XGain

EMPOWERING RURAL COMMUNITIES

A STRATEGIC GUIDE TO LOCAL BROADBAND DEPLOYMENT

xgain-project.eu

Developed by:

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Preface

This guide serves as a comprehensive resource for rural stakeholders, such as public authorities, business owners, and community associations, who seek to implement broadband connectivity projects. It highlights the critical importance of affordable, high-speed internet for fostering economic growth, improving access to education and healthcare, and enhancing overall quality of life in underserved rural areas.

The guide provides a structured, six-step approach to broadband deployment. It begins with identifying community needs, forming a task force, and establishing a clear vision. From there, it outlines how to conduct feasibility studies, determine legal and operational models, create a financing plan, and establish partnerships. By following these steps, communities can navigate the complex challenges of planning, financing, and executing successful broadband projects. The guide also includes practical case studies to inspire and inform communities embarking on their connectivity journeys.

List of abbreviations

Abbreviation	Description
3LOM	Three-Layer Open Model
ALOM	Active-Layer Open Model
CEF	Connecting Europe Facility
DBO	Design, Build, and Operate
EAFRD	European Agricultural Fund for Rural Development
EIB	European Investment Bank
ERDF	European Regional Development Fund
FTTH	Fibre to the Home
ICT	Information and Communication Technology
ILSR	Institute for Local Self-Reliance
KFT	Knowledge Facilitation Tool
MNO	Mobile Network Operator
NöGIG	Niederösterreichische Glasfaserinfrastrukturgesellschaft (Lower Austrian Fibre Infrastructure Company)
PLOM	Passive-Layer Open Model
PPP	Public-Private Partnership
RoW	Right of Way
USF	Universal Service Fund

1. Introduction

The main goal of this guide is to assist rural stakeholders, like public authorities, small business owners, citizens associations and any relevant rural stakeholder group interested in implementing a local broadband connectivity project. XGain acknowledges that current connectivity, in some EU rural areas, is poor or even non-existence unable to adapt and respond to the current and forthcoming digital connectivity needs. It is mainly concerned with providing clear steps for all the *stakeholders of the community* (mentioned just by the term *community* throughout the document) that are interested to plan the development and execution of their own local connectivity network and help them create a strategy plan. The guide provides 6 main steps that communities need to be concerned with, in order to ensure successful implementation. The steps are presented in the figure below and analytically explained in the Strategic Planning chapter. After having completed all the steps and together with the technology mix recommendations provided from XGain's Knowledge Facilitation Tool (KFT) regarding the technology mix that can be used, the users will now have a clear understanding of what they need to do and proceed with project implementation.

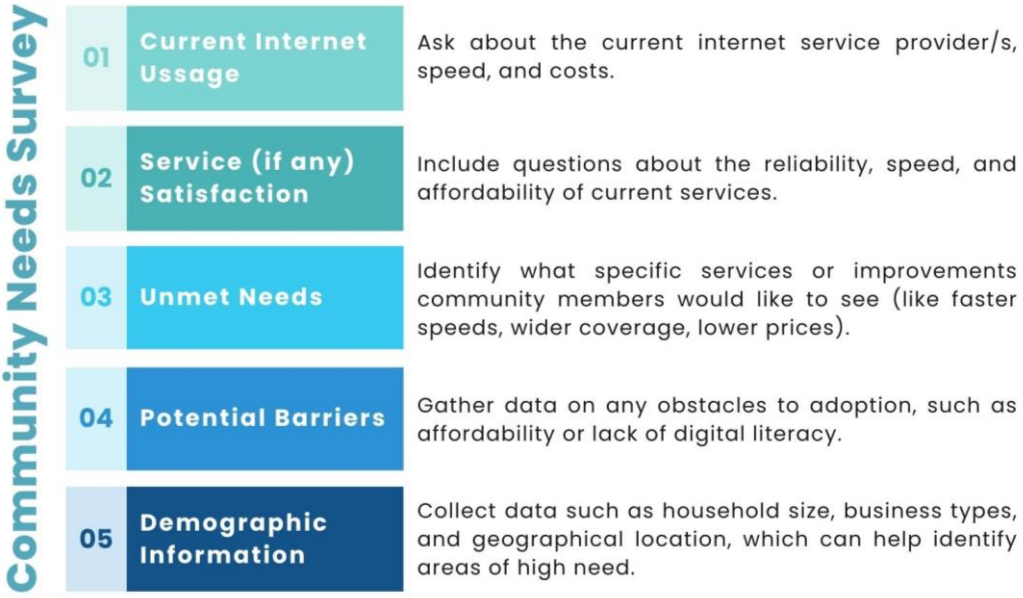
Figure 1: Deployment process overview

Having a good internet connection has become a necessity by now. Affordable, accessible and high-speed broadband is an essential component that can enable the long-term success of a community. Despite different communities having different needs, meaning that there is no one size fits all connectivity model, the guide presents a base methodology that all projects can follow in order to take all the necessary decisions, regarding **legal**, **financial** and **operational issues**.

Information presented herein is as clear and concise as possible, easing non-experts new to the concept of rural connectivity and local infrastructure projects. More detailed sources and guides are also pre sented in the Appendix.

2. Identifying Community Needs and Goals

Effective broadband deployment in rural areas begins by having an understanding of community needs and future goals. Before proceeding to the actual planning stage for your project there are a few useful things that you can do and will help you in planning and execution, as a pre-planning stage. **Conducting a survey or assessment is a good start** in order to identify the current state of connectivity, specific requirements of residents and businesses, and potential barriers towards adoption. A more data-driven decision-making process can ensure that the solutions implemented are tailored to meet the unique demands of your rural community, maximising the benefits and enhancing the quality of life for residents. The surveys can be conducted using both quantitative and qualitative methods. The survey can include both closed (yes/no, scale or multiple-choice questions) and open-ended questions. Some useful key inputs the survey can cover, are:



Keep in mind that the survey can be available in both digital and physical formats to accommodate individuals with limited online access. You can gather input by conducting interviews with people, especially experts or influential people in the community. If possible, it can also be beneficial to host a community-wide meeting that can engage a broader audience and gather real-time feedback. These events also provide an opportunity to educate residents about the benefits of enhanced connectivity (mentioned below) and gather support for the project.

Once survey data has been collected, it's important to thoroughly assess it in order to identify the main needs of the areas and "translate" it into a set of connectivity objectives that match community needs. **Setting clear and achievable objectives** is essential for guiding the deployment process. The primary goals should focus on three key areas: *affordability*, *accessibility*, and *quality*. **Affordability should** ensure

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that internet services are within the financial reach of all residents. **Accessibility should** guarantee full coverage, ensuring that even the most remote areas are connected. **Quality should** aim to provide high-speed, reliable digital connectivity able to support the needs of modern usage, from remote work and online education to eHealth services and e-commerce.

Engaging all relevant stakeholders, like residents, local businesses, and local authorities, is vital for the success of a connectivity project. Stakeholder engagement helps build a sense of ownership and commitment to the project, ensuring sustained support and collaboration. By involving the community in the planning and decision-making processes, project leaders can better understand the unique challenges and opportunities within the area, fostering innovative and effective solutions. Effective communication of the benefits that digital connectivity can offer to rural communities is key in attracting willing participants to the project. Those reasons can include:

1. **Economic Development:** High-speed internet access enables local businesses to compete in the global marketplace, attract investment and create new job opportunities. It supports the growth of new industries, such as tech startups and remote work hubs, which can drive economic revitalisation in rural areas.
2. **Education and Lifelong Learning:** Internet connectivity is essential for providing access to quality education and lifelong learning opportunities. Students can participate in online classes, access educational resources,

and engage in virtual collaboration, levelling the playing field with their urban counterparts.

3. **Healthcare Access:** eHealth services rely on robust internet connections to provide remote consultations, monitoring, and treatment. This is particularly important in rural areas where access to healthcare facilities may be limited.
4. **Social Inclusion and Quality of Life:** Connectivity fosters social inclusion by enabling residents to stay connected with family and friends, participate in online communities, and access a wide range of digital services. It enhances the overall quality of life by providing access to entertainment, information, and e-government services.
5. **Innovation and Smart Solutions:** Internet access is a gateway to innovative solutions able to address local challenges. For example, smart agriculture technologies can improve farming efficiency and sustainability, while smart grid solutions can enhance energy manage ment and reduce costs.

3. Strategic Planning for Broadband Deployment

After identifying that broadband internet has a positive impact towards adoption by the community it is time to proceed on how you can bring the project to life. Strategic planning for a local broadband network deployment is necessary for successful project implementation. In this part of the guide a series of steps is proposed that will help you plan, finance and ultimately execute the project.

Figure 2: Creating a strategic plan for rural connectivity infrastructure deployment

STEP 1: CREATE A DEDICATED TASK FORCE

For rural associations, groups of citizens or public authorities wishing to expand their low, or non-existent, broadband connectivity, the first step is to organise a task force that will try to move things forward. The task force should ideally include individuals that are recognised and carry weight in the community. Ideally, the task force should include:

- Members representing various sectors and community groups like, farmers, retailers, land owners, healthcare providers, local government etc.
- Network and technology experts.
- People with the ability to think critically, both supporters and sceptics.

The task force must have logistical and administrative support from an affiliate organisation (maybe a local public authority like the municipality, or a private group like a citizens' association, a local cooperative of professionals like farmers, shopkeepers, etc.) and a plan to develop a set of recommendations with a reporting deadline. A good case practice from successful community projects is to have/appoint a person that will passionately lead the efforts. A leader that is visible and active in pursuing connectivity improvement in the community is a necessary component for successful project implementation. An important role of this person

is to communicate project goals to other members of the community and also to members of the community's public authorities and explain the benefits that can be offered. Those benefits, as identified by the XGain project, can include the **creation of new jobs** especially in the areas of e-commerce, hospitality and more, a **potential increase of per capita income**, application of **more effective and sustainable agriculture methods** through the application of new technologies and the **overall enhancement of citizen's health and well-being**.

STEP 2: SET A CLEAR VISION AND GOALS

Defining the scope and vision of a connectivity project is a critical step that sets the foundation for success. This step begins by **establishing a clear, shared vision that aligns with the community's needs and long-term goals**. The vision should articulate what the community hopes to achieve through enhanced connectivity, such as economic development, improved access to education and healthcare, or increased social inclusion. By having a well-defined vision, the project can gain the necessary buy-in from stakeholders, ensuring that everyone involved is working towards the same objectives.

Once the vision is in place, the next task is to **determine the geographical coverage area** of the project (network). This involves identifying the specific regions or communities that will benefit from the network deployment. In rural areas, this often means prioritising areas with the greatest need or those currently underserved by existing providers. Additionally, the project must establish target outcomes, such as the percentage of households to be connected, the minimum broadband speeds to be delivered, and the timeline for completion. **Clear, measurable goals are essential** for guiding the project's progress, ensuring accountability, and providing a benchmark for success.

These steps collectively form the strategic backbone of the project, helping to translate the community's aspirations into concrete actions and outcomes. Keep in mind that developing a community consensus will not come at once, so take time in order to discuss and understand everyone's perspective on the matter.

Clear, measurable goals are essential for guiding the project's progress, ensuring accountability, and providing a benchmark for success.

STEP 3: CONDUCT ALL NECESSARY ANALYSES AND ESTIMATES

Having established a task force and knowing what you want to do, you can now undertake studies and analyses towards project technical feasibility and provision.

Starting off with a **feasibility study** can be of great value. A feasibility study is a business planning tool that integrates various analytical elements into a thorough assessment. The study focuses on identifying *"how"* a project can be made *financially* and *technically* viable while aligning with community objectives. It should be seen as a decision-making funnel, where relevant information, ultimately presenting practical implementation options, are collected and presented. Conducting an independent, third-party feasibility study ensures that reliable data is available to support effective negotiations with potential broadband provider partners, construction firms, and suppliers. A feasibility study usually covers four main aspects of a project which are the technical, financial, market and organisational. To give a brief explanation of each aspect:

- Technical feasibility: A detailed inventory of the necessary hardware and software, along with the skilled labour required for their effective implementation.
- Financial feasibility: An estimated budget for the entire project, including projected costs and anticipated returns.
- Market feasibility: An analysis of the market, encompassing the product or service, industry trends, competitive landscape, consumer demand, sales forecasts, and growth potential.
- Organisational feasibility: A structured outline of the business model, including the management team and organisational framework needed to support the project.

Another valuable study that can be conducted is a **local market study**. A study like this would focus on the community and the total existing demand for better access to high-speed internet. To support this study, data can be incorporated from the previously mentioned community survey to calculate local demand. The study can also include potential service offers and pricing, area demographics and potential customers, both individuals and businesses/organisations.

At this stage **hiring an outside expert/consultant to assist with the analyses and also the later stages of the planning would be advisable**, especially if the task

force lacks relevant experts. After having completed the analyses deemed necessary, and having all information available, you can proceed in determining the legal status and operating models, and then create a financing plan.

STEP 4: DETERMINE LEGAL STATUS & OPERATING MODEL

Through the feasibility process, the main strategies to be followed should be more or less clear by now. The last important decisions that need to be made are: i) the legal status and ii) the operating models of the network.

Each legal status offers a unique blend of control, responsibility, and financial implications, making it crucial for the community to select the model that best aligns with its goals and capabilities.

Regarding **legal status**, the community can opt for several alternatives, each with its own advantages and challenges. One option is to establish a **public utility** or **municipal broadband authority**, which allows the community to own and manage the network directly, often providing greater control but requiring adherence to specific public sector regulations. Another possibility is forming a **non-profit organisation** or **cooperative**, which enables the community to operate the network with a focus on service quality and community benefits rather than profit. This model often fosters strong local engagement but may face challenges in raising capital. Alternatively, the community could create a **public-private partnership (PPP) or some other form of partnership**, where different entities, potentially from both public and private sector, share risks, resources, and expertise. While this model can bring in necessary investment and technical know-how, it requires careful negotiation to balance public interests with private sector objectives, if the latter is involved. Each legal status offers a unique blend of control, responsibility, and financial implications, making it crucial for the community to select the model that best aligns with its goals and capabilities. Giving more details for the different potential governance structures that can be employed it can be said that:

PUBLIC UTILITY | A government-owned and operated entity established to provide broadband services to a community. As a public utility, the broadband network is managed similarly to other essential services like water or electricity,

with a focus on serving the public interest rather than generating profit. This model allows the community to maintain full control over the network's infrastructure, operations, and pricing, ensuring that the service is tailored to local needs and priorities. The authority is typically governed by a board or commission appointed by local government officials, which ensures accountability and transparency in decision-making. Establishing a public utility or municipal broadband authority can lead to long-term benefits, such as stable pricing, reinvestment of revenues into network improvements, and the provision of equitable access to all residents. However, this model also requires the community to bear the full financial and operational responsibilities, including securing funding, managing the network, and adhering to public sector regulations.

NON-PROFIT ORGANISATION OR COOPERATIVE | An organisation established to provide broadband services is a community-focused entity that operates with the primary goal of delivering affordable and reliable internet access, rather than generating profits. In this model, the broadband network is owned and managed by the members of the community it serves, often through a cooperative structure where residents and local businesses become members or stakeholders. Decisions are typically made democratically, with each member having a say in the governance and direction of the organisation. The non-profit or cooperative model prioritises service quality, affordability, and equitable access, reinvesting any surplus revenue back into the network for maintenance, upgrades, or expanded coverage. This approach fosters strong local engagement and ownership, ensuring that the service aligns closely with the community's needs and values. However, such organisations may face challenges in raising capital for initial infrastructure investments and sustaining operations, often relying on member contributions, grants, and community fundraising efforts. Despite these challenges, the non-profit or cooperative model can be an effective way to provide community-driven broadband solutions that prioritise long-term social and economic benefits over short-term financial gains.

PUBLIC-PRIVATE PARTNERSHIP (PPP) | A collaborative model where the community partners with private sector entities to design, build, finance, and operate the broadband network. In this arrangement, the public sector, often represented by local government, works with private companies, such as

internet service providers, technology firms, or infrastructure developers, to leverage their expertise, resources, and investment capabilities. The private partner typically handles the technical aspects of the project, including network construction, maintenance, and service delivery, while the public sector plays a key role in ensuring the project aligns with community goals, regulatory requirements, and public interests. PPPs offer several advantages, including access to private sector innovation and efficiency, shared financial risk, and potentially faster deployment of broadband services. This model can be particularly beneficial for communities with limited technical or financial resources, as it allows them to benefit from the private partner's experience and capital while retaining some level of control and oversight.

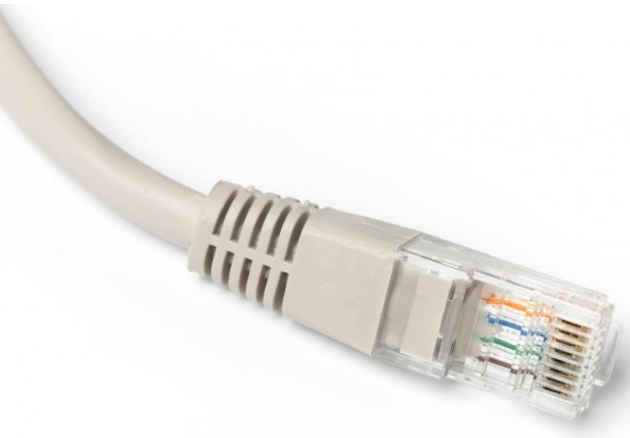
Regarding the **operating model** of the network, it should be taken into account that the main reasons for not providing broadband access to rural areas are more commercial than technical. The most common business model for providing connectivity until now is the '*Vertically Integrated Operator*' model, in which the operator designs, builds, operates, and maintains the whole telecommunication network. Considering that rural areas have some characteristics such as low population density, lack of backbone infrastructure and landscape variation, the cost of connecting these areas is considerably higher compared to urban ones and thus, not attractive for investment. Considering a more liberative model that has been introduced the recent years mostly in fibre deployments, splits the network into three layers: passive equipment, active equipment and services, could indeed introduce new business models for the actors, introducing **three new roles**:

- the physical infrastructure owner that owns and maintains the passive infrastructure;
- the network provider that operates the active equipment;
- the service provider that delivers the service to end-users.

Operating models ranging from an actor that takes all three roles to models that all roles are undertaken from different actors could be in place. For the latter, an open network model in which the infrastructure is open to all market participants in equal terms is achieved. In order to allow a number of smaller entities to enter the market along with local communities, with aim to promote the cooperation among actors, layer split is often used such as:

- **Passive-layer wholesale-only (also known as Passive-Layer Open Model- PLOM)** in which an entity (e.g., a local cooperative, or a private investor, depending on the investment model chosen) builds and operates passive infrastructure to be made available to all market actors under fair and non-discriminatory conditions;
- **Active-layer wholesale-only (also known as Active-Layer Open Model- ALOM)** in which one entity deploys and operates the passive and active layer (hence acting as an integrated physical infrastructure and network provider);
- **Mediated wholesale-only (also known as Three-Layer Open Model- 3LOM)** in which the roles of physical infrastructure provider, network and service provider are explicitly separated.

Based on these roles, a community has three main options for operating the network, with various levels of involvement. The first one would be to **provide broadband as a public utility**, meaning that the legal form chosen above would own both passive and active infrastructure, and will deliver retail services to businesses and individuals. Another option would be for the entity to build and own the network but lease it to either one or multiple providers that will provide retail services in an **open access model**. The third option is to **provide incentives to a private provider in order to build the infrastructure**. The types of incentives that can be employed can be financial, like the offering of public grants, or other types of incentives, like having the passive infrastructure in place and the provider only having to build the active one, exclusivity for some years, committing to sign contracts for public organisations and facilities etc.



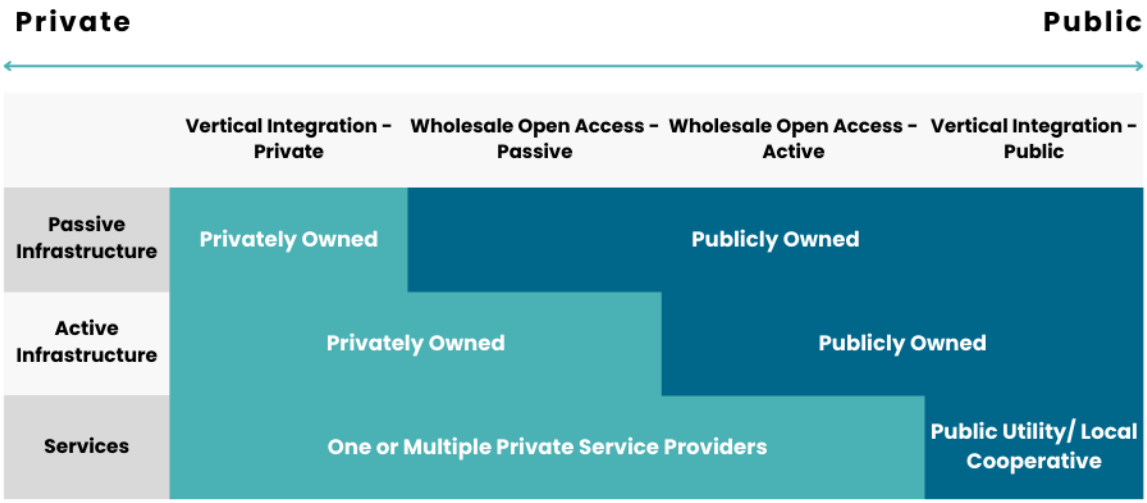


Figure 3: Operating model options

For example, a community might decide, based on its area's characteristics and population, that a public utility model is the way to proceed, to provide better and more affordable internet services to its citizens. As such, the community builds/scales up the network in order to operate it for public interest. Another mode of operation, possibly more feasible, is to build the passive infrastructure -invite private developers to set up the active ones and sell internet services to citizens/SMEs. In order to provide incentives for the private company they can approach a Mobile Network Operator (MNO) that can manage a multipower environment according to an open-access model. A multitude of examples and real-life cases of underserved areas that manage to provide high-speed internet services, using some variation of the above stated models will be presented below.

STEP 5: CREATE A FINANCING PLAN

The financing plan must carefully address both capital (CAPEX) and operating costs (OPEX). Information and Communication Technology (ICT) infrastructure development financing methods have changed throughout time. In past times the required infrastructure investment outlays were substantially modest, and speech technology was still the primary focus. Today, however, the situation is much more complicated. In contrast to the past, when services were provided by large organisations, today's economy is heavily reliant on small and medium-sized businesses. Different finance methods must consequently be utilised to fund projects intended to expand rural residents' access to ICTs, as there is no universally applicable financing structure or model:

PUBLIC-UTILITY FINANCING MODEL

The municipality or government agency operates as an investor for an open-access network in urban and suburban roll-outs, securing early finance at cheaper rates for construction.

DIRECT INVESTMENT MODEL

The publicly-run municipal network model (public DBO). In this model, the government entity initiates the development of a broadband network within a specific municipality, county, or region, a process often referred to as Design, Build, and Operate (DBO). The deployment is overseen and directly managed by the government authority. To accomplish this, either a newly established company or a specialised division within an existing utility company is tasked with deploying the network, either through direct implementation or standard procurement processes. Ownership of the network remains with the public authority, which is also responsible for its ongoing operation and maintenance. Subsequently, the network is typically made accessible to all market participants, operating as an open access network. The public authority or a dedicated entity assumes a substantial level of commitment and assumes all associated financial risks, while maintaining complete control over the network's design and its usage.

OPERATOR FUNDING

This happens when a network operator pays for infrastructure projects out of its own budget or with private capital. It is the most typical type of financing. However, with this kind of cash, investment is frequently confined to cities.

UNIVERSAL SERVICE FUND FINANCING MODEL

Cost-sharing models include infrastructure pooling between rival businesses. Competition is usually hesitant to use these methods, though, which is where public money comes in.

CONCESSION MODEL

The privately-run municipal network model: In this model, the public authority engages in a process known as public outsourcing or concession, wherein it outsources the construction and operation of a broadband network within a

municipality, county, or region to a private entity. This private actor is granted a concession to operate the network for an extended period, typically ranging from twenty to thirty years. The contracted private firm's primary task is to establish an open, operator neutral network, enabling various service providers to offer their services to end-users. While the public authority retains ownership of the passive infrastructure, it wields significant influence over the network's design and service provisioning. To ensure equitable and non-discriminatory conditions for all service providers, it is desirable that the private firm responsible for network construction and operation refrains from offering its own services, although this isn't always the case, often due to the limited availability of operator-neutral network providers and independent service providers in specific regions and a lack of awareness about this option. Throughout the contract period, the contracted firm assumes the financial investment, as well as the associated risks and revenues. Once the contract concludes, the network infrastructure remains under the control of the public authority, which may choose to renew the contract, enter into an agreement with another company, or potentially transition to a publicly managed municipal network model.

COMMUNITY SUPPORT MODEL

In this model, local residents take the lead in spearheading investments in broadband infrastructure through grassroots initiatives, reflecting a bottom-up approach. These community-led projects consistently yield notable success by fostering higher rates of end-user adoption and establishing financially sustainable ventures. The degree of competition within these initiatives varies, with some embracing an open network business model marked by robust competitive dynamics, while others function as fully integrated entities or engage in long-term service agreements with a single operator. Public authorities play a pivotal role in supporting these endeavours by offering co-financing, facilitating right-of-way (RoW) access, implementing regulatory frameworks, coordinating with other infrastructure development initiatives, and granting access to public infrastructure and critical points of presence for essential backhaul connections. Additionally, public authorities are instrumental in ensuring fair and impartial conditions for all operators seeking access to the shared infrastructure.

OPERATOR SUBSIDY MODEL (GAP-FUNDING OR PRIVATE DBO)

In this model, the public authority does not directly engage in the broadband deployment projects within the region but rather provides subsidies to a specific market player to enhance their existing infrastructure. Typically, incumbent telecommunications operators and major alternative service providers own both the passive infrastructure and the active equipment while offering services to end-users under a vertically integrated framework. The public authority's role is to bridge the financial gap between what is commercially viable and the desired coverage objectives. This funding is provided in the form of grants to one or more private operators. This model offers advantages in terms of streamlined contractual arrangements, the potential for relatively swift deployment, and shifting risks to the grant recipient or operator. However, public authorities do not generate financial returns from this approach; instead, they must contend with increasing funding requests for each subsequent deployment phase, resulting in higher investments than initially anticipated.

THE NEUTRAL HOST MODEL

This model refers to a system where a third-party entity provides shared infrastructure for multiple service providers (like mobile network operators, internet service providers, etc.). It is especially useful for improving connectivity in areas where it is inefficient or costly for individual operators to build their own infrastructure, such as in dense urban areas, rural locations, or indoor environments like shopping malls and stadiums. In the neutral host model, the third-party operator owns and manages the infrastructure (e.g., towers, small cells, fibre networks) and leases it to multiple service providers. This leads to more efficient use of resources, reduced costs, and faster deployment of digital networks. It also fosters competition, as smaller operators can access the same infrastructure without needing to invest heavily in their own. This approach is increasingly being discussed in the context of 5G deployment and smart cities, where collaboration and shared infrastructure can enable faster, more reliable, and widespread digital connectivity.

Financing a local broadband project requires access to diverse funding sources that can help cover both initial capital investments and ongoing operational costs.

Below an extensive list of potential funding mechanisms and programmes that communities can leverage to support their broadband initiatives is presented.

1. **GRANTS |** Grants are non-repayable funds provided by governments, international organisations, and private foundations to support public infrastructure projects, including broadband deployment. Some major grant sources include: i) the European Regional Development Fund (ERDF): it supports infrastructure development in less-developed regions of the EU. ERDF funds can be used for broadband projects aimed at reducing regional disparities in connectivity. ii) the Horizon Europe: while primarily a research and innovation programme, Horizon Europe also supports infrastructure projects that promote digital inclusion and innovation in connectivity. iii) European Agricultural Fund for Rural Development (EAFRD): Provides funding for rural development, including broadband expansion in agricultural and remote areas to boost rural economies. iv) Digital Europe Programme: Focuses on accelerating the digital transformation of Europe. This programme supports projects in areas like high-performance computing, AI, and broadband infrastructure.
2. **PUBLIC BONDS |** Public bonds allow communities to raise capital by borrowing funds from investors. These bonds are repaid over time with interest and can be an effective way to finance long-term infrastructure projects like broadband networks. The main categories that a community can consider are: i) **Municipal Bonds**: Local governments can issue municipal bonds to finance broadband infrastructure. Bonds allow communities to raise significant amounts of capital upfront, with repayment coming from future revenue or taxes. ii) **Green Bonds**: Communities can explore issuing green bonds for broadband projects that contribute to sustainability, such as smart grids or reducing energy consumption through digital infrastructure.
3. **EU LOANS AND FINANCIAL INSTRUMENTS |** Loans from public sector institutions and financial instruments can offer more favourable terms compared to private lenders, including lower interest rates and longer repayment periods. The main option here would be: i) European Investment Bank (EIB) Loans: The EIB provides long-term loans for digital infrastructure projects, often in collaboration with national governments and private partners. ii) InvestEU Programme: InvestEU supports infrastructure

investments, including broadband and digital connectivity, by providing financing guarantees to attract private investment.

4. **COMBINED PUBLIC-PRIVATE FUNDING FOR PPPS |** Public-Private Partnerships combine public sector resources with private sector investment and expertise. These partnerships can significantly reduce the financial burden on local governments while accelerating project implementation. The European PPP Expertise Centre (EPEC) provides technical and advisory support for structuring PPPs in the EU, offering a valuable resource for communities interested in leveraging private investment for broadband.
5. **NATIONAL AND REGIONAL GOVERNMENT FUNDING |** Many national and regional governments offer programmes specifically designed to improve broadband access in rural or underserved areas. These programmes usually provide a mix of grants, loans, and subsidies.
6. **CROWDFUNDING AND COMMUNITY CONTRIBUTIONS |** In cases where traditional funding sources are limited, communities can turn to crowdfunding or direct community contributions to support broadband initiatives. Communities can use platforms like Kickstarter to raise funds for broadband projects, mainly targeting members of the community itself. This method is usually used in conjunction with other funding sources. Some community broadband projects allow **residents to buy shares in the infrastructure project**, creating a sense of ownership and responsibility while providing additional capital.

At this point it is also beneficial to provide an overview of the **eligibility criteria for someone to receive public funding in the EU**. To be eligible for receiving public grants, whether from national authorities or European Union (EU) programmes, applicants must fulfil a set of key requirements, which generally align with ensuring that both the entity applying and the proposed project fit the strategic goals of the funding programme, and that they are financially and administratively capable of carrying out the project.

First, the applicant must be **established as a recognised legal entity in an eligible country**, usually within the EU or a participating state. Depending on the specific funding programme, **eligible entities can include public bodies, non-profit organisations, research institutions, and small or medium-sized enterprises (SMEs)**. Some programmes may also allow individuals or sole proprietorships to

apply, though this depends on the nature of the grant. A crucial aspect is that **the project must align with the objectives of the grant programme**. Each funding scheme, such as *Horizon Europe*, *Erasmus+*, or the *ERDF*, has specific goals. For example, Horizon Europe focuses on research and innovation, while Erasmus+ targets education and youth mobility. Proposals must clearly demonstrate how they contribute to the programme's aims, ensuring that the project has a positive impact in areas such as economic development, innovation, or social inclusion. Applicants must also **demonstrate both financial viability and administrative capacity**. This involves providing financial statements or records showing stability, proving that the organisation can manage the project budget, and, where necessary, co-finance a portion of the project's costs. In many EU programmes, co-funding is a requirement, meaning the applicant is expected to contribute a percentage of the total project cost.

Compliance with broader EU regulations is another essential criterion. **Projects must adhere to laws on environmental protection, non-discrimination, equal opportunities, and data protection (particularly the General Data Protection Regulation, GDPR)**. Furthermore, applicants must not be in violation of any obligations, such as outstanding tax or social security payments, and must not be in any situation that would exclude them from receiving public funds (e.g., bankruptcy, involvement in corruption or fraud). **Some programmes**, particularly those focused on innovation or research, such as Horizon Europe, **require partnerships between multiple entities from different countries**. These collaborative arrangements are designed to maximise the project's European impact and foster cross-border cooperation. Additionally, **the project must be well-defined and ready for implementation**. This often means the submission of a detailed project proposal that outlines clear objectives, an analytical work plan, budget, expected outcomes, and a sustainability strategy to ensure that the project can continue beyond the period of public funding. Finally, **applicants must avoid any conflict with state aid rules**, which ensure that public funding does not distort market competition. Each grant call includes specific guidelines detailing any further eligibility criteria, which applicants must follow to avoid disqualification.

In summary, eligibility for national or EU grants is structured to ensure that funding goes to projects and entities that are aligned with public policy goals, financially

sound, and compliant with legal requirements. The application process is often competitive, and careful attention to these criteria is crucial for success.

STEP 6: ESTABLISH PARTNERSHIPS

When it comes to supporting initiatives intended to expand rural access to ICTs, partnerships are particularly helpful. Partnerships can ease the load on the government and even the private sector in establishing rural connections due to their nature:

- **Public partnerships (PuP):** A partnership that is being employed in ICT development, as well as other disciplines, is a cooperation between a government body or public authority and another government body and/or public authority to promote, or in fact supply, services and/or facilities. Sometimes the aim is to impart technical knowledge and skills. Sometimes it is to split the expense of expensive initiatives in underdeveloped areas. Other local, regional, or state provincial organisations, school boards, parks boards, NGOs, unions, pension funds, professional associations, and community groups in emerging nations are examples of potential partners.
- **Public-private partnerships (PPPs):** They are the most typical kind of partnerships and have been used in many different economic areas. Large-scale domestic and international infrastructure projects are best suited for this kind of partnership. For instance, ICT content providers like Microsoft, Amazon, and Google are increasingly funding underwater cables and other ICT projects across a number of nations, either independently or in collaboration with government agencies and commercial ICT operators.
- **Intergovernmental partnerships:** Partnerships between international organisations, businesses, and governments are essential. These partnerships typically function as parts of regional organisations and focus more on developing policy and providing implementation guidance.
- **Private partnerships:** The ICT industry has made considerable use of private partnerships, which are started by for-profit parties without backing from public offers, typically between ICT operators and financial institutions and insurance service providers. However, despite the fact that financial inclusion has increased dramatically as a result of collaborations between banks and ICT service providers, they do not often aim to provide universal access to broadband. In this context, network sharing models allow multiple providers to share infrastructure, reducing costs and improving network

coverage, particularly in rural or underserved areas. These collaborations could include active sharing, where operators share components like radio access networks (RAN), or passive sharing, which involves shared towers or sites without integrating active equipment.

- **Small scale private networks:** A final consideration in the development of private networks, particularly within the agricultural sector, is the role of small-scale initiatives, such as those driven for example by a group of a few farmers or a local agricultural association. These entities may collaborate to establish a private network tailored to their specific operational needs rather than providing broadband services to the general public. The primary purpose of such a network would be to enhance connectivity for the members, improving data sharing, resource management, and the overall efficiency of farming activities. This grassroots approach to connectivity allows small agricultural communities to take control of their digital infrastructure, addressing issues like remote monitoring, precision agriculture, and sustainable farming practices through private, member-focused networks. This model underscores the importance of connectivity solutions designed for operational effectiveness rather than commercial service delivery.

When implementing partnerships, it is vital to evaluate the implications of the various elements of these funding methods based on macroeconomic indicators of the relevant economy. The funding mechanism's adequacy in light of the macroeconomic conditions should be taken into account. PPPs are more useful and appropriate for projects requiring significant financial investments. It may be useful for smaller ICT initiatives to use in-country PuPs. (International Communication Union, 2021.)

Risk Management

Successfully planning and implementing a broadband deployment project requires the anticipation and mitigation of various risks that can arise during the process. These risks, if not managed properly, can lead to delays, budget overruns, or even project failure. Therefore, it is crucial for communities to identify potential risks early on and develop strategies to address them.

One of the most common risks is **funding delays**. Broadband projects often depend on a mix of public and private financing, including grants, loans, and partnerships. Any delays in securing these funds can significantly disrupt project timelines. To mitigate this, project leaders should develop a contingency plan that includes alternative funding sources or phasing the project into manageable stages. By doing so, communities can proceed with initial phases of the project, such as infrastructure assessment or small-scale deployments, while awaiting larger funding commitments. Regular communication with funding bodies and clear documentation of project goals and progress can also help to ensure timely disbursements.

Community pushback is another risk that can affect broadband deployment efforts, particularly in rural areas where residents may be sceptical of new technology or changes in local infrastructure. Resistance may stem from concerns about potential disruptions, environmental impact, or the perceived high cost of internet services. To address these concerns, early and continuous engagement with the community is essential. Organising community meetings, workshops, and information sessions where residents can express their concerns and receive clear, transparent information about the project's benefits and impacts can help build trust and reduce resistance. Emphasising how improved connectivity will enhance local education, healthcare, and economic opportunities can also foster broader community buy-in.

Legal and regulatory challenges may also arise, particularly when dealing with land use rights, permits, and compliance with national or EU telecommunications regulations. These issues can cause significant delays if not properly anticipated. To mitigate legal risks, the project task force should seek legal advice early in the planning phase to ensure that all regulatory requirements are met and to navigate any potential bureaucratic obstacles. Establishing relationships with local and national regulatory bodies can also help to smooth the permitting process and ensure that the project remains compliant with all legal frameworks.

Spectrum regulation specifically, is crucial to broadband deployment in the EU, especially for rural and underserved areas. The primary risk is **ensuring sufficient spectrum allocation**, often hindered by national policies or competing interests like mobile networks, broadcasting, and public services. While the EU's Radio

Spectrum Policy Programme (RSPP) mandates coordinated spectrum use to boost efficiency and reduce interference, inconsistent national implementations pose challenges. **Cross-border spectrum coordination is also critical**, especially for seamless 5G rollout, but delays and regulatory differences can disrupt projects. Engaging early with national regulatory bodies and EU consultations, as well as working with the Body of European Regulators for Electronic Communications (BEREC), can help projects navigate these risks. The EU also encourages flexible spectrum management, like shared or dynamic spectrum access, offering alternatives if key frequency bands are unavailable. The above issues can be especially challenging for small scale or private deployment projects and should be taken into account proactively, ensuring availability and ability to lease.

Technical risks, such as difficulties in securing the necessary equipment or delays in network construction, can also threaten the success of broadband deployment. These risks are often heightened in rural areas where geographical barriers, such as difficult terrain, can complicate infrastructure installation. To manage these risks, it is important to conduct thorough feasibility studies that consider local topography and logistical challenges. Engaging experienced contractors and technology experts can help in identifying potential technical obstacles early on and ensuring that solutions are in place to address them before they become critical.

Finally, **market risks should also be considered**, particularly if the project depends on securing a sufficient number of subscribers to be financially viable. Communities may overestimate the demand for broadband services, which could result in lower-than-expected subscription rates. To mitigate this risk, conducting a market study and demand analysis is critical. This will provide a more accurate picture of the community's actual needs and help set realistic goals for subscription uptake. Additionally, offering phased payment plans or affordable subscription tiers can attract more users, especially in areas where affordability is a major concern.

By proactively identifying and planning for these risks, communities can improve the resilience of their broadband deployment projects, ensuring that they remain on track and deliver the intended benefits. A well-structured risk management plan

not only helps to mitigate potential obstacles but also strengthens the overall strategic planning process by enabling more informed decision-making.

4. Case Studies of successful broadband projects

This chapter highlights several real-life examples of communities and regions that have successfully implemented high-speed broadband networks, despite the challenges. These case studies showcase a variety of approaches, from public-private partnerships to community-owned cooperatives, demonstrating how different models can be tailored to meet the unique needs of different areas. By examining these successful broadband projects, valuable insights can be gained into the strategies, best practices, and innovations that have enabled these communities to bridge the digital divide and enhance their economic and social well-being. The examples also show that the initiative for rural broadband can come from national, regional and local community level. Together with them the guide also includes other reports where the reader can find many more examples of rural areas that implemented some form of a connectivity project. The goal of these examples is to inspire readers and help them to shape a clearer picture of how their community network can be set up and work.

PPP in Limousin France - Regional Concession to Create and Operate Rural Broadband Network

The Limousin region of France, a rural area, began its pursuit of reliable broadband connectivity as early as 1996. Dissatisfied with the offerings from both established and new providers, **the regional authorities decided to establish a public consortium** known as DORSAL. This consortium was tasked with securing the necessary financing, determining the scale and scope of the deployment, and managing the overall project for their own broadband network.

In the first phase of the project, after securing €204 million in funding, a 24-year concession was granted in 2005 to a local ICT company, Axione Limousin, through a competitive bidding process. Axione was responsible for **designing, constructing, and operating an active-layer wholesale-only model broadband network**, which was made available to all French service providers on a non-discriminatory basis. This initial deployment was known as the first-generation network.

Simultaneously, **another consortium called SPL Aquitaine was formed and given the responsibility to design and build public fibre access networks**. These networks were later transferred to Axione under a concession agreement to commercialise and manage their operation. This subsequent deployment became known as the second-generation network. A key factor in the project's success was the seamless integration between the first and second-generation networks. Additionally, the region has promoted private investment by allowing service providers to deploy their own infrastructure in the more densely populated areas of Limousin. You can read about this example and many more in the following report from the World Bank (Innovative Business Models For Expanding Fiber-Optic Networks And Closing The Access Gaps).

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NöGIG 2 - The public takes action in Lower Austria

In Lower Austria, where telecom companies had not invested for 15 years, **the state intervened by establishing a company specifically tasked with bringing broadband access** to over 450,000 people **in rural areas**. Igor Brusic, Vice President of the nöGIG company, stated, "Without broadband, the inhabitants and companies are forced to move from these rural areas to urban ones. Investing or building up a financial structure and attracting capital for rural areas is something that makes this project unique". This initiative was recognised as a finalist in the 2019 European Broadband Awards.

nöGIG, the Lower Austrian Fibre Infrastructure Company, **employs a three-layer open model that separates infrastructure, active operations, and service provision, operating exclusively on a wholesale basis**. The project, which involves a €310 million investment, is designed to recoup its costs over 30 years, after which the network will be entirely owned by the state. To learn more about the project you can watch the following video.

Lithuania's National Broadband Strategy

In October 2021, the Ministry of Transport and Communications initiated a plan to accelerate the development of ultra-fast broadband infrastructure. The goal is to **ensure that by 2027, internet speeds of at least 100 Mbps will be available to households** and public institutions not only in urban areas but **also in rural regions**. A budget of €75 million has been allocated for this initiative, which will be used to construct communication towers and lay fibre optic lines. Investment planning will prioritise key public and economic hubs, ensuring they are connected to the broadband network.

Additionally, in October 2021, **the Ministry, along with public sector institutions and telecom operators, signed a memorandum committing to achieve 100 Mbps internet speed for at least 95% of Lithuanian households by 2025**.

To support the deployment of next-generation mobile networks (5G), the Ministry established a working group to develop the 2020-2025 Guidelines for 5G development in Lithuania, which include measures to streamline site access for radio-network construction. A memorandum on 5G development, also signed in October 2021, aims to provide uninterrupted 5G services along the international land transport corridors Via Baltica and Rail Baltica by 2025. The company Plačiajuostis internetas is preparing a 5G investment project as part of this effort. You can read more on the European Commission's website [Broadband in Lithuania].

The rise of community broadband networks in the US

There are now over **447 community-owned communications networks** operating across the United States, with numbers steadily increasing. These networks are part of a growing movement to provide **affordable and reliable broadband access**, especially in areas underserved by traditional internet service providers (ISPs). Organisations like the **Institute for Local Self-Reliance (ILSR)**, **Internet Society**, **Next Century Cities** and more, have been instrumental in supporting and advising these community-driven projects by offering technical assistance and advocacy to local governments and organisations.

Since January 2021, more than **50 new municipal broadband networks** have been established, with many more in various stages of planning and construction. These networks adopt diverse models, including **conduit-only systems**, **institutional networks**, **open-access frameworks**, and extensive **fibre-to-the-home (FTTH)** deployments. Examples of this would be projects like the **Yellowstone Fiber in Bozeman** and **FairlawnGig in Fairlawn,** which aim to provide widespread high-speed internet access over the coming years.

Yellowstone Fiber, is a **nonprofit organisation deploying a fibre-optic broadband network** in Bozeman, Montana, with plans to expand into surrounding Gallatin County. Initially, the network connected community anchor institutions, but it has since expanded to a **fibre-to-the-home (FTTH)** network targeting approximately 18,000 homes with an anticipated 50-60% take rate. The network design allows for up to 10 Gbps symmetrical speeds, even in rural areas. Partnering with **UTOPIA Fiber, a large, publicly owned, Utah-based open access network provider,** for design, marketing, and operations, Yellowstone secured $65 million in revenue bonds, leveraging its nonprofit status for favourable interest rates. This project aims to bolster Bozeman's vibrant tech economy.

Fairlawn, Ohio, launched **FairlawnGig**, a **fibre-to-the-home (FTTH)** network, after recognising the importance of reliable internet as essential infrastructure, akin to water and roads. Initially unable to partner with incumbent providers, **the city decided to build and own the network**, later assuming full operational control to ensure high service standards. The result is affordable, world-class broadband with gigabit internet available to all residents and businesses for $55 per month. With over 60% household subscription and growing, FairlawnGig has boosted customer satisfaction and spurred economic development, attracting new businesses and raising housing values. The network's success is rooted in its simple focus on delivering reliable, high-quality internet service.

The surge in community-owned networks reflects growing dissatisfaction with incumbent ISPs, which often hold regional monopolies and provide **limited, expensive services**. In response, major ISPs have ramped up lobbying efforts to discourage the expansion of municipal broadband, citing concerns over competition. Despite this opposition, public support for community networks continues to grow, driven by their reputation for **high-quality service and local accountability**. Additionally, numerous **Tribal nations** are independently developing broadband infrastructures to bridge the digital divide within their communities, further exemplifying the nationwide push towards locally controlled internet access solutions. You can read more about those kinds of American initiatives on the Community Networks website www.communitynets.org and in the following report (Own Your Internet: How To Build A Public Broadband Network).

5. Conclusions

Having high-speed internet connection is an essential component of a community's development. It not only has the ability to better individual lives but it can also help the community as a whole, providing opportunities for business growth, learning and health that are not bound by geography.

When it comes to rural communities, they may face a unique set of challenges, such as low population density, lack of backbone infrastructure and landscape variation, that make the cost of connecting these areas considerably higher compared to urban ones and thus, not attractive for investments. Rural community stakeholders, whose area is underserved in terms of connectivity, should band together in order to devise an action plan that can benefit all.

This guide serves as a concise resource for communities aiming to implement local broadband connectivity projects, offering clear, actionable steps to navigate the complexities of planning, financing, and deploying a network. As rural communities increasingly recognise the necessity of reliable, high-speed internet for economic development, education, healthcare, and social inclusion, this guide aspires to assist them in taking control of their digital futures. By following the strategic planning framework provided, communities can identify their specific needs, establish a clear vision, conduct essential feasibility studies, and select the appropriate legal and operational models that align with their goals. The examples of successful broadband projects demonstrate the diverse approaches available, from public-private partnerships to community-owned networks, illustrating that with determination and the right strategy, even underserved areas can achieve robust connectivity. Ultimately, the most vital takeaway is the importance of active community involvement in bridging the digital divide, fostering sustainable growth, and enhancing the quality of life in rural regions. As these communities move forward with their projects, the principles and lessons outlined here will serve as a foundation for their success, ensuring that they can build networks that meet the needs of today while being adaptable to the challenges of tomorrow.

6. Appendix

Helpful resources:

European Commission:

- Broadband: Basic business models
- Broadband in Lithuania
- Broadband Investment Handbook
- Mobile and Fixed Broadband Prices in Europe 2022
- Updated study on National Broadband Plans in the EU27

Benton Institute .3for Broadband & Society:

Own Your Internet: How To Build A Public Broadband Network

Internet Society:

Telecommunications Reclaimed: A Hands-On Guide To Networking Communities

Next Century Cities:

Becoming Broadband Ready Toolkit

World Bank:

Innovative Business Models For Expanding Fiber-Optic Networks And Closing The Access Gaps