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# Broadband Mapping

## *International Good Practices and World Bank Experience*

2 July 2019

# Agenda

- Why broadband mapping
  - Objectives and benefits to stakeholders
- Approach
  - Overall process, stakeholders, type of information needed
- Broadband mapping in the EaP context
  - WB approach and assistance
- Example of our work in Romania

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# Why broadband mapping?

# Objectives and benefits of broadband mapping

**Stakeholders**

| Objectives | Public Sector (including NRA) | Telecom Operators | Alternative Infrastructure Owners | Consumers |
|---|---|---|---|---|
| **Insight into availability of broadband** | - Monitoring progress on universal access<br>- Network expansion obligations<br>- Other M&E | - Identifying new markets | - NA | - Identifying closest networks<br>- Civil society coordination for demand aggregation |
| **Coordinate broadband deployment measures** | - Faster network deployment to extend access to the unconnected<br>- Increased competition | - Easier and more reliable Investment planning | - Alternative revenue source | - Quicker expansion of broadband networks to consumers in unconnected areas |
| **Reduce cost of broadband network deployment** | - Faster network deployment<br>- Increased affordability of services (increasing adoption) | - Reduced cost and time of network deployment<br>- Quicker expansion to new markets | - Alternative revenue source | - Reduced price of broadband services<br>- Increased access to broadband |

*Contents of cells indicate main benefits to various stakeholders for each objective*

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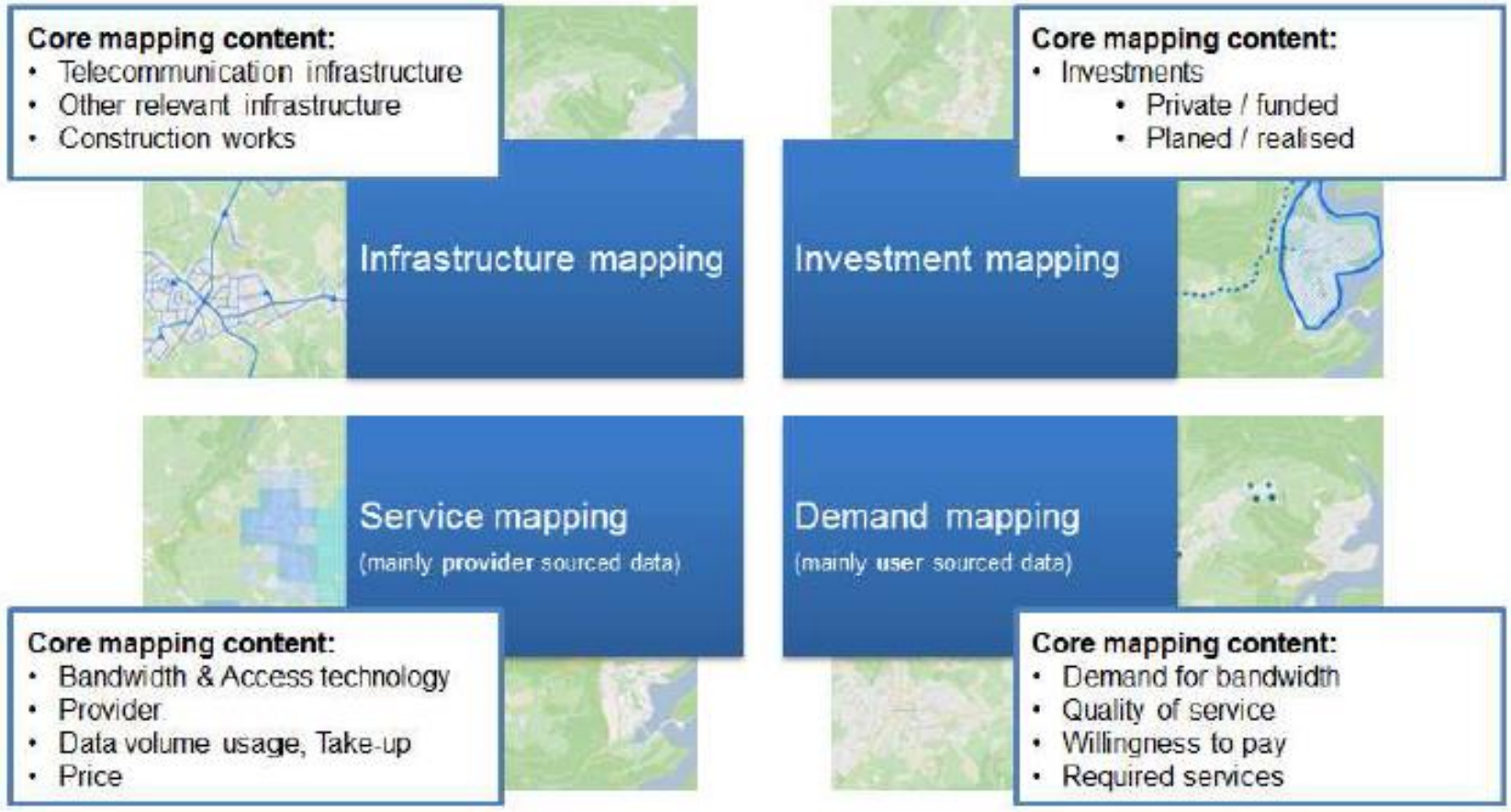
# Broadband mapping can be approached from different perspectives

## Categories of Broadband Mapping

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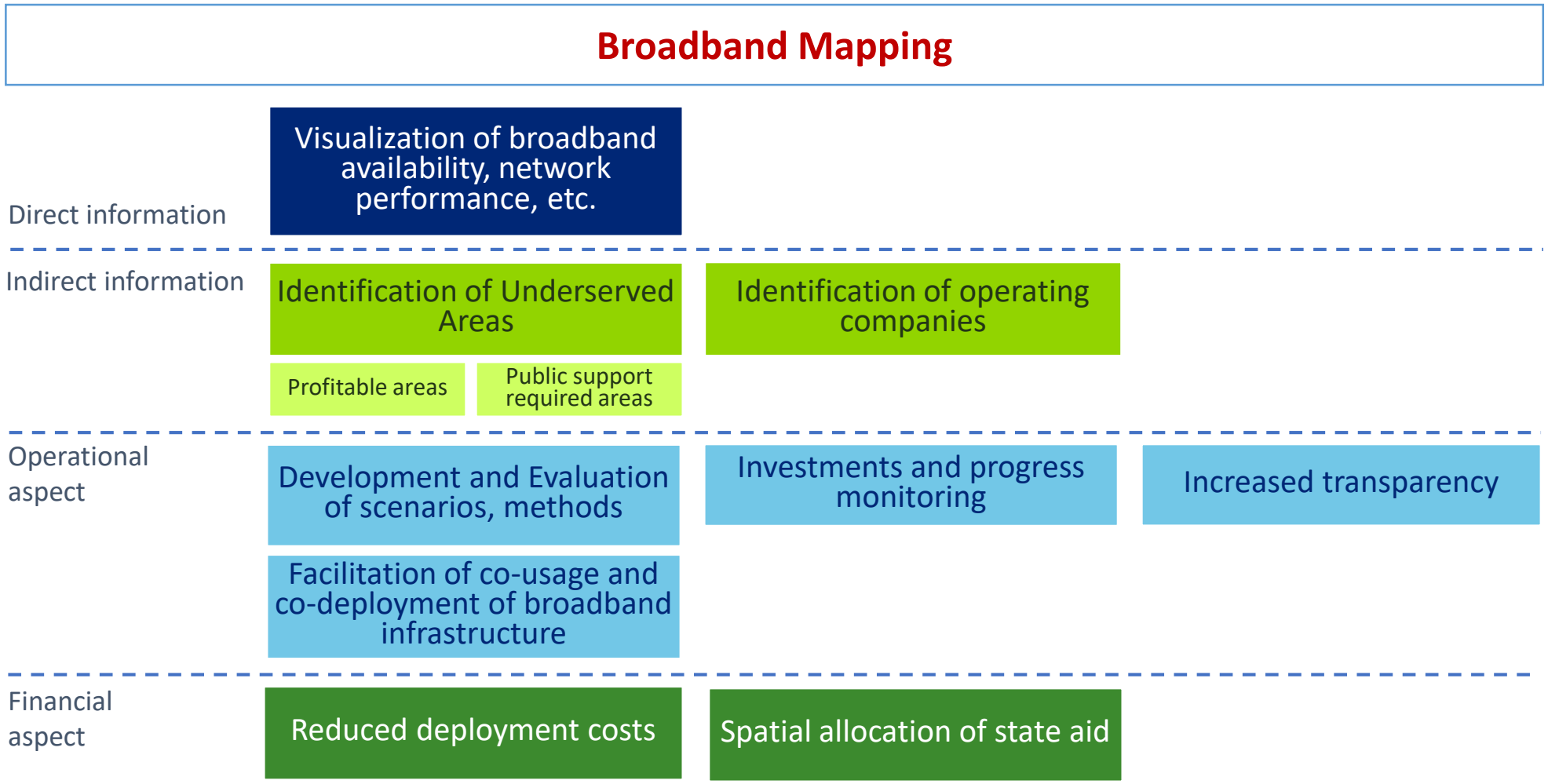
# It helps ensure efficient and effective broadband deployment in underserved areas

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# Overall approach

# All types of broadband mapping broadly follow a common process

## Data Collection

Choice of
- Data sources;
- Information to be collected;
- Spatial level of data collection
- Data supply process/frequency

## Data Processing

- Quality checks (additional manual checks/ user feedback);
- Data conversion;
- Additional spatial data integration

## Data Publication

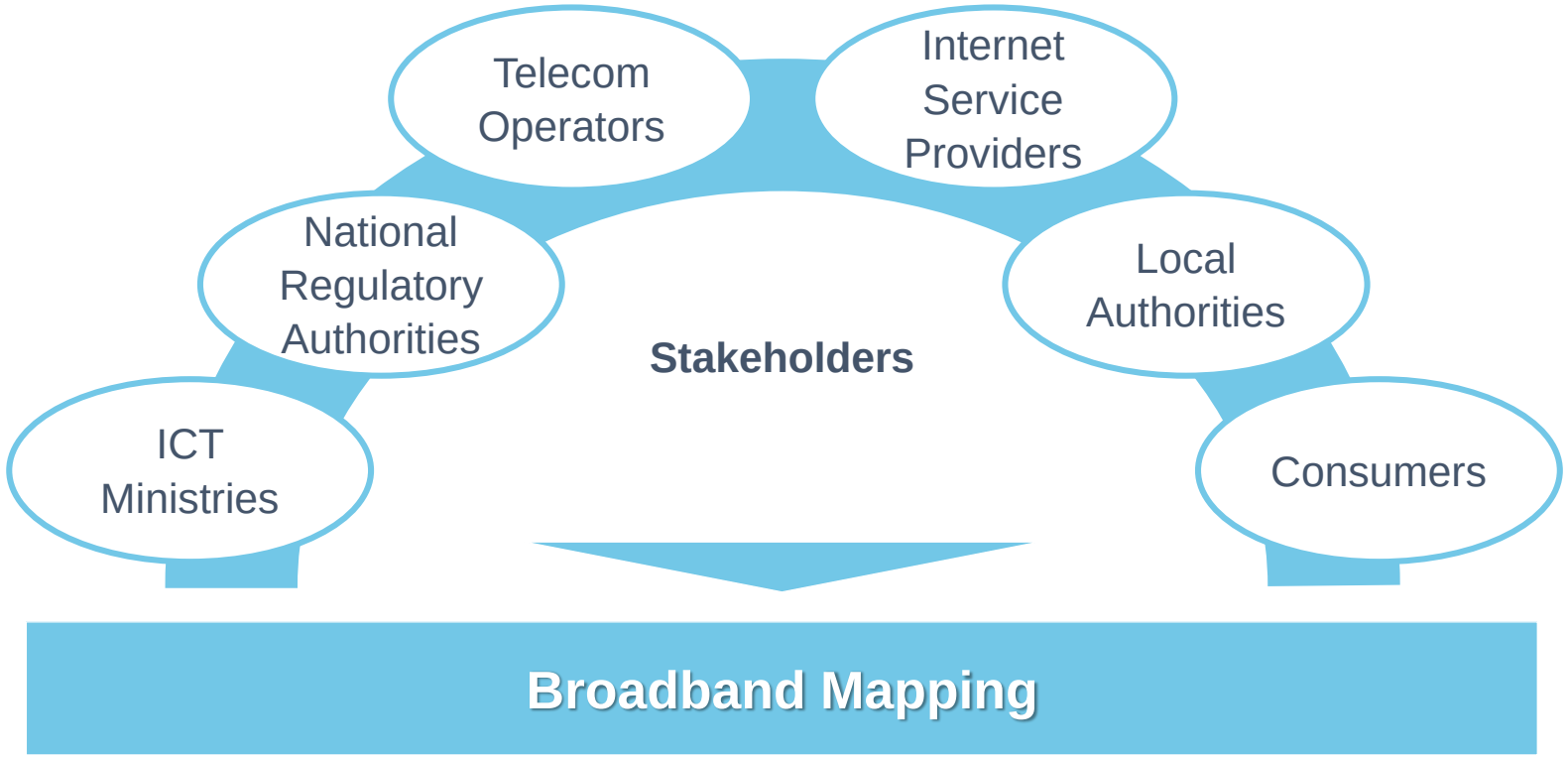
Choice of
- Data access level;
- Spatial level of publication;
- Publication format

# Information types and attributes needed for infrastructure mapping

| Types of Information | | |
|---|---|---|
| **Attribute Information** | **Minimum information** | **Additional information** |
| Location and route | ● | |
| Size of infrastructure | | ● |
| Infrastructure type | ● | |
| Construction works type | ● | |
| Current use of infrastructure | ● | |
| Network elements involved in construction works | ● | |
| Estimated date for starting the works and their duration | ● | |
| Contact point | ● | |
| Availability for alternative/additional use | | ● |

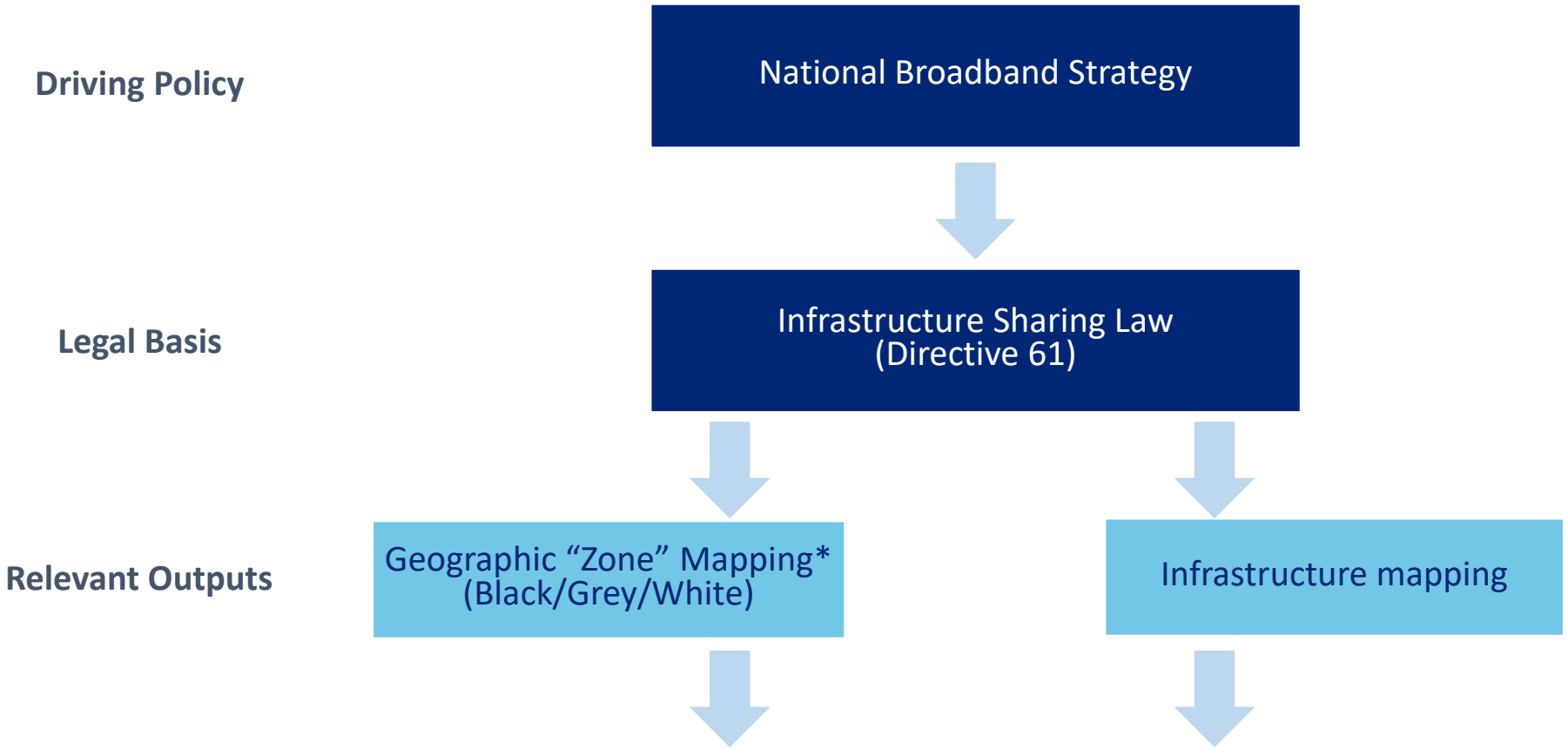
| Attribute details | Attribute |
|---|---|
| Nodes: distribution points (e.g. street cabinets, DSLAMs, exchange central office), radio tower, infrastructure to (potentially) host radio towers, …<br>Lines: ducts, fibre, coax, copper, radio link | Infrastructure type |

# Stakeholder coordination is a key element in successful broadband mapping, and maintenance of maps – more on this later



# Broadband mapping in EaP context

# A national broadband strategy can help drive initiatives such as mapping to achieve universal access




** Infrastructure sharing law is not a pre-requisite for zone mapping, but a legal tool to achieve intended results from the mapping exercise in a faster and more cost efficient manner*

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# EU4Digital Initiative allows for WB assistance in preparing policy, legal and regulatory framework necessary for successful broadband mapping

- WB is working with EaP countries to define or update their broadband strategies to provide the policy lever to develop broadband markets

- Transposition of Directive 61 to facilitate cost reduction of network deployment is a core legislation being addressed through the program
  -
  - WB is assisting with drafting law on infrastructure sharing in Georgia, and secondary legislation necessary
  - Team is assisting Moldova to update their infrastructure sharing law
  - Dialog in other countries at varying levels of progress

- WB is also assisting with necessary stakeholder coordination to identify and implement secondary legislation, and can advise on technical requirements to implement mapping, single information point etc.

*Implementation of Directive 61 provides a strong **basis for development of necessary infrastructure** to support the development and maintenance of infrastructure maps, but also **entails significant stakeholder coordination** – Following 2 slides illustrate extent of coordination needed*

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# Illustrative list of stakeholders involved in permit and authorization granting process (1/2)

**Stakeholders Involved**

**Scenario and Type of Infrastructure**

| | | Municipality | Construction Supervision/ Standards Agency | Roads Department / Ministry | State Property Agency | Forestry Agency | Protected Areas Agency | Border Authorities | Central Gov. | Private Land Owners | Other Linear Infra. Owners | Public Registry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roads - international | Cables | YES | X | YES | X | X | X | X | X | X | X | YES |
| Roads - intrastate | Cables | | X | | X | X | X | X | X | X | X | |
| Roads - local | Cables | YES | X | YES | X | X | X | X | X | X | X | |
| State forests | Cables | YES | X | X | X | YES | X | X | YES | X | X | YES |
| | Other (non-linear) infrastructure | YES | YES | | | | | | | | | YES |
| Municipal forests | Cables | YES | X | X | X | YES | X | X | YES | X | X | YES |
| | Other (non-linear) infrastructure | YES | YES | | | | | | | | | YES |
| Protected areas | Cables | YES | X | X | X | X | YES | X | YES | X | X | YES |
| | Other (non-linear) infrastructure | YES | YES | | | | | | | | | YES |

# Illustrative list of stakeholders involved in permit and authorization granting process (2/2)

**Stakeholders Involved**

| Scenario and Type of Infrastructure | | Municipality | Construction Supervision/ Standards Agency | Roads Department / Ministry | State Property Agency | Forestry Agency | Protected Areas Agency | Border Authorities | Central Gov. | Private Land Owners | Other Linear Infra. Owners | Public Registry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State-owned land plot | Cables | YES | X | X | YES | X | X | X | X | X | X | YES |
| | Other (non-linear) infrastructure | YES | YES | | | | | | | | | YES |
| Municipal-owned land plot | Cables | YES | X | X | X | X | X | X | X | X | X | YES |
| | Other (non-linear) infrastructure | YES | YES | | | | | | | | | YES |
| State border and coastal zones | Cables | YES | X | YES | X | X | X | YES | X | X | X | YES |
| | Other (non-linear) infrastructure | YES | YES | | | | | | | | | YES |
| Private land plot | Cables | YES | X | X | X | X | X | X | X | YES | X | YES |
| | Other (non-linear) infrastructure | YES | YES | | | | | | | | | YES |
| Existing linear infra | Cables | YES | X | X | X | X | X | | X | X | YES | YES |

# Example of our work in Romania

# A demand mapping exercise to inform state intervention

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 (infrastructure, service, demand and funding), WB considered 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.

The demand mapping exercise had **two objectives:**

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

# NGN-white, grey and black areas

**Table 1: Identification of broadband areas in Romania (types and number)**

| | | 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**<br>7,040 villages (51.7%) | **Distribution-not-Access**<br>**DnotA**<br>252 villages (1.8%) |
| | **No** | **Access-not-Distribution**<br>**AnotD**<br>99 villages (0.7%) | **NGN-white areas**<br>6,235 villages (45.8%) |

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# NGN-white, grey and black areas in valid villages

**Table 1: The distribution of broadband areas by NGN-type (for fixed broadband connections) and by 'fictive'/'valid' villages (SIRUTA units)**

| | 'Fictive' villages (zero inhabitants) | | 'Valid' villages (1+ inhabitants) | | Total |
|---|---|---|---|---|---|
| | Rural | Urban | Rural | Urban | |
| **NGN-white villages** | **109** | **14** | **5,785** | **450** | **6,358** |
| **NGN-grey villages, of which:** | **0** | **0** | **325** | **26** | **351** |
| - DnotA - Distribution-not-Access | 0 | 0 | 235 | 17 | 252 |
| - AnotD - Access-not-Distribution | 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 |
| - 'Fictive' villages | 5 | 1 | 0 | 0 | 6 |
| **Total** | **114** | **15** | **12,373** | **1,253** | **13,755** |

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

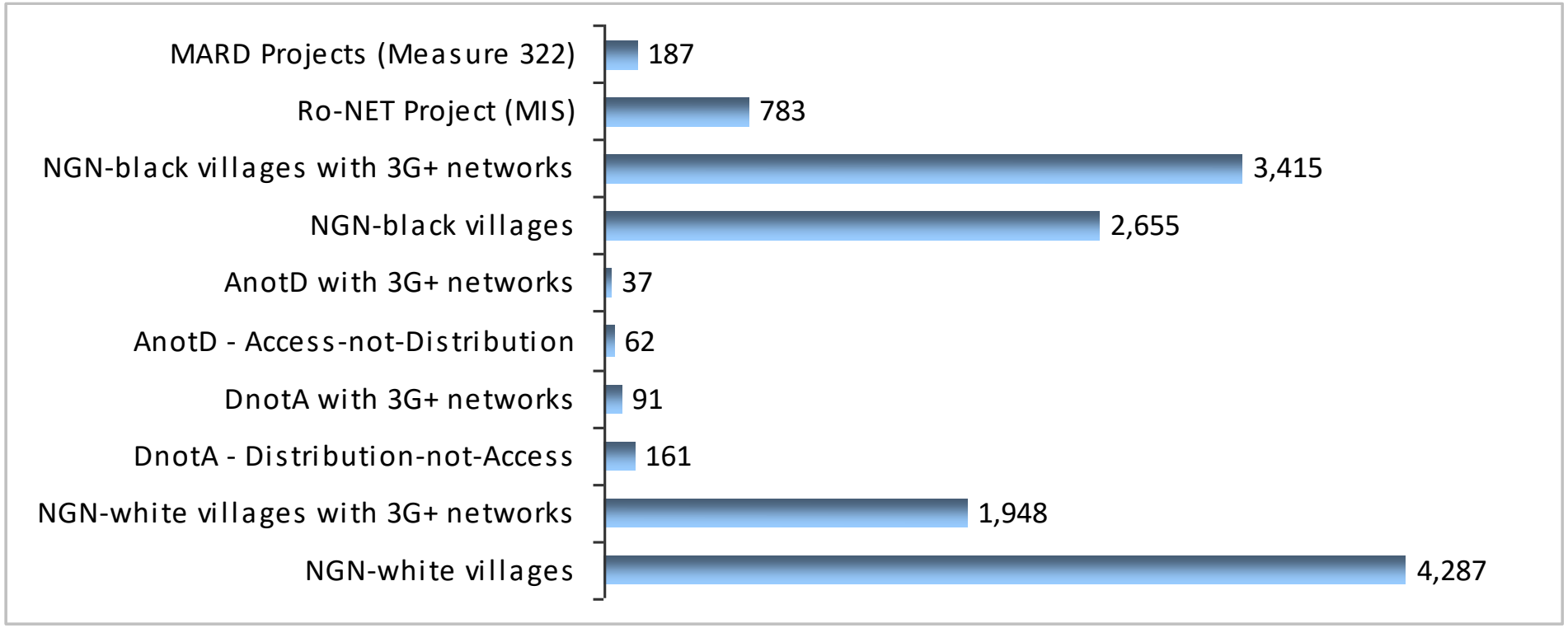
# NGN-white, grey and black areas in valid villages and considering also the mobile networks

**Table 1: 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)**

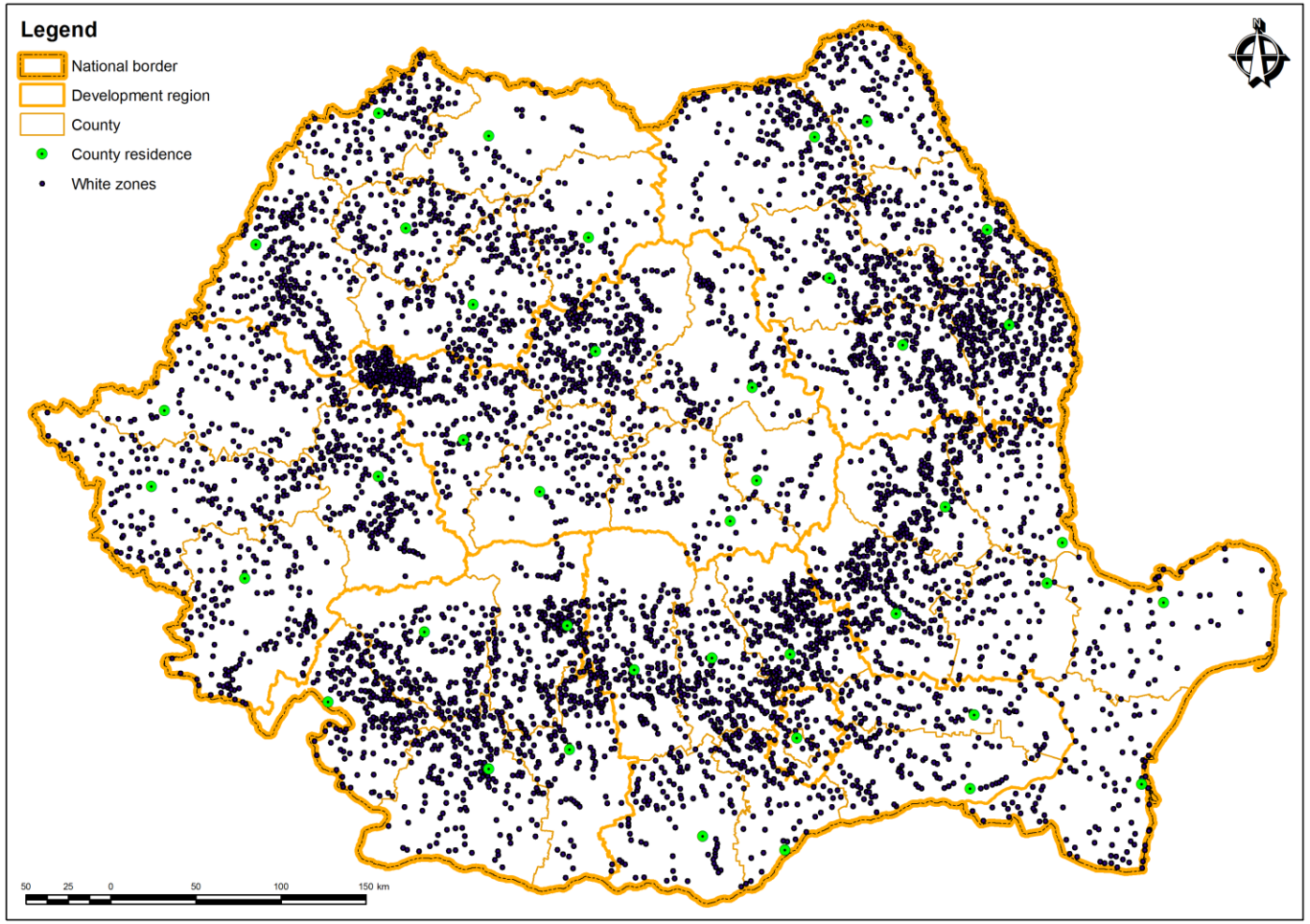
| | No networks 3G+ | Only access networks 3G+ | Access and distribution networks 3G+ | Total |
|---|---|---|---|---|
| **NGN-white villages** | **4,287** | **1,154** | **794** | **6,235** |
| **NGN-grey villages, of which:** | **223** | **66** | **62** | **351** |
| - DnotA - Distribution-not-Access | 161 | 49 | 42 | 252 |
| - AnotD - Access-not-Distribution | 62 | 17 | 20 | 99 |
| **NGN-black villages, of which:** | **3,322** | **2,075** | **1,643** | **7,040** |
| - Existing networks | 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 (2015). Notes: Access networks - local loop; Distribution networks - backhaul; 3G+ refers to 3G+(HSPA)/LTE/LTE Advanced.

# Ten types of broadband areas entered into analysis



# Map of the NGN-white areas




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). 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.

Source: World Bank calculations using ANCOM (2015).

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# The coverage related objective of the NGN Plan (>80% at 30Mbps) was achieved

| | | 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**<br>84.4% of population | **Distribution-not-Access**<br>**DnotA**<br>1.4% of population |
| | **No** | **Access-not-Distribution**<br>**AnotD**<br>0.5% of population | **NGN-white areas**<br>13.7% of population |

Source: World Bank calculations using ANCOM (2015).

| | Rural | Urban | Total |
|---|---|---|---|
| **NGN-white, of which:** | **12.5** | **1.2** | **13.7** |
| NGN-white villages | 8.4 | 0.4 | 8.7 |
| NGN-white villages with 3G+ networks | 4.1 | 0.9 | 5.0 |
| **NGN-grey, of which:** | **1.7** | **0.1** | **1.9** |
| DnotA - Distribution-not-Access | 0.9 | 0.0 | 0.9 |
| DnotA with 3G+ networks | 0.4 | 0.1 | 0.5 |
| AnotD - Access-not-Distribution | 0.3 | 0.0 | 0.3 |
| AnotD with 3G+ networks | 0.2 | 0.0 | 0.2 |
| **NGN-black, of which:** | **31.8** | **52.6** | **84.4** |
| NGN-black villages | 11.7 | 1.2 | 13.0 |
| NGN-black villages with 3G+ networks | 18.1 | 51.3 | 69.4 |
| Ro-NET Project (MIS) | 1.8 | 0.1 | 1.9 |
| MARD Projects (Measure 322) | 0.2 | 0.0 | 0.2 |
| **Total %** | **46.0** | **54.0** | **100.0** |
| **N** | **9,262,851** | **10,858,790** | **20,121,641** |

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# Thank you!

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