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Report on typologies of communities/geographic areas and options for broadband and NGN investment interventions

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List of Acronyms

ANCOM	National Authority for Administration and Regulation in Communications
BMVIT	Bundesministerium für Verkehr, Innovation und Technologie; Federal Ministry for Transport, Innovation and Technology
EAFRD	European Agricultural Fund for Rural Development
EFF	European Fisheries Fund
ERDF	European Regional Development Fund
FLAG	Fisheries Local Action Groups
IDA	Intercommunity Development Association
LAG	Local Action Group
LEADER	Liaison Entre Actions de Développement de l'Économie Rurale or Links between the rural economy and development actions
MARD	Ministry of Agriculture and Rural Development
MF	Ministry of Finance
MIS	Ministry of Information Society
NIS	National Institute for Statistics
NGA	National Plan on Next Generation Access
NGN	Network Infrastructure
NRDP	National Rural Development Programme.
NSDAR	The National Strategy on Digital Agenda for Romania
TO2	EU's Thematic Objective 2
PTS	Swedish Post and Telecom Authority

Executive Summary

This report relates the second part of the first component of the assignment, which aims to provide support to MIS for the operationalization of the National Plan on Next Generation Access and Network Infrastructure (NGA&NGN) through the provision of recommendations for improving the legal and regulatory framework and through analysis of the socio-economic and communication market conditions for selecting areas for broadband and NGN investment interventions. To this end, this report proposes a typology of the communities that need improved broadband services and the various economic models that the client may want to apply when appraising the efficiency, the sustainability, and the financing schemes of broadband projects combined with operational models in these areas.

This paper presents a demand mapping with the following two objectives: (i) identification of a typology of 'white' and 'grey' areas from Romania; (ii) identification of suitable models of publicly-funded intervention for the prevalent types of 'white' and 'grey' areas from Romania. The study uses an indirect approach based on socio-economic and demographic characteristics of the territory. The high-level conclusion of this analysis is that in spite of the achieved progress in broadband coverage and penetration rate, additional development of broadband networks and, especially, of NGNs continues to require public intervention and funding.

Until now, the absence of broadband infrastructure/service was sufficient to document market failure. This study assesses market failure in a more complex way, by considering market potential, demand for broadband services (actual and potential), as well as economic potential in the various NGN white, grey and black broadband areas. Therefore, the demand mapping presented in this paper relates closely to questions of investment mapping, in particular, with respect to state aid and determining the areas indeed uncovered and undersupplied, as well as their specific development needs. Identifying the areas indeed uncovered is important in order to inform the possible spatial allocation of state aid, which represents a potential means to provide incentive to broadband deployment in undersupplied areas. Nevertheless, state aid is an instrument that is intended to be used only as a complementary measure to private investment, hence for areas indeed uncovered, and that state aid does not lead to significant market distortions.

The coverage-related targets of the Digital Agenda for Romania 2020 have already been achieved in 2015. Yet, investments are still necessary for closing the significant urban-rural gap, particularly in relation to high speed Internet (30+ Mbps) and keeping in mind that rural areas concentrate most disadvantaged population. In addition, these data send a clear signal that much more attention and efforts should be channeled on stimulating demand for and usage of the Internet, especially through developing the supply of services such as e-commerce, e-health, e-learning and foremost e-government. Only increasing the supply of services, the usage may increase sufficiently to reach the other Digital Agenda targets.

The key level of the analysis is at the village/ neighborhood (SIRUTA) level, which represents the same degree of granularity at which the 'white' and 'grey' areas are measured by the MIS. By definition, in this study, 'NGN-white' areas refer to villages (SIRUTA units), from rural and urban environment of Romania, that have neither local loop networks nor backhaul connections for broadband communications with 30 Mbps or over speed download, and that are not involved in ongoing publicly-funded broadband projects (either by MARD or by MIS). NGN-white villages are spread in all counties and all regions. In spite the fact that the coverage-related targets have been achieved, in Romania still are registered a large number of NGN-white villages (6,235), of which a significant part are

white spots (no networks, no operators). Nonetheless, because these are to a large extent villages small, declining, peripheral and remote, the overall population in NGN-white areas is almost 14% of general population, whereas in the white villages live about 2% of total country population that represent about 4% of rural population. The Digital Agenda target of 100% coverage of population with fixed broadband was achieved for urban population. A large part of the NGN-white units (including the white villages) come from only seven Alba and Cluj (Centre), Hunedoara (West), Vaslui, Bacau and Iasi (North-East), and Buzau (South-East).

Nonetheless, after dividing the NGN-white, grey and black areas in subcategories more homogeneous and easier to understand, the analysis unravels the villages (SIRUTA units) indeed uncovered based on a series of filters, including: degree of market potential, quality of existing broadband infrastructure, levels of demand potential. By investigating in a comparative manner all types of NGN broadband areas, the development needs of each type are identified. Then, for informing the prioritization of investments, development needs are examined against the community economic potential. In the final step, priorities of intervention are divided according to funding opportunities (European Funds) so that to determine the candidates for state support through the MIS national programs. During the process, the number of NGN-white areas (including the white village) has shrunk from over six thousands to 552 for investments in broadband infrastructure and 1,575 areas from communes and small towns that require demand stimulation measures.

While in black areas, the market is expected to make unassisted deliveries, the public support is still required in many grey and white areas. Besides financing the deployment of broadband infrastructure, the measures to foster demand for broadband services are critical for many areas in Romania. In this way the public intervention can encourage private operators to start or to continue to invest in areas where they would not invest under normal business standards, due to the low profit resulting from the invested capital. To this end, however, business incentives to develop (expand) the existing networks in the white and NGN-white communes would add significant value. More generally, measures to stimulate private investments in broadband infrastructure and services are necessary for creating the premises for a boost in demand and use of Internet as well as for closing the considerable urban-rural digital divide.

Therefore, investments in infrastructure need to be with integrated with soft interventions aiming digital literacy and meaningful use of the Internet. In this sense, a national program offering financial support and assistance (centre of resources) to local stakeholders (public authorities, public or private organizations, community organization), and ensuring national monitoring and evaluation, could be an effective policy response to the severe need for demand stimulation. The program may also work with the municipalities that are member of a local partnership (LAG/FLAG) so that to assist those local communities committed to enhance access to and use of ICT technologies.

In the light of the NGN National Plan, the option to change the design of state intervention from village (SIRUTA unit) to administrative unit (municipality) is recommended to be considered. A large part of the villages candidate for state support through MIS programs are grouped in a small number of white or NGN-white communes, which indicates that intervention at administrative unit (commune) level could be more efficient than the intervention village by village. Even more so if the investment model is changed so that to ensure that in each commune at least a village has access to high speed broadband accompanied by extensive demand-supply measures at local level. Preferably, the village 'nucleus' for broadband development is determined based on geographic parameters that would reduce at minimum the costs of extension to the other villages within the commune. In addition, operating companies within the commune or in neighboring localities

can be identified and directly contacted regarding an evaluation of possibilities for broadband deployment/extension in the respective area.

The findings of this study need to be considered in designing the new state aid programmes for 2014-2020. It is estimated that at present, the accomplishment of the backhaul and backbone NGN infrastructure at a quality that meets the objectives from the Digital Agenda 2020 for NGN penetration exceeds the amount of 2 billion Euro, while 750 million Euro is required for modernizing the existing networks in the urban areas, and 1.25 billion Euro represents the funding needs for the accomplishment of the NGN coverage in rural areas. Romania has already planned a set of specific measures/actions for the development of basic broadband infrastructure as part of the National Broadband Strategy 2009-2015: development of broadband backhaul in eligible areas/"white areas" (Ro-NET project), other incentives for broadband development (stimulation of demand). However, all these measures, as well as the specific NGN actions, could benefit of the data and analysis produced by this study for designing more sustainable and effective investment programs.

Introduction

This report is the second deliverable of the first component of the World Bank Technical Assistance to support the Ministry of Information Society (MIS) for the operationalization of the NGA&NGN strategy.

Analyzing the legal, regulatory, institutional and competitive framework for Electronic Communications, NGN Development Plan in Romania commands the characterization of an Analytical Mapping Framework which, once confronted to the local market structure and national project initiatives, can be turned into a powerful Geographical Mapping Exercise capable of setting genuine intervention models to help the Government to meet the goals Digital Agenda for Romania 2020.

The general methodology adopts in this first component is to used the Analytical Mapping Framework to propose first a Coverage Gap Analysis addressed in the first report and secondly to translate it into a Geographical Mapping Exercise which has the general purpose to address coverage gaps in clustering the territory, identify selected communities and associate the most appropriate business and investment models to guide and to frame public intervention.

Pursuant to recommendation 3 on implementation of a mapping tool issued in the report 1 this second rapport carries out a Geographical Mapping Exercise and proposes a set of project clusters and communities associated with relevant associated intervention models.

In addition, this mapping exercise is necessary for providing the information needed to decide on the four strategic choices identified in the European Commission Guide to High-Speed Broadband Investment namely the Choice of the infrastructure type, of the investment model, of the business model and eventually of the financing tools.

This mapping exercise describes the policy context as well as the current situation and the investment need in broadband. Thus, in order to identify where and how to intervene, the mapping should answer questions such as: (i) What are the needs for services based on high speed broadband among the socio-economic actors?; (ii) What are the problems to overcome for the rapid deployment and for facilitating usage of high speed broadband?; (iii) Which benefits will broadband create for various groups of residents and for society at large in terms of economic growth, business development, employment, tourism, education etc.?; (iv) How strong is competition for broadband services in the selected areas?; (v) What role can local communities play in aggregating demand and contributing to investment? Also, the mapping should identify the main stakeholders from the targeted communities as well as the possibilities to aggregate or 'federate' the targeted small communities into networks with integrated broadband infrastructure.

This paper presents such a mapping for Romania, carried out in August-September 2015.

1. The Mapping exercise

A. Why a Mapping Exercise?

The 2020 targets of the Digital Agenda for Europe[1] are 100% coverage of 30Mbps Internet and 50% penetration of 100Mbps service in the European Union member states. The bulk of the investment needed to meet these targets is expected to be undertaken by private operators, but public funding is vital for areas affected by market failure. So, it has become critical that public authorities define their role at each step of the way to full high speed broadband coverage, as an integral part of their policy responsibility towards their citizens and the territory they administer, especially in relation to the 'white'[2] areas[3].

The role of public authority and public funding in investments in new broadband infrastructure in 'white' areas is very important specifically because of: (a) high risk investment; (b) long payback periods; (c) insufficient size of promoters; (d) open wholesale access (which may be imposed by ex-ante regulation); and (e) lack of evidence substantiating the viability of the business model.

For planning the intervention, public authority needs to define a broadband plan that should clarify the strategic choices on four different levels: infrastructure type, investment model, business model and financing tools. The four strategic choices represent the backbone of the investment option most appropriate for the intervention to have best effect.

Box 1. Four Strategic Choices of a Broadband Plan

(1) Choice of the infrastructure type
Do the public administration aim at deploying a new future-proof broadband infrastructure or would it be sufficient to upgrade the existing infrastructure, considering the pros and cons of the two choices?

(2) Choice of the investment model
What role does the public authority want to play with respect to the implementation, operation, ownership and management of the infrastructure?

(3) Choice of the business model
Should the public authority opt for a vertically integrated or an open-access network model? Which one is the most likely to maximize the financial sustainability of the project, broadband coverage and penetration (also beyond an individual project), promote competition and, most importantly, the socio-economic development of the affected community?

(4) Choice of the financing tools
How can the public authority ensure an adequate financial coverage for building and operating the new infrastructure and what can it contribute in terms of capital, expenditure and assets?

Source: European Commission (Forzati et al), Guide to High-Speed Broadband Investment, Release 1.1 - 22 October 2014: 11.

[1] http://ec.europa.eu/digital-agenda/

[2] 'White' area is defined as an area in which no NGN broadband network is currently present or planned to be operational within the coming three years. European Commission, *Guide to High-Speed Broadband Investment*, Release 1.1 - 22 October 2014: 9.

[3] Guido Acchioni, Broadband Unit, DG Connect, in the introduction of the European Commission (Forzati et al), *Guide to High-Speed Broadband Investment*, Release 1.1 - 22 October 2014.

B. What Type of Mapping?

For an effective broadband plan, reliable and valid data on existing broadband infrastructure and services already offered is fundamental. The broadband mapping is necessary to identify gaps in the broadband coverage and penetration, to identify suitable areas of investment, and to cut investment costs. Additionally, it helps to avoid duplication of financing as subsidies can be allocated to areas affected by market failure.

Four types of public national broadband mapping are currently carried out in the 28 member states of the European Union, as shown by a recent study (SMART 2012/0022) realized in 2013 by TÜV Rheinland and WIK-Consult for the European Commission[4]. Within this study, Romania reported no existing public national initiative, but an infrastructure mapping in the planning phase.

Box 2. Four Types of Broadband Mapping in the European Union

(1) Infrastructure mapping
The detailed, geo-referenced and structured gathering, processing and visualization of data of relevant infrastructure (e.g. ducts/fiber/nodes suitable for the provision of electronic communications services but also other relevant infrastructure serving energy or water supply). The aim of infrastructure mapping is to reduce costs of broadband deployment and to coordinate broadband deployment measures.

(2) Broadband service mapping
Systems for gathering, analyzing and presenting information on the supply side of broadband service provision including the available bandwidths (speed), technologies, operators/service providers and quality of service in a specific area. The aim of service mapping is to create an insight into the current state of broadband availability.

(3) Demand mapping
A structured process of gathering information on dimensions characterizing the demand for broadband services, including broadband speeds required by citizens, expectations regarding service quality and willingness to pay by different user groups. The aim of demand mapping is to create insight into the actual demand for broadband services, which is likely to be useful in the funding and deploying of broadband networks.

(4) Investment and funding mapping
The structured gathering, consolidation, processing and visualization of information related to financing sources and instruments for broadband project funding.

Source: European Commission (Arnold et al), *Study on Broadband and Infrastructure Mapping*, 2014: 12-13; 21-22.

Ideally, only a broadband mapping comprising all four dimensions - infrastructure, services, demand and investment - would offer a complete picture to all stakeholders for any purpose. In practice, however, the abovementioned review of existing broadband mapping initiatives showed that the four types of mapping rarely all exist side by side in any one country. The most common type of mapping initiative is service mapping (operational in 20 EU Member States). Although one of the key elements of any business case for infrastructure deployment is consumer and business demand, the demand and investment mapping play only a minor role in the plans of Member States.

[4] European Commission (Arnold et al), 2014, *Study on Broadband and Infrastructure Mapping*, http://ec.europa.eu/digital-agenda/en/news/mapping-broadband-and-infrastructure-study-smart-20120022.

Within this RAS, the Romanian MIS provided the list of 'white' and 'grey' areas, at the national level, and asked support from the World Bank with identification on where and how to intervene in the 2015-2020 period. Given the four types of broadband mapping, we consider that a demand mapping in correlation with public funding opportunities is the most appropriate for determining a typology of undersupplied areas and the suitable models of intervention in Romania. Thus, this paper presents such a demand mapping at the national level based on socio-economic and demographic characteristics, which provides a first picture of the potential demand for services in the 'white' and 'grey' areas.

2. Mapping Methodology

A. Objectives and Approach

The demand mapping presented in this paper has two objectives:

(1) Identification of a typology of 'white' and 'grey' areas from Romania based on socio-economic and demographic indicators used as a proxy for the potential demand for broadband services;

(2) Identification of suitable models of publicly-funded intervention for the prevalent types of 'white' and 'grey' areas from Romania.

Box 3. Demand Mapping

The current Broadband State Aid Guidelines do not require demand mapping in particular to be undertaken in order to demonstrate market failure in a given area. However, the Guidelines also do not exclude any kind of method of identifying market failure, which would need to be done in addition to the existing method of submission of market operators' plans for the next three years. In this context, once demand mapping produces actual results, there could be scope for mapping of demand according to definition (1) to be combined with the state aid guidelines, which would represent one element of justifying state aid measures. In particular, demand mapping could provide a clearer view of: a) the types of areas (white, grey or black) under examination for state aid (level of demand, range of price to be paid by willing consumers and required technical characteristics); b) the identification of market failure; and c) the identification of changes required (e.g. whether indeed there is demand in white areas or whether there is unsatisfied demand in grey/black areas).

Source: European Commission (Arnold et al), *Study on Broadband and Infrastructure Mapping*, 2014: 23.

According to the EU study on the mapping of broadband,[5] demand mapping has to be divided into two mapping approaches: (1) the mapping of demand in terms of need for broadband services based on undersupply or future needs and (2) the mapping of quality of service such as delivered bandwidth.

The study presented in this paper focuses on the 'white' and 'grey' areas from Romania, hence is based on the first approach, with the aim to create insight into the actual demand for broadband services in the undersupplied communities. Thus, our study will inform the planning process for

[5] European Commission (Arnold et al), *Study on Broadband and Infrastructure Mapping*, 2014.

broadband deployment so that to facilitate state aid distribution and to avoid misdirected investment.

The EU Guide[6] points out that mapping of demand (need for services) can best be obtained through the direct involvement of the local population and businesses. In fact only three European countries (Austria, Finland and Sweden) focus on demand in terms of need for broadband in unserved or underserved areas and they use different methods for mapping.[7] Austria conducts country-wide demand mapping based on qualitative data and statements received from inhabitants (inquiries/complaints submitted in a web-based form made available on the website of BMVIT).[8] Finland has done several consumer surveys to collect information about user experience, demand and the main problems. In Sweden, the Swedish Post and Telecom Authority (PTS) collects demand data for broadband in areas where there is no availability of broadband of a minimum 1 Mbit/s. The user can submit a demand on the PTS website.

An alternative is to obtain a picture of the potential demand based on socio-economic and demographic characteristics of the territory (ageing structure, education, employment, ICT usage, poverty etc.). This indirect approach, based on proxy variables for the potential demand for broadband services, has been applied in the study on Romania presented in this paper.

B. Literature and Data Sources

With respect to the selection of the mapping type and the intervention models, this report draws heavily on two recent studies of the European Commission, namely:

- *Study on Broadband and Infrastructure Mapping* (2014) and
- *Guide to High-Speed Broadband Investment*, Release 1.1 (2014).

In order to decide the most relevant socio-economic and demographic indicators used as a proxy for the potential demand for broadband services, which are needed to develop the typology of 'white' and 'grey' areas from Romania, we will draw on the following World Bank studies carried out in 2014-2015 under various RAS projects:

- *Competitive cities. Reshaping economic geography of Romania (2014)*
- *Atlas of Urban Marginalized Areas in Romania (2014)*
- *Inputs for the Preparation of a Draft National Strategy and Action Plan on Social Inclusion and Poverty Reduction 2015-2020 (2015) and*
- *Atlas of Rural Marginalized Areas in Romania* (2015).

Major sources of data include:

- *National Institute for Statistics (NIS): Census of Population and Dwellings (2011)*
- *Ministry of Finance (MF): Local Budgets Execution Data 2012*
- *Ministry of Agriculture and Rural Development (MARD): List of Authorized Local Action Groups (LEADER Romania) and List of Authorized Fisheries Local Action Groups*

[6] European Commission (Forzati et al), *Guide to High-Speed Broadband Investment*, Release 1.1 - 22 October 2014.

[7] European Commission (Arnold et al), *Study on Broadband and Infrastructure Mapping*, 2014: 84-85.

[8] Bundesministerium für Verkehr, Innovation und Technologie; Federal Ministry for Transport, Innovation and Technology.

- *Ministry of Information Society (MIS): List of 'white and 'grey' spots from Romania (ANCOM.v1 and ANCOM*.v2).

C. Method

As most other mapping studies, the one presented in the next sections is not only linked to geo-referential visualization, but comprises also the entire process of data collection and processing. Identification of data sources and data preparation for analysis was done by a team of individual consultants coordinated by Manuela Sofia Stănculescu, during August 2015.

This demand mapping is based on a secondary analysis of data collected by various institutions, including NIS, MF, MARD and MIS. The selected socio-economic and demographic indicators are collected at various levels, namely:

- population (individuals and households),
- villages/neighborhoods (SIRUTA units), and
- administrative units, which in Romania are clusters of villages/neighborhoods (communes, in rural areas, and cities, in urban areas – SIRSUP units).

The individual data (regarding individuals and households) were aggregated at the village/ neighborhood (SIRUTA) level. In the same time, data about territorial-administrative units were assigned to all incorporated villages. The analysis was done at the village/neighborhood (SIRUTA) level that represents the same degree of granularity at which the 'white' and 'grey' areas are measured by the MIS.

Data refer to all villages/neighborhoods (SIRUTA units) in the country. Data are not weighted.

3. Main Findings of the Mapping

This report aims to aggregate and to analyze demand, as well as potentially make a business case for broadband infrastructure deployment in areas where there are white or grey spots in Romania. Usually, the absence of broadband infrastructure/service is sufficient to document market failure. Nevertheless, by considering demand for broadband service in the identified white or grey areas (by the MIS), this study improves the assessment of market failure in Romania. Furthermore, it proposes a typology of areas where there are white or grey spots in order to identify the suitable models of publicly-funded intervention for the next years. By providing an overview about objective evidence in case of undersupply of broadband services in Romania, this mapping study could also be seen as a planning tool for assignment of financial means, subsidies and, in particular, state aid.

This chapter of the report is organized in five sections. The first section makes the opening by presenting the policy context of villages/neighborhoods from Romania. The second section introduces the areas where there are white or grey spots in Romania, according to the definition used by the MIS. The third section presents a short geospatial analysis of the distribution of these areas across the country. The fourth section provides a typology of these areas, based on socio-economic and demographic indicators used as a proxy for the potential demand for broadband services. In the end, the sixth section discusses the most suitable models of publicly-funded intervention in these areas. Policy recommendations are laid out in the next chapter.

A. Socio-Economic Picture of Villages from Rural and Urban Areas in Romania

This section draws heavily on the analysis done by the World Bank (2015) within the RAS project on *Inputs for the Preparation of a Draft National Strategy and Action Plan on Social Inclusion and Poverty Reduction 2015-2020*.[9]

In Romania, the territorial units are divided into:

- villages/neighborhoods (SIRUTA units), and
- administrative units, which are clusters of villages/neighborhoods and are named communes, in rural areas, and cities, in urban areas (SIRSUP units).

In the Nomenclature of Territorial-Administrative Units (NIS), in January 2015, 13,755 villages (SIRUTA units) were reported nationwide, which were forming 3,181 administrative units. However, 129[10] villages have been 'fictive' (have zero inhabitants) and have no corresponding data in the 2011 Population and Housing Census. As most of the analysis presented in this section is based on 2011 census data, we will refer only to those villages that are 'valid', 13,626 SIRUTA units, of which 12,373 in rural areas and 1,253 in urban areas.

i. Urban-rural gap

Romania has constantly been characterized by considerable regional disparities. The Northeast and South regions of the country are fare worse than other areas on nearly all socio-economic indicators, especially in rural areas. As a general rule in Romania, the larger the proportion of the rural population, the more severe the poverty is in that region or county. So, inter-regional disparities are mainly the result of the large discrepancies between urban and rural areas. Actually, a recent study by the European Commission clearly showed that the rural-urban gap has been more marked in Romania than in the Western European countries (Bertolini et al, 2008).[11]

After 1989, as structural changes began to be made in Romania, the urban–rural gap widened, with rural areas being clearly at a growing disadvantage. Income poverty is much higher in rural areas than in urban areas.[12] Infant and under-5 mortality rates have always been considerably higher among children in rural areas than those in urban areas.[13] Access to upper secondary education, healthcare, and social services has been much more limited in rural areas. Rural households are located, on average, much further from a high school or a major hospital than urban residents. There has always been less infrastructure available in rural areas and of lower quality. Rural areas lag significantly behind urban areas in terms of the availability of basic utilities

[9] More precisely, this section refers to chapter 3.1. Geographical Dimension of Poverty (pages 275-296) of the *National Strategy for Social Inclusion and Poverty Reduction for 2015-2020*.

[10] The 'fictive' villages are both from rural (114) and from urban (15) areas.

[11] Bertolini, P., Montanari, M., Peragine, V., 2008, *Poverty and Social Exclusion in Rural Areas*. EC Directorate-General for Employment, Social Affairs and Equal Opportunities Unit E2. Available at: http://www.google.ro/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CDQQFjAA&url=http%3A%2F%2Fec.europa.eu%2Fsocial%2FBlobServlet%3FdocId%3D2087%26langId%3Den&ei=IODqUvqaCYPgyAPXh4Fo&usg=AFQjCNH237dT1dD7GyMQ88Ce0c-0nyI5bg.

[12] For example, in 2012, income poverty was three times more likely in rural areas compared with urban areas; while only 11 percent of people living in densely or intermediate populated areas were at risk of poverty, 38 percent of those living in thinly populated areas faced such a risk (World Bank calculations using data from 2012 EU-SILC).

[13] For example, in 2013, the infant mortality rate was 10.4 live births to 1,000 inhabitants in rural areas compared with 6.8 in urban areas (National Institute of Statistics, Tempo Online, https://statistici.insse.ro/shop/).

such as water supply, the sewerage network, and natural gas, with the notable exception of electricity, which is available to virtually all rural dwellers.[14]

ii. Rural areas

Nearly half of the population lives in rural administrative areas (46% according to the 2011 census). Both the aging of the rural population and the migration of many rural dwellers – notably of young people and women – in search of work abroad are deepening the general impoverishment of rural areas.

Rural areas are highly heterogeneous. Rural areas in Romania are organized into 2,861 communes (territorial-administrative units) that include 12,373 villages. Villages are categorized by geography (plain, hill, mountain), population size, distance to a city, and administrative type (central or peripheral). Some 88% of communes have one central village and between 1 and 40 peripheral villages. The other 12% of communes include only one (central) village. Central villages tend to concentrate the administrative and institutional resources of the commune (the mayoralty, health unit, school, library, post office, and police station). Public infrastructure, which is in need of modernization in most rural areas, is significantly poorer in peripheral villages. The most affluent villages are those located close to a city and/or to a European road (Sandu, 2000 and Stănculescu, 2004). In fact, many of these developed villages are part of suburban or peri-urban localities.

Table 1: Distribution of villages and rural population by village population size, in 2002 and 2011

Village size (inhabitants)	2002 Census				2011 Census			
	Population		Average number of inhabitants per village	Number of villages	Population		Average number of inhabitants per village	Number of villages
	Number	%			Number	%		
0	0	0.0	-	100	-	-	-	-
1 - 20	2,709	0.0	11	249	3,396	0.0	10	341
21 - 100	70,097	0.7	60	1,160	76,110	0.8	59	1,285
101 - 500	1,402,325	13.7	284	4,933	1,404,138	15.2	280	5,014
501 – 1,000	2,219,634	21.7	716	3,100	2,073,992	22.4	713	2,909
1,001 – 2,000	2,877,188	28.2	1,387	2,075	2,570,137	27.7	1,385	1,856
2,001 – 3,000	1,490,844	14.6	2,416	617	1,335,535	14.4	2,402	556
3,001 and more	2,156,906	21.1	4,503	479	1,799,543	19.4	4,368	412
Total	10,219,703	100	810	12,713	9,262,851	100	749	12,373

Source: World Bank calculations based on 2002 and 2011 Population and Housing Censuses.

The large majority of the Romanian villages have between 100 and 2,000 inhabitants (Table 1). In 2011, the average size of a village was 749 persons (smaller than the average size of 810 persons recorded at the 2002 Census). Thus, in the Romanian rural context, three categories of villages according to their population size can be considered, namely:

- small (1-500 inhabitants),

[14] In 2013, only 72% (2,050) of rural municipalities were connected to a public drinking water supply, in contrast with 99% of cities. Only 23% (672) of rural localities were connected to a public sewerage network, compared with 97% of urban districts. In addition, only 23% (657) communes could tap into the natural gas supply, as opposed to 95% of urban dwellings (National Institute of Statistics, Tempo Online, https://statistici.insse.ro/shop/).

- medium (501-2,000 inhabitants) and
- large (2,001-over 20,200 inhabitants).

Small and especially very small villages are the most disadvantaged, particularly those with an elderly population and/or those that are located in remote areas. The 2011 census counted a total of 3,172 very small villages with fewer than 200 inhabitants, of which villages with fewer than 100 inhabitants represent about a half. About 3.4 percent of the total rural population (nearly 312,000 people) lives in very small villages. Most of the small and very small villages are peripheral within their communes (sometimes situated many kilometers away from the central village) and have elderly populations.[15] Small and very small villages are spread all over the country but appear to be concentrated in the West and Center regions. Also, villages with an elderly population are more likely to be found in the Western regions of the country (North-West, West, and South-West). In terms of basic infrastructure, small and very small villages have similar development needs as the larger communities.[16] However, due to their population composition, small and very small villages have specific needs mainly related to the development of social services, specifically assistance in carrying out daily tasks (home help) for the elderly and better access to quality education (particularly early childhood education and primary school for younger children) as in many of these villages schools have been closed down or are severely underfinanced because of the small number of pupils.

Among rural municipalities, the small communes with fewer than 2,000 inhabitants are the most disadvantaged in terms of human and social development. Table 3 shows that in Romania, the size of the commune populations varies widely from a low of 119 to a high of almost 23,000 inhabitants.[17] The small communes (those with fewer than 2,000 inhabitants) represent 26% of all communes (or 751) and are inhabited by over 1.1 million people. These communes are spread throughout the country but tend to be concentrated in the West, Center, and South-West regions, a pattern rather similar to that of the small villages and the villages with a high proportion of elderly inhabitants.

With regard to the availability, affordability, and quality of basic infrastructure, small communes have a similar proportion of dwellings connected to utilities and of households that report difficulties and delays in paying their utility bills (such as heating, electricity, and gas) as other communes. However, the Local Human Development Index (LHDI) [18] indicates that small

[15] Over 41% of the population of villages with fewer than 200 inhabitants and 45% of the population of villages with fewer than 100 inhabitants are aged 55 or older. In the same time, children aged 0 to 17 years old represent only 18%, and 16% respectively of the total population. For comparison, in villages over 200 inhabitants, on average, children represent 22%, while people aged 55 or older constitute 31% of the total population.

[16] The villages with a high proportion of elderly inhabitants appear to have lower percentages of dwellings connected to utilities such as cooking gas, piped water, or the sewerage network, but usually the demand for these services is also lower (some elderly are too poor to afford gas and water tariffs, while others have no desire to invest in such facilities as they are used to getting their drinking water from wells or fountains).

[17] Brebu Nou (Weidenthal) is the smallest commune in the country (119 inhabitants according to the 2011 census). It is a former Saxon commune that includes two villages and is located in the Semenic Mountains in Caraş-Severin County in western Romania. The largest commune is Floresti, which is a peri-urban suburb of Cluj-Napoca city in Cluj County in the Centre region.

[18] The Local Human Development Index (LHDI) was devised to measure the overall level of development of each locality within the country (World Bank, 2014). The LHDI measures the total capital of rural and urban administrative units in Romania on four dimensions: (i) human capital; (ii) health capital, (iii) vital capital, and (iv) material capital. Human capital is measured by the indicator of education stock at the local level (for the population aged 10 years old and over). Health capital is measured as life expectancy at birth at the local level. Vital capital is measured by the mean age of the adult population (those aged 18 years old and over). Finally, material capital is assessed as a factor score of three

communes were and still are significantly less developed than the larger communes, even the remote ones (Table 2).

In fact, Table 2 shows that, on the one hand, the remote communes (those that have little connection to any city) are likely to be disadvantaged only when they are small (in other words, when they have fewer than 2,000 inhabitants) and, on the other hand, the small communes are generally less connected to their nearest cities than larger communes (in other words, they are more likely to be remote). Although the small communes have had a positive evolution in terms of infrastructure development between 2002 and 2011 and attracted a larger volume of European Funds per inhabitant than the larger communes between 2009 and 2012, they have not succeeded in closing the development gap.

At the same time, the local budget indicators from Table 2 show that small communes are also disadvantaged in terms of economic development. The extent to which local communities depend on support from the state budget is a relevant indicator of the potential for local economic growth. If a locality's budget contains few central budget transfers in conjunction with a high proportion of self-generated revenues[19] (from local tax collection), then this is a sign that it is experiencing healthy economic development and that it has a large base of taxpayers (citizens and firms). Ministry of Finance data from the end of 2012 show that the average share of self-generated revenues (or independence from state budget transfers) of Romanian localities was only 24%. Within this average, rates differed significantly between urban areas (42%), communes (22%), and small communes (19%). Only a small number of localities managed to achieve an independence threshold of over 50% in 2012, namely 84 cities (or 26% of all cities apart from Bucharest) and 135 communes (of which 109 are neither small nor remote). Consequently, capital investments are low and have even decreased in recent years in all localities.

Table 2: Human and economic development of small Communes and remote communes

	Small communes (<2,000 inhabitants)	Remote communes 2,000+ inhabitants	Other communes (neither small nor remote)	Urban areas
Number of communes	751	375	1,735	320
Average population size (number of people)	1,474	3,558	3,932	34,000
Urban Connectivity Index (IURCON)	1.4	1.0	1.7	1.4
Share of remote communes (%)	23	100	0	-
Local Human Development Index 2002 (LHDI 2002)	29.8	32.7	33.5	44.3
Local Human Development Index 2011 (LHDI 2011)	33.5	36.7	37.7	47.2

specific indicators that focus on living standards: (i) size of dwelling spaces, (ii) the number of private cars for every 1,000 residents, and (iii) the distribution of gas usage for household consumption in the particular geographical unit. The four measures of the dimensions of community capital are aggregated by calculating another factor score.

[19] Self-generated revenues reflect the municipality's fiscal autonomy and local economic potential. They do not include the portions deducted from PIT (personal income tax) for equalization purposes in order to analyze the category of revenues upon which the municipality holds a greater degree of control. The formula per capita enables vertical comparisons (localities of different sizes or status – urban/rural) and horizontal comparisons (localities of the same status, but in different counties). They are computed as an annual average for the period 2009-2012 on local budget execution data. Revenues are computed in 2009 constant value; index of inflation from the National Institute of Statistics.

Evolution of LHDI (2011 as % of 2002)	112	112	112	106
Total volume of expenditures on European funded projects, in the period 2009-2012 (Euro per capita)	174	153	112	61
Share of self-generated revenues in total revenues in the local budget, in 2007 (%)	12.9	16.0	17.4	38.6
Share of self-generated revenues in total revenues in the local budget, in 2012 (%)	19.1	20.8	22.8	41.6
Evolution of self-generated revenues (2012 as % of 2007)	148	130	131	108
Share of capital investments in total expenditures in the local budget, in 2007 (%)	26.0	22.6	25.4	19.4
Share of capital investments in total expenditures in the local budget, in 2012 (%)	20.7	18.4	20.4	16.5
Evolution of capital investments (2012 as % of 2007)	80	81	80	85

Source: World Bank calculations using 2011 Population and Housing Census from World Bank (2015: 288) *Inputs for the Preparation of a Draft National Strategy and Action Plan on Social Inclusion and Poverty Reduction 2015-2020*; LHDI 2002 and 2011 and IURCON from World Bank (2014) *Competitive cities. Reshaping economic geography of Romania*; Local budget execution data posted by the Ministry of Administration and Interior, available at: http://www.dpfbl.mai.gov.ro/sit_ven_si_chelt_uat.html and population data from 2011 Population and Housing Census.

Notes: IURCON provides an estimation of urban connectivity based on a set of distances between a commune and its neighboring small, medium, large, and very large cities. The higher the IURCON value, the better connected to cities is that commune. Remote communes are those localities in the lowest quintile of IURCON.

All the above indicate that policymakers should explore the possibility of reforming the local government administrative structure as a realistic and efficient way to enable rural development. At the moment, it is too expensive for most localities to invest in the development of any basic infrastructure or service. Therefore, policymakers need to devise adequate legislation to enable rural communes to merge and create fewer but larger communities that are better connected to urban areas (especially to the growth poles). This will help to reduce the existing inequalities between rural and urban areas as well as within rural communities.

iii. Urban areas

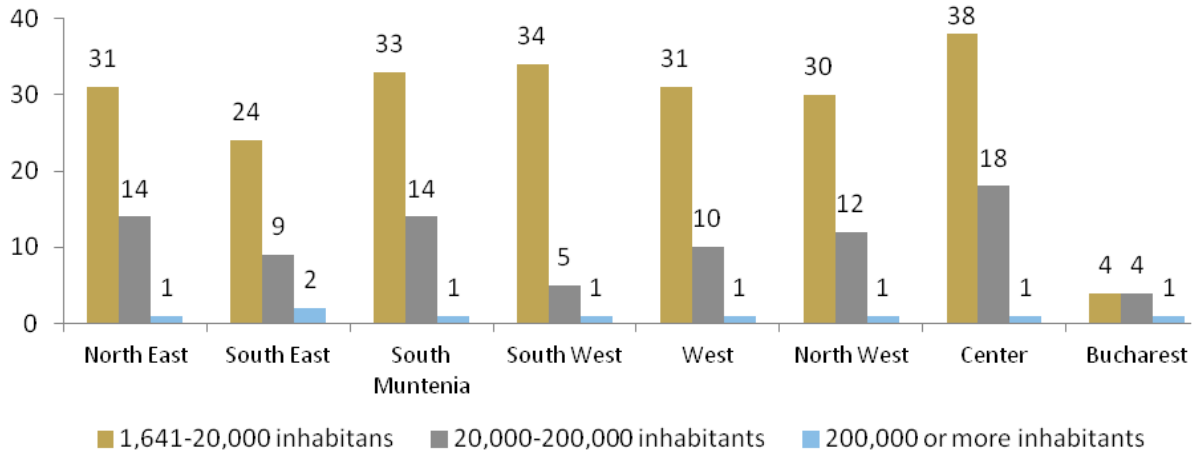
Urban areas are substantially more developed compared with rural ones, but considerable discrepancies exist among different types of urban areas according to the population size. The 2013 Regional Yearbook[20] (Eurostat) shows that the at-risk-of-poverty or social exclusion rate (AROPE) has a strong geographical dimension, in other words, a location effect, in the entire Europe. However, function of degree of urbanization, the widest gap has been recorded in Bulgaria and Romania. Thus, Romania recorded the second widest range between at-risk-of-poverty or social exclusion rates for three different degrees of urbanization: a difference of 19 percentage points between thinly and densely populated areas. Furthermore, the income poverty rate (AROP)[21] - one of the highest among the European Member States - varies widely from about 7% in densely populated areas to 19% in intermediate density (small urban) areas and over 31% in thinly populated (rural) areas. Therefore, the differences (by degree of urbanization) suggest that the at-risk-of-poverty rate does not exclusively depend on personal characteristics such as

[20] Available at: http://www.trf.sll.se/Global/Dokument/Statistik/externa_rapporter/Eurostat-regional-yearbook-2013.pdf.

[21] The at-risk-of-poverty rate is not adjusted for differences in the cost of living between the different types of area, and therefore the gap between different areas may be overestimated.

education, employment status, household type and age, since the rate in thinly (rural) areas is 4.5 times as high as that of in densely populated areas (medium and large cities).

Figure 1: The regional distribution of Romanian cities by population size (number)



Source: World Bank calculations using 2011 Population and Housing Census from World Bank (2015: 292) *Inputs for the Preparation of a Draft National Strategy and Action Plan on Social Inclusion and Poverty Reduction 2015-2020*.

Note: Only 9 cities have more than 200,000 inhabitants (including the capital Bucharest with over 1.88 million people).

Most urban centers in Romania are small towns with fewer than 20,000 inhabitants that is 225 out of a total of 320 cities (Figure 1). However, as shown in Table 3, most of the urban population (43.1% of the 10,859 million inhabitants) lives in medium-sized cities, 37.6% in large cities and only 19.3% in these small towns.

Table 3: Distribution of rural and urban population by population size of the administrative unit, in 2011

	Rural				Urban			
Village size (inhabitants)	Population		Average number of inhabitants per commune	Number of communes	Population		Average number of inhabitants per city	Number of cities
	Number	%			Number	%		
119 < 2,000	1,107,306	12.0	1,474	751	1,641	0.0	*	1
2,000 < 3,000	1,933,694	20.9	2,473	782	14,618	0.1	2,436	6
3,000 < 7,500	5,359,580	57.9	4,336	1236	506,203	4.7	5,818	87
7,500 < 20 thou	839,458	9.1	9,225	91	1,574,390	14.5	12,018	131
20 thou < 200 thou	22,813	0.2	*	1	4,678,281	43.1	54,399	86
200 thou or more	-	-	-	-	4,083,657	37.6	453,740	9
Total	9,262,851	100	3,238	2,861	10,858,790	100	33,934	320

Source: World Bank calculations based on 2011 Population and Housing Census. Note: * Only one case.

The category of small towns is highly heterogeneous, representing a mix of agricultural cities, former (mono)industrial cities, and tourism areas. Some small towns have a long history and tradition (especially in Transylvania - Center region), others were formed during the communist regime, as part of the industrialization process (particularly around a former large enterprise in heavy industry), while others still were administratively declared cities in recent years (as result of

pressure to increase the proportion of urban population within the country). Out of the 225 small towns (with fewer than 20,000 inhabitants), 79 have a long history, being formed before 1950, 90 were developed during the communist era (1950-1989), 5 were officially included among urban settlements between 1990 and 2000, while 51 were declared cities[22] in recent years (2002-2006). These recent small towns total about 385,000 people and have an average population size of approximately 7,500 people. Thus, the typical city in Romania is small, incorporates villages, has or used to have an industrial aspect,[23] has no tourism or historical aspects,[24] and is somewhat socially underdeveloped.

Among small towns, the 51 recently-declared ones are the most disadvantaged. In fact, these are rural settlements with severely underdeveloped urban infrastructure, facilities, functionality and appearance. The Local Human Development Index (LHDI)[25] shows that they were and have remained considerably less developed than other urban areas. Furthermore, 57% of these recent small towns are among the least developed urban areas in Romania (the lowest quintile of LHDI2011). Along with those, a large number (41%) of the very small cities (fewer than 7,500 inhabitants) are among the least developed urban areas in the country.

In Romania, only 81 cities (out of 320) do not include villages (compact settlements of houses with a rural aspect usually located a few kilometers away from the city nucleus).[26] By contrast, 88% of recent small towns (declared in 2002-2006), 80% of other small towns and 62% of medium-sized cities include between 01 and 21 villages, as shown in Figure 2. There are, for example, small towns that cover a mountain area, where villages are spread at distances of more than 10 km from the city center. Investment in the infrastructure of villages incorporated within cities is needed in order to improve the quality of life of the population in small towns and to close the gap between disadvantaged small cities and other urban areas.

[22] E.g. Law no. 83/2004 through which 35 settlements were declared urban; http://www.lege-online.ro/lr-LEGE-83%20-2004-(51035).html.

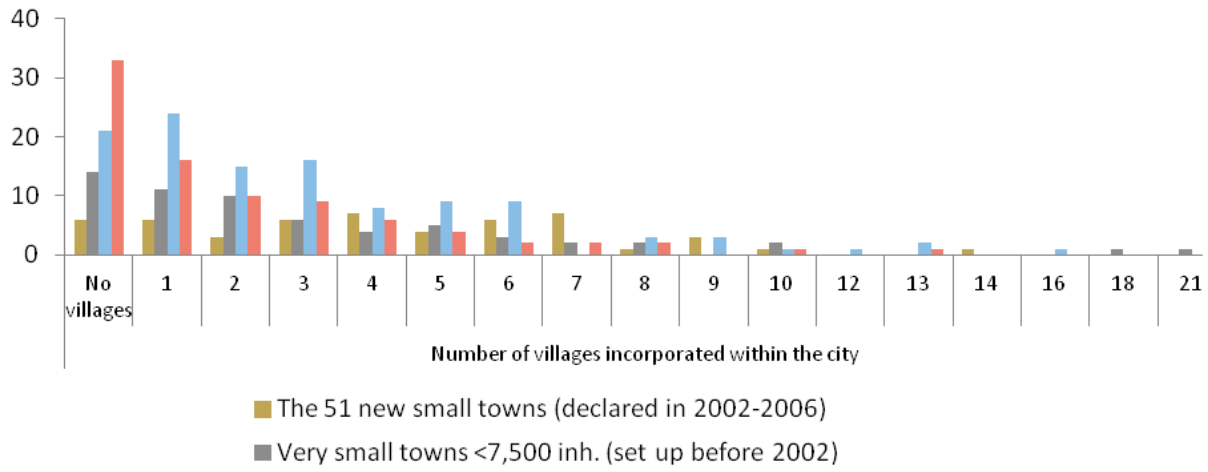
[23] The dominant economic profile of small towns, based on a knowledge-typology developed within a previous World Bank study, indicates that about 180 small towns (out of 225 in total) used to have an industrial dimension. The number, size and economic sector of local enterprises have varied, but in most small towns the former enterprises were closed down after 1990 and only small businesses were developed mainly in commerce and service sectors. Source: Stănculescu M.S., 2005, *K-Typologies of the Romanian rural and small urban communities*, World Bank, Knowledge Economy Project.

[24] The historical dimension refers to the existence within the city of a historical centre or area, which before the communist era was inhabited by Jews (in the Eastern regions) or by Germans (in the Central and Western regions of the country). Later, the houses in these areas were nationalized. After 1990, some were reinstated to their former owners, while others remained under the municipality that had used them as social housing. At present, in many cases, these areas accommodate poor, marginalized groups of population. However, as a rule, these areas are well-located within cities and have a high value on the real-estate market. Tourism is not necessarily associated with the historical aspect. Most often, tourism is associated with the existence of cultural, sports, leisure or historical sites within the city. In terms of housing, houses predominate in the touristic small towns, and due to their tourism-related uses, they are larger, modernized, better maintained and thus more expensive than in other small towns.

[25] See definition of LHDI in footnote 19.

[26] The 320 cities from Romania include a total of 1,253 village neighborhoods.

Figure 2: Romanian cities by population size and number of incorporated villages (number)



Source: World Bank calculations using data from the National Institute of Statistics (SIRUTA database).

Note: No villages refers to cities including only urban center with no incorporated villages.

In fact, many small towns are thinly-populated areas and appear on the map as clusters of distant settlements with poor road linkage. Unlike, the medium or large cities are densely-populated areas and their growth is mainly linked to a suburbanization process. Some medium or large cities have expanded and reached the limits of some villages and have thus naturally incorporated those within their boundaries. Therefore, among small towns the presence of villages reflects mainly an effort to meet the administrative population threshold for obtaining the status of urban administrative unit, whereas among medium or large cities the presence of villages is linked more with the enlargement of their functional area.

The number of village-neighborhoods is significantly correlated[27] with the city's local level of human development: the larger the number of villages included within a city, the higher its probability of being underdeveloped (measured against LHDI).[28] Since the recent small towns (declared between 2002 and 2006) and very small towns with fewer than 7,500 inhabitants have, on average, a larger number of villages (more than five), they have a much more accentuated rural character and are more likely to be underdeveloped compared with other urban areas. Therefore, the 51 recently-declared small towns (below 20,000 inhabitants) and the older[29] 61 very small cities (fewer than 7,500 inhabitants) must receive more support and assistance in their catching up efforts for developing faster than other urban areas.

B. NGN-White, Grey and Black Areas in Romania

The *Implementation Programme for the National Plan for Development of the NGN*[30] *Infrastructure* (MIS, 2015)[31] shows that the NGN investment plan in Romania focuses mainly on

[27] Pearson correlation coefficient between the number of incorporated villages and LHDI2002 is -0.18 (p=.001) and -0.23 (p=.000) for LHDI2011.

[28] See definition of LHDI in footnote 19.

[29] Declared cities before 2002.

[30] Next Generation Network.

the segment of next generation access, but also aims at the development of the already existing transport (backbone) and distribution (backhaul) networks. The backbone and backhaul networks in Romania are at a development level that can be used and/or extended for ultra-fast NGA connections. Nonetheless, in the rural areas, significant additional deployments of the backhaul networks are necessary in order to cover the 'white' areas.

For identifying the market failure in relation to the development of the NGN infrastructure, the National Authority for Administration and Regulation in Communications (ANCOM) carried out in 2015 a mapping of the electronic communication networks. This ANCOM.v1 study[32] identified the areas that, as at end of December 2014, lacked a local loop and/or a backhaul network with speed of 30 Mbps or over and were not involved in publicly-funded broadband projects (by MARD, under Measure 322, or MIS, under Ro-NET project). The list of these areas was submitted to public consultations and has been handed to the World Bank team for analysis under this RAS project.

According to the ANCOM.v1 survey (2015), at 31 December 2014, in Romania, out of the total 13,755 villages/neighborhoods (SIRUTA units)[33] in rural and urban areas, were recorded:

- 6,457 villages (47%) without local loop networks [34] for broadband communications with speed of 30 Mbps or over and that are not involved in publicly-funded broadband projects;
- 6,610 villages (48%) without backhaul connections [35] for broadband communications with speed of 30 Mbps or over and that are not involved in publicly-funded broadband projects.

By intersecting these two variables related to fixed broadband connections, we determined the broadband areas shown in Table 4. These areas are analyzed in the next sections of this report.

Table 4: Identification of broadband areas in Romania (types and numbers)

		Villages (SIRUTA units), from rural and urban environment of Romania, that have **local loop networks for broadband communications with speed of 30 Mbps or over**, and that are not involved in ongoing publicly-funded broadband projects (either by MARD or by MIS).	
		Yes	**No**
Villages (SIRUTA units), from rural	**Yes**	**NGN-Black areas**	**Distribution-not-Access**

[31] The programme was approved by the government in June 2015 (GD 414/3 June 2015). The goals of the National Plan for NGN Infrastructure Development are driven by the National Strategy on the Digital Agenda for Romania 2020, which was approved in April 2015.

[32] National survey on operators and network providers, including 1,006 respondents. The results were corrected in June 2015, after our analysis was finalized. Corrections affect the status of 52 'valid' villages. However, corrections affect only marginally the typologies presented in this paper.

[33] This number includes both 'fictive' villages (129) with zero inhabitants and 'valid' villages (13,626).

[34] These are fixed and mobile local networks, which connect the end user to a point in the backhaul or backbone area. Services provided by local loop operators can include: telephony, Internet, VPN, IPTV services etc.

[35] Backhaul operators represent an intermediate link between backbone and local loop. Their networks extend the services provided by backbone operators to areas that are not covered, but present interest for the local loop operators.

and urban environment of Romania, that have **backhaul connections for broadband communications with speed of 30 Mbps or over**, and that are not involved in ongoing publicly-funded broadband projects (either by MARD or by MIS).		7,040 villages (51.7%)	DnotA 99 villages (0.7%)
	No	Access-not-Distribution AnotD 252 villages (1.8%)	NGN-White areas 6,235 villages (45.8%)

By definition, in this study, 'NGN-white' areas refer to villages (SIRUTA units), from rural and urban environment of Romania, that have neither local loop networks nor backhaul connections for broadband communications with 30 Mbps or over speed download, and that are not involved in ongoing publicly-funded broadband projects (either by MARD or by MIS).[36]

'NGN-grey' areas include two categories, namely:

- AnotD or Access-not-Distribution areas are villages (SIRUTA units), from rural and urban environment of Romania, that have only local loop networks for broadband communications with 30 Mbps or over speed download, and that are not involved in ongoing publicly-funded broadband projects (either by MARD or by MIS); and
- DnotA or Distribution-not-Access areas are villages (SIRUTA units), from rural and urban environment of Romania, that have only backhaul connections for broadband communications with 30 Mbps or over speed download, and that are not involved in ongoing publicly-funded broadband projects (either by MARD or by MIS).

Finally, we consider 'NGN-black' areas all villages (SIRUTA units), from rural and urban environment of Romania, that are neither NGN-white nor NGN-grey areas. Thus, 'NGN-black' areas include also the villages involved in the ongoing publicly-funded broadband projects, be it MARD projects, under Measure 322, or the Ro-NET project implemented by MIS. So, these areas have or will have in near future (due to participation in projects) local loop networks and/or backhaul connections for broadband communications with speed of 30 Mbps or over. While MARD projects support both backhaul and local loop deployment, the Ro-NET project finances only the backhaul with an agreement that a local loop will be developed by private investors in the near future.

Before showing the results of the empirical analysis, few remarks are necessary. We called 'NGN-white' the areas targeted by this study on two grounds. First, NGN-white areas relate to the 2020 target of 80% of households coverage with broadband of speed 30 Mbps or over set up by the *National Plan for Development of the NGN Infrastructure*. The second reason is to attract attention on the difference between the NGN-white areas and the 'white' zones with regard to basic broadband infrastructure. As defined by the European Commission, the typical 'white' areas refer to zones where broadband infrastructure does not exist and it is unlikely to be deployed in the near future. By contrast, in some 'NGN-white' zones is quite likely to exist some infrastructure, but of lower quality than that required for achieving the Digital Agenda for Europe 2020

[36] In this paper, 'ongoing publicly-funded broadband projects' or 'ongoing projects' refer to all MARD or Ro-NET projects, irrespective in which phase of implementation they are.

development objectives. In fact, the data reported by MIS in 2014[37] show that the number of localities (SIRUTA units) in which there are no broadband communication service providers is much smaller than the number of 'NGN-white' spots (3,666 compared with 6,358). Also, in 210 localities there are private operators willing to deploy broadband networks in the next three years.[38] So, most likely, the 'NGN-white' spots are a mix of 'white' and 'grey' areas in terms of basic broadband infrastructure.

The distinction between 'NGN-white', 'NGN-grey' and 'NGN-black' areas is relevant for evaluating the compatibility of the state subsidy for NGN networks. 'NGN-white' areas are eligible for state support if the compatibility conditions[39] are fulfilled. The 'NGN-grey' areas may also receive conditional state support. In order to ensure that a public intervention in one of these NGN undersupplied areas does not impede private investments, the fact that no private investors are interested in developing additional NGN infrastructure in the next three years needs to be assessed. In this sense, a summary of the planned aid measures needs to be published and the stakeholders should be invited to present their observations. In addition, legislative and regulatory measures to reduce the barriers for the deployment of NGN networks should be considered. Finally, in 'NGN-black' areas, state intervention is not necessary.

The third remark refers to the number of broadband areas shown in Table 5. ANCOM 2015 data indicate that in Romania are 6,358 NGN-white spots. A part of these (123 spots), however, are an effect of the way in which the ANCOM.v1 list was done, based on the inventory of territorial units that includes the 'fictive' villages, which have been depopulated or even disappeared. Hence, after cleaning the data, the number decreases to 6,235 'valid' NGN-white areas (or 45.8% of all 'valid' villages in the country). The large majority of these areas (5,785 or 93%) are located in rural areas. With regard to NGN-grey areas (AnotD and DnotA), there are 351 spots, of which 93% (or 325) are from the rural environment.

Table 5: The distribution of broadband areas by NGN-type (for fixed broadband connections) and by 'fictive'/'valid' villages (SIRUTA units) (number)

	'Fictive' villages (zero inhabitants)		'Valid' villages (1+ inhabitants)		
	Rural	Urban	Rural	Urban	Total
NGN-white villages	**109**	**14**	**5,785**	**450**	**6,358**
NGN-grey villages, of which:	**0**	**0**	**325**	**26**	**351**
- AnotD - Access-not-Distribution	0	0	235	17	252
- DnotA - Distribution-not-Access	0	0	90	9	99
NGN-black villages, of which:	**5**	**1**	**6,263**	**777**	**7,046**
- Existing networks	0	0	5,320	750	6,070
- Ro-NET Project (MIS)	0	0	756	27	783
- MARD Projects (Measure 322)	0	0	187	0	187

[37] Official Monitor 441 bis, June 19, 2015: 23, regarding MIS, *Implementation Programme for the National Plan for Development of the NGN Infrastructure*, https://www.mediasinfo.ro/wp-content/uploads/documente/mo/mo441bis2015.pdf

[38] However, only 5 of these operators have submitted the necessary documents.

[39] Evidence should be produced that: (i) no affordable or adequate services are available in the target-area for satisfying citizens' or businesses' needs; (ii) no less distortive measures are available (including ex-ante regulations) in order to reach the same objectives; and (iii) there are no other operators planning to invest in the target-area in the next three years.

- 'Fictive' villages	5	1	0	0	6
Total	**114**	**15**	**12,373**	**1,253**	**13,755**

Source: World Bank calculations using ANCOM.v1 (2015). For determining 'fictive' and 'valid' villages: Nomenclature of Territorial-Administrative Units, January 2015 (NIS), and 2011 Population and Housing Census.

The fourth remark introduces the issue of villages covered by mobile broadband networks 3G+(HSPA)/LTE/LTE Advanced.[40] The ANCOM 2015 survey was focused on fixed broadband connections, but collected also coverage information of the mobile broadband networks, although MIS has considered that those do not meet some performance requirements, especially with regard to prices for access/package services. Nevertheless, for planning the future interventions in broadband infrastructure and services, we consider useful to use the coverage with mobile broadband networks as an additional criterion in distinguishing between various types of broadband areas. The results of using this criterion are shown below.

Table 6: The distribution of broadband areas from 'valid' villages (SIRUTA units) by NGN-type (for fixed broadband connections) and coverage with mobile broadband networks 3G+(HSPA)/LTE/LTE Advanced (number)

	No networks 3G+	Only access networks 3G+	Access and distribution networks 3G+	Total
NGN-white, of which:	**4,287**	**1,154**	**794**	**6,235**
NGN-grey, of which:	**223**	**66**	**62**	**351**
AnotD - Access-not-Distribution	161	49	42	252
DnotA - Distribution-not-Access	62	17	20	99
NGN-black, of which:	**3,322**	**2,075**	**1,643**	**7,040**
Existing network	2,655	1,895	1,520	6,070
Ro-NET Project (MIS)	564	135	84	783
MARD Projects (Measure 322)	103	45	39	187
Total %	**7,832**	**3,295**	**2,499**	**13,626**

Source: World Bank calculations using ANCOM.v1 (2015). Notes: Access networks - local loop; Distribution networks - backhaul; 3G+ refers to 3G+(HSPA)/LTE/LTE Advanced.

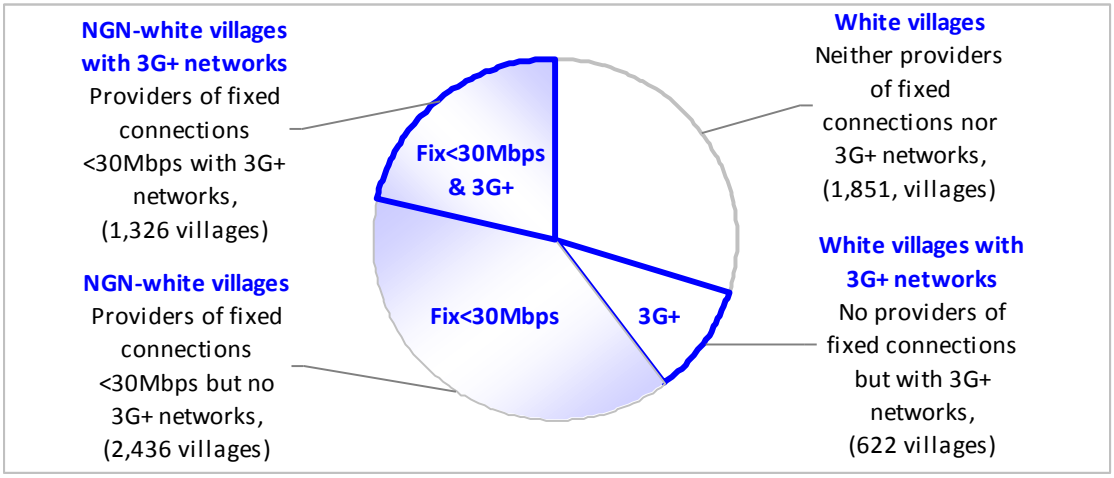
Almost a third (31% or 1,948) of the NGN-white areas (as defined above) are covered by mobile broadband networks 3G+(HSPA)/LTE/LTE Advanced, either access networks or access and distribution networks (Table 6). Also, 36% of AnotD zones, 37% of DnotA areas and over a half (53%) of NGN-black points are in a similar situation. Therefore, for the purpose of this study, we combine the NGN-types with the presence/absence of a 3G+ network, as Figure 4 illustrates.

The last remark relate to the target of 100% of total population covered by fixed broadband, set up in the *National Strategy on Digital Agenda for Romania 2020*. In order to refer to this target we have to introduce two additional subcategories of NGN-white areas, which to reflect the lack of fixed broadband connections (even lower than 30 Mbps). To this end, we use the MARD data (December 31, 2014) on the number of electronic communication networks and service providers (official or unofficial) per village. Consequently, in this report, we define 'white' spots as the NGN-white villages in which there is no provider of fixed broadband connection (regardless a mobile 3G+ network is present or not). Figure 3 illustrates the four subcategories of NGN-white villages

[40] HSPA - High Speed Packet Access; LTE - Long-Term Evolution.

and Map 7 shows their distribution across the country. A number of 2,473 villages are broadband 'white' (no operator and no connection), of which 662 are covered by a mobile broadband 3G+ network. In this way the number of NGN-white villages decreases from 6,235 to a total of 3,762 white villages, of which 1,326 are also covered by mobile broadband 3G+ networks.

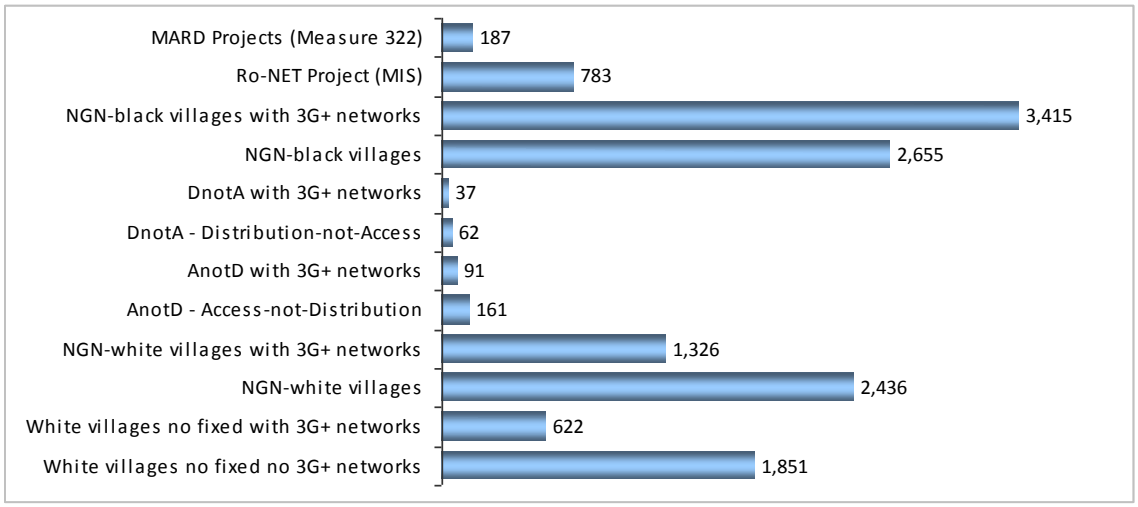
Figure 3: Subcategories of NGN-white areas considering the number of electronic communication networks and service providers (official or unofficial) per village for discerning the 'white' villages (with no fixed broadband)



Source: World Bank calculations using ANCOM.v1 (2015). N=6,235 NGN-white villages (with or without 3G+ networks). The number of providers by village as per MARD study on December 31, 2014.

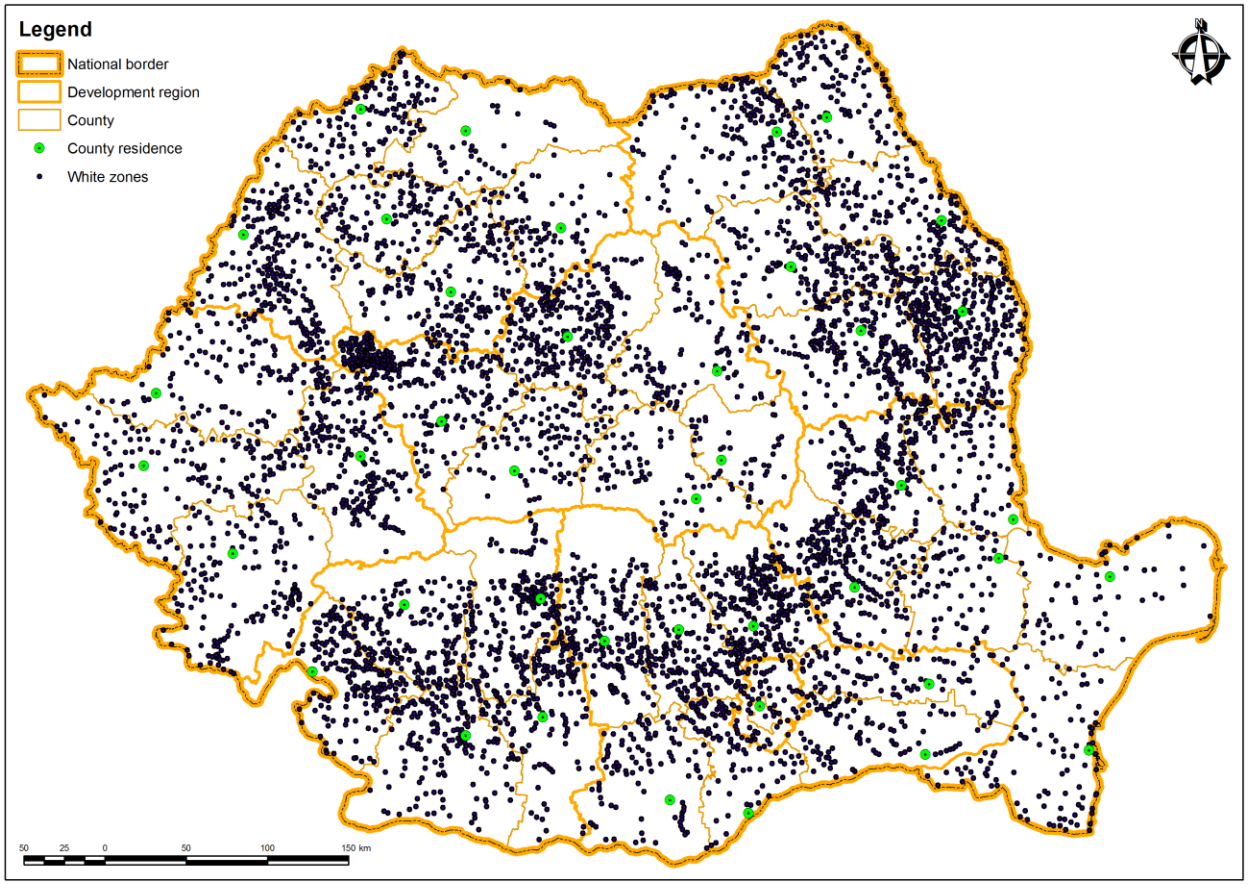
In conclusion, twelve types of broadband areas are included in the study, which are shown in Figure 4. The next sections present the results of the empirical analysis that compares these different broadband areas, considering only the 'valid' villages, on various dimensions related to geographical, institutional and socio-economic indicators.

Figure 4: Twelve types of broadband areas entered into analysis (number)



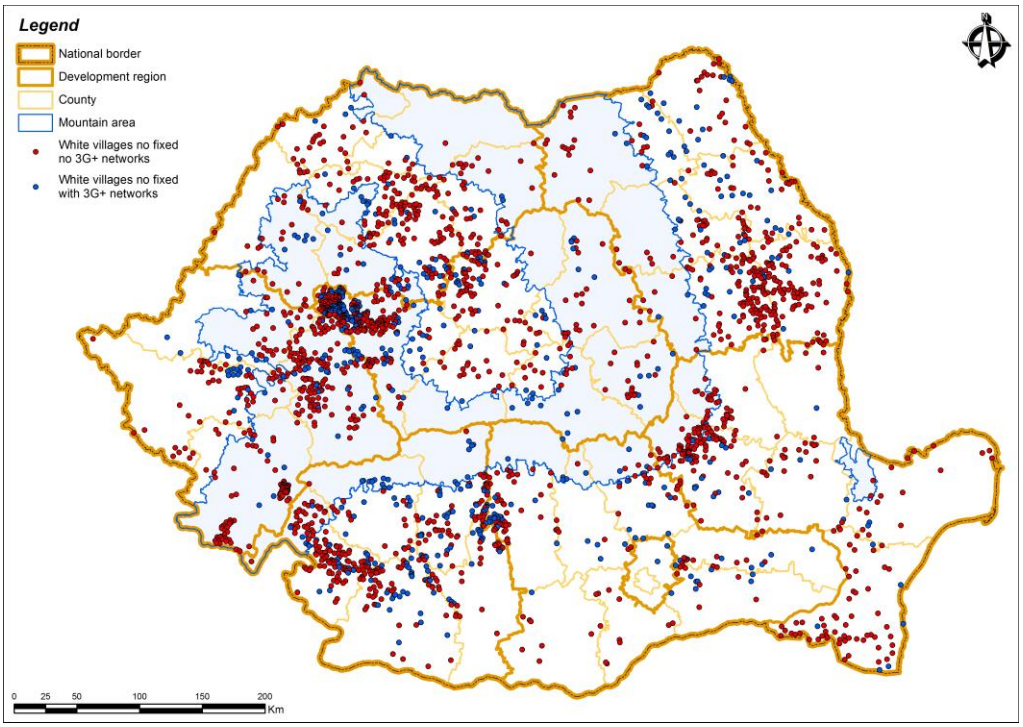
Source: World Bank calculations using ANCOM.v1 (2015). Note: 3G+ refers to 3G+(HSPA)/LTE/LTE Advanced.

Map 1. All NGN-white areas (white or NGN-white, with or without 3G+ networks) across Romania, at December 31, 2014

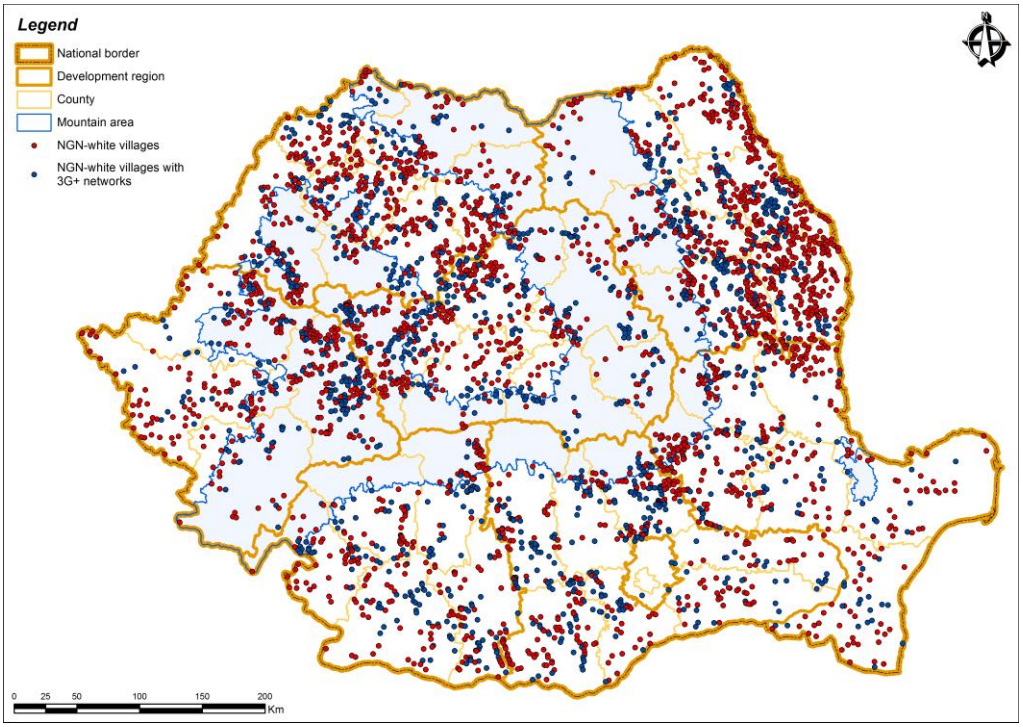


Source: World Bank calculations using ANCOM.v1 (2015).

Map 2: White spots (no fixed broadband connections, with or without 3G+ networks) in Romania, at December 31, 2014

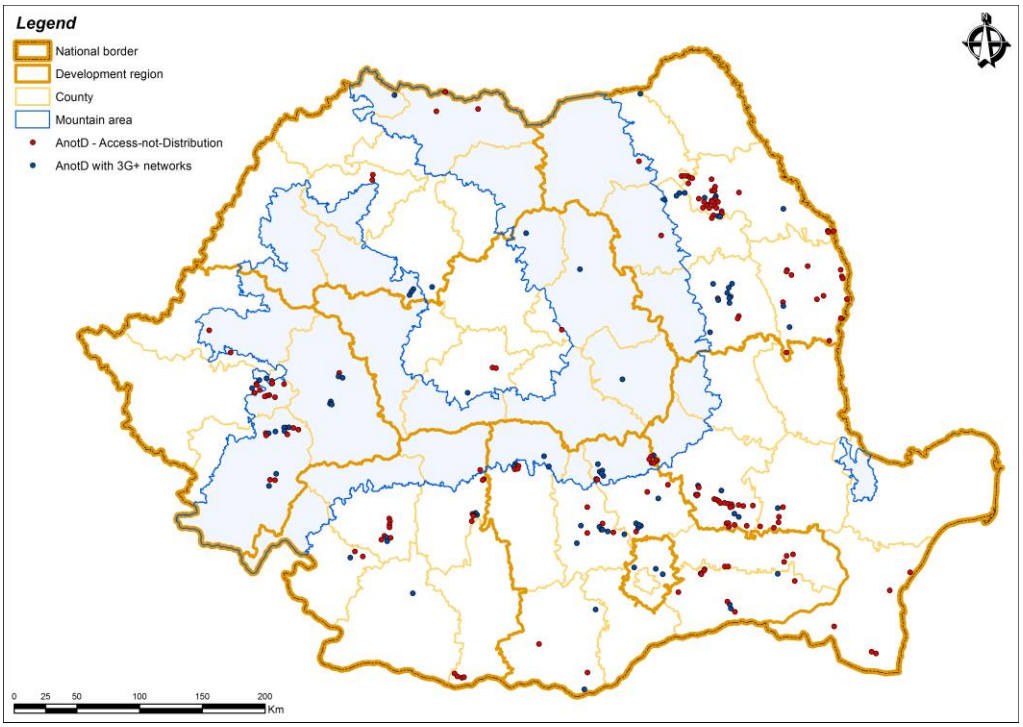


Map 3: NGN-white spots (fixed broadband < 30 Mbps, with or without 3G+ networks) across Romania, at December 31, 2014

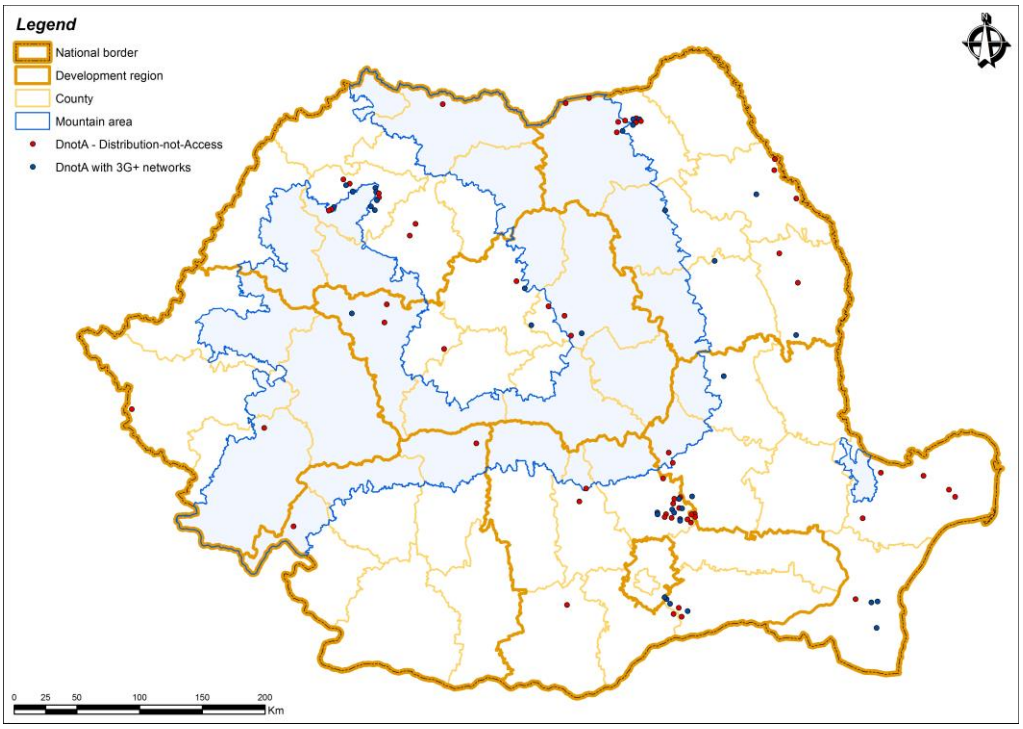


Source: World Bank calculations using ANCOM.v1 (2015).

Map 4: The distribution of NGN-grey villages Access-not-Distribution (AnotD) (with or without 3G+ networks) across Romania, at December 31, 2014

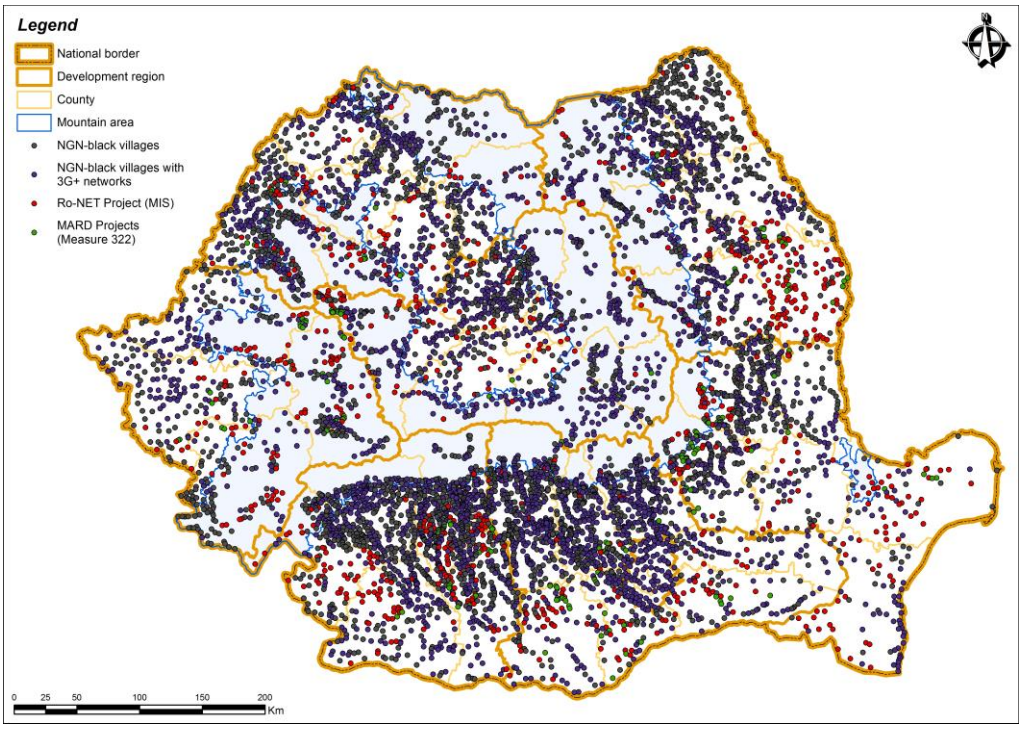


Map 5: The distribution of NGN-grey villages Distribution-not-Access (DnotA) (with or without 3G+ networks) across Romania, at December 31, 2014

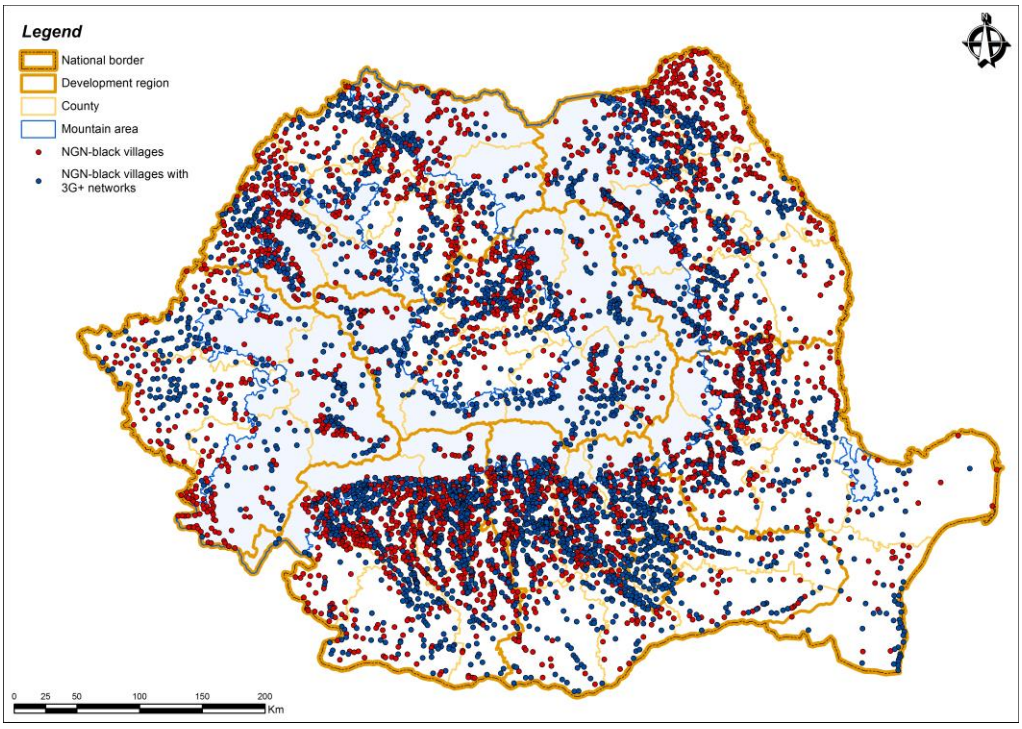


Source: World Bank calculations using ANCOM.v1 (2015).

Map 6: All NGN-black areas (fixed broadband 30+ Mbps, existing networks or part of ongoing projects, with or without 3G+ networks) across Romania, at December 31, 2014

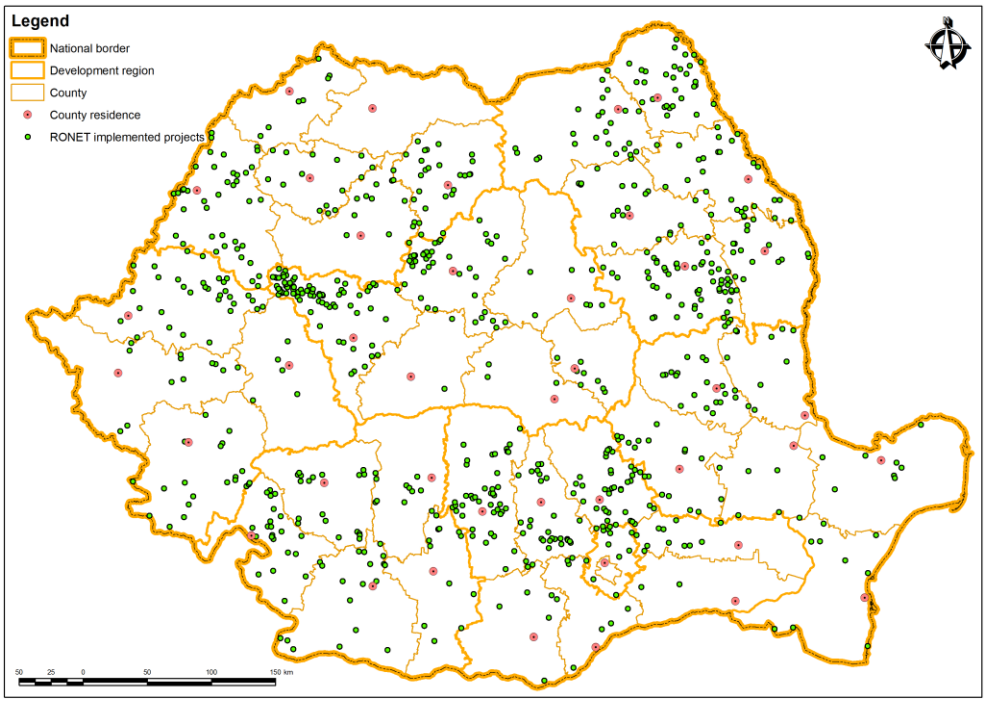


Map 7: The distribution of NGN-black villages - existing networks 30+ Mbps (with or without 3G+ networks) across Romania, at December 31, 2014

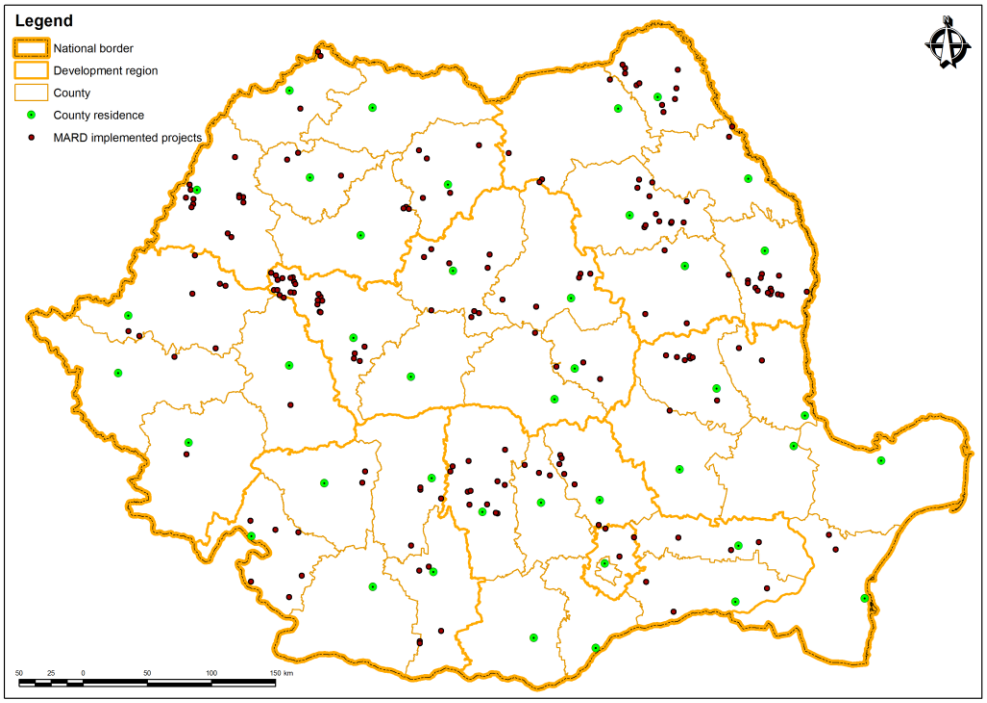


Source: World Bank calculations using ANCOM.v1 (2015).

Map 8: The distribution of NGN-black villages involved in ongoing public broadband projects: Ro-NET, at December 31, 2014



Map 9: The distribution of NGN-black villages involved in ongoing public broadband projects: MARD, at December 31, 2014



Source: World Bank calculations using ANCOM.v1 (2015).

C. Geospatial Analysis of the NGN-White and NGN-Grey Areas from Romania

Based on information about the location and territory characteristics of undersupplied areas, appropriate measures can be undertaken by competent authorities or private actors aiming to supply these areas with broadband. This section provides such geographical data.

i. Distribution by region and county

White and NGN-white villages

Map1 shows that NGN-white villages are spread in all counties and all regions (see Maps 1-3 and Tables A.1-A.8 in Annex). On the one hand, out of all NGN-white villages, 21% are from the region with the lowest urbanization level in the country, namely North-East (especially from counties Vaslui and Bacau). Other 18% are from the Centre region (8% come from only one county, Alba), while 15% are from North-West. In the North-East region predominate NGN-white villages (no 3G+), whereas NGN-white with 3G+ networks are very numerous in Centre. On the other hand, the proportion of NGN-white spots in all 'valid' villages has a national average of 46%, but varies widely from about 6% in Bucharest-Ilfov to 30-35% in South and South-West, 47-49% in South-East and North-West, reaching over 52% in North-East, West and Centre regions.

Seven counties could be considered priority for intervention, namely Alba and Cluj (Centre), Hunedoara (West), Vaslui, Bacau and Iasi (North-East), and Buzau (South-East). Overall, these counties contribute with 36% of all NGN-white villages in the country (38% of those without 3G+ networks and 33% of those with 3G+ networks), as well as 42% of the white spots (no connection and no operator). In the same time, in these counties, the process of broadband development seems to be the slowest in the country, since the NGN-white spots account for over 60% of all villages, in each.[41] Other counties which lag behind in broadband development, but with a smaller contribution due to a smaller overall number of villages, include: Mehedinti (South-West), Salaj and Bistrita-Nasaud (North-West), as well as Constanta (South-East).

NGN-grey villages

The NGN-grey areas are fewer and tend to be highly territorially concentrated (see Maps 4 and 5 and, in Annex, Tables A.1-A.8):

- Over two thirds (65%) of all AnotD (Access-not-Distribution) villages are located in nine counties: Iasi, Vaslui and Bacau (both from North-East), Buzau (South-East), Prahova, Calarasi and Dambovita (South-Muntenia), Caras-Severin and Timis (West). Villages AnotD with 3G+ networks are more numerous in one county only, that is Prahova. At the regional level, 70% of all AnotD villages (no 3G+) are situated in North-East, South-East and South-Muntenia regions, whereas almost three quarters of the AnotD villages with 3G+ networks belong to South-Muntenia, North-East and West regions.
- Almost a half of all DnotA (Distribution-not-Access) villages (46%)42 are situated in only three counties, namely: Prahova (South-Muntenia), Salaj (North-West) and Suceava (North-East). The most intense development of DnotA networks has taken place in the South-Muntenia region.

NGN-black villages

[41] Only in Buzau the proportion of NGN-white villages in all 'valid' villages is lower, 52%.

[42] The proportion is 40% of DnotA no 3G+ and 54% of DnotA with 3G+ networks.

NGN-black villages are spread in all counties and all regions (see Maps 6 and 7 and, in Annex, Tables A.1-A.8). However, seven counties accumulate 37% of all NGN-black villages in Romania (both without and with 3G+ networks). These counties are: Arges and Dambovita (South-Muntenia), Valcea and Gorj (South-West), Bihor (North-West), Mures (Centre) and Suceava (North-East). The same counties are the most advanced in developing broadband services since the proportion of NGN-black villages represent over 60% of all 'valid' villages, in each. [43] Other counties with a high proportion of NGN-black villages are:

(i) Botosani (North-East), Maramures (North-East) and Galati (South-East), with respect to NGN-black no 3G+ villages (with values of 34-42% as compared to the national average of 20% in all 'valid' villages);

(ii) Bucharest, Ilfov (Bucharest-Ilfov) as well as Brasov and Covasna (Centre) with regard to NGN-black villages with 3G+ networks (proportions of 100%, 90%, 46% and 39% respectively, as compared with 25% of all 'valid' villages at the national level).

At regional level, the most intense development of the fixed high speed broadband in the country has taken place in three regions: South-Muntenia and Bucharest-Ilfov, particularly for NGN-black villages with 3G+ networks, and South-West, with regard to NGN-black villages without 3G+ networks. At the other extreme, the weakest development has been recorded in the West, North-East, Centre and South-East regions.

Extremely small proportions of NGN-black spots in all 'valid' villages (between 6% and 21% as compared to 45% national average) are found in four counties: Vaslui (North-East), Alba (Centre), Tulcea (South-East) and Hunedoara (West). In addition, out of the 96 villages included in the Danube Delta micro-region,[44] only 23 are NGN-black (12 without and 11 with 3G+ networks).

Ongoing projects

A total number of 970 villages were recorded as being involved in ongoing projects as at December 31, 2014 (ANCOM.v1, 2015). Most of them (783) have participated in the Ro-NET project, implemented by MIS, and only 187 have been part of a MARD projects (see Maps 8 and 9 and, in Annex, Tables A.1-A.8).

These villages are dispersed in all counties, with the exception of Maramures (and the capital Bucharest). Nonetheless, the number of villages per county ranges between 1 and 53, with a peak of 101 in Vaslui county (North-East).

Table 7 illustrates a matching exercise between the number of projects per county and the profile of county in terms of mix of NGN-areas (white, grey or black). The exercise includes only the extreme cases on at least one of the four dimensions considered (columns in table). The main finding of this exercise is that, at present, the public broadband projects are poorly correlated with the NGN-types.

[43] Only in Mures the proportion of NGN-black villages in all 'valid' villages is lower, 52%.

[44] These villages belong to Tulcea and Constanta counties.

Table 7: Matching exercise at village level between targets of public broadband projects and county profile in terms of mix of NGN-areas

County	White and NGN-white	NGN-grey		NGN-black	Ongoing projects (Ro-NET or MARD)
		AnotD	DnotA		No. projects (all villages)
Vaslui	+ +	+		- -	101 (461)
Valcea				+ +	53 (608)
Olt			0	+	53 (388)
Teleorman				-	48 (236)
Alba	+ +	0		- -	44 (707)
Buzau	+ +	+ +	+	-	42 (485)
Hunedoara	+ +		0	- -	40 (479)
Mehedinti	+			-	39 (356)
Cluj	+ +			-	38 (429)
Tulcea		0	+	- -	38 (21 Danube Delta) (137)
Vrancea		0			36 (344)
Dolj		1	0		35 (383)
Bihor		0	0	+ +	33 (458)
Caras-Severin		+			32 (307)
Suceava		2	+ +	+ +	23 (410)
Calarasi	-	+	+	-	23 (158)
Constanta	+			-	22 (0 Danube Delta) (210)
Timis		+			21 (323)
Mures		1		+ +	19 (504)
Bacau	+ +	+		-	18 (502)
Salaj	+	2	+ +	-	15 (288)
Arges	-		0	+ +	13 (583)
Iasi	+ +	+ +		-	12 (428)
Bistrita-Nasaud	+	0	0	-	12 (249)
Dambovita	- -	+		+ +	10 (373)
Prahova		+ +	+ +	+	9 (454)
Brasov	-	0	0	+	8 (165)
Satu Mare		1	0		8 (231)
Ialomita			0		7 (138)
Botosani		0	0	+	7 (335)
Harghita		2	+		6 (259)
Galati	-	0	0	+	4 (183)
Covasna	- -	1	0	+	3 (127)
Ilfov	- -		0	+	1 (104)
Gorj	- -		0	+ +	1 (435)
Maramures	-			+	0 (247)

Source: World Bank calculations using ANCOM.v1 (2015).

Notes: '+ +'/ '- -' Very high/low values both in absolute numbers and in proportion in total 'valid' villages; '+'/'-' Very high/low values either in absolute numbers or in proportion in total 'valid' villages; Numbers (0-2) in N-grey villages columns shows that in the respective county there are only 0-2 AnotD or DnotA villages; Colors code: Dark green - very good situation or strong response (large number of interventions); Light green - good situation; Yellow - medium values/ response; Light red - problematic situation; Dark red - very problematic situation or weak response (small number of interventions).

Considering the county as comparison level, it becomes apparent that public broadband projects tend to give the same response to situations that are very different. Let us take as an example the counties with the highest number of interventions. The strongest response is targeted to the most problematic cases (such as Vaslui, Alba and Hunedoara), as would have been expected. Nonetheless, a response of comparable intensity is addressed to some medium situations (such as Vrancea and Dolj) and even to good situations (such as Valcea, Bihor or Olt). Furthermore, the same number of projects is financed from public funds in counties with very different number of villages. For example, about 50 villages are targeted by projects both in counties with a relatively small number of villages (Teleorman, 236) and in medium-size counties (Olt with 388 villages overall), as well as in counties with a large number of villages (Valcea with a total of 608 villages). In a similar manner, a medium intensity response is given to problematic situations (Bacau and Iasi), but also to some rather weak (Constanta or Salaj), medium (Timis), good (Arges, Mures or Suceava), as well as very good, such as in Dambovita.

This mismatch, most likely, has a multitude of causes among which:

- lack of a mapping/ data at national level, wherefrom the lack of any consideration regarding the county profile of NGN-types when villages are selected for intervention;

- different and uncoordinated approaches of the two public projects: (i) MIS has provided support only backhaul conditioned by the interest expressed by a private operator to build up the local loop, while MARD has financed both backhaul and local loop; (ii) villages for intervention in Ro-NET were selected by MIS based on a study, whereas for MARD funding the operators applied on a competitive basis. However, the existence of an interested operator was a prerequisite for both projects. It is a well documented fact that the presence of operators as well as the propensity to document/apply for projects is considerably higher in more developed communities, with high social capital, as compared with poor/deprived areas, unless an extended campaign and facilitation is rolled out before the project onset. No such campaign was implemented, which led to a part of the mismatch. For example, among counties with the largest number of MARD projects are found Olt and Valcea. Nonetheless, in other counties with a comparable profile (rather advanced in terms of broadband infrastructure development), the MARD projects have played an insignificant role or not at all, such as in the cases of Suceava and Mures.

However, the analysis at village level provides only a partial picture that needs to be completed with data on population and households.

ii. Distribution according to the size of population

This section turns from village to population. The analysis is focused on size of the population in the ten types of NGN areas included in the analysis, at the levels of population (individuals), household, village and administrative unit (commune or city).

Number of population

Coverage-related 2020 target already achieved in urban areas

Over 84% of Romania's population lives in NGN-black areas, which means they have access to high speed Internet (Table 8 and, in Annex, Table A.9). This coverage rate of population varies between 69% in rural areas and 97% in urban ones. Furthermore, in urban areas, 95% of population lives in cities covered by fixed broadband with high speed download (30+ Mbps) and mobile broadband networks 3G+(HSPA)/LTE/LTE Advanced. By contrast, in rural settlements, only 39% of residents have access to services similar to those from urban areas, while 26% have access only to fixed connections (NGN-black no 3G+ networks).

Overall, in the all NGN-white villages (6,235) reside only almost 14% of general population (Table 8 and, in Annex, Table A.9). Out of them, in the white villages not covered by fixed broadband live about 2% of total country population that represent about 4% of rural population (Table A.9, Annex). The Digital Agenda target of 100% coverage of population with fixed broadband was achieved for urban population.

Number of households

Coverage-related 2020 target already achieved at country level

About 85% of households in Romania have access to high speed Internet as residents of a NGN-black areas (Table 8 and, in Annex, Table A.10). The coverage of households varies considerably between 68% in rural communities and 98% in cities. The Digital Agenda target of 80% coverage of households with broadband above 30 Mbps was achieved at the country level.

Table 8: Distribution of Romania's population by NGN-areas

		Villages (SIRUTA units), from rural and urban environment of Romania, that have **local loop networks for broadband communications with speed of 30 Mbps or over**, and that are not involved in ongoing publicly-funded broadband projects (either by MARD or by MIS).	
		Yes	**No**
Villages (SIRUTA units), from rural and urban environment of Romania, that have **backhaul connections for broadband communications with speed of 30 Mbps or over**, and that are not involved in ongoing publicly-funded broadband projects (either by MARD or by MIS).	**Yes**	**Black areas** 84.4% of population 84.9% of households	**Distribution-not-Access** **DnotA** 0.5% of population 0.5% of households
	No	**Access-not-Distribution** **AnotD** 1.4% of population 1.3% of households	**NGN-white areas** 13.7% of population 13.3% of households **Of which, white areas** 2% of population 2% of households

In conclusion, the coverage-related targets of the Digital Agenda for Romania 2020 have already been achieved in 2015. Yet, investments are still necessary for closing the significant urban-rural gap, particularly in relation to high speed Internet (30+ Mbps) and keeping in mind that rural

areas concentrate most disadvantaged population. In addition, these data send a clear signal that much more attention and efforts should be channeled on stimulating penetration, demand and usage of Internet, especially through developing the supply of services such as e-commerce, e-health, e-learning and foremost e-government. Only increasing the supply of services, the usage may increase sufficiently to reach the other Digital Agenda targets.

Table 9: Matching exercise at household level between targets of public broadband projects and county profile in terms of mix of NGN-areas

County	White and NGN-white	NGN-grey		NGN-black	Ongoing projects (Ro-NET or MARD)
		AnotD	DnotA		No. of villages/households
Vaslui	+ +	+ +		- -	101/ 16,881
Valcea	-				53/ 8,142
Olt			0		53/ 8,421
Teleorman	+ +			- -	48/ 9,393
Alba	+ +	0		- -	44/ 2,991
Buzau	+	+ +			42/ 5,958
Hunedoara			0		40/ 3,648
Mehedinti	+			- -	39/ 6,602
Cluj	+			+	38/ 5,439
Tulcea	+	0	+ +	- -	38/ 7,140
Vrancea		0			36/ 4,596
Dolj	+	-	0	+	35/ 7,965
Bihor	-	0	0	+ +	33/ 4,731
Caras-Severin	- -	+ +	-		32/ 5,269
Suceava			+ +	+	23/ 4,422
Calarasi		+ +	+ +		23/ 4,933
Constanta			+	+	22/ 4,258
Timis				+	21/ 2,669
Mures					19/ 3,034
Bacau	+ +	+		-	18/ 3,025
Salaj			+	-	15/ 2,132
Arges			0	+ +	13/ 1,675
Iasi	+ +	+ +			12/ 1,782
Bistrita-Nasaud	+	0	0	- -	12/ 1,873
Dambovita	- -	+ +		+	10/ 1,722
Prahova		+ +	+ +	+	9/ 1,201
Brasov	-	0	0	+	8/ 1,369
Satu Mare		-	0		8/ 1,149
Ialomita			0	-	7/ 1,550
Botosani	+	0	0		7/ 917
Harghita		-			6/ 729
Galati		0	0	+ +	4/ 1,207
Covasna	- -	-	0		3/ 326
Ilfov	- -		0	+	1/ 255
Gorj	- -		0		1/ 106
Maramures					0/ 0

Source: World Bank calculations using ANCOM.v1 (2015).

Notes: '+ +'/ '- -' Very high/low values both in absolute numbers and in proportion in total number of households; '+'/'-' Very high/low values either in absolute numbers or in proportion in total households; Zero in N-grey villages columns shows that in the respective county there are zero DnotA or AnotD villages; Minus in N-grey villages columns indicate a very small overall number of households in DnotA or AnotD villages; Colors code: Dark green - very good situation or strong response (large number of interventions); Light green - good situation; Yellow - medium values/ response; Light red - problematic situation; Dark red - very problematic situation or weak response (small number of interventions).

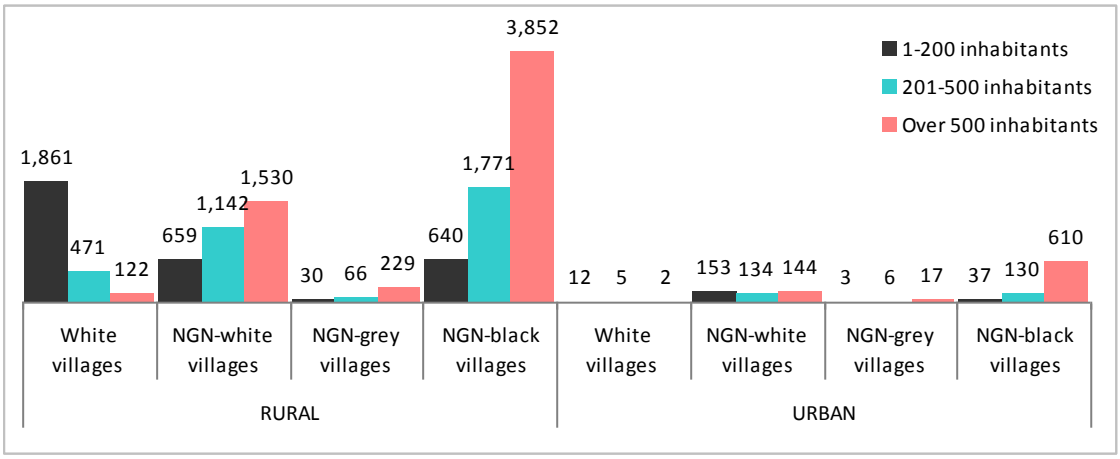
As for the existing interventions, the public broadband projects are poorly correlated with the profile of county in terms of mix of NGN-areas (white, grey or black). Table 9 shows the results of a matching exercise between the number of projects per county and the county broadband profile, when the number of households is taken into consideration. This exercise confirms the results of the analysis based on the number of villages shown in Table 7. Inconsistencies between intervention and the treated problem remain, regardless if the number of villages or that of households is taken as reference. A response of comparable intensity has been given to very different or even opposed situations, from very problematic to good situations.

Size of population at village level

Section A.ii3.A.ii has already shown that in Romania, most villages have between 100 and 2,000 inhabitants. At one extreme, the small villages (below 500 inhabitants) and, especially very small villages (less than 200 inhabitants), are the most disadvantaged, particularly those with an elderly population and/or those that are located in remote areas. At the other extreme, large villages (above 2,000 inhabitants) tend to be the most developed. Thus, the size of village population is a strong determinant for its general level of development or potential.

The size of village population is a strong correlate of NGN broadband areas, which indicates this indicator as a good proxy for market potential (see Table A.11 in Annex). Over three quarters of the white villages (no operator and no connection) are very small with less than 200 inhabitants. In fact, 310 white villages have below 20 inhabitants (306 in rural and 4 in urban areas). In the same time, the proportion of white villages from rural areas decreases from 90% of villages 1-20 inhabitants to 73% of villages 21-100 inhabitants and 39% respectively in villages of 101-200 inhabitants. Once a rural community reaches the threshold of 200 inhabitants, it starts to have increased chances to be covered by some fixed broadband connections, be it high speed or not. At the threshold of 500 inhabitants, rural communities have 61% chances to have fixed broadband connections at speeds above 30 Mbps (mostly accompanied by mobile 3G+ networks). The odds to have access to high speed Internet increases with village population size, reaching 87% of villages with over 3,000 inhabitants. A similar correlation is registered in urban areas, with the difference that hamlets of 1-20 residents from cities have a probability of 71% to be NGN-white villages, hence they have access to Internet but of at a speed below 30 Mbps.

Figure 5: Distribution of NGN broadband areas by residency and size of village population (number)



Source: World Bank calculations using ANCOM.v1 (2015) and 2011 Population and Housing Census.

Development of broadband infrastructure is still needed predominantly in small and very small villages (<500 inhabitants), but also in 1,798 medium or large villages, of which only 146 are in urban areas (Figure 5). Given the rather high market potential of medium and large villages, especially the urban ones, the state intervention should be directed towards the small white or NGN-white areas from rural environment. Among these, however, priority should be given to viable communities with growth potential. A relevant measure of community viability is population growth. With this purpose, the study measured the evolution of village population between 2002 and 2011 (the last censuses). Based on this indicator the small white and NGN-white areas (<500 inhabitants) can be divided into 'small viable' communities and 'small-declining' communities, as shown in Table 10.

Table 10: Small declining and viable white and NGN-white villages in Romania (2002-2011)

	Rural				Urban			
	Small declining	Small viable	Missing data	Total	Small declining	Small viable	Missing data	Total
White villages, of which:	**1,847**	**473**	**12**	**2,332**	**7**	**8**	**2**	**17**
1 - 20	258	40	8	306	2	-	2	4
21 - 100	763	175	1	939	3	-	-	3
101 - 200	488	128	-	616	2	3	-	5
201-500	338	130	3	471	-	5	-	5
NGN-white, of which:	**1,275**	**525**	**1**	**1,801**	**201**	**57**	**29**	**287**
1 - 20	13	4	-	17	15	2	3	20
21 - 100	147	45	-	192	50	14	2	66
101 - 200	337	112	1	450	44	12	11	67
201-500	778	364	-	1,142	92	29	13	134
All white and NGN-white								
N	**3,122**	**998**	**13**	**4,133**	**208**	**65**	**31**	**304**
%	**75.5**	**24.1**	**0.3**	**100**	**68.4**	**21.4**	**10.2**	**100**

Source: World Bank calculations based on 2002 and 2011 Population and Housing Censuses and ANCOM.v1 (2015).

Notes: Small declining villages are SIRUTA units (urban and rural) with 500 inhabitants at most that at 2011 census had a resident population smaller than 95% of the level registered at 2002 census. Small viable are SIRUTA units (urban and rural) with 500 inhabitants at most that at 2011 census had a resident population >95% of the level registered at 2002 census.

Only about one in every five small rural white communities and small urban white and NGN-white hamlets is viable. The other four in every five of these villages are declining. The share of viable communities slightly increases to 29% among small rural NGN-white villages.

In total, in the small villages (<500 inhabitants) that are white or NGN-white spots live almost 818 thousand persons. Out of them 93% are in rural areas (7% in urban), 64% in NGN-areas (36% in white spots), 72% in declining communities and only 28% in viable ones (see Table A.12 in Annex).

These people belong to around 315 thousand households, of which 93% are in rural areas (7% in urban), 63% in NGN-areas (37% in white spots), 74% in declining communities and only 26% in viable ones (see Table A.13 in Annex).

Size of population at administrative unit level (commune/city)

Sections 3.A.ii and **Error! Reference source not found.** have already discussed the main characteristics of administrative units from Romania, both communes and cities. We saw that:

- Among rural municipalities, the small communes with fewer than 2,000 inhabitants are the most disadvantaged in terms of economic, human and social development. Even the remote communes (those that have little connection to any city) are likely to be disadvantaged only when they are small. In the same time, the small communes are generally less connected to their nearest cities than larger communes (in other words, they are more likely to be remote).
- Among small towns, the (51) recent small towns (declared between 2002 and 2006) and (61)[45] very small towns with fewer than 7,500 inhabitants have, on average, a larger number of villages (more than five), they have a much more accentuated rural character and are more likely to be underdeveloped[46] compared with other urban areas.

Therefore, an analysis of the administrative units (SIRSUP level) in which the NGN broadband areas (identified at village - SIRUTA level) are grouped is highly relevant. Even more so given that local authority (mayoralty) is an important stakeholder in any public intervention, since it represents and is responsible for all incorporated villages.

Table A.14 (Annex) shows the distribution of villages (SIRUTA units) according to the NGN-type and size of population in the administrative units (SIRSUP units) to which they belong. A pattern is evident. In the rural environment, white points belong more frequently to small rural municipalities (<2,000 inhabitants), whereas AnotD, DnotA and NGN-black areas tend to concentrate in communes over 3,000 inhabitants. In urban areas, white spots are found only in small cities with less than 20 thousand inhabitants, especially in those very small of less than 7,500 people. NGN-grey (AnotD and DnotA) are frequently located in small towns (7,500-20 thou persons), while medium and large cities predominantly incorporate NGN-black villages.

[45] Declared cities before 2002.

[46] Measured against LHDI. See definition of LHDI in footnote 19.

Table 11: Distribution of administrative units by residency and mix of NGN broadband areas

Incorporate villages of ... types	Number			%		
of NGN broadband areas	Rural	Urban	Total	Rural	Urban	Total
Only 1 type	1,121	150	1,271	39.2	46.9	40.0
2 types	1,062	143	1,205	37.1	44.7	37.9
3 types	583	24	607	20.4	7.5	19.1
4 types	92	3	95	3.2	0.9	3.0
5 types	3	-	3	0.1	0.0	0.1
Total	**2,861**	**320**	**3,181**	**100**	**100**	**100**

Source: World Bank calculations using ANCOM.v1 (2015) and Nomenclature of Territorial-Administrative Units, January 2015 (NIS). Note: NGN-types include white, NGN-white, AnotD, DnotA, NGN-black, and villages that participate in ongoing projects (Ro-NET or MARD).

In Romania, most administrative units, be it rural or urban, incorporate village-neighborhoods (section **Error! Reference source not found.**).[47] Thus, any commune or city is a mix of NGN broadband areas of 1-to-5 types of villages, including white, NGN-white, AnotD, DnotA, NGN-black, and villages that participate in ongoing projects (Ro-NET or MARD). Table 11 shows that only 39% of communes and 47% of cities incorporate villages of only one NGN-type. At the other extreme, three communes have the most complex mix of (five) NGN-types villages. For example, commune Stoilesti,[48] from Valcea county, includes a total of 15 villages, out of which: 4 white communities, 1 NGN-white, 6 AnotD settlements, no DnotA, 1 NGN-black village, and 3 ongoing Ro-NET projects.

Lessons for public interventions and priority administrative units

Given the current development level of broadband infrastructure seen at the administrative unit level (Table A.15, Annex), few lessons could be drawn:

(1) In the light of the NGN National Plan, the option to change the design of state intervention from village to administrative unit is recommended to be considered. Until now, both Ro-NET and MARD projects targeted villages regardless the broadband profile of the administrative unit. Partly this was the result of the technical parameters required by the project, partly was caused by lack of data, and partly was given by the different definition used for targets ('white' areas). At present, the entire landscape has changed and a new approach may prove beneficial, both in effectiveness and efficiency terms. Even more so taking into account that in most communes, the geography does not obstructs viable technical solutions for covering the entire territory, hence all included villages.

(2) The coverage targets of the Digital Agenda for Romania 2020 have already been achieved. Therefore, there is a need to prioritize interventions towards the communities most in need (characterized by the most accentuated market failure). For the villages that belong to administrative units in which there are operators of electronic communication networks at

[47] The 320 cities from Romania include a total of 1,253 village neighborhoods. Only 81 cities do not include villages (compact settlements of houses with a rural aspect usually located a few kilometres away from the city nucleus). As a general rule, the larger the number of villages included within a locality, the higher its probability of being underdeveloped (measured against LHDI as defined in footnote 19).

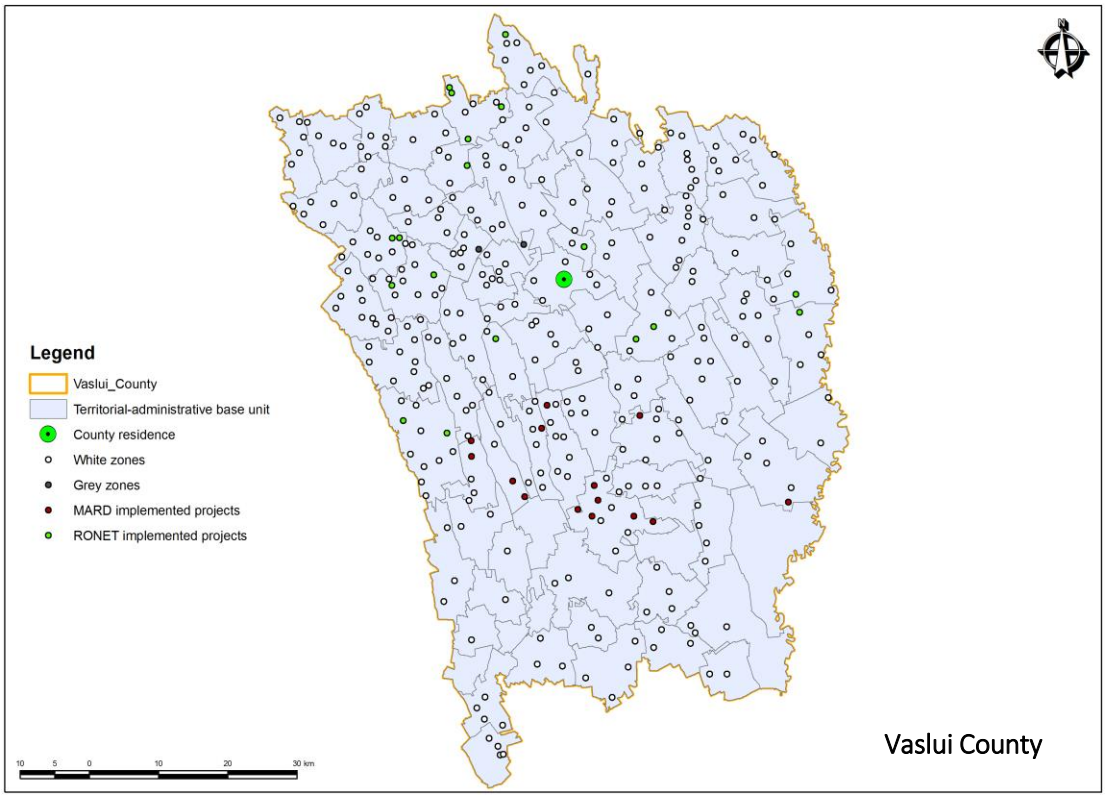
[48] The other two communes with a mix of five NGN-types are Feliceni (Harghita) and Ileana (Calarasi).

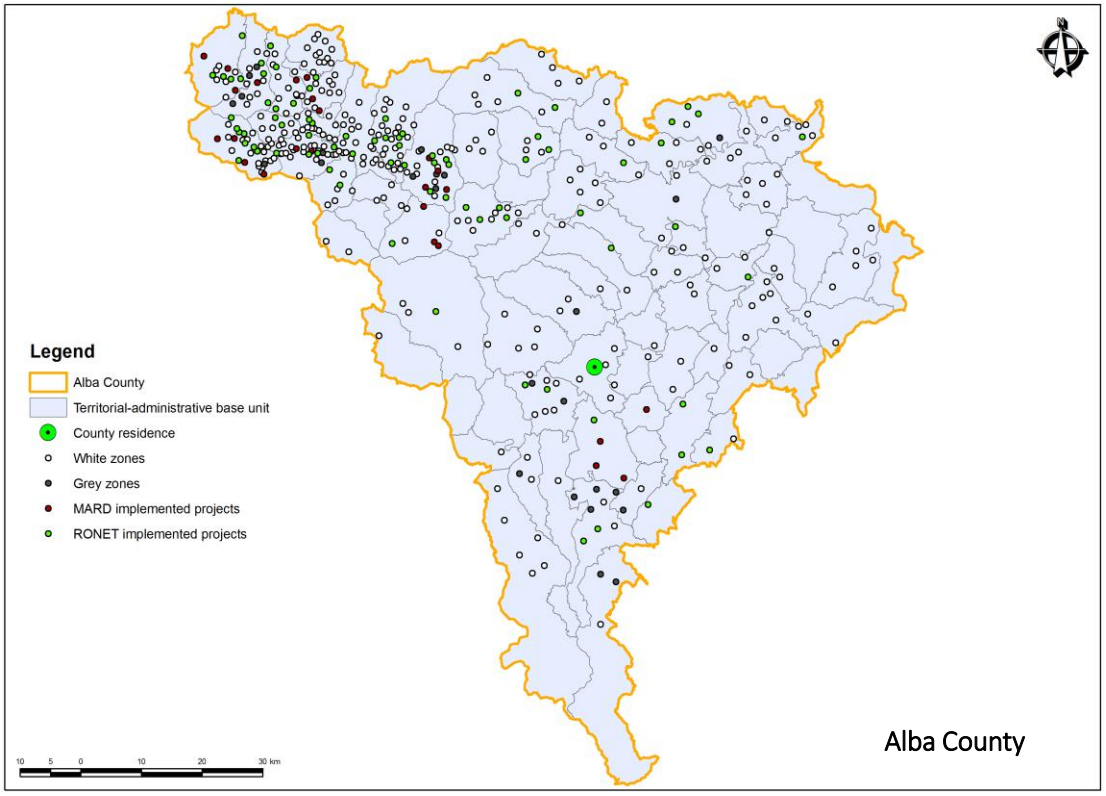
speeds above 30 Mbps, an option is to let the market to develop, while focusing the public effort on developing the supply of services and on stimulating demand.

(3) A public intervention at administrative unit level may also consider the change of business model. Until now, the local authorities had a rather low profile in the public interventions, mainly due to the requirement to work with an operator willing to develop the infrastructure (backhaul and/or local loop). In the future, the role of public authorities could increase, especially if intervention at administrative unit level is considered. Consequently, mechanisms and tools to increase the local capacity to deal with local networks and operating companies would become crucial.

(4) Simply zooming up the map of broadband areas it becomes obvious that many undersupplied municipality are neighboring other undersupplied municipalities. An example is presented in Map 10 regarding Vaslui county. So, besides the municipality level, the intervention may take place at the level of clusters of localities such as the partnerships of administrative units (Local Action Groups - LAG) under LEADER (MARD) or CLLD (OPHC and ROP) programs financed from European funds. This issue is treated in section 3.D.i Here we keep analyzing the interventions at the commune/city level, which are highly relevant for rural and urban municipalities that are not part of any LAG.

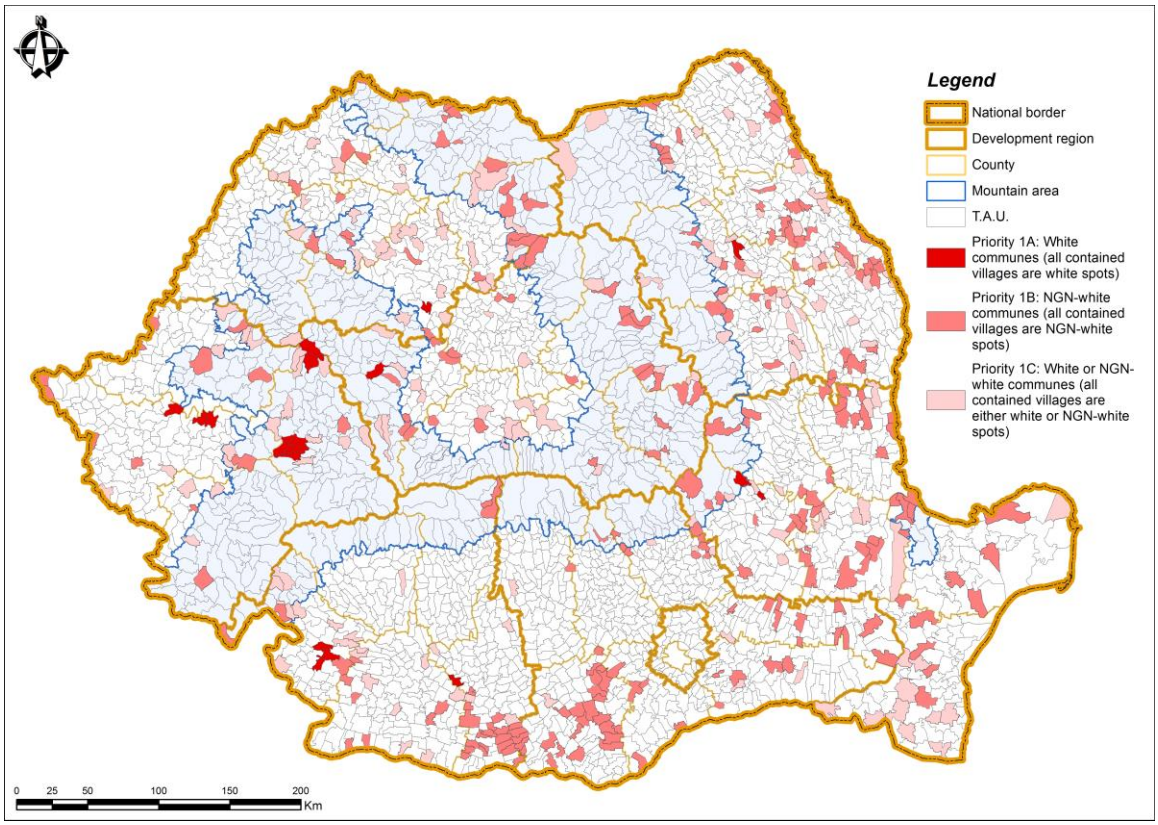
Map 10: Zoom the map of NGN broadband areas for Vaslui and Alba counties, at December 31, 2014





Source: World Bank calculations using ANCOM.v1 (2015).

Map 11: The distribution of white and NGN-white communes and cities (priority 1) for the first phase of a future public intervention at administrative unit level, at December 31, 2014



Source: World Bank calculations using ANCOM.v2 (2015).[49]

The analysis of the broadband profile at administrative unit level (Table A.15, Annex) indicates the following intervention priorities:

Priority 1:

- (A) White-Communes in which all included villages are white spots (no operator)

19 communes from 7 counties, including 127 villages in which live over 18 thousand people in 7,572 households (see list in Table A.16, Annex). Among these villages, 94 are small declining, 26 are small viable and only 7 have over 500 inhabitants.

- (B) NGN-white-communes and cities in which all incorporated villages are NGN-white spots (with no access to high speed broadband)

247 communes and one small town (Insuratei, Braila) with a total of about 614 thousand inhabitants and over 220 thousand households. These settlements incorporate 613 villages (4 in urban), of which 399 are medium or large (>500 inhabitants) and other 41 are small viable communities. They are scattered in 38 counties, with a concentration in six counties, namely Buzau, Galati, Iasi, Ialomita, Olt

[49] The results of ANCOM survey were corrected in June 2015. Corrections have affected the status of 52 'valid' villages, which produced significant changes only for 9 communes with respect to the intervention priorities.

and Teleorman.

- (C) Communes that have only white or NGN-white villages

158 communes almost evenly distributed in 37 counties. They have about 374 thousand inhabitants in 136 thousand households, which are grouped in 822 villages, out of which 251 are medium or large (>500 inhabitants) and 134 are small viable communities.

By investing in infrastructure development in 423 communes and one small town (Insuratei, Braila), which are the most affected by market failure (priority 1), over a million persons (in 364 thousand households and 1,562 villages) may be reached. Such an approach would address 487 white villages and 1,075 NGN-white spots,[50] increasing the coverage with over 5% of population and 4.9% of households at national level. Map 11 shows the distribution of these settlements in the territory.

iii. Distribution according to distance, position and territory

Distance and territory at village level

The village accessibility, measured by geographic distance[51] to the nearest city, is a highly relevant indicator from the social and economic point of view. Large distance combined with poor quality of roads determines little profitability of transportation service. Low profitability leads to serious reduction of transportation means. Consequently, the large distance becomes remoteness especially during rainy seasons. Neither a doctor nor a teacher, based outside commune, accepts to work in remote villages primarily due to extremely difficult commuting. Therefore, geographical isolation comes together with institutional marginalization. In addition, low villagers' opportunity to reach urban peasant market for selling their food products deepens the economic weakness of individuals and community.

Distance to the nearest city is highly correlated with existence of a railway or a bus station. It represents a proxy for the distance to the nearest high school and university, as well as to the nearest urban peasant market. It is correlated with the development of village infrastructure: the smaller the distance to a city, the larger the number of kilometers of modernized road, the larger the share of houses endowed with running water, and the larger the share of households with telephone. In addition, the lower the distance to the nearest city, the larger and more sophisticated the cultural consumption of the population: the higher the number of newspapers subscriptions, the higher the education stock (Sandu, coord., 2000),[52] and the higher the ability to use a foreign languages (Voicu and Voicu, 2004).[53]

The distance to the nearest city varies in Romania between 0.5 and 82 km (excepting the villages with access on water from Danube Delta), with an average of 21 km and a standard variation of 11 km. Thus, in Romania, a village is close to city if it is located to less than 10 km from it, 10-32 km represents a moderate distance, while a village is remote if there are 32 km or more to the nearest urban area.

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[50] These values represent 20% of all white spots and 29% of all NGN-white villages in the country.

[51] We use the distances determined by a team of geographers from the Institute for Geography.

[52] Sandu D. (coord.), Stănculescu M. S., Şerban M., Holt S. and Dobrescu D., 2000, *Social Assessment for Rural Development Project. Social Needs and Actions in Romanian Villages*, World Bank Report, Bucharest.

[53] Voicu B. and Voicu M., 2004*, Knowledge Divide in Romania Series*, Papers No.1-6, World Bank Reports, Bucharest.

In rural areas, the geographic distance to the nearest city is also a strong correlate of the NGN-type. Small villages tend to be remote or far from cities, large villages concentrate in the cities neighborhood, and medium size villages are predominantly at moderate distances to cities. Table A17 (Annex) shows that the share of white and NGN-white villages in all SIRUTA units increases incrementally from 34% of the villages at 0.5-10 km from a city to 43% among villages found at >10-21 km, 53% in the case of villages at >21-32 km, and reaches a high 61% for remote villages located at over 32 km from the nearest city.[54] So, the larger the number of remote villages incorporated by a commune, the higher its chances to be among the white or NGN-white communes (priority 1).

Landform of territory makes also a difference with regard to the village NGN-type. In rural Romania, plain and hilly-plain villages are predominantly white or NGN-white areas, whereas hilly-mountain and mountain villages tend to be NGN-black points (Table 12).

Table 12: Villages by NGN broadband areas and landform (%)

	Mountain	Hilly-mountain	Hilly-plain	Plain	Total (%)
RURAL					
White villages	10.9	10.3	19.1	36.6	19.9
NGN-white villages	21.6	24.9	29.8	29.3	26.9
AnotD - Access-not-Distribution	1.8	2.3	2.0	1.5	1.9
DnotA - Distribution-not-Access	0.5	1.3	0.7	0.4	0.7
NGN-black villages	60.9	56.1	40.1	20.6	43.0
Ongoing projects	4.3	5.1	8.3	11.6	7.6
Total (%)	100	100	100	100	100
N	2,289	2,922	3,693	3,084	11,988

Source: World Bank calculations using ANCOM.v1 (2015) and landform according to the Institute of Geography. Notes: In this paper, 'ongoing publicly-funded broadband projects' or 'ongoing projects' refer to all MARD or Ro-NET projects, irrespective in which phase of implementation they are. N=385 missing cases.

Administrative position of the village within commune/city

As section Error! Reference source not found. explained, 88% of communes are constituted of at least two villages, one central and one or more peripheral villages.[55] The share of peripheral villages is about 75% in all SIRUTA units, both in rural and urban areas. Nonetheless, the proportion of population living in peripheral villages (neighborhoods) represents 48% of total rural population and mere 6% of urban population. With the majority of population, central villages (neighborhoods) concentrate the administrative and institutional resources of the commune/city. The central village/town is the locus for the municipality, postal unit, health unit, church, coordinating school, police, House for Culture and so on. In contrast, in most peripheral villages there are only two institutions, a church and a school. Furthermore, the public infrastructure is significantly poorer in peripheral villages (dirt roads, lack of running water, lack of communications, etc.).

[54] The share of white and NGN-white villages in all SIRUTA units is 46% at the country level.

[55] The other 12% of communes comprise only a central village.

Table 13: Villages by NGN broadband areas and administrative position within commune/city (%)

	Rural Central	Rural Peripheral	Urban Central	Urban Peripheral	Total (%)
RURAL					
White villages	1.1	25.5	0.0	2.0	18.1
NGN-white villages	23.5	28.0	0.9	46.1	27.6
AnotD - Access-not-Distribution	2.8	1.6	0.3	1.7	1.8
DnotA - Distribution-not-Access	1.2	0.6	0.0	1.0	0.7
NGN-black villages	68.4	35.3	98.8	46.2	44.5
Ongoing projects	2.9	9.0	0.0	2.9	7.1
Total (%)	100	100	100	100	100
N	2,861	9,512	325	928	13,626

Source: World Bank calculations using ANCOM.v1 (2015) and Nomenclature of Territorial-Administrative Units, January 2015 (NIS). Notes: In this paper, 'ongoing publicly-funded broadband projects' or 'ongoing projects' refer to all MARD or Ro-NET projects, irrespective in which phase of implementation they are.

The administrative position of village is another strong correlate of the level of development of broadband infrastructure (Table 13). The share of NGN-black villages in all SIRUTA units increases incrementally from 35% of peripheral rural settlements to 46% among urban peripheral villages/neighborhood, 68% in the case of central villages, and peaks 99% for central units of cities.[56] Therefore, integrated intervention at administrative unit level, which to find the most suitable technical solution for all incorporated villages (central and peripheral) would be beneficial in relation to the cohesion policy.

Distance and geographical position within county at administrative unit level

At the village level, the distance to the nearest city is a strong correlate for the type of broadband area. For communes, as clusters of villages, this correlation is much attenuated (Table 14). Counter-intuitively, among the remote communes (measured based on IURCON), the share of those without any NGN-black village is smaller and not larger than in the communes well connected to the urban network. Nonetheless, the proportion of communes comprising only white or NGN-white villages is also smaller. So, regarding broadband, the remote communes tend to be a combination of white, grey and black villages. A much better indicator is the existence within the commune of one or more remote villages (at >32 km from the nearest city).

Position at county boundaries is also relevant for the communes identified as intervention priority. Not only that slightly more communes at county boundaries would qualify for priority interventions, but also more of them are located at over 75 minutes trip from the county capital city (from where many documents and approvals should be obtained for infrastructure deployment).

[56] The share of NGN-black villages in all SIRUTA units is 44.5% at the country level.

Table 14: Communes by NGN-priority and connectivity to cities (%)

	Remote communes	Communes at county boundaries, of which …	… at 75 minutes or more from the county capital city	Communes with remote villages (32+ km to city)	Total (%)	N
Communes not intervention priority	87.2	82.6	80.1	81.5	85.2	2,438
Priority 1 communes:	12.8	17.4	19.9	18.5	14.8	423
(A) White Communes	0.7	0.7	0.5	1.6	0.7	19
(B) NGN-white communes	6.8	9.9	11.2	7.7	8.7	246
(C) White/NGN-white communes	5.3	6.8	8.2	9.3	5.5	158
Total (%)	100	100	100	100	100	2,861
N	547	1288	196	562	2,861	

Source: World Bank calculations using ANCOM.v2 (2015). For remote communes (based on IURCON), World Bank (2014) *Competitive cities. Reshaping economic geography of Romania*; For communes at county boundaries, World Bank (2015) *Inputs for the Preparation of a Draft National Strategy and Action Plan on Social Inclusion and Poverty Reduction 2015-2020*. Notes: For definition of communes NGN-priority see section 3.C.ii. Remote communes determined based on IURCON, which provides an estimation of urban connectivity based on a set of distances between a commune and its neighboring small, medium, large, and very large cities. The higher the IURCON value, the better connected to cities is that commune. Remote communes are those localities in the lowest quintile of IURCON.

D. Socio-Economic Analysis of the NGN broadband areas from Romania

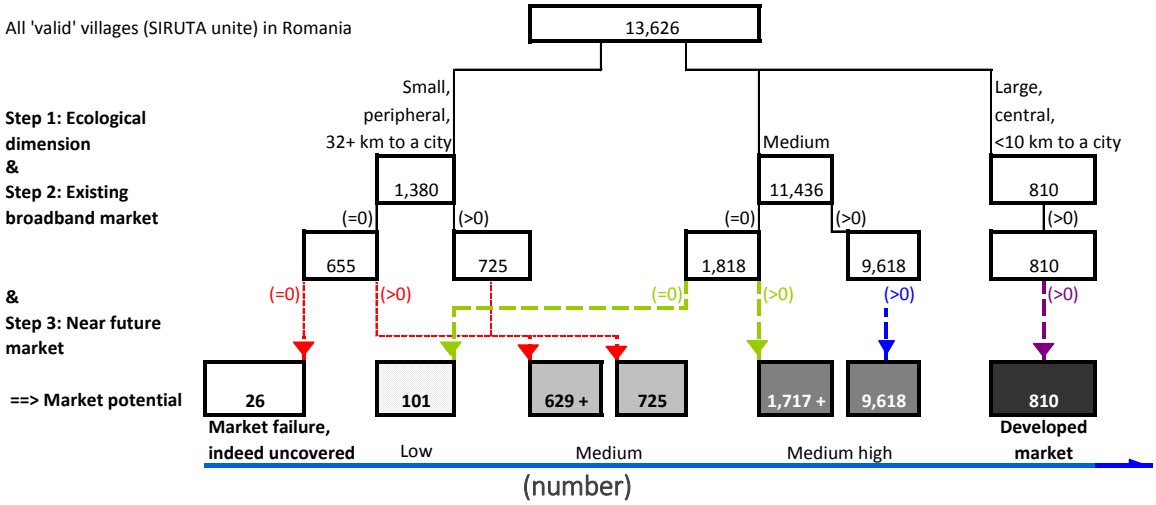
This chapter of the broadband mapping aims to identify the areas indeed uncovered (most undersupplied) through a comparative analysis between the NGN-white (including white), NGN-grey (AnotD and DnotA) and NGN-black areas (including ongoing projects). The analysis is based on socio-economic and broadband indicators grouped on three dimensions: market potential, demand potential, and economic power of population and community. The analysis will unfold at two levels: village (SIRUTA units) and administrative unit (SIRSUP units). Such an analysis constitutes a baseline study useful for developing the future investment monitoring, which is necessary in order to determine resulting effects if an authority allocates state aid or funds for broadband deployment.

Identifying the areas indeed uncovered is important in order to inform the possible spatial allocation of state aid, which represents a potential means to provide incentive to broadband deployment in undersupplied areas. However, state aid is an instrument that is intended to be used only as a complementary measure to private investment, hence for areas indeed uncovered, and that state aid does not lead to significant market distortions.

i. Market potential for broadband in undersupplied areas

In this study, areas of distinctive potential for development are delimited by combining data on broadband availability with additional data on various ecological characteristics. Identification of market potential of each village from Romania is based on a procedure in three steps. Figure 6 describes this procedure and the empirical results at 'valid' village level.

Figure 6: Procedure for identification of broadband market potential at village (SIRUTA) level



Source: World Bank calculations using ANCOM.v1 (2015).

The first step refers to the ecological dimension. Previous sections have brought evidence that the ecological dimension is highly relevant for the level of development of broadband infrastructure in the country. Villages small (<500 inhabitants), peripheral and remote (32+ km to the nearest city) have disproportionately low chances to be covered by broadband, whereas those large (>1,000 inhabitants), central and close-to-city (< 10km to the nearest city) have disproportionately high chances, as compared with the other (medium) villages. Correspondingly, all 'valid' villages were divided in three groups that have a market potential low, medium and high, given by their ecological characteristics. Thus, out of all SIRUTA units in Romania, 10% have low market potential, 6% have a high level, and 84% are medium.

The second step shifts the focus towards the existing broadband market. This is measured based on the number of electronic communications networks and services providers that operate within the village, which can be official or unofficial and can deliver broadband at a speed of 30 Mbps or lower.[57] The three ecologically-based groups of villages were further divided according to the number of existing operators, which led to five different categories of villages. SIRUTA units without any operating company were found only among villages with low or medium potential given by their ecological traits. In fact, the proportion of villages not covered by any operator decreases sharply from 47% of those small, peripheral and remote (655 out of 1,380) to 16% of medium ones (1,818 out of 11,436) and 0%, respectively, among villages large, central, in

[57] The ANCOM survey 2015 includes also data on electronic communications networks and services providers as per MARD study at December 31, 2014.

the vicinity to a city. Accordingly, the share of villages with low market potential has halved to 5% of all 'valid' villages, while the share of those with high market potential has remained the same.

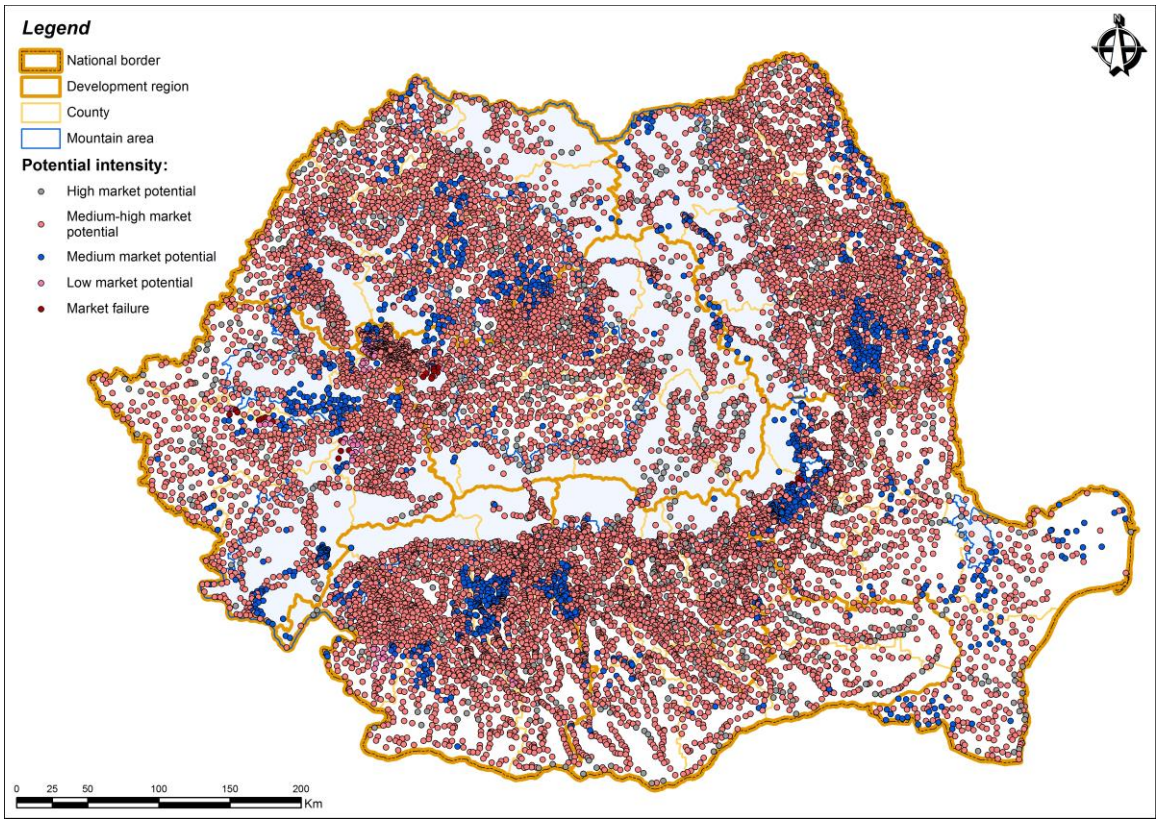
The third step looks toward the near future and not at the current market situation. The ANCOM 2015 survey does not include data on operators that expressed some interest in broadband deployment for the next three years (near future). Therefore, another indicator is used as a proxy, namely the number of operators within the commune to which the given village belongs. The rationale behind this indicator refers to the fact, that once a local provider develops, there are higher chances for this business to expand to the neighboring communities (even small and peripheral), in the near future. On the one hand, the advantage of such a proxy variable is that it is both realistic and available. For example, the fact that over a half of the small, peripheral, remote villages is covered by a network is most likely the result of such an expansion process of a local operator from the neighboring villages. On the other hand, this proxy has as major limit in the fact that, in some communes, peripheral villages may be quite far one from another and data about vicinity and distances between the uncovered village and the villages with a provider are still missing.

Following the 3-step procedure, five types of villages becomes apparent, which correspond to five degrees of market potential (Map 12 shows their distribution in territory):

- market failure or villages indeed uncovered (and with very low chances to be covered in the near future) refer to only 26 SIRUTA units in the country (or 0.2% of total)
- 101 (0.7%) villages have low market potential which is given only by their favorable ecological characteristics
- 1,354 (9.8%) villages have medium market potential, as broadband market has already developed or have some chances to developed in the near future, in spite of their unfavorable ecological characteristics
- 11,335 (82.4%) villages have medium-high market potential both due to their favorable ecological characteristics and to the market situation
- 810 (5.9%) villages with high potential which are already covered by broadband networks and service providers, mostly at a speed of 30+ Mbps.

Villages marked by market failure and those with low market potential (a total of 127 SIRUTA units) are all in rural areas and, to a very large extent, are small, declining (between 2002 and 2011) and peripheral (see Table A.18, Annex). By definition, the first category is also remote, while low potential villages are closer to a city (>10-32 km). In addition, both categories neither have broadband networks, nor have realistic chances to be covered in the near future. Accordingly, they make part of the white villages (100%). Hence, they belong to the communes identified as being first intervention priority, in the previous section 3.C.ii. Therefore, state intervention in priority 1 communes would target all villages mostly affected by market failure in the entire country together with 14% of all communities with medium chances for development, 12% of the medium-high ones, as well as 7% of the developed areas (NGN-black points). Such a mix of villages requires the development of an integrated approach for public intervention at commune level, in which local authorities and local operators and service providers should hold a significant role.

Map 12: Five degrees of market potential in Romania, village level, at December 31, 2014



Source: World Bank calculations using ANCOM.v1 (2015).

Out of all villages with medium chances of broadband market development (1,354), 98% are from the rural areas and only 2% from cities (Table A.18, Annex). They are small, declining, peripheral and remote. However, 53% of them are covered by 1-to-5 broadband networks, but only about 19% have access to high download speeds of 30+ Mbps. Furthermore, all these medium villages belong to communes with 1-to-43 networks, of which about half (52%) have only basic infrastructure (<30 Mbps) and half (48%) have access to broadband at speeds above 30 Mbps. Hence, about 14% are part of priority 1 communes (see section 3.C.ii). In urban areas, villages/neighborhoods with medium chances are located in only nine very small towns (Table 15).

Table 15: List of small towns in which are located all urban SIRUTA units with medium chances of broadband market development, at December 31, 2014

County	SIRSUP code	Small town	Total of SIRUTA units	SIRUTA units with medium market potential	Town population
CONSTANTA	61069	ORAS BANEASA	4	1	5,384
MARAMURES	109176	ORAS SOMCUTA MARE	8	3	7,565
MURES	119242	ORAS SARMASU	8	3	6,942
MURES	119331	ORAS SANGEORGIU DE PADURE	4	1	5,166
SUCEAVA	147358	ORAS BROSTENI	10	7	5,506
TIMIS	157086	ORAS GATAIA	6	3	5,861
TIMIS	158314	ORAS RECAS	7	1	8,336
VASLUI	164981	ORAS MURGENI	7	1	7,119
VÂLCEA	168452	ORAS BALCESTI	9	6	4,864
Total			**63**	**26**	**56,743**

Source: World Bank calculations using ANCOM.v1 (2015) and 2011 Population and Housing Census.

Villages with medium-high potential of broadband development (a total of 11,335 villages) are 92% from rural areas (Table A.18, Annex). They include a mix of small, medium and large communities, declining and viable, peripheral and central, remote or close to city, in proportions comparable to those recorded at the level of all villages nationwide. Thus, the typical village from rural Romania has medium-high broadband market potential. Correspondingly, 84% of them are covered by 1-to-30 networks, almost equally divided between <30 Mbps and 30+ Mbps speeds download. A number of 1,703 such villages are uncovered, of which 1,220 belong to priority 1 communes. However, all of them are part of communes covered by 1-58 networks, of which over 67% offer broadband at 30+ Mbps.

Villages/neighborhoods with medium-high potential of broadband development from urban areas (958 SIRUTA units) are distributed in 245 towns from all counties (Table A.18, Annex). About a half of these villages (47%) are small (<500 inhabitants), mostly declining and peripheral. Only 1.5% of them are uncovered and all those are located in three small towns, namely Budesti (Calarasi), Pogoanele (Buzau), and Insuratei (Braila). The majority of 98.5% is covered by 1-to-30 networks, but only 53% are NGN-black spots (including ongoing projects). Nonetheless, high speed broadband (30+ Mbps) is available in nearly all cities of belonging.

Villages with high market potential (810) are both from rural and urban areas: 33% and 67%, respectively (Table A.18, Annex). These are large and central communities from cities or from communes nearby cities. The large majority of them are NGN-black points, 85% of rural ones and 99% of urban. Most of those that are NGN-white (have broadband at speeds <30 Mbps) are included in the administrative units identified in section 3.C.ii as being intervention priorities. In urban areas, such zones can be found only in three small towns: Budesti (Calarasi), Pogoanele (Buzau), and Insuratei (Braila).

Refining the typology from the intervention perspective

The typology of villages may now be refined from the intervention perspective by combining the degree of market potential with quality of the existing broadband infrastructure. Table 16 shows that various types of villages have different development needs and opportunities related to broadband infrastructure:

- **Need to be covered by fixed broadband not necessary able to ensure >=30Mbps:**[58] White villages and those with low market potential from white communes (127 units), which are indeed uncovered. However, given their dominant profile (small, declining, remote, peripheral) and the coverage-related targets of the Digital Agenda for Romania, they need to be covered by fixed broadband not necessary able to ensure >=30Mbps.
- **Need for support/stimulation for high speed broadband (30+ Mbps) deployment at least in one village per administrative unit:**[59] White and NGN-white villages with medium-to-high market potential (1,435) from NGN-white communes/cities (only providers <30 Mbps) need support/stimulation for high speed broadband (30+ Mbps) deployment. The rationale for deployment in at least one village per administrative relates to the medium-to-high market potential of these villages, which indicate that once the market-seed is planted they have some potential to expand locally, without additional state intervention. These types of villages are also found in the communes with ongoing projects. Nonetheless, by the end of the ongoing projects, the high speed broadband (30+ Mbps) deployment in at least one village per administrative unit is expected to be achieved. For this reason, only administrative units without MARD or Ro-NET projects are considered in relation to this development need.
- **Need for support for the extension of the existing infrastructure within the commune to cover the white and NGN-white villages:**[60] This development need characterizes many undersupplied areas. Nonetheless, for state intervention, only white or NGN-white villages, with medium or medium-high market potential, should be considered. Thus, a total of 1,061 villages from communes with some broadband networks and service providers >=30Mbps need support for the extension of the existing infrastructure from neighboring villages within the commune. This situation occurs both in communes with ongoing projects (MARD or Ro-NET), and in communes without such projects (582 and 479 villages, respectively).

All the other villages (SIRUTA units) either are part of ongoing projects (970) or have a medium-to-high market potential and are located in communes/cities with a favorable broadband market landscape (10,033), which does not seem to require state support.

The distribution of development needs regarding broadband infrastructure in the territory is shown is Map 13.

[58] Cells marked in yellow in Table 16.

[59] Cells marked in grey in Table 16.

[60] Cells marked in bleu in Table 16.

Table 16: Villages (SIRUTA units) according to their degree of market potential and quality of existing broadband infrastructure, at December 31, 2014 (number)

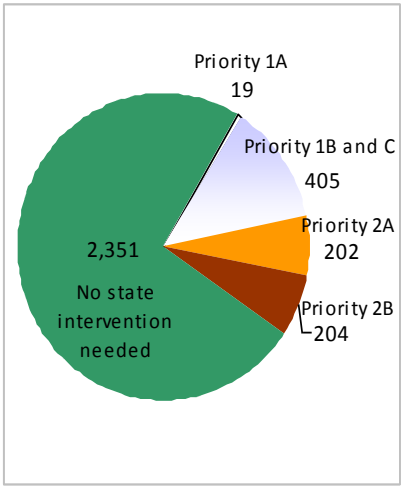
	Degree of market potential					
	Market failure	Low	Medium	Medium-high	High	Total
(A) Villages from communes/cities without ongoing projects						
White villages (no networks, no operators) in white communes	26	101	-	-	-	127
White villages in NGN-white communes (only providers <30 Mbps)	-	-	97	263	-	360
White villages in communes with providers <30 Mbps but with access networks and/or distribution networks >=30Mbps	-	-	108	228	-	336
White villages in communes with broadband networks and service providers >=30Mbps	-	-	143	762	-	905
NGN-white villages (only providers <30 Mbps) in NGN-white communes (only providers <30 Mbps)	-	-	83	953	39	1,075
Villages with providers <30 Mbps in communes with providers <30 Mbps but with access networks and/or distribution networks >=30Mbps	-	-	79	895	32	1,006
Villages with providers <30 Mbps in communes with broadband networks and service providers >=30Mbps	-	-	99	1,731	23	1,853
Villages with providers >=30Mbps	-	-	126	4,071	641	4,838
Sub-Total (A)	26	101	735	8,903	735	10,500
(B) Villages from communes/cities with ongoing projects MARD or Ro-NET						
Villages involved in ongoing projects MARD or Ro-NET	-	-	196	770	4	970
White villages in NGN-white communes (only providers <30 Mbps)	-	-	118	177	-	295
White villages in communes with providers <30 Mbps but with access networks and/or distribution networks >=30Mbps	-	-	56	91	-	147
White villages in communes with broadband networks and service providers >=30Mbps	-	-	107	196	-	303
NGN-white villages (only providers <30 Mbps) in NGN-white communes (only providers <30 Mbps)	-	-	33	269	4	306
Villages with providers <30 Mbps in communes with providers <30 Mbps but with access networks and/or distribution networks >=30Mbps	-	-	15	182	8	205
Villages with providers <30 Mbps in communes with broadband networks and service providers >=30Mbps	-	-	27	244	5	276
Villages with providers >=30Mbps	-	-	67	503	54	624
Sub-Total (B)	-	-	619	2,432	75	3,126
Total Romania	**26**	**101**	**1,354**	**11,335**	**810**	**13,626**

Source: World Bank calculations using ANCOM.v1 (2015).

Note: The marked cells indicate the situations recommended for intervention.

Aggregating per administrative unit the development needs of incorporated villages, the list of priorities for intervention, presented in section 3.C.ii,[61] can be completed with the communes and cities with specific developments needs in broadband infrastructure.

Figure 7: Priorities for intervention - Administrative units (SIRSUP units) according to the development needs of the incorporated villages, at December 31, 2014 (number)



Source: World Bank calculations using ANCOM.v2 (2015). See also Map 14.

Priority 1A communes need fixed broadband deployment: 19 white communes that include the villages indeed uncovered (127).

Priorities 1B and 1C communes need support for high speed broadband (30+ Mbps) deployment at least in one village per administrative unit: 404 NGN-white communes and one city (Insuratei, Braila), which include white and/or NGN-white villages with medium-to-high market potential (1,435).

Priorities 2A and 2B communes need support for the extension of the existing infrastructure within the commune:

(2A) 199 communes and 3 small towns that include (476 and 3 villages, respectively) white villages with medium or medium-high market potential. The three small towns are Baneasa (Constanta), Somcuta Mare (Maramures) and Brosteni (Suceava).

(2B) Among the administrative units that contain ongoing projects (MARD or Ro-NET), 202 communes and 2 small towns that include (580 and 2 villages, respectively) white or NGN-white villages with medium or medium-high market potential. The two small towns are Gataia and Recas (Timis).

Note: The neighborhood from Recas is an old depopulated village, with less than 15 inhabitants, nowadays.

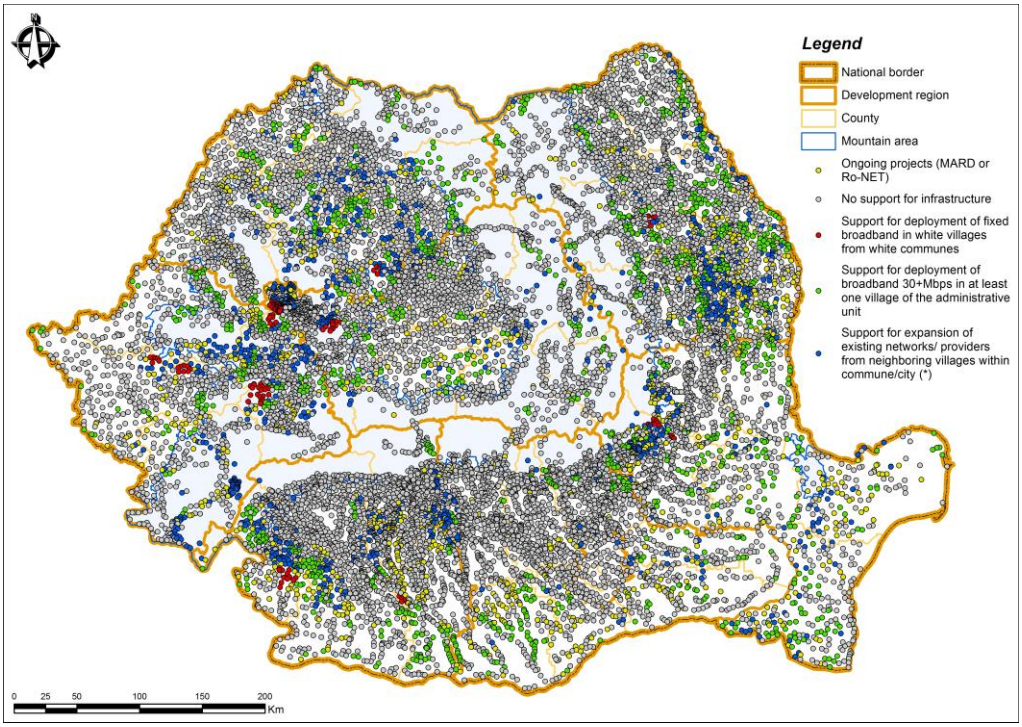
If in the next period, interventions is decided to be continued at village level

The approach based on market potential and the quality of existing infrastructure addresses 61% of all white spots as well as 29% of all NGN-white areas in Romania, which are the least likely to develop in the absence of state support (Table A.19, Annex). Overall, 2,623 villages would be involved (19% of all SIRUTA units), in which live almost 1.16 million persons (5.8% of total country population) and over 423 thousand households (5.7% of total households nationwide).[62] Such a programme would cover all counties (see also Map 13).

[61] Typology at the administrative unit level for identifying the priorities of intervention (priority 1), as presented in on *Lessons for public interventions and priority administrative units* and Map 11.

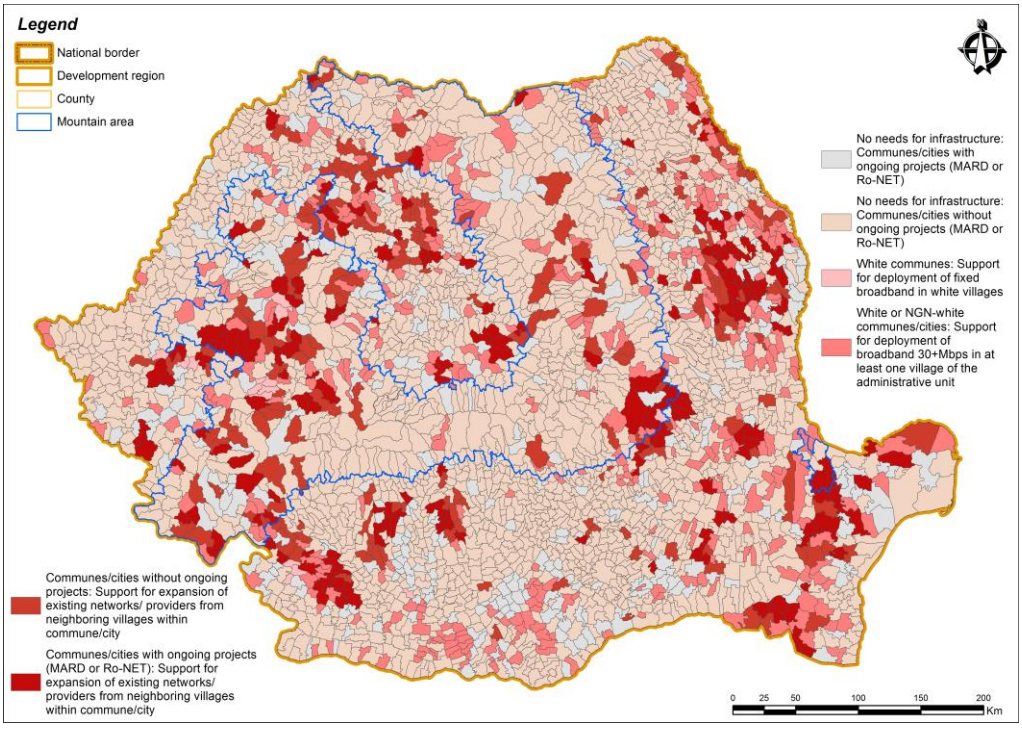
[62] Of which, in rural areas 1.15 million persons and over 421 thousand households.

Map 13: Development needs regarding broadband infrastructure among villages (SIRUTA units) from Romania, at December 31, 2014



Source: World Bank calculations using ANCOM.v1 (2015).

Map 14: Development needs regarding broadband infrastructure among administrative units from Romania, at December 31, 2014



Source: World Bank calculations using ANCOM.v1 (2015).

If in the next period, interventions at administrative unit level are introduced

The same approach applied at the level of administrative unit would involve 824 communes and 6 small towns (see also Map 14). These include besides the 2.623 beneficiary villages another 1,754 villages of all types (NGN-white, NGN-grey or NGN-black), as shown in Table A.20 (Annex). However, an intervention at administrative unit would require the identification of the most suitable technical solutions to maximize access with minimal costs for all incorporated villages, which in the same time would be complementary to existing private investments and would not lead to significant market distortion at local level.

ii. Demand potential for broadband in undersupplied areas

The insight into the actual demand for broadband services is useful in the funding and deploying of broadband networks. Proof of existing undersupply and/or demand for (higher) bandwidths commonly initiate the planning process for broadband deployment. Actual deployment still depends on the economic potential of the specific area, but this issue is discussed in the next section 3.D.iii.

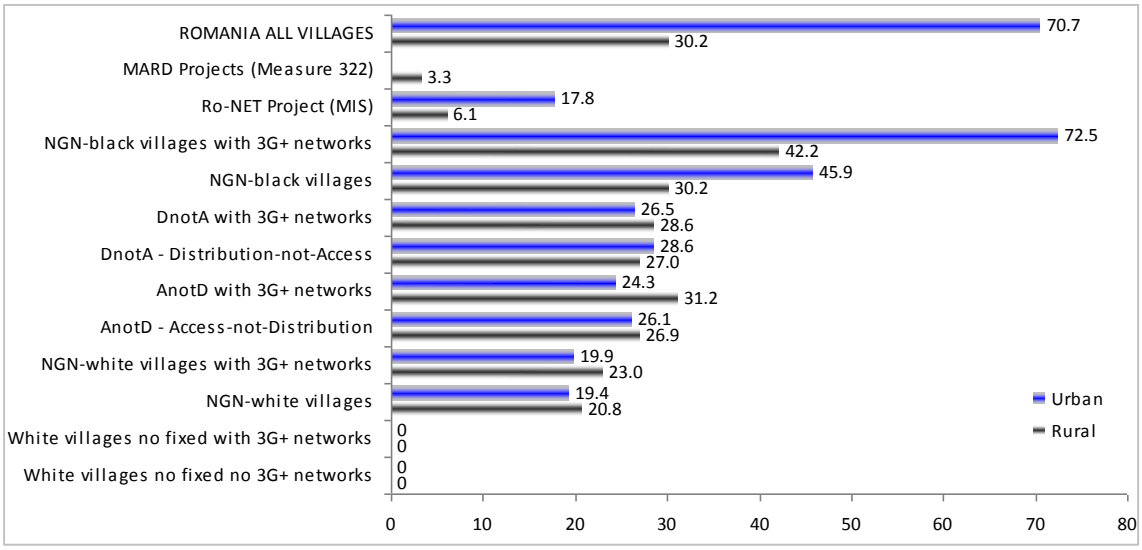
This section is focused on actual and potential demand for broadband Internet services at village (SIRUTA unit) level. The actual demand is measured based on two categories of indicators: penetration rates[63] (ANCOM, 2015) and usage of Internet (2011 census). Potential demand is estimated based on the share in total population aged 6 years and over of those groups with high propensity to use Internet (children and youth, employees and employers, commuters, migrants abroad and their families), determined based on 2011 census. There is a lag in data between 2011 and 2014, but more updated data at SIRUTA unit level are not available.

Actual and potential demand for broadband is strongly associated with the NGN broadband areas determined in section 3.C.i, as shown in Figures 8-to-11.

- - White areas have zero penetration rates (at the end of 2014), but an average of 7-12% of population 6+ years that, since 2011, were declaring to use the Internet (census). Most of the white spots have a potential demand considerably smaller than in the other NGN-types of villages. Most of them are also very small, with less than 200 inhabitants. Nonetheless, in the white spots from rural areas, an average of 80 persons per village represents a rough estimate of the potential target population.
- - NGN-white areas have low penetration rates, with values of about 20 per 100 households and 7-8 per 100 inhabitants. The use of Internet is, however, rather close to the national average in rural areas. For example, the proportion of population aged 6+ years that declared use of the Internet was 14% in rural NGN-white areas as compared with 15% at the level of all villages (Figure 10).

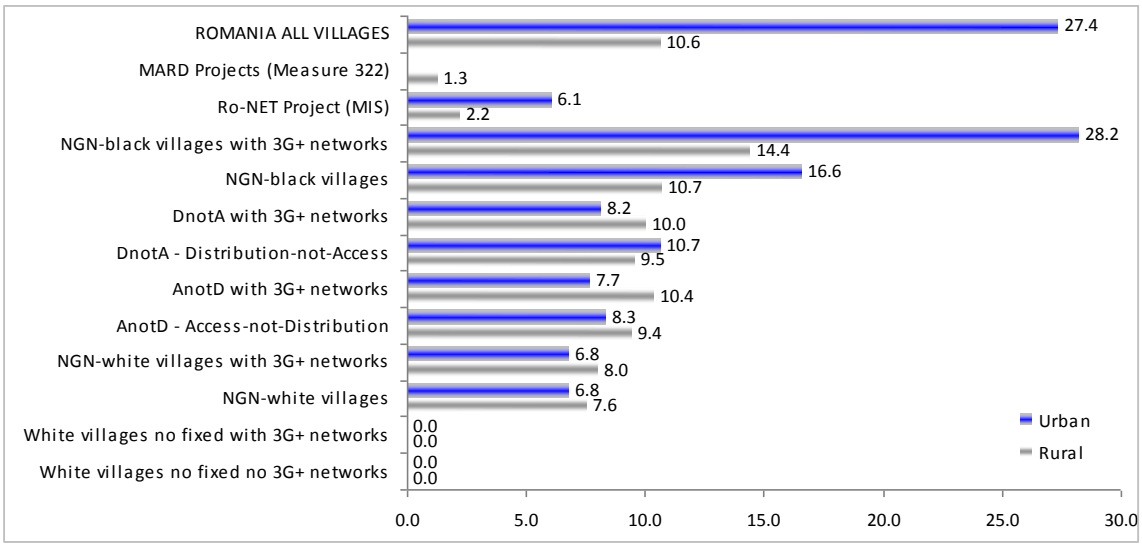
[63] Penetration rates determined as sum of fixed connections >=256kbps at NGN-type level (for legal and natural persons), multiplied by 100 and divided by total number of inhabitants/households at NGN-type level. Technologies that were considered in ANCOM (2015): optical fibre, coaxial cable, (including DOCSIS) XDSL, UTP/FTP cable, radio (using frequency bands based on a license to use radio frequencies or radio frequency bands of which use is free, for example, point to multipoint connections with fixed access - FWA, Wi-Fi connections based on IEE 802.11 b,g,n standards, WiMax connections based on IEEE 802.16 standards). Data on population and households at SIRUTA level from 2011 census, which partly differs from the data used by ANCOM.

Figure 8: Broadband penetration rates per 100 households (%), determined per NGN types of villages (SIRUTA units), at December 31, 2014



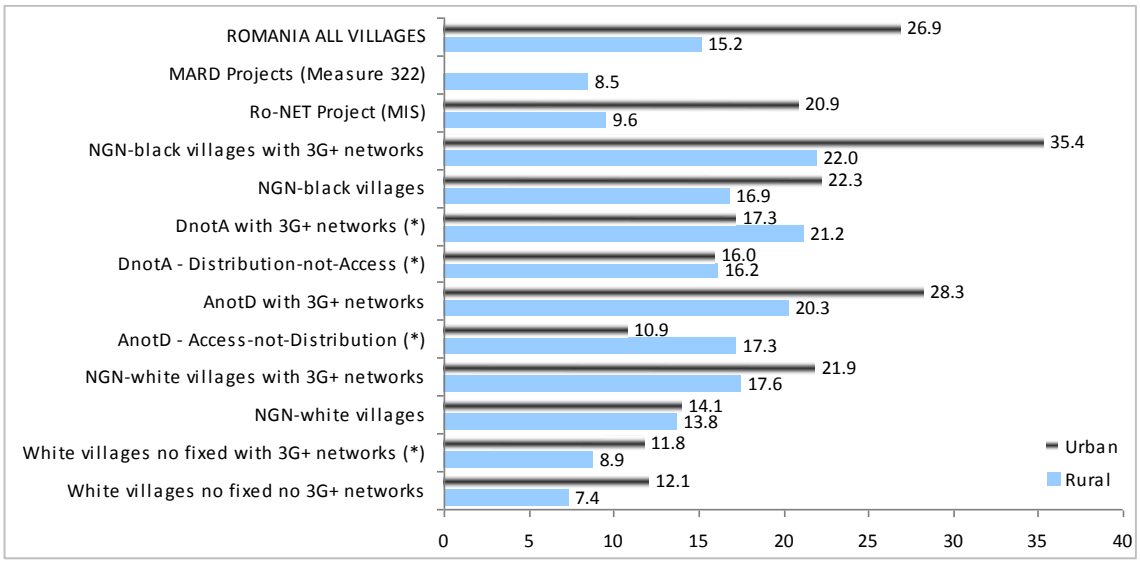
Source: World Bank calculations using ANCOM.v1 (2015) and 2011 Population and Housing Census. Note: Penetration rate determined as sum of fixed connections >=256kbps at NGN-type level (for legal and natural persons), multiplied by 100 and divided by total number of households at NGN-type level. Both legal and natural persons may hold more than one fixed connection. Therefore, penetration rates may exceed 100%, especially in small communities but also in touristic sites (with many hotels and restaurants).

Figure 9: Broadband penetration rates per 100 inhabitants (%), determined per NGN types of villages (SIRUTA units), at December 31, 2014



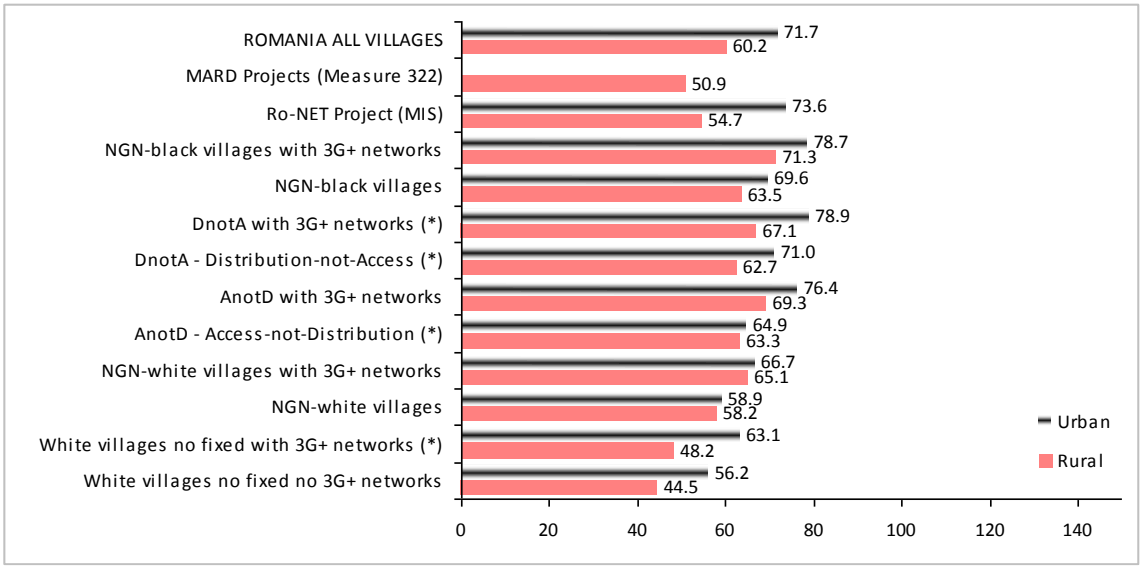
Source: World Bank calculations using ANCOM.v1 (2015) and 2011 Population and Housing Census. Note: Penetration rate determined as sum of fixed connections >=256kbps at NGN-type level (for legal and natural persons), multiplied by 100 and divided by total number of inhabitants at NGN-type level. Both legal and natural persons may hold more than one fixed connection. Therefore, penetration rates may exceed 100%, especially in small communities but also in touristic sites (with many hotels and restaurants).

Figure 10: Internet usage of population aged 6 years or over (%), average rates per NGN types of villages (SIRUTA units), at December 31, 2014



Source: World Bank calculations using ANCOM.v1 (2015) and 2011 Population and Housing Census. Note: (*) Small number of SIRUTA units in urban areas, at most 6.

Figure 11: Potential demand for broadband services (categories of population with high propensity to use the Internet % of total population), average rates per NGN types of villages (SIRUTA units), at December 31, 2014



Source: World Bank calculations using ANCOM.v1 (2015) and 2011 Population and Housing Census. Note: Categories of population with high propensity to use the Internet refer to: children and youth (0-29 years), employees and employers, commuters to a city, residents of the village who migrated abroad and their families left behind. These categories are not exclusive. Therefore, their overall proportion in total village population may exceed 100%, especially in small communities. (*) Small number of SIRUTA units in urban areas, at most 6.

By contrast, in the NGN-white areas from the urban environment the usage of Internet is comparable with that from rural areas and far smaller than in other urban settlements. The potential demand is also close to the national average in the NGN-white villages from rural areas, but rather small in urban areas. In terms of potential clients, the NGN-white points from rural areas include about 400 persons, and around 300 persons in urban areas.

- NGN-grey villages (AnotD and DnotA) from rural areas have penetration rates comparable with the national average. By contrast, the NGN-grey SIRUTA units from urban areas have penetration rates comparable with the rural ones, far lower than the urban national average. For example, AnotD points register in urban areas a rate of 8.3 per 100 inhabitants and 26.1 per 100 households, as compared with 27.4 and 70.7 respectively for the entire urban environment (Figures 8 and 9).

Regarding the use of Internet, the presence of mobile 3G+ networks makes a big difference. In rural areas, the NGN-grey villages which also are covered by mobile 3G+ networks appear to have quite high shares of population using the Internet as compared with the areas without 3G+ networks (Figure 10). In urban areas, the small number of NGN-grey SIRUTA units do not allow solid conclusions. Nonetheless, the existence of 3G+ networks increases the proportion of population (6+ years) using Internet from 11% to over 28%, in AnotD areas (of which sufficient cases are available). With regard to market demand, a pattern is highly visible. In NGN-grey villages, both from rural and urban areas, the higher the potential demand, more likely is that village to be also covered by mobile 3G+ networks. The number of potential clients in NGN-grey areas is about 700 persons, in rural, and approximately 500 persons, in urban.

- NGN-black villages, especially those with 3G+ networks, are in the most favorable situation in all regards, penetration, use of Internet and potential demand.

The previous analysis points out some important lessons related to the mobile technologies 3G+.[64] These mobile technologies, although not considered relevant with regard to broadband deployment, appear to play an important role in increasing the use of Internet. On the one hand, mobile 3G+ networks are linked to higher potential demand, which could have been expected in the current market conditions in which operators are inclined to invest in economically viable areas only. So, the areas with higher potential demand have already attracted more private investments and benefit now of more opportunities. On the other hand, once the mobile technologies become available, they seem to contribute significantly both to penetration and the use of Internet. The added value related to penetration is highly visible mainly for NGN-black villages, both from rural and urban. Figure 8 shows that for NGN-black villages the penetration rate per 100 households increases from 30.2% in areas without 3G+ to 42.2% in those covered by 3G+ networks, in rural, and from 45.9% to 72.5%, in urban. The added value related to usage of the Internet can be observed in all NGN-types of areas, starting with the white spots and increasing incrementally to the NGN-black areas (Figure 9). So, taking measures[65] for stimulating the operators to extend the coverage of mobile networks, particularly those that comply with the NGN standards (deploying 4G networks),[66] could bring considerable benefits related to penetration and use of Internet, besides those in terms of coverage.

[64] ANCOM (2015) refers to 3G+(HSPA)/LTE/LTE Advanced.

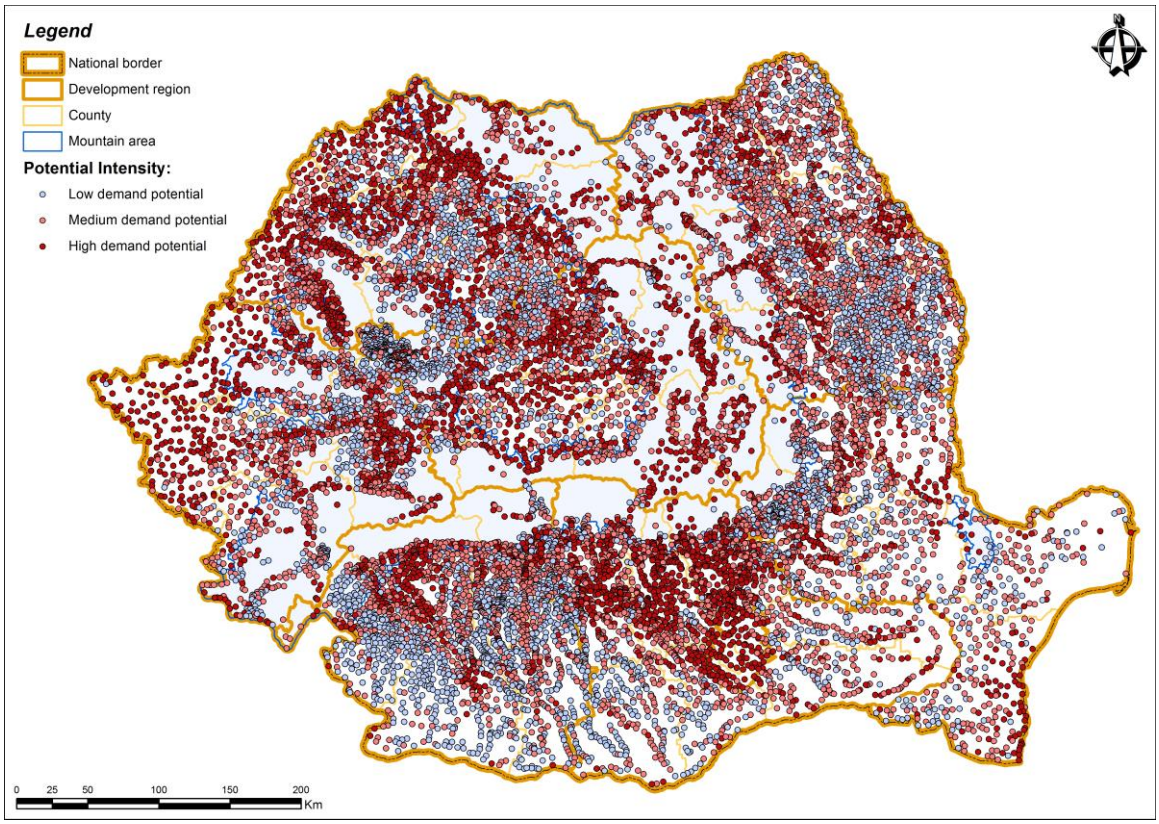
[65] Such as reducing the price for use of spectrum, as mentioned in the *Implementation Programme for the National Plan for Development of the NGN Infrastructure*, section 5.5 (page 43).

[66] Romania has good 3G coverage, but below average 4G coverage (25%). Source: *Implementation Programme for the National Plan for Development of the NGN Infrastructure* (page 27).

The typology of villages (SIRUTA units) according to demand (actual and potential) is determined based on an index of demand potential (IDP). The index of demand potential is determined at SIRUTA unit level as factor score of the following three indicators: (i) penetration rate per 100 inhabitants, (ii) share of population aged 6 years or over using Internet and (iii) proportion of categories with high propensity to use Internet in total population.[67] In the next step, three distinctive degrees of potential demand at village (SIRUTA unit) level are determined as follows (see also Map 15):

- low demand potential - IDP deciles 1-to-3 (the lowest 30% values in the country);
- medium demand potential - IDP deciles 4-to-7 (the average values nationwide); and
- high demand potential - IDP deciles 8-to-10 (the highest 30% values in Romania).

Map 15: Three degrees of demand potential in Romania, village level, at December 31, 2014



Source: World Bank calculations using ANCOM.v1 (2015).

[67] Factor analysis, principal components extraction, KMO = .605, Approx. Chi-Square = 9216.211 (p=.000), one factor extracted that explains 63.49% of total variance. The factor loading for each variable is: .876 for share of population aged 6 years or over using Internet; .824 for proportion of categories with high propensity to use Internet in total population; and .677 for penetration rate per 100 inhabitants. So, the index reflects more closely the potential demand than the actual demand (penetration).

The index of demand potential is significantly associated with the ecological indicators.[68] Expectedly, it is considerable higher in urban compared with rural areas. Small, declining (between 2002 and 2011), remote and peripheral villages are the most likely to have a very low potential demand. At the other extreme, the highest demand potential is found in villages that are large, viable, central and close to a city.

The intersection between the typology on market potential (section 3.D.i) and the one on demand potential is shown in Table 17. About 68% of villages from rural areas and 90% in urban areas have both market potential and demand potential medium-to-high. The other SIRUTA units in the country have a low demand (actual and potential) hence they require demand-stimulation measures in order to achieve the Digital Agenda targets.

Table 17: Villages (SIRUTA units) in Romania according to market and demand potential typologies, at December 31, 2015

	Demand Potential (Number)			Total	Demand Potential (%)			Total
Market Potential	Low	Medium	High	(N)	Low	Medium	High	(%)
RURAL	**3,952**	**5,093**	**3,328**	**12,373**	**32**	**41**	**27**	**100**
Market failure	24	2	-	26	0.2	0.0	-	0.2
Low	84	15	2	101	0.7	0.1	0.0	0.8
Medium	858	428	42	1,328	6.9	3.5	0.3	10.7
Medium-high	2,974	4,506	2,897	10,377	24.0	36.4	23.4	83.9
High	12	142	387	541	0.1	1.1	3.1	4.4
URBAN	**131**	**367**	**755**	**1,253**	**10**	**29**	**60**	**100**
Medium	11	12	3	26	0.9	1.0	0.2	2.1
Medium-high	120	350	488	958	9.6	27.9	38.9	76.5
High	0	5	264	269	-	0.4	21.1	21.5

Source: World Bank calculations using ANCOM.v1 (2015).

Noteworthy, 131 SIRUTA units from urban areas have a low demand potential. A part of them (13 units) are depopulated areas with less than 15 inhabitants.[69] The others 118 units, nearly all belong to very small or small towns (52 towns with less than 20,000 inhabitants). However, nine units are part of five medium cities, which is surprising considering the general statistics on medium-large urban areas. In all these cases, the low demand is rather an effect of the underdeveloped service supply. Although the cities they belong to are well endowed with high speed broadband networks and services, these nine villages are far from the city centre and have access at basic broadband at best. For example, five of these nine villages belong to Cugir city and are touristic sites from Apuseni Mountains, with a large number of guesthouses and hotels.[70] The

[68] The Pearson correlation coefficients between the index of potential demand and village population (number of inhabitants) is .199 (Sig. = .000); with population viability between 2002 and 2011 (0=declining, 1=viable) is .321 (Sig. = .000); with distance to the nearest city (number of km) is -.396 (Sig. = .000); and with administrative type (0=peripheral, 1=central) is .323 (Sig. = .000).

[69] For example, the village Angofa from city Sighisoara (Mures), Priba from Rm. Valcea (Valcea) or Deleni-Obirsie from Blaj (Alba).

[70] In only one of these sites there are 71 hotels and guesthouses.

other four cases are villages poorly linked to city, which lack all kind of infrastructure not only the broadband-related one, but also modernized roads, piped water or sewage.[71]

For distinguishing further the type of intervention needed per village, the demand potential index should be seen in combination with the refined typology on development needs regarding infrastructure (Table 18). Besides the villages that are part of an ongoing project (MARD or Ro-NET) - 7% of all SIRUTA units in the country - additional 34% need an intervention: 8% related to broadband infrastructure only; 15% interventions aiming only stimulation of demand; and 11% interventions in both fields. More than 97% of villages that need interventions (4,535 of total 4,665 villages) are from rural areas (Table A.21 in Annex).

Table 18: Villages (SIRUTA units) by development needs regarding broadband infrastructure and demand-stimulation (number)

Need for public intervention measures, like allocations (grants) or direct investments	Demand-stimulation measures	Demand Potential			Total	
		Low	Medium	High	N	%
Support for deployment of fixed broadband in white villages from white communes	Yes	108	17	2	127	0.9
Support for deployment of broadband 30+Mbps in at least one village of the administrative unit	Yes	592	-	-	592	4.3
	No	-	642	201	843	6.2
Support for expansion of existing networks/ providers from neighboring villages within commune/city (*)	Yes	793	-	-	793	5.8
	No	-	246	22	268	2.0
Ongoing projects (MARD or Ro-NET)	Yes	548	-	-	548	4.0
	No	-	356	66	422	3.1
No support for infrastructure	Yes	2,042	-	-	2,042	15.0
	No	-	4,199	3,792	7,991	58.6
Total		**4,083**	**5,460**	**4,083**	**13,626**	**100**

Source: World Bank calculations using ANCOM.v1 (2015). Note: (*) Include villages from communes that contain ongoing projects (MARD or Ro-NET).

Unlike the need for infrastructure development, which is concentrated in white and NGN-white villages, the need for demand-stimulation measures is spread across all types of areas: white, NGN-white, NGN-grey (AnotD and DnotA), NGN-black, and especially in villages involved in ongoing projects (more than half of them). Data are shown in Table A.22 (Annex). This fact indicates that the current interventions, focused strictly on subsidizing the distribution and/or access networks could be more effective if a demand-stimulating component is added.

In addition, the fact that even in one in every ten NGN-black areas has a low demand potential indicate that demand for broadband Internet services could not increase unless availability of e-government services, e-health, e-learning, e-commerce, mobile banking and other services relevant for daily-life will significantly increase.

[71] For instance, the village Pintic at 11 km from city Dej (Cluj) or the village Stina separated from the city Zalau by a mountain, or the village Dealu Babii, a *momarlani* village at 7 km in the mountain from the Vulcan city (Hunedoara). The village Pintic is part of Ro-NET project.

iii. Economic power of population and communities in undersupplied areas

Previous sections provided insights both into market potential and demand for broadband services. As we have already mentioned, proof of existing undersupply and/or demand for (higher) bandwidths commonly initiate the planning process for broadband deployment. Nevertheless, actual deployment depends on the economic potential of the specific area. If economic potential is lacking in an area where there is undersupply or demand for a better connection, there could be scope for state aid funding schemes to offer support. Specifically in this sense, this demand mapping could be seen as a tool to facilitate state aid distribution and to avoid misdirected investment.

Consequently, the last dimension included in the analysis of NGN broadband areas refers to the economic potential. The typology of villages (SIRUTA units) according to economic potential is determined based on an index (IEP) which is computed as a factor score[72] of the following three indicators: (i) share of self-generated revenues in total revenues in the local budget, (ii) share of population in relative poverty (AROP indicator) and (iii) proportion of population living in marginalized areas in total village population. In the next step, four distinctive degrees of economic potential at village (SIRUTA unit) level are determined as follows:

- very poor village - quintile 1 of IEP (the lowest 20% values in the country);
- poor village - quintile 2 of IEP;
- medium economic potential - quintiles 3-4 of IEP;
- high economic potential - quintile 5 of IEP (the highest 20% values in the country).

Self-generated revenues[73] reflect the municipality's fiscal autonomy and local economic potential. Share of self-generated revenues in total revenues in the local budget is a measure of the independence from state budget transfers. If a locality's budget contains few central budget transfers in conjunction with a high proportion of self-generated revenues (from local tax collection), then this is a sign that it is experiencing healthy economic development and that it has a large base of taxpayers (citizens and firms). This indicator is calculated at administrative unit level and the value is attributed to all incorporated villages (SIRUTA units).[74]

The risk of relative poverty after receiving social transfers (AROP indicator) refers to the share of people whose disposable income is lower than 60% of the median income as expressed per adult equivalent.[75] Data used in this study were determined based on 2012 EU-SILC, within the World

[72] Factor analysis, principal components extraction, KMO = .525, Approx. Chi-Square = 6027.445 (p=.000), one factor extracted that explains 54.38% of total variance. The factor loading for each variable is: .858 for share of population in relative poverty (AROP); -.765 share of self-generated revenues in total revenues in the local budget; and .556 for proportion of population living in marginalized areas in total village population.

[73] Self-generated revenues do not include the portions deducted from PIT (personal income tax) for equalization purposes in order to analyze the category of revenues upon which the municipality holds a greater degree of control. The formula per capita enables vertical comparisons (localities of different sizes or status – urban/rural) and horizontal comparisons (localities of the same status, but in different counties). They are computed based on Ministry of Finance 2012 data on local budgets execution.

[74] Ministry of Finance data from the end of 2012 show that the average share of self-generated revenues localities from Romania was only 24%, with a significant urban-rural gap: urban areas (42%), communes (22%), and small communes (19%).

[75] The indicator is computed according to a national methodology (Decision no. 488/2005 on the national system of social inclusion indicators) and to Eurostat methodology. Disposable income is the sum of all revenues (including social protection transfers) minus the amount of taxes (income or property-based) and social insurance paid.

Bank (2015) *Inputs for the Preparation of a Draft National Strategy and Action Plan on Social Inclusion and Poverty Reduction 2015-2020*. This indicator is calculated at administrative unit level and the value is attributed to all incorporated villages (SIRUTA units).[76]

The marginalized areas are compact territories within localities (neighborhoods, parts of villages, hamlets etc.) in which live extremely poor people, such as ghettos or slums. Thus, the proportion of population living in marginalized areas provides an estimate of the extreme 'unacceptable' multidimensional poverty, which tends to become chronic and to be transmitted from a generation to another. At national level, 6.2% of the rural population, 5.3% of households and 5.2% of dwellings are located in rural marginalized areas.[77] In addition, 3.2% of the population, 2.6% of households, and 2.5% of dwellings are located in urban marginalized areas.[78] Data used in this study were determined based on 2011 Population and Housing Census, within two previous World Bank studies (2014 and 2015). The number of people living in marginalized areas (urban or rural) is determined at census sector level. These values are then aggregated at village (SIRUTA unit) level and proportion in total village population is computed.

The distribution of villages according to the index of economic potential across the country is shown in Map 16.

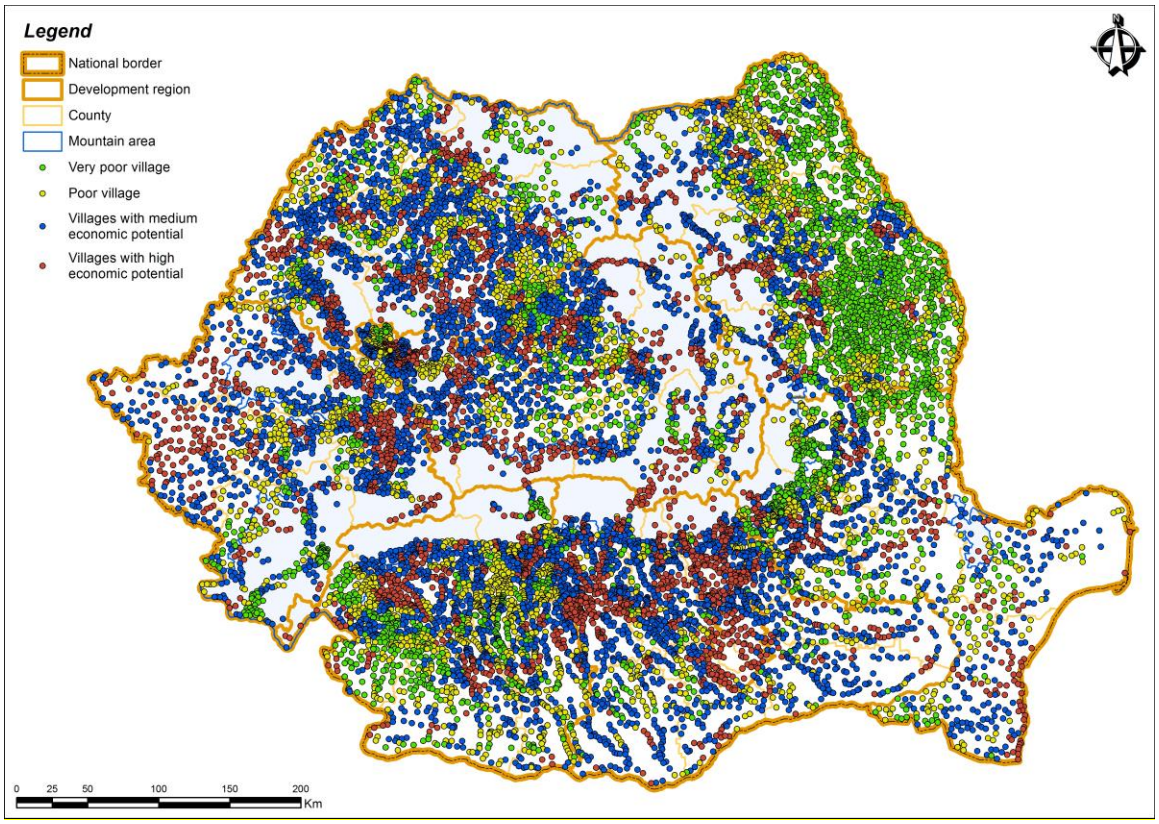
[76] EU-SILC data show that the relative poverty rate was 22.5% in Romania in 2012. The differences that characterize the urban/rural divide can be identified in the very large difference between the values of the AROP indicator for the two areas: 11% in urban as compared with 38% in rural.

[77] These rural areas are severely deprived census sectors which cumulate people who completed lower secondary education at most, make a living in the informal sector (especially agriculture), and live in precarious housing conditions even for the rural context that generally has a low access to basic infrastructure and utilities (living in overcrowded houses and/or without access to water or electricity). These marginalized areas are reckoned as being 'problematic' specifically due to the combination of a concentration of low-income households, low levels of education and skills relevant to the labor market, a preponderance of single mothers, large numbers of children, and a high rate of petty crime. Even more than the other rural communities, the marginalized areas have poor physical accessibility, by dirt streets, have bad housing, are exposed to environmental hazard (floods, land slides etc.), and have low-quality or absent public services. Source: World Bank (2015) *Inputs for the Preparation of a Draft National Strategy and Action Plan on Social Inclusion and Poverty Reduction 2015-2020* (section 3.2.1).

[78] These are severely deprived areas that combine low human capital (little education, poor health, and/or a high number of children) with low formal employment and inadequate housing conditions. These marginalized areas are deemed to be 'problematic' as a result of a combination of bad housing, dirty and decrepit streets, a concentration of low-income households, low levels of education and skills relevant to the labor market, overall poor health, a preponderance of single mothers, large numbers of children, poor quality and/or segregated schools, and a high rate of petty crime. In addition, such areas are physically inaccessible and are exposed to environmental degradation, with only low-quality or no public services. Thus, the market value of the land and dwellings in these areas is much lower than in other areas of the same city.

The methodology for identifying urban marginalized areas was developed in a World Bank study using 2011 census data. It identifies three broad criteria: (i) human capital; (ii) formal employment; and (iii) housing conditions. The analysis was done at the level of the census sectors. Marginalized areas (or census sectors) were defined as those that were disadvantaged in all three respects. In addition, the study identified three other types of urban areas that were disadvantaged on terms of one or two of the three criteria. The majority of the total urban population (67.8%) lives in non-disadvantaged areas, while 11.7% live in areas disadvantaged in terms of human capital, 9.9% live in areas affected by unemployment, 5.2% live in areas disadvantaged in terms of housing, and 2.3% live in other urban areas. Source: World Bank (2014) *Atlas of Urban Marginalized Areas*.

Map 16: Four degrees of economic potential in Romania, village level



Source: World Bank calculations using Ministry of Finance 2012 data on local budgets execution and two previous World Bank studies: *Atlas of Urban Marginalized Areas* (2014) and *Inputs for the Preparation of a Draft National Strategy and Action Plan on Social Inclusion and Poverty Reduction 2015-2020* (2015).

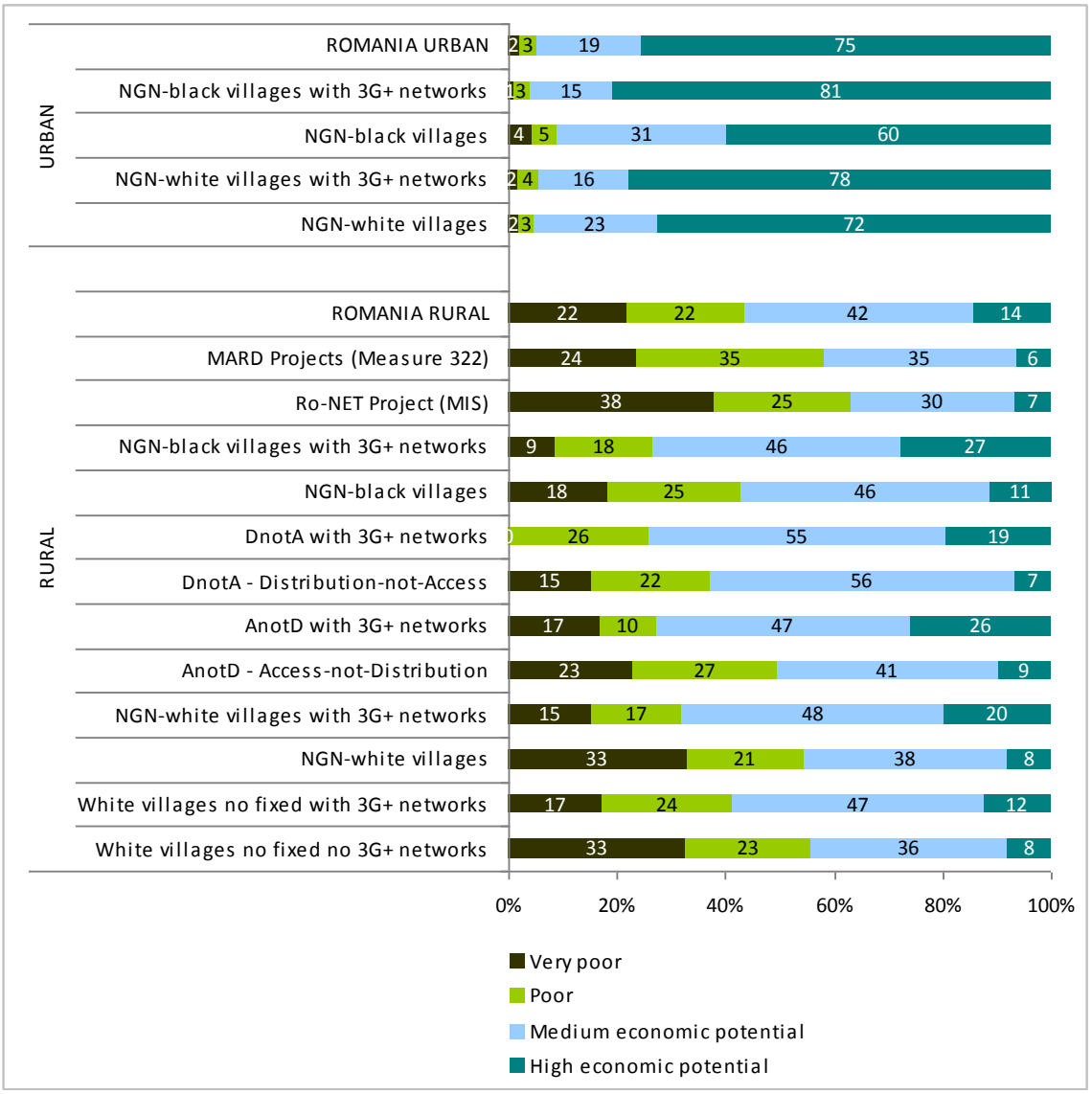
The index of economic potential is significantly associated with the ecological indicators.[79] Expectedly, it is considerable higher in urban compared with rural areas. The small and remote villages are the most likely to have a very low economic potential, while the highest economic potential is found in large villages close to a city.

Economic potential is also strongly associated with market potential and demand potential (Table A.23, Annex). Thus, the share of very poor or poor villages decreases from 77% of villages characterized by market failure to 64% of those with medium market potential, 39% of medium-high ones, and 16% of units with high market potential. Also, the proportion of villages with high economic potential is zero among undersupplied areas and reaches 49% of those with a high market potential. In the same time, the higher is the economic potential, the higher the demand potential.[80]

[79] The Pearson correlation coefficients between the index of economic potential and village population (number of inhabitants) is .15 (Sig. = .000); with distance to the nearest city (number of km) is -.39 (Sig. = .000). Correlations with variables on population viability between 2002 and 2011 (0=declining, 1=viable) and village administrative type (0=peripheral, 1=central) are also significant but weaker.

[80] The Pearson correlation coefficient between index of economic potential and index of demand potential is .47 (Sig. = .000).

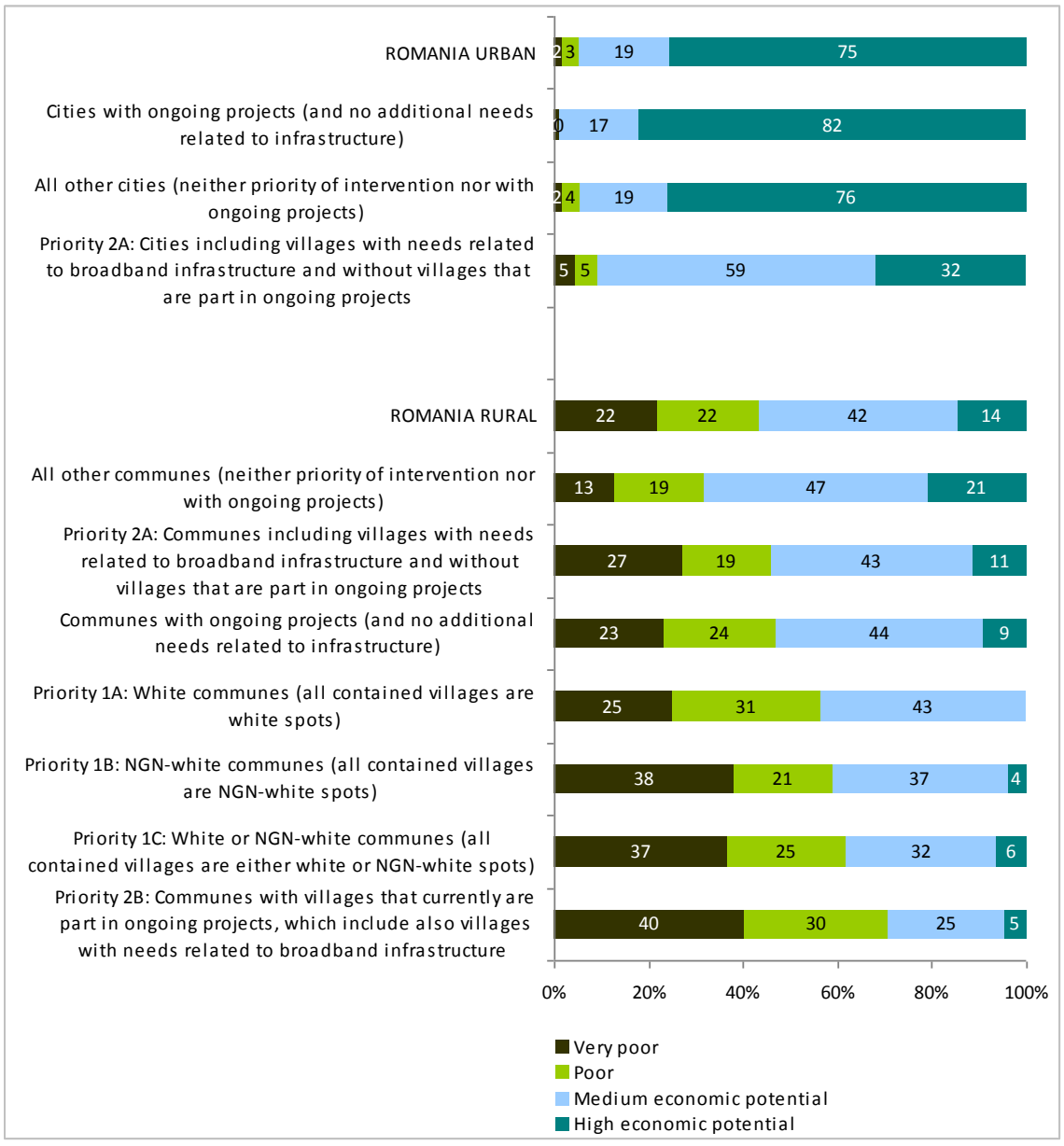
Figure 12: Economic potential divide across the NGN broadband areas (%)



Source: World Bank calculations using ANCOM.v1 (2015), Ministry of Finance 2012 data on local budgets execution and two previous World Bank studies: *Atlas of Urban Marginalized Areas* (2014) and *Inputs for the Preparation of a Draft National Strategy and Action Plan on Social Inclusion and Poverty Reduction 2015-2020* (2015).

A significant divide in economic potential is visible among the NGN broadband areas (Figure 12). The white and NGN-white spots are more likely located in very poor or poor villages, while NGN-black spots are more likely villages with medium or high economic potential. In the same time, within each type of NGN broadband areas, the mobile networks 3G+ has been selectively developed in the areas with a higher economic potential.

Figure 13: Loading with very poor and poor villages of the administrative units identified as intervention priorities (% of SIRUTA units)



Source: World Bank calculations using ANCOM.v1 (2015), Ministry of Finance 2012 data on local budgets execution and two previous World Bank studies: *Atlas of Urban Marginalized Areas* (2014) and *Inputs for the Preparation of a Draft National Strategy and Action Plan on Social Inclusion and Poverty Reduction 2015-2020* (2015). Note: For the definition of administrative units identified as intervention priorities see Figure 7 and Map 14. In urban areas, cities identified as priorities 1B and 2B are not included in the graph due to the small number of contained SIRUTA units, 4 and 13 respectively. See also Table A.24 in Annex.

The analysis at administrative unit level shows a considerable gap between those selected as intervention priorities and the others, with respect to the proportion of very poor SIRUTA units in all incorporated units (Figure 13). In rural areas, as compared with communes that are neither intervention priorities nor with ongoing projects, the share of very poor villages is almost four

times larger in communes priorities 1B, 1C and 2B, and two times higher in communes priorities 2A and 1A. Out of all very poor and poor villages in Romania, almost two thirds[81] belong to communes selected as intervention priorities and the other 38% are located in communes and cities that are not selected as intervention priority. A similar analysis[82] based on the index of economic potential computed at administrative unit level displays a comparable pattern (Table A.25, Annex).

iv. Typology for prioritization of investments in broadband in Romania

According to the *Implementation Programme for the National Plan for Development of the NGN Infrastructure*: 'Investments, more precisely public intervention (for instance: incentive for investments, grant, state aid, etc.) will be focused on the development of a next generation infrastructure in the areas affected by market failure – areas with limited potential/no potential for private investments, the so-called white areas' (MIS, 2015: 35). This study addresses precisely this objective, by putting forward a typology of villages (SIRUTA units) and administrative units (SIRSUP level) useful for prioritization of investments.

As we have already mentioned, actual broadband deployment depends on the economic potential of the specific area. If economic potential is lacking in an area where there is undersupply or demand for a better connection, there could be scope for state aid funding schemes to offer support. Specifically in this sense, this demand mapping could be seen as a tool to facilitate state aid distribution and to avoid misdirected investment.

This is the last step of the analysis which results in the final typology. For easy understanding, a short summary of the research approach is shown in Scheme 1. Thus, after exploring market potential at village level and considering the quality of existing infrastructure, a refined typology of development needs regarding broadband infrastructure was introduced (Table 16 and Map 13). In the next step, demand potential was analyzed and combined with the refined typology, which led to a sharper typology of development needs regarding both infrastructure and demand stimulation (Table 18). Finally, the economic potential of villages and administrative units was investigated. In this section, the final typology for prioritization of investments in broadband in Romania is determined by dividing the typology of development needs according to economic potential of villages (SIRUTA units). Table 19 and Map 17 show the empirical results.

Out of all villages (SIRUTA units) in Romania, 12% have various broadband infrastructure-related needs and are eligible for state support (being very poor or poor villages), 9% have also such development needs but are not eligible (as villages with medium-to-high economic potential), while almost a third (30%) need measures of stimulation of demand for broadband services.

[81] 19% are part of communes priority 2B, 14% belong to communes with ongoing projects (MARD or Ro-NET), 11% are incorporated in communes priority 2A, 9% are contained by white or NGN-white communes (priority 1C), 7% are in communes priority 1B (NGN-white communes), and less than 2% are in white communes (priority 1A).

[82] At administrative unit level, factor analysis, principal components extraction, KMO = .544, Approx. Chi-Square = 2032.813 (p=.000), one factor extracted that explains 61.66% of total variance. The factor loading for each variable is: .891 for share of population in relative poverty (AROP); -.727 share of self-generated revenues in total revenues in the local budget; and .726 for proportion of population living in marginalized areas in total village population. So, the higher values of IEP indicate higher commune/city poverty, while lower values show economic potential or development. For easy reading, IEP values were reversed to reflect economic potential.

Scheme 1: Research approach in building the typology for prioritization of investments in broadband

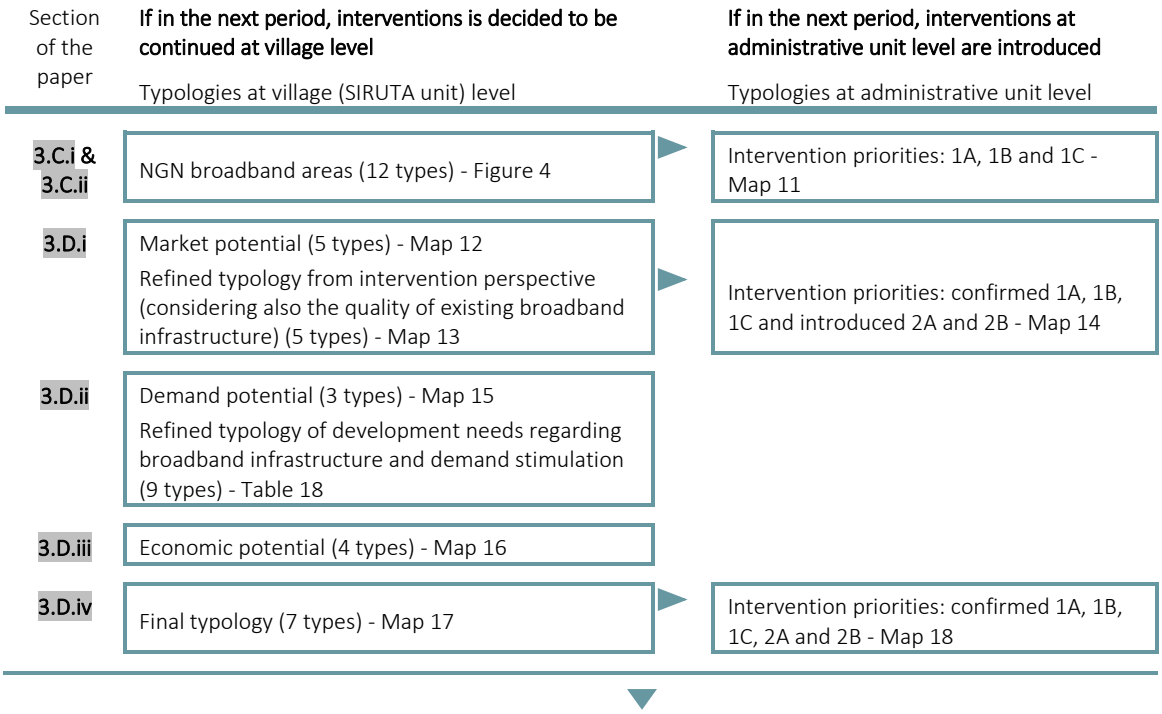


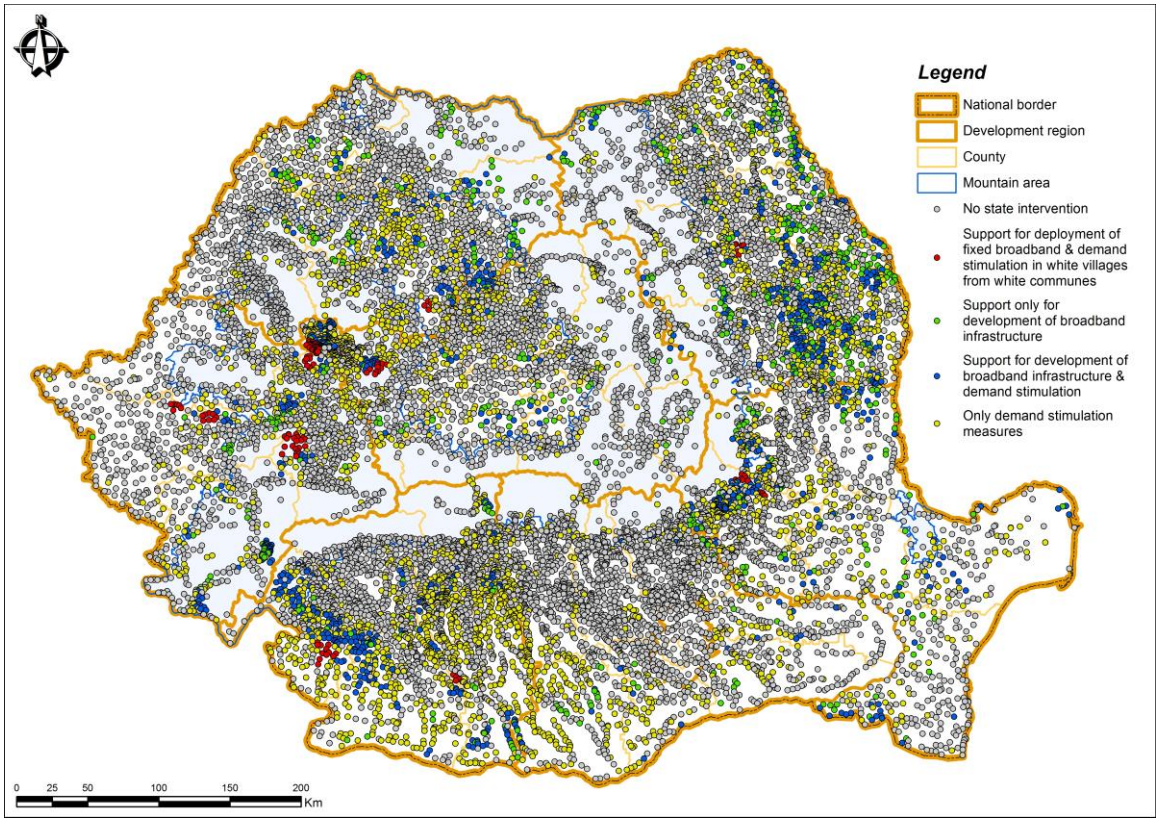
Table 19: Final typology for prioritization of investments in broadband in Romania (number of villages)

	State support for infrastructure deployment		Demand stimulation measures	
	Eligible	Not eligible	Eligible	Total
Need public intervention only to support development of broadband infrastructure:				
- Support for deployment of broadband 30+Mbps in at least one village of the administrative unit	474	369		843
- Support for expansion of existing networks/ providers from neighboring villages within commune/city (*)	137	131		268
Need only demand stimulation measures:				
- Ongoing projects (MARD or Ro-NET)			548	548
- No support for infrastructure			2,042	2,042
Need public intervention to support broadband infrastructure & demand stimulation measures:				
- Support for deployment of fixed broadband & demand stimulation in white villages from white communes	127		127	127
- Support for deployment of broadband 30+Mbps in at least one village of the administrative unit & demand stimulation	393	199	592	592
- Support for expansion of existing networks/ providers from neighboring villages within commune/city & demand stimulation (*)	514	279	793	793
No support needed				8,413

Total	1,645	978	4,102	13,626

Source: World Bank calculations 2015. Notes: (*) Include villages from communes that contain ongoing projects (MARD or Ro-NET). See also Table A.26 in Annex.

Map 17: Final typology for prioritization of investments in broadband in Romania, at village (SIRUTA unit) level, at December 31, 2014



Source: World Bank calculations 2015.

Needs for public interventions to support only development of broadband infrastructure are observed in 1,111 SIRUTA units (of which only 4 in urban areas),[83] but only 55% (611) of them are very poor or poor communities from rural areas that are eligible for state support.

Needs for public interventions to support development of broadband infrastructure together with needs for demand stimulation are found in 1,512 SIRUTA units (of which only 5 in urban areas).[84] Out of these villages, the white villages belonging to white communes (127) have medium economic potential at most, hence are considered all eligible for state support. Other 907 poor or very poor villages are also eligible for state support. In addition, all the other 478 villages not eligible for support in broadband deployment can benefit of demand-stimulation measures.

Measures to stimulate demand for broadband services are needed in 4,102 villages (131 urban), of which about 40% have medium-to-high economic potential (Table A.26, Annex). However,

[83] Small towns Gataia and Recas from Timis county.

[84] Small towns Baneasa (Constanta), Somcuta Mare (Maramures), Brosteni (Suceava), and Insuratei (Braila).

regarding demand-side programs intended to stimulate broadband adoption, economic potential is only useful information (for design) and not an eligibility criterion. Given the multiplicity of barriers to broadband adoption, the demand stimulation measures are part of the larger digital literacy effort and they work when they make non-users want to connect, make the Internet cheaper and easier to use, and adjust to users' preferences.

Overall, a number of 1,645 white or NGN-white villages need and are eligible for investments in broadband infrastructure, whereas 4,102 villages and small towns' neighborhoods do need and would benefit from demand-stimulation programs. These two categories are not exclusive, as shown above.

The villages resulted as priority for state intervention are distributed in all counties (see Table A.27, Annex). All SIRUTA units identified as eligible for state aid for broadband deployment are from rural areas, but demand-side programs should also cover some small towns (see Table A.28, Annex). Most investments in broadband infrastructure should be directed to small, peripheral and declining villages, which tend to accumulate low market potential with low demand for broadband services and community poverty. To a large extent, they also are part of small communes positioned at county boundaries. By contrast, the demand stimulation measures should also address the population from medium and large communes, some close to a city. While investments in infrastructure target only white and NGN-white villages from priority communes, demand-stimulus measures aim all types of NGN broadband areas.

Table 20: Final typology for prioritization of investments in broadband in Romania, at administrative unit (SIRSUP) level, at December 31, 2014

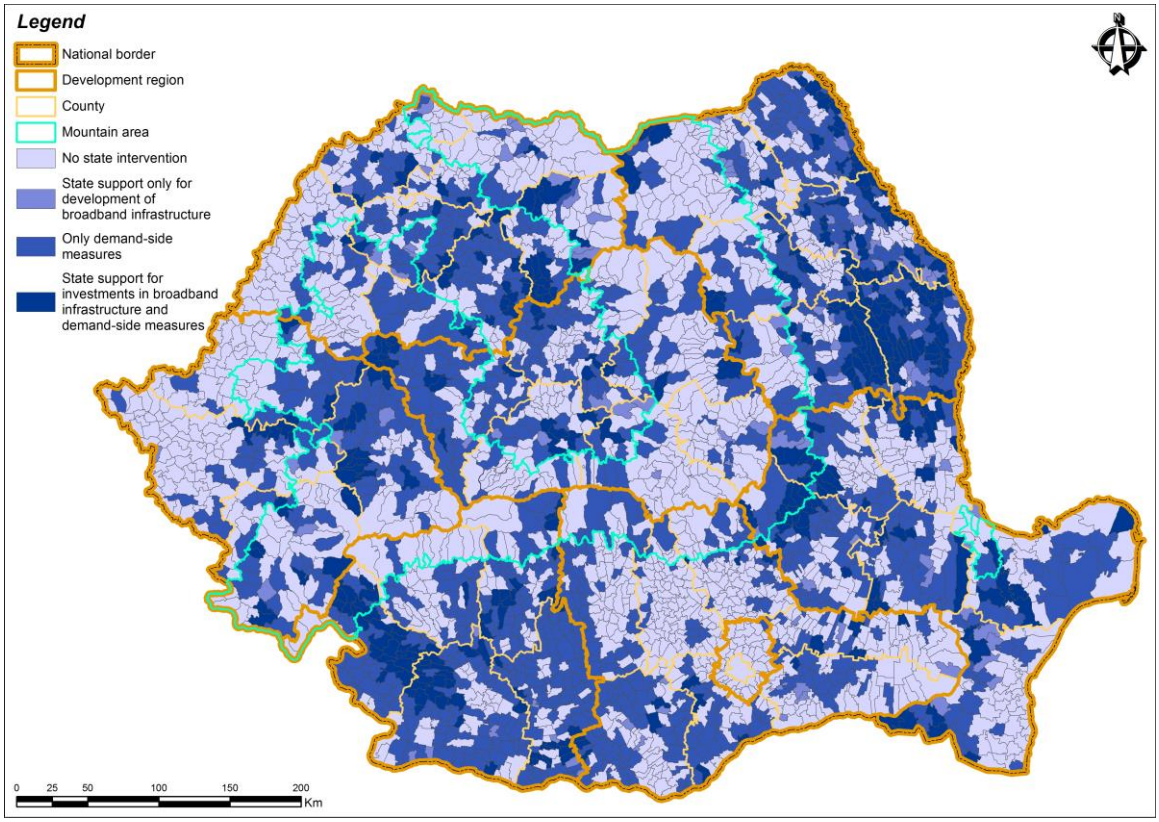
	State support only for broadband infrastructure	Only demand-side measures	Both types of measures	No state intervention	Total
RURAL	**105**	**1,056**	**397**	**1,303**	**2,861**
Priority 1A: White communes (all contained villages are white spots)	-	-	19	-	19
Priority 1B: NGN-white communes (all contained villages are NGN-white spots)	80	37	69	60	246
Priority 1C: White or NGN-white communes (all contained villages are either white or NGN-white spots)	9	48	91	10	158
Priority 2A: Communes including villages with needs related to broadband infrastructure and without villages that are part in ongoing projects	8	78	91	22	199
Priority 2B: Communes with villages that currently are part in ongoing projects, which include also villages with needs related to broadband infrastructure	8	54	127	13	202
Communes with ongoing projects (and no additional needs related to infrastructure)	-	239	-	92	331
All other communes (neither priority of intervention nor with ongoing projects)	-	600	-	1,106	1,706
URBAN		**63**		**257**	**320**
Priority 1B: NGN-white cities (all contained SIRUTA units are NGN-white spots)		1		-	1
Priority 2A: Cities including villages with needs related to broadband infrastructure and without villages that are part in ongoing projects		3		-	3
Priority 2B: Cities with villages that currently are part in ongoing projects, which include also villages with needs		1		1	2

related to broadband infrastructure					
Cities with ongoing projects (and no additional needs related to infrastructure)		4		15	19
All other cities (neither priority of intervention nor with ongoing projects)		54		241	295
ROMANIA (all SIRSUP)	**105**	**1,119**	**397**	**1,560**	**3,181**

Source: World Bank calculations 2015.

Dividing the villages (SIRUTA units) according to economic potential led to a decrease in the number of targeted villages, from the units in need to the eligible ones. Consequently, the number of targeted communes has also reduced at those which contain the eligible villages. Table 20 shows the distribution of the eligible administrative units by categories of priorities. The following Map 18 presents their territorial distribution.

Map 18: Final typology for prioritization of investments in broadband in Romania, at administrative unit (SIRSUP) level, at December 31, 2014



Source: World Bank calculations 2015.

All 1,645 white or NGN-white villages (SIRUTA units) eligible for public investments in broadband infrastructure belong to 502 communes. The number of eligible villages per commune varies widely from one unit (for 34% of communes) to a maximum of 38 villages.[85] So, in more than two thirds of these communes there are at least two villages that need and are eligible for state

[85] Two eligible villages are recorded for 19% of these communes, three in 15% of communes, four in 10%, five in 8%, and 6-to-38 in the other 15% of communes.

intervention. This is additional evidence that intervention at administrative unit (commune) level could be more efficient than the intervention village by village. Even more so if the investment model is changed so that to ensure that in each commune at least a village has access to high speed broadband accompanied by extensive demand-supply measures at local level. Preferably, the village 'nucleus' for broadband development is determined based on geographic parameters that would reduce at minimum the costs of extension to the other villages within the commune.

In addition, operating companies can be identified and directly contacted regarding an evaluation of possibilities for broadband deployment in the respective area.

In villages eligible for public investments in broadband infrastructure live around 711 thousand persons, in almost 257 thousand households.

Regarding the 4,102 SIRUTA units with low demand for broadband services, they are part of 1,453 communes and 63 small towns. In more than 80% of small towns, only one peripheral community needs such a program. By contrast, in communes, the number of villages ranges between one and 33, with an overrepresentation of those with 1-3 villages.

The top demand-side barriers to broadband adoption refer to lack of affordability, lack of usability, lack of relevance, and lack of availability (Horrigan, 2009). [86] Affordability relates to the cost of broadband installation and ongoing service fees, as well as to the cost of computers. Usability pertains to the difficulty (cognitively or physically) to use the Internet. Relevance refers to reasons for not adopting broadband due to lack of interest in going online or in switching from dial-up to broadband (sometimes regardless of price) or to beliefs such as use of the Internet is a waste of time.

Thus, an effective demand stimulation program must tackle many goals, especially the price of broadband service,[87] lack of computer ownership, lack of digital literacy, and the lack of perceived value of broadband. Local and national approaches to stimulating broadband adoption may both be considered (Hauge and Prieger, 2009).[88] One the one hand, when local public authorities or community organizations are involved, they typically begin with a more complete knowledge of what the barriers to adoption are in the community. Local organizations may also be more effective at ensuring that programs are actually utilized by the intended recipients. On the other hand, nationally coordinated efforts may have more capability to set up programs that can be evaluated effectively and to collect and analyze data. So, a national program offering financial support and assistance (centre of resources) to local stakeholders (public authorities, public or private organizations, community organization), and ensuring national monitoring and evaluation, could be an effective policy response to the severe need for demand stimulation in the identified 1,453 communes and 63 small towns, in which live a total of over 1.32 million people in around 522 thousand households.[89]

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[86] Horrigan, John (2009) *Home Broadband Adoption 2009: Broadband Adoption In-creases, but Monthly Prices Do Too*, Pew Internet & American Life Project, June, available at http://www.pewinternet.org/~/media//Files/Reports/2009/Home-Broadband-Adoption-2009.pdf.

[87] According to the *Implementation Programme for the National Plan for Development of the NGN Infrastructure* (MIS, 2015), Romania is one of the states with the lowest prices for broadband connections and triple play.

[88] Hauge, Janice and Prieger, E. James (2009) Demand-Side Programs to Stimulate Adoption of Broadband: What Works?, available at: http://ssrn.com/abstract=1492342.

[89] The identified small towns have almost 25 thousand persons in 10 thousand households.

E. Access to funding broadband investments of the undersupplied areas

Romania is receiving funding from various European Union funds to enhance access to, and use and quality of, ICT technologies. These funds are the European Regional Development Fund (ERDF) and the European Agricultural Fund for Rural Development (EAFRD). The government is expected to allocate about €0.53 billion (ERDF) of these funds to meet this EU's Thematic Objective 2 (TO2). [90] These funds will finance other ICT infrastructure through the Competitiveness OP. Access to small-scale ICT infrastructure in rural areas (as well as basic infrastructure and services) can be improved through the LEADER[91] approach (EAFRD/NRDP[92]). In addition, various ICT projects can be financed through the Operational Program for Fisheries (EFF - European Fisheries Fund).[93] Support is granted to Local Action Groups (LAGs)[94] or Fisheries Local Action Groups (FLAG) operating in rural areas and small towns.[95]

For making the best use of EU funds in enhancing access to, and use and quality of, ICT technologies in rural areas, more assistance should be provided to local authorities and local stakeholders in micro-regions (clusters of communes) or rural communities. The capacity of local authorities to integrate funding priorities and develop ICT-related projects needs to be increased with respect to: (i) Assessing the need for ICT infrastructure and services; (ii) Training and facilitation for the LEADER program and the use of the LAG framework; (iii) Improving the usage of the ICT infrastructure in community-based services, including new technologies that would support the needs of rural residents.

The development of partnerships by local authorities is key to attracting investment from European funds. These funds are open to applications from two main types of partnerships – referred to in the operational programs: intercommunity development associations (IDAs) and local action groups (LAGs/FLAGs) – as well as partnerships between local authorities and other eligible partners. Both of these (IDAs and LAGs/FLAGs) were devised as ways to enhance administrative capacity (NRDP, 2012).[96]

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[90] Source: *Summary of the Partnership Agreement for Romania 2014-2020*, available at: http://ec.europa.eu/contracts_grants/pa/partnership-agreement-romania-summary_en.pdf.

[91] LEADER (Liaison Entre Actions de Développement de l'Économie Rurale or Links between the rural economy and development actions) is a local development method developed by the European Network for Rural Development (ENRD) that allows local people to develop an area by using its inherent potential.

[92] NRDP - National Rural Development Programme.

[93] Both rural and urban (under 100,000 inhabitants) areas are eligible as members of a local partnership (Fisheries Local Action Group - FLAG), but the overall population covered by FLAG should be between 10,000 and 150,000 inhabitants. (MARD, 2014: 86).

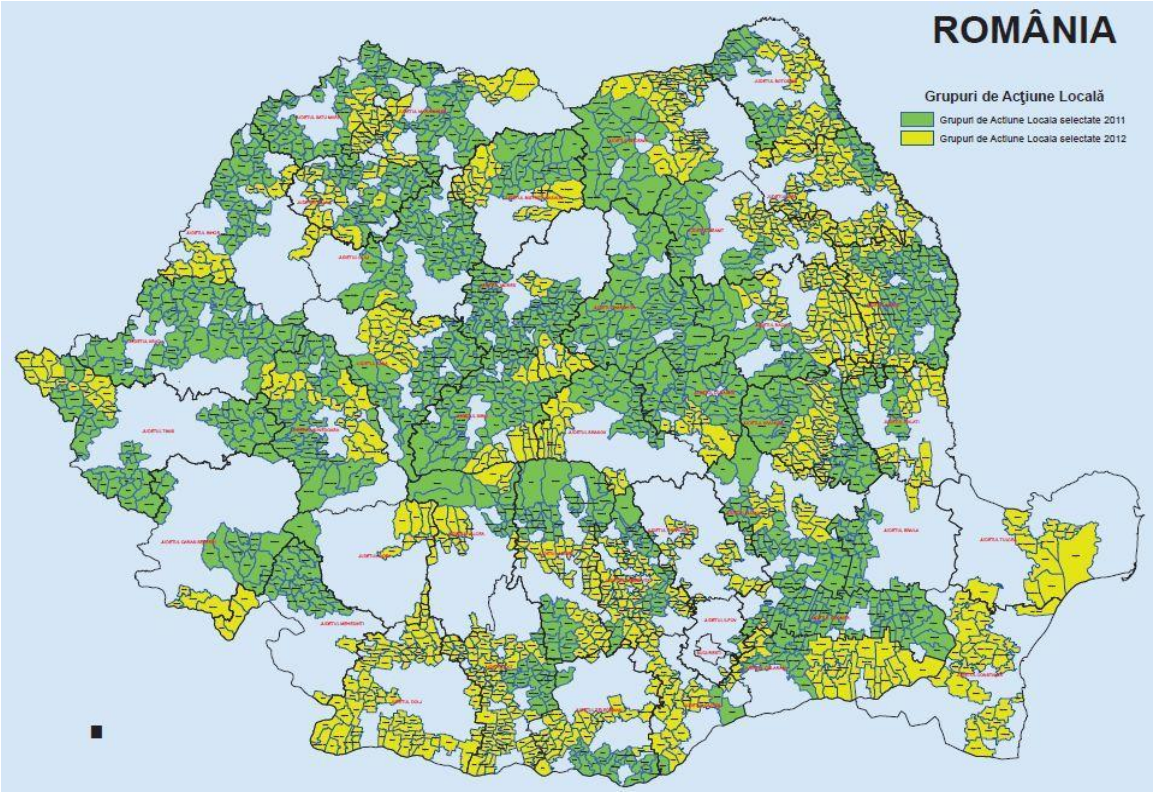
[94] Local Action Groups (LAGs) are made up of public and private partners from the rural territory (including towns under 20,000 inhabitants), and must include representatives from different socio-economic sectors. The LAG membership is open to everyone living within the LAG boundaries. Both private persons and local public/private organizations can become members. The number of members is a good indicator on how widely the LAG is known and recognized on its territory. Source: http://enrd.ec.europa.eu/enrd-static/leader/leader/leader-tool-kit/the-local-action-group/en/what-is-the-lag-s-structure_en.html.

[95] Both rural and small urban (under 20,000 inhabitants) areas are eligible but only as members of a local partnership (LAG) that might include one or more towns (only in exceptional cases), which however cannot have in total more than 20,000 inhabitants or over 25% of the total number of inhabitants living in LAG. (MARD, 2013: 396).

[96] *National Rural Development Programme 2007-2013*, Consolidated version from March 2012, available at: http://www.fonduri-structurale.ro/Document_Files/dezvoltarerurala/00000033/t5ihv_Programul_National_de_Dezvoltare_Rurala_2007_-_2013_-_versiunea_martie_2012_.pdf

Partnerships increase a rural municipality's chances of EU funds absorption (Marin, 2014).[97] A partner with either well-developed administrative capacity (including specialized human resources) or high fiscal capacity (for covering the expenditures on consultancy firms or feasibility studies) can help all members of the partnership to attract extra-budgetary revenues from European funds. As a rule, the number of inhabitants is a strong predictor of the administrative unit's fiscal capacity, which is in turn important for ensuring co-financing from European funds or bank loans, which is often necessary for ensuring the flow of funds to the project. Increasing the size of the population through a partnership can satisfy the fund's cost-efficiency conditions for large-scale investments.

Map 19: The map of Romanian LAGs selected for funding under LEADER Axis, end of 2014



Source: Ministry of Agricultural and Rural Development. At present, September 2015, the LAGs are under a revision process.

[97] Marin, M. (2014) *The role of administrative capacity in success of structural funded projects: the case of Romanian local public administration*, Unpublished PhD thesis, Bucharest, Faculty of Sociology and Social Work, University of Bucharest.

Box 4. Local Action Groups (LAGs), LEADER Axis, Romania, end of 2013

The *2013 Progress Report on the National Rural Development Programme* reported data on the authorized Local Action Groups (LAGs), approved for financing under the LEADER Axis. At the end of 2013, there were 163 LAGs with Local Development Plans selected for financing[98], which:

- covered a total surface of 142,267 km2 , which represent 78.3% of the provisioned target;
- covered a total population of over 6.77 million inhabitants (as compared to the target of 9.36 million);
- included as partners 1,781 communes and 77 small towns;
- included over 6,942 members, out of which 5,103 private partners and NGOs;
- have received financial assistance to implement local development plans, by awarding grants to local projects; a total number of 2,040 local projects were contracted (as compared to the target of 9,502). Most projects, and the largest grants, went to LAGs from three regions: North-East (518 projects granted nearly 16 MEURO), South (354 projects, over 15.1 MEURO), and Center (301 projects, more than 12.1 MEURO).

Source: Ministry of Agriculture and Rural Development, 2014: 105-109.

At the same time, the IDAs/LAGs/FLAGs between rural and urban municipalities have the potential to further the integrated development of both urban and rural areas in partnership with other private stakeholders. Even those local public authorities that are not explicitly declared to be eligible for particular European funds can also build partnerships with other (eligible) beneficiaries to apply to those funds. Furthermore, another type of partnership with potential benefits for a large number of communes and small towns consists of associations of local authorities such as the Romanian Association of Communes and the Romanian Association of Cities. Both of these have carried out large-scale European funded projects[99] that have had an impact in numerous localities.

Small towns appear to have fewer sources of extra-budgetary funds than communes, and their access to European funding strongly depends on their capacity to build and participate in partnerships. For small towns, partnerships are a prerequisite for accessing most of the available European programs, particularly IDAs or LAGs.

The Map 19 shows that localities members in LAGs are spread all over the country, but are much better represented in the North-East and Center regions. Thus, the proportion of localities participating in LAGs declines among small towns (urban) from 35% in North-East region and 32% in Center to 18-26% in the other regions; the rate of participation in LAGs among communes (rural) diminishes from nearly 80% in Center to 69% in North-East, 62-65% in West and North-West, 57-60% in South-East and South, and less than 48% in South-West, respectively 13% in Bucharest-Ilfov.

Communes of all types participate in LAGs. However, it appears that communes with the smallest self-generated revenues at local budget and more extended poverty have relatively higher propensity to be partners in LAGs. In the same time, the small and remote communes (with fewer than 2,000 inhabitants) have difficulties to take part in local partnerships. Thus, the rate of participation is 54% among the small and remote communes as compared to 63% of the small

[98] In 2011, 81 LAGs with a total public financing of 227.55 MEURO and in 2012, other 82 LAGs with Local Development Plans with a total public funding of Euro over 226.1 MEURO.

[99] Details of the implemented projects can be found on www.acor.ro or www.aor.ro.

non-remote communes, 69% of the remote communes larger than 2,000 inhabitants, and 62% of the other communes.

Priorities for investments in broadband and LEADER (MARD)

For the period 2014-2020, rural and small urban municipalities have access to funding small-scale ICT infrastructure through the LEADER approach (MARD), if they are members of a Local Action Group (LAG) or a Fisheries Local Action Group (FLAG). For this reason, it is relevant to distinguish among the villages/ administrative units identified as priorities for intervention in section 3.D.iv between municipalities that are part of a LAG/FLAG and those that do not.[100] The villages/ administrative units with no access to EAFRD/EFF funds should be supported by the MIS, through the Ro-NET program.

About two thirds of all villages (SIRUTA units) and administrative units with broadband-related development needs, which are eligible for state support (as very poor or poor units), are part of a local partnership, either a LAG or a FLAG. Therefore, the number of localities representing priorities for intervention that must be supported by MIS through Ro-NET or other national programme drops sharply with respect to investments in infrastructure to a number of 552 villages, included in 163 communes (Table 21).

Regarding demand stimulation measures, a national programme that work both with LAGs/FLAGs (for instance offering assistance, monitoring and evaluation) and with communes and small cities not participating in a partnership may prove more effective in enhancing demand and use of the Internet.

The candidates for state support, through the Ministry of Information Society, distribute unevenly across counties (Table A.29, Annex). While in 18 counties their number is less than ten communes/small towns, few counties concentrate between 34 and 43 municipalities each. Noteworthy, among the counties with a large number of candidates for state intervention are found Valcea, Teleorman, Dolj or Olt. Therefore, the profiles of counties seen from the perspective of investments prioritization combined with available funding opportunities (Table 21) differs considerably from the one obtained based on the mix of NGN broadband areas (as discussed in Tables 7 and 9).[101] Although the counties' profiles change considerably in some cases, the mismatching between the problems severity and the policy response given through the ongoing projects (MARD and Ro-NET) persists.

[100] For this assignment we use the most updated list of LAGs approved for financing under LEADER, available at: http://leader-romania.ro/leader/2011/Lista_Grupurile_de_Actiune_Locala_autorizate_pentru_functionare_de_MADR_si_date_de_contact_GAL_la_data_de_03.11.2011_.pdf. Nonetheless, at the workshop organized within the project in September 2015, we learned from the MARD representative that LAGs are currently under a revision process. The analysis presented in this section must be revised when the new list of LAGs will become available.

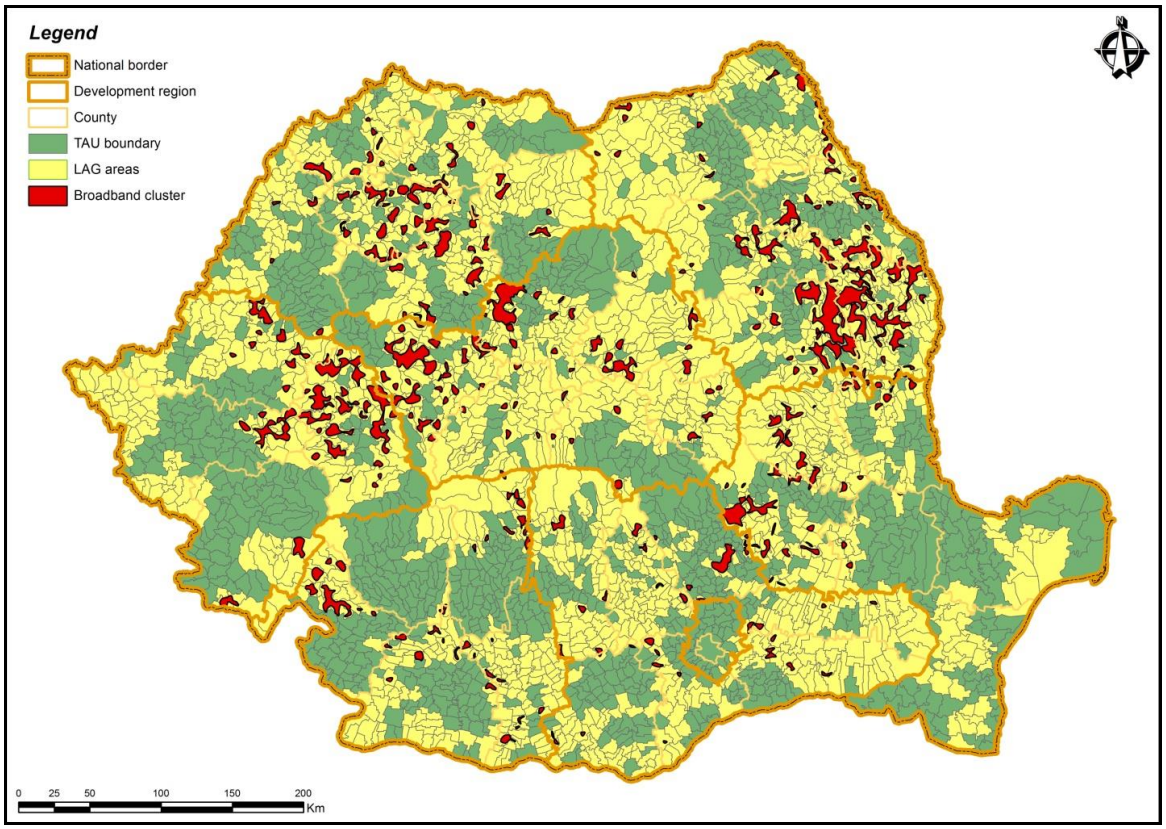
[101] We refer to the matching exercise between targets of public broadband projects and county profile in terms of mix of NGN broadband areas.

Table 21: Villages (SIRUTA units) and administrative units by residency, typology for prioritization of investments in broadband and membership in a LAG or FLAG (which make them eligible for LEADER) (number)

	Candidate for MIS support (Ro-NET)	Members in a LAG or FLAG	Total
Village (SIRUTA units) level			
RURAL	**4,546**	**7,827**	**12,373**
Support for deployment of fixed broadband & demand stimulation in white villages from white communes	68	59	127
Support only for development of broadband infrastructure	175	436	611
Support for development of broadband infrastructure & demand stimulation	309	598	907
Only demand stimulation measures	1,113	1,824	2,937
No state intervention	2,881	4,910	7,791
URBAN	**832**	**421**	**1,253**
Only demand stimulation measures	85	46	131
No state intervention	747	375	1,122
TOTAL			
Measures related to investments in infrastructure	**552**	**1,093**	**1,645**
Measures for stimulating demand	**1,575**	**2,527**	**4,102**
Administrative unit (SIRSUP) level			
RURAL	**995**	**1,866**	**2,861**
Support for deployment of fixed broadband & demand stimulation in white villages from white communes	9	10	19
Support only for development of broadband infrastructure	35	70	105
Support for development of broadband infrastructure & demand stimulation	119	259	378
Only demand stimulation measures	376	680	1,056
No state intervention	456	847	1,303
URBAN	**223**	**97**	**320**
Only demand stimulation measures	39	24	63
No state intervention	184	73	257
TOTAL			
Measures related to investments in infrastructure	**163**	**339**	**502**
Measures for stimulating demand	**543**	**973**	**1,516**

Source: World Bank calculations 2015. LAGs and FLAGs as at end of 2014, MARD.

Map 20: Clusters of broadband undersupplied villages, Romania, at December 31, 2014



Source: World Bank calculations 2015.

The sub-chapter 3.C.ii (in section *Lessons for public interventions and priority administrative units*) showed that many undersupplied municipalities are neighboring other undersupplied municipalities. Illustration is provided in Map 10 (cases of Vaslui and Alba counties). The distribution of such clusters of undersupplied villages that cover a compact territory (with a diameter less than 80 km) is presented in Map 20. Existence of such undersupplied clusters that may cover a number of communes represent another possible level of state intervention, besides village and administrative unit/municipality. Nonetheless, given the difficulties in forming partnerships between municipalities as well as due to the various legislative and administrative barriers for action on such territories (e.g. for construction work or official approval and documents), this approach is not realistic for now. LAGs/FLAGs represent the sole partnerships, built on a bottom-up approach, which could apply a broadband project on such undersupplied clusters. Therefore, the identification of undersupplied clusters must be revisited once the final list of LAGs (for 2015-2020 financial envelop) becomes available.

Methodology used for creating the broadband investment clusters

The process of determining the broadband clusters, eligible for investments, began with a selection of all the settlements which have the status of a whitezone or greyzone village and which are contained in a LAG entity. The localities selected this way were subsequently used in a spatial analysis operation with the aim of creating spatial clusters that will simultaneously meet a number of defined criteria. Practically, every cluster generated was subject to certain rules, as follows: to be composed of at least three localities, the distance between localities to not be more than 5km and the cluster limits need to be inside the LAG entity boundaries.

According to the analysis of data based on those rules, have been identified a number of 315 clusters eligible for broadband investment, comprising a total of 2,723 localities, included in the territories of 163 LAG entities. The average number of population included in the nationally generated clusters is approx. 3,300 inhabitants. The smallest cluster in terms of underserved population reaches 101 inhabitants, when the largest cluster, serves more than 22,000 inhabitants.

Test analysis - Broadband Clusters within Development Regions

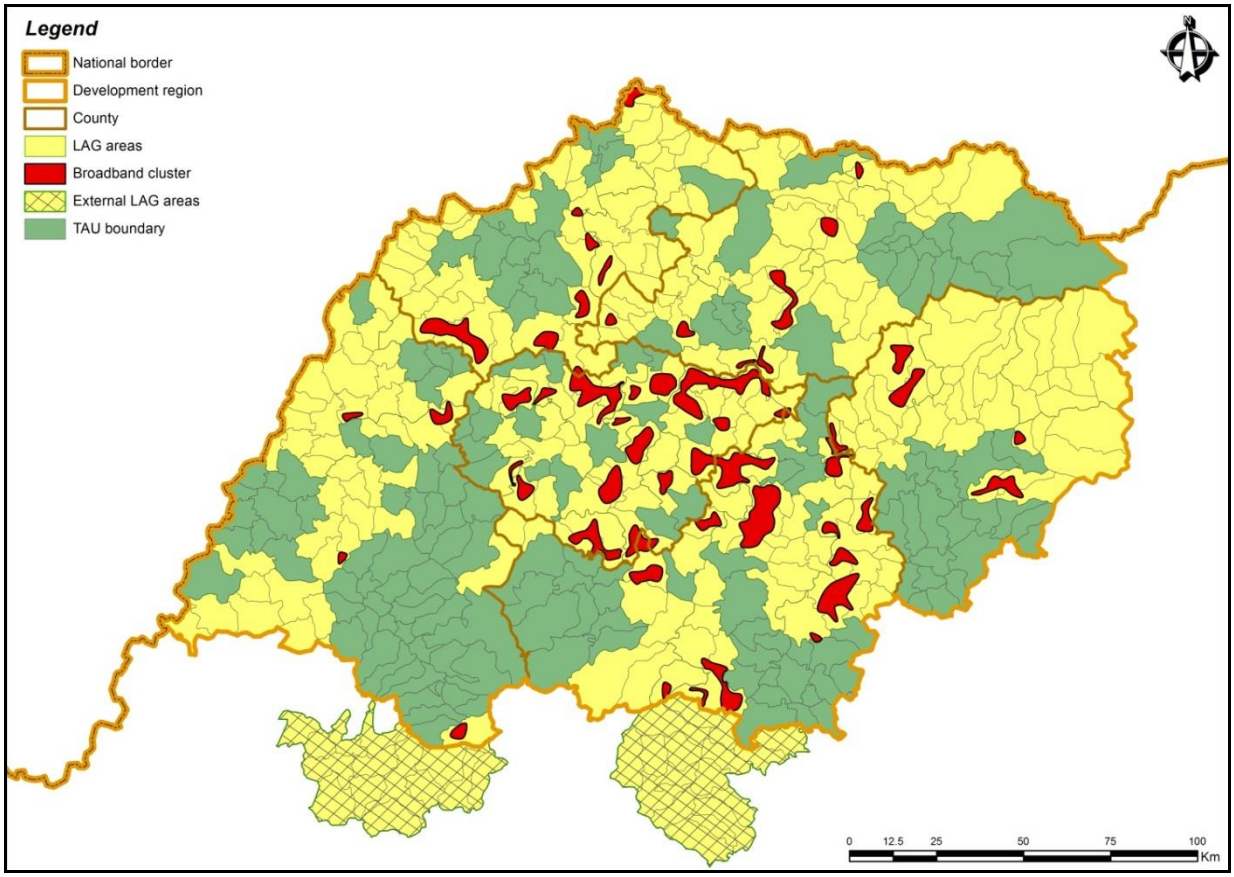
For better interpretation and representation of the results, analysis was performed in the context of development regions. Further, the analysis results will be presented within each Development Region in Romania.

A. "North-West" Development Region

In the studied area, have been identified a number of 52 clusters eligible for broadband investments which are contained within the territories of 24 LAG entities out of a total of 27 entities, which occur in the North-West Development Region.

The highest density of clusters is found in the center of the region, specifically on the territory of Salaj County. Across the entire region, in terms of population served, the smallest cluster includes approx. 255 inhabitants while the largest cluster serves a total of over 8,000 inhabitants. The average number of inhabitants served by a cluster in this region is approx. 2,700 inhabitants. Across the region there are a total of 1,883 villages, totaling a population just over 2.584 million inhabitants. From these localities, 924 settlements, representing 49% of the total are in whitezone and have a population of approx. 378,637 inhabitants, representing 14.65% of the entire region. Besides these, 27 localities, representing 1.43% of the total, are in greyzone and summarize a population of over 28,000 inhabitants, representing 1.10%.

Map 21: Clusters of broadband undersupplied villages, North-West Development Region, at December 31, 2014



F. Qualitative research study: 15 case studies

i. Objective of the qualitative research

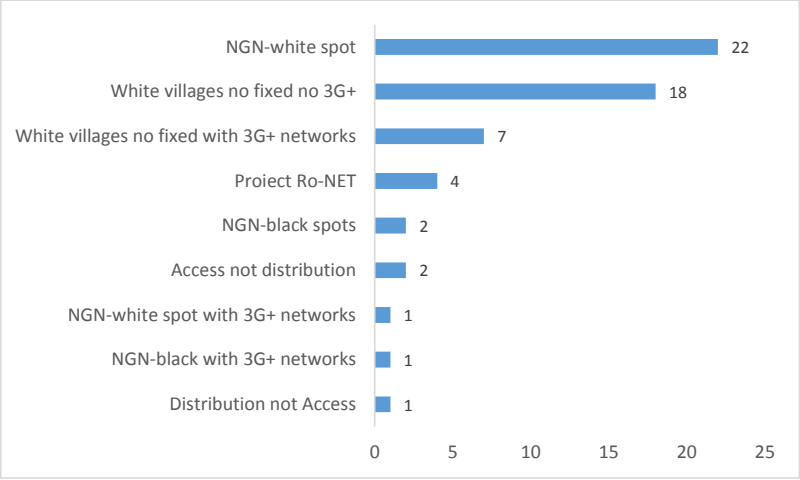
The Digital Agenda for Europe (DAE), one of the flagship initiatives of Europe 2020, includes a set of specific broadband coverage targets, as follows: (i) universal broadband coverage by 2013; (ii) universal broadband coverage of speeds at least 30 Mbps by 2020 and (iii) 50% penetration of 100Mbps service in the European Union member states. The objective of the research is related to the first two DAE policy priorities, in relation to the standard fixed and NGA broadband coverage.

The qualitative research aims to provide a meaningful picture of the current status of broadband coverage both at the level of public institutions as well as households' level.

ii. Methodology of the qualitative research

The qualitative research covered 15 communes from the following five counties: Hunedoara, Mehedinți, Neamț, Timiș and Vaslui, with a total number of 58 villages.[102] The selection of the villages is based on the typology identified in the previous chapters. It covers nine different types of NGN broadband areas, with most of the villages being NGN white spots or white villages no fixed no 3G+ networks.

Figure 14: Distribution of villages included in the qualitative research by NGN type broadband areas (number)



The data collection method was phone interviews with representatives of the municipalities – mayors, secretaries, social workers or former managers of PAPI (Public Access Points to Information). The interviews have been conducted in the period of September 27 – October 5, 2015, by a team of experienced researchers: Bogdan Corad, Cătălina Iamandi Cioinaru, Monica Marin, Georgiana Neculau and Andreea Trocea.

The interview guide (see Annex) covered the following key issues:

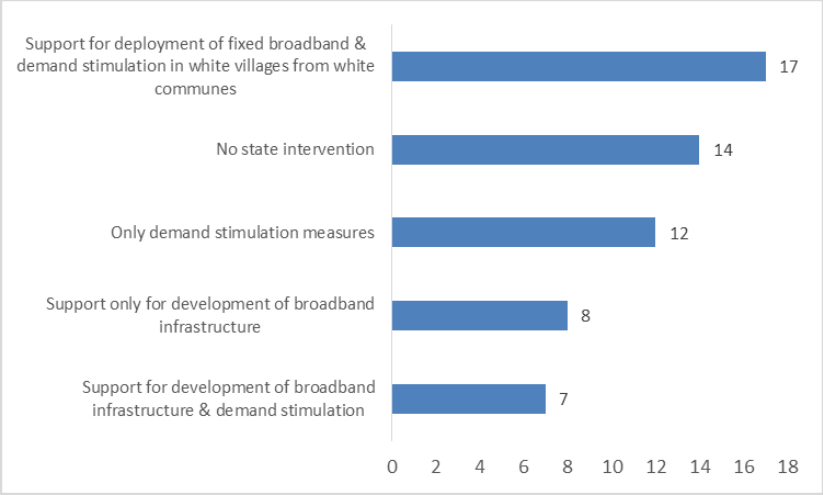
[102] One village is fictive– Cheches from the commune of Secas, Timis county. The 'fictive' villages have zero inhabitants and no corresponding data in the 2011 Population and Housing Census.

A. general connection of the public institutions, including history of Internet connection in the commune, participation in Local Action Groups and directions for communications development,

B. territoriality – white area/ areas of the commune, including information on the geographical barriers,

C. profile of the local population (digital skills, opinions on development directions, migrants, etc.). Therefore, the interview guide requested information both at commune and village level. The differences on Internet connections, if any, have been explicitly requested to be disaggregated at village level.

Figure 15: Distribution of villages included in the qualitative research by final typology for prioritization of investments in broadband (number)



iii. Main results of the qualitative research

The information presented in this section is based on the views, opinions and knowledge of the institutional representatives, therefore cannot be regarded as an 'objective' evaluation of the adequacy of proposed interventions. However, it provides a useful insight on the perceived obstacles, needs and solutions for development of broadband infrastructure in rural Romania. It draws attention especially on the need of better planning of state interventions, based on an in-depth assessment of lessons learned from previous projects implemented at national level.

Broadband coverage at population level

The typology of NGN broadband areas has been generally confirmed by the qualitative research especially in what concerns the households' fixed coverage, the market potential, the demand potential and the economic potential of villages. The research also confirms the importance of the size of the population, of demographic composition or of geographical barriers in relation to broadband coverage.

The size of village population is a strong correlate of NGN broadband areas. The research included small and very small villages in which there are few chances for broadband infrastructure to be deployed by private investment in the near future. Combined with a rather

old-age population with no digital skills, this makes the 'perfect candidate' for very low market potential for developing the broadband infrastructure.

In addition to this, geographical barriers such as mountain areas, forests, railways, bridges or no road infrastructure have been confirmed by the municipality representatives as obstacles in development of broadband network. There are cases of villages with differences of altitude in excess of 500 m. Furthermore, the physical barriers also depend on the season. In winter, because of the weather conditions, the Internet connection breaks generally four or five times in the case of remote villages.

The demand for broadband coverage comes mainly from youth and parents with children at school. However, both groups have access to Internet other than the standard broadband coverage at household level: the youth also have smart phones with mobile coverage and children also have access to Internet through the school lab. Yet, connectivity of school depends on the connectivity of the village.

The coverage with mobile broadband networks is a good substitute for lack of fixed broadband infrastructure. Further questions arise in relation to the quality of the coverage, as there is no uniform standard speed provided. However, mobile broadband connections are also used by public employees in their daily work (if the municipality does not have a broadband connection).

The subscriptions to mobile connections are used for communications with migrants. As the subscriptions have become more affordable, 'when calling their relatives abroad, some young people come and stand in front of the town hall to get connected to the wireless' (Mayor, Vaslui county).

The demand for new services that require much faster Internet access, with speeds of at least 30Mbps, is poorly understood at population level. The needs are rather defined in relation to having Internet access or not, and also in relation to the affordability of the subscription 'If it would it be free, the population would agree to have high speed internet' (Secretary, Mehedinți county).

Broadband coverage at public institutions' level

There are two main issues to be discussed in relation to the connectivity of public institutions: (i) the level of the analysis - the institutions represented at commune level (municipality, police, library, dispensary, pharmacy) and the ones most likely to be represented at village level - schools and/ or churches and (ii) the sustainability of previous project interventions addressing connectivity of public institutions (or public access to Internet through public institutions).

Generally the institutions represented at commune level are connected to Internet. Some of them have been connected through previous projects such as the Knowledge Economy Project, with the standard broadband speed for public institutions of 4 Mbps. Similar to the level of the population, the representatives of the institutions have not identified a clear need for upgrading the speed of the Internet connections for carrying out their professional duties. However, especially for public institutions this must be viewed in relation to the general very low level of development of e-government services and must be put in the context of other initiatives related to implementation of the Digital Agenda strategy in Romania - universal access to the telemedicine services for the rural population in Romania by 2020. As a consequence, as new public e-services will be developed at national level, the demand for faster Internet access from public institutions might also grow.

The municipality and the library represent the key institutions for broadband coverage of public institutions at commune level. In our sample, they are connected to Internet either by their own efforts or as a result of two large projects: Knowledge Economy Project (KEP) and Biblionet. In some cases, the County Council has developed the broadband infrastructure through public-private partnerships at county level. This is the case of mayoralties from Mehedinti county, part of the EuDiS (European District System) project, which connects the town halls throughout the county and other public institutions, with a knot within the Mehedinți County Council. However, the sustainability of project interventions in terms of providing public access points to information (PAPI) is a challenge.[103] The computers provided in the project are rather old and have been moved from PAPI to the municipality or school. In this way, the population no longer has access to publicly available computers with Internet connection. Some of the solutions come from Biblionet which is a large scale project providing access to Internet through public computers at library level.

The institutions represented at village level, such as schools, generally depend on the level of development of broadband infrastructure at the village level. The research has also identified innovative solutions used by local authorities in order to make feasible financial investments – related especially to the high costs of investing in optical fiber networks. A school in an NGN white spot village from Vaslui county has used a wireless antenna with signal from a relay located in another commune (at a distance of 20 km). The same relay also connects the school from another village (which is also included in the RoNet project). Yet, the quality of the connection is not uniform, as the Internet routers are switched off during weekend time and therefore the provider can no longer monitor service provision. As a result, the connection is not properly working all the time.

In what concerns the capacity for collaboration, almost all of the communes included in the research are part of the Local Action Groups (LAGs). However, they have not included in their strategic development directions the need for improving the communications infrastructure. Therefore, this comes as a challenge in terms of stimulating the demand for the European Funds allocated with the National Rural Development Plan for development of broadband infrastructure in the rural area.

In addition to this, the priority level of access to Internet comes after the roads and social infrastructure: 'the commune lacks many other things, ahead of the internet' (Mayor, Vaslui county) or 'we have other priorities for this moment. These are the roads, schools and kindergartens. After we resolve these, we can think about the Internet' (Social Worker, Vaslui county).

Priorities at national level such as the ones related to voting might substantially contribute to providing connection at school level. 'The plan is to connect the school from the other village too, because it will be polling station and it will need internet connection' (Secretary of the commune, Vaslui county).

Last but not the least, the general connectivity of public institutions must be assessed first of all in relation to the delivery of service. The Internet connection of library or of dispensary cannot replace the lack of human resources needed for the service to be delivered to the beneficiaries.

[103] The research has also identified cases of villages in which the RoNet project has started the implementation process, but has not ended with the expected results -'due to a history about which I don't want to comment on, the project has been closed and the computers have been moved to the municipality and school. In these villages the quality of the 3G coverage is quite poor' (Social Worker, Vaslui county).

For instance, the research has identified in a NGN white commune (Vaslui county) the case of a library connected to Internet but without a librarian, therefore not working. In another white commune from Hunedoara county the dispensary has Internet connection but it is not functional, as there is no medical doctor. Therefore, an accurate indicator for the Internet connection as a key enabler for delivering public services would be the number of functional public institutions with Internet connection or in the case of library, the number of users of publicly available computers with Internet connection.

Concluding remarks

The qualitative research has generally confirmed the typology of NGN broadband areas, especially in what concerns the households' fixed coverage, the market potential, the demand potential and the economic potential of villages. Less clear results are on the typology of investments.

Firstly, access to Internet varies a lot between local public institutions and between local public institutions and population. The research has identified cases of white communes with public institutions connected to Internet and also cases of NGN white spots with population connected to Internet through mobile 3G+ networks. Therefore, the current set of statistical data needs to be completed with field visits for a comprehensive picture of the connectivity of the village/commune.

Secondly, multiple projects on development of broadband infrastructure have been developed in a 'silo' approach without a coordination mechanism at central level. Their results should also be considered when designing the needed investments in each village/ commune.

Thirdly, the qualitative research has highlighted the importance of access to 3G+ mobile networks, a factor that should be considered especially when considering the market potential for developing the broadband infrastructure. The current affordable subscriptions for mobile communications result in a challenge for stimulating the demand for fixed broadband coverage, even at higher transfer speeds.

In conclusion, the research showed a clear need for a better planning process of investments in broadband infrastructure, based on more detailed information collected through field visits. The qualitative research has also showed that the typology of NGN broadband areas is a useful, but not sufficient instrument for designing the necessary investments.

iv. Detailed results of the qualitative research: 15 case studies

Typology –1.A. White communes

i. Corlățel, Mehedinți

Map 22. Corlățel commune

Source: Google maps.

Profile of the commune

Commune	Corlățel
SIRSUP	111417
County	Mehedinți
Development Region	South West Oltenia
Population	1,366
Broadband typology	White commune
Villages	Valea Anilor Corlățel

NGN profile of the commune

In the 'white' commune of Corlățel almost all public institutions are connected to Internet, some of them also with access to 3G+ networks. The economic potential of the investment in broadband infrastructure is severely undermined by extensive usage of mobile phones within the general population.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police		*Intranet*	
School(s)			
Kindergarten(s)			
Library			
Dispensary	*3G*		
Pharmacy	*3G*		
House of culture			
Church(es)			
Agricultural associations	*Not in the locality*		
Other institutions			

Municipality: The town hall is connected to the Internet through cable, provided by the Company for Information Technology Services Mehedinți. The speed is lower than 30 Mbps.

Police: It is connected to the Intranet.

Schools: The commune has just one school in Corlățel village, which is connected to the Internet, through cable, also from the Company for Information Technology Services Mehedinți.

Kindergarten: The kindergarten is not connected to the Internet.

Library: The library is connected to the Internet through Biblionet project, but it has no computers with public access.

Dispensary (Medical practice) and pharmacy: May have internet connection from Orange.

House of Culture: It is located in the same building with the library, thus it has internet connection.

Church(es): No Internet connection.

Agricultural associations (or of producers'): There are three agricultural associations or of producers, which have internet connection, because their headquarters is in the municipality which is county capital.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Corlățel	111426	779	Central	White villages no fixed no 3G+
Valea Anilor	111435	587	Peripheral	White villages no fixed with 3G+ networks

In both Corlățel and Valea Anilor villages the population is aged. The authorities estimate that about 70% of the inhabitants are old people. Corlățel village has about 200 children. The young population migrates abroad.

The children use the internet, but the general population uses extensively the mobile phones, both for national and for international calls. "Would it be free", the villagers would agree to have high speed internet.

C. Broadband-related Projects and local market

Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	Yes
BiblioNet	Yes
Other projects, specify.....	No

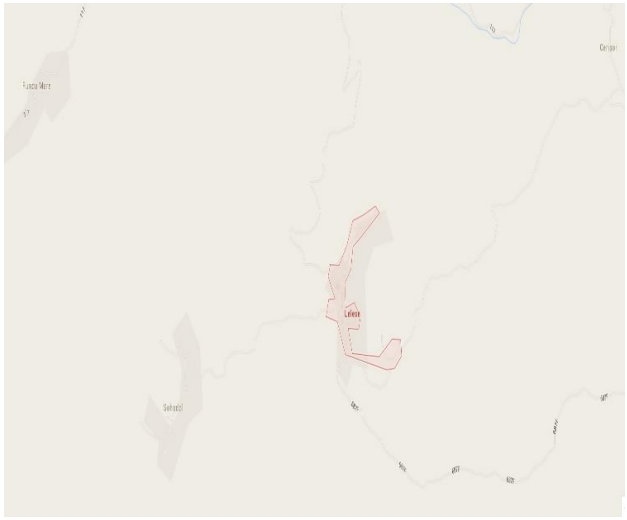
Until now, no private company which distributes high speed internet showed interest, in time, to operate in the commune, but the local authorities too, didn't try to draw such investments. The secretary of the commune knows that in the neighboring town, Vânju Mare, located 7 km away, there is a high speed Internet provider, AKTA, which might develop broad band infrastructure in Corlățel commune. However, the secretary says that it would not be sustainable to make investments in high speed internet infrastructure because the population would not pay the subscriptions. Furthermore, the "trend is moving now towards mobile phones and phone internet".

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Corlățel	low	low	very poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Valea Anilor	low	low	very poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes

ii. Leleșe, Hunedoara

Map 23. Leleșe commune



Source: Google maps.

Profile of the commune

Commune	Leleșe
SIRSUP	90066
County	Hunedoara
Development Region	West
Population	406
Broadband typology	White commune
Villages	Leleșe Cerișor Runcu Mare Sohodol

NGN profile of the commune

In the 'white' commune of Leleșe both public institutions and the general population have access to Internet. Unlike other areas of Romania, the aged population has digital skills, developed for communication with migrants abroad.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police			
School(s)			
Kindergarten(s)			*Not applicable*
Library			
Dispensary			
Pharmacy			*Not applicable*
House of culture			
Church(es)			
Agricultural associations			
Other institutions			

Municipality: It is connected to the Internet by cable. The PAPI center (World Bank project – knowledge-based economy) functions in the town hall, where the villagers have free access to computers connected to the Internet. This center is visited particularly in the weekends, when the library, beneficiary of BibioNet (Microsoft) project, and which has new computers, is closed. The fixed phone connection is also done through the Internet cable. The town hall installed a new router and distributes free wireless internet in the village which is the commune center – 75% of the inhabitants from this village have computers at home and can use the free internet connections from the mayor's office. Cerișor village, which is closer to the village which is the commune center, also benefits of Internet connection.

Police: It is connected to the Internet by cable.

Schools: There is a school in the commune, with three buildings, but just one of them is functional, the one from the village which is the commune center; this building has Internet connection.

Kindergarten: There is no kindergarten in the commune.

Library: It is connected to the Internet through BiblioNet project. There are computers with public access to the Internet.

Dispensary (Medical practice): The commune has a dispensary, which is connected to the internet. This dispensary is not functional, however, because there is no medical doctor.

Pharmacy: There is no pharmacy in the commune.

House of culture: The house of culture is connected to the internet.

Church(es): There is just one church in the village which is the commune center, and it is connected to the internet.

Agricultural associations (or of producers'): There is an agricultural association, the Association of animal breeders, Leleșe 2008, and their headquarters is connected to the internet.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Leleșe	90075	154	Central	White Villages No Fixed No 3G+
Cerișor	90084	104	Peripheral	White Villages No Fixed No 3G+
Runcu Mare	90093	123	Peripheral	White Villages No Fixed No 3G+
Sohodol	90100	25	Peripheral	White Villages No Fixed No 3G+

Leleșe commune has a population of about 400, but this summer it reached about 1000 people, because the people working in Hunedoara or in other places come here for the holidays. The commune is rather aged – over 60% of the villagers are old people. The commune has about 50 children. The commune is affiliated to the GAL 'Ținutul Pădurenilor Țara Hațeg', and the development strategy relies on previous projects.

Although the population is rather old, it has rather good digital competencies. There are old people aged 70+ who have computers connected to the internet and who communicate with their kin abroad.

Cerișor village, being closer to the village centre of the commune, also has internet connection.

C. Broadband-related Projects and Local Market

Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	Yes
Ministry of Education	No
BiblioNet	Yes
Other projects, specify…	No

The library center has old computers and it is open to public only on Saturdays and Sundays, because the library is closed these days.

The villages from Leleșe commune are isolated and the access to them is difficult because of the mountains, valleys and forests. There are differences of altitude in excess of 500 m, where the mayor's office pumps water to be distributed in the villages. In winter, because of the weather conditions, the Internet connection breaks generally four or five times. When this happens, they have no internet connection, and n phone connection either – because the fixed phone connection is done through the internet cable too, and the mobile phones have very weak signal, if any.

The town hall authorized and made available a plot of land for the erection of a Vodafone pillar, to have signal for the mobile phones – they are currently waiting for the investment to materialize.

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Leleșe	low	medium	poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Cerișor	low	low	poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Runcu Mare	market failure	low	poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Sohodol	low	low	poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes

iii. Poroina Mare, Mehedinți

Map 24. Poroina Mare commune	Profile of the commune	
	**Commune**	Poroina Mare
	SIRSUP	113153
	County	Mehedinți
	Development Region	South West Oltenia
	Population	1,048
	Broadband typology	White commune
	Villages	Poroina Mare Fântânile Negre Stignița Șipotu
Source: Google maps.		

NGN profile of the commune

The 'white' commune of Poroina Mare seems to be indeed 'white' in regard to broadband coverage both at public institutions and population levels. None of the previous or current broadband projects has included investments in this area. The market and economic potential of the investments represent a challenge at population level.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police			
School(s)			
Kindergarten(s)			
Library			
Dispensary			
Pharmacy			*Not applicable*
House of culture			
Church(es)			
Agricultural associations			
Other institutions			

Municipality: The town hall is part of the EuDiS (European District System) project implemented by CG&GC IT SA Company and by the Mehedinți County Council, through a public-private partnership. This project created an information system which connects the town halls throughout the county and other public institutions, with a knot within the Mehedinți County Council.

Police: It is not connected to the Internet.

Schools: The commune has two elementary schools with grades I-IV, one in Stignița village and one in Poroina Mare village. None of them is connected to the Internet.

The commune doesn't have middle schools, with grades V-VIII. The children go the school from the neighbouring commune Livezile, located about 10 km away.

Kindergarten: There are two kindergartens, one in Stignița village and one in Poroina Mare village, but none of them is connected to the Internet.

Library: The library is connected to the Internet through BiblioNet project.

Dispensary (Medical practice): It is not connected to the Internet.

Pharmacy: There is no pharmacy in the commune.

House of Culture: It is not connected to the Internet.

Church(es): It is not connected to the Internet.

Agricultural associations (or of producers'): There are about 10 agricultural or producers' associations, but none of them is connected to the Internet.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Poroina Mare	113162	319	Central	White villages no fixed no 3G+
Fîntinile Negre	113171	193	Peripheral	White villages no fixed no 3G+
Stignita	113180	461	Peripheral	White villages no fixed no 3G+
Șipotu	113199	75	Peripheral	White villages no fixed no 3G+

All villages are covered with Internet from Orange, through modem or mobile internet. There also are some Telekom subscribers, but the signal is not very good.

The villages are aged; according to the evaluation of the local authorities, about 80% of the villagers are old people. In Poroina Mare village there are about 30 children in the elementary school, and throughout the entire commune there are 50 children in the elementary school, grades I-IV and 16 children in grades V-VIII.

The digital competencies of the population are rather poor; only the young people are interested by the Internet. The willingness of the population to pay subscription for the Internet is rather low. Most villagers use phones to communicate: fixed phones with Telekom subscription, or mobile phones with Orange subscription.

C. Broadband-related Projects and Local Market

Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	No
BiblioNet	Yes
Other projects, specify...	No

The Biblionet center has four computers located in the library, with free Internet access, both for the children and for the adult people. The local authorities consider that the development of broad band infrastructure is not a necessity for the commune, which is why no action has been taken so far in this respect. The commune secretary says that a public access point to the Internet might be established in the town hall, where the public meetings are held.

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Poroina Mare	low	low	very poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Fîntinile Negre	low	low	very poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Stignita	low	low	very poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Șipotu	low	low	very poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes

iv. Secaș, Timiș

Map 25. Secaș commune

Source: Google maps.

Profile of the commune

Commune	Secaș
SIRSUP	158608
County	Timiș
Development Region	West
Population	299
Broadband typology	White commune
Villages	Checheș - fictiv Secaș Crivobara Vizma

NGN profile of the commune

The commune of Secas, Timiș is completely 'white' broadband spot both at public institutions and population levels. The greatest challenge for investments at households' coverage is the very low number of inhabitans (both at village as well as commune levels).

A. Local institutions internet connection

	Yes	No	Not clear
Municipality		*Personal 3G*	
Police			
School(s)			
Kindergarten(s)			
Library			
Dispensary		*Personal 3G*	
Pharmacy			
House of culture			
Church(es)			
Agricultural associations			*Not applicable*
Other institutions			

Municipality: The building of the municipality is not connected to Internet. The employees use their own mobile devices to connect to Internet. Until few years ago there was a Romtelecom connection but the 'boxes with antenna' have been removed as they were very old and not replaced with the necessary new infrastructure.

Police: Not connected to Internet, only 3G personal mobile connection.

Schools: There is only one school not connected to Internet.

Kindergarten: Not connected to Internet.

Library: Not connected to Internet.

Dispensary (Medical practice): There is one dispensary not connected to Internet.

Pharmacy: It is not connected to Internet.

House of culture (cămin cultural): Not connected to Internet.

Church(es): Not connected to Internet.

Agricultural associations (or of producers'): There are no agricultural associations.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Secaș	158626	223	Central	White villages no fixed with 3G+ networks
Crivobara	158617	66	Peripheral	White villages no fixed with 3G+ networks
Vizma	158635	10	Peripheral	White villages no fixed with 3G+ networks

Given the low number of inhabitants, Romtelecom is not interested in developing modern infrastructure for Internet connection as their financial estimation of costs is of 20,000-25,000 euro. At the neighbouring community, Paniova has won a project to develop optical fiber infrastructure that hopefully might contribute to the broadband coverage also in Secaș.

C. Broadband-related Projects

Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	No
BiblioNet	No
Other projects, specify.....	No

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Secaș	low	medium	poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Crivobara	market failure	low	poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Vizma	market failure	low	poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes

v. Văleni, Neamț

Map 26. Văleni commune

Source: Google maps.

Profile of the commune

Commune	Văleni
SIRSUP	125123
County	Neamț
Development Region	North East
Population	1,380
Broadband typology	White commune
Villages	David Moreni Munteni Văleni

NGN profile of the commune

The white commune of Văleni is rather 'black' in terms of connectivity of public institutions and given the coverage of mobile communication networks (also with Internet access) also in terms of general population.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police			
School(s)			
Kindergarten(s)			
Library			
Dispensary			
Pharmacy			*Not applicable*
House of culture			*Not applicable*
Church(es)			
Agricultural associations			
Other institutions			

Municipality: The building of the municipality has been connected to Internet through Knowledge Economy Project at the standard fixed broadband coverage for public institutions. There is also a Vodafone coverage, not uniform in quality provision, but however it covers all the commune.

Police: With Internet connection.

Schools: There are three schools in the commune, in the villages of Valeni, Moreni and Munteni (one in each), which are all connected to Internet through optical fiber.

Kindergarten: Also connected to Internet through optical fiber.

Library: It is connected to Internet, but there are no publicly available computers connected to Internet.

Dispensary (Medical practice): Connected to Internet.

Pharmacy: There is no pharmacy in the commune.

House of culture (cămin cultural): There is no house of culture in the commune.

Church(es): There are two churches in Valeni and Moreni, but only in Valeni the presbitery is connected to Internet.

Agricultural associations (or of producers'): There are 6 agricultural associations which are connected to Internet.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
David	121821	89	Peripheral	White villages no fixed no 3G+
Moreni	121830	300	Peripheral	White villages no fixed no 3G+
Munteni	121849	371	Peripheral	White villages no fixed no 3G+
Văleni	121867	620	Central	White villages no fixed no 3G+

The Internet connection provided through KEP project at schools has not resulted in broadband coverage of the households. Romtelecom has not agreed in developing the necessary infrastructure for households coverage. Still, the population is connected to fixed and mobile telephone communications, with Vodafone coverage, also providing Internet connection.

C. Broadband-related Projects and Local Market

Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	Yes
Ministry of Education	No
BiblioNet	No
Other projects, specify.....	No

PAPI is no longer functional, the headquarters of the project is no longer working and the computers have been transferred to the municipality. The commune is part of the Local Action Group Stefan cel Mare Dragomiresti but there is no development direction regarding the broadband infrastructure, the municipality doesn't see it as a priority as the people are connected through mobile Internet connection.

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
David	low	low	very poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Moreni	low	low	very poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Munteni	low	low	very poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes
Văleni	low	low	very poor village	Support for deployment of fixed broadband & demand stimulation in white villages from white communes

Typology –1.B. NGN-white communes

i. Micleşti, Vaslui

Map 27. Micleşti commune	Profile of the commune	
		
Source: Google maps.	**Commune**	Micleşti
	SIRSUP	164892
	County	Vaslui
	Development Region	North East
	Population	2,636
	Broadband typology	NGN-white commune
	Villages	Micleşti Chircești Popești

NGN profile of the commune

The NGN white commune of Micleşti has all public institutions connected to Internet but it lacks the necessary infrastructure developed at villlage level. In addition, private providers showed no interest in developing it for ensuring households' coverage.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police			
School(s)			
Kindergarten(s)			
Library			
Dispensary			
Pharmacy			
House of culture			
Church(es)			
Agricultural associations			*Not applicable*
Other institutions			

Municipality: The building of the municipality has been connected to Internet through Romtelecom (not able to assess the speed of the connection).

Police: Connected to Internet.

Schools: There are three schools (one in each village of the commune), all of them are connected to Internet.

Kindergarten: Connected to Internet.

Library: It is connected to Internet and there are 3-4 computers with free access to Internet, however few people come to use these computers.

Dispensary (Medical practice): There is one dispensary connected to Internet.

Pharmacy: It is connected to Internet.

House of culture (cămin cultural): Connected to Internet.

Church(es): There is one church and the presbiterian is connected to Internet.

Agricultural associations (or of producers'): There are 4 agricultural associations working in Micleşti but none of them has the headquarters in Miclesti (they are located either in Vaslui or in neighbouring communes).

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Micleşti	164909	975	Central	NGN-white spot
Chircești	164918	1217	Peripheral	NGN-white spot
Popești	164927	444	Peripheral	NGN-white spot

Micleşti village is connected to Internet through Romtelecom. None of the villages has 3G mobile coverage.

In Chircești there are 2 areas: Chircesti deal and Chircesti-vale. Chircesti deal has the necessary infrastructure developed up to school and in Chircesti vale there is no infrastructure.

In Popești, the infrastructure is developed in half of the village. Romtelecom is not interested to further develop the infrastructure.

C. Broadband-related Projects and Local Market

Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	No
BiblioNet	Yes
Other projects, specify.....	No

The municipality doesn't see broadband infrastructure as a priority but it is part of a Local Action Group (Stefan cel Mare sau Movila lui Burcel), the strategy of the GAL does not include in it development directions on communications infrastructure.

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Miclești	medium-high	medium	very poor village	Support only for development of broadband infrastructure
Chircești	medium-high	medium	very poor village	Support only for development of broadband infrastructure
Popești	medium-high	low	very poor village	Support for development of broadband infrastructure & demand stimulation

ii. Rafaila, Vaslui

Map 28. Rafaila commune

Source: Google maps.

Profile of the commune

Commune	Rafaila
SIRSUP	167240
County	Vaslui
Development Region	North East
Population	1,835
Broadband typology	NGN-white commune
Villages	Rafaila

NGN profile of the commune

In the NGN white commune of Rafaila neither the institutional stakeholders, nor the general population perceive the need for NGN infrastructure. Instead, they want a connection 'that works properly and is affordable'.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police		*Intranet*	
School(s)			
Kindergarten(s)			
Library			
Dispensary			
Pharmacy			
House of culture			
Church(es)			
Agricultural associations			
Other institutions			

Municipality: The building of the municipality has been connected to Internet through Knowledge Economy Project, with the standard broadband connection for public institutions of 4Mbps.

Police: Not connected to Internet, they are only using Intranet, 'but they don't want Internet connection because of safety reasons'.

Schools: The school is connected to Internet through a project recently implemented by the Ministry of Education (finished last year).

Kindergarten: Not connected to Internet.

Library: Connected to Internet, but it does not function very well.

Dispensary (Medical practice): Connected to Internet, the general practitioner connects to Internet with a modem from Orange.

Pharmacy: The pharmacy is connected to Internet through Romtelecom (ADSL type of connection).

House of culture (cămin cultural): Not functional, not connected to Internet.

Church(es): Not connected to Internet, only the vicarage has Internet connection (ADSL type).

Other institutions: There are several shops in the commune where people gather toghether, only one of them is connected to Internet, the one closed to the municipality – 'I think I have brought them the cable'.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Rafaila	166477	1835	Central	NGN-white spot

The population is connected to Internet through modems from Orange but the quality of the coverage is poor, does not work all the time. The ones 'knocking at municipality's door asking for Internet connection are the parents of the children in school'. The population does not necessarily want a higher speed Internet connection, but a connection that works properly. There have been initiatives for connections from private providers (as Telekom) but there have given up as the commune is small, recently divided from the commune of Todiresti, which is 'larger and at the asphalt'.

C. Broadband-related Projects and Local Market

Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	Yes
Ministry of Education	Yes
BiblioNet	No
Other projects, specify...	No

The former developed PAPI center is used now by a non-governmental organization, World Vision, which no longer offers computers with public access to Internet. They are also using the school informatics lab whenever they need.

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Rafaila	medium-high	medium	very poor village	Support only for development of broadband infrastructure

Typology –1.C. white or NGN-white communes

i. Boțești, Vaslui

Map 29. Boțești commune

Source: Google maps.

Profile of the commune

Commune	Boțești
SIRSUP	162871
County	Vaslui
Development Region	North East
Population	2,049
Broadband typology	White or NGN-white commune
Villages	Gănești Tălpigeni Boțești Gugești

NGN profile of the commune

In the commune of Botesti, Vaslui it seems that the main needs for infrastructure development come from the part of public institutions. The two villages not connected to communications infrastructure are very small.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police			
School(s)			
Kindergarten(s)			
Library			
Dispensary			
Pharmacy			
House of culture			
Church(es)			
Agricultural associations			
Other institutions			

Municipality: It is connected to the Internet by Romtelecom cable. Gugești village is connected to the internet also through Romtelecom. In the other two villages – Gănești and Tălpigeni – there is just signal for the mobile phones from Telekom (former Cosmote).

Police: It is connected to the Internet through Romtelecom cable.

Schools: There are two schools in the commune, with two buildings each, but just one building from each school is connected to the internet, namely, the buildings where the IT classes are taught.

Kindergarten: There are two kindergartens in the commune, but they are not connected to the internet.

Library: No Internet connection.

Dispensary (Medical practice): No Internet connection.

Pharmacy: No Internet connection.

House of culture: No Internet connection.

Church(es): There are three churches in the commune – two in Boțești and one in Gugești villages – but they are not connected to the internet.

Agricultural associations (or of producers'): There are no agricultural associations or producers' associations.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Gănești	162899	41	Peripheral	White villages no fixed no 3G+
Tălpigeni	162915	42	Peripheral	White villages no fixed no 3G+
Boțești	162880	922	Central	NGN-white spot
Gugești	162906	1044	Peripheral	NGN-white spot

Boțești commune has a population of about 2000. The commune is rather aged – over 60% of the villagers are old people. The commune has about 160 children. The commune is affiliated to the GAL "Movila lui Burcel" and has no strategy for the development of broad band infrastructure for the period 2015-2020.

The migrant population counts about 200 people, who go abroad in the Scandinavian countries to cut and plant trees.

In the two villages with Romtelecom connection (Gugești and Boțești) there are about 200 phone subscriptions in each village.

C. Broadband-related Projects

Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	No
BiblioNet	No
Other projects, specify...	No

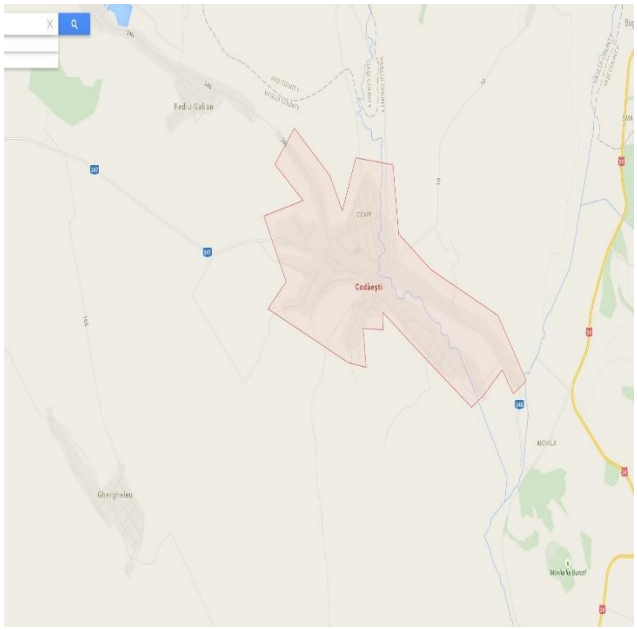
The villages from Boțești commune are isolated by hills, valleys, forests and they are rather remote from one another. In the two villages – Gănești and Tălpigeni – there is signal for mobile phones just for Telekom (former Cosmote) while Orange and Vodafone have no signal at all in that area.

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Gănești	medium-high	low	very poor village	Support for development of broadband infrastructure & demand stimulation
Tălpigeni	medium-high	low	very poor village	Support for development of broadband infrastructure & demand stimulation
Boțești	medium-high	low	very poor village	Support for development of broadband infrastructure & demand stimulation
Gugești	medium-high	low	very poor village	Support for development of broadband infrastructure & demand stimulation

ii. Codăești, Vaslui

Map 30. Codăești commune



Source: Google maps.

Profile of the commune

Commune	Codăești
SIRSUP	163002
County	Vaslui
Development Region	North East
Population	4,362
Broadband typology	White or NGN-white commune
Villages	Ghergheleu Codăești Pribești Rediu Galian

NGN profile of the commune

The public institutions from Codăești are generally connected but at households' level there are significant geographical barriers which results in a low interest on behalf of private service providers.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality	■		
Police	■		
School(s)	■		
Kindergarten(s)		■	
Library	■		
Dispensary	■		
Pharmacy	■		
House of culture		■	
Church(es)		■	
Agricultural associations		■	
Other institutions			

Municipality: It is connected to the Internet through Romtelecom cable.

Police: It is connected to the Internet through Romtelecom cable.

Schools: There are four school and a high school, all of them having internet connection.

Kindergarten: „The kindergarten is falling apart... what's the point of internet connection!..." - Social worker Codăești

Library: It is connected to the Internet.

Dispensary (Medical practice): It is connected to the Internet.

Pharmacy: It is connected to the Internet.

House of culture: No Internet connection.

Church(es): No internet connection, just the vicar's house is connected to the internet.

Agricultural associations (or of producers'): There is the Association of animal breeders, but they have no headquarters.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Ghergheleu	163020	454	Peripheral	White villages no fixed no 3G+
Codăești	163011	2024	Central	NGN-white spot
Pribești	163039	1247	Peripheral	NGN-white spot
Rediu Galian	163048	637	Peripheral	NGN-white spot

Codăești has a population of about 3300 inhabitants. The commune is rather aged – over 60% of the villagers are old people.

The commune is affiliated to GAL "Ștefan cel Mare" and has no strategy for the development of broad band infrastructure for the period 2015-2020.

C. Broadband-related Projects and Local Market

Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	No
BiblioNet	Yes
Other projects, specify...	No

The villages from Codăești commune are isolated by hills, valleys and forests and they are rather remote from one another. No private company which distributes the internet showed interest, in time, to operate in the commune, because of the very high costs with the infrastructure.

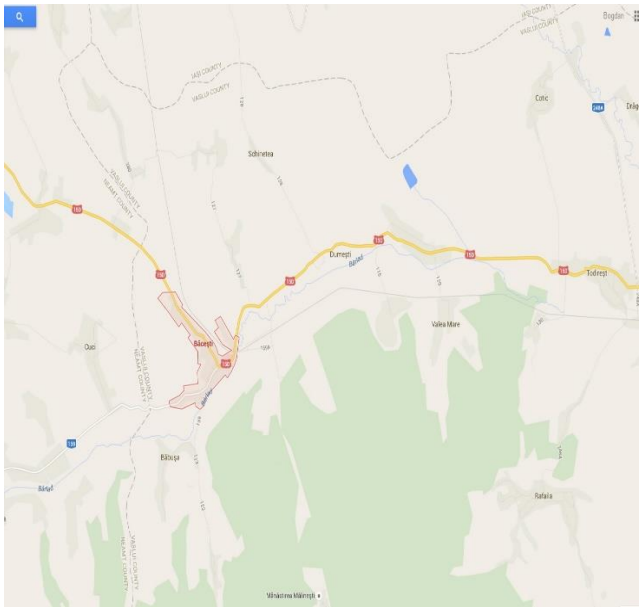
D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Ghergheleu	medium	low	very poor village	Support for development of broadband infrastructure & demand stimulation
Codăești	medium-high	medium	very poor village	Support only for development of broadband infrastructure
Pribești	medium-high	medium	very poor village	Support only for development of broadband infrastructure
Rediu Galian	medium-high	medium	very poor village	Support only for development of broadband infrastructure

Typology – Priority 2A: communes without projects and with EXPAND nets

i. Băcești, Vaslui

Map 31. Băcești commune



Source: Google maps.

Profile of the commune

Commune	Băcești
SIRSUP	162381
County	Vaslui
Development Region	North East
Population	4,107
Broadband typology	White commune
Villages	Pălitiș Băbușa Țibănești Buhlii Vovrieşti Armășeni Băcești

NGN profile of the commune

In the 'white' commune of Băcești the current status of connectivity of public institutions is rather good and so is for the general population (except for a remote village) due to connections to mobile and cable Internet.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police			
School(s)	*1 of 6*		
Kindergarten(s)			
Library			
Dispensary			
Pharmacy			
House of culture			*Not applicable*
Church(es)			
Agricultural associations	*1 of 6*		
Other institutions			

Municipality: It is connected to the Internet through cable, wireless (ADSL). The provider is Telekom. It provides Internet services for all the institutions in the commune, and for the population, with a maximal speed of 10 Mbps.

Police: It is connected to cable Internet, but he doesn't know whether it is intranet or another type.

Schools: There are six schools in the commune, located in the villages of Băceşti (preparing, elementary and middle school), Păltiniş, Armăşeni, Băbuşa, Ţibăneştii Buhlii and Vovrieşti (elementary schools, grades I-IV). Only one school, consisting of two buildings, is connected to the Internet, the school from Băceşti village.

Kindergarten: There are five kindergartens, located in the villages of Băceşti, Păltiniş, Armăşeni, Băbuşa and Vovrieşti, but they are not connected to the Internet.

Library: Only the library of the school from Băceşti village is connected to the Internet.

Dispensary (Medical practice): It is connected to the Internet through Telekom. The system of the National Health Insurance House imposed the connection to the Internet.

Pharmacy: Doesn't know whether the pharmacy is connected or not to Internet.

House of culture: There is no house of culture in the village.

Church(es): It is not connected to the Internet.

Agricultural associations (or of producers'): There are six agricultural or producers' associations. Only one is connected to the Internet, through Telekom.

Other institutions: Other institutions connected to the Internet: CEC Agency –3G Vodafone antenna, Centre of Medical-Social Assistance Băceşti and the Forestry Range – cable Internet from Telekom.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Păltiniș	162425	418	Peripheral	White villages no fixed no 3G+
Babușa	162416	433	Peripheral	NGN-white spot
Tibănești Buhlii	162434	207	Peripheral	NGN-white spot
Vovriești	162443	317	Peripheral	NGN-white spot
Armășeni	162407	377	Peripheral	NGN-white spot with 3G+ networks
Băcești	162390	2355	Central	NGN-black spots

Păltiniş village is located 5 km from the village which is the commune centre, but it is not connected to cable Internet because it is not sustainable for the provider. Few people have phone with mobile internet. Telekom has better signal in the neighbouring commune, Dumeşti. The Internet connection through optical fibre is new, it has been introduced only in Negreşti town, come 20 km away.

Ţibăneştii Buhlii village is small, with aged population. It is located 5 km from the village which is the commune centre and it is connected to cable Internet with speed of 4-6 Mbps. Most of them have mobile phones, and the youngest ones have mobile internet.

Armăşeni village is located 3 km from the village which is the commune centre and it is connected to cable Internet with speed of 4-6 Mbps. Most of them have mobile phones, and the youngest ones have mobile internet.

Băbuşa village is located 3 km from the village which is the commune centre and it is connected to cable Internet with speed of maximum 8 Mbps. Most of them have mobile phones, and the youngest ones have mobile internet.

Vovrieşti village is located 7 km from the village which is the commune centre and it is connected to cable Internet with speed of 4-6 Mbps. Most of them have mobile phones, and the youngest ones have mobile internet.

C. Broadband-related Projects

Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	No
BiblioNet	No
Euro 2000	Yes

Bârlad Bridge is an obstacle for the investments in broad band infrastructure and it affects the 3G signal, according to the provider. The optical fibre is likely to reach Băceşti commune is some years.

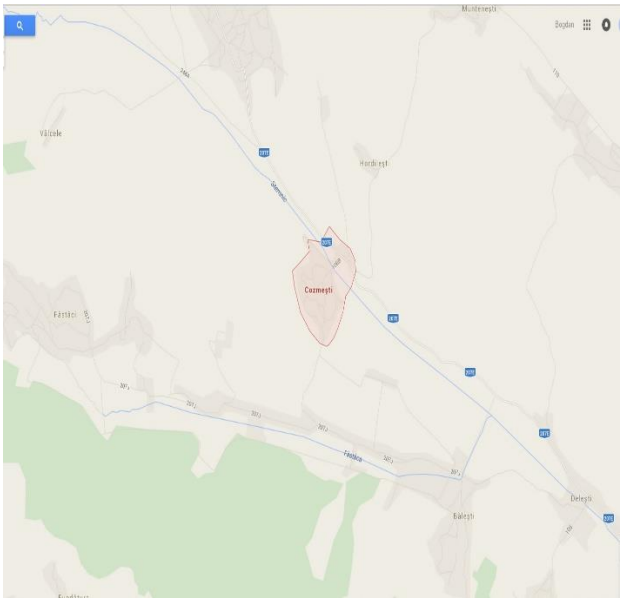
D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Păltiniș	medium-high	medium	very poor village	Support only for development of broadband infrastructure
Babușa	medium-high	medium	very poor village	No state intervention
Tibăneștii Buhlii	medium-high	low	very poor village	No state intervention
Vovriești	medium-high	medium	very poor village	Only demand stimulation measures
Armășeni	medium-high	medium	very poor village	No state intervention
Băcești	medium-high	medium	very poor village	No state intervention

Typology – Priority 2B: communes with villages in ongoing projects need EXPAND nets

i. Cozmești, Vaslui

Map 32. Cozmești commune



Source: Google maps.

Profile of the commune

Commune	Cozmești
SIRSUP	167277
County	Vaslui
Development Region	North East
Population	2,202
Broadband typology	White commune
Villages	Hordilești Bălești Cozmești Fâstâci

NGN profile of the commune

In the white commune of Cozmești, Vaslui the municipality has identified innovative and more cost-efficient solutions for broadband infrastructure for public institutions. For the general population, the challenge is related rather to the quality of service rather than to access to Internet.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police		*Intranet*	
School(s)			
Kindergarten(s)			
Library			
Dispensary			
Pharmacy			*Not applicable*
House of culture			*Not applicable*
Church(es)			
Agricultural associations			
Other institutions			

Municipality: The town hall is connected to the Internet through Telekom, but the speed is low – 2 Mbps.

Police: The police is connected to the Intranet.

Schools: The commune has four schools, one in each village. As of 2014, the school from Bălești has wireless internet connection (aerial mounted by TelePlus company), which receives signal from a relay located in Zăpodeni commune, about 20 km away from Bălești commune. This wireless aerial sends wireless internet to the school from Fâstâci village. This was the variant chosen by the local authorities, since connection through optic fibre would have been too costly. Because the routers are unplugged from the power source during the weekends, they can no longer be monitored by the internet provider, and thus, many times the connection is no longer functional in the schools.

Kindergarten: The commune has two kindergartens, which are not connected to the Internet.

Library: It is connected to the Internet.

Dispensary (Medical practice): The dispensary has mobile Internet.

Pharmacy: The commune has no pharmacy because the Local Council doesn't want one.

House of Culture: The commune has no house of culture because the Local Council doesn't want one.

Church(es): The church has mobile Internet.

Agricultural associations (or of producers'): The commune has two agricultural or producers' associations, but they don't have Internet connection.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Hordilești	163459	37	Peripheral	White villages no fixed with 3G+ networks
Bălești	163404	755	Central	NGN-white spot
Cozmești	163413	270	Peripheral	NGN-white spot
Fâstâci	163422	1140	Peripheral	Proiect Ro-NET

Hordilești village is small, with 6-7 households, located far away from the road. It is not sustainable to develop there broad band infrastructure. Those who have smartphones, also have mobile Internet. In Bălești and Cozmești there is cable Internet from Telekom, but with low speed. In Fâstâci there is mobile Internet. There is optical fibre going to the neighbouring village, Delești, located 8 km away. The young people and the children account for more than half of the population; very many people migrated abroad. Most of the adult people have Internet sticks from the suppliers of mobile phones and communicate thus with the people working abroad. The mobile phones are used mostly to communicate with the people abroad. 'Some young people come and stand in front of the town hall to get connected to the wireless.' Being the largest village, with the highest number of children, one can notice here the highest interest of the population for the Internet. However, the mayor considers that their willingness to pay for the subscription is rather low, that they would rather "want it for free".

C. Broadband-related Projects

Project	Yes/No
RoNET	Yes
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	No
BiblioNet	No
Other projects, specify...	No

A RoNet project will be implemented in Fâstâci village, which is on the list of the villages where broad band infrastructure is to be developed.

Until now, no private company which distributes high speed internet showed interest to operate in the commune because the former leaders didn't display any interest. The optical fibre connection is rather costly and likely not sustainable because the population has rather low incomes and most of the villagers could not pay the subscription. Nevertheless, the development solution proposed by the mayor is the connection to the optical fibre network from the neighbouring commune Delești, located 8 km away, but "the commune lacks many other things, ahead of the internet". A public point for internet access could be implemented in the house of culture to be built, or in the new school that will soon be finished. The villages of Bălești and Cozmești could develop the Telekom Internet network.

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Hordilești	medium-high	low	very poor village	Support for development of broadband infrastructure & demand stimulation
Bălești	medium-high	low	very poor village	Only demand stimulation measures
Cozmești	medium-high	low	very poor village	Only demand stimulation measures
Fâstâci	medium-high	low	very poor village	Only demand stimulation measures

ii. Osești, Vaslui

Map 33. Osești commune

Source: Google maps.

Profile of the commune

Commune	Osești
SIRSUP	165130
County	Vaslui
Development Region	North East
Population	3,157
Broadband typology	White commune
Villages	Vâlcele Buda Osești Pădureni

NGN profile of the commune

In the 'white' commune of Osești the current status of connectivity of public institutions is rather good and so is for the general population due to connections to mobile communications.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police			
School(s)			
Kindergarten(s)			
Library			
Dispensary			
Pharmacy			
House of culture			
Church(es)			
Agricultural associations			
Other institutions			

Municipality: It is connected to the Internet through Romtelecom cable. Mobile signal from all networks, everywhere in the commune.

Police: It is connected to the Internet through Romtelecom cable.

Schools: There are four schools in the commune, with one building each. All of them are connected to the internet.

Kindergarten: There are two kindergartens in the commune, but they are not connected to the internet.

Library: It is connected to the Internet. Beneficiary of the BiblioNet (Microsoft) program.

Dispensary (Medical practice): It is connected to the Internet.

Pharmacy: It is connected to the Internet.

House of culture: Operates in the same building with the library, therefore it is connected to the internet.

Church(es): No internet connection.

Agricultural associations (or of producers'): There is the Association of animal breeders, Osești, and because its headquarters is in the town hall, it benefits of connection to the internet.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Vilcele	165176	70	Peripheral	White villages no fixed with 3G+ networks
Buda	165158	1436	Peripheral	NGN-white spot
Osești	165149	1277	Central	NGN-black with 3G+ networks
Pădureni	165167	374	Peripheral	Project Ro-NET

Osești commune has a population of about 3000. The commune is rather aged – over 60% of the villagers are old people. The commune is affiliated to GAL "Movila lui Burcel" and has no strategy for the development of broad band infrastructure for the period 2015-2020.

The four villages of the commune have good mobile signal from all networks.

C. Broadband-related Projects and Local Market

Project	Yes/No
RoNET	Yes
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	No
BiblioNet	No
Other projects, specify...	No

RoNET project is currently running only for the school from Pădureni village.

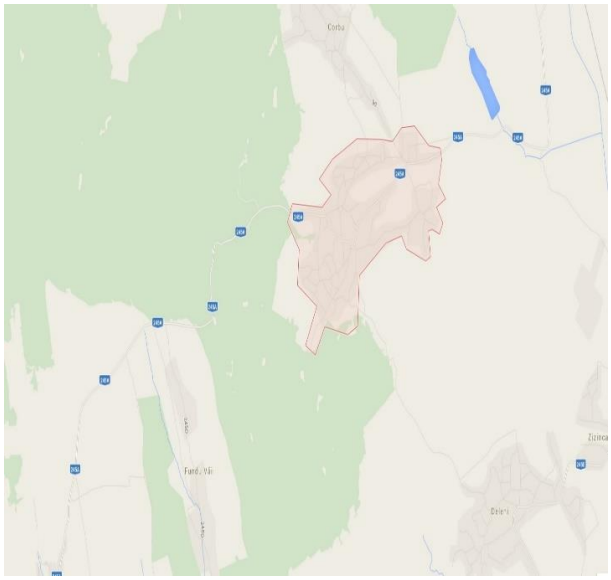
The villages from Osești commune are isolated by hills, valleys and forests and they are rather remote from one another. No private company which distributes the internet showed interest, in time, to operate in the commune.

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Vilcele	medium-high	medium	very poor village	Support only for development of broadband infrastructure
Buda	medium-high	medium	very poor village	No state intervention
Osești	medium-high	low	very poor village	Only demand stimulation measures
Pădureni	medium-high	medium	very poor village	No state intervention

Typology – Communes with villages in ongoing projects - no more action needed

i. Lipovăț, Vaslui

Map 34. Lipovăț commune	Profile of the commune	
	**Commune**	Lipovăț
	SIRSUP	164687
	County	Vaslui
	Development Region	North East
	Population	3,960
	Broadband typology	White commune
	Villages	Chițoc Corbu Lipovăț Căpușneni Fundu Văii
Source: Google maps.		

NGN profile of the commune

In the 'white' commune of Lipovăț the current status of connectivity of public institutions is rather good and so is for the general population due to connections to Internet through mobile communications.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police			
School(s)	*3 of 5*		
Kindergarten(s)			
Library			
Dispensary	*1 of 2*		
Pharmacy			
House of culture			
Church(es)			
Agricultural associations			
Other institutions			

Municipality: The building of the municipality has been connected to Internet through Romtelecom (not able to assess the speed of the connection).

Police: No Internet connection.

Schools: There are five schools in the commune, but only in the villages of Chițoc, Corbu and Lipovăț the schools are connected to Internet.

Kindergarten: Not connected to Internet, although it is next to school.

Library: It is connected to Internet.

Dispensary (Medical practice): There are two dispensaries (Lipovăț and Chițoc), the one from Lipovăț is connected to Internet.

Pharmacy: It is connected to Internet through 3G mobile connection.

House of culture (cămin cultural): Connected to Internet.

Church(es): There is one church, which is not connected to Internet.

Agricultural associations (or of producers'): There are up to 10 agricultural associations which are connected to Internet.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Chițoc	164712	996	Peripheral	NGN-white spot
Corbu	164721	569	Peripheral	NGN-white spot
Lipovăț	164696	1520	Central	DnotA
Căpușneni	164703	277	Peripheral	Proiect Ro-NET
Fundu Văii	164730	598	Peripheral	Proiect Ro-NET

Population from Chițoc, Corbu and Lipovăț villages is connected to Internet through mobile connections (Orange) and the quality of the 3G coverage is quite good. The RoNet project has been implemented in Căpușneni and Fundu Văii villages but 'due to a history about which I don't want to comment on' the project has been closed and the computers have been moved to the municipality and school. In these villages the quality of the 3G coverage is quite poor.

C. Broadband-related Projects

Project	Yes/No
RoNET	Yes
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	No
BiblioNet	No
Other projects, specify...	No

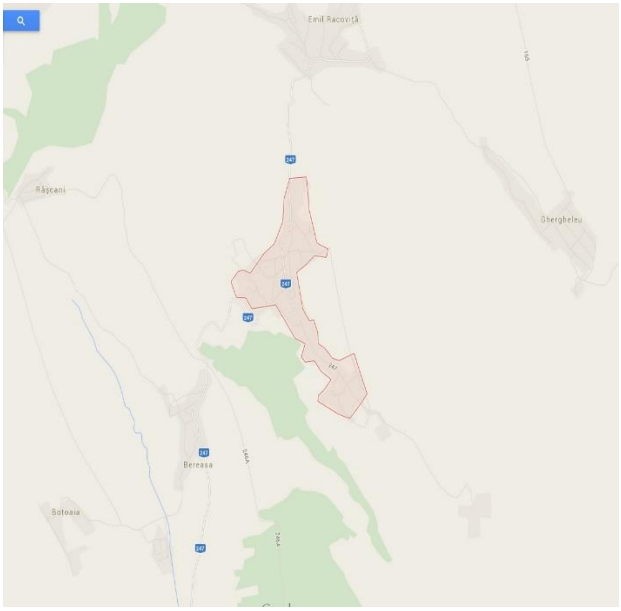
D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Chițoc	medium-high	medium	very poor village	No state intervention
Corbu	medium-high	medium	very poor village	No state intervention
Lipovăț	medium-high	medium	very poor village	No state intervention
Căpușneni	medium-high	low	very poor village	Only demand stimulation measures
Fundu Văii	medium-high	low	very poor village	Only demand stimulation measures

Typology – No priority

i. Dănești, Vaslui

Map 35. Dănești commune



Source: Google maps.

Profile of the commune

Commune	Dănești
SIRSUP	163253
County	Vaslui
Development Region	North East
Population	2,205
Broadband typology	No priority
Villages	Botoaia Dănești Bereasa Emil Racoviță Râșcani Tătărăni

NGN profile of the commune

The public institutions from the commune of Dănești are not connected to Internet (except for the municipality, police and school) and there has been no large-scale project implemented in this commune. The demand at the population level is very poor, also diminished by availability of mobile networks.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police			
School(s)	*2 of 5*		
Kindergarten(s)			
Library			
Dispensary			
Pharmacy			
House of culture			
Church(es)			
Agricultural associations			
Other institutions			

Municipality: It is connected to cable Internet (optical fibre). The provider is Telekom. It provides Internet services through optical fibre only for the town hall, with a speed of 15-50 Mbps. The population is connected to the Internet through cable/phone, Dial-Up, with a maximal speed of 5 Mbps. The 2G signal is very weak. None of the composing villages has signal for 3G mobile Internet.

Police: It is connected to cable Internet. Secured system.

Schools: There are five schools, located in the villages of Emil Racoviţă, Dăneşti (middle schools), Bereasa, Răşcani, Tătărăni (elementary schools, with grades I-IV). Two schools are connected to the Internet, the school from Dăneşti village and the school from Emil Racoviţă village.

Kindergarten: There are three kindergartens, located in the villages of Bereasa, Emil Racoviţă and Dăneşti; none has Internet connection.

Library: It is not connected to the Internet.

Dispensary (Medical practice): It is not connected to the Internet.

Pharmacy: It is not connected to the Internet.

House of culture: It is not connected to the Internet.

Church(es): It is not connected to the Internet.

Agricultural associations (or of producers'): There are 8 agricultural or producers' associations. Three of them have Internet connection.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Boțoaia	163280	71	Peripheral	White villages no fixed no 3G+
Dănești	163262	605	Central	NGN-white spot
Bereasa	163271	246	Peripheral	NGN-white spot
Emil Racoviță	163299	929	Peripheral	NGN-white spot
Râșcani	163306	107	Peripheral	NGN-white spot
Tătărani	163315	247	Peripheral	NGN-black spots

The village Boţoaia is very small, with mixed population: 50% old people and 50% young people. Most of them have mobile phones, and the youngest ones are connected to cable Internet with a speed of 2 Mbps. The village is located 5.5 km from the village which is the commune centre, where Telekom switchboard is.

The demand is small and it is not sustainable for the provider. The population of the village Bereasa consists of 60% old people and 40% young people. Most of them have mobile phones, and the youngest ones are connected to cable Internet with a speed that doesn't exceed 4 Mbps. The village is located 5 km from the village which is the commune centre, where Telekom switchboard is.

Răşcani village is small, with young population. Most of them have mobile phones. They are not connected to cable Internet. The village is located 10 km from the village which is the commune centre, where Telekom switchboard is. The demand is small and it is not sustainable for the provider.

Tătărăni village is small, with aged population. The authorities are discussing the possibility that Tătărăni village shifts to Fereşti commune as territorial assignation, because of the easier route of access. Most people have mobile phones. They are not connected to cable Internet. The village is located 7 km from the village which is the commune centre, where Telekom switchboard is, and 4 km from Fereşti commune. The demand is small and it is not sustainable for the provider. Emil Racoviţă village is very small, with mixed population: 50% old people and 50% young people. Most of them have mobile phones, and the youngest ones are connected to cable Internet with a speed of 4-6 Mbps. The village is located 3.5 km from the village which is the commune centre, where Telekom switchboard is. The demand is small and it is not sustainable for the provider.

C. Broadband-related Projects and Local Market

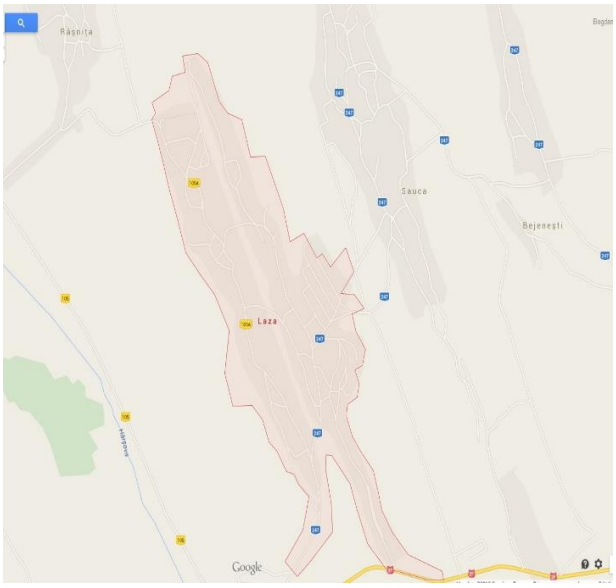
Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	No
BiblioNet	No
Other projects, specify...	No

One problem identified by the local authority representatives was the signal for mobile phones and 3G mobile internet. The solution proposed: Telekom provider should install more relays for optical fibre and to amplify the signal for the mobile phones; replacement of the switchboard from Băceşti (whose current capacity is of 190-200 subscribers), with one of higher capacity and with better performance.

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Boțoaia	medium-high	medium	very poor village	No state intervention
Dănești	medium-high	low	very poor village	Only demand stimulation measures
Bereasa	medium-high	low	very poor village	Only demand stimulation measures
Emil Racoviță	medium-high	low	very poor village	Only demand stimulation measures
Râșcani	medium-high	low	very poor village	Only demand stimulation measures
Tătărani	medium-high	low	very poor village	Only demand stimulation measures

ii. Laza, Vaslui

Map 36. Laza commune	Profile of the commune	
	**Commune**	Laza
	SIRSUP	164598
	County	Vaslui
	Development Region	North East
	Population	3,114
	Broadband typology	No priority
	Villages	Bejenești Râșnița Laza Săuca

Source: Google maps.

NGN profile of the commune

In the commune of Laza the Internet provider for both public institutions and households' levels is a local company which provides more affordable and higher speed subscriptions. This results in a clear confirmation of the investment-related typology.

A. Local institutions internet connection

	Yes	No	Not clear
Municipality			
Police			
School(s)	*2 of 3*		
Kindergarten(s)	*2 of 3*		
Library			
Dispensary			
Pharmacy			
House of culture			*Not applicable*
Church(es)			
Agricultural associations			
Other institutions			

Municipality: It is connected to the Internet through cable (optical fibre). The provider is a company from Vaslui (TelePlus), which provides Internet services since 2013, for all the institutions from the commune, as well as for the population. The speed is 100 Mbps, which actually means about 60-70 Mbps.

Police: It is connected to the Internet through cable, but doesn't know whether it is intranet or another type.

Schools: There are three schools in the commune, located in the villages of Laza (middle school), Săuca and Râșnița (elementary schools, grades I-IV). Two of the schools have Internet connection, the school from Laza and the school from Săuca. The plan is to connect the school from Râșnița village too, because it will be polling station and it will need internet connection.

Kindergarten: There are three kindergartens, located in the villages where the schools are; just like the schools, only two kindergartens have internet connection.

Library: It is connected to the Internet through BiblioNet project. There are six computers with public access to the Internet.

Dispensary (Medical practice): It is connected to the Internet through TelePlus.

Pharmacy: Doesn't know whether it is connected to the Internet.

House of Culture: There is no house of culture in the commune.

Church(es): The church is not connected to the Internet.

Agricultural associations (or of producers'): There are four agricultural or producers' associations, whose headquarters is at the domicile of the founding members, and they have Internet connection.

Other institutions: The veterinary dispensary is connected to the Internet.

B. Local Population

Village	SIRUTA	Population	Central/ Peripheral	NGN-Type Broadband Areas
Bejenești	164614	52	Peripheral	White villages no fixed with 3G+ networks
Rîșnița	164641	287	Peripheral	NGN-white spot
Laza	164605	1767	Central	AnotD
Sauca	164650	1008	Peripheral	AnotD

Bejenești village is very small, with aged population; there are just two young families in the village. Most young people have mobile phones, and the younger ones have mobile internet. The village is located 5 km from the village which is the commune centre, but it is not connected to the cable Internet because there is no demand, and it is not sustainable for the provider. Since the time when TelePlus started to provide Internet connection in the commune, most villagers (about 30% of the population) connected to the internet via this provider and gave up Telekom services whose internet speed was lower (<10 Mbps). Besides the higher internet speed, the local people selected this provider because of the lower fees (about 50 RON Internet plus cable TV, compared to 80 RON, the price demanded by Telekom). Most Internet users are young people.

C. Broadband-related Projects and Local Market

Project	Yes/No
RoNET	No
Ministry of Agriculture	No
Knowledge-based economy (PAPI)	No
Ministry of Education	No
BiblioNet	Yes
Other projects, specify...	No

At the beginning of the project, many people went to the library for the Internet, but now, when they have Internet at home, the number of people coming to the library decreased.

D. Final typology for prioritization of investments in broadband in Romania

Village	Market Potential	Demand Potential	Economic Potential	Final Typology For Prioritization of Investments in Broadband at Village
Bejenești	medium-high	medium	very poor village	No state intervention
Rîșnița	medium-high	low	very poor village	Only demand stimulation measures
Laza	medium-high	low	very poor village	Only demand stimulation measures
Sauca	medium-high	low	very poor village	Only demand stimulation measures

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