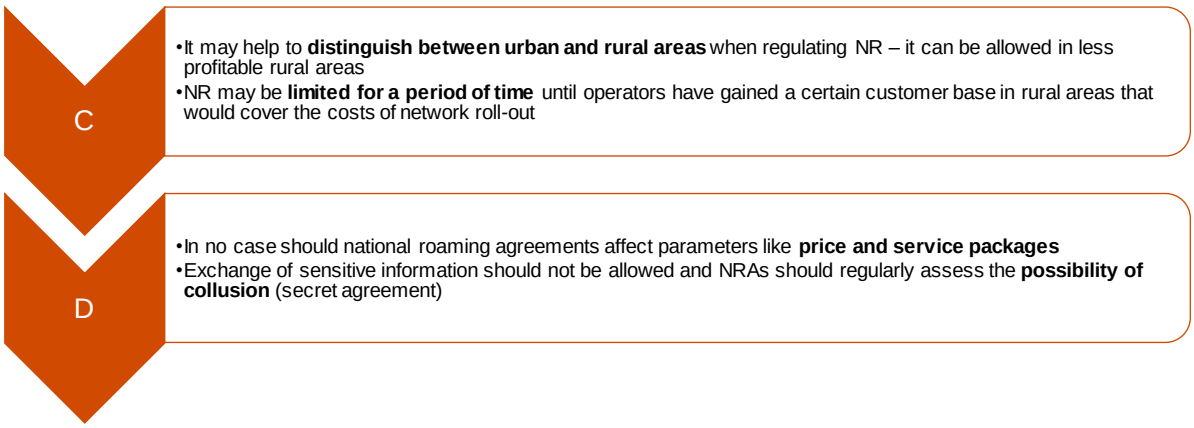
- **Market Definition** – definition of relevant markets susceptible to ex ante regulation;
- **Market Analysis** – identification and assessment of relevant markets that are not effectively competitive and designation of operators with SMP;
- **Selection of remedies** – imposition of ex ante regulatory obligations that are appropriate.

Last market analysis of mobile termination was prepared in 2010, with several updates on retail voice services, SMS and internet services including definition of SMPs, but it was not based on EU Recommendations. Based on the latest competition research and analysis of the Retail mobile market: “According to the Commission's decision N684 / 19 of September 7, 2017, the maximum tariff for mobile phone call termination was reduced from 3.5 tetri to 0.75 tetri, and for fixed line telephone termination services from 2 tetri to 0.28 tetri. By the same decision, wholesale tariffs were reduced for fixed and mobile network call service, from 3.5 tetri to 1.44 tetri in mobile and from 2 tetri to 0.38 tetri in fixed network.”

3.1 Recommendations on national roaming terms and condition

Based on the examples of NR described in Section 2, the four main phases of the NR obligation using balance regulatory approach can be defined:





In this section of the document we will focus on the definition of NR Agreement and the NR conditions that need to be defined to have positive impact, in order to reduce the concertation and to increase competitions. From the experience from EU countries mentioned in previous section of the document the national roaming agreements should contain at least these main contractual provisions:

Confirmation of the scope of the services

The confirmation of the scope of the services is dependent on the NR obligation imposed on the operators with SMP. This should be in accordance with the Telecommunication Law and Methodological Rules for definition of Relevant Markets and Market Analysis for the purpose of ex-ante regulation and the assessment of concentrations in the sector of electronic communications.

The scope of the services is dependent on the situation on local market. Based on the terms of the assignment and the discussion with the GNCC representatives, the minimum range of the services that the national roaming obligation should support include:

- Incoming calls to NR access seeker irrespective of the origin of the call;
- Outgoing calls from NR access seeker irrespective of the destination of the call (including emergency services);
- All incoming and outgoing SMS irrespective of their origination and termination;
- Access to data services;

The NR access seeker is under no obligation to support international roaming agreements for the national roaming services defined above.

All of the National roaming services which are within the scope of the NR, should be cost oriented, based on the Retail minus methodology described in Section 4 of this document, with a right of GNCC to review and approve the proposed prices.

Conditions of the NR

The conditions of the NR access terms define duration, the minimum level of coverage by the NR access seeker's own infrastructure and NR access seeker's investment plan for their own network infrastructure for the future. The second condition can be defined by percentage of covered areas in the country, the number of own BTS stations or cell sites and the second must include at least:

- The establishment of roll-out milestones to be met by the NR access seeker to continue to access the national roaming services;
- The planned business model for roll-out of a cellular mobile network that provides telecommunication services to at least a defined percentage of the Georgian population. The GNCC must establish the roll-

out milestones and the roll-out thresholds that ensure that the NR access seeker has strong incentives to invest in its own network in an efficient and timely manner.

National roaming coverage

The NR services should be provided to the NR access seeker based on the mutual agreement, where the Provider of NR has network coverage and NR access seeker have not built its own mobile network yet. The terms or conditions of the service should not be discriminatory to the NR access seeker and its customers.

The NR access seeker should supply the Provider of NR information including the network extension plans and capacity forecasts in a timely manner in order to facilitate network planning, testing and provision of capacity, which should include adequate and sufficient forecasts. Similarly, as in Section 3.3 the NR access provider should use it best endeavours to provide accurate and sufficient traffic forecasts.

The National roaming coverage provided to NR access seeker should not be contributed in the NR access seekers network coverage targets or similar obligations specified by the GNCC regulation.

The Quality of services definition, technical requirements and timeframes definitions for the NR agreements are described in more detail in section 3.2 and 3.3 of this report, where the NR agreement terms and MVNO agreement terms are similar.

3.2 Recommendation on regulatory framework for MVNO

This section of the document provides assessment of the regulatory framework for MVNO, with relevant information for both the potential MVNO and the MNOs in Georgia, including the market entry phase of the potential MNVO, negotiation phase for MVNO and MNO and roll out phase as is it shown in Table 6.

Table 6. Regulatory framework for MVNO

Phase 1 – Market Entry Phase	Phase 2 – Negotiation Phase	Phase 3 – Roll out Phase
• Definition of Licensing/ Authorization Requirements • Definition of Numbering Requirements	• Timeframes for the MVNO agreement negotiations • Interconnection • International connectivity and roaming • Wholesale prices of services	• Timeframes definition for the roll out phase • Compliance to the Quality of service (“QoS”) • Mobile Number Portability (“MNP”) requirements

Definition of Licensing/Authorization requirements

According to the Telecommucation Law, authorization of the activities at the electronic communication sector is carried out by the GNCC.

In the first place, a person willing to authorize for the operations in the sector submits an application to the GNCC. The application must be accompanied by:

- extract from the registry of business (non-commercial) legal entities of Georgia;
- copy of the statute of the legal entity;
- copy of the relevant identification document of the individual.

The GNCC register the interested person at the register of authorized undertakings within 10 working days. However, in case the application and/or supporting documentation is not submitted properly, the GNCC provides additional 5 working days to submit the full package of required documents. If the person fails to meet the requirements within the given period, authorization shall not be granted. Notwithstanding, there is no limitation on the number of applications submitted by the person.

The person is considered to be authorized unless the GNCC requests any additional terms for submission of full documentation. The extract from the register of authorized undertakings will be issued within the following 3 working days.

Authorization of the activities at the electronic communications sector is carried out for an unlimited period of time. It is impossible to cancel the authorization unless the authorized person requests it itself.

Figure 14 - Authorization types in Georgia

Georgian National Communications Commission is authorized to issue several types of licenses in scope of its competences, according to the law:

A. Provision of electronic communication networks and facilities:

A.S. Provision of cellular communication networks and facilities:

A.S1 Providing satellite communications network with relevant elements and facilities

1. Providing satellite subscriber access network with functional resources and capabilities
2. Satellite communication system terminal facilities with functional resources and capacities

B. Provision of services through electronic communication networks and facilities:

B.M. Mobile Communication Services

B.M1 Mobile (Voice) Subscriber Service for Mobile Communication Systems

1. Telephone (voice) connectivity with local and mobile communication systems subscribers
2. Mobile international (voice) connection service

B.M2 Extended service of mobile communication system subscribers

1. Text messaging service
2. Multimedia services
3. Digital Data Transfer Services (GPRS , etc.)
4. Mobile Internet Services
5. Moving transit broadcasting services
6. Other mobile communication services

For the potential MVNO only authorization of services through electronic communication network and facilities is needed to provide their services in Georgia, but the it should be reviewed on case-by-case basis upon the GNCC assessment of the potential MVNO.

All the entities that intend to perform an activity within the scope of the MVNO framework, must notify GNCC of their intention. The notification should be in line with current authorization process defined above. The slight difference is between the different types of MVNO.

The medium, full MVNO and MVNE will be required to send notification as providers of services through electronic communications networks and facilities, based on the core network elements they use and on the whole range of services they intend to provide. The light MVNO model operators that are dependent on core elements of MNO, will have to conclude with the MNO agreement establishing and describing how they comply with the legal obligations that require the support of the core network administrator, this should be described in the notification.

Table 7. EU/UK best practice on authorization procedures

Selected EU/UK country	Description
The Netherlands	General Authorization Regime is in place, but companies have to fill out a form: 'Notification of the provision of public electronic communications activities. Any change related to the registration has to be notified instantly. The form has to be sent through fax, via post or email. The company has to specify what kind of services, network or related facilities they provide: (i) Public electronic communications services, (ii) Public electronic communications network, (iii) Related facilities. The provider is required to observe all obligations of the Telecommunications Act, of which the most important pertain to interoperability/interconnection, SMP regulations (if applicable), numbering, laying of cables and rights of way, consumer protection, privacy regulation.
Austria	The license is granted by the regulatory authority in response to a written application. The authority shall decide on the application within 6 weeks. The

	application for the granting of a license shall contain details of the type of service, the area supplied and the organizational, financial and technical requirements relating to operation by the applicant. The license shall be granted if the applicant • has the necessary technical competence and; • there is no reason to assume that he will not provide the relevant service in accordance with the license. The financial strength of the applicant, his experience in the telecommunication sector and related sectors, and his expertise shall all be taken into consideration. The licensee shall draw up and present to the regulatory authority business conditions, service description relevant tariffs in a suitable form.
UK	There is no need to register telco operator in the UK. General Authorization regime – Licenses are no longer required for providing communications networks or services in the UK – everyone is 'generally authorized' to do so and no notification is needed. However, the General Authorization is subject to the General Conditions of Entitlement: these conditions apply to all persons providing electronic communications networks and services. The General Conditions of Entitlement distinguish between all public service providers and telephone service providers.
Germany	General Authorization Regime is in place, but BNetZa has to be sent a notification in written form/not by email. The notification form should be sent to the address stated in the form. There are no notification charges. The basics requirements are set out in the law (company register number, address, start of service, short description of service). There are no special provisions for cross-border operators. These providers still have to fill in the relevant network and/or service categories. If (part of) their network is located in Germany or the services are also offered to German companies (not cross-border), the questionnaire has to be filled in any case. There are no restrictions on foreign ownership or investment in the telecoms, audio-visual media distribution and the internet sectors in Germany.

Definition of Numbering requirements

The National System of numbering is set by the Government of Georgia with the agreement to the GNCC. According to the Telecommunication Law, the basis for issuing permits for use of numbering resource includes:

- existence of free numbering resources;
- application of the interested person;
- compulsory payments;
    - permit fee provided by the Law of Georgia on "license and permission fees"; and
    - cost for the use of numbering resource defined by the "the rules of issue, use and payment of the numbering resources"

The application of the legal entity will have to be accompanied by an extract from the Register of Entrepreneurs and Non-Profit Non-commercial) Legal Entities.

In case the application is incomplete, and some documents are missing, the GNCC sets an additional period for providing necessary documents not less than 5 and no more than 15 working days. If the seeker does not submit the relevant information before the deadline, the GNCC may decide to leave the application without consideration.

Permission for the use of numbering resources is issued only for the authorized activities in the electronic communications field, without time-limit and with a condition of annual renewal.

To renew the permit, a person should submit documents confirming the payment of the fee for usage of numbering resources to the GNCC one year prior to the expiration date. After that, the regulating authority shall introduce the information on renewal of the permission in the relevant departmental register. Failure to meet the requirements lead to the revoke of the permission.

The ground for cancellation of the right to use numbering resources are:

- Upon request;
- Non-payment of fees;
- Multiple violations of terms of use;
- Cancellation of authorization for relevant electronic communications services

The GNCC is obliged to ensure transparent and non-discriminatory conditions and rules in acquiring rights to use numbering resources as well as regulation of issues related to the subject.

As wholesale access is provided via provisioning of Mobile Communication Services Authorization, the potential MVNO should be responsible for management of numbering requirements under the current regulation of the numbering allocation. If the potential MVNO intends to invest in the network elements and network infrastructure (e.g. HLR, billing) they will need to apply the request to GNCC for allocation and use of the relevant block of numbers which allows them to provide the relevant services as defined in Telecommunication Law.

GNCC will be responsible for allocation, upon request. Of the numbering resources in accordance with the National system of numbering and with the regulations regarding the allocation of numbering resources.

Timeframes for the MVNO agreement negotiations

Every MNO that has the obligation to offer wholesale access to potential MVNOs, if requested must enter into good faith negotiations to complete and MVNO Agreement with any MVNO without avoidable delay. The Communications and Information Technology Commission defines the actions or practices that violate the duty to negotiate in good faith as follows[4]:

- Obstructing or delaying negotiations or resolution of disputes;
- Refusing to provide information about an MNOs' own telecommunications facilities that are necessary for access agreement;
- Misleading or coercing a party into reaching an agreement it would otherwise have made;

[4] Draft of Mobile Virtual Network Operator Guidelines, CITS, Saudi Arabia

- Requiring prior or simultaneous negotiation or agreement on the provision of other services;
- Demanding that another service provider to sign a non-disclosure agreement that precludes it from providing information defined in reference offer;
- Offering terms which are discriminatory in nature, and more.

Based on the future obligation on the GNCC any person may initiate the negotiations with operators that have SMP on the market to establish preliminary MVNO Agreement discussions. The final MVNO Agreement will be signed after the MVNO operator will be authorized to provide electronic communication services.

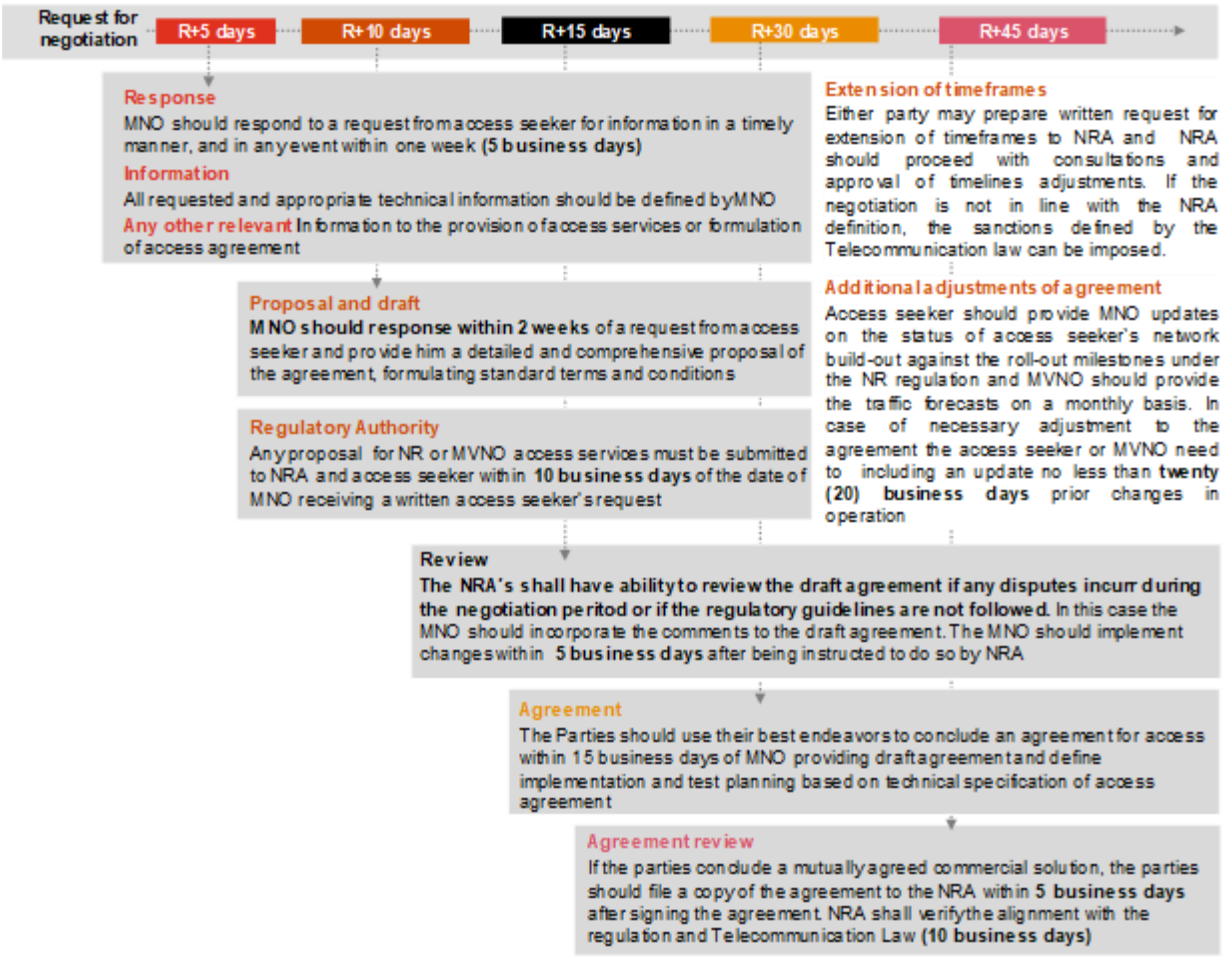
Figure 7 - Illustrative example of clauses that should not be included in MVNO agreement; (source ANCOM regulatory guide for MVNO, 2012)

The MVNO agreement should not include following information limiting the operation of the MVNO:

- ✗ The MVNO's commercial autonomy in the retail market;
- ✗ The MVNO's capacity of changing the MNO or of concluding agreements with several MNO in future;
- ✗ The MVNO's development plans, especially as regards the duration, the extension terms and termination and cancellation terms of the access agreement.

In case that the MVNO and MNO are not able to reach an agreement, either party of the negotiations should be able to apply to GNCC for clarification and guidance on the terms of the proposed MVNO agreement. To avoid discouraging initiative in such a dynamic market as that of mobile communications and also taking into account that there are several MVNO types, the GNCC should decide on timeframe for the period in which the MVNO and MNO negotiating the contract.

Figure 8 - Illustrative example on definition of timeframes for negotiation of access agreement



Based on the best practice applied in selected countries the timeframe for finalization of the MVNO agreement varies from 2 months to 6 months. We recommend also definition of a timeframe for GNCC to enter the negotiation between the MVNO and MNO to clarify and guide the process. Both parties that are in the negations should be able to open a dispute to GNCC if they do not see a progress in the negotiations based on specific timeframe

prepared by GNCC. Illustrative example of detailed timeframe for Phase 2 – Negotiation phase is shown in Figure 8.

GNCC should be also able to differentiate between the first MVNO agreement and the subsequent MVNO access agreement. This is also the case of the Romanian NRA (ANCOM), that in their regulatory guideline for MVNO operating in Romanian electronic communication sector, define the timeframe for competition of MVNO agreement being 6 months for first MVNO agreement, and 4 months for subsequent MVNO access agreements.

Interconnection

Under the Article 19. General rights and obligations of authorized undertakings Telecommunication Law, an authorized undertaking shall be empowered to request an electronic communications network operator to provide access and/or interconnection to relevant elements of its network. Based on current regulation the MNOs have an obligation to negotiate interconnection with each operator, for the purpose of providing the services through the electronic communication networks. In this context, we recommend the GNCC to impose the obligation to negotiate interconnection with MVNO, who has been allocated numbering resources in the National system for numbering. The light MVNO should not be able to negotiate an interconnection agreement and should use interconnection of the MNO.

International connectivity and roaming

The potential MVNOs may want to build a business model based on their potential international connectivity and roaming capability to attract the relevant market segment. In this case the detailed control by GNCC is recommended to ensure that the MVNOs have appropriate authorization, that is required for provisioning of gateway services. In this regard, the international connectivity and roaming agreements should be provided on commercial basis. Similarly, as in the previous section the light MVNO should be able to use roaming agreements of the MNO on commercial basis.

Wholesale prices of services

The wholesale prices of services should provide an appropriate margin between the wholesale price charged to the MVNO and the retail price for the equivalent service provided by MNO to its own customers.

Figure 9 - Comparison of pricing principles for MVNOs

Volumetric Cost plus (per unit) prices

- Volumetric wholesale prices allow the MVNOs to introduce to the market own products based on the number of minutes, SMS and data.
- MVNOs can't offer unlimited packages because they could be liable to high wholesale charges from the MNO caused by high volume consumption.
- Volumetric wholesale prices are good for MVNOs that sell specified bundles of traffic and prepaid services, since the MNO and the MVNO can predict with certainty the likely wholesale and retail revenues per customer.

Capacity based deals

- Capacity based deals allow MVNOs to utilize a part of the MNOs total network capacity. MVNOs are able to build own service packages based on the network capacity.
- The deals require more significant investment from the MVNO for the market entry.
- The MNO benefits from Capacity based deal through constant source of income regardless of the actual use of the capcity by the MVNO.

Retail minus wholesale limits

- Retail minus limits leave little room for the MVNO to design own service packages and lead to the MVNOs providing packages similar to the MNO.
- Retail minus limits are more suitable to "resale MVNOs" – which are more likely to utilize the light MVNO business model.

There are three possible general tariff model options between the MVNOs and MNOs either with or without regulatory interference. Traditionally, volumetric prices have been used in the cooperation between MNOs and MVNOs, but due to the introduction of 5G, the capacity-based deals may become more relevant, which are better suited for the full MVNOs.

We recommend allowing the MVNO and MNO to negotiate the pricing of wholesale services on commercial basis, but to apply the Retail minus methodology for access seekers defined in Section 4 of this report, if the parties are not able to reach the agreement. In the most cases of MVNO Agreements, there is also define one-off set up fee, which should be cost-oriented covering all incurred costs during the implementation and testing of the wholesale access services operation. We recommend that GNCC should have right to review the one-off fee including

financial information of costs, that are part of calculation. Those costs should be excluded from the Retail minus methodology.

Timeframes definition for the roll out phase

The last phase of the regulatory framework for the MVNO Agreement is the roll out phase. In this context it means the period where the final MVNO agreement is signed and compliance with GNCC requirements for the providers of services through electronic communication networks need to be followed. Based on the best practice the timeframe for the roll-out of the network varies case-by-case from four to six months. After the signature of the agreement, the MNO should notify the MVNO, that not more than 6 months following the notification or payment of bank guarantee to the MNO, the MVNO should launch its mobile electronic communication service to its end-customers.

Compliance to the Quality of service ("QoS")

The Telecommunication law defines the Quality of the service and the protection of users' right that both the MVNO and MNO need to comply. The GNCC should endorse the view that the MNO and MVNO solution of access to MNO's network must allow an efficient economic operation, must provide non-discriminatory conditions in terms of service quality, compared to the customers of MNO. Article 32 of the Telecommunication Law defines the obligation of non-discrimination: "While offering access to relevant elements of the network, technical facilities, free functional resources and capacities, an electronic communications network operator with significant power shall, in essentially the same circumstances and under the same conditions, ensure non-discriminatory provision of requested electronic communication services and related information to an applicant authorized undertaking, in the same time frame and under the same conditions."

We recommend that the MVNO should be responsible for QoS of the provided services to comply to standards defined by the GNCC, which are also applied to MNOs. MVNO QoS should be checked regardless the of the MNO operation. If the result will be different from the results of the MNO, the GNCC should have a right to penalize the MNO.

In same time the MNO should have the possibility to set a certain level of QoS to the MVNO which may be different to its own QoS parameters. In terms of specific QoS the MVNO agreement should provide clauses specific to a Service Level Agreement ("SLA") negotiated and agreed by the both parties, which are based on technical standards define by association as ITU, GSMA or 3GPP.

Table 8 - Illustrative example of SLA structure in MVNO reference offer in Czech Republic

The quality of service KPIs defined in MVNO reference offer in Czech Republic	
Access radio network	In the SLA is defined the MNO should offer access to radio network based on non-discriminatory principle, that the MVNO will be able to offer the services in the same geographical area and same quality as the MNO offer to its own end-users.
Quality of connection to the provider of the access (usually defined by the ITU, 3GPP, GSM Association)	**Errored Seconds/ Severely Errored Seconds** – ITU - T Recommendations G.826, M.2100, M.2102 **ASR parameter** – ITU – T E.411 **Availability of connection** – 99,9% based on monthly basis **Maximum error time – 4 hours** with definition of the error and non-including the maintenance on the MNO network

	Based on lower KPI of interconnection MNO offer discount on monthly fees
Quality of customer care	**Definition of customer care offered to MVNO** in case of any issues on the network and process of troubleshooting by the MNO
Definition of communication matrix for troubleshooting	Defines the roles of MVNO and MNO during the troubleshooting and issue escalation based on the critical priority of the network errors

Mobile Number Portability ("MNP") requirements

"Portability of subscriber numbers" (translation) shall mean the possibility of choice for end-users (subscribers) to keep the same subscriber number when changing authorised undertaking to another authorised undertaking providing fixed or mobile communications network and facilities or services (The Law of Georgia on Electronic Communications, article 2).

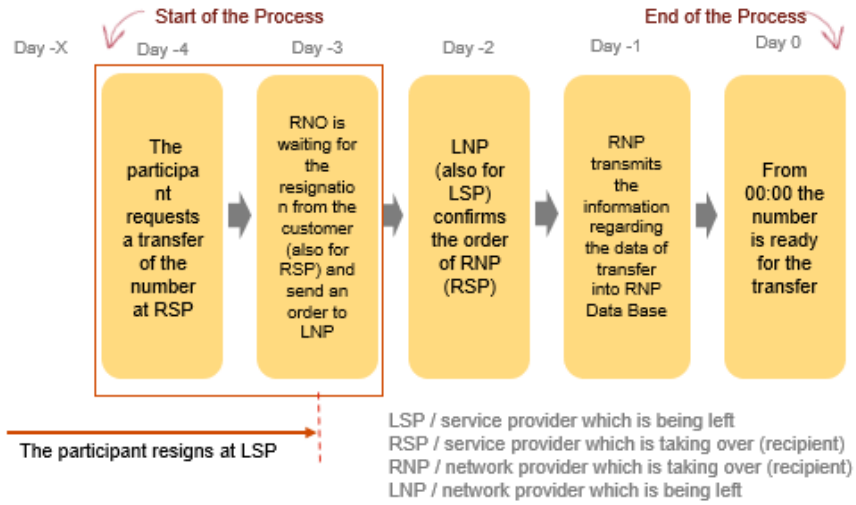
Portability applies to all telephone numbers apart from service numbers specific to a certain telecommunications area and televoting numbers.

Mobile number portability creates for mobile users the benefit of something akin to a personal number, which enhances the concept of personal mobility. It empowers users to switch mobile network without the possible cost and inconvenience of a change of their telephone number. This is because, in the absence of number portability, a change of number when switching networks requires most users to notify people who contact them of the new number. For business users, especially those who rely on a mobile phone as a primary method of communication, the effort and cost involved in notifying contacts of a new number may be quite substantial.

For the regulators, the implementation of the mobile number portability causes certain positive effects on the mobile market. In particular, it should prevent network operators from gaining market power by charging an extra price margin that corresponds to the cost of switching networks. Consequently, mobile number portability should:

- Enhance competition among network operators, especially in relation to the installed subscriber base;
- Create downward pressure on prices;
- Make it easier for newer entrants to gain market share.

Figure 10 : The general process of portability of a mobile phone number



The general procedure of the number portability is shown in Figure 10 : The general process of portability of a mobile phone number. The length and method depend on the peculiarities of the local regulatory environment, which will be described more in details in the following chapter. However, the overall process includes an official request from the user, arranging technical implementation of the process between the operator who has been left and the one who takes over, administration, economic arrangements, and finally the transfer itself. According to the report of the Electronic

Communications Committee (ECC) within the European Conference of Postal and Telecommunications Administrations (CEPT), the target period for number porting is on average 7-8 days.

Mobile number portability EU best practice

CEPT countries vary regarding the extent of regulatory involvement in determining how mobile number portability is implemented. On the one hand, without involvement by the regulator, industry players will lack the initiative, will be reluctant to reach an agreement or settle on a particular method of implementation. On the other hand, the most cost-effective solution to a network operations problem will be delivered by the industry players themselves.

It is worth mentioning, that in case the regulator is not involved, many CEPT countries establish a forum and process for making decisions collectively about mobile number portability implementation. Consequently, the majority of them agreed that it is critical to actively involve industry in developing the detailed specification for how mobile number portability should be introduced and operate to maximise efficiency.

At the initial stages of the preparation for mobile number portability implementation, a key question is a **method** used for routing of calls from an originating network to the mobile network associated with a given mobile number. There are broadly two methods available for routing of calls in a mobile number portability environment:

- Routing of a call directly from the originating network to the correct terminating mobile network, which requires the former to determine what is the appropriate network for a given number

- The mobile network that was originally associated with a given number is involved in the routing of a call to the correct terminating mobile network.

It may not be necessary for all networks in a particular country to use the same method for routing of calls, rather permit network operators to choose the method of routing they will utilize.

As it was mentioned before, the process of mobile number portability involves the use of a **database** that contains information on the network with which ported numbers are associated. This information is used in routing a call to a ported number, to determine the correct terminating network for the call. The actual information is usually a routing number that can be used to enable a call to a ported number to be routed to the correct mobile terminating network.

Number databases are typically managed in two manners:

- The centralised model involves a single reference database containing data for all mobile numbers. It is usual for this reference data to be copied to operational databases in each participating network on a frequent basis. A centralised number database is generally managed by a consortium of network operators. The actual operation and maintenance of a centralised number database may be out-sourced to a third party company which has experience in database operations (Belgium, Germany, Poland)

- The distributed model involves multiple databases containing subsets of the total data. Each separate database in the distributed model may, for example, comprise only the numbers assigned to a particular mobile network operator. The full set of information about all mobile numbers is only available from these separate databases when taken as a whole (Austria, Malta)

The **administrative arrangements** that facilitate porting of numbers are key factors for successful implementation of portability. It is already well known that poorly designed, complex or easily-abused procedures for porting of mobile numbers are less likely to result in the successful implementation of portability or to produce the benefits that portability is intended to deliver.

The design of porting procedures for mobile market involves the role of retailers, the need to change SIM-card, and the existence of contracts related to handset subsidies. Particularly these days the majority of mobile users deal exclusively with retail outlets in managing their mobile service. Therefore, it makes a lot of sense for them to deal with porting their mobile number to a different operator unless there are any restrictions on the entities handling the porting request.

The porting procedure itself encompasses authentication of the requested person, communication between parties during the process, ground for refusal, timing, and managing bulk ports. All counties developed special protocols or other arrangements regulating these steps to minimize cost and ensure flexibility and robustness of the porting process.

The transfer of the mobile number also requires a set of **economic arrangements**, which specify costs calculation and allocation method between the donor and provider. There are several categories of costs associated with implementing mobile number portability:

- The administrative cost each time that a number is ported
- The establishment and operating costs associated with running a database containing details of ported numbers
- The costs of additional conveyance of calls to ported numbers in the case that they must transit the mobile network originally associated with a ported number

After defining the cost, a regulator has a couple of options on how to apportion them between the original network provider and the network associated with the ported number:

- Imposing it entirely on the donor/recipient provider
- Sharing it among the relevant market players
- Allowing the relevant market providers to negotiate how the cost is apportioned
- Requiring all market players to bear their own costs
- Imposing it on users

To sum everything up, the mobile number portability has been introduced or actively being planned in up to 29 European countries. The approach to implementation considerably varies yet gives useful insights and allows to determine possible pitfalls and opportunities when executing it in the Georgian environment.

We recommend that the MNP service provision should be provided to light MVNO by the MNO. The medium and full MVNOs should be responsible for provisioning of the MNP service, with support from MNO.

3.3 Use cases of selected sections of the Reference offer for wholesale access (MVNO Agreement)

In this section of the report we analyze selected sections of the Reference offers with practical examples of their definition. The optimal wholesale access agreement between the MNO and the MVNO usually addresses these following issues:

Wholesale Access Offer

This the section shall cover mobile electronic communication services, which the MVNO is capable to provide to its end-users via the MNO's radio access network. Parties should designate a custom solution for service architecture.

- *Austria:* wholesale access for origination and termination of circuit-switched, SMS, packet-switched data (incl. MMS), wholesale access for the provision of VAS, location data for emergency call delivery services, location data and real-time CDRs for legal interception services
- *Czech Republic:* Wholesale access for LTE data services in two variants, voice, fax, and SMS services, VAS (including call forwarding, call barring and identifying the caller)

- Greece: Voice, SMS, and Data services, lawful Interception, emergency call handling, wholesale billing and invoicing, international roaming service management, VAs

Technical Specification

Need to be decided based on the technical capabilities of negotiating parties. The MNO should give access to all existing and new network technologies, spectrum, products and services at the same time as MNOs provide such technologies to their retail and business customers. Currently the network technologies shall include 2G, 3G and 4G, in future access to 5G network should be decided.

In the context of a long-term agreement, it is important to include provisions for the investments in MNO's network and new technology standards. It will ensure that the performance of the MNO's network is at least on the level of other MNOs in the market and an MVNO is able to meet its end-users' expectations on the quality of services provided.

- Austria: Services based on GSM, GPRS, UMTS, HSPA, HSDPA and LTE network

  The network elements need to be defined. Access to future evolutions in mobile technologies unless such access is not technically feasible. MNO may charge a set-up fee for the technical implementation work required in order to provide wholesale services in the amount of 200 000 EUR, payable in two equal instalments
- Czech republic: Network architecture is described for connection and provision of 2G, 3G, LTE data services.

  Available radio frequencies for MVNO disposal: the 800 MHz, 1800 MHz and / or 2600 MHz bands
- Botswana: services are available using the 2G and 3G mobile network technologies. Access to other and/or future evolutions in mobile technologies unless such access is not technically feasible.

  MNO may charge a set-up fee for the technical implementation work required in order to provide wholesale services in the amount of 200 000 BWP, payable in two equal instalments

Charges

This part of the reference offer usually describes charges, fees, tariffs for the access and associated services, which MVNO commits to pay to MNO. It intends to prevent the MNO from cutting its retail prices below or too close to the MVNO's effective wholesale rate. The most straightforward way to achieve this would be to agree a 'retail-minus' price per unit of traffic.

- Austria: MNO and MVNO should in good faith negotiate reasonable charges for the services. The reference offer also includes discount rates per volume tiers of traffic for all services. The MVNO can also elect the retail tariff based on retail minus pricing (for data access SIM only services, or retail price minus 25%)
- Czech republic: Prices are defined in reference offer and are covering: one-off fee for the implementation of the MVNO operation (for the LTE data services the one-off fee is set to 33 million Czech crowns – approximately 1,3 million of EUR), a monthly fee for access, monthly fee per sim, and monthly fee per MB
- Botswana: Charges for the services shall be subject to commercial negotiations and agreement. The agreed rates are subject to price indexation. MNO may charge a set-up fee for the technical implementation work required in order to provide wholesale services in the amount of 200 000 BWP (approximately 16-17 thousand of EUR), payable in two equal instalments
- Greece: Charges are defined following negotiations between the Parties and depending on the specific implementation that is needed to launch MVNO operation

Forecast

The parties should agree on a traffic forecasting mechanism which enables the MNO to plan and build the capacity in its network that aligns with the MNO's overall network demand forecasting timetable, and to meet the demand forecasted by the MVNO under the wholesale agreement. The MVNO should be permitted to change its forecasts, within certain agreed limits, up to a point in time in the forecasting cycle when the forecasts for a given period become binding.

Sometimes MNOs introduce measures in the wholesale agreement to promote accurate forecasting to protect the experience of all end users on the MNO network – such measures often include penalties for incorrect forecasting.

- Austria: the MVNO is obliged to provide 12-month forecast every month for each year and an annual 4-year forecast. The variance of capacity is 75-125%
- Greece: the MVNO is obliged to provide a 12-month forecast, each quarter for purpose of capacity planning defined in SLA
- Czech Republic: the MVNO is obliged to provide 36 months forecast. The capacity variance is set of 70-150%
- Botswana: the MVNO is obliged to provide 12-month forecast every month for each year and annual 4-year forecast. Non-binding quarterly update forecasts which shall be taken into account for interim capacity planning purposes. The variance of capacity is 75-125%

Non-discrimination obligation

Obliges MNOs to provide MVNOs with at least the same quality and range of services and coverage as MNOs provide to their consumer and business customers. Ideally, this obligation should also apply in circumstances where the MNO suspends the provision of the services for maintenance and emergencies or for fraudulent or other unauthorised use of the MNO's network by an MVNO customer. It is common practice to agree certain exceptions to the obligation, such as where there are differences in the specifications or standards of MVNO's core network and MNO's core network and such differences have a material impact on the services provided to the MVNO.

- Greece: MNO commits not to discriminate between its own customers and the customers of the MVNO in relation to service quality and coverage
- Austria: MNO shall supply the same quality of service and coverage to the MVNO as it does to its own customers. The reduction of the portfolio of services offered by MNO to its customers could also result in comparable limitations on the services offered by the MVNO to its customers, subject to MNO providing the MVNO a lead time of 1 month. MNO shall be permitted to monitor and conduct internal analyses of the MVNO customers for the purpose of network quality assurance. Such monitoring and internal analyses shall not be used for any other purpose than to assure network quality
- Czech Republic: MNO is obliged not to discriminate any of the individual candidates and contractors, with whom it signed the agreement

Access to and use of MVNO customer information, privacy and protection

The agreement affirms that the MVNO 'owns' the relationship with the customers to which it provides services. In addition to more general provisions relating to data protection and confidentiality, specific provisions could be included which provide that, in respect of MVNO customers, the MVNO handles and administers all contractual relationships, including initiating and entering contracts, administering requests, credit checking, billing and collecting payment, supplying handsets, providing customer care and terminating relationships. The MNO will not perform any services directly for MVNO customers unless provided for in the wholesale agreement.

- Austria: The MNO and the MVNO shall each comply with relevant data protection and privacy laws with respect to the processing of the MVNO customer data (including traffic and location data). MNO personnel has access to the forecast information and data relating to the MVNO's customers. MVNO ensures to limit the number of people that work with this data
- Greece: Any selling, assigning, transferring or otherwise disposing of its Customer Base by the MNO – other than to an affiliated company – shall be explored in the Agreement. The Parties must treat all information in relation to negotiations of the prospective Agreement as confidential and only disclose it to their directors, officers and advisors on a strict need to know basis or to the extent required by law

Numbering

The provision on the granting rights to the MVNO for the use of numbering resources upon MVNO's reasonable request. Numbering resources refer to the numbering resources in the local National Numbering Plan and the associated technical resources.

- Austria: The MVNO shall be solely responsible for meeting its numbering requirements under Austrian law and MNO shall be under no obligation to manage any part of its numbering requirements

MVNO should provide MNO IMSI range and MSISDN range to be used by the MVNO's SIMs on MNO network

- Greece: The guiding principles define that the numbering is based on MVNO's agreed needs, technical solution of with MVNO

  Botswana: the MVNO is responsible for the availability and request of number ranges from the MNO as well as the declaration of their number range to other operators. The MNVO shall provide its own shortcode numbers for any VAS. The MNVO shall also manage the quantity of numbers available to it and the time required for the allocation of new number ranges

Use of the MNO network

Based on the business strategy and operational model of the MVNO in agreement with the network provider. It specifies technical and commercial conditions regarding access to the network as well as responsibilities between parties for maintenance of the quality of the network.

- Austria. The Reference Offer does not cover, for instance, the following services:

  (b) the provision of a mobile number portability platform

  (c) transit or routing services

  The provision of any such services by MNO shall be subject to separate negotiation and agreement between MNO and the MVNO of the terms and conditions, and shall not form part of the MVNO Agreement.

- Greece: The responsible Parties must mutually agree on respective services each Party will provide under its responsibility. An indicative, non-exhaustive list of areas where the respective responsible Party must be mutually agreed include for example:
  - Voice interworking agreements, SMS interworking agreements, premium SMS agreements, MMS interworking agreements, roaming agreements (except where separate transit arrangements may need to be agreed between the Parties).

  Detailed responsibilities and schedules of procedures shall be agreed during the negotiations and included in the Agreement.

- The Czech Republic. Unless we agree otherwise with the other party, the MVNO undertakes to ensure that a contract concluded meets at least the following conditions:
  - will allow the Authorized National Roaming Customer access to voice services provided on any technology operated on the communications network to which access is provided so that the Authorized National Roaming Customer can provide voice, fax and SMS services, including call forwarding, call barring and identifying the caller, as well as allowing the Authorized National Roaming Interested to provide its own VAS through access to the necessary transmission capacity;
  - will allow the Authorized National Roaming Customers access to the transmission capacity provided on any technology operated on the communication network to which access is provided so that the Authorized National Roaming Applicant can provide access to the transmission capacity, including VAS, in the same the extent to which they are provided by MVNO

Invoicing & Payments

Specify time and conditions of billing, which are usually standard for the industry. It enables the independent third party to carry out all aspects of the billing, billing reconciliation and invoicing functions required.

- Greece: MNO shall invoice the MVNO no later than 15 days from the end of each month. The MVNO will settle the Invoice no later than 30 days from the Invoice Date and its electronic receipt. If MVNO fails to pay any charges by due date MNO may upon thirty days (30) notice to MVNO suspend the provision of the services. No further invoices relating to a particular month shall be raised more than 90 days from the end of the month.
- Austria: The MNO will issue invoices monthly, which shall be payable within 30 days.

Exclusivity and Brand segregation

The key elements of any wholesale agreement for an MNO as it locks in the projected or committed wholesale revenue. Exclusivity does not restrict MVNO's ability to structure, price, promote and distribute the mobile services

in any way, or build their own supplemental network using unlicensed or licensed spectrum. This is critical for MVNOs who either own or have access to a fixed network with a large installed base of small cells as it allows them to divert traffic away from the MNO's network and thereby mitigate the impact of high wholesale data rates.

Furthermore, if the MNO will not commit to providing certain mobile services (e.g. mobile services based on 5G standards), the MVNOs can insist on a carve-out from exclusivity for those services.

Finally, exclusivity should not prevent an MVNO from discussing a possible new wholesale arrangement or commencing a procurement process in advance of the end of the term of the wholesale agreement.

- Greece: The MNO will provide the Services to the MVNO without any obligation of exclusivity, therefore reserving the right to provide identical or similar wholesale access services to the MNO network to third parties without any restrictions. Both parties will have to be distinguished, not confused or in any way associated with the same brand
- Austria: All intellectual property rights which are owned by, or proprietary to, a party shall remain the exclusive property of that party.

Term and termination

This section is called to provide certainty for both parties around services supply for an extended period. As a regular practice, MVNOs should have the option to extend the term of the wholesale agreement at the end of the initial term. The section also includes provisions on customers migration in case the agreement expires or is terminated.

- Austria: The term of the agreements is 3 years with possible extension to 10 years. After 2022 the agreement can be signed only for two years. Termination period –2 months for defined reasons
- Greece: The initial agreement shall be 4 years from commercial launch and can be renewed for another 2 years. Termination period is 12 months or after the 6 anniversary
- Czech Republic: The term of the contract is for at least 2 years unless the applicant requests the shorter period

Laws & Jurisdiction

Each party to the MVNO agreement shall **comply with all relevant laws**, regulations and rules applicable to its obligations under the MVNO Agreements. The MVNO agreement shall also specify the supremacy of the laws of the country of operations.

This section claims sole and exclusive jurisdiction of the competent court in the country of operation over any disputes between the parties arising in connection with the execution of the MVNO Agreement

4. Overview of retail minus methodology

The retail minus method is one of the most accepted methodologies of regulating wholesale prices with the aim of increasing the competition and providing additional benefits to retail end-users. The retail price of a particular service, as determined by the Retail minus method, is based on the revenue that the regulated entity, the wholesale provider, receives for the provision of the type of service in question in the retail market.

The name Retail Minus is an abbreviated term "Retail minus avoided costs", which can be freely translated as "Retail costs minus cost savings". From the theoretical point of view, the Retail minus method determines the wholesale price of the retail revenue, which is reduced by the costs that the wholesale provider saves by not providing the service to the retail customer but to the wholesale customer - another telecommunications network operator. In practice, in addition to such adjusted retail revenues, the additional costs incurred specifically by the wholesale provider for providing the service on the wholesale market are added.

The use of the Retail minus method is based on its use in regulating wholesale prices on the electronic communications market in international practice and is often applied by regulators in the Member States of the European Union. It was identified as a method of regulating the wholesale prices of National Roaming services in consultation with the UK National Regulatory Authority OFCOM.

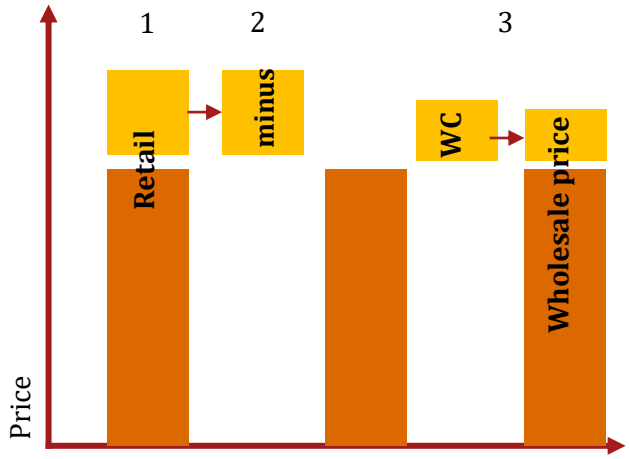
The main advantage of this method is that the National Roaming access seeker that has a National Roaming agreement with wholesale provider, can replicate the retail offer of the wholesale provides, that will allow to compete on the mobile market with existing mobile operators that already have their own network. Is also keep the NR access seeker motivated to invest in the infrastructure. It also prevents “margin squeeze” by ensuring that the margin between retail and wholesale services is large enough.

In Retail minus methodology can be applied for calculation of both national roaming wholesale services prices and wholesale access prices for MVNOs. For the better understanding of the methodology only terms of “National roaming provider” and “National roaming access seeker” are used to define access seekers and operators with significant market power.

In addition to ensuring a reasonable and non-discriminatory price to NR access seeker, the Retail minus method provides the predictability of the regulatory environment on the market.

Illustrative example of wholesale price calculation using Retail minus method:

Figure 14: Concept of calculation of wholesale price according Retail minus methodology



Retail – represents the revenue of National roaming provider from the provision of the service in retail market

Minus – represents costs of National roaming provider, which it saves as a result of not providing the service on retail market, but providing it to wholesale market

WC – wholesale costs – additional costs of National roaming provider that arise specifically by providing the service on wholesale market

Wholesale price (WSP) – The resulting wholesale price determined by the Retail minus method

To illustrate to concept, we can confirm according to the formula:

$$WSP = \frac{Retail - Minus + WC}{Q}$$

Where:

WSP - The wholesale price for each service category per unit of the service determined by the Retail minus method.
Retail – represents the revenue of National roaming provider from the provision of the service in retail market.
Minus - The amount of costs the regulated entity saves by not providing the services to retail customers but to the alternative operator.

WC – wholesale costs are additional costs of National roaming provider that arise specifically by providing the service on wholesale market.

Q – volume of units of given services provided by a regulated entity to end- user over a period.

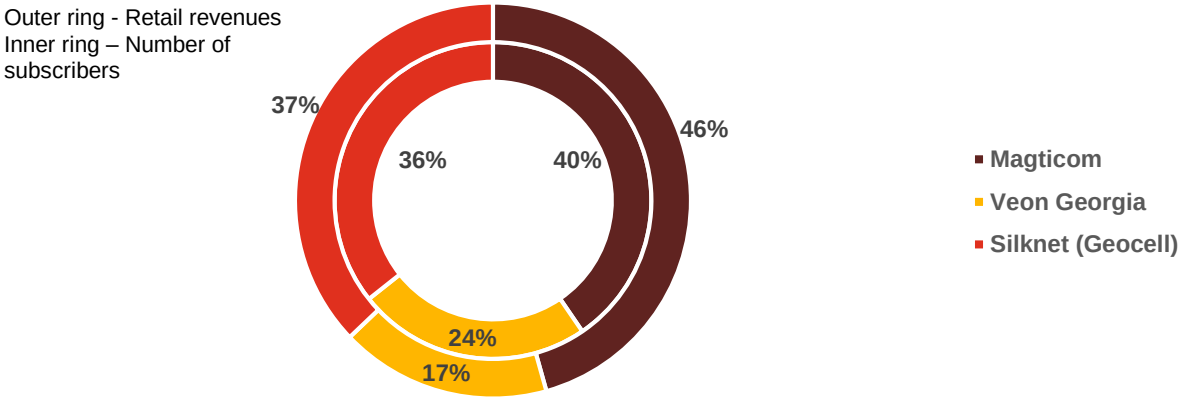
5. Georgian mobile market analysis

5.1 Georgian mobile market overview

The purpose of the review of Georgian mobile market analysis (review of market share, key players, retail prices) is to assess the impact of the NR and wholesale access obligations on possible retail prices in Georgia.

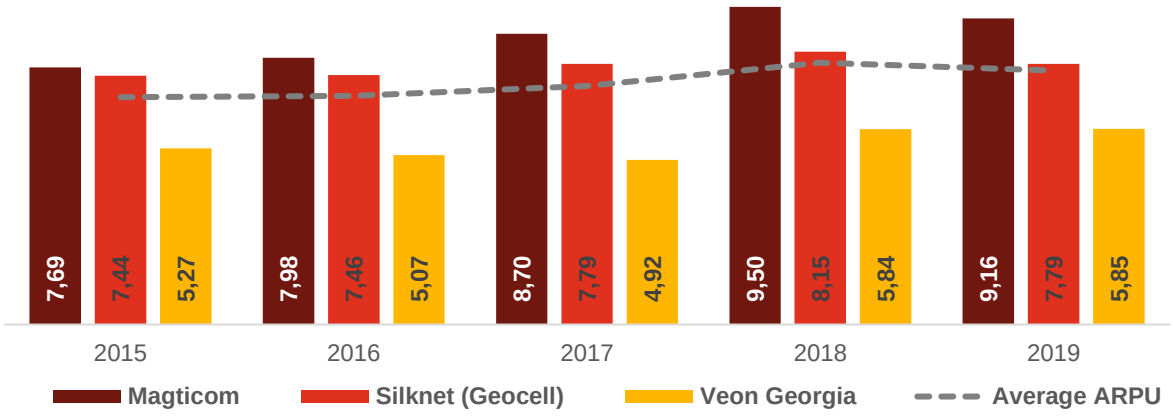
There are three market players operating on the market – Magticom, Silknet (Geocell) and Veon. The analysis of the three players shows that the market share is relatively stable. The penetration rate expressed as the proportion of number of subscribers to the population of Georgia reached approximately 131% in the first half of 2019.

Figure 17: Market shares by retail revenues and number of subscribers (2019) source: GNCC Analytical Portal



The highest market share is held by Magticom which has 46% share based on the revenues and 40% share based on the number of subscribers. The higher share of market share by revenues compared to the market share by number of subscribers points to the average revenue per user (also referred to as "ARPU") higher than the ARPU of the whole market. Second largest mobile operator is Silknet (Geocell) which has 37% share of the revenues of the market and 36% share of the number of subscribers, pointing to the ARPU similar to the market average. Lowest share of the market is held by Veon, which represents 17% of the revenues of the market and 24% of the number of subscribers. The lower share of revenues compared to the share of number of subscribers points to ARPU lower than the market average.

Figure 18: Development of ARPU (2015 – 2019), source: GNCC Analytical Portal

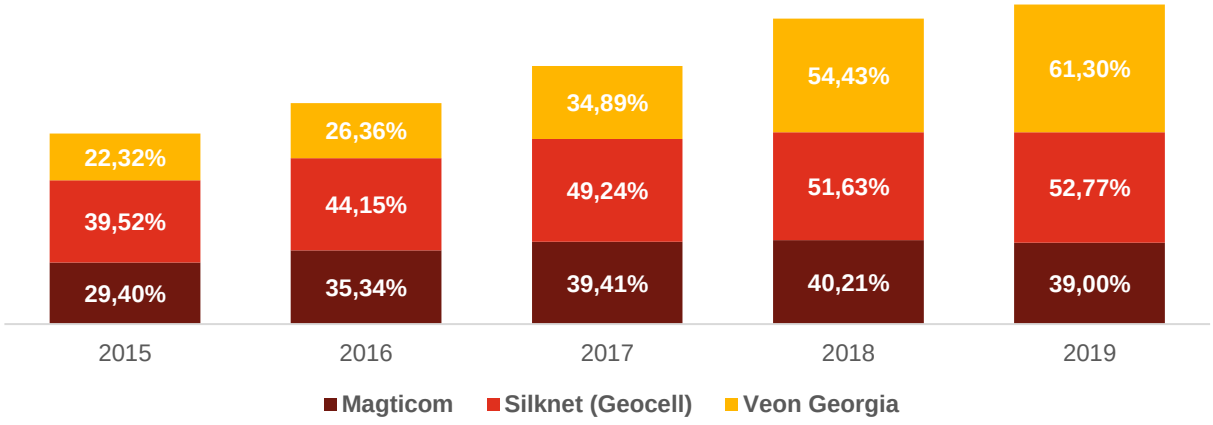


Magticom has the highest ARPU with 9,16 GEL per subscriber per month in 2019 and is followed by Silknet with 7,79 GEL per subscriber per month and Veon with 5,85 GEL per subscriber per month. In the period of years from 2015 to 2019 all operators have increased the ARPU.

The monthly ARPU has grown on average by 2,25% annually between the years 2015 and 2019. In 2015 the monthly ARPU was 6,80 GEL and has increased to 7,60 GEL in 2019. The monthly ARPU of Magticom has recorded growth rate above the market average as it grew on average by 3,56% annually. The growth rate of the monthly ARPU of Veon amounted to the annual average of 2,12%, performing similarly to the market average. Silknet recorded the lowest average growth rate with 0,92% annually.

The growth of ARPU points to the trend of increased use of mobile internet, which generates higher revenues for the operators. The impact of the increased use of mobile internet is illustrated by relationship between the growth of number of subscribers and the growth of the revenues. The total number of subscribers has grown by 0,18% annually on average while the average monthly revenues have grown by 2,60% annually. The number of subscribers with mobile internet subscription has grown by 9,72% annually on average.

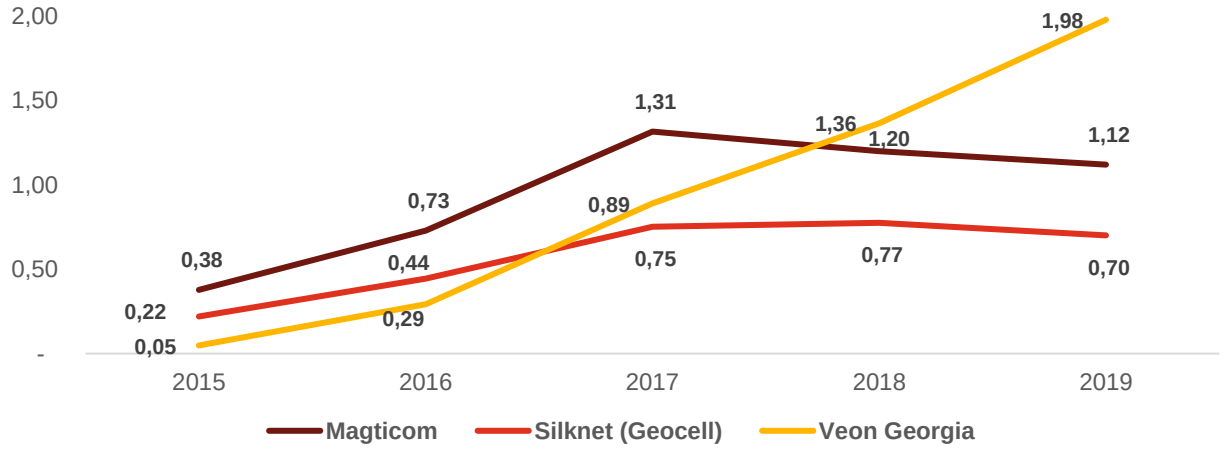
Figure 19: Subscribers with mobile internet as % of the total subscriber base of the operators (2015 – 2019) source: PwC Analysis, GNCC Analytical Portal



The number of subscribers using mobile internet can be observed among all three market players, with the highest proportion of mobile internet users to the total number of subscribers in Veon. Veon has managed to significantly increase its subscriber base with mobile internet subscription from 22,32% in 2015 (the lowest among the three operators) to 61,30% in 2019.

In addition to the growth of subscribers using mobile internet the total volume of mobile internet traffic has increased almost 5 times as it increased from the average of 0,24 GB per subscriber per month in 2015 to 1,17 GB per subscriber per month in 2019.

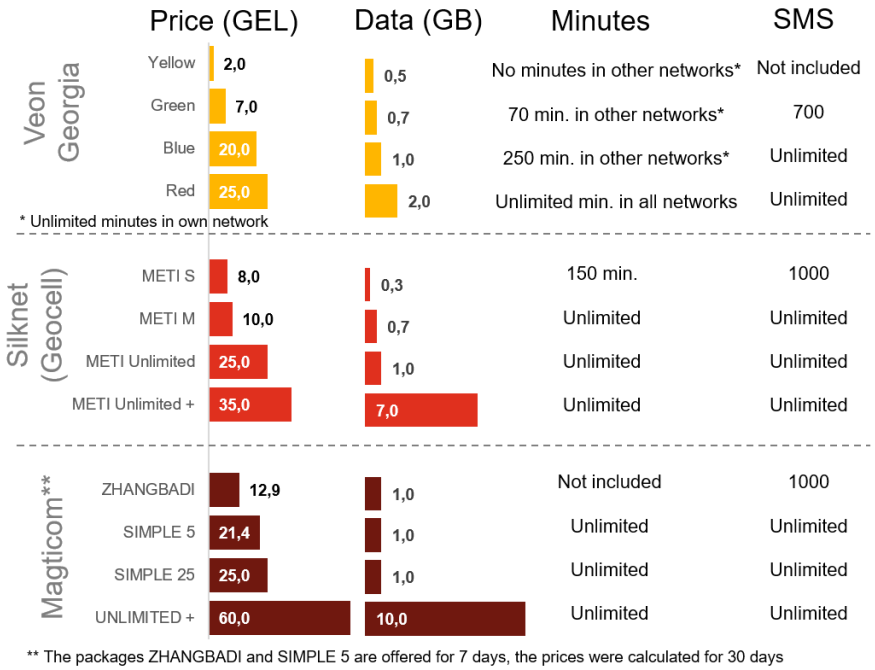
Figure 20: Mobile internet traffic per subscriber per month in GB (2015 – 2019), source: PwC Analysis, company websites available 10.9.2019



In 2019 Veon had above average monthly mobile internet traffic per user. The percentage of subscribers of Veon using mobile internet has increased significantly as well as has increased the traffic per subscriber, which has grown from 0,05 GB per month in 2015 to 1,98 GB per month in 2019. The monthly mobile internet traffic per subscriber of Magticom and Silknet is 1,12 GB and 0,70 GB respectively.

In general, the mobile internet traffic per subscriber reflects the set-up of the service packages offered by the operators.

Figure 21: Service packages offered by the operators (2019) source: PwC Analysis, company websites available 10.9.2019

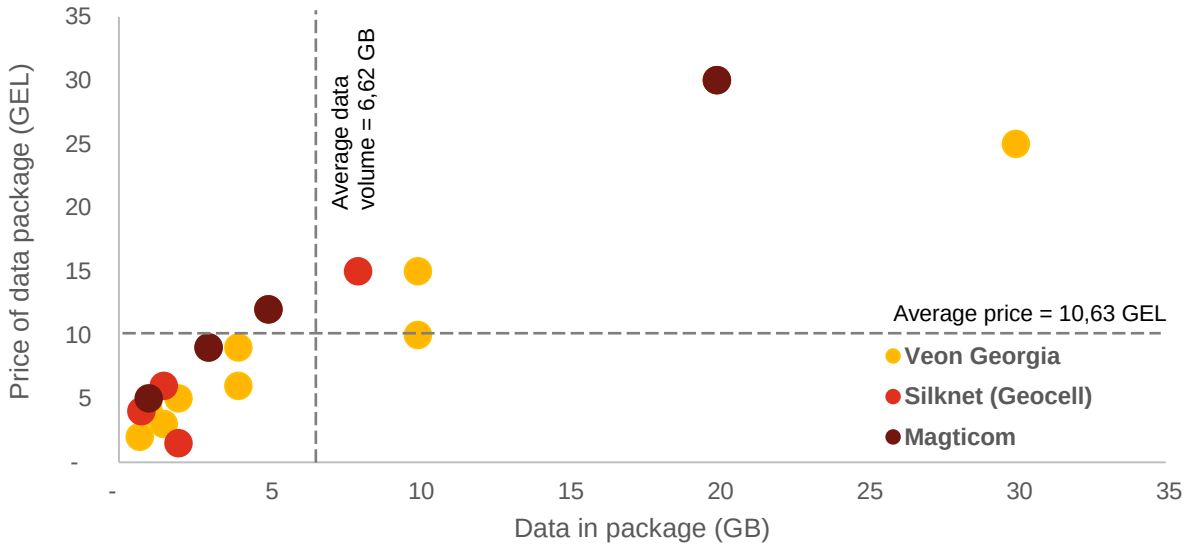


All operators offer service packages with mobile internet access however no operators offer unlimited mobile internet as a part of service packages. Unlimited mobile internet and higher volume data packages are available only as add on services.

The packages priced at 25 GEL all offer unlimited minutes and SMS. Differences between the packages priced 25 GEL are in the volume of data as Veon offer for the price 2 GB per month and Magticom and Silknet both offer 1 GB per month. Unlimited SMS and minutes are available in package starting at 10 GEL offered by Silknet. Veon and Magticom provide unlimited SMS in packages from 20 GEL and 21,4 GEL respectively. The offer of Veon includes unlimited minutes only in the most expensive package with the price 25 GEL.

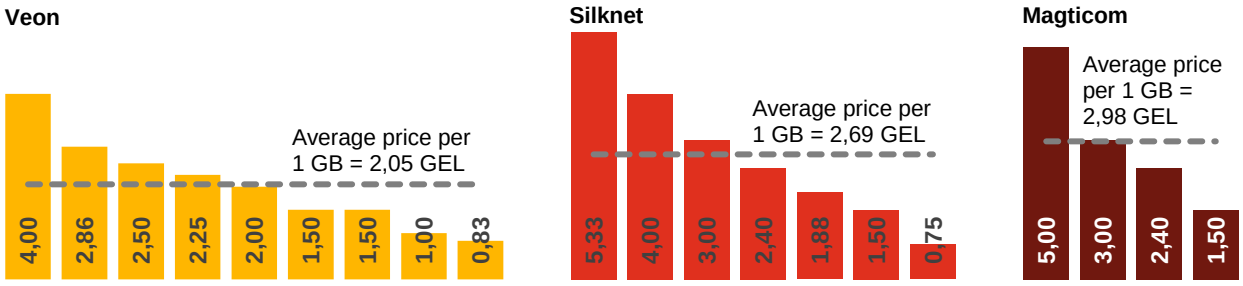
Data heavy packages are offered only as the most expensive option and are lacking in the offer of Veon. Additional data can be purchased by the customers as additional package.

Figure 22: Relationship between the volume of data in package (GB) and the price of the package (GEL, 2019) source: PwC Analysis, company websites available 10.9.2019



The offer of data packages over 10 GB is relatively limited. Unlimited data packages are either expensive or are available only for a limited time. The average volume of data in the add-on package is 6,62 GB with the average price at 10,63 GEL. Average price per 1 GB offered by the operators is higher due to the relatively low price of large volume packages. The unlimited data package offered by Veon is available only for 3 hours. Silknet offers unlimited data only for 1 day.

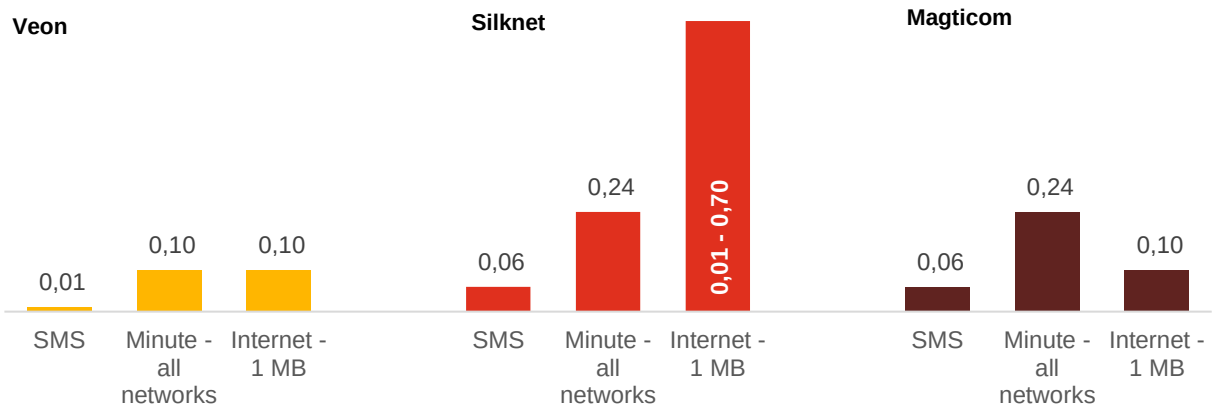
Figure 23: Price per 1 GB of data in data only packages (2019) source: PwC Analysis, company websites available 10.9.2019



The lowest average price per 1 GB of add-on package is offered by Veon with the price 2,05 GEL, followed by Silknet with 2,69 GEL and Magticom with 2,98 GEL. Excluding the unlimited data packages, the largest data package in Veon offer is 30 GB, while Silknet and Magticom offer 20 GB package as the largest option.

The ratio between the price of package and the volume of offered data falls significantly with the large volume packages. In the large volume data packages, the price per 1 GB is thus lowest, reaching 0,83 GEL per GB in the offer of Veon, 0,75 GEL per GB offered by Silknet and 1,50 GEL per GB offered by Magticom.

Figure 24: Default tariffs for the SMS, voice and data offered by the operators (2019) source: PwC Analysis, company websites available 10.9.2019



In general, the lowest default tariffs are provided by Veon in for SMS and minutes. Both Silknet and Magticom offer the same tariffs for SMS and minutes, however both the highest and lowest potential tariff for 1 MB of data offered by Silknet is (0,01 - 0,70 GEL). The price of 1 GB of data, based on the default tariff, is significantly higher than the price of add-on data packages. When using the data outside of the standard service package the customer could end up paying 10 – 700 GEL per 1 GB when using the Silknet packages as the default price per 1 MB is 0,01 – 0,70 GEL depending on the service package used. Both Magticom and Veon provide the 0,10 GEL per 1 MB default tariff, leading to price 100 GEL per 1 GB.

The service packages offered by Veon do not commonly include minutes in other operators' network, thus the actual price paid by the customer could be higher, depending on the number of minutes. The offer of Magticom and Silknet includes unlimited minutes and SMS in all but the least expensive packages, thus the impact of default tariffs on the actual prices paid by the subscribers using is limited.

5.2 Potential MVNOs in Georgia

Currently there are no MVNOs operating on the market in Georgia. The cases from the EU show that companies establish MVNOs when there are opportunities to reach economies of scale due to utilization of existing branch network, cross selling of products when the companies have subscriber base or when there are loyal customers. Existing branch network can be utilized in the case of financial institutions such as insurance companies or banks, postal network operator or retail chains. Cross selling can be interesting for fixed broadband providers, or even for utility companies (potential to combine the bills for utilities with bills for mobile). Companies identified as potential MVNOs in Georgia are the following:

- Insurance Company GPI Holding – The company was founded as the first private pension fund of Georgia. The company was founded by TBC Bank and TBIH Group. It is a leader on both retail and corporate markets and has agency network throughout Georgia.
- Telasi is one of the largest grid companies in Georgia, distributing electricity. It operates in Tbilisi and serves customers in 10 business centres located in all districts of the city.
- NIKORA is one of the most successful food producers on Georgian market. At present, the holding has its own retail and distribution chain, a regional production plant in Poti, a representative office for the distribution network in Imereti. Nikora owns more than 280 retail branches.
- United Water Supply Company of Georgia provides water supply and sanitation services to urban-type settlements throughout the country, except for Tbilisi, Mtskheta, Rustavi, Gardabani Municipality, and Adjara Autonomous Republic. The company operates 50 service centres.
- Georgian Communication, GeCom is ICT solutions provider and integrator in Tbilisi. It provides end-to-end solutions in telecom and enterprise networks, devices, and cloud computing, Telecommunications, Data, Mobile Networks, Fiber Infrastructure.
- JSC “VTB Bank (Georgia)” – VTB Group is a global provide of financial services, comprised of over 20 credit institutions and financial companies operatirng acress all key areas of the financial market. The main shareholder of VTB is the Russian government and since 2002 VTB Bank took over 15 banks in Russia, CIS, Europe, Asia.
- TBC Bank is the largest banking group in Georgia with dominant position in all key banking segments. The company is committed to invest in technology and upgrading operations to provide the best digital channel solutions and customer experience.
- Bank of Georgia is a leading retail banking player in Georgia, serving more than 2.4 million customers. The bank offers a broad range of retail banking, corporate banking and investment management services. Both with TBC Bank are listed on the London Stock Exchange.
- Liberty Bank is the third largest bank institution in the country with approximately 1,5 million customer accounts.
- Euroins is one of the largest insurance companies in Eastern Europe market. The company successfully operates on Georgian insurance market and offers almost all types of insurance products.

- Imedi L is a health insurer and is part of the largest healthcare group in Georgia offering exclusively health insurance products only.

- CGC (Central Georgian Communications Cooperation Limited) is provider of Internet and fixed telecommunication services in Georgia. The CGC is currently providing the internet services to around 13 thousand subscribers (Sept 2019, source: GNCC Analytical portal).

- Akhali Kselebi Ltd (New Net Group) is the third largest telecommunication company of Georgia and Caucasus, providing fixed telephony, Internet, IP-TV and IP-telephony services. The company has business relations with various leading communications companies worldwide and was founded in 1996.