INTERNATIONAL TELECOMMUNICATION UNION

ITU POLICY ANALYSIS
Strengthening National Broadband Mapping Systems in Botswana

Africa Broadband Maps

Table of Contents

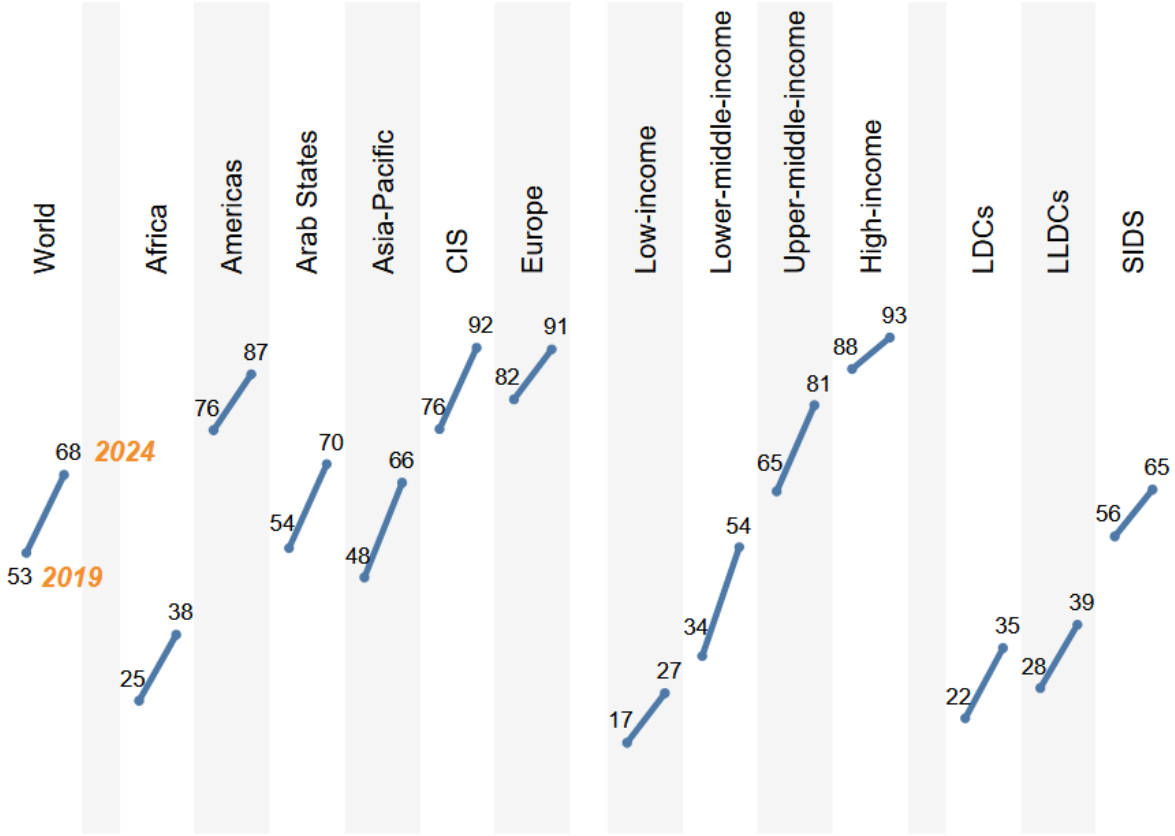
List of Figures and Tables

1. Introduction

1.1 Purpose and objectives of the project

Africa's internet connectivity is significantly lower than the global average, with only 38% of the population online in 2024 compared to a 68% global rate, but the continent is experiencing the fastest internet growth in the world[1].

Figure 1: Percentage of individuals using the Internet by region, 2019 and 2024



ITU, 2024.

The urban-rural gap is as well high in Africa in a comparison with other regions[2]. Africa-BB-Maps is an ITU-led initiative supported by the European Commission (EC), designed to accelerate digital transformation across Africa. The project focuses on establishing national broadband mapping systems that provide data-driven insights, guide investment strategies, and identify connectivity gaps. By integrating broadband mapping into national digital policies, the initiative aims to enhance digital infrastructure, promote equitable access to connectivity, and drive socio-economic development.

The project benefits eleven Sub-Saharan African countries (Benin, Botswana, Burundi, Côte d'Ivoire, Ethiopia, Kenya, Malawi, Nigeria, Uganda, Zambia, and Zimbabwe), which will utilise broadband mapping to address challenges related to internet coverage, quality, and

[1] International Telecommunication Union. Measuring digital development: Facts and Figures 2024, https://www.itu.int/itu-d/reports/statistics/facts-figures-2024/ page. 2
[2] International Telecommunication Union. Measuring digital development: Facts and Figures 2024, https://www.itu.int/itu-d/reports/statistics/facts-figures-2024/, page. 7

affordability. These systems will enable evidence-based policymaking and strategic investment planning, contributing to more inclusive and efficient digital ecosystems.

Africa-BB-Maps also serves as a platform for collaboration between European and African national regulatory authorities (NRAs), promoting knowledge exchange, capacity building, best practices, and policy innovation. It represents a key milestone in leveraging European expertise to support Africa's digital transformation agenda, fostering mutual learning and long-term partnerships across regions.

The following core objectives of the Africa-BB-Maps Project are to:

i. Identify connectivity gaps by mapping broadband infrastructure to pinpoint unserved and underserved areas in terms of broadband coverage, quality, and affordability[3].
ii. Support evidence-based policy by providing reliable data to government policy makers and regulators to design targeted interventions for bridging the digital divide[4].
iii. Facilitate resource allocation by providing evidence-based data to guide more efficient investment decisions by showing where infrastructure is most needed.
iv. Promote harmonization by establishing standardized mapping systems across 11 African countries (Benin, Botswana, Burundi, Côte d'Ivoire, Ethiopia, Kenya, Malawi, Nigeria, Uganda, Zambia, and Zimbabwe).
v. Accelerate digital inclusion by making broadband access more transparent, thus ensuring equitable connectivity for rural and urban populations[5].

A central and initial component this initiative is the policy and regulatory workstream which supports countries in aligning policies and frameworks governing broadband mapping, interoperability, and data governance.

The project is of strategic importance because, funded by the European Union and implemented by ITU's Telecommunication Development Bureau (BDT), it reflects international collaboration for Africa's digital transformation, as it will enable data-driven planning where governments can use the maps to prioritize infrastructure rollouts, especially in rural and low-income areas. Additionally, it supports regional integration since harmonized systems will enable to compare progress across countries and align country-level initiatives with continental strategies such as the African Union's Digital Transformation Strategy.

1.1.1 Problem Statement: The need for broadband mapping

Across Africa, broadband data, where available, remains fragmented, inconsistent, and often unavailable in standardised geospatial formats. Many countries lack clear mechanisms for data collection, validation, and publication, making it difficult to understand the true state of national coverage, infrastructure deployment, and service quality.

In Botswana, these challenges are explicitly reflected in the national questionnaire (Annex A), which confirms that the country:

- does not yet operate a formal broadband infrastructure mapping system;
- does not collect broadband infrastructure data through a structured, standardised method;
- updates coverage information only on an ad hoc basis;
- relies primarily on self-reported data from operators without independent verification; and

[3] Developing Telecoms. ITU launches Africa Broadband Maps to identify connectivity gaps 2024. https://developingtelecoms.com/telecom-business/humanitarian-communications/16966-itu-launches-africa-broadband-maps-to-identify-connectivity-gaps.html
[4] International Telecommunication Union. Implementing national broadband mapping systems in Africa. ITU Digital Impact Unlocked 2025. https://www.itu.int/itu-d/sites/digital-impact-unlocked/implementing-national-broadband-mapping-systems-in-africa/
[5] International Telecommunication Union. Implementing national broadband mapping systems in Africa. ITU Digital Impact Unlocked 2025. https://www.itu.int/itu-d/sites/digital-impact-unlocked/implementing-national-broadband-mapping-systems-in-africa/

- lacks any national cross-sector framework for data sharing or interoperability.

These gaps were reinforced during the Botswana National Africa-BB-Maps Event (12–14 August 2025), where stakeholders emphasised that the absence of a unified national broadband mapping results in limited planning activities and consequently duplication of investments, low visibility of connectivity gaps, limited cross-sector coordination, and difficulties in supporting especially rural broadband expansion[6].

The core problem is therefore structural: Botswana lacks a consolidated and trusted national broadband data baseline, undermining efficient planning, comprehensive oversight, and equal service coverage.

1.1.2 Strategic value for Botswana

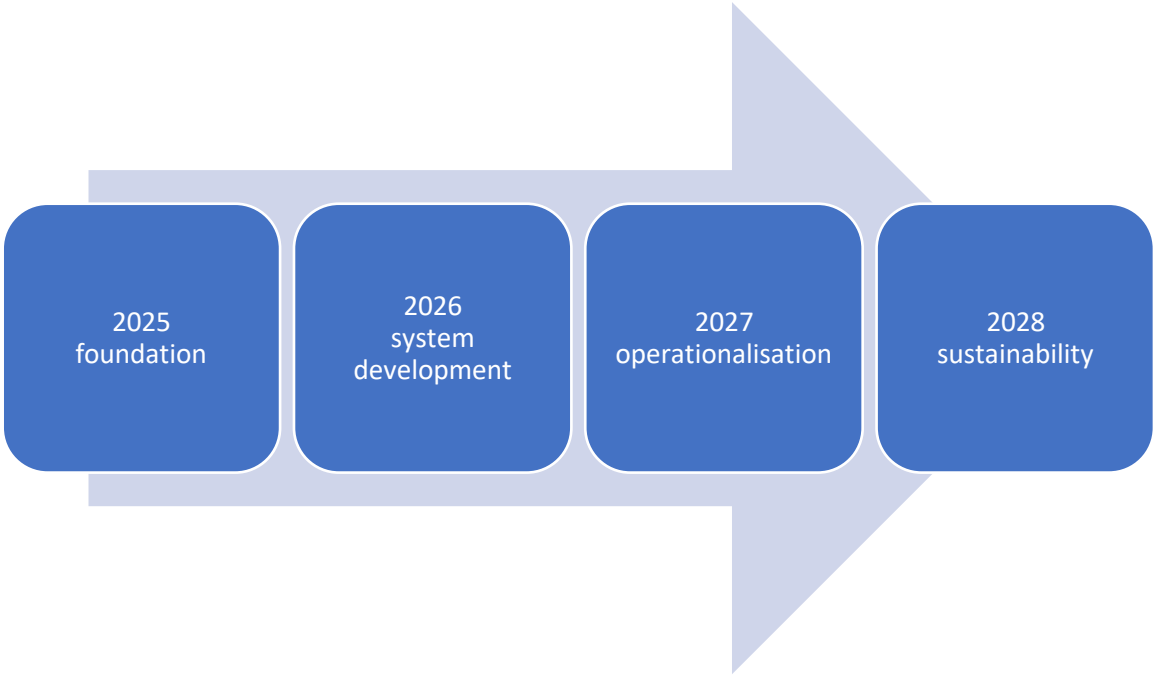
The Africa-BB-Maps initiative aligns directly with Botswana's national digital transformation priorities. As highlighted by government ministries (parastatial institutions), BOCRA, operators, and utilities during the national event, Botswana is expanding 4G/5G networks, extending metropolitan fibre, and pursuing universal access for public facilities such as schools, health clinics, and dikgotla.

However, these efforts require a coordinated, transparent, and data-driven framework. A national broadband mapping system will:

- consolidate currently fragmented datasets from the public and private sectors;
- support evidence-based investment planning, particularly for rural and underserved areas;
- enable BOCRA to enforce data standards, reporting obligations, and validation mechanisms;
- improve transparency and empower users, who will be able to verify actual coverage (or service availability) and quality;
- facilitate cross-sector coordination and planning activities, reducing infrastructure duplication across telecom, energy, transport, and local government authorities;
- support national policy reforms, including the Digital Services Bill and future data governance frameworks;
- position Botswana as a regional leader under SADC and CRASA through harmonised standards and reporting.

The national roadmap endorsed during the event—2025 (foundation), 2026 (system development), 2027 (operationalisation), 2028 (sustainability)—provides a clear, multi-year structured approach informed by international best practice and the Slovenian broadband mapping model.

[6] ITU. Botswana National Africa-BB-Maps Event Outcome Report 2025. https://s47139.pcdn.co/wp-content/uploads/2025/11/ITU-EXECUTIVE-SUMMARY-REPORT-Botswana.pdf



1.1.3 Alignment with EU and ITU policy frameworks

The Africa-BB-Maps project is grounded in global and regional policy instruments that promote interoperability, transparency, quality assurance, and standardisation. These include:

- ITU Guidelines for Establishing National Broadband Mapping Systems (2022)[7], which emphasise data governance, validation, interoperability, and public accessibility.
- ITU case studies from European and EaPeReg regions (2024)[8], including Slovenia's model of mandatory quarterly reporting, strict data validation, and regulator-led geoportal management.
- European Electronic Communications Code (Directive (EU) 2018/1972)[9], promoting harmonised data and coordinated infrastructure deployment.
- Gigabit Infrastructure Act (2024)[10], introducing measures to reduce deployment costs and standardise data formats for high-speed networks.
- EU Connectivity Toolbox (2023)[11], which provides operational best practices for data-driven broadband rollout.

Aligning Botswana's national broadband mapping system with these frameworks ensures:

- compatibility with international standards,
- regulatory maturity and transparency,
- strong data governance structures (including data classification and sharing frameworks),
- the ability to benchmark progress with other African and European countries, and
- enhanced regional harmonisation within CRASA and SADC.

[7] ITU. Establishing or Strengthening National Broadband Mapping Systems 2002. https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Publications/2022/ITU%20Guidelines%20to%20establish%20broadband%20mapping.pdf
[8] ITU. Compendium of Case Studies on Broadband Mapping Systems Across the EMERG and EaPeReg Regions 2024. https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Publications/2024/2024.10.09%20Final_Open%20Document_%20ITU%20Compendium%202024.pdf
[9] Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code 2018. https://eur-lex.europa.eu/eli/dir/2018/1972/oj/eng
[10] Regulation (EU) 2024/1309 of the European Parliament and of the Council of 29 April 2024 on measures to reduce the cost of deploying gigabit electronic communications networks, amending Regulation (EU) 2015/2120 and repealing Directive 2014/61/EU (Gigabit Infrastructure Act) 2024. https://eur-lex.europa.eu/eli/reg/2024/1309/oj/eng
[11] European Commission. Connectivity Toolbox for 5G and fast broadband. https://digital-strategy.ec.europa.eu/en/policies/connectivity-toolbox

1.2 Methodology and approach

The preparation of this policy and regulatory report followed a structured, multi-layered methodology combining international best practice, national inputs, and comparative regulatory analysis. The approach was designed to ensure robustness, accuracy, and contextual relevance, drawing on both qualitative and quantitative evidence. The methodological process consisted of five main components.

1.2.1 Expertise and experience brought by the project team

The ITU/Slovenia expert team applied knowledge and methodologies developed through previous broadband mapping projects, including:

- the design and implementation of the Slovenian national broadband mapping system (AKOS GIS),
- the development of legal frameworks for mandatory data reporting, validation procedures, and interoperability standards,
- advisory work in the EMERG and EaPeReg regions on mapping harmonisation,
- contributions to ITU guidelines, case studies, and regulatory toolkits related to broadband mapping and geospatial data governance,
- contribution to the Study on Broadband and Infrastructure Mapping[12],
- contribution to the mapping and geographical surveys related work in BEREC.

This practical experience directly informed the analytical framework, stakeholder engagement strategy, and the identification of data, regulatory, and institutional requirements relevant for Botswana.

1.2.2 Literature Review

A comprehensive literature review was conducted with a primary focus on:

1. ITU publications and materials including, but not limited to:
- Guidelines to Establish or Strengthen National Broadband Mapping Systems (2022),
- the ITU Compendium of Case Studies on Broadband Mapping Systems (2024),
- ITU Academy technical resources on broadband mapping,
- materials and outputs from the Africa-BB-Maps regional workshop in Abidjan (March 2025)[13].

These publications provided the conceptual and methodological basis for evaluating Botswana's maturity, gaps, and opportunities.

2. European frameworks. The review also incorporated EU/BEREC documentation to enrich the regulatory dimension, particularly in relation to:
- the European Electronic Communications Code (EECC),
- the Gigabit Infrastructure Act (GIA),
- the EU Connectivity Toolbox,
- BEREC guidelines and reports on infrastructure mapping and data transparency.

These materials supported the development of recommendations for data governance, reporting obligations, interoperability, and cross-sector coordination.

[12] European Comission. Study on Broadband and Infrastructure Mapping 2014
[13] ITU. Africa-BB-Maps Regional Event Outcome Report 2025. https://s47139.pcdn.co/wp-content/uploads/2025/07/Regional-Event-Outcome-Report.pdf and related documents

1.2.3 National Inputs and Stakeholder Engagement

Meetings with BOCRA

Multiple meetings were held with BOCRA leadership and technical teams, including:

- project coordination sessions,
- discussions on legal mandates, existing data flows, Infrastructure mapping and access to infrastructure data,
- clarifications on BOCRA's internal capacity, GIS capabilities, and institutional constraints,
- exchanges regarding data collection practices and operator reporting.

Botswana National Africa-BB-Maps Event (August 2025)

The national three-day event served as a major methodological component, providing:

- high-level strategic orientation from ITU,
- detailed technical inputs from operators, utilities, and public agencies,
- insights into existing datasets, systems, bottlenecks, and expectations,
- discussions on governance, data sharing, interoperability, and critical infrastructure,
- co-created sessions aimed at producing stakeholder roles, technical requirements, and roadmap elements.

The perspectives collected during the event constitute a core evidence base for the analysis in this report.

Pre-event National Questionnaire (BOCRA, 2025)

A structured questionnaire—completed by BOCRA prior to the national event—provided foundational information about Botswana's current broadband ecosystem, including:

- legal and regulatory frameworks,
- data collection mechanisms,
- operator compliance with procedures,
- availability of broadband coverage and infrastructure datasets,
- institutional capacity,
- national targets and rural connectivity conditions.

The full questionnaire is included in the Annex A. Its responses were used to determine Botswana's baseline broadband mapping maturity and to shape the analytical structure of this report.

Stakeholder Invitations and Thematic Questionnaires (January 2026)

Ahead of the January 2026 stakeholder coordination meetings, ITU and BOCRA prepared invitation letter (Annex 3) and circulated targeted questionnaires tailored to:

- BOCRA and ICT policy bodies,
- Telecom operators,
- Mapping, land and spatial planning authorities,
- Utilities,
- Transport infrastructure authority.

These instruments aimed to acquire more detailed and group-specific insights into data availability, technical standards, reporting capacity, legal concerns, and interoperability challenges. Received responses will be integrated into later phases of the Africa-BB-Maps

Botswana workstream and referenced in subsequent versions of the policy analysis. In addition, they will serve as a key input for the initial post-report discussions among BOCRA and relevant stakeholders aimed at implementing the recommended actions.

All questionnaires grouped by relevant stakeholders are included in the Annex B.

1.2.4 Desk Research and Comparative Analysis

A targeted desk research exercise was conducted for the selected stakeholders. This included:

- examining public versions of broadband mapping portals,
- reviewing available documentation from regulators (e.g., guidelines, maps, standards),
- analysing technical presentations, webinars, or reports shared.

This comparative dimension provided useful insights into operational models, governance structures, and data validation practices applicable to Botswana.

1.2.5 Integrated Analytical Framework

All inputs described above were synthesised into a unified assessment organised along the three thematic areas of the Africa-BB-Maps initiative:

1. Policy and Regulation of Broadband Mapping
2. Data Governance and Interoperability Frameworks
3. Institutional Capacity and Regional Harmonisation

The methodological approach ensured:

- triangulation of diverse data sources (literature, stakeholder input, questionnaire data, event discussions),
- consistency with ITU guidelines and international best practice,
- contextualisation to Botswana's national policies, infrastructure landscape, and institutional roles,
- alignment with the Africa-BB-Maps roadmap and upcoming technical development activities.

1.3 Structure of the report

The structure of this report follows a logical progression that reflects the analytical process of the Africa-BB-Maps initiative. It begins with an overview of the project's purpose, objectives, and strategic relevance, followed by the methodology and approach used to gather and assess evidence. The core of the report is organised around the three thematic pillars of the ITU framework—policy and regulation, data governance and interoperability, and institutional capacity and regional harmonisation—each presenting the current situation in Botswana, key challenges, and detailed recommendations. The document concludes with proposed policy actions, a roadmap for implementation, and considerations for long-term sustainability. Supporting materials, including the national questionnaire, stakeholder inputs, and reference documents, are provided in the annexes to ensure transparency and traceability of the analysis.

2. Policy and strategic context

2.1 International framework: ITU and EU policy directions

This chapter will present the current strategic and legislative framework, with an emphasis on mapping and its impact on mapping processes within the EU, which is regarded as one of the key global actors in this domain. The chapter will help clarify the original context of the document.

2.1.1 Strategic framework

European Digital Decade

In its communication of 9 March 2021 entitled "2030 Digital Compass: The European way for the Digital Decade"[14] the Commission laid out its vision for 2030 to empower citizens and businesses through digital transformation (the "Digital Decade"). The Union's path to the digital transformation of the economy and society should encompass digital sovereignty in an open manner, respect for fundamental rights, the rule of law and democracy, inclusion, accessibility, equality, sustainability, resilience, security, improving quality of life, the availability of services and respect for citizens' rights and aspirations. It should contribute to a dynamic, resource-efficient, and fair economy and society in the Union. The European Digital Decade is therefore European Union's strategic vision for guiding the digital transformation of the EU between 2020 and 2030.

Digital Decade Policy Programme 2030

Digital Decade Policy Programme 2030[15] is part of the Europe's Digital Decade framework. In fact, the Digital Decade Policy Programme 2030 is the specific policy-programme that operationalises the vision of the European Digital Decade. It was formally established by Decision (EU) 2022/2481 of the European Parliament and of the Council, adopted on 14 December 2022 and published in the Official Journal of the EU on 19 December 2022. The Decision entered into force on 8 January 2023, officially launching the Digital Decade Policy Programme 2030. This programme builds upon earlier digital initiatives and provides the EU with a binding structure for achieving a digitally empowered, competitive, and sovereign Europe.

The purpose of the Digital Decade is to articulate a common vision for Europe's digital future, strengthen the EU's technological capacity, and ensure that digital transformation is human-centred, inclusive, and aligned with European values. It responds to global shifts in technology, competitiveness, and digital sovereignty, positioning the EU as a leading global actor in areas such as secure digital infrastructure, digital skills, and interoperable public services. The programme establishes a coordinated governance mechanism in which the European Commission and Member States work jointly to meet shared objectives through national Digital Decade strategic roadmaps and annual progress monitoring.

The governance framework is built around the "Path to the Digital Decade," which defines cooperation cycles based on annual progress reports, the Digital Economy and Society Index

[14] European Commission. Communication from the Commission to the European parliament, the council, the European economic and social committee and the committee of the regions - 2030 Digital Compass: the European way for the Digital Decade 2021. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0118
[15] Decision (EU) 2022/2481 of the European Parliament and of the Council of 14 December 2022 establishing the Digital Decade Policy Programme 2030. https://eur-lex.europa.eu/eli/dec/2022/2481/oj

(DESI), and periodic assessments of Member State performance. This mechanism ensures transparency, comparability, and accountability. It also enables corrective action where necessary and promotes cross-border collaboration, particularly through multi-country projects. These projects are essential for developing Europe-wide digital infrastructure and capabilities—such as secure data processing, next-generation cloud-edge systems, high-performance computing, advanced semiconductors, cybersecurity capacities, and interoperable public administration platforms.

At its core, the Digital Decade sets four key pillars, each with specific quantitative targets for 2030:

1. Digital Skills:

At least 80% of EU adults should possess basic digital skills, while the Union aims to reach 20 million employed ICT specialists. The goal is to reduce skill gaps and ensure that workers and citizens can participate fully in the digital society.

2. Secure and Sustainable Digital Infrastructure:

Targets include gigabit connectivity for all households, universal 5G coverage for populated areas, doubling Europe's share of global semiconductor production, and deploying 10,000 climate-neutral edge nodes. These targets aim to strengthen Europe's digital sovereignty and resilience.

3. Digital Transformation of Businesses:

By 2030, 75% of European businesses should adopt advanced digital technologies such as artificial intelligence, cloud computing, and big data. Additionally, more than 90% of SMEs should reach at least a basic level of digital intensity to remain competitive in a global market.

4. Digitalisation of Public Services:

All key public services should be fully accessible online, allowing citizens and businesses to interact with public administrations efficiently and securely. A particularly important milestone is enabling all EU citizens to access digital health records across borders, supporting a more integrated and interoperable health ecosystem.

Global Gateway Strategy EU

In 2021, the European Commission and the EU High Representative launched the Global Gateway[16], a new European strategy to boost smart, clean and secure links in digital, energy and transport sectors, while also strengthening health, education and research systems across the world. Since 2021, Team Europe has mobilised over €306 billion of investments that support sustainable and high-quality projects, addressing the needs of partner countries and ensuring lasting benefits for local communities. This has allowed EU's partners to (1) develop their societies and economies and (2) to create opportunities for the private sector in the EU to invest and remain competitive, whilst upholding the highest environmental and labour standards, as well as sound financial management. The Global Gateway is the EU's contribution to narrowing the global investment gap. It reflects the commitment of the G7 leaders in June 2021 to launch a values-driven, high-standard and transparent infrastructure partnership to meet global infrastructure development needs. The Global Gateway is also fully aligned with the UN's Agenda 2030 and its Sustainable Development Goals, as well as the Paris Agreement. A first milestone of the Global Gateway was the Africa-Europe Investment

[16] European Commission, Joint Communication to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank - The Global Gateway 2021. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021JC0030

Package, with approximately €150 billion of investment dedicated to strengthening partnerships with Africa. Europe has also started implementing Global Gateway in Asia and the Pacific and in Latin America and the Caribbean. In 2023, ninety key projects were launched worldwide across the digital, energy and transport sectors, while also advancing health, education, and research systems globally.

Global Gateway partnerships are based on 6 principles: (1) Democratic values and high standards, (2) Good governance and transparency, (3) Equal partnerships, (4) Green and clean, (5) Security focused and (6) Catalysing private sector investment.

The European Green Deal

The European Green Deal[17] is transforming the EU into a modern, resource-efficient and competitive economy. Launched by President von der Leyen in 2019, it responds to citizens' urgent call—especially from young people—for climate action. It sets out a plan to transform Europe's economy, energy, transport, and industries for a more sustainable future. It aims to cut emissions by at least 50% by 2030, rising towards 55%, while legally binding the 2050 neutrality goal through the European Climate Law. It pushes forward a clean transition that protects people and planet, is economically sound and socially fair. The Green Deal invests in innovation, clean technology, and green infrastructure while ensuring a just transition for the communities most affected. Thanks to the European Green Deal, Europeans enjoy cleaner air and more energy efficient products and homes. They are also drawing on more renewable energy sources to power their lives. The following promises kept are published[18]: (1) climate neutrality and emissions reduction; (2) financing through NextGenerationEU and REPowerEU; (3) just and fair transition; (4) carbon pricing and industrial reform; (5) clean and secure energy; (6) green industrial competitiveness; (7) circular economy; and (8) stakeholder engagement.

Competitiveness compass

In January 2025, the Commission presented the competitiveness compass[19], a new roadmap to restore Europe's dynamism and boost its economic growth. The compass builds on the analysis of Mario Draghi's report on the future of European competitiveness[20], which identified three necessities for the EU to boost its competitiveness: (1) Closing the innovation gap, (2) Decarbonising its economy and (3) Reducing dependencies. The compass sets out an approach to translate these necessities into reality.

To close the innovation gap, it focuses on creating a friendly environment for young companies to start and expand, supported by a dedicated EU start-up and scale-up strategy; helping big companies adopt new technologies such as artificial intelligence (AI) and robotics through the Apply AI strategy; making it easier for companies to operate across the EU by simplifying rules and laws, including a proposal for a 28th legal regime that will guarantee one set of rules across the EU; and supporting the development of new technologies with action plans for quantum, advanced materials, biotech, robotics, and space technologies.

To decarbonise the economy, the Compass proposes putting forward the Clean Industrial Deal to help reduce carbon emissions, especially for energy-intensive companies, presenting

[17] Communication from the Commission to the European parliament, the European council, the council, the European economic and social committee and the committee of the regions - The European Green Deal 2019. https://op.europa.eu/en/publication-detail/-/publication/b828d165-1c22-11ea-8c1f-01aa75ed71a1?

[18] The European Green Deal Striving to be the first climate-neutral continent. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

[19] Communication from the Commission to the European parliament, the European council, the council, the European economic and social committee and the committee of the regions - A Competitiveness Compass for the EU 2025. https://european-research-area.ec.europa.eu/sites/default/files/documents/2025-01/COM%202025%2030%20-%20A%20Competitiveness%20Compass%20for%20the%20EU%20_%2029-1-2025.pdf

[20] The Draghi report on EU competitiveness 2024. https://commission.europa.eu/topics/competitiveness/draghi-report_en

tailor-made action plans for vulnerable sectors such as chemicals, steel, and metals, and developing an affordable energy action plan to help bring down energy prices and costs.

To reduce dependencies, it highlights the EU's existing network of trade agreements covering 76 countries and outlines measures to diversify and strengthen supply chains, including developing new clean trade and investment partnerships to secure raw materials, clean energy, sustainable transport fuels, and clean tech, as well as reviewing public procurement rules to introduce a European preference in critical sectors and technologies.

To complement these three pillars, the competitiveness compass introduces five horizontal enablers to increase Europe's competitiveness across all sectors. These are: (1) Cutting red tape, (2) Removing barriers in the single market, (3) Enabling more efficient financing, (4) Promoting skills and quality jobs and (5) Ensuring better coordination.

High-Level Strategic Framework Summary

Table 1: High-Level Strategic Framework Summary

Strategy / Framework	High-Level Purpose	Key Policy Focus Areas
European Digital Decade (2030 Digital Compass)	To provide the EU's long-term vision for Europe's digital transformation by 2030.	Digital skills; secure and sustainable digital infrastructure; digital transformation of businesses; digitalisation of public services.
Digital Decade Policy Programme 2030	To operationalise the Digital Decade vision through binding governance mechanisms and coordinated Member State actions.	Governance cycles ("Path to the Digital Decade"); national digital roadmaps; DESI-based monitoring; multi-country projects.
Global Gateway Strategy (2021)	To shape the EU's global engagement through sustainable, high-standard infrastructure partnerships.	Digital, energy and transport infrastructure; education and research systems; values-based cooperation; private sector mobilisation.
European Green Deal (2019)	To steer the EU towards a climate-neutral, resource-efficient and competitive economy by 2050.	Emissions reduction; clean and secure energy; circular economy; sustainable industry; just transition.
Competitiveness Compass (2025)	To provide a forward-looking blueprint to strengthen Europe's productivity, innovation capacity and economic resilience.	Innovation and technology development; decarbonisation; reducing strategic dependencies; Single Market strengthening; skills and financing enablers.

ITU, 2025.

Strategic mapping relevance

The 2030 Digital Compass (European Digital Decade) identifies mapping as a key tool for monitoring, analysis, and strategic planning of digital projects, infrastructure, skills, and the digital transformation of businesses across the EU. Without precise mapping, it would be difficult to track progress towards the objectives of the Digital Decade. The Decision (EU) 2022/2481 establishes the Digital Decade Policy Programme 2030, providing a governance framework for the EU's digital transformation, which sets clear objectives across four key

areas: digital skills, infrastructure, business digitalisation, and public service digitalisation. Mapping as a central tool within this framework, enabling the Commission and Member States to monitor progress, identify gaps, and strategically plan initiatives. Tools such as national roadmaps and the Digital Economy and Society Index (DESI) allow for precise mapping of digital capabilities and the tracking of progress towards the 2030 targets. The European Green Deal sets out the Commission's vision for transforming the EU into a modern, resource-efficient and competitive economy. Within this framework, mapping functions as a vital tool to identify, monitor and optimise the deployment of sustainable infrastructure, clean energy systems, circular economy practices and digital innovations. By systematically mapping existing capabilities, resource use and transition pathways, the Union can track progress, close gaps and align investments with its sustainability objectives. A Competitiveness Compass for the EU, issued by the European Commission on 29 January 2025, sets out a forward-looking framework to enhance Europe's competitiveness by addressing innovation, decarbonisation and strategic dependencies. Within this framework, mapping plays a vital role in identifying barriers, monitoring structural weaknesses and aligning policies across Member States and sectors. Through precise mapping of digital, industrial and skills-related capabilities, the EU can strategically direct reforms, investments and cross-border collaboration to ensure the conditions for innovation-led productivity and resilience.

Legislative framework, specifically key electronic communications laws and guidelines related and with an emphasis on mapping will be presented in the sub-chapter 2.1.3. Before introducing the legislative framework, subsection 2.1.2 highlights the role of ITU-T Recommendations, which provide the technical standardisation necessary for reliable, comparable, and regulator-ready broadband mapping.

2.1.2 ITU-T Recommendations (technical standardisation underpinning broadband mapping)

In addition to the EU regulatory framework, it is important to briefly highlight ITU-T Recommendations[21], as broadband mapping is not merely a cartographic exercise but relies on globally harmonised technical definitions, quality indicators (QoS/QoE), and network performance parameters. Referencing ITU-T standards helps ensure that data collected from operators, measurement campaigns, and crowdsourcing initiatives is technically consistent, internationally comparable, and regulator-ready. This is particularly relevant for NRAs, as broadband maps are increasingly linked to quality of service monitoring, transparency obligations, and evidence-based regulatory interventions.

From a practical perspective, ITU-T Recommendations provide a common technical language between regulators, operators, vendors, and international organisations, reducing ambiguity in technical aspects of broadband mapping. They also support alignment with ITU statistical frameworks and global initiatives such as Africa Broadband Maps.

Examples of key ITU-T Recommendations relevant to broadband mapping include (non-exhaustive):

QoS and IP network performance

- ITU-T Y.1540 – Defines fundamental IP network performance parameters (e.g. delay, packet loss, availability), which form the basis for measurable broadband KPIs.

[21] ITU-T Recommendations and other publications. https://www.itu.int/en/ITU-T/publications/Pages/default.aspx

- ITU-T Y.1541 – Specifies network performance objectives and QoS classes for IP-based services, useful for setting regulatory benchmarks and targets.
- ITU-T Y.1545 / Y.1545.1 – Provides a framework for end-to-end QoS monitoring and guidance tailored for regulators, including measurement approaches and interpretation of results.

Access and transport technologies

- ITU-T G-series Recommendations (e.g. G.98x, G.65x) – Define technical characteristics of fixed broadband and fibre access networks, relevant for technology classification in broadband maps.
- ITU-T L-series Recommendations – Address infrastructure deployment and sharing, supporting mapping of passive infrastructure where relevant.

User experience and service assessment

- ITU-T E-series and P-series Recommendations – Provide concepts related to Quality of Experience (QoE) and user-perceived performance, increasingly relevant when combining coverage maps with crowdsourced or user-based measurements.

For reference, ITU-T Recommendations are publicly available and continuously updated on the ITU website[22], providing a comprehensive repository of standards applicable to broadband networks and services.

Including a short reference to ITU-T standards alongside EU legislation underlines that the proposed broadband mapping approach is anchored not only in regulatory best practice, but also in internationally recognised technical standards, strengthening its credibility, sustainability, and future interoperability.

2.1.3 Legislative framework

EECC

The European Commission published a draft Directive establishing the European Electronic Communications Code on 14 September 2016[23] as a first review of the EU regulatory framework for electronic communications since 2008. The European Electronic Communications Code was part of the Digital Single Market strategy as the Commission's overarching strategy on digital issues for 2015–2020.

Directive (EU) 2018/1972 establishing the European Electronic Communications Code (EECC)[24] constitutes a comprehensive and modernised regulatory framework governing electronic communications networks, electronic communications services, associated facilities and associated services within the European Union. The Directive was adopted on 11 December 2018, published in the Official Journal on 17 December 2018, and entered into force on 20 December 2018. Member States were required to transpose its provisions into national law by 21 December 2020, with certain end-user protection provisions foreseen to be aligned by the end of 2021. The overarching purpose of the Directive is to ensure a harmonised regulatory approach across the Union, promoting connectivity, access to and take-up of very high-capacity networks (VHCN's), fostering sustainable competition,

[22] ITU-T Recommendations. https://www.itu.int/rec/T-REC
[23] Proposal for a directive of the European parliament and of the Council establishing the European Electronic Communications Code 2016. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2016:0590:FIN
[24] Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code 2018. https://eur-lex.europa.eu/eli/dir/2018/1972/oj/eng

supporting innovation and the internal market, and strengthening the rights of end-users. The Code simultaneously places strong emphasis on the security, resilience and continuity of electronic communications networks and services, and on ensuring accessibility and equitable treatment for all categories of end-users, including vulnerable users and persons with disabilities.

Article 3 of the Directive sets out the general objectives that Member States, national regulatory authorities (NRAs) and other competent authorities must pursue when implementing the EECC. The foremost objective is to promote competition in the provision of electronic communications networks, electronic communications services and associated facilities, including effective and sustainable investment and innovation. This includes promoting the deployment and take-up of VHCN's and ensuring that regulation is proportionate, technology-neutral, predictable and aimed at supporting long-term investment incentives while securing efficient use of radio spectrum, numbering resources and other essential facilities.

A further key objective under Article 3 is to develop the internal market by removing remaining obstacles to the provision of electronic communications networks and services across the Union, encouraging harmonised regulatory approaches, interoperability and cross-border services, and ensuring consistent application of the regulatory framework in cooperation with BEREC. The Directive also emphasises the need to promote the interests of end-users by ensuring widespread availability, affordability, high quality and security of electronic communications services; strengthening end-users' rights; and ensuring equivalent access and choice, including for end-users with disabilities. Moreover, NRAs and other competent authorities must contribute to ensuring a high level of security and resilience of networks and services, and to the efficient management of spectrum and numbering resources. Article 3 therefore establishes a balanced regulatory foundation combining competitive dynamics, investment incentives, end-user protection and strategic development of high-capacity connectivity across the Union.

Several provisions of the EECC directly establish or reinforce the regulatory framework for broadband mapping in the Union. These articles define obligations for information gathering, geographical surveys, the use of mapping results in market regulation and universal service, and cooperation between national authorities. Collectively, they confirm that accurate, consistent and up-to-date geographical information on electronic communications networks constitutes a core regulatory tool for ensuring effective competition, targeted public intervention, and evidence-based policy-making. These are:

- Article 20 – Information requests to undertakings

Article 20 introduces a strengthened and harmonised legal basis enabling Member States to ensure that providers of electronic communications networks and services supply all information necessary for competent authorities and BEREC to verify compliance with the EECC. This includes information on current network coverage, technical characteristics and deployment plans. The provision obliges undertakings to respond to such requests in a timely manner and allows authorities to impose confidentiality requirements where appropriate. The article complements and reinforces the Broadband Cost Reduction Directive by reinforcing and formalising the information-gathering powers of NRAs and other competent authorities.

- Article 22 – Geographical surveys of network deployments

Article 22 establishes a mandatory obligation for national regulatory authorities and/or other competent authorities to conduct a geographical survey of broadband networks capable of delivering electronic communications by 21 December 2023, with updates required at least

every three years thereafter. The provision clearly defines the objective of mapping the reach and performance of electronic communications networks across the Union. It requires BEREC to issue guidelines to ensure consistent application of survey methodologies. Article 22 thus creates an EU-wide legal obligation for broadband mapping, significantly strengthening earlier non-binding requirements such as those in the 2013 State aid guidelines. Member States may impose penalties on undertakings that submit misleading, erroneous or incomplete information , in accordance with Article 29 EECC

- Articles 64–67 – Market analysis and significant market power (SMP)

These articles govern the SMP framework and require NRAs to conduct market analyses based on objective criteria reflecting the state of competition in clearly defined markets. Where relevant, Article 64 explicitly states that geographical surveys must be taken into account when delineating markets and assessing competitive conditions. The results of mapping (geographical market definition) therefore serve as an input to identifying competitive and non-competitive areas, supporting proportionate and geographically targeted SMP obligations.

- Article 73 – Obligations of access to, and use of, specific network elements and associated facilities

Article 73 establishes the framework under which NRAs may impose obligations on undertakings to provide access to specific network elements and associated facilities. NRAs may require operators to meet reasonable access requests where refusal or restrictive terms would hinder sustainable competition at retail level and undermine end-user interests. The provision lists a wide range of possible access obligations, including granting access to physical and virtual network elements, unbundled local loops, wholesale services for resale, co-location, interoperability services, operational support systems, interconnection, and access to associated services such as identity, location, or presence data. When considering whether to impose such obligations, NRAs must assess their proportionality and examine whether other wholesale access inputs—commercial or regulated—would adequately address the identified competition problems. Article 73 therefore provides a structured and balanced mechanism to ensure proportionate, fair and effective wholesale access regulation that supports competitive and sustainable market outcomes across the Union.

- Article 76 – Regulatory treatment of new very high-capacity network elements

Article 76 sets out a specific regulatory framework for co-investment offers proposed by operators with significant market power for the deployment of new very high-capacity network elements. The article requires BEREC to publish guidelines to ensure NRAs apply the assessment criteria consistently. Although not exclusively about mapping, Article 76 directly relies on information on planned and existing network deployments, meaning that accurate geographical survey information supports the evaluation of co-investment commitments, eligibility conditions and the sustainability of competitive outcomes.

- Articles 84–92 – Universal service obligations (USO)

These provisions govern universal service obligations, including the requirement for Member States to ensure the availability at a fixed location of adequate broadband Internet access. Article 85 requires competent authorities to take account of the results of geographical surveys when assessing the availability of adequate broadband at end-user premises. As with SMP regulation, the use of mapping results extends the function of geographical surveys to support evidence-based application of USO rules, funding mechanisms and targeted interventions where market coverage is insufficient.

Under Article 122, the European Commission is required to conduct a review of the functioning of the Code and report to the European Parliament and the Council. This review includes an examination of whether the regulatory framework - such as that governing information gathering, geographical surveys, market regulation and universal service - is adequate to achieve the objectives of the Code.

State aid guidelines

The Guidelines on State Aid for Broadband Networks published by the European Commission on 31 January 2023[25] provide a modernised framework for the assessment and approval of public support measures to deploy and expand fixed and mobile broadband networks in the European Union. They reflect evolving market, policy and technological developments—especially the priorities of the EU Digital Decade and the transition to very high-capacity connectivity—and aim to ensure that Member States' broadband aid interventions are designed in a way that is compatible with the internal market and does not distort competition. The core purpose of the Guidelines is to guide Member States and national authorities in deploying public funds to support broadband infrastructure only where the market fails to deliver adequate connectivity, thereby addressing identified market failures, creating the necessary "step-change" in deployment and take-up of broadband services, and leveraging private investment rather than crowding it out. The Guidelines emphasise technology neutrality, transparency, proportionality and thorough mapping of coverage and performance (including the requirement for detailed mapping annexed to the Guidelines) to underpin public interventions.

Overall, these Guidelines serve to align public aid-based broadband deployment initiatives with the Union's strategic objectives of universal high-capacity connectivity, territorial cohesion, competition, innovation and investment efficiency.

GIA

The Gigabit Infrastructure Act[26] establishes measures to reduce the cost of deploying gigabit electronic communications networks, and in doing so amends Regulation (EU) 2015/2120 and repeals Directive 2014/61/EU. The Regulation was adopted on 29 April 2024 and published in the Official Journal on 8 May 2024. It enters into force immediately, with most of its provisions applicable from 12 November 2025. The regulation applies directly in all Member States, without transposition, and sets minimum requirements that Member States may complement with national measures provided these comply with the Regulation. The overarching objective is to facilitate and accelerate the rollout of very-high-capacity networks (VHCNs) and to ensure the achievement of the Union's digital connectivity targets by reducing deployment costs, removing regulatory and administrative obstacles, promoting the reuse of existing physical infrastructure, and coordinating civil works. Key features of the GIA include: the extension of access obligations to physical infrastructure owned or controlled by utilities, public bodies, land-aggregators and other non-telecom undertakings; the obligation for competent authorities to establish a single-point electronic information system providing geo-referenced data on available infrastructure, permits and rights of way; and the introduction of tacit approval and streamlined permitting procedures to reduce administrative delay. In-building and new-building infrastructure obligations (including fibre-ready requirements) are also introduced to support fibre deployment and the transition to gigabit connectivity. Overall, the GIA creates a harmonised framework across the Union aimed at enabling a faster, more

[25] Communication from The Commission Guidelines on State aid for broadband networks 2023/C 36/01 2023. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52023XC0131%2801%29

[26] Regulation (EU) 2024/1309 of the European Parliament and of the Council of 29 April 2024 on measures to reduce the cost of deploying gigabit electronic communications networks, amending Regulation (EU) 2015/2120 and repealing Directive 2014/61/EU (Gigabit Infrastructure Act) 2024. https://eur-lex.europa.eu/eli/reg/2024/1309/oj/eng

cost-efficient deployment of gigabit networks, while fostering infrastructure sharing, enabling multi-operator access, ensuring transparency of physical infrastructure, and aligning regulatory requirements with the digital and sustainability policy goals of the Union.

BEREC

Under the EECC, BEREC was explicitly tasked with supporting national regulatory authorities in the implementation of certain obligations related to broadband mapping and VHCN. In particular BEREC issued guidelines to assist national authorities in carrying out geographical surveys in a consistent and harmonised manner across the Union (Article 22), BEREC also plays a role in developing guidance related to the deployment of VHCNs, including best practices for access obligations and co-investment frameworks, as reflected in Articles 76 and 78.

Guidelines on conducting geographical surveys of network reach including procedural and verification guidelines

Three sets of BEREC Guidelines are prepared to support National Regulatory Authorities (NRAs) and Other Competent Authorities (OCAs) in fulfilling their obligations under Article 22 of the EECC. These covers: (i) the Core Guidelines on conducting geographical surveys of network reach[27]; (ii) Procedural Guidelines on the designation of areas, invitation of investment intentions and related processes[28]; and (iii) Verification Guidelines on ensuring the accuracy and reliability of submitted data[29]. Set of guidelines emphasises that geographical surveys are a key regulatory instrument to characterise the reach and performance of electronic communications networks capable of delivering broadband. They outline that surveys must collect data on current network capabilities and may include forecasts of network deployments, thereby supporting regulatory and policy decision-making, market definition, universal service obligations and public intervention. Core guidelines provide detailed guidance on: definitions and data sources; spatial resolution of data (granularity); the elements of network connectivity and service performance to be collected for both fixed and mobile broadband; data collection frequency; Geographic Information System (GIS) requirements; forecast methodologies; data publication, confidentiality and aggregation. A significant element of guidelines is its treatment of the designation of “areas” where VHCNs are not planned or are unlikely, and the procedure by which competent authorities may invite undertakings and public bodies to declare their investment intentions in such areas. Procedural Guidelines provides step-by-step flow diagrams and criteria for delimiting areas, publishing notices, collecting responses and disclosing outcomes — all in compliance with Article 22 (2-4) of the EECC. In addition, the Verification Guidelines emphasise a four-step process for data accuracy: internal validation; third-party external checks; verification of declared service and infrastructure data; and decision-making on data correctness with publication of the methodology to enhance transparency and trust.

BEREC uses ITU standards and definitions when mentioning 3G, 4G and 5G[30] and they could be resumed as follow:

- 3G UMTS and HSPA technologies[31]
- 4G LTE or LTE–advanced technologies[32]

[27] BEREC Guidelines on Geographical surveys of network deployments 2020.
https://www.berec.europa.eu/sites/default/files/files/document_register_store/2020/3/BoR_%2820%29_42_Guidelines_BBgeoSurveys.pdf
[28] BEREC Guidelines on Geographical surveys of network deployments Article 22 (2), 22 (3) and 22 2021.
https://www.berec.europa.eu/sites/default/files/files/document_register_store/2021/3/BoR_%2821%29_32_BEREC_GL_Art22%282%2C3%2C4%29_clean.pdf
[29] BEREC Guidelines on Geographical surveys of network deployments. Verification of information 2021.
https://www.berec.europa.eu/sites/default/files/files/document_register_store/2021/6/BoR_%2821%29_82_BEREC_Guidelines_on_Verification_P2_2021_clean.pdf
[30] BEREC Guidelines on Geographical surveys of network deployments 2020. Point 71.
[31] 3G as mentioned in the Recommendation ITU-R M.1457-14 specifying IMT – 2000 standard
[32] 4G as mentioned in the IMT – Advanced documentation

• 5G either the 3GPP release 15 (New Radio (NR) non -standalone- the core network is 4G) and NR standalone (the core network is 5G) and further developments - 3GPP release 16 under development and will include new specifications for 5G[33].

Overall, the set of guidelines promotes harmonisation across Member States in how geographical surveys are carried out, while recognising the need for proportionality and cost-effectiveness. By providing authoritative guidance on data specification, collection, verification and publication processes, it enables regulators to build robust broadband maps capable of supporting investment, regulatory intervention, market analyses and the achievement of the EU's connectivity and infrastructure policy objectives.

BEREC published an implementation report on the BEREC Guidelines on geographical surveys of network deployments[34], where concluded to update the Core Guidelines to consider the implementation report findings and developments since 2020. The update is to be published in 2026.

The Core Guidelines have contributed to a substantial increase in the number of geographical surveys across the EU, as well as to improvements in their granularity, the quantity and breadth of information collected, and their comparability.

VHCN

BEREC defines Very High Capacity Networks (VHCNs) in accordance with Article 82 of the European Electronic Communications Code (EECC) and issues guidelines to assist national regulatory authorities in determining when a network qualifies as a VHCN. A network is considered a VHCN if it meets at least one of several criteria, including: a fixed-line connection with fibre deployed to the building or premises (FTTB/FTTH), a wireless connection with fibre backhaul to the base station, or a network—fixed or wireless—that can deliver a defined level of quality of service under normal peak-time conditions. BEREC specifies performance thresholds for downlink and uplink speeds, latency, packet loss, and availability to ensure that VHCNs provide reliable, high-performance connectivity. The concept of VHCNs is central to the EECC regulatory framework, supporting long-term policy objectives by enabling resilient, high-capacity connectivity essential for innovation, economic development, and social cohesion across the Union. BEREC is mandated to update its VHCN Guidelines periodically to reflect technological developments and evolving network deployments. The BEREC Guidelines on Very High Capacity Networks[35] were updated at the end of 2025[36].

GIA guidelines

BEREC has published guidelines under the Gigabit Infrastructure Act to support national regulatory authorities in implementing key provisions of the regulation. The Guidelines on the Coordination of Civil Works (Article 5(6) GIA)[37] provide guidance to ensure efficient planning and execution of civil works, minimise duplication of works, and reduce deployment costs for VHCNs. The Guidelines on Access to In-Building Infrastructure (Article 11(6) GIA)[38] set out practical principles for facilitating access to physical infrastructure within buildings, including

[33] 5G as the IMT – 2020 specifications will state
[34] Implementation report on the BEREC Guidelines on Geographical surveys of network deployments 2024. https://www.berec.europa.eu/system/files/2024-10/BoR%20%2824%29%20146_Implementation%20report%20on%20the%20BEREC%20Guidelines%20on%20Geographical%20surveys%20of%20network%20deployments.pdf
[35] BEREC Guidelines on Very High Capacity Networks 2023. https://www.berec.europa.eu/en/all-documents/berec/regulatory-best-practices/guidelines/berec-guidelines-on-very-high-capacity-networks
[36] BEREC Guidelines on Very High Capacity Networks 2025. https://www.berec.europa.eu/system/files/2025-12/BoR%20%2825%29%20182_BEREC%20Guidelines%20on%20Very%20High%20Capacity%20Networks.pdf
[37] BEREC Guidelines on the coordination of civil works according to Article 5(6) of the Gigabit Infrastructure Act 2025. https://www.berec.europa.eu/system/files/2025-10/BoR%20%2825%29%20140_BEREC%20Guidelines%20on%20the%20coordination%20of%20civil%20works%20according%20to%20Article%205%286%29%20of%20the%20Gigabit%20Infrastructure%20Act.pdf
[38] BEREC Guidelines on the access to in-building infrastructure according to Article 11(6) of the Gigabit Infrastructure Act 2025. https://www.berec.europa.eu/system/files/2025-10/BoR%20%2825%29%20142_BEREC%20Guidelines%20on%20the%20access%20to%20in-building%20infrastructure%20according%20to%20Article%2011%286%29%20of%20the%20Gigabit%20Infrastructure%20Act.pdf

technical, administrative, and procedural aspects, to enable faster and more cost-efficient VHCN deployment.

In addition Article 3 (13) stipulates that the European Commission, in close cooperation with BEREC, may provide guidance on the application of Article 3 GIA. Article 3 governs access to existing physical infrastructure owned or controlled by network operators or public sector bodies.

Expected developments

DNA and the review of the EECC and BEREC's evaluation

The European Commission plans to adopt the Digital Networks Act (DNA) on 20 January 2026, alongside the outcome of the review of the EECC and BEREC's evaluation. The DNA aims to simplify and further harmonise the legal framework for electronic communications across the EU, with the objective of reinforcing competitiveness and promoting a more integrated single market. The Commission's proposal will be accompanied by an impact assessment, informed by the EECC evaluation, evidence collection, and stakeholder input, in line with Better Regulation guidelines. This assessment will also draw on the results of three dedicated studies commissioned by the Commission, covering access provisions and relevant markets, financing and regulatory implications, and regulatory enablers for cross-border networks.

Methodology on 5G Mobile and Fixed QoS Coverage Mapping

To support monitoring of the Digital Decade connectivity targets The European Commission plans to publish methodology for mapping the quality of service (QoS) of 5G networks across Europe, which holds high relevance for future connectivity mapping. The proposed methodology estimates theoretical QoS using a harmonised model applicable across all Member States and mobile operators, regardless of the 5G frequency band. It is designed to provide a more accurate representation of real network performance, particularly during peak-time usage, complementing existing indicators that currently do not capture such variations. The Commission is considering using this approach as the basis for a new KPI to support monitoring of the Digital Decade connectivity targets and to improve the targeting of EU funding instruments and future State Aid assessments. The draft was developed with input from academic experts, national regulators, BEREC, GSMA, and industry stakeholders, supported by pilot testing in several Member States.

The Omnibus package

On 19 November, the European Commission published a proposal for the Digital Omnibus Regulation[39], a legislative package aimed at simplifying and harmonising various existing EU digital laws. Although this proposal does not change the existing definition of High-Value Datasets, it builds on the framework already established under the Open Data Directive and its Implementing Regulation.

Geospatial data continue to be identified as one of the six thematic categories of High-Value Datasets listed in Annex I of Implementing Regulation (EU) 2023/138. Public sector bodies are therefore required to make these datasets available in open, machine-readable, standardised and reusable formats, via APIs or bulk download, due to their significant societal and economic importance.

[39] European Commission. Digital Omnibus Regulation Proposal 2025. https://digital-strategy.ec.europa.eu/en/library/digital-omnibus-regulation-proposal

As a result, geospatial data remain recognised as a key category enabling a wide range of digital services, innovation, and analytical or mapping applications. The Digital Omnibus proposal does not alter this classification but supports the overall objective of reducing administrative burdens and ensuring more coherent digital data governance within the EU.

Digital fitness check – testing the cumulative impact of the EU's digital rules

The European Commission plans to finalise the digital fitness check in the first quarter of 2027 and has recently opened a public consultation[40] on the digital fitness check, with a view of exploring further simplification of the EU digital framework. The main purpose of the fitness check is to analyse the interplay between digital rules and their cumulative impact on businesses.

Connectivity Coverage in Europe

The renewed exercise "Connectivity Coverage in Europe", aiming to update the status of fixed and wireless connectivity in Europe for 2025, is an annual reporting activity that continues the work of the Broadband Coverage in Europe 2024 study[41] and earlier rounds. The purpose of these studies is to assess how far Europe has progressed in terms of the availability of different broadband technologies and speeds. The results are crucial for preparing the annual Digital Decade country reports, the Digital Economy and Society Index (DESI), as well as for assessing the investment gaps needed to reach the connectivity targets set in the Digital Decade Policy Programme. The Digital Decade reports and the underlying data also feed into the European Semester analysis, the implementation of the Recovery and Resilience Facility, and the related National Recovery Plans.

Legislative Framework – High-Level Summary Table

Table 2: Legislative Framework – High-Level Summary Table

Instrument / Framework	High-Level Purpose	Status	Mapping-Relevant Articles / Provisions
European Electronic Communications Code (EECC)	Modernised, harmonised regulatory framework for electronic communications; promotes VHCN deployment, competition, end-user protection, security and internal market integration.	In force	Articles: 20, 22, 64–67, 73, 76, 84–92
State Aid Guidelines for Broadband Networks (2023)	Framework for approving State Aid for broadband deployment while avoiding market distortion.	In force	Detailed annex related to mapping
Gigabit Infrastructure Act (GIA)	Reduces cost of gigabit deployment; streamlines permits; imposes infrastructure sharing.	Applicable mainly from Nov 2025	Requires geo-referenced information system for permits, rights of way and infrastructure availability.

[40] European Commission. Digital fitness check – testing the cumulative impact of the EU's digital rules 2025. https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/15554-Digital-fitness-check-testing-the-cumulative-impact-of-the-EUs-digital-rules_en

[41] European Commission. Digital Decade 2025: Broadband Coverage in Europe 2024. https://digital-strategy.ec.europa.eu/en/library/digital-decade-2025-broadband-coverage-europe-2024

Instrument / Framework	High-Level Purpose	Status	Mapping-Relevant Articles / Provisions
BEREC Guidelines: Geographical Surveys (Core, Procedural, Verification)	Harmonised technical and procedural rules for conducting broadband mapping across the EU.	In force; core guidelines to be updated in 2026	Definitions, granularity, validation processes; designation of areas; data publication and confidentiality.
BEREC Guidelines on Very High Capacity Networks (VHCN)	Defines performance and technological criteria for VHCN qualification; supports consistent regulatory treatment.	In force	Mapping indirectly required to assess VHCN footprint and verify thresholds.
BEREC GIA Guidelines (Civil Works; In-Building Access)	Supports NRAs in implementing GIA obligations on infrastructure access and coordination of civil works.	In force; further guidance pending (Art. 3 GIA)	Geo-referencing of civil works; mapping of in-building infrastructure availability.
Digital Networks Act (DNA)	To simplify and harmonise electronic communications regulation; strengthen EU competitiveness and Single Market.	Draft Expected Jan 2026	n/a
EECC Review & BEREC Evaluation	Comprehensive assessment of whether EECC remains effective and aligned with policy objectives.	Expected 2026	n/a
EU Methodology for 5G Mobile & Fixed QoS Mapping	Harmonised method for estimating theoretical 5G QoS across Member States.	Expected 2026	Basis for potential new Digital Decade KPIs; enhanced mapping of QoS, especially peak-time performance.
Digital Omnibus Regulation Proposal	Simplifies and harmonises EU digital legislation; improves data governance and administrative coherence.	Proposed Nov 2025	Confirms continued High-Value Dataset obligations.
Digital Fitness Check	Evaluates cumulative impacts of EU digital rules; explores potential simplification.	Expected Q1 2027	n/a
Connectivity Coverage in Europe (Annual Exercise)	Annual assessment of fixed and mobile broadband availability; supports DESI, Digital Decade reporting and investment gap analysis.	Ongoing, to be updated	Produces harmonised EU datasets for broadband coverage, technology availability and speeds.

ITU, 2025.

2.2 National context: Slovenian experience and best practices

This chapter presents the Slovenian case as a consolidated reference model, summarizing the institutional framework, legal basis, technical solutions, and best practices that have enabled a consistent and high-quality broadband mapping system.

Slovenia has developed one of the most advanced, coherent, and institutionally well-coordinated broadband mapping ecosystems in Europe. Over nearly two decades, the country has progressively aligned its spatial planning, electronic communications regulation, and geospatial data infrastructure, resulting in an integrated environment that supports broadband development, investment planning and regulatory decision-making.

2.2.1 Slovenian Policy and Regulatory Framework

Historical Development of Broadband Mapping in Slovenia

Slovenia's broadband mapping system has been shaped through a series of legislative, institutional, and technical milestones that span more than five decades. The evolution reflects the country's gradual transition from fragmented local records toward a unified, nationally coordinated geospatial and regulatory framework that supports modern broadband deployment. The key phases of this development include:

The early development of geospatial activities in Slovenia dates back to the Land Cadastre Act of 1974[42], which introduced the first systematic collection of public infrastructure data, albeit at the municipal level and with incomplete or inconsistently maintained records. Following Slovenia's independence in 1991, the country began redesigning its legal and administrative structures, creating the foundations for a modern spatial data environment. A more coherent national approach emerged following the adoption of the Law on the Regulation of Space[43] in 2002, which established a unified legislative foundation for spatial planning, spatial information systems and the standardisation of planning processes. Building on this, the Surveying and Mapping Authority of the Republic of Slovenia (GURS) initiated the development of the Consolidated Cadastre of Public Infrastructure[44] in 2004, creating the first unified national repository of public utility networks. The subsequent Real Estate Records Act[45] of 2006 further improved the legal basis for accurate, standardised, and interoperable geospatial datasets. Together, these reforms laid the groundwork for Slovenia's future broadband mapping system.

In 2012, the launch of Network Termination Point (NTP) mapping as a service-mapping exercise was introduced by the former Ministry of Education, Science and Sport, Information Society Directorate, together with AKOS and GURS. These institutions began the systematic collection of NTPs data from operators of electronic communication infrastructure, establishing the first telecom-specific geospatial dataset at the national level. In December 2013, based on the Electronic Communications Act, AKOS formalised the rules for the collection, submission and access to NTP data through the General Act on NTP Data Collection[46]. In 2015, AKOS established the Broadband Mapping Database. In 2016, the Decree on the Provision and Re-use of Public Information[47] enabled the disclosure of consolidated public infrastructure data, improving transparency and public access. In 2017, the Electronic Communications Act was

[42] Zakon o zemljiškem katastru (ZZKat) 1974. https://pisrs.si/pregledPredpisa?id=ZAKO116
[43] Zakon o urejanju prostora (ZUreP-1) 2002. https://pisrs.si/pregledPredpisa?id=ZAKO1581
[44] Zakon o urejanju prostora (ZUreP-1). https://www.e-prostor.gov.si/podrocja/gospodarska-javna-infrastruktura/zbirni-kataster-gji/
[45] Zakon o evidentiranju nepremičnin (ZEN) 2006. https://pisrs.si/pregledPredpisa?id=ZAKO4544
[46] Splošni akt o vpisovanju, zbiranju in dostopu do podatkov o omrežnih priključnih točkah iz evidence infrastrukturnih omrežij in objektov 2013. https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina?urlurid=20133890
[47] Uredba o posredovanju in ponovni uporabi informacij javnega značaja 2016. https://pisrs.si/pregledPredpisa?id=URED6941

amended[48], introducing legal grounds for the public disclosure of NTP data and creating the basis for multi-layer reporting of passive infrastructure (ducts, cables, lines). Public access to NTP data was implemented in December 2017[49], and multi-layer passive infrastructure reporting became operational in 2018. In 2019, AKOS launched the Geoportal[50] with the main purpose of lowering the costs of building very high-capacity networks (VHCN) and encouraging shared use and joint construction. Since then, the Geoportal has provided visualisation of telecommunications and utility infrastructure, broadband coverage and analytical layers. In December 2019, a new exchange format for NTP[51] data was published, containing clearer technical requirements to ensure consistent operator reporting. In 2022, a new Electronic Communications Act (ZEKom-2[52]) was adopted, fully transposing the provisions of the European Electronic Communications Code (EECC) into Slovenian legislation, including those related to geographical surveys and the use of state aid.

Mapping related national legislative framework

The Gigabit Infrastructure Development Plan 2030

The Gigabit Infrastructure Development Plan 2030[53] serves as Slovenia's strategic framework for establishing—and partly also promoting the use of— infrastructure that will enable gigabit connectivity for all Slovenian households, homes and apartments, businesses, and key socio-economic drivers. It also aims to ensure uninterrupted 5G coverage across all urban and other populated areas, as well as along major terrestrial transport routes. The plan is fully aligned with the European Union's core digital connectivity objectives, while excluding those digital infrastructure goals that will be addressed through other strategic documents and public policies.

The plan sets out the targets and necessary measures in the field of gigabit infrastructure development to ensure that Slovenia becomes one of the most digitally advanced countries by 2030, achieving gigabit connectivity for all households in both rural and urban areas and ensuring 5G coverage for all populated areas. Among the key interim targets to be achieved by 2025 is the provision of internet access with speeds of at least 100 Mb/s for all Slovenian households, with the possibility of upgrading this to gigabit speeds.

The plan provides the basis for directing financial resources from the Recovery and Resilience Facility, cohesion policy funds for the 2021–2027 period, and other public funding instruments in this field. In this regard, it fulfils the necessary enabling conditions for the implementation of broadband infrastructure deployment in white (underserved) areas and for promoting connectivity using the most appropriate technologies.

The Addendum to the Gigabit Infrastructure Development Plan 2030

The Addendum to the Gigabit Infrastructure Development Plan 2030[54] defines the key performance indicators for achieving Slovenia's goals in the development of gigabit infrastructure. The Ministry for Digital Transformation will be responsible for measuring and monitoring these indicators, based on data provided by relevant ministries, the Statistical

[48] Zakon o spremembah in dopolnitvah Zakona o elektronskih komunikacijah (ZEKom-1C) 2017. https://pisrs.si/pregledPredpisa?id=ZAKO7549
[49] Public Geodetic Data. https://ipi.eprostor.gov.si/jgp/data
[50] AKOS Geoportal. https://gis.akos-rs.si/
[51] Izmenjevalni format zbirnega katastra gospodarske javne infrastrukture za vpis omrežnih priključnih točk 2023 version. https://www.e-prostor.gov.si/fileadmin/Podrocja/GJI/Postopki/Elaborati_OPT/Izmenjevalni_format_ZKGJI__OPT_v1.2.pdf
[52] Zakon o elektronskih komunikacijah (ZEKom-2) 2022. https://pisrs.si/pregledPredpisa?id=ZAKO8611
[53] Načrt razvoja širokopasovnih omrežij naslednje generacije do Leta 2030. https://www.gov.si/assets/ministrstva/MDP/javne-objave/Nacrt-razvoja-gigabitne-infrastrukture-do-leta-2030.pdf
[54] Dodatek k načrtu razvoja gigabitne infrastrukture do leta 2030. https://www.gov.si/assets/ministrstva/MDP/Dokumenti/DodatekNRGI2030.docx

Office of the Republic of Slovenia, AKOS, as well as data from the Central Population Register and the Consolidated Cadastre of Public Infrastructure.

The indicators will be measured annually, and the results will be published on the Ministry's website. The specific connectivity targets have already been set out in the Gigabit Infrastructure Development Plan 2030.

Electronic Communication Act 2

The Electronic Communications Act (ZEKom-2)[55] represents a comprehensive modernisation of the legal framework for electronic communications in the Republic of Slovenia. It aligns national legislation with the European Electronic Communications Code and establishes a robust regulatory environment intended to support high-capacity networks, competitive markets, effective spectrum and numbering management, user protection, and secure and sustainable infrastructure development. The Act was adopted by the National Assembly on 28 September 2022, published in the Official Gazette of the Republic of Slovenia on 11 October 2022, and entered into force on 10 November 2022. From this date onward, entities operating in the electronic communications sector must comply with the new regulatory obligations. A key strategic objective of ZEKom-2 is to promote the deployment of very high-capacity networks and ensure efficient investment through access obligations, infrastructure sharing, and transparent reporting of physical infrastructure data. The Act also sets high standards for cybersecurity, protection of personal and location data, and the rights of consumers and end-users. ZEKom-2 strengthens the role of the Agency for Communication Networks and Services (AKOS), enhances interoperability and cross-border cooperation with EU regulators, and introduces streamlined administrative procedures to accelerate network rollout and reduce unnecessary duplication of infrastructure in physical space. Provisions related to spatial planning, mapping, and infrastructure registers are particularly important for coordinated development, the most important are:

- Article 12 – Joint construction

Local communities shall, within the scope of their powers, promote the construction of electronic communications networks and associated infrastructure and, where appropriate, cooperate with the AKOS and the Ministry; they shall lay down, in particular, conditions for the construction of electronic communications networks and associated infrastructure in their spatial planning documents, shall conclude right of use and other contracts with operators on their infrastructure, shall notify operators and AKOS of intended future interventions in their existing infrastructure, and may plan the construction of open public communications networks.

- Article 15 – Entry in records

The infrastructure operator shall be obliged to report the information about their communication networks directly to the authority responsible for mapping and surveying for entry in the register of infrastructure networks and facilities in accordance with the regulation governing entry in this register, and any change to such information shall be communicated to the competent authority within three months of the onset thereof.

- Article 16 – Network operator access to information on existing physical infrastructure

[55] Zakon o elektronskih komunikacijah (ZEKom-2) 2022. https://pisrs.si/pregledPredpisa?id=ZAKO8611

If the information are not available in the case of electronic communications networks, or the information on the location and route, type and current use of physical infrastructure and the point of contact in the case of other infrastructure operators which are entered in the records of infrastructure networks and facilities, the network operator may request the infrastructure operator to provide access to this information, and the infrastructure operator must grant access on proportionate, non-discriminatory and transparent terms within two months and provide the information in the form required for entry in those records; access may be refused only where necessary for reasons of network security, national security, public health or safety.

- Article 18 – Survey and announcement of network deployment

AKOS shall conduct and update the geographic survey of the reach of broadband networks in three-year intervals, taking into account the information referred to in paragraphs one and four of Article 15; at least every three years, AKOS shall publish a public call for enquiries into investors' intentions to build very high-capacity networks or to upgrade or extend existing networks to provide speeds of at least 100 Mbps, and shall determine the extent to which it will take into account the information collected. This article transposes Article 22 EECC into Slovenian law.

- Articles 19–21 (state aid context)

In the context of implementing state aid for the construction of high-capacity networks, investors must notify AKOS of their intention to deploy commercial networks in accordance with Article 19, whereby AKOS collects and verifies information on the announced deployment of networks and shares this information with the competent state authority or self-governing local authority; these authorities, when allocating public funds under Article 20, shall take into account the information collected pursuant to paragraph one of Article 18 of Electronic communication Act and the information on the announced network deployment collected pursuant to Articles 18 and 19, while public funds may be provided for the construction, upgrading or extension of networks meeting the prescribed performance thresholds, in accordance with EU regulations on compatibility of aid with the internal market, and may offer the investor a contract under Article 21 whereby the investor undertakes to build a broadband network within three years in the areas and to the extent demonstrated in the notification, with the signed contract and any related agreement forwarded to AKOS.

The provisions that transpose the BCRD Directive into the Slovenian legal order, and the provisions related to the regulation of an operator with significant market power, of which the geographic market survey forms a part, are contained in Chapter IX – ensuring competition. Chapter X universal service and additional mandatory services is dedicated to provisions related to the universal service. Also, provisions related to cooperation of AKOS with other bodies in the area of electronic communications are part of this legislation.

The General Act on survey and announcement of network deployment and market interest enquires for the construction of high capacity networks

The General Act[56] was adopted on 22 March 2023, published in the Official Gazette of the Republic of Slovenia No. 34/23 on 24 March 2023 and in force since 8 April 2023. It was issued by AKOS with the purpose of defining a detailed procedure for carrying out the geographical survey of broadband coverage, conducting the forecast of network deployment (Article 18), and implementing the market-interest inquiry required for awarding state aid under Article 19 of the Electronic Communications Act; its aim is to ensure transparent, data-driven

[56] Splošni akt za pregled in napoved postavitve omrežij ter izvedbo poizvedovanja po tržnem interesu za gradnjo visokozmogljivih omrežij 2023. https://pisrs.si/pregledPredpisa?id=AKT_1327

identification of areas eligible for public funding, avoid investment overlap, support efficient allocation of public resources, and provide a structured mechanism through which public and private investors report planned deployment of very high-capacity networks.

Decree on the Provision and Re-use of Public Information

This regulation[57], issued on the basis of the Access to Public Information Act (ZDIJZ)[58], sets out the manner of providing information of public character to applicants and for publication on the web, the charging of costs for such provision, the price and other conditions, and from its provisions organisations providing public-information have to make published information and charging rules available, thereby increasing transparency and enabling reuse of public-interest data.

Rules on the management and content of data on electronic communications networks and associated infrastructure, network termination points and other electronic communication networks

This rule[59] establishes the rules for maintaining and defining the content of data regarding electronic communications networks, their associated infrastructure, network termination points (NTPs) at fixed locations, and other electronic communications networks for which infrastructure operators are legally obliged to report data for entry into the register of infrastructure networks and facilities according to article 15 ZEKom-2. The data to be recorded include all network elements such as routes, cables, ducts, poles, base-station buildings, antenna masts or antennas, street cabinets and others, as well as other necessary network objects and their technical characteristics. The rules also define that the technical data set, forms, and layout (exchange formats) required for registry entry shall be published by the competent geodetic authority on its website.

Exchange formats

The exchange formats[60] defines the official exchange format for submitting data for the consolidated cadastre of public infrastructure in the Republic of Slovenia, which is the central national registry of public infrastructure assets in Slovenia. The Mapping and Surveying Authority of the Republic of Slovenia (GURS) maintains the system, and all infrastructure operators must submit newly built objects or updates to existing objects in this format. The purpose of the specification is to ensure complete, interoperable, consistent and machine-readable spatial datasets for all types of public infrastructure across Slovenia, enabling reliable national infrastructure mapping, maintenance, planning and integration with the spatial information system.

[57] Uredba o posredovanju in ponovni uporabi informacij javnega značaja 2016. https://pisrs.si/pregledPredpisa?id=URED6941
[58] Zakon o dostopu do informacij javnega značaja (ZDIJZ) 2003. https://pisrs.si/pregledPredpisa?id=ZAKO3336
[59] Pravilnik o vodenju in vsebini podatkov o elektronskih komunikacijskih omrežjih in pripadajoči infrastrukturi, omrežnih priključnih točkah in drugih elektronskih komunikacijskih omrežjih 2023. https://pisrs.si/pregledPredpisa?id=PRAV14961
[60] Exchange formats OPT and GJI. https://www.e-prostor.gov.si/podrocja/gospodarska-javna-infrastruktura/postopki-vpisa-sprememb-gji-in-opt/?acitem=2204-2201

Slovenia – Legislative & Strategic Framework

Table 3: Slovenia – Legislative & Strategic Framework

Instrument / Framework	High-Level Purpose	Status	Mapping-Relevant Articles / Provisions
Gigabit Infrastructure Development Plan 2030	National strategic framework for gigabit connectivity and uninterrupted 5G coverage.	Strategic framework in force	n/a
Addendum to the Gigabit Infrastructure Development Plan 2030	Defines KPIs for gigabit infrastructure development; assigns monitoring roles.	In force	n/a
Electronic Communications Act – ZEKom-2	Implements EECC in Slovenia; modern regulatory framework supporting VHCN rollout, infrastructure sharing, user protection, cybersecurity and coordinated infrastructure development.	In force	Articles: 12, 15, 16, 18, 19–21.
The General Act on survey and announcement of network deployment and market interest enquires for the construction of high capacity networks	Secondary legislation or operational act defining procedures for geographic surveys, deployment forecasts and market-interest inquiries for state aid allocation.	In force	Implements ZEKom-2 Art. 18 & 19 and provides additional guidance
Decree on the Provision and Re-use of Public Information	Regulates provision, publication and reuse of public-sector information; increases transparency and enables access to machine-readable datasets.	In force	Facilitates reuse of public-interest data related to mapping, especially for infrastructure and spatial datasets.
Rules on the management and content of data on electronic communications networks and associated infrastructure, network termination points and other electronic communication networks	Establishes rules for maintaining and defining the content of data on electronic communications networks, associated infrastructure, and network termination points to be recorded in the national infrastructure register.	In force	Defines mandatory dataset content (routes, cables, ducts, poles, masts, cabinets, antennas, etc.); requires publication of technical data sets and exchange formats by GURS
Exchange Formats for the Consolidated	Defines mandatory national exchange format for submitting infrastructure data to the Consolidated Cadastre of Public	In force	Core requirement for national infrastructure mapping; mandatory spatial data submission by

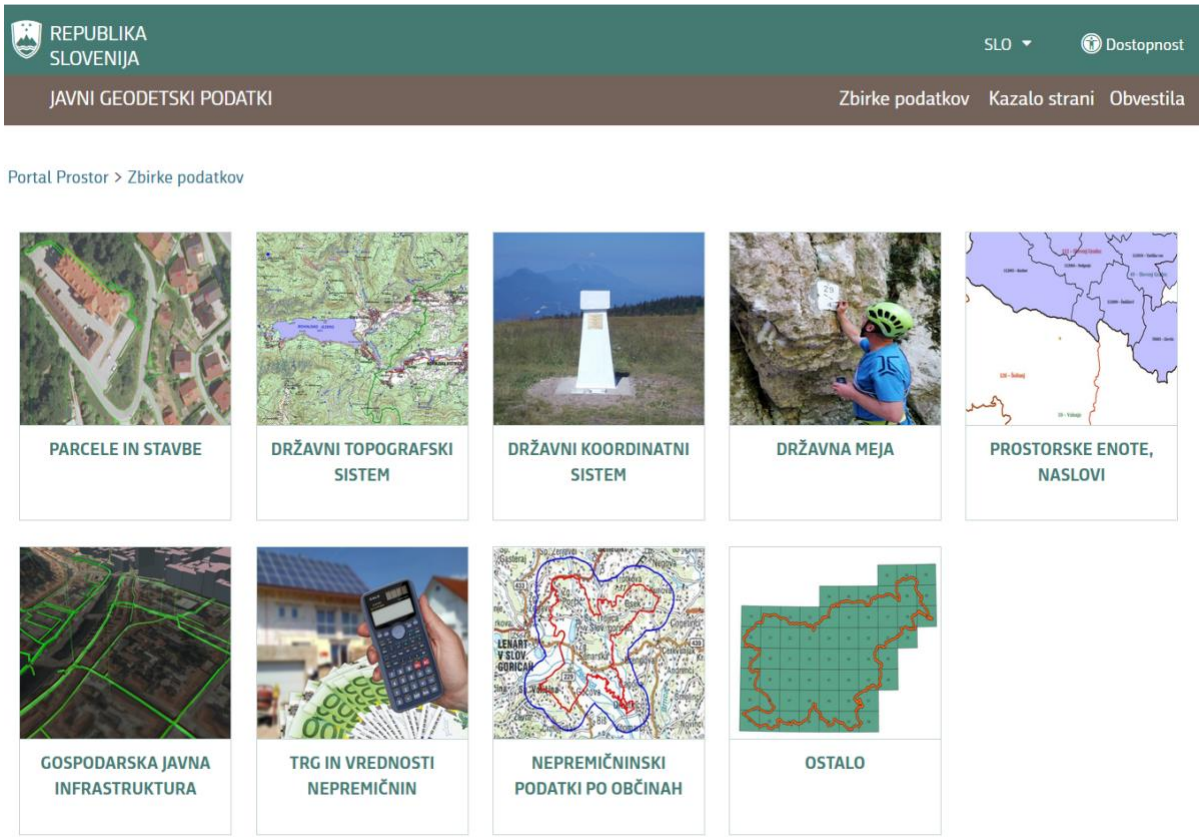
Instrument / Framework	High-Level Purpose	Status	Mapping-Relevant Articles / Provisions
Cadastre of Public Infrastructure	Infrastructure; ensures interoperable, complete, machine-readable spatial datasets.		all operators/ infrastructure owners.

ITU, 2025.

2.2.2 Transparent access to data in Slovenia

The mission of the Surveying and Mapping Authority of the Republic of Slovenia (GURS) is to provide a high-quality official spatial data infrastructure and land administration system, and to offer users efficient services and high-quality official spatial data in ways that meet the high standards of a geoinformation-literate modern society. In recent years, the demand for GURS digital data has been growing exponentially with the introduction of efficient tools for online access to digital datasets. GURS ensures uninterrupted access to geodetic data for public and professional users, businesses, state administration and the wider public, either electronically through the services of its data distribution system or traditionally at service counters at all GURS locations. Links to all applications for viewing geodetic data managed by GURS, as well as certain datasets of other data administrators, are available on the Prostor web portal[61]. The portal enables access to data from the real estate cadastre, the state border registry, the consolidated cadastre of public infrastructure, the register of spatial units, the real estate market register, the register of geographical names, and topographic–cartographic datasets.

Figure 2: Prostor web portal



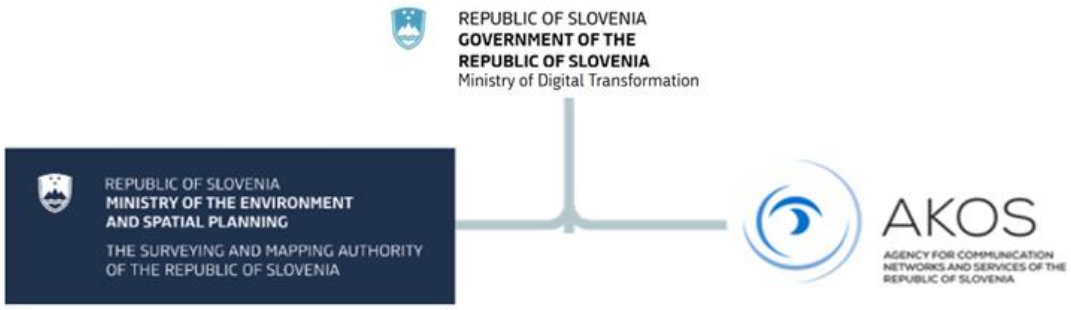
GURS, 2025.

[61] Public geodetic data. https://ipi.eprostor.gov.si/jgp/data

With the main purpose of the Geoportal[62] to lower the costs of building VHCNs and to encourage shared use and joint construction and main goals of providing these data to public which are also related to higher transparency of operation and proactive publication of spatial information, the interactive web viewer provided by the AKOS is a mirror of all work related to mapping in Slovenia, showing more than 150 layers in the fields of telecommunications, public infrastructure, postal services and railways to general public.

2.2.3 Institutions included in a mapping process in Slovenia

Figure 3: Institutions included in a mapping process in Slovenia



ITU, 2025.

The Surveying and Mapping Authority of the Republic of Slovenia

The Surveying and Mapping Authority[63] is an independent body within the Ministry of Natural Resources and Spatial Planning. It is a national land surveying service and is responsible for conducting administrative procedures and deciding in administrative cases at the first instance, issuing data from geodetic databases, and other administrative services and tasks of a land surveying service.

Ministry of Digital Transformation

The Ministry of Digital Transformation[64] monitors and analyses the state of digital transformation and the information society at the national level. It is responsible for the areas of the information society, electronic communications, digital inclusion, digital competences, the data economy, management of information and communication systems, and the provision of electronic public administration services. In cooperation with the competent ministries and government offices, the Ministry prepares, coordinates and implements national measures and projects in the field of the information society and digital transformation of the economy, public administration, healthcare, justice, agriculture, education and other areas.

The Agency for Communication Networks and Services of the Republic of Slovenia

The Agency for Communication Networks and Services of the Republic of Slovenia[65] is an independent body that regulates and supervises the electronic communications market, performs tasks related to radio and television, and regulates and supervises postal services and railway traffic in Slovenia.

[62] AKOS Geoportal. https://gis.akos-rs.si/?lang=eng
[63] The Surveying and Mapping Authority. https://www.gov.si/en/state-authorities/bodies-within-ministries/surveying-and-mapping-authority/about-the-authority/
[64] The Ministry of Digital Transformation. https://www.gov.si/en/state-authorities/ministries/ministry-of-digital-transformation/about-the-ministry/
[65] The Agency for Communication Networks and Services of the Republic of Slovenia. https://www.akos-rs.si/en/about-akos

2.2.4 Successful use of mapping in national projects/ best practices

Construction of open public communications networks (GOŠO)

As part of the Construction of open public communications networks Project, aimed at developing modern broadband infrastructure in so-called white (underserved) areas, the construction of open broadband networks has been carried out in the past and continues to be implemented in areas lacking adequate high-speed internet access. The project's primary goal is to provide stable and high-performance broadband connectivity to households in hard-to-reach and sparsely populated regions. Special attention is given to areas with fewer than 150 inhabitants per square kilometre and to regions with complex geographical characteristics, which are typically more challenging for commercial operators to cover.

This investment represents an important pillar of Slovenia's broader digital transformation. By establishing gigabit-capable infrastructure, the project supports the development of smart services, advanced digital solutions, and strengthens the long-term competitiveness of local communities.

To date, six such projects have already been successfully completed in Slovenia, collectively providing coverage to nearly 10% of all households, particularly in rural areas. These projects mark a significant step toward ensuring equal digital connectivity across the entire country and creating the foundation for further development of smart rural environments.

White areas are individual households in locations where spatial analysis has shown that operators do not provide broadband networks capable of delivering broadband electronic communications services (based on data from the Network termination points Evidence), and where market interest enquires for the construction of networks have indicated no expressed commercial interest in building such broadband networks within the next three years.

Geographical segmentation (Regulation of wholesale broadband markets in Slovenia)

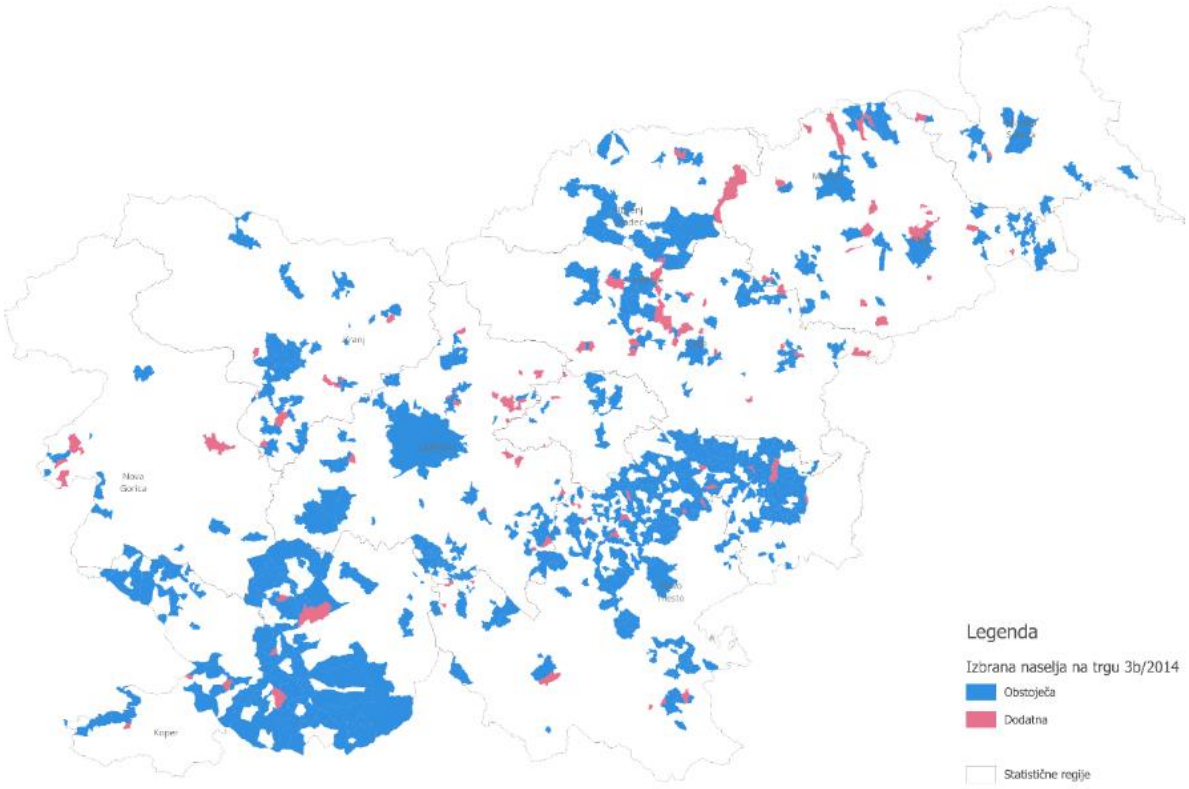
In the analysis of relevant markets, once the relevant product market has been identified, the next crucial step is to determine its geographic scope. Only after defining the geographic dimension of the market can a national regulatory authority properly assess the competitive conditions within it. The delineation of geographic markets follows the same principles applied when evaluating demand- and supply-side substitution in response to a relative price increase. According to established case law, the relevant geographic market encompasses the area in which the undertakings concerned participate in the supply and demand of the relevant products or services, where the competitive conditions are sufficiently homogeneous, and which can be clearly distinguished from neighbouring areas where those conditions differ significantly. Areas with heterogeneous competitive conditions therefore cannot be considered a single, uniform geographic market (Guidelines on market analysis and the assessment of significant market power under the EU regulatory framework for electronic communications networks and services, points 46-48[66]).

AKOS has repeatedly defined geographic sub-markets through the use of advanced spatial analyses, first doing so in 2017 on relevant market 3b/2014[67]. By conducting complex spatial analysis and reviewing combined datasets from multiple spatial evidences, AKOS was able to identify areas with appropriate competitive conditions, which demonstrated sufficient market maturity and stability to justify a gradual withdrawal of regulatory obligations.

[66] Communication from the Commission — Guidelines on market analysis and the assessment of significant market power under the EU regulatory framework for electronic communications networks and services 2018. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2018_159_R_0001

[67] Relevant market 3b/2014 market analysis. https://www.akos-rs.si/telekomunikacije/raziscite/regulacija-upostevnih-trgov/arhiv-analiz-in-odlocb/upostevni-trg/veleprodajni-osrednji-dostop-na-fiksni-lokaciji-za-izdelke-za-mnozicni-trg

Figure 4: Map of deregulated municipalities in Slovenia on Relevant market 3b/2014.



AKOS, 2025.

Joint deployment intentions

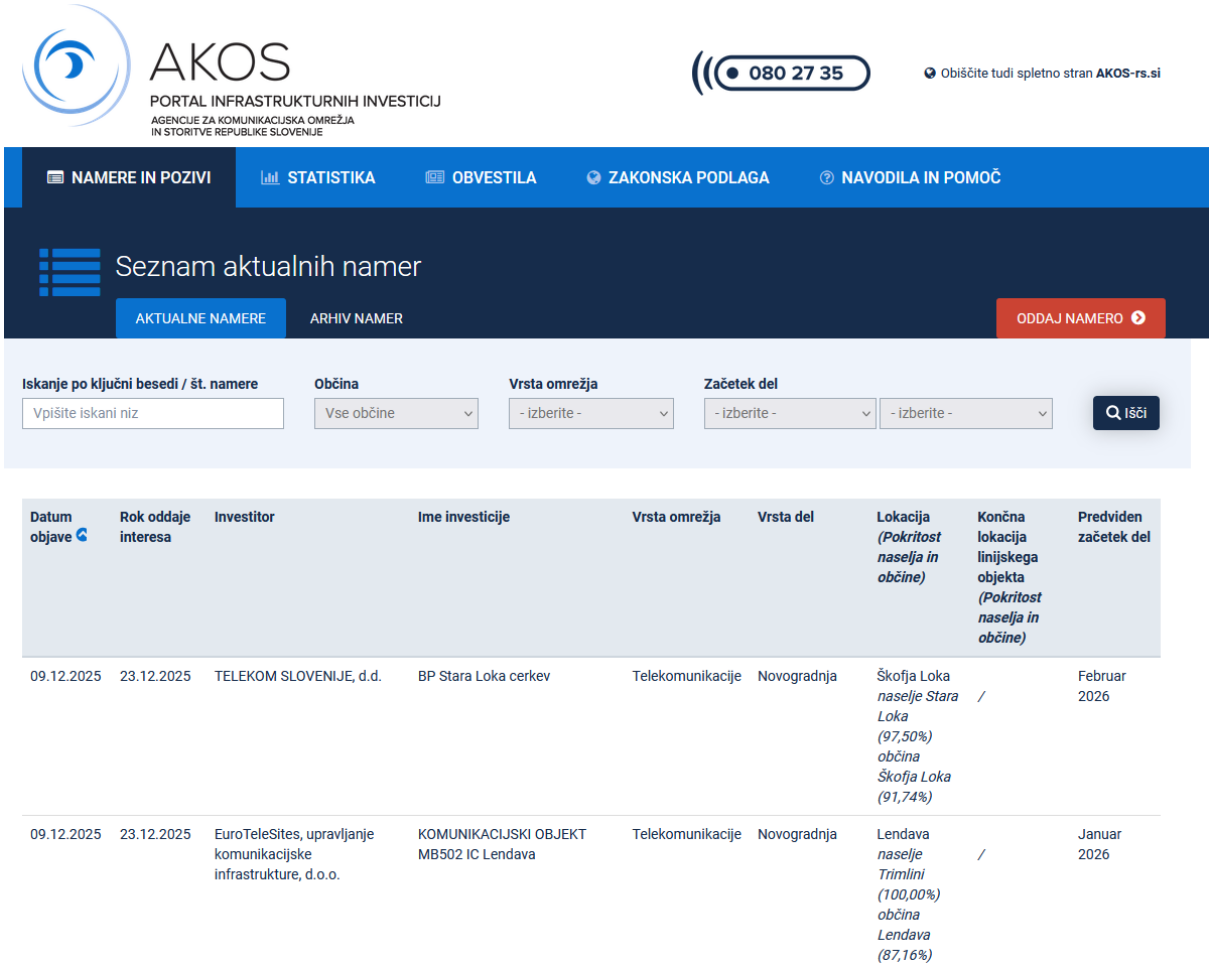
An essential measure for reducing the cost of deploying electronic communications networks in Slovenia is the coordinated construction of infrastructure whenever public interest is demonstrated.

All investors in public economic infrastructure must notify the national regulator, AKOS, of their planned construction works and issue a public call to electronic communications network investors for possible joint deployment. Once the notification is submitted, AKOS automatically publishes it on its website[68]. Interested parties then have a minimum of 10 working days to express their interest to both AKOS and the initiating investor.

Until now, almost 5,000 intentions for joint construction have been submitted, and more than 2,000 expressions of interest for joint construction have been recorded.

[68] Joint deployment intentions portal. https://investicije.akos-rs.si/

Figure 5: Joint deployment intentions portal



Datum objave	Rok oddaje interesa	Investitor	Ime investicije	Vrsta omrežja	Vrsta del	Lokacija *(Pokritost naselja in občine)*	Končna lokacija linijskega objekta *(Pokritost naselja in občine)*	Predviden začetek del
09.12.2025	23.12.2025	TELEKOM SLOVENIJE, d.d.	BP Stara Loka cerkev	Telekomunikacije	Novogradnja	Škofja Loka *naselje Stara Loka (97,50%) občina Škofja Loka (91,74%)*	/	Februar 2026
09.12.2025	23.12.2025	EuroTeleSites, upravljanje komunikacijske infrastrukture, d.o.o.	KOMUNIKACIJSKI OBJEKT MB502 IC Lendava	Telekomunikacije	Novogradnja	Lendava *naselje Trimlini (100,00%) občina Lendava (87,16%)*	/	Januar 2026

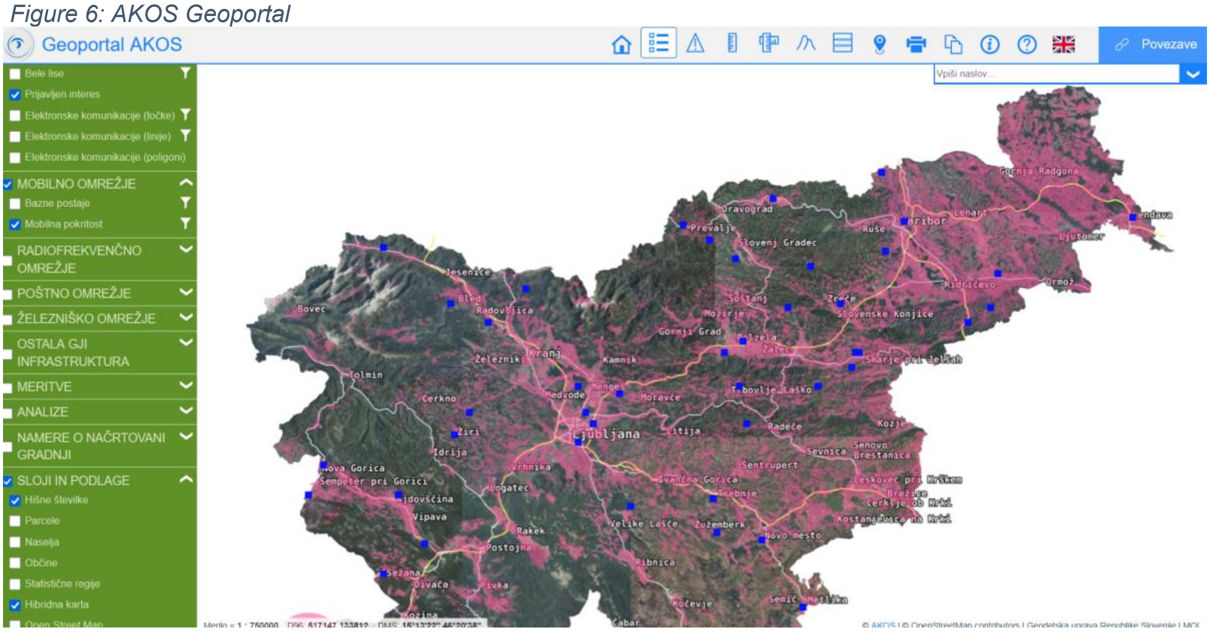
AKOS, 2025.

Empowering of end users

The AKOS Geoportal[69] is the central online platform for accessing and viewing spatial data. It already contains more than 150 spatial layers. All spatial data are collected and displayed in one place, enabling users to verify the availability of electronic communications networks, services, and postal services at any location in the Republic of Slovenia. In addition, the Geoportal offers several advanced tools, the most important of which are the ability to generate overview maps in PDF format and perform quick online analyses that allow users to extract various data on network access points at the municipal or settlement level. Figure 5 below shows a simulation of mobile network coverage, calculated using the ITU propagation model ITU-R P.1812[70].

[69] AKOS geoportal. https://gis.akos-rs.si/
[70] ITU - P.1812 : A path-specific propagation prediction method for point-to-area terrestrial services in the frequency range 30 MHz to 6 GHz. https://www.itu.int/rec/R-REC-P.1812

Figure 6: AKOS Geoportal



AKOS, 2025.

Commercial deployment of VHCN

The adequacy of collecting spatial data on network access points in the Republic of Slovenia, together with the high level of data accuracy, has significantly contributed to the planning and development of fixed optical broadband networks in the country. According to DESI research[71], Slovenia has progressed from 42.4% coverage of households with fibre connections in 2014 to 63.8% in 2019 and reached 79.6% coverage in 2024.

Broadband universal service obligation

Under Slovenian legislation, if an end-user cannot obtain broadband access from commercial service providers, this access is ensured through the universal service framework[72]. Universal service is intended as a safety net for all citizens of EU Member States. ZEKom-2 defines universal service as a set of at least the minimum services of a specified quality which is available to all end-users in the Republic of Slovenia at an affordable price, irrespective of their geographical location. Universal service includes, among other things, access to telephone services and internet access at a fixed location. ZEKom-2 further specifies that the universal service must be available at the location where the user permanently resides or actually carries out their business activity. Universal service may be provided using wired or wireless technologies.

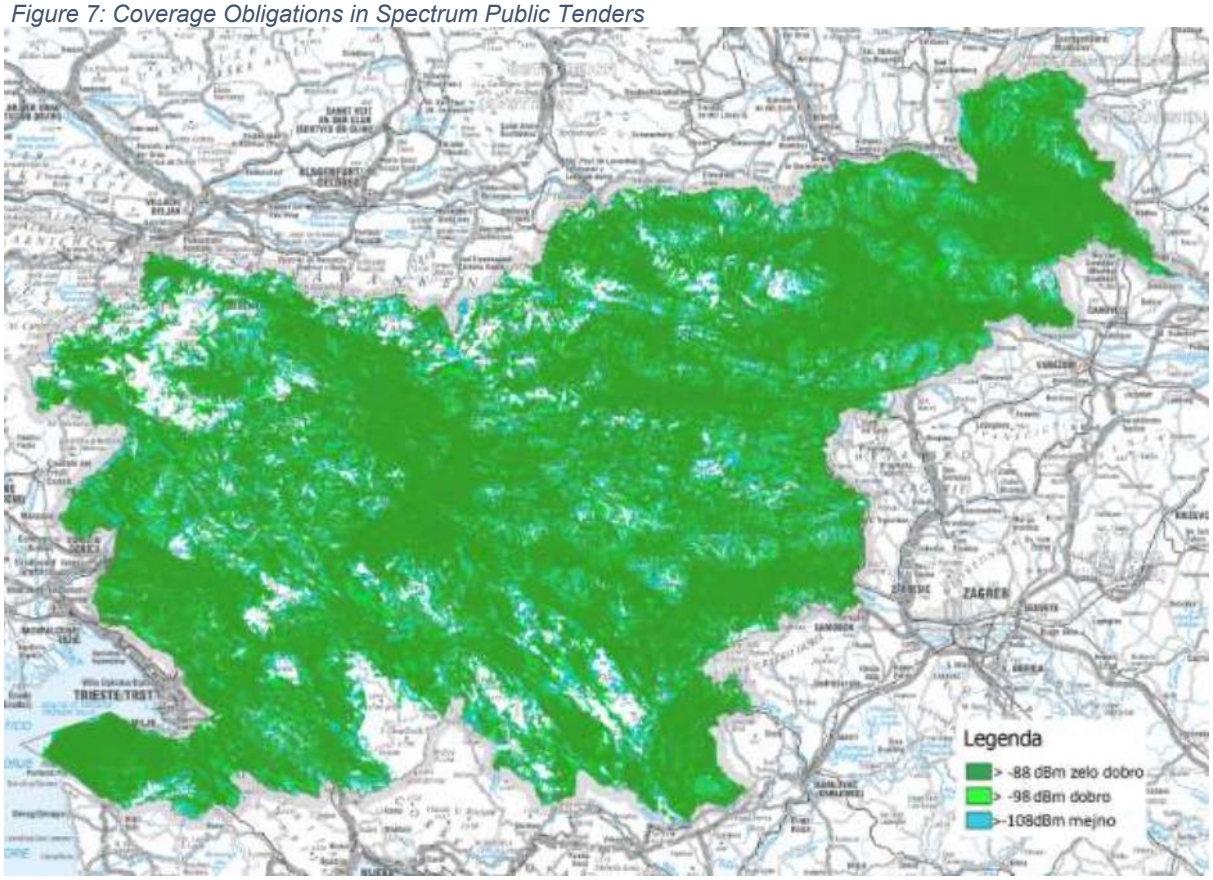
Mobile and fixed coverage and expected future deployments of USO designated operator‘s network has been geographically analysed and the estimated number of households eligible for BB USO services is approximately 0,3% of households in Slovenia. The agency determines the required data transmission speed based on an analysis of market conditions. The currently defined minimum speed considered suitable for internet access is 10 Mbit/s downstream and 1 Mbit/s upstream.

[71] European Commission - The Digital Economy and Society Index (DESI). https://digital-strategy.ec.europa.eu/en/policies/desi
[72] Universal service in Slovenia. https://www.akos-rs.si/en/telecommunications/explore/universal-service

Coverage Obligations in Spectrum Public Tenders

Public tenders for mobile networks[73] are designed to allocate radio-frequency spectrum to mobile operators, ensuring efficient use of this scarce public resource and promoting investment in modern mobile networks. Through these tenders, AKOS defines clear conditions for spectrum use that encourage technological development, foster competition, and improve the availability and quality of mobile services across Slovenia. A key part of these licence conditions are coverage obligations, which require operators to use the awarded frequencies to extend mobile network coverage within specific geographical and time-bound milestones. Operators must begin providing services in at least one major city within one year of the spectrum becoming available, and within five years they must fully utilise the awarded spectrum and offer services in all major cities. Overall, coverage obligations ensure that awarded spectrum is not merely held as a resource but actively used to expand high-quality mobile connectivity for users across the entire country. For some specific coverage calculations, the model based on ITU-R Recommendations ITU-R P.525/526[74] was also used.

Figure 7: Coverage Obligations in Spectrum Public Tenders



AKOS, 2025.

2.2.5 Conclusion

Slovenia has developed a mature, fully operational, and EU-aligned model for broadband mapping. Its approach—grounded in clear legislation, strong institutional cooperation, open-source technologies, and effective regulatory leadership—serves as an international best practice. By combining regulatory expertise with advanced geospatial capabilities and

[73] Public tenders for mobile networks in Slovenia. https://www.akos-rs.si/en/radio-frequency-spectrum/explore/public-tenders-for-mobile-networks
[74] ITU - P.526 : Propagation by diffraction 2025. https://www.itu.int/rec/R-REC-P.526

transparent public tools, Slovenia has positioned itself as a reference country in this field. It demonstrates how even a small state can successfully build and sustain a comprehensive, reliable, and forward-looking broadband mapping ecosystem.

3. Countrywide assessment and justification for broadband mapping

3.1 Geographic and institutional overview

When assessing the geographical features of Botswana[75], the first thing to highlight is its size. Botswana is a relatively large country, with an area of about 581,730 km², making it somewhat larger than, for example, France. It is bounded by Namibia to the west and north, Zambia and Zimbabwe to the northeast, and South Africa to the southeast and south. The Zambezi River border with Zambia is only several hundred meters long. The border along the main channel of the Chobe River up to the Zambezi was disputed with Namibia, until a 1999 ruling by the International Court of Justice favoured Botswana. The point at which the borders of Botswana, Namibia, Zambia, and Zimbabwe meet in the middle of the river has never been precisely determined.

At the same time, with a population of about 2.5 million people, it is among the very sparsely populated countries, especially compared to other countries of the region. The country's population density exhibits striking variations across its districts. The country's overall density is 4.1 persons per square kilometre and Gaborone emerges as the most densely populated district, with 1257.7 inhabitants per square kilometre, followed closely by Orapa at 1047.9 persons per square kilometre. In contrast, the Delta region registers the lowest density, with less than one person per square kilometre. Such diversity underscores the complex interplay between geography, urbanization, and human settlement patterns within the country.

The country is divided into three main environmental regions. The hardveld region consists of rocky hill ranges and areas of shallow sand cover in eastern Botswana. The sandveld region is the area of deep Kalahari sand covering the rest of the country. The third region consists of ancient lake beds superimposed on the northern sandveld in the lowest part of the Kalahari Basin. The surface geology of the eastern hardveld, exposed in its hill ranges, largely consists of basement complex rocks (more than 2.5 billion years old) intruding from northern South Africa and southern Zimbabwe. This complex is known to extend into younger rock formations (2.5 billion to 1.2 billion years old) in the extreme southern sandveld, while rocks of the Ghanzi and Damara groups (1.2 billion to 570 million years old) extend across the northwest corner of the country into northern Namibia. This policy report thus highlights basic geological data, as it affects the development of the country's economic and also telecommunications landscape[76].

In the field of connectivity and telecom perspective, the sheer size of the terrain and the very uneven population distribution bring two different sets of technical capabilities. While urban inhabitation allow the use of cost-effective investment methods and consequently modern technologies, sparsely populated rural areas inevitably lead to the use of older technologies, slower data and/or higher prices since local operators are struggling with costs of infrastructure deployment. In the rural areas, on top of limited connectivity, people generally tend to use lower speeds and higher cost connections for technical reasons.

Botswana's political history is characterized by stability and a multiparty democracy. The country has managed to maintain a peaceful political landscape, guided by a tradition of

[75] Botswana geography, maps, climate, environment and terrain from Botswana – CountryReports. https://www.countryreports.org/country/Botswana/geography.htm
[76] World Population Prospects 2024. https://population.un.org/wpp/ and Botswana Population & Housing Census Analytical Report 2022. https://www.statsbots.org.bw/sites/default/files/Botswana%20Population%20%26%20Housing%20Census%202022%20Analytical%20Report%20Volume%201.pdf

consultation and consensus-building. The government's commitment to good governance has secured Botswana's position as one of Africa's most politically stable nations.

It is a unitary parliamentary republic with an executive presidency. The President serves as both the Head of State and Head of Government (Executive Branch). The President is indirectly elected by the National Assembly for a five-year term and is limited to two terms. The 1966 Constitution remains in effect, contributing to long-term political stability.

Legislative authority is held by the Parliament, which consists of two bodies: National Assembly (a unicameral body that is the primary legislative power) and Ntlo ya Dikgosi (House of Chiefs - An advisory body composed primarily of traditional tribal chiefs with advisory role pertaining to tribal law, customs, and land matters). This setup reflects the incorporation of traditional structures into modern governance.

Local government (local councils for rural and urban areas) are elected simultaneously with national parliamentary elections. However, the central government maintains influence by appointing certain members and supervisory district commissioners, thus ensuring some central oversight of local decision-making[77].

3.2 Economic and Telecom Market Overview

Living conditions have steadily improved since independence as the wealth from diamond discoveries has helped lay the foundations for growth and development and fund major advances in social service delivery, expanding broad access to clean water, electricity, and sanitation. Basic education and health outcomes have also steadily improved. However, the extractives-driven growth model is reaching its limits and ability to further sustain poverty reduction and inclusive growth.

Botswana maintains a highly stable and relatively diversified economy, setting it apart from many of its regional neighbours. The core driver of its wealth since independence has been the diamond mining sector, which generates the majority of export revenue and foreign exchange. Through a successful partnership between the government and De Beers (Debswana), the nation has effectively managed this resource, using the proceeds to invest heavily in social services, education, and infrastructure, underpinning decades of political and economic stability. This careful management has resulted in Botswana consistently receiving high sovereign credit ratings and being known for its low levels of corruption, positioning it favourably within Africa for foreign direct investment.

However, recognizing the inherent risk of over-reliance on a single commodity, Botswana has actively pursued an agenda of economic diversification. This effort aims to reduce the dependence on the cyclical diamond market and foster growth in non-mining sectors. The government has prioritized the development of sectors such as financial services, tourism, and manufacturing. The tourism sector, specifically high-end ecotourism centred on the Okavango Delta and Chobe National Park, is a significant foreign exchange earner and has strong growth potential. Meanwhile, the financial services sector is leveraging the country's stability and sound regulatory environment to attract regional business.

A major challenge facing the economy is the need to address high unemployment, particularly among the youth, and persistent income inequality. Despite substantial wealth generation, the benefits have not been evenly distributed across the population. Furthermore, the economy

[77] World Bank - Botswana Overview: Development news, research, data. https://www.worldbank.org/ext/en/country/botswana

faces structural constraints common to landlocked countries, including high logistical and transport costs, as indicated by the reliance on major transport corridors and foreign ports. The private sector, while growing, often finds itself constrained by skill gaps in specialized areas and the need for greater access to finance, prompting the government to implement various reforms designed to improve the ease of doing business and support the growth of Small and Medium Enterprises (SMEs).

Looking ahead, the government's strategic focus remains on private sector-led growth and improving human capital. Key initiatives involve further investment in digital infrastructure to facilitate the transition to a knowledge-based economy and the continued development of local processing capabilities within the diamond value chain (beneficiation). Overall, while the diamond sector provides a solid financial bedrock, Botswana's long-term economic narrative is centred on navigating diversification challenges and translating its national wealth and political stability into broad-based, inclusive economic growth for all its citizens[78].

Focusing on telecom market, Botswana's broadband access spans mobile, fibre, wireless, and satellite technologies, collectively covering over 98% of the population. The telco market is heavily dominated by mobile services, with a significant presence of three main players: Mascom, Orange, and BTC (Botswana Telecommunications Corporation). The broadband penetration officially stands at 129%, likely reflecting SIM-based service activations (subscriptions and pre-paid services) rather than unique users. High mobile service adoption (112% of the population) and multi-SIM usage are noted.

When observing Mobile vs. Fixed Broadband connections, the Mobile Broadband dominance is clear via the total subscriptions of 3.5 million, hence the vast majority of internet access is provided via the mobile network (3G/4G/5G). This confirms the central role of mobile operators (Mascom, Orange) in connecting the nation to the internet. Fixed Broadband is a growing segment with BTC and other providers, though it is still much smaller than the mobile segment.

Prepaid subscriptions significantly outweigh postpaid subscriptions. This is typical for emerging markets, reflecting consumer preference for cost control and flexibility.

Fixed telephony subscriptions is a shrinking market, with 150,000 subscriptions, which is minimal compared to the 5 million mobile subscriptions. This trend mirrors global patterns where traditional fixed-line telephony is being rapidly substituted by mobile services.

A critical indicator of financial inclusion and digital service adoption in Botswana is Mobile Money Subscriptions. The total number of mobile money subscriptions is scaled up to 2 million. This shows high uptake of mobile-based financial services, closing the gap where traditional banking infrastructure may be limited. The inclusion of non-telecom entities like Botswana Post alongside the main mobile operators (Mascom, Orange, BTC) indicates a competitive environment for financial services.

In summary, the available data illustrates a robust, competitive, and mobile-centric telecom market in Botswana, driven by high mobile phone and mobile broadband penetration, alongside rapidly growing mobile money adoption[79].

[78] Bank of Botswana - Annual Report. https://www.bankofbotswana.bw/annual-reports and IMF - Consultation Reports for Botswana. https://www.imf.org/en/publications/cr/issues/2025/12/08/botswana-2025-article-iv-consultation-press-release-staff-report-and-statement-by-the-572347

[79] Bocra - Telecom statistics 2024. https://www.bocra.org.bw/telecoms-statistics

3.3 Broadband Development to Date

Botswana has made significant progress in deploying digital infrastructure, with mobile telephony being the major success story. The country generally fares similarly to, or better than, many of its regional peers in key digital indicators, reflecting a relatively liberal telecommunications policy and strong government commitment. The mobile network, driven by competition among major providers, provides extensive coverage, which is the primary mode of internet access for the majority of the population. This has led to high broadband uptake, with mobile data services dominating the market.

Despite the strong mobile coverage, Internet connectivity and international transport connections have historically lagged behind those of other countries with comparable income levels. While the country is connected to international undersea fibre optic cables via neighbouring countries (like South Africa and Namibia), high international bandwidth costs and infrastructure bottlenecks along these routes can affect the cost and quality of service domestically.

The backbone network infrastructure, which is essential for carrying high volumes of traffic, has seen investment, but its development is often concentrated in the most profitable areas. Backbone competition has primarily emerged within major urban areas and on inter-city routes. However, the majority of the population living outside these urban corridors is less likely to benefit directly from this competition, necessitating some form of public support to extend high-capacity backbone networks beyond major centres.

In terms of fixed access, the Fibre-to-the-X (FTTx) infrastructure rollout in residential areas is typically done on a case-by-case basis, often requiring a subsidy due to the high costs involved, which makes fixed broadband deployment a natural monopoly in many locations. Consequently, while the digital infrastructure is rated as "very good" in terms of potential, its utilization, especially in terms of Internet usage, historically showed considerable disparity between urban and rural access to services.

A major constraint on infrastructure development and utilization has been the high cost associated with connectivity. While liberalization efforts have been made, high international bandwidth costs and high charges for Internet usage have historically limited mass-market adoption of affordable broadband. Furthermore, the effectiveness of the digital economy rests on a framework that, while relatively strong in individual strategies and regulations, is sometimes fragmented, with implementation often being slow. This fragmentation and inefficiency, combined with structural challenges like the high cost of equipment and lack of electricity in many rural areas, have hindered the full utilization of the existing physical infrastructure across the country[80].

A key policy decision underpinning deployment was the establishment of a wholesale backbone model. The government unbundled the incumbent operator, resulting in the creation of Botswana Fibre Networks (BoFiNet), a wholesale entity responsible for deploying the national fibre network, including the TransKalahari Fibre Optic Ring. This national network, spanning approximately 8,000 km, connects cities, towns, and villages, and provides the country's essential cross-border connections to international submarine cables (like WACS and EASSy) via neighbouring nations. By making the national and international capacity available to third parties on fair and non-discriminatory terms, the policy aims to foster retail competition and drive down consumer prices for services delivered over both mobile and fixed

[80] World Bank group - Botswana Digital Economy Diagnostic, https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099100007222230376 and Botswana's Infrastructure - A Continental Perspective. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/865861468013869689/botswanas-infrastructure-a-continental-perspective

infrastructure. It also explicitly supports the connectivity of Community Access Points (known as Kitsong Centres), health centres, libraries, and schools to ensure public access to the infrastructure being rolled out.

3.4 Short review of existing national broadband mapping initiatives

Despite its substantial infrastructure and policy successes, the country's broadband mapping systems remain at an early stage of development. Crucially, Botswana does not yet have specific policy provisions or operational mechanisms for broadband mapping. As a result, there is no centralized public or governmental broadband mapping portal. Instead, BOCRA develops coverage maps solely for internal use by collecting data from its licensees and directly from Internet Service Providers (ISPs) on a case-by-case basis when needed. Some of these coverage maps are subsequently made available only through BOCRA's Annual Reports. This reliance on intermittent, internal data collection is further complicated by the regulatory environment, as there are no penalties for non-compliance with data submission requirements by ISPs, and the enforcement of these rules is not strict.

Operationally, BOCRA faces current structural obstacles that complicate any effort to establish a comprehensive mapping system. The authority anticipates significant challenges arising from the inherent lack of data available in proper, harmonized formats from the various service providers. Furthermore, the regulator is aware of the difficulty involved in accurately mapping and addressing connectivity in rural areas that lack proper addressing systems or established roads, which presents a barrier to data integrity and geographic analysis, since supporting spatial layers are critical for accurate geolocation and for establishing a comprehensive spatial overview of connectivity.

3.5 Stakeholder Engagement and Collaboration

Broadband mapping in Botswana relies on a wide ecosystem of actors whose roles were clarified and tested during the Botswana National Africa-BB-Maps Event held from 12–14 August 2025 in Gaborone. The three-day dialogue brought together BOCRA, key ministries, public agencies, mobile network operators, wholesale and retail service providers, infrastructure owners, utilities, development partners and international experts, and confirmed that a sustainable mapping system can only be delivered through structured, long-term collaboration.

On the public-sector side, the Ministry of Communications and Innovation (MCIE), through the Department of Digital Communications, Infrastructure and Business (DCIB), provides policy leadership and ensures that broadband mapping is aligned with national digital transformation strategies and initiatives such as SmartBots. Statistics Botswana contributes geo-coded population and ICT usage data, including outputs from the 2022 Population and Housing Census, which are essential for demand-side analysis and identification of underserved communities and areas. The Department of Surveys and Mapping (DSM) supplies authoritative base geospatial layers, including the national geodetic framework, administrative boundaries, ortho-imagery and infrastructure layers that form the backbone of the infrastructure atlas. The Department of Town and Regional Planning (DTRP) links mapping to land-use planning and development control, ensuring that rights-of-way and utility corridors are planned in a way that facilitates efficient broadband deployment.

On the operator and infrastructure side, Mascom, Orange Botswana, BTC, BoFiNet, Paratus and other providers represent the primary data owners for broadband coverage, tower locations, backbone and access fibre routes, microwave links, quality-of-service (QoS) indicators and similar datasets. During the national event, these actors confirmed their willingness to participate in the mapping initiative provided that data formats are standardised, sensitive layers are subject to adequate protection and the regulator offers clear guidance on update cycles and validation procedures. Utilities such as Botswana Power Corporation and Botswana Railways also own infrastructure—such as poles, ducts, wayleaves and fibre along rail corridors—that is critical for cross-sector infrastructure sharing and must therefore be included within the mapping system.

International partners and development agencies, including UNICEF (through the GIGA school connectivity initiative), the European Union and ITU, contribute additional datasets, financing and technical assistance. The mapping of schools under GIGA, including real-time connectivity monitoring, provides an important reference layer that will be integrated into the national infrastructure atlas and used to guide future connectivity interventions for education and other public facilities.

The stakeholder engagement process has followed a multi-phase approach. First, BOCRA completed a national questionnaire under the Africa-BB-Maps initiative, providing a baseline of legal, institutional and data-related conditions (Annex 1). Second, the national event generated shared recommendations on governance structures, data priorities and platform choices, including consensus that BOCRA should serve as custodian of the system and that an enterprise ArcGIS environment, complemented by open-source tools, is the most practical technical option for Botswana. Third, BOCRA and ITU prepared targeted questionnaires for BOCRA itself, operators and infrastructure providers, and public institutions ahead of the January 2026 stakeholder meetings; these instruments are designed to deepen understanding of current data availability, standards, legal concerns and interoperability challenges and will feed into subsequent iterations of this report (Annex 2).

In the next phase, stakeholder engagement should shift from consultation to formalised collaboration, including the establishment of a Project Steering Committee at Permanent Secretary level and a technical working group. These bodies shall serve as permanent coordination mechanisms overseeing data governance, update cycles, conflict resolution and prioritisation of new features in the mapping platform. The long-term success of broadband mapping in Botswana will depend on maintaining this collaborative approach, ensuring that all stakeholders see tangible value in contributing to and using the system.

3.6 Impact Assessment of Broadband Mapping

The establishment of a sophisticated National Broadband Mapping System in Botswana offers profound benefits, serving as a critical tool for both the telecommunications sector and general country development by transforming policy and investment from assumption-driven planning into evidence-based strategy. Given Botswana's demographic characteristics (approximately 66% to 79% of the population lives in urban areas, but the country still has vast, sparsely populated rural districts with a density as low as one person per square kilometre) accurate and granular mapping is essential to bridge the persistent digital divide[81].

[81] Statistics Botswana - ICT household survey results 2024. https://www.statsbots.org.bw/sites/default/files/press-releases/Press%20Release-Statistics%20Botswana%202024%20ICT%20Household%20Survey%20Results.pdf#:~:text=Gaborone%2C%20Botswana%20%E2%80%93%20Statistics%20Botswana%20has%20released%20the,persistent%20gaps%20in%20rural%20connectivity%20and%20digital%20skills

For the telecommunications sector, broadband mapping provides the necessary market transparency and regulatory oversight to foster targeted competition and optimize investment. With a high mobile penetration rate that exceeds the population (reaching over 4.19 million subscriptions in Q1 2025) and robust 4G population coverage at 98.2%[82], Botswana has focused its regulatory efforts on quality and access in underserved areas. Mapping would allow BOCRA to move beyond simple coverage percentages and pinpoint exactly where quality of service (QoS) is poor, where speeds fall below national targets, and where service coverage gaps truly exist at the block level, rather than relying on potentially inaccurate self-reported data from operators. This information empowers BOCRA to enforce service standards effectively and make data-driven decisions on infrastructure sharing to reduce deployment costs and avoid overlapping construction in areas already covered[83].

Furthermore, the mapped data is crucial for the efficient management of the Universal Access and Service Fund (UASF). Instead of broadly funding projects, mapping identifies specific rural communities or districts, that require subsidy. This targeted allocation of public funds ensures maximum impact for closing the digital divide, especially important given the significant disparity in internet access between urban areas (79.2% access) and rural areas (20.8% access). By identifying these specific, high-need locations, mapping reduces financial risk for the government and increases accountability for both the regulator and the subsidized operators.

In the sphere of general country development, broadband mapping is a fundamental enabler of national strategies, including the SmartBots initiative. By providing a spatial layer for all digital infrastructure, mapping facilitates evidence-based policymaking that links connectivity to socio-economic indicators. The most significant economic benefits of establishing a national Broadband Mapping System in Botswana stem from its ability to accelerate economic growth through optimized investment and foster new digital service economies. Studies on Sub-Saharan Africa suggest that a 10% increase in broadband penetration is associated with approximately a 1.38% increase in GDP growth[84], underscoring the necessity of expanding high-quality connectivity.

Furthermore, accurate mapping directly promotes the development of digital industries and job creation. By transparently publishing where connectivity exists and where gaps lie, the maps reduce market uncertainty for local and foreign private investors looking to set up e-commerce platforms, FinTech services, data centres or similar. This transparency encourages competition and facilitates the creation of a more vibrant digital ecosystem. Specifically, in rural and agricultural areas, for the latter mapping the availability of high-speed internet enables the adoption of precision farming and "smart farming" techniques. For a country with a significant agricultural sector, this technology allows for real-time monitoring, optimized resource use, and could lead to increased yields, thereby diversifying the national economy beyond the traditional mining sector. The efficiency, transparency, and targeted investment facilitated by mapping systems act as a powerful catalyst for inclusive economic growth, ensuring that the benefits of the digital economy are distributed across Botswana's entire geographic expanse.

Mapping allows ministries like the Ministry of Education and Skills Development to overlay the location of every school and health centre onto the network map, immediately highlighting all unconnected critical public facilities. This ensures that the rollout of e-government and e-health services is systematic and inclusive. Moreover, by clearly showing investment opportunities

[82] International Trade Administration, Botswana Country Commercial Guide 2024, https://www.trade.gov/country-commercial-guides/botswana-ecommerce
[83] ICT Statistics 2024, Statistics Botswana, https://statsbots.org.bw/ict-statistics
[84] Qiang, C. Z. W., Rossotto, C. M., & Kimura, K. (2009). "Economic Impacts of Broadband."; "The Macroeconomic Impacts of Digitalization in Sub-Saharan Africa", IMF (2021)

in underserved districts, the maps reduce information asymmetry for potential private and foreign investors, making Botswana's digital sector more attractive and encouraging the investment and innovation needed to sustain growth. Ultimately, a robust broadband map is not just a picture of wires and towers; it is a diagnostic tool that ensures all citizens—regardless of their geographical location in Botswana's vast and varied landscape—can equally benefit from the country's ongoing digital transformation.

4. Policy and regulatory assessment Botswana

4.1 Existing Legal and Regulatory Environment

The current Botswana policy framework is mainly built on the following documents:

The Botswana National Broadband Strategy - NBS (2018) was designed as a holistic framework to coordinate the implementation of the country's digital ecosystem, aiming to transition Botswana into a knowledge-based economy. The Strategy is anchored on achieving universally accessible and affordable high-speed broadband and outlines specific approaches for both infrastructure deployment and data-driven management.

The core of the deployment strategy is built upon a dual approach covering both mobile and fixed infrastructure to bridge the digital divide. The NBS calls for the deployment of Mobile Broadband Access Networks (3G/4G), specifically targeting comprehensive coverage across urban centres, major villages, and remote rural and agricultural areas. Simultaneously, it mandates the roll-out of Fixed Broadband and ultra-fast broadband access networks (including xDSL, Fibre-to-the-X or FTTx, and Fixed Wireless) directed primarily toward cities, towns, and key villages. The Strategy strongly emphasizes infrastructure sharing, particularly leveraging the government's prior substantial investments in national backbone networks. To accelerate the rollout, the government decided to allow the sharing of its infrastructure, leading to the process of transferring government-owned broadcast, power utility, and water utility infrastructure to the state-owned Botswana Fibre Networks (BoFiNet), creating a national infrastructure sharing asset. The NBS also promotes adopting a hybrid technology mix to ensure efficient and complementary infrastructure deployment, combining optical fibre cable, satellite, and terrestrial microwave solutions. Crucially, the plan advocates for integrating broadband infrastructure planning with the development of other physical infrastructure, such as roads, railways, and utility pipelines, to streamline deployment and reduce costs.

While the NBS itself did not explicitly mandate the creation of a public broadband infrastructure atlas, its objectives lay the groundwork for a data-driven system and mapping is implicit in its monitoring framework. The Strategy includes a Performance Management Framework that requires Strategic Mapping as a foundational element. This indicates a clear recognition that reliable, quality data is essential to support the development and use of broadband infrastructure and services. The intent is to utilize this strategic information for monitoring and evaluation purposes. Furthermore, the NBS includes specific strategies aimed at making broadband and overall utility deployment more efficient, such as promoting and implementing a national postcode and addressing system to facilitate the last-mile delivery of services and e-commerce. It also stresses the need to regulate, coordinate, and harmonize the development, deployment, and sharing of all broadband infrastructure among public and private stakeholders. These requirements ultimately necessitate robust, accurate mapping systems to identify coverage gaps, monitor service quality, and ensure the effective allocation of resources.

The Botswana National ICT Policy, known as Maitlamo (2007), set a clear and aggressive agenda for digital development, focusing heavily on infrastructure deployment and universal access.

The primary goal of the Maitlamo Policy is to achieve universal service and access to ICT facilities across the country, transforming Botswana into a globally competitive, knowledge-based economy. This commitment necessitates the rollout of high-speed, high-capacity connectivity to all citizens, businesses, and communities at appropriate quality and affordable

prices. The policy framework actively supports a multi-technology approach, mandating the deployment of Mobile Broadband Access Networks (3G, 4G) to cover urban centres, major villages, and even rural and agricultural areas. Simultaneously, it pushes for the roll-out of Fixed Broadband and ultra-fast broadband networks (such as FTTx and xDSL upgrades) in cities and towns, aiming to provide a robust information highway. A central component of this strategy is leveraging the Universal Access and Service Fund (UASF), which is specifically tasked with subsidizing and extending broadband connectivity into remote, unserved, or high deployment cost areas, thereby addressing the persistent digital divide between urban and rural populations.

While the primary Maitlamo Policy and the subsequent Broadband Strategy focus heavily on the act of deployment and the goals of universal access, they do not historically contain specific, explicit mandates for a public, institutionalized broadband mapping system. The policy tasks the regulator, BOCRA, with ensuring compliance, monitoring service quality, and enforcing licensing terms, which inherently involves collecting operator data. However, the development of sophisticated, public geographic information system that enables mapping has generally been treated as an operational requirement within the strategy's monitoring and evaluation framework, rather than a standalone, legislated policy pillar.

The Botswana Communications Regulatory Authority Act - CRA (2012) is the foundational piece of legislation that established the Botswana Communications Regulatory Authority (BOCRA) as an independent body. The Act's primary purpose was to converge the regulation of the country's entire communications sector, replacing the previous fragmented regulatory environment (which included the Telecommunications Act of 1996 and the Broadcasting Act). It created a unified regulatory authority responsible for telecommunications, internet and ICTs, radio communications, broadcasting, and postal services, ensuring a consistent and streamlined regulatory approach across these interconnected industries.

CRA grants BOCRA a broad and comprehensive mandate. Administratively, BOCRA is responsible for promoting and ensuring universal access to communications services, which includes imposing a universal access and services levy on operators to fund expansion, and promoting enhanced performance across the regulated sectors. Regulatory responsibilities focus on ensuring that services are safe, reliable, efficient, and affordable throughout Botswana, with a specific duty to protect the interests of consumers regarding pricing, availability, quality, and variety of services. CRA explicitly requires BOCRA to take the needs of low-income, rural, or disadvantaged groups into account when regulating operators. BOCRA oversees the Universal Access and Services Fund (UASF), which subsidizes broadband rollout in rural and underserved areas. Complementing this, the SmartBots initiative promotes digital access in public facilities such as clinics, schools, and tribal administration offices. However, despite these advances, Botswana does not yet have specific policy provisions or operational mechanisms for broadband mapping.

When it comes to data collection, CRA to some extent empowers BOCRA to obtain information regarding mapping of broadband services and infrastructure through noted legal instruments, primarily focusing on its general power to acquire information and its specific duty to monitor the regulated sectors.

Section 8 (“Power to Obtain Information”) grants BOCRA the authority to compel regulated entities to provide necessary data "… from any regulated supplier such information as the Authority deems necessary to enable it to carry out its functions under this Act." Since BOCRA's mandate includes ensuring universal access and monitoring performance, it can

use this power to demand data on network coverage, infrastructure deployment, and broadband service quality.

"Information" in CRA is broadly defined to include "any information which is in the actual possession, custody or control of any person or can reasonably be obtained by that person." This ensures BOCRA can request both existing records and information that is reasonably derivable, such as network topology or geographical coverage maps.

Additionally, any request for information must specify the "nature and type of the information sought" and the "format and the time within which the information is to be provided," establishing a clear, enforceable mechanism for data collection.

Section 6, defining Regulatory Responsibility for Monitoring, explaining the necessity of collection of data on service reach and performance, states, that BOCRA is required to "monitor the performance of the regulated sectors in relation to levels of investment, availability, quantity, quality and standards of services... and any other matters decided upon by the Authority." The terms "availability" and "quantity" of services can directly pertain to mapping of location where services are available and how many people are served (eg. broadband penetration).

Section 50 mandates the maintenance and provision of customer data, which is crucial for determining service reach. A regulated operator "shall maintain a register of its customers or subscribers" and "provide information to the Authority or such other person as the Authority may designate." Subscribers location data, if requested by the Authority, provides direct evidence of where services are being utilized, which can be used for mapping service penetration and reach. The information is required to be "made available to the Authority upon written request".

5. Data governance and interoperability frameworks

A credible broadband mapping system depends on more than a technical platform: it requires, among others, clear rules on data ownership, data collection process, validation mechanisms, sharing protocols and rules on data protection, with focus on how different datasets are made interoperable. In Botswana, the foundations for such a framework already exist in sectoral legislation (notably the CRA Act), statistical and land-survey laws, and the broader digital policy environment as described in a chapter 4. However, these instruments have not yet been translated into a coherent, cross-sector data governance regime specifically tailored to broadband mapping. This chapter therefore outlines the institutional and legal foundations, proposes data-sharing protocols and access rights, and describes governance models for multi-stakeholder collaboration that can support a sustainable system.

5.1 Institutional and legal foundations for data governance

At present, BOCRA is partly empowered under the CRA to request information from regulated providers and to monitor the performance of the communications sector in terms of availability, quality and coverage of services. These provisions could provide a legal basis for collecting broadband infrastructure and coverage data from operators and other licence holders. Please see chapter 4 for further details. In parallel, Statistics Botswana is mandated to collect, validate and disseminate official statistics, including geo-referenced census and survey data; the Department of Surveys and Mapping provides authoritative geospatial base maps and maintains core spatial reference systems. Sectoral ministries hold administrative datasets relating to public facilities, roads, energy and other critical infrastructure. Despite this foundation, national consultations and the August 2025 event highlighted several gaps: the absence of a dedicated, cross-sector national data-sharing framework, the lack of a data classification policy distinguishing public, restricted and confidential datasets, and limited standardisation of data formats and updates across institutions. These gaps result in fragmented data flows, ad hoc information exchange and limited reuse of existing datasets as well datasets are not updated on a regular basis, consequently limiting the ability to monitor time series..

To address these issues, Botswana should build a broadband-mapping-specific data governance framework on three pillars:

- Legal clarity: Use the existing powers of BOCRA under the CRA Act to make broadband data submission a formal licensing obligation, specifying minimum datasets, quality thresholds and update frequencies. Where necessary, secondary legislation or BOCRA directives can provide operational detail on exchange formats, metadata and penalties for non-compliance.
- Horizontal alignment: Develop a government-wide data governance policy, led by MCIE in collaboration with BOCRA, Statistics Botswana, DSM and other ministries, that defines overarching principles for data quality, stewardship, retention, access and reuse. Broadband mapping can serve as a flagship use case within this broader framework.
- Integration with national strategies: Ensure that the data governance framework is explicitly referenced in the implementation of the National Broadband Strategy, SmartBots, and future instruments such as the Digital Services Bill and cyber-security legislation, so that broadband data is treated as a strategic national asset rather than a sectoral by-product.

5.2 Data sharing protocols and access rights

To operationalise these principles, Botswana will need standardised data-sharing protocols and a clear definition of access rights for different user categories.

On the technical side, data-sharing protocols should be based on:

- Standardised templates and exchange formats also containing specific instructions for operator submissions, covering at minimum:
  – fixed and mobile coverage (technology, downlink/uplink speeds, QoS indicators);
  – backbone and access routes of electronic communication networks and facilities;
  – tower and base station locations with specific parameters such as azimuth (antenna direction);
  – connected public facilities (schools, health centres, dikgotla, government offices);
  – Universal Access and Service Fund (UASF) projects and other subsidised deployments.
- Machine-readable formats (e.g. GeoJSON, shapefile, Geopackage, GDB, or well-structured CSV including coordinates) with mandatory metadata describing methods, reference dates, coordinate systems and coverage definitions.
- Secure data-exchange channels, such as BOCRA-hosted SFTP, web-based upload portals and, in the medium term, API-based interfaces for automated updates from operators and public agencies.

On the governance side, access rights should follow a tiered model:

1. Internal, full-detail access: BOCRA, the Project Steering Committee and authorised technical staff from key institutions (MCIE, DSM, Statistics Botswana, DTRP, selected security agencies) should have access to full-resolution infrastructure data, including sensitive layers (e.g. critical sites, backbone routes, cross-border links). Access should be governed by confidentiality agreements, role-based permissions and audit trails.
2. Professional, limited access: Licensed operators, utilities, and accredited researchers should access detailed but partially aggregated datasets where necessary (for example at grid-cell or street-segment level) sufficient for network planning, investment analysis and academic research, while masking or generalising strategic elements that could present security risks.
3. Public portal access: The national interactive broadband map—hosted by BOCRA—should provide highly aggregated, user-friendly information for citizens, businesses and local authorities, such as coverage by technology, advertised speeds, connected public facilities and the status of UASF or government-funded projects. Publication should follow open data principles wherever possible, in line with emerging national open-data policies and international best practice.

Implementing this tiered access model will require a data classification policy that categorises all broadband-related datasets into public, restricted and confidential classes, with clear criteria, retention rules and handling procedures.

5.3. Governance models for multi-stakeholder collaboration

Sustainable data governance for broadband mapping cannot be managed by BOCRA alone. The outcome of the national event and subsequent consultations suggests the creation of a two-tier governance model:

- A Project Steering Committee (PSC) at Permanent Secretary level, chaired by BOCRA should approve data-governance policies, endorse annual workplans and budgets, resolve escalated disputes, and ensure alignment with national development priorities and regional initiatives such as CRASA.
- A Technical Working Group (TWG) composed of experts from BOCRA, DSM, Statistics Botswana, DTRP, SmartBots/Ministry of Education, BoFiNet, operators and utilities. The TWG should be responsible for:
  – defining technical standards and exchange formats;
  – coordinating data submissions and validation cycles;
  – advising on system architecture and interoperability;
  – monitoring data quality and recommending corrective measures.

Both bodies should operate under formal Terms of Reference that specify roles, decision-making procedures, meeting frequencies and reporting lines. To maintain momentum, the PSC should meet at least twice a year, while the TWG should meet quarterly, aligned with planned data-update cycles.

Finally, governance arrangements should encourage regional harmonisation and knowledge exchange. Botswana's mapping framework should seek alignment with emerging regional practices under CRASA and draw on European experience documented by ITU and BEREC, including methodologies and data definitions for geographical surveys, QoS mapping and VHCN definitions. This will not only improve technical robustness but also reinforce Botswana's role as a regional leader in broadband mapping. More details on this will be provided in Chapter 7 of the report.

6. Institutional capacity

Developing and sustaining a national broadband mapping system requires not only the right technology and regulatory framework, but also strong institutional capacity across all organisations involved in data collection, validation, analysis and system governance. Discussions during the national Africa-BB-Maps event highlighted that Botswana has committed and technically capable institutions, yet existing capacities—particularly in GIS expertise, data management, validation workflows, inter-agency coordination and operational resourcing—remain uneven and need systematic strengthening to support a modern and continuously updated broadband map. BOCRA, as the designated custodian of the system, will require enhanced technical, human and organisational capabilities, while public-sector agencies, operators and utilities must similarly develop skills, processes and tools to ensure accurate data flows and effective collaboration. This chapter assesses the current institutional readiness, identifies the main capacity gaps and bottlenecks, and outlines measures needed to build a resilient, future-proof institutional ecosystem capable of supporting the broadband mapping system in the long term.

6.1 Relevant stakeholders and institutional roles

6.1.1 BOCRA - Botswana Communications Regulatory Authority

The Botswana Communications Regulatory Authority (BOCRA) was established by the Communications Regulatory Authority Act of 2012 to serve as the unified, converged regulator for the entire communications sector in Botswana, including telecommunications, broadcasting, postal services, and internet/ICTs. BOCRA's core mandate in the telecommunications sector is centred on market liberalization, promoting universal access, and ensuring competitive service delivery. Key competencies include licensing operators under the modern converged framework, which comprises Network Facilities Provider (NFP) and Services and Applications Provider (SAP) licences, replacing the older Public Telecommunications Operator (PTO) system. By controlling the entry and operation of providers like Mascom, Orange, and BTC, BOCRA shapes the market structure.

BOCRA is explicitly responsible for managing Botswana's critical national resources to facilitate telecommunications growth. This involves the efficient management of the radio frequency spectrum for all wireless communications (a crucial element for mobile broadband deployment) and the establishment of a fair and non-discriminatory numbering and domain name system. Furthermore, the Authority is tasked with setting and enforcing technical Type Approval standards for communications equipment connected to the national network, ensuring that all devices are safe and compliant with international standards. Through its regulatory oversight, BOCRA aims to foster competition and private sector investment, which in turn drives the affordability, quality, and variety of telecommunications services available to consumers across the country.

BOCRA is arguably the most significant institutional stakeholder in Botswana’s broadband deployment and mapping efforts because its statutory mandate directly connects regulatory authority with strategic national development goals. Firstly, BOCRA is the administrator and key beneficiary of the Universal Access and Service Fund (UASF), which is financed by levies on communication service providers. This fund is the primary financial mechanism used by the government to subsidize the rollout of broadband infrastructure to underserved and unserved communities and finance national initiatives like school connectivity. BOCRA’s control over the allocation of this capital makes it the decision-maker for where and how crucial last-mile broadband infrastructure is deployed, especially in rural areas that are not commercially viable for private operators.

Secondly, the Authority's role in data collection and policy implementation makes it central to mapping. BOCRA is the entity, which is most suitable to be fully legally empowered to compel all licensed operators to submit information regarding service availability, quantity, quality, and coverage. This data is the raw material necessary to create accurate broadband maps that identify existing connectivity gaps—the core objective of national mapping initiatives, such as the Africa Broadband Maps project in which BOCRA is a partner. By publishing reports like the Broadband Facts and Figures, BOCRA translates this raw data into actionable intelligence for the government and industry stakeholders. Therefore, BOCRA not only enforces the rules of the telecommunications market but also controls the financial resources and the critical information required to plan, finance, and execute the national vision for universal high-speed broadband access as articulated in the National Broadband Strategy[85].

6.1.2 MCIE – Ministry of Communication and Innovation

The Ministry of Communications and Innovation (MCIE), which houses the Department of Digital Communication, Infrastructure and Business (DCIB), is the policy development and strategic leader for the entire communications and technology sector in Botswana. Its core mandate is to provide overall leadership, formulate national policy, set strategy, and establish standards governing communications, research, science, technology, and knowledge utilization. Unlike the regulator BOCRA, which implements the rules, the Ministry formulates them, aiming to facilitate an enabling environment that will realize a digitally transformed knowledge economy.

Concerning telecommunications, the Ministry's key functions are to develop and review policies and laws—such as the National ICT Policy (Maitlamo) and the National Broadband Strategy. This includes setting the direction for cybersecurity and network infrastructure development. The MCIE is also responsible for facilitating the development and maintenance of reliable, efficient, and secure ICT network infrastructure. Furthermore, the Ministry oversees the performance contracts of all major state-owned enterprises (SOEs) in the sector, including the wholesale infrastructure provider, BoFiNet, and the retail incumbent, BTC, ensuring their actions align with national policy goals like increased connectivity and economic diversification.

The MCIE's role as the policy owner and financial orchestrator makes it the primary strategic stakeholder in broadband deployment. Firstly, the Ministry is the architect of the overarching national digital transformation agenda, encapsulated in the SmartBots Strategy, which aims to connect the country and bridge the digital divide. Under this strategy, the MCIE champions major government programs, such as the SmartBots Village Connectivity Programme, and allocates substantial budgetary resources (as seen in recent annual budgets) to accelerate these initiatives. This includes funding the expansion of networks to connect public institutions like schools and hospitals, demonstrating its direct involvement in determining the scope and scale of infrastructure rollout.

Secondly, the Ministry holds the ultimate authority over all major infrastructure investment decisions by state entities. The MCIE was responsible for the strategic decision to structurally separate the incumbent operator and establish BoFiNet as the wholesale fibre network provider, which is arguably the most critical piece of national broadband deployment. By guiding BoFiNet, the Ministry mandates the national fibre backbone rollout and ensures that high-capacity international connectivity is secured. While BOCRA manages the UASF day-to-day, the Ministry sets the policy direction for how those funds are ultimately deployed to

[85] BOCRA. https://www.bocra.org.bw/

achieve the universal service goal. Therefore, the Ministry sets the strategic vision, controls the budget, and directs the state-owned companies that physically deploy the national backbone, making it the most significant strategic driver of all broadband and mapping initiatives[86].

6.1.3 DSM – Department of Surveys and Mapping

The Department of Surveys and Mapping (DSM), operating under the Ministry of Land Management, Water and Sanitation Services, serves as Botswana's National Mapping Agency. Its core competencies and mandate are deeply rooted in establishing and maintaining the authoritative geospatial foundation for the entire country. The DSM is primarily established under the Land Survey Act[87] and is responsible for collecting, managing, and disseminating all fundamental geospatial information and services. This includes undertaking and overseeing cadastral land surveying, developing a robust geodetic referencing system, and executing national mapping programs that produce topographic, thematic, and orthophoto maps at various scales.

The Department's role as a data caretaker is critical: it maintains the Geographic Information System (GIS), which integrates cadastral, geodetic, and topographic databases. This system acts as the central repository for foundational geographic information, ensuring data quality and availability for both the government and the public. The DSM's processes involve rigorous examination and approval of all land survey records, general plans, and diagrams before any land registration is affected. Furthermore, the Department is the authoritative source for digital elevation models (DEMs) and remote sensing data, both of which are essential components for sophisticated land-use planning, infrastructure monitoring, and accurate statistical analysis.

DSM is a major stakeholder in broadband deployment and mapping because it provides the essential geographic context and base data without which effective network planning and accurate gap analysis are impossible. Accurate broadband mapping relies entirely on having precise background layers, such as digitized roads, power lines, topography (DEMs), and building locations. The DSM is the sole source for this authoritative base data, ensuring that connectivity maps are geometrically correct and spatially accurate, thereby preventing costly deployment errors.

Furthermore, the DSM's mandate for land management directly intersects with the deployment phase of broadband infrastructure. Deployment requires the physical installation of fibre optic cables, which necessitates accurate cadastral information (land boundaries and ownership), planning permissions, and approved layout plans for subdivisions and townships. By managing and approving these land survey records, the DSM controls the legal and physical path of new infrastructure. Any major network operator, whether private (Mascom) or state-owned (BoFiNet), must rely on the DSM's approved land data to secure rights-of-way, locate poles, or lay fibre, thereby making the DSM a key enabler—or potential bottleneck—for the efficient and cost-effective expansion of the national broadband network.

[86] The Ministry of Communications and Innovation (MCIE). https://www.gov.bw
[87] Legislation available: https://botswanalaws.com/consolidated-statutes/principle-legislation/land-survey

6.1.4 Statistics Botswana

Statistics Botswana (SB) is the apex body within Botswana's National Statistical System (NSS), mandated by the Statistics Act[88] of 2009 to be the authoritative source for official national statistics. Its core mandate is to collect, process, compile, analyse, publish, disseminate, and archive a wide range of social and economic statistics to inform national planning, policy, and decision-making. This function is critical for tracking national development plans, the National Vision 2036[89], and the Sustainable Development Goals (SDGs). SB is also responsible for coordinating, monitoring, and supervising the entire NSS to ensure that all data produced by various government agencies adheres to strict national and international statistical standards and methodologies.

In terms of data collection and caretaking, SB's competencies are robust. The agency conducts large-scale, nationwide statistical operations, most notably the Population and Housing Census (every 10 years) and various large-scale sample surveys (like the Quarterly Multi-Topic Survey and specialized surveys on employment, health, and consumption). The Statistics Act grants the Statistician General authority to access administrative data and records from other agencies, ensuring comprehensive data coverage. Crucially, the agency is committed to ensuring data quality, accuracy, and reliability through the implementation of the Botswana Data Quality Assessment Framework (BDQAF). This commitment extends to modernizing data collection, moving from paper-based to electronic systems, and utilizing Geographic Information Systems (GIS) for accurate data capture and dissemination.

Statistics Botswana is an indispensable major stakeholder in broadband mapping and deployment because it provides the demand-side demographic and socio-economic context that all technical mapping efforts rely upon. The regulator (BOCRA) provides supply-side data (where the network is built), but SB provides the demand-side data (where the people are, who they are, and how they use the network).

Firstly, SB's extensive ICT Household Surveys provide the definitive measure of broadband penetration and the digital divide. These surveys track metrics like the percentage of households with internet access, the mode of access (mobile vs. fixed), computer ownership, and internet use by district. This granular, geographically coded data is essential for identifying underserved areas based on socio-economic need, not just technical feasibility. For instance, the data revealed that internet access is significantly higher in urban areas (e.g., Gaborone) than in rural areas, providing the quantifiable evidence needed by the Universal Access and Services Fund (UASF) to prioritize its subsidy allocation.

Secondly, SB's recent efforts in modernizing its census cartography directly benefit broadband mapping and deployment. By employing modern geospatial technologies for the 2021 Census, SB mapped the coordinates for every structure and developed Enumeration Area (EA) maps with high precision. This provides deployment operators like BoFiNet and private mobile operators with the foundational geographic data necessary to accurately plan network expansion, estimate resource requirements (e.g., number of base stations needed), and ensure their infrastructure efficiently reaches specific population clusters rather than just covering large, empty geographical areas[90].

[88] Statistics Botswana. Statistics Act 2009. https://www.statsbots.org.bw/sites/default/files/documents/Statistics%20Act%202009.pdf
[89] Statistics Botswana. The National Vision 2036 https://www.statsbots.org.bw/sites/default/files/documents/Vision%202036.pdf
[90] Statistics Botswana. https://www.statsbots.org.bw

6.1.5 DTRP – Department of Town and Regional Planning

The Department of Town and Regional Planning (DTRP), under the Ministry of Lands and Water Affairs, is mandated by the Town and Country Planning Act (TCPA) of 2013 to facilitate the orderly and sustainable spatial development of land across both urban and rural areas of Botswana. Its core competency lies in formulating the National Physical Planning Policy and preparing the statutory Regional and Local Development Plans. These plans dictate the optimal use of land, zoning regulations (e.g., residential, commercial, industrial), and the preservation of amenities within declared planning areas.

Concerning telecommunications and data caretaking, the DTRP's influence is rooted in physical development control rather than direct technical regulation. The Department is the gatekeeper for all "development" (which includes any building, engineering, or mining operations) on land. Building of telecommunications infrastructure, such as fibre optic cables, mobile towers, or data centres, falls under the scope of engineering operations, requiring planning permission from the local planning authorities overseen by the DTRP. The DTRP acts as a data consumer, utilizing geospatial information from the Department of Surveys and Mapping (DSM) to inform its planning decisions, and it maintains extensive records related to approved layout plans and land use changes, which are fundamental spatial data assets.

The DTRP is a major stakeholder in broadband deployment because it wields the legal and physical power of veto over where and how all fixed and mobile infrastructure can be physically placed. Any telecommunications operator, whether the national wholesaler BoFiNet or a private mobile provider, must obtain planning permission from the local physical planning committees, which operate under the DTRP's guidance, before initiating construction.

This approval process directly impacts deployment costs, timelines, and technical feasibility. For instance, the DTRP decides the permissible height of cell towers in residential areas, whether fibre can be buried beneath a specific road, or if a data centre is allowed in a planned industrial zone. Furthermore, the DTRP ensures that serviced land includes provisions for essential infrastructure like water, power, and, critically, telecommunication ducts. By pre-planning the right-of-way and utility corridors in new developments, the DTRP reduces the logistical and legal barriers for network deployment, effectively acting as an enabler of cost-effective, future-proof broadband expansion by incorporating digital readiness into the nation’s physical geography.

6.1.6 Department of Educational Technology / Smart Botswana

The Ministry of Education and Skills Development (MoESD), specifically through the Department of Educational Technology (DET), which operates under the framework of the national SmartBots initiative, holds an additional mandate concerning telecommunications. The DET’s core competency is not regulatory or infrastructural, but educational and utilization-focused. Its primary role is to drive the integration of ICT into the national education system, ensuring that schools, teachers, and students have the necessary digital literacy skills and access to technology to support learning and administration. This involves developing digital content, managing educational software, and implementing technology training programs. Its mandate is to facilitate the use of connectivity across every educational institution makes it a massive consumer and driver of national telecom requirements.

The Department of Educational Technology (DET), operating under the SmartBots umbrella, is a major stakeholder in broadband deployment and mapping primarily because it represents the largest single institutional demand for universal high-capacity broadband access in Botswana. The government’s goal of providing every school with quality internet access

translates into a national requirement to connect thousands of specific, geographically defined points across the entire country, including the most remote rural areas. Consequently, the DET's strategic plan essentially defines a vast portion of the unmet demand and the required Quality of Service (QoS) for the telecommunications sector.

When broadband mapping is conducted, the location of every school becomes a mandatory target for network coverage, instantly highlighting critical gaps where connectivity is either non-existent or inadequate. The DET uses this mapped data to report back to the Ministry of Communications and Innovation (MCIE) and the Universal Access and Services Fund (UASF), advocating for the necessary funding and intervention to meet its educational mandates. By quantifying the need for high-speed connectivity in specific geographic locations nationwide, the DET provides the essential demand-side justification and locations that both BOCRA and private operators should use to prioritize network rollout plans and measure the success of the national universal access goals[91].

6.2 Human and technical capacity development

The successful implementation and long-term operation of Botswana's broadband mapping system depend on the availability of appropriate human resources and technical capabilities across BOCRA and partner institutions. The August 2025 national event confirmed that while Botswana already possesses pockets of advanced expertise—particularly in BOCRA's Network and QoS teams, in BoFiNet's GIS and planning units, and within DSM and Statistics Botswana—these capacities are unevenly distributed and not yet organised around a unified mapping mandate.

On the human capacity side, several priority profiles are needed:

- GIS and geospatial analysts, capable of managing the enterprise ArcGIS environment, integrating disparate datasets, running spatial analyses and generating standard outputs for regulators and policymakers.
- Data engineers and database administrators, responsible for designing and maintaining the underlying data architecture, ETL (extract-transform-load) processes, APIs and backup routines.
- Telecommunications engineers and planners, who can interpret network topologies, coverage metrics and QoS indicators and translate them into meaningful geospatial representations.
- Policy and legal experts, able to design and implement data-sharing agreements, licensing conditions and compliance mechanisms, ensuring that the mapping system remains anchored in a solid legal framework.
- End-user champions within ministries and agencies (e.g. SmartBots, health, education, local government) who can use the mapping outputs to guide sectoral planning and provide feedback on usability.

A structured capacity development plan should therefore be implemented over the 2026–2028 period, aligned with the "learning by doing" approach agreed in the national roadmap. Key elements include:

- Targeted training for BOCRA, DSM, Statistics Botswana, DTRP and SmartBots staff on ArcGIS administration, geostatistical analysis, data validation and open-data publication.

[91] The Department of Educational Technology. https://www.gov.bw

- Secondments and joint working sessions between BOCRA and operators' GIS teams to harmonise methodologies and build trust around data quality and interpretation.
- Participation in ITU and regional (CRASA) workshops on broadband mapping, data governance and QoS monitoring, leveraging Slovenia and other reference countries as practical case studies.
- Long-term partnerships with universities and technical institutes in Botswana to incorporate broadband mapping, geospatial analytics and data-governance topics into curricula, ensuring a pipeline of qualified graduates.

On the technical capacity side, BOCRA and its partners will need to ensure that the enterprise ArcGIS deployment is supported by:

- Adequate server and storage resources, including redundant systems and disaster-recovery arrangements.
- Secure connectivity and authentication mechanisms for internal and external users.
- Standardised software environments and licences for participating institutions to avoid fragmentation and compatibility issues.
- A test environment where new datasets, tools and visualisation features can be trialled before production deployment.

Together, these human and technical capacity measures will transform broadband mapping from a one-off project into a sustainable national capability embedded within Botswana's broader digital governance ecosystem.

6.3. Institutional coordination mechanisms

Given the number and diversity of stakeholders involved in broadband mapping, effective institutional coordination is essential to avoid duplication, ensure consistent data flows and maintain stakeholder commitment over time. The Botswana National Africa-BB-Maps event and subsequent meetings already sketched out a coordination model centred on BOCRA as custodian, supported by a high-level steering structure and a technical working group.

In practical terms, three complementary coordination layers are proposed:

1. **Strategic coordination (policy level)**
   Led by the Ministry of Communications and Innovation, this layer ensures that broadband mapping remains aligned with national development strategies, including the National Broadband Strategy, SmartBots, Vision 2036 and sectoral digitalisation plans (education, health, local government). It operates through the Project Steering Committee.
2. **Operational coordination (technical level)**
   The Technical Working Group, chaired by BOCRA, functions as the main forum for day-to-day coordination of data collection, validation, system maintenance and feature development. It includes technical representatives from operators, utilities and relevant public agencies. The TWG agrees on implementation timelines, resolves technical issues (e.g. data format inconsistencies, coverage definitions, coordinate reference systems), and recommends adjustments to standards or procedures based on operational experience.
3. **Project-level coordination (implementation level)**
   For specific initiatives—such as integrating GIGA school-connectivity data, launching a new public portal module, or preparing a UASF-funded rollout—the relevant sectoral stakeholders form ad-hoc project teams under BOCRA's facilitation. These teams have

clearly defined deliverables and timelines and report back to the TWG and, where relevant, to the Steering Committee.

To support these mechanisms, BOCRA should maintain a formal communication and reporting framework, including:

- an annual broadband-mapping workplan approved by the Steering Committee;
- quarterly technical progress notes summarising data updates, system enhancements and outstanding issues;
- an incident and change-management procedure for the mapping platform; and
- clear contact points in each participating institution.

This structured approach to coordination will help ensure that the mapping system remains accurate, trusted and relevant to the evolving needs of policymakers, regulators, operators and end users.

7. Proposals and Recommendations

7.1 Policy and Strategic Recommendations

This section outlines the key policy and strategic recommendations required to establish a sustainable, legally grounded and institutionally coordinated broadband mapping system in Botswana. These recommendations build directly on the findings from the national Africa-BB-Maps event (August 2025), the BOCRA questionnaire, stakeholder discussions and subsequent consultations. They address immediate priorities ("first solutions to implement") as well as medium-term structural reforms. To initiate implementation of these recommendations, it is highly advisable that BOCRA, immediately following the finalisation of this report, convenes structured meetings with all relevant stakeholders identified through the questionnaire process. These meetings should serve to discuss the recommendations, agree on a common way forward, and formally initiate arrangements, including the establishment of the proposed Steering Committee and Technical Working Group (TWG). Early stakeholder engagement will be critical for building ownership, clarifying roles and ensuring coordinated implementation.

7.1.1 Immediate Priority Actions

Define a level of data sensitivity of data (sensitive vs. public data) through a multi-stakeholder process. Following the strong consensus reached at the national event, Botswana should (1) convene BOCRA, DSM, operators, utilities and security representatives to define which datasets are:

- public (e.g., aggregated coverage maps),
- restricted (e.g., municipal-level fibre availability),
- confidential (e.g., backbone fibre routes, critical nodes).

This classification is essential for building trust and ensuring compliance with future mandates.

(2) Standardise data submission templates and data formats across all stakeholders. Operators, utilities and mapping authorities currently use heterogeneous data formats. Harmonised submission templates—based on the TWG's technical standards—are required to ensure interoperability and automation.

(3) Address anticipated operational barriers early on. Challenges include:

- unsystematic or incomplete geospatial datasets,
- lack of consistent addressing systems in rural areas,
- absence of a national data-sharing policy,
- fragmented submission practices among operators and utilities.

These barriers must be addressed through coordinated capacity building and clearer regulatory requirements.

7.1.2 Strengthening the Legal and Regulatory Foundations

Mandate broadband data submission through licensing and regulation, BOCRA already has certain legal basis and authority under the CRA Act, but the process should be formalised through:

- secondary legislation and guidelines on clarifying and defining BOCRA's ability to request, process and use data, including data extent and types,
- updated licence conditions,
- BOCRA directives on mandatory datasets, accuracy, metadata, and update cycles,
- enforcement mechanisms proportional to non-compliance, as demonstrated in the Slovenian model including penalties and incentives to ensure compliance. Examples include:
  - administrative penalties for late or inaccurate submissions,
  - reduced regulatory fees or priority access to rights-of-way for compliant operators.

Use MoUs and Data Sharing Agreements as transitional instruments. Until national legislation and the Digital Services Bill are fully in place, MoUs can ensure predictable cooperation and clarify confidentiality and responsibilities.

7.1.3 Building Institutional and Human Capacity

(1) Prioritise capacity building in GIS, analytics and compliance enforcement. Botswana requires a consistent skills base within:

- BOCRA (GIS, QA/QC, database management),
- DSM (spatial integration, national basemaps),
- Statistics Botswana (population modelling),
- operators/utilities (data validation and standardisation).

(2) Implement a multi-year training programme (2026–2028). Aligned with the national roadmap, ITU will support:

- GIS and database training,
- coverage modelling and validation,
- cybersecurity and data protection standards,
- regulatory compliance systems.

7.1.4 Transparency, Accountability and Public Value

(1) Publish regular broadband maps to empower users and increase accountability and transparency. Public transparency enhances competition, improves QoS expectations and supports community-level digital planning. Slovenia's experience illustrates how public visibility improves operator performance as well as data quality.

(2) Ensure that public maps focus on aggregated, non-sensitive information, such as:

- coverage by technology,
- connected public facilities,
- progress of UASF-funded rollouts.

7.1.5 Ensuring Long-Term Sustainability

(1) Integrate broadband mapping into national budgeting processes. The map must not rely on ad hoc funding. Sustainable financing should come from:

- the national ICT budget,
- BOCRA's operational budget,
- future donor-supported technical assistance,

- possible public–private collaboration on shared datasets.

(2) Align mapping with national digital transformation programmes. SmartBots, e-government platforms, and sectoral digitalisation (education, health, agriculture) should become systematic users of mapping outputs.

(3) Promote the positive aspects and impacts of the broadband mapping system, as well as information availability, for all types of stakeholders.

7.2 Implementation Roadmap

The implementation of a national broadband mapping system requires a structured, phased and institutionally coordinated approach. Building on the outcomes of the Botswana National Africa-BB-Maps Event (August 2025), the maturity assessment, and international best practices such as the Slovenian model, this report recommends an implementation roadmap that clearly defines governance structures, responsibilities, workflows and technical milestones. The roadmap is designed to guide Botswana from foundational readiness to full operationalisation, ensuring that the system is not only technically sound but also legally grounded, institutionally sustainable and aligned with national digital transformation priorities. By adopting this coordinated approach—supported by a RACI responsibility model and dedicated working groups—Botswana can ensure predictable collaboration among stakeholders, strengthen regulatory oversight, and deliver a broadband mapping platform that remains accurate, transparent and future-pro.

7.2.1 Overview of the RACI Model (Short Explanation)

The implementation of Botswana's national broadband mapping system involves a wide range of institutions with distinct mandates, datasets, and responsibilities. To ensure clarity, avoid duplication and establish predictable workflows, a RACI responsibility matrix is used to define who is Responsible **(R)** for executing tasks, who is Accountable **(A)** for final approval, who must be Consulted **(C)** during implementation, and who should be Informed **(I)**. The RACI model provides a structured governance backbone for the project, ensuring that BOCRA—as custodian—retains regulatory and operational accountability, while operators, utilities, mapping authorities and policy bodies each fulfil their respective roles in data provision, validation, and strategic oversight. Including the RACI matrix directly supports coordination, accelerates decision-making, and standardises multi-stakeholder collaboration throughout the implementation of the broadband mapping system.

7.2.2 Stakeholder Overview Table

The successful implementation of a national broadband mapping system depends on the coordinated participation of a diverse set of institutions spanning regulation, policy, network operators, spatial authorities, utilities, transport agencies and development partners. For clarity and to ensure structured engagement, all relevant stakeholders are grouped below according to their institutional category and functional role within the broadband ecosystem. This categorisation also forms the basis for the subsequent RACI responsibility matrix, where each actor's specific contribution to legal frameworks, data provision, validation, platform operation and policy use is defined. The table provides a consolidated overview of all entities whose collaboration is essential for the development, operation and long-term sustainability of Botswana's broadband mapping system.

Table 4: Relevant stakeholders in Botswana

Category	Stakeholder / Institution	Role in Broadband Mapping Ecosystem
Regulator & ICT Policy Bodies	BOCRA – Botswana Communications Regulatory Authority	National regulator; custodian of broadband mapping; data governance lead
	Ministry of Communications and Innovation (MCIE)	Telecommunications & digital policy; strategic oversight; alignment with national ICT goals
	SmartBots	National digital transformation programme; integration with e-government and smart services
Telecom Operators	Mascom Wireless	Mobile & fixed broadband provider; telecom data submission
	Orange Botswana	Mobile & fixed broadband provider; telecom data submission
	BTC / BTC	Fixed/mobile operator; fibre and access network data submission
	BoFiNet	National wholesale backbone operator; backbone and PoP data submission
Mapping, Land & Spatial Authorities	Department of Mapping and Surveys (DMS)	National base maps, geodetic reference, spatial standards
	Department of Town & Regional Planning (DTRP)	Spatial planning, zoning, development layers
	City & Town Councils	Local planning data, permits, rights-of-way
Infrastructure Utilities	Botswana Power Corporation (BPC)	Power grid infrastructure; utility corridors for shared deployment
	Water Utilities Corporation (WUC)	Water infrastructure; trenching coordination
Transport Authorities	Department of Roads	Road network, transport corridors, rights-of-way
International / Development Partners	ITU	Technical assistance, methodology, training, QA/QC support
	European Union (EU)	Funding support under Africa-BB-Maps
	UNICEF (GIGA initiative)	School connectivity data; integration with national mapping
Other Actors	Statistics Botswana	Population datasets, census grids, ICT access indicators

ITU, 2025.

RACI roles:

R – Responsible: who does the work
A – Accountable: who owns the result and signs it off (only 1 per activity, ideally)
C – Consulted: who must be asked and involved (two-way communication)
I – Informed: who just needs to be kept in the loop (one-way communication)

Key activities (columns):

1. A1 – Legal & governance framework for BB mapping
2. A2 – Collecting & validating telecom network data (coverage, capacity, etc.)
3. A3 – Collecting & validating other infrastructure/utility data
4. A4 – Base maps, spatial data & planning layers
5. A5 – Operating & maintaining the national broadband map/portal
6. A6 – Using outputs for policy, planning & funding decisions

A) Regulator & ICT policy

Table 5: RACI matrix (Regulator & ICT policy)

Stakeholder	Role category	A1 Legal & governance	A2 Telecom data	A3 Other infra data	A4 Base & planning data	A5 Map operation	A6 Policy & planning use
BOCRA	Regulator	A/R – leads regulatory framework for data sharing, confidentiality, standards	A/R – defines templates, collects and validates operator data	C – consulted on what infrastructure data is needed	C – consulted on GIS standards and integration	A/R – owner/operator (or co-owner) of mapping platform	R – prepares regulatory reports, market analysis; C for high-level policy
Ministry (Department of Digital Communication, Infrastructure and Business / MCIE)	Policy maker	A/R – politically accountable for national policy and alignment with ICT strategies	I – informed about telecom data status	I – informed about infra datasets	I – informed about spatial datasets	C – consulted on data confidentiality, open data policy	A/R – uses outputs for strategy, funding and legislation
SmartBots	Digital transformation programme	C – consulted to align with digital strategy	I – informed about telecom data for smart services	I – informed about infra data	C – consulted for smart-city / e-services layers	C – may co-sponsor UX, integration with e-Government	R – uses map outputs for prioritising smart projects, inclusion, etc.

ITU, 2025.

B) Electronic communications operators (fixed & mobile)

Table 6: RACI matrix (Electronic communications operators (fixed & mobile)

Stakeholder	Role category	A1 Legal & governance	A2 Telecom data	A3 Other infra data	A4 Base & planning data	A5 Map operation	A6 Policy & planning use
Mascom	Telecom operator	I – must comply with rules	R – provides detailed network and coverage data, responds to validation	I	I	C – consulted on performance, APIs, technical issues	R – uses results for own planning, commercial decisions
Orange Botswana	Telecom operator	I	R – same as above	I	I	C	R
BTC / BTC	Telecom operator (fixed & mobile)	I	R – access, backhaul and coverage data	I	I	C	R
BoFiNet	National fibre backbone (wholesale operator)	I	R – provides backbone, PoP, international gateway data	I	I	C – for integration of backbone visualisation	R – uses map for planning extensions, wholesale offers

ITU, 2025.

C) Mapping, land and spatial planning

Table 7: RACI matrix (Mapping, land and spatial planning)

Stakeholder	Role category	A1 Legal & governance	A2 Telecom data	A3 Other infra data	A4 Base & planning data	A5 Map operation	A6 Policy & planning use
Department of Mapping and Surveys	National mapping	C – consulted on standards, coordinate systems	I	I	A/R – provides base maps, reference layers, coordinates	C – consulted for technical integration, tiling, services	R – uses outputs to improve national spatial data ecosystem
Town & Regional Planning (City/Town Councils, Dept TCP)	Planning authorities	C – consulted to align with spatial planning regs	I	C – consulted for municipal infra data	R – provides zoning, planning boundaries,	C – consulted for adding planning overlays	R – uses map directly for planning new development, conditions, etc.

Stakeholder	Role category	A1 Legal & governance	A2 Telecom data	A3 Other infra data	A4 Base & planning data	A5 Map operation	A6 Policy & planning use
					growth areas		

ITU, 2025.

D + E) Infrastructure utilities + Transport infrastructure

Table 8: RACI matrix (Infrastructure utilities + Transport infrastructure)

Stakeholder	Role category	A1 Legal & governance	A2 Telecom data	A3 Other infra data	A4 Base & planning data	A5 Map operation	A6 Policy & planning use
Botswana Power Corporation (BPC)	Power utility	I	I	R – provides power network routes, substations	I	C – consulted for integration, sensitivity	R – uses map for planning joint corridors with fibre
Water Utilities Corporation (WUC)	Water utility	C – regarding shared usgase of infrastructure	I	R – provides main pipelines, plants, reservoirs	I	C	R – uses outputs for coordinated civil works, trench sharing
Department of Roads	Roads authority	C – consulted regarding wayleaves policies	I	R – provides road network & classifications	C – contributes to base transport layers	C	R – uses map to anticipate telecom digs and coordinate works

ITU, 2025.

7.2.3 Governance Structure

Effective governance is central to the success of the national broadband mapping system. Based on the national stakeholder consultations and international good practice, Botswana will adopt a three-tier governance model consisting of a Steering Committee, Technical Working Group, and Data Working Group, supported by a dedicated Secretariat. This model ensures strategic oversight, operational coordination and continuous data stewardship across all involved institutions.

Steering Committee (SC)

Purpose: Provide strategic direction, make high-level decisions, validate standards, and provide the political mandate for data collection.

Chair: BOCRA
Co-chair: Ministry of Communications and Innovation (MCIE)

Members:

- BOCRA (DG or Director-level),
- MCIE – Department of Digital Communication, Infrastructure and Business,
- SmartBots,
- BoFiNet,
- BTC,
- Mascom,
- Orange,
- Department of Mapping & Surveys,
- Department of Town & Country Planning,
- Department of Roads,
- Botswana Power Corporation (BPC),
- Water Utilities Corporation (WUC).

Responsibilities:

- Approve the legal & governance framework (MoUs, NDAs, data standards),
- Approve the annual data collection and update schedule,
- Decide on publication and open-data policies,
- Validate the final broadband map before public release,
- Resolve cross-institutional issues (data sensitivity, access rights, licensing).

Technical Working Group (TWG)

Members are specialized experts (GIS, telecom and IT specialists) — who act as the technical backbone of the project.

Lead: BOCRA (GIS/ICT Division)
Support: ITU (technical assistance, training, QA)

Members:

- BOCRA GIS & ICT teams,
- Department of Mapping & Surveys,
- BoFiNet network planning team,
- Mascom, Orange, BTC – radio + fibre planning teams,
- BPC, WUC – GIS/asset management teams,
- Department of Roads – GIS transport data,
- SmartBots – integration with government digital platforms.

Responsibilities:

- Define the GIS data model and schema,
- Set up the broadband mapping platform (hosting, APIs, services),
- Conduct QA/QC on all datasets,
- Define spatial reference systems and tiling schemes,
- Provide capacity building and technical training,

- Integrate all datasets into the broadband map,
- Maintain system documentation and configuration.

Data Working Group (DWG)

Focused on data flows, templates, submissions and validation.

Lead: BOCRA – Data Manager

Members:

- Telecom operators: Mascom, Orange, BTC, BoFiNet,
- Utilities: BPC, WUC,
- Department of Roads,
- Local authorities (City/Town Councils – selected),
- Department of Mapping & Surveys.

Responsibilities:

- Submit datasets based on agreed templates,
- Ensure completeness and correctness,
- Respond to QA/QC findings,
- Update data per agreed schedule (quarterly/biannual),
- Maintain metadata (date, accuracy, scale, data owner).

Secretariat (Project Office)

Daily operational coordination.

Hosted by: BOCRA
Supported by: ITU

Responsibilities:

- Organise meetings, agendas and minutes,
- Maintain project calendar and deliverables,
- Manage communication channels (email, Teams, mailing lists),
- Ensure version control and document management,
- Produce progress reports for the Steering Committee,
- Coordinate all training sessions and workshops.

7.2.4 Legal and Governance Framework

Before the operational work can advance, the project requires a coherent legal and governance foundation that defines the rules of engagement among all stakeholders. While Botswana already benefits from strong regulatory institutions and sectoral legislation (as described in sections 5.1 and 7.1.2), the establishment of a national broadband mapping system introduces new requirements concerning data ownership, confidentiality, submission obligations, interoperability and cross-sector coordination. To ensure predictable collaboration, safeguard sensitive information and enable effective regulatory oversight, the project must formalise these requirements through a dedicated legal and governance framework. The following section outlines the core instruments and policy mechanisms needed to support structured data sharing and long-term sustainability of the mapping system.

Memorandum of Understanding (MoU)

Between BOCRA and each utility. Defines:

- purpose of data sharing,
- scope of collaboration,
- confidentiality and data security,
- update cycles,
- liabilities and responsibilities.

Taking in consideration the obtained information concerning the legislation process dynamics in Botswana and the current secondary legislation gap, there is also the possibility of exercising the MoU approach between BOCRA and each operator (until secondary legislation is implemented).

Data Sharing Agreement (DSA)

More technical, specifying:

- list of required datasets,
- file formats (Shapefile, GeoJSON, CSV, raster etc.),
- data granularity requirements,
- metadata structure,
- submission and approval processes,
- QA/QC requirements.

Data Catalogue & Metadata Standard

Unified technical specification including:

- full list of mandatory and optional datasets,
- attribute schema & domain values,
- national coordinate system,
- metadata template (ISO19115 or similar).

7.3 Monitoring and Evaluation Framework

A light but structured monitoring and evaluation framework is essential in the early stages of implementing the national broadband mapping system. During the initial phase, the primary objective is to ensure that governance structures function effectively, that data flows begin according to agreed schedules, and that collaboration between stakeholders becomes routine and predictable. The focus is therefore on simple coordination mechanisms rather than complex performance indicators.

To support this, BOCRA—as custodian of the system—will lead the monitoring process, supported by the Technical Working Group (TWG) and Data Working Group (DWG). The groups will hold monthly coordination meetings during the first year to review progress on data submission, address technical issues, track system setup activities and resolve any operational bottlenecks. These meetings ensure that all stakeholders maintain momentum and that challenges are identified early, before affecting later phases of implementation.

At a strategic level, the Project Steering Committee (PSC) should meet quarterly during the first year. These sessions provide an opportunity to review overall progress, validate major decisions (e.g., data governance instruments, publication policies), and ensure alignment with

national priorities. BOCRA will prepare short summary updates for these meetings, outlining accomplishments, challenges, and next steps.

Evaluation in the early phase will remain qualitative and process-oriented, focusing on whether:

- stakeholders are submitting data according to agreed templates and timelines,
- governance bodies are functioning as intended,
- data validation and feedback loops are operational,
- the technical platform is progressing according to plan,
- communication and collaboration remain effective.

At the end of the first implementation year, BOCRA and ITU will conduct a brief structured review, summarising lessons learned, outstanding gaps and recommended adjustments for the following year. This ensures continuous improvement while keeping the process practical and manageable.

8. Risk Analysis and Mitigation Strategies

The development of a national broadband mapping system is a complex, multi-stakeholder process which on top of policy framework highly depends on coordinated data flows, institutional readiness, and technical robustness. In the early phases of implementation, several risks may affect progress, data quality or stakeholder engagement. While most risks can be anticipated and managed proactively, they require continuous monitoring and clear mitigation strategies.

8.1 Institutional and Coordination Risks

Risk: Delays due to slow decision-making process, limited availability and responsiveness of key institutions, or unclear responsibilities during the start-up phase.

Mitigation:

- Maintain active monthly TWG/DWG meetings and quarterly PSC oversight.
- Use the RACI model to ensure clarity of duties and avoid duplication.
- Establish a clear escalation mechanism (TWG → PSC) for resolving bottlenecks quickly.

8.2 Legal and Governance Risks

Risk: Absence of formalised data-sharing agreements or unclear confidentiality requirements may discourage full participation.

Mitigation:

- Use interim MoUs and Data-Sharing Agreements while broader frameworks are finalised.
- Prioritise early agreement on sensitive vs. public data.
- Engage legal officers within ministries and BOCRA to accelerate drafting.
- Ensure that project progress is regularly monitored through the Steering Committee.

8.3 Stakeholder Engagement Risks

Risk: Some stakeholders may perceive the process as burdensome or unclear, leading to reduced cooperation.

Mitigation:

- Communicate regularly and clearly via BOCRA's Secretariat.
- Highlight mutual benefits (reduced duplication, better planning, improved service rollout).
- Recognise and incorporate stakeholder feedback into platform features.

8.4 Data Submission and Data Quality Risks

Risk: Operators or utilities may submit incomplete, delayed, or inconsistent datasets, particularly before templates and processes are fully internalised.

Mitigation:

- Start with simplified templates and gradually increase detail (define transition period).
- Provide an extended explanation and clear instructions on reporting, including random examples of specific cases to report.
- Provide targeted training sessions and walkthroughs on data preparation.
- Implement a lightweight QA/QC feedback loop during the early cycles to build trust and common understanding.

8.5 Technical Capacity and System Readiness Risks

Risk: Limited in-house GIS or IT capacity may slow platform setup, validation or integration.
Mitigation:

- Adopt the “learning by doing” approach with ITU support.
- Use a phased platform deployment (test → pilot → production).
- Assign dedicated technical focal points within BOCRA and DSM.
- Provide targeted training sessions for GIS and IT staff.
- Develop clear technical documentation and Standard Operating Procedures for platform operation and maintenance.
- Engage external technical experts or short-term consultants during critical setup and integration phases.

8.6 Sustainability and Resource Risks

Risk: Lack of long-term funding or staff turnover could affect continuity after initial implementation.

Mitigation:

- Secure a dedicated budget line within BOCRA and MCIE.
- Ensure knowledge transfer through extensive documentation and cross-training.
- Integrate mapping responsibilities into permanent job descriptions where relevant.

8.7 Political or Strategic Alignment Risks

Risk: Shifts in national priorities, or misalignment across ministries, may impact continuity.
Mitigation:

- Embed broadband mapping within national strategies (SmartBots, broadband plans, digital policies).
- Ensure PSC representation at Permanent Secretary level to maintain cross-ministerial support.

- Popularize the positive impacts of mapping among the wider public and especially to the key stakeholders.

8.8 Overall Assessment

None of the identified risks are prohibitive. With structured governance, consistent communication and phased implementation, these risks can be effectively managed. The roadmap, combined with regular monitoring and early stakeholder engagement, provides a strong foundation for mitigating disruptions and ensuring that the system matures into a stable, trusted national asset.

10. Sustainability and Long-Term Vision

Ensuring the sustainability of Botswana's national broadband mapping system requires a long-term vision that integrates technical resilience, institutional stability, regulatory certainty, and continuous capacity development. Broadband mapping system is not a one-off technical exercise but an evolving national asset that must remain accurate, trusted, and operational for decades. As digital infrastructure becomes increasingly vital to economic growth, public services, inclusion, and national security, Botswana's mapping system will serve as a foundational tool for strategic planning, oversight, and investment targeting. The long-term vision must therefore position broadband mapping as part of the country's core digital governance architecture, aligned with national development strategies and adaptable to future technological and policy shifts.

From a technical perspective, sustainability requires establishing a geospatial platform that is robust, secure, and scalable. The adoption of enterprise ArcGIS as the preferred environment provides a high level of reliability and expandability, ensuring that the system can integrate new datasets, larger volumes of information, and more sophisticated analytics over time. The long-term sustainability of the system will depend on systematic data collection and validation processes, including automated reporting, API-based feeds, periodic audits, and harmonised data formats. This must be accompanied by clear operational responsibilities within BOCRA, ensuring that the authority is equipped to host, maintain, and continuously improve the geoportal as broadly described in a previous chapters. The mapping platform should also be supported by resilient data storage, redundancy, backup systems, and recovery procedures so that the system can withstand operational disruptions or infrastructure failures.

Institutional sustainability is equally essential. For the system to remain effective, Botswana needs enduring governance structures that transcend changes in leadership or institutional priorities. The establishment of a Project Steering Committee at the Permanent Secretary level, supported by a multi-disciplinary technical working group, is a foundational step. This body should evolve into a permanent cross-sector coordination mechanism responsible for oversight of data governance, stakeholder compliance, and long-term strategic direction. Further details are included in chapters six and seven. Such a structure will ensure that all major data providers—operators, utilities, ministries, and public agencies—remain engaged and accountable. In addition, embedding broadband mapping responsibilities into institutional mandates, job descriptions, and budget cycles will reinforce continuity and prevent dependency on individual champions or temporary project teams.

Regulatory sustainability is another pillar of the long-term vision. The CRA Act already grants BOCRA the authority to collect and publish infrastructure data, but sustaining the system requires strengthening this framework with clear obligations for data submission, standardised reporting formats, defined update cycles, and compliance enforcement. The development of a national data-sharing framework and a data classification policy will establish predictable rules for handling sensitive, commercial, and public datasets. Over time, Botswana may also consider formalising broadband mapping requirements within sectoral policies such as urban planning, energy infrastructure, transport development, education connectivity, and emergency response systems. Such integration will transform the broadband map from a regulatory tool into a national planning instrument, used by ministries and local governments to optimise infrastructure deployment and public investments.

Human capacity is central to long-term sustainability. The recommended "learning by doing" approach—spanning 2026 to 2028—should evolve into continuous professional development

programs. BOCRA and other key institutions will require staff proficient in GIS analysis, data validation, geostatistical modelling, cybersecurity, and broadband technology trends. Collaboration with universities, technical institutes, and regional organisations such as CRASA can help cultivate a pipeline of skilled professionals able to support the system over the long term. Capacity building should not be limited to BOCRA alone: operators, public agencies, and municipal planners must understand data standards, quality expectations, and how to use the mapping platform for their operational needs.

Financial sustainability must also be ensured. Although initial platform development is supported by ITU and the European Union, long-term operation requires stable national budgeting. Botswana may explore a mixed model that includes government appropriation, regulatory fees, integration with Universal Service Fund planning, or cross-sectoral cost-sharing arrangements. The long-term financial plan should cover hosting infrastructure, licences, system upgrades, staff training, security enhancements, and periodic external audits.

Looking ahead, the long-term vision positions the broadband mapping system as a strategic national asset capable of expanding in scope and sophistication. Future iterations of the mapping platform may include predictive analytics for investment planning, integration with artificial intelligence for anomaly detection, 3D visualisation for urban planning, environmental monitoring layers, or deeper interoperability with power, water, and transport GIS systems... As Botswana advances toward a more connected society, the mapping system can also support emerging technologies such as 5G densification modelling, fibre route optimisation, satellite broadband integration, and early-warning mechanisms for infrastructure resilience.

Finally, regional leadership forms a key element of Botswana's long-term vision. With a strong and sustainable system, the country can contribute to harmonised approaches within CRASA, support data comparability across SADC, and participate in related cross-border coordination efforts. Establishing Botswana as a regional centre of excellence for broadband mapping will strengthen the country's standing in continental digital transformation initiatives and reinforce the sustainability of the system through international collaboration.

In summary, sustainability requires viewing broadband mapping not as an isolated IT tool, but as a living, evolving component of Botswana's digital governance ecosystem. Through strong institutions, clear regulations, reliable technology, skilled personnel, and committed long-term investment, the broadband mapping system will continue to generate value for government, operators, communities, and the economy for many years to come.

11. Conclusion

This policy report has outlined a comprehensive pathway for the establishment of a sustainable and reliable national broadband mapping system in Botswana under the Africa-BB-Maps initiative. The analysis confirms that Botswana already possesses many of the essential foundations for success: a relatively good broadband infrastructure footprint, an empowered national regulatory authority, active participation from operators and utilities, and strong political and institutional alignment with national digital transformation objectives.

The findings clearly demonstrate that broadband mapping should not be treated as a one-off technical exercise, but rather as a long-term regulatory and policy instrument. When properly implemented, it becomes a shared national reference tool that supports evidence-based decision-making, improves coordination across sectors, reduces duplication of infrastructure investments, and enhances transparency for citizens, investors, and policymakers alike. In this context, BOCRA's role as the neutral custodian of the system is both appropriate and critical, ensuring trust, continuity, and regulatory credibility.

The report also highlights that technology choices alone will not determine success. Whether Botswana proceeds with an enterprise GIS solution or strategically incorporates open-source components, sustainability will ultimately depend on institutional capacity, clear governance arrangements, predictable funding, and enforceable data-sharing obligations as well on transparency and mutual benefits for relevant stakeholders. The assumption that broadband mapping can be maintained at negligible cost must be avoided; instead, long-term operational expenditure, skills retention, and system maintenance must be explicitly planned and budgeted for.

International experience, particularly from Slovenia, demonstrates that strong legal mandates, standardized reporting, and regular validation are key enablers of high-quality broadband data and maps. Botswana is well positioned to adapt these lessons to its national context, leveraging existing legislation such as the CRA act while progressively strengthening policy instruments related to data governance, critical infrastructure, and cybersecurity.

Looking ahead, the phased roadmap agreed with stakeholders provides a realistic and achievable framework: moving from foundational readiness, through system development and operationalisation, towards long-term sustainability and regional leadership. If implemented consistently, Botswana's broadband mapping system can evolve into a strategic national asset—supporting universal access objectives, guiding public and private investment, and reinforcing the country's position as a digital leader in the region.

In conclusion, the Africa-BB-Maps initiative represents a timely opportunity for Botswana to institutionalise broadband mapping as a core component of its regulatory and development toolkit. With continued stakeholder commitment, adequate resourcing, and strong leadership from BOCRA, the country can deliver a transparent, resilient, and future-ready broadband mapping system that delivers lasting socio-economic impact.

11.1 Practical Checklist for BOCRA – Key Points to Keep in Mind

The following operational checklist is designed as a practical management and implementation tool rather than an academic framework. It translates the policy recommendations and strategic objectives of this report into concrete actions that BOCRA should continuously keep in focus throughout the lifecycle of the broadband mapping system. The checklist highlights the key institutional, legal, technical, and operational elements that

require sustained attention to ensure that broadband mapping is not only successfully implemented, but also maintained, updated, and embedded into BOCRA's day-to-day regulatory and planning activities. Its purpose is to support informed decision-making, reduce implementation risks, and help BOCRA move from project-based delivery to a fully institutionalised and sustainable national broadband mapping function. As an initial step, it is highly advisable that BOCRA, immediately following the finalisation of this report, convenes structured meetings with all relevant stakeholders to discuss next actions and priorities arising from this report.

1. Governance & Institutional Setup

- Formalise BOCRA's role as custodian and system owner of the broadband mapping platform,
- Establish a Project Steering Committee (Permanent Secretary level),
- Establish a Technical Working Group for day-to-day implementation,
- Define clear roles: data providers, data stewards, validators, and publishers,
- Ensure regular coordination meetings (monthly/quarterly).

2. Legal & Policy Framework

- Clearly anchor data collection and publication under the CRA act and provide secondary legislation on clarifying and defining BOCRA's ability to request, process and use data,
- Develop or support a national data-sharing framework (cross-sector),
- Prepare a data classification policy (public / restricted / confidential),
- Use MoUs as interim instruments where formal frameworks are not yet in place,
- Align broadband mapping with cybersecurity and critical infrastructure policies.

3. Technical Platform & Architecture

- Decide and formally approve the GIS platform strategy (enterprise ArcGIS + complementary open-source tools where appropriate),
- Ensure adequate hosting, storage, backup, and recovery capacity,
- Standardise data models, formats, and submission templates,
- Enable API-based and automated data submission where possible,
- Design the system for scalability, not only current needs.

4. Data Collection & Quality Assurance

- Define minimum mandatory datasets (fibre, towers, coverage, QoS, public facilities, population) and attributes to collect,
- Set clear reporting obligations and update cycles for operators and utilities,
- Implement validation mechanisms (field checks, audits, crowdsourcing, cross-checks),
- Avoid static formats (PDFs); require machine-readable GIS data including geolocation information,
- Maintain a documented data lifecycle (submission → validation → publication → archive).

5. Human Capacity & Skills

- Ensure dedicated internal GIS capacity within BOCRA,
- Plan for continuous training (not one-off workshops),
- Minimise reliance on single individuals (knowledge retention risk),
- Use a "learning by doing" approach during implementation,

- Budget for external support only where internal skills cannot be sustained.

6. Transparency & Public Value

- Define what data will be publicly accessible and how often it will be updated,
- Publish maps and indicators in a user-friendly way,
- Ensure transparency does not compromise security-sensitive infrastructure,
- Use the map actively for policy analysis and regulatory decisions, not just visualization,
- Communicate clearly to stakeholders how the data is used and why it matters and popularize the positive impacts of mapping among.

Conclusions regarding **funding and resource mobilization** are included in Annex 4.

Annexes

Annex 1: Botswana national questionnaire

AFRICA-BB-MAPS QUESTIONNAIRE

SECTION 1: BROADBAND POLICY AND STRATEGIC PLANNING

1. **Does your country have government initiatives or public policies related to broadband mapping?**
   - ❑ Yes, with a structured plan and budget
   - ❑ Yes, but without a structured implementation plan
   - X No formal broadband mapping strategy exists
   - ❑ Other, please specify:

2. **Which types of broadband technologies are most widely deployed in your country? (Multiple selections possible)**
   - X Fiber optic
   - ❑ Coaxial cable
   - X Wireless networks
   - ❑ Copper pair
   - ❑ Satellite
   - ❑ All of the above

3. **What is the main objective of your broadband expansion strategy?**
   - X Development of mobile broadband (3G/4G/5G)
   - ❑ Expansion of satellite broadband
   - X Extension of fiber optic broadband
   - ❑ Other, please specify:

4. **Does your country have specific broadband penetration targets for the next five years?**
   - X Yes, for both urban and rural areas
   - ❑ Yes, but only for urban areas
   - ❑ No formal broadband penetration targets

5. **Does your country have a broadband mapping system?**
   - ❑ Yes, it is publicly accessible (If yes, please provide the link)
   - ❑ Yes, but it is not publicly accessible
   - X We collect and develop internal maps, but they do not constitute a true broadband mapping system
   - ❑ We collect data only, without mapping
   - ❑ No, and we do not collect any data

6. **Are there policies or incentives to encourage the expansion of mobile and satellite broadband in rural areas?**
   - X Yes, with active government support
   - ❑ Some incentives exist, but implementation is weak

❑ No policies or incentives

7. **Does your country have a broadband roadmap specifically for underserved communities?**
   X Yes, with active government support
   ❑ Some initiatives exist, but implementation is weak
   ❑ No policy or incentives

8. **Does your agency have a dedicated division responsible for broadband infrastructure and development?**
   X Yes (If yes, does it include GIS experts? ☐ Yes / X No)
   ❑ No

9. **How many personnel are part of the legal and policy department?**
   ❑ More than 15
   ❑ 5-15
   X Less than 5

10. **How many employees are part of the network and infrastructure division?**
    ❑ More than 5
    X Between 3 and 5
    ❑ Less than 3

11. **Are there national broadband targets for the next 5 years?**
    X Yes:
    ❑ No:

12. **Is broadband mapping integrated into national infrastructure projects?**
    ❑ Yes:
    X No:

SECTION 2: BROADBAND INFRASTRUCTURE MAPPING SYSTEMS

13. **Does your country have a national broadband infrastructure mapping system?**
    ❑ Yes, with regularly updated data and public access
    ❑ Yes, but it is not regularly updated or fully accessible
    X No formal broadband infrastructure mapping system exists

14. **If yes, who manages the system?**
    - ❑ National Regulatory Authority (NRA)
    - ❑ Ministry responsible for ICT
    - ❑ Other, please specify:

15. **Which infrastructure or coverage data are included in broadband mapping efforts? (Multiple selections possible)**
    - ❑ Backbone networks and fiber backhaul
    - ❑ Mobile broadband towers (3G, 4G, 5G)
    - ❑ Satellite broadband coverage areas
    - ❑ Fixed broadband access networks (DSL, FTTH, Cable)
    - ❑ Power and energy infrastructure related to broadband (backup power, grid connections)
    - X None of the above – no infrastructure data is mapped
    - ❑ Other, please specify:

16. **How are broadband infrastructure mapping data collected? (Multiple selections possible)**
    - ❑ Data provided by ISPs and telecom operators
    - ❑ Field surveys conducted by the government
    - ❑ Validation by independent third parties
    - ❑ Crowdsourced user reports and participatory data
    - X No structured data collection on broadband infrastructure

17. **Is broadband infrastructure mapping integrated with other national infrastructure planning systems?**
    - ❑ Yes, broadband mapping is integrated with national transport, energy, and urban planning initiatives
    - ❑ Some level of integration exists, but it is not fully structured
    - X Broadband infrastructure mapping is isolated from other national planning efforts

SECTION 3: BROADBAND SERVICE MAPPING AND REGULATORY MONITORING

18. **Does your agency collect broadband coverage data?**
    - ❑ Yes, regularly and systematically
    - X Occasionally, but not systematically
    - ❑ No broadband coverage data is collected

19. **How is broadband coverage data collected? (Multiple selections possible)**
    - X Self-reported by Internet Service Providers (ISPs)
    - ❑ Government-led surveys

- ❑ Crowdsourced user data (speed tests, complaints, etc.)
- ❑ Field audits and independent verification

20. Are ISPs legally required to submit broadband coverage and Quality of Service (QoS) data?

- ❑ Yes, with strict enforcement and penalties for non-compliance
- X Yes, but enforcement is weak
- ❑ No legal obligation

21. Does your country publish broadband coverage data for public consultation?

- ❑ Yes, fully open and accessible (If yes, please provide the link)
- ❑ Limited access for stakeholders only
- X No public access to broadband data

22. Is there a national or regional framework to coordinate cross-border data collection and broadband mapping standards?

- ❑ Yes, a robust framework is in place
- ❑ Partial cooperation, but no structured framework
- X No framework exists

23. Are there formal sanctions or incentives to ensure compliance with broadband data submission?

- ❑ Yes, with clear penalties and/or incentives
- ❑ Some measures exist, but they are rarely enforced
- X No enforcement mechanism

SECTION 4: DATA COLLECTION, VERIFICATION, AND ACCURACY (For countries with a broadband mapping system only)

24. What methods are used to collect broadband coverage data? (Multiple selections possible)

- X ISP reports
- ❑ Crowdsourced data
- ❑ Automated real-time data validation tools
- ❑ Independent field surveys
- ❑ Government-led audits

25. Does your broadband mapping system follow standardized GIS protocols (e.g., ITU recommendations)?

- ❑ Yes, fully standardized
- ❑ Partially standardized

X No standardization

26. How frequently are broadband coverage maps or datasets updated and verified?

- ❑ Continuously / in real-time
- ❑ Quarterly or more frequently
- ❑ Annually
- X Ad hoc updates

27. Does your broadband mapping system systematically integrate user-reported issues and network complaints?

- ❑ Yes, with automated verification and real-time updates
- ❑ Yes, but user reports are manually verified and rarely updated
- X No, user feedback is not systematically included

28. Does your broadband mapping process include validation by an independent third party (e.g., audits, field tests)?

- ❑ Yes, with regular independent audits verifying ISP-reported data
- ❑ Yes, but audits are occasional and not standardized
- X No third-party validation

SECTION 5: INFRASTRUCTURE, COVERAGE, RESILIENCE, AND EXPANSION

29. How does your country define "rural areas"? (Please select the closest definition)

- ❑ Population density between 0 and 100 inhabitants/km²
- ❑ Population density between 101 and 200 inhabitants/km²
- X Settlements with fewer than 2,500 inhabitants
- ❑ Areas outside urban municipalities with limited infrastructure
- ❑ Other, please specify:

30. What percentage of rural areas in your country have access to basic broadband (≥2 Mbps)?

- X Above 60%
- ❑ Between 30% and 60%
- ❑ Below 30%

31. What percentage of rural areas have access to broadband speeds meeting the ITU's minimum recommended threshold for sustainable development (≥10 Mbps)?

- X Above 60%, with national resilience and crisis response plans
- ❑ Between 30% and 60%, with partial resilience planning in some areas
- ❑ <30%

- ❑ Below 30%, with no resilience strategy

32. Does your country use the Universal Service Fund (USF) to develop broadband in underserved areas?

- X Yes, with clear eligibility criteria
- ❑ Yes, but funding is limited
- ❑ No, the USF is not used for broadband

33. Are there specific policies to encourage investment in rural broadband infrastructure?

- X Yes, with clear incentives
- ❑ Some efforts exist, but they are not well-structured
- ❑ No dedicated policy for rural broadband investment

34. Are there specific projects to improve network resilience (e.g., backup power, redundant links)?

- ❑ Yes, with published Service Level Agreements (SLAs)
- X Under development
- ❑ No such projects exist

35. To what extent are local municipalities or other community groups involved in broadband deployment planning and execution?

- ❑ Highly involved
- ❑ Some coordination, but limited
- X Minimal involvement

36. Does your country have a roadmap or pilot programs for next-gen tech (e.g., 5G, advanced satellite) in urban and/or rural areas?

- ❑ Yes, with a fully developed pilot program
- X Yes, but limited in scope
- ❑ No pilot program exists

Annex 2: Questionnaire for stakeholders

Category / Group	Stakeholders
A. Regulator & ICT Policy Bodies	• BOCRA (Botswana Communications Regulatory Authority) • Ministry of Communications and Innovation (MCIE) – Dept. of Digital Communication, Infrastructure and Business • SmartBots (National Digital Transformation Programme)
B. Telecom Operators (Electronic Communications Providers)	• Mascom Wireless • Orange Botswana • BTC / BTC (Botswana Telecommunications Corporation Limited) • BoFiNet (Botswana Fibre Networks – wholesale backbone)
C. Mapping, Land & Spatial Planning Authorities	• Department of Mapping & Surveys (DMS) – Ministry of Lands & Agriculture • Department of Town & Country / Regional Planning • City & Town Councils (local authorities)
D. Utilities (Critical Infrastructure Owners)	• Botswana Power Corporation (BPC) • Water Utilities Corporation (WUC)
E. Transport Infrastructure Authorities	• Department of Roads (Ministry of Transport & Public Works)

A Questionnaire for BOCRA

(Regulator – primary custodian of broadband mapping)

Legal framework, mandate and data access

1. Under the CRA Act 2012, which specific articles provide BOCRA with the authority to request, collect and process telecom-related data (any kind)?
2. Are there any subsidiary regulations, guidelines or ministerial directives that further define BOCRA's data-collection powers?
3. Does BOCRA have any Memoranda of Understanding (MoUs) with operators, utilities, or other institutions regulating access to datasets? If yes, please share or describe.
4. Which types of datasets does BOCRA currently have access to (infrastructure, services, coverage, QoS, spectrum, numbering, etc.), and under which legal basis?
5. Which types of infrastructure or service data does the current legal framework not allow BOCRA to collect?

Strategies, data governance and publication

6. Is there a valid or upcoming national broadband/ICT strategy that defines coverage, infrastructure or service targets?

7. Does BOCRA have a specific mandate or internal policy regarding the publication of infrastructure or coverage maps?
8. What is the status and effectiveness of BOCRA's infrastructure sharing guidelines? Please assess their relevance and implementation.
9. How does BOCRA manage data confidentiality, sensitivity classification, and access rights for telecom infrastructure data?
10. Have any legal or practical challenges occurred when collecting data from operators or utilities? Please describe.

B Questionnaire for Ministry of Communications, SmartBots

(Policy makers, digital governance and strategy institutions)

Evidence-based policymaking

1. Which datasets does the Ministry currently rely on for evidence-based policymaking in ICT?
2. Which institutions contribute data to policy formulation (BOCRA, Statistics Botswana, DMS, operators, etc.)?
3. Are there known data gaps that hinder national ICT or digital policy development?
4. What is the Ministry's vision for a National Data-Sharing Framework? Are any drafts or references already available?

Strategy development and legislative process

5. Which institutions participate in drafting ICT strategies, broadband plans and sector legislation?
6. Are new laws or amendments being prepared related to:

- digital services,
- data governance,
- infrastructure sharing,
- mapping and geospatial data?

7. What is the current status of the Digital Services Bill or similar digital transformation initiatives?

Institutional coordination

8. Are policies implemented centrally, or do local authorities (councils) also play a role?
9. Has the Ministry undertaken actions towards regional harmonisation (SADC, ATU, cross-border fibre, digital policy alignment)? Please list key activities.
10. What expectations does the Ministry have for the Africa-BB-Maps Botswana project?

C Questionnaire for Telecom Operators (Mascom, Orange, BTC, BoFiNet)

(Mobile, fixed, and wholesale backbone operators)

Access to data and regulatory compliance

1. Do operators have the legal right to request or access utility infrastructure datasets (electricity, water, roads)? Under which legal basis?
2. Under which laws or BOCRA directives are operators required to submit telecom infrastructure and service data?
3. Which legal gaps or grey areas exist regarding:

- access to cadastral data,
- rights-of-way and servitudes,
- infrastructure sharing,

- access to government spatial datasets?

4. Which institutions do operators report to, how frequently, and under which regulatory obligations? Please list.

Technical and operational aspects

5. What types of network data can operators share today (fibre routes, network termination points, mobile coverage, QoS, microwave links, etc.)?
6. Are there internal technical, commercial or legal constraints that limit data sharing?
7. Do operators use any standardised or automated processes to prepare data submissions for BOCRA?
8. What are the main operational challenges when coordinating with utilities or local authorities during infrastructure deployment?
9. Do operators see value in establishing a national data-sharing framework for telecom infrastructure?
10. What improvements do operators expect from a National Broadband Map?

D Questionnaire for Department of Mapping & Surveys (DMS)

(National geospatial authority & population/statistics authority)

Legal basis and authority

1. Which laws regulate DMS's authority to collect, store and distribute geospatial datasets?
2. Who can access DMS spatial datasets, and under which licensing, permissions or fee structures?
3. Does DMS have the authority to collect or manage settlement and population distribution data?
4. Does DMS maintain any geospatial standards, metadata requirements, or national coordinate system rules?

Institutional role and cooperation

5. Is DMS purely a technical service provider, or does it also hold coordination functions for the National Spatial Data Infrastructure (NSDI)?
6. What is DMS's policy towards signing MoUs or Data-Sharing Agreements with other institutions?
7. Which datasets managed by DMS are considered authoritative, and which are sourced from partner institutions?
8. Does DMS collaborate with Statistics Botswana on census grids, population modelling or spatial analysis?
9. What are the main limitations in existing base maps or spatial datasets (scale, age, accuracy, coverage)?

E Questionnaire for Utilities (BPC, WUC)

(Electricity and water utilities – critical infrastructure owners)

Legal authority and data access

1. Which laws govern the collection, management and protection of your infrastructure GIS datasets?
2. Are your datasets considered public, restricted or classified? Under what conditions can they be accessed by third parties?
3. Do you have existing MoUs or data-sharing agreements with telecom operators or government bodies?

4. Which datasets can you share, and which ones are restricted due to safety, security or operational risks?

Technical capacity and cooperation

5. Do you coordinate trenching, civil works or corridor planning with telecom operators? If yes, how?
6. Do you maintain internal GIS standards, metadata structures or spatial policies?
7. What risks or constraints limit your ability to share utility network data?
8. Would your institution benefit from participating in a national infrastructure mapping initiative for coordinated planning?
9. What bottlenecks or challenges exist in issuing permissions or wayleaves for telecom deployments?
10. What improvements would you expect from a national broadband and infrastructure mapping platform?

F Questionnaire for Department of Roads & City/Town Councils

(Transport corridors, rights-of-way, zoning, local datasets)

1. Under which laws do you manage rights-of-way and permits for telecom infrastructure?
2. Which datasets do you maintain (road network, zoning, building permits, land-use plans, servitudes)?
3. Can telecom operators access these datasets? Under what conditions?
4. What administrative challenges exist in the permit/wayleave process for telecom deployments?
5. Do your departments maintain GIS systems, and how often are datasets updated?
6. Is there structured coordination with telecom operators or utilities on joint civil works?
7. Do you have internal policies for data sharing, MoUs or digital transformation?
8. What improvements would you expect from a national broadband and infrastructure map?

Annex 3: Draft invitation letter to the stakeholders

Invitation to Africa-BB-Maps Botswana Stakeholder Follow-up Meeting

Dear [Organisation Name],

The Botswana Communications Regulatory Authority (BOCRA), in close collaboration with the International Telecommunication Union (ITU) under the Africa Broadband Mapping System (Africa-BB-Maps) initiative, kindly invites you to a follow-up stakeholder meeting to continue the national broadband mapping work initiated during the Africa-BB-Maps National Event held in Gaborone from 12–14 August 2025.

Following the success of the national event and the valuable contributions made by all participating institutions, BOCRA is now moving into the next phase of implementation. This follow-up meeting will provide an opportunity to:

- briefly revisit the Africa-BB-Maps project objectives and expected outcomes;
- present key findings, recommendations, and agreements from the August 2025 national event, including the agreed technical and governance approach;
- confirm stakeholder roles in the mapping ecosystem (BOCRA as custodian and operational lead; infrastructure owners/data holders as principal data providers); and
- invite your support in preparing the ITU Policy Report, which will serve as the foundation for the 2026 work programme and the continued rollout of Botswana's broadband mapping system.

Proposed meeting date:

The meeting will be held virtually via MS Teams. A calendar invitation and connection details will be shared once the date is confirmed based on your availability.

Please send your meeting availability to **Tebogo Ketshabile** with a copy to **Elind Sulmina and Marko Simončič**.

BOCRA sincerely appreciates your continued commitment to this important national initiative. With your cooperation, Botswana will be well positioned to deliver a robust, transparent, and sustainable broadband mapping system that guides investment decisions, closes connectivity gaps, and advances digital inclusion.

Ahead of the meeting, BOCRA will circulate a short questionnaire for your review and completion; your inputs will then form an important part of our discussion as we work together to identify the concrete next steps and responsibilities for advancing the project.

We look forward to your confirmation and continued collaboration.

Yours faithfully,

Tebogo Ketshabile

Deputy Director Networks and QoS

Botswana Communications Regulatory Authority (BOCRA)
On behalf of BOCRA and the ITU Africa-BB-Maps Initiative

Annex 4: Funding and Resource Mobilization

1. Objectives of Funding and Resource Mobilization

The primary purpose of mobilizing resources for broadband mapping in Botswana is to guarantee stable financing for both immediate implementation and long-term sustainability. The funding structure supports a comprehensive roadmap aimed at elevating the country's status to "advanced maturity" within the ITU Africa-BB-Maps framework.

Financial resources are first allocated to the backbone of the project: the creation and enforcement of binding standard operating procedures (SOPs). This legal anchoring is supported by the rollout of standardized systems that allow operators to submit data for automated validation. To verify the reality on the ground against these digital submissions, the budget provides for regular data quality checks and extensive field measurement campaigns.

Beyond technical infrastructure, the funding is dedicated to strengthening the institution itself. Significant emphasis is placed on capacity building within BOCRA to manage these complex systems effectively. The ultimate goal of this financial planning is to facilitate a progressive handover, transitioning the initiative from its current state into a permanent, nationally funded operation.

2. Role of ITU Africa-BB-Maps in Funding

Strategic Positioning

The ITU Africa-BB-Maps Programme, funded by the European Union and implemented by the ITU Telecommunication Development Bureau, serves as the central external funding pillar for the initial and intermediate phases of broadband mapping in Côte d'Ivoire. This support is strategically calibrated to act as a catalyst rather than a permanent crutch.

The programme's funding is specifically designed to finance non-recurrent investments—such as platform design, the development of Standard Operating Procedures (SOPs), and specialized training—that are essential for system establishment. By focusing on the transfer of technical know-how and international standards, the initiative ensures that the necessary infrastructure is not only built but also understood. Ultimately, this foundational support is intended to enable a structured and secure transition, handing over a fully strengthened system to national ownership.

3. Funding Needs by Cost Category and Source

Activity	Funding needs	Funding sources	Funding rationale
SOP Development and Regulatory Framework	• Drafting and formalization of SOPs (data collection, validation, publication); • Legal anchoring of SOPs in decrees and licence obligations; • Inter-institutional coordination instruments (MoUs).	**ITU Africa-BB-Maps:** • Technical assistance for SOP design aligned with ITU Guidelines; • Expert support for data governance and regulatory harmonization. **National budget**:	SOP development is a one-time enabling investment, well-suited for ITU project funding.

		• Legal processes, gazetting, and long-term enforcement	
Operator Data Submission and Validation Platform	• Secure SFTP / API ingestion mechanisms; • Automated schema-validation and QA tools; • Core GIS infrastructure for controlled access.	**ITU Africa-BB-Maps:** • Initial platform architecture and configuration; • Integration of ITU reference data models and templates **European Union (via Africa-BB-Maps):** • Capital expenditure for platform establishment. **National budget (medium term):** • Hosting, maintenance, and upgrades.	Platform establishment is capital-intensive and fits the Africa-BB-Maps system-building mandate.
Capacity Building and Skills Transfer	• Training BOCRA staff on SOP execution and data validation; • Certification in GIS, geospatial QA, and data governance; • Knowledge transfer from ITU experts.	**ITU Africa-BB-Maps:** • ITU Academy courses and certifications; • On-the-job coaching and regional workshops. **National budget:** • Staff costs and skills retention.	Capacity building is a pillar of Africa-BB-Maps and a prerequisite for sustainability.
Field Verification and Measurements	• Biannual measurement campaigns (QoS verification); • Data processing and discrepancy resolution.	**Mixed model:** ITU Africa-BB-Maps (initial methodology and tools); BOCRA operational budget (routine campaigns).	Africa-BB-Maps supports methodological setup, while recurrent measurements must be nationally funded.
Governance, Monitoring, and Evaluation	• SOP reviews and updates; • Operator compliance monitoring; • Annual evaluation and maturity assessment.	**ITU Africa-BB-Maps:** • Initial maturity assessments; • Performance monitoring templates. **National budget:** • Permanent governance and reporting structures.	

4. Consolidated Funding Sources Matrix

Cost Area	ITU Africa-BB-Maps	National Budget
SOP development & harmonization	✅ Core funder	✅ Legal enforcement
Platform establishment	✅ Core funder	✅ O&M after handover
Operator schema standardization	✅ Technical support	✅ Enforcement
Staff training & certification	✅ Core funder	✅ Retention
Field verification setup	✅ Initial support	✅ Recurrent
Routine operations	❌	✅ Primary

5. Phased Resource Mobilization Strategy

Resource mobilisation phase	**Primary funding**
Phase 1 – Establishment (0–6 months)	ITU Africa-BB-Maps
• SOP drafting and approval	
• Operator schema finalization	
• Platform architecture and onboarding	
Phase 2 – Scaling (6–18 months)	ITU Africa-BB-Maps + National Budget
• Automated validation	
• First mandatory data cycles	
• Capacity building and verification	
Phase 3 – Sustainability (18+ months)	National Budget
• Routine operations	
• SOP updates	
• Long-term regulatory use	

6. Sustainability and Exit Strategy from Donor Funding

To prevent dependency on external financing, the project is structured around a clear exit strategy. Since the Africa-BB-Maps funding is strictly timebound and non-recurrent, the financial responsibility for platform operations will be progressively absorbed into BOCRA's core mandate budget. This shift ensures that the system's maintenance is treated as a permanent operational necessity rather than a project-based expense.

Operational continuity is guaranteed by institutionalizing Standard Operating Procedures (SOPs), which embed these processes into the daily workflow beyond the project's closure. Furthermore, the strategy prioritizes the internal retention of skills acquired through ITU support, ensuring that technical expertise remains within the organization. Finally, the sustainability of the investment is maximized by the multi-purpose utility of the data; the

mapping outputs are designed to be reused across various regulatory functions—including licensing, Quality of Service (QoS) monitoring, universal access planning, and infrastructure coordination—thereby justifying the ongoing operational costs.

7. Key Funding Risks and Mitigation

Risk	Mitigation
Overreliance on ITU funding	Clear national handover plan
Fragmented donor support	Africa-BB-Maps used as single entry point
Sustainability gap post project	Early national budget integration
Platform cost escalation	Modular, SOP driven automation