Demand side research: Use cases

Open Fibre Data Standard consultation document

How to engage with this document

This is a working document shared for comments and feedback from stakeholders.

You can provide feedback by commenting and suggesting edits directly in the document or by commenting on the associated Github discussion (free account registration required).

Introduction

Design choices in the development of the Open Fibre Data Standard must be based on identified user needs. We identify **user needs** through a three-stage process:

1. Use cases	2. User stories	3. Requirements
A small number of high-level narrative descriptions of how different stakeholders want to use and/or publish open fibre data. Use cases are gathered through stakeholder engagement, persona development and desk research.	Detailed, specific descriptions of the user needs identified for each use case. User stories are documented using the structure: As a [user], I want [need] so that [use case]	Technical requirements for the standard based on the user stories. Requirements may cover fields to be disclosed, publication formats and/or access methods.

User stories and **requirements** act as key reference points during standard development. In the course of standard development, we should be able to evidence:

- The requirement and user story that informed each design choice, for example, why a particular field is included in the standard; **and**
- How each user story can be met using the standard - either directly, or through use of intermediary tools and analysis; **or**

- Why a user story is not handled by the alpha version, and whether it could be handled in future or not.

Taking account of the prior work on the data model by the technical working group, the objectives of the demand side research are to identify and document:

- The use cases that informed the draft data model prepared by the technical working group
- Any additional use cases that should be considered for standard development

This document provides a narrative summary of the use cases identified in the demand side research and highlights key requirements related to each use case. Requirements are highlighted as follows:

Requirements:

Full details of the users and user stories associated with each use case can be viewed in Airtable

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Research

The narrative use cases in this document were developed based on interviews with nine stakeholders identified by the ITU and the World Bank as having an active interest in open data about terrestrial fibre networks in Africa. The stakeholders included:

- Physical infrastructure and network providers
- Telecoms consultants
- Researchers
- Regulatory agencies
- Industry associations
- Investors
- Non-governmental organisations
- Intergovernmental organisations

Based on the interviews, we developed narrative personas detailing the characteristics and needs of users of open fibre data. We also carried out desk research to identify other users and use cases for open fibre data.

Use cases

Primary use cases

Network investment, planning, and deployment

There are a variety of use cases related to investing in, planning, and deploying passive and active network infrastructure. These can be divided into two categories: identification of infrastructure gaps and opportunities, and avoiding overbuild.

Identification of infrastructure gaps and opportunities

A wide range of actors have the potential to address access gaps in a sustainable manner, including community networks, public and private investors, network operators and wireless ISPs. These actors are interested in identifying underserved areas, identifying opportunities to build new network infrastructure and identifying opportunities for co-usage and co-deployment of infrastructure; for example:

- The developer of a new middle mile and/or access network could use open fibre data to identify dark fibre that they can use as backhaul.
- A small rural municipality might determine from a public fibre map that it is in their interest to invest in 50 kilometres of fibre network to connect to a nearby network.
- A school or a hospital could fundraise for better access if they can show that a fibre optic cable is within a reasonable distance[1].
- A regulator, other national government agency, or multilateral financial institution could combine data on existing and planned fibre networks with data on population density to identify underserved areas and opportunities to invest in network development to improve access to high speed broadband.
- A multilateral financial institution could use open fibre data to coordinate investments with other institutions.
- An investor could use open fibre data to understand the ownership structure of networks that they are considering investing in.

Requirements:

[1] See Africa Schools Open Data Broadband Project and Project Connect

To support these use cases, actors need data on:

- The physical location of existing and planned fibre infrastructure
- The capacity of existing and planned fibre infrastructure
- The availability of dark fibre, i.e. unlit fibre that is available for lease
- The organisations responsible for the existing fibre infrastructure
- The availability of power at nodes
- The investors involved in financing existing and planned networks
- The ownership structure of existing and planned networks

To identify gaps and opportunities it must be possible to connect data on fibre infrastructure to other datasets such as population density or school locations.

Avoiding overbuild

For actors involved in planning and deploying networks, a key consideration is avoiding overbuild, i.e. avoiding duplicating existing fibre infrastructure. For private operators, this is a matter of reducing commercial risk. For all types of operator, avoiding overbuild is a matter of reducing costs and increasing efficiency.

Requirements:

To avoid overbuild, operators need data on:

- The physical location of existing and planned fibre infrastructure
- The capacity of existing and planned fibre infrastructure
- The availability of dark fibre, i.e. unlit fibre that is available for lease
- The organisations responsible for the existing fibre infrastructure

Avoiding damage to existing network infrastructure

Where fibre infrastructure is buried beneath roadways, damage from construction activities is a challenge. This is primarily due to the lack of information on the location of fibre infrastructure. Damage to fibre infrastructure can impact end users through service disruptions and increased costs. It can also result in delays to construction activities and increased costs of doing business.

Requirements:

To avoid damage to existing network infrastructure, actors involved in planning and delivering construction activities need data on:

- The physical location of existing fibre infrastructure
- Detailed routes of fibre cables

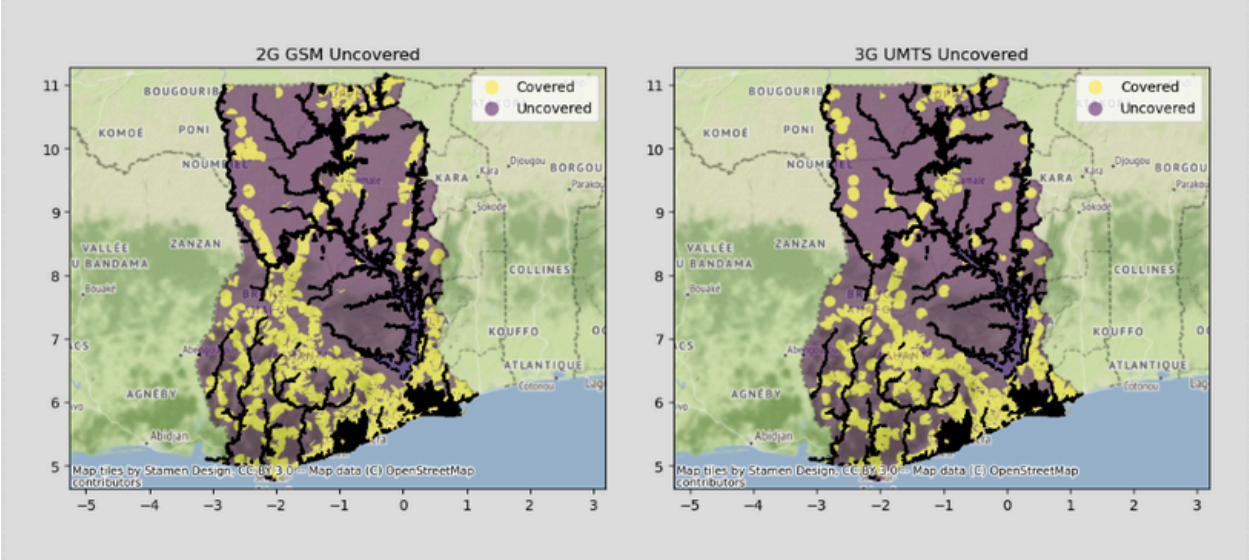
Climate and disaster resilience

Network infrastructure may be affected by the physical impacts of climate change and natural disasters, for example:

- Temperature change may require increased cooling for datacenters
- Sea-level rise may result in inundation of coastal infrastructure
- Changing patterns of precipitation may result in damage to infrastructure from flooding and/or subsidence
- Changing patterns of storms may result in damage to above ground transmission infrastructure such as aerial cables and masts
- Earthquakes may result in damage to above and below ground infrastructure
- Wildfires, tsunamis and volcanic eruptions may result in damage to above ground infrastructure

Network infrastructure can also play an essential role in building resilience to the impacts of climate change and natural disasters, and can help to reduce direct losses, and reduce the indirect costs of disruption. For example by ensuring that connectivity is available for the coordination of civil defence, emergency response, and healthcare provision in the immediate wake of a disaster, and by providing connectivity for remote learning and working where physical access to educational facilities and workplaces is restricted.

The following map is an example of combining data on mobile network coverage with data on river flooding. A similar analysis could be carried out using data on fibre network infrastructure in place of the mobile network coverage.



Requirements:

To assess the resilience of existing infrastructure, and to plan and develop climate and disaster resilient infrastructure, actors need data on:

- The physical location of existing and planned infrastructure
- Detailed routes of fibre cables

It must be possible to connect data on fibre infrastructure to other datasets such as flood projections, sea-level, temperature rise projections, and wildfire risks.

Climate and disaster resilience analysis is likely to be performed using a combination of bespoke simulation methods and common GIS tools, so open fibre data should be published in a format suitable for consumption by common GIS tools.

Impact analysis, policy development, and decision making

Many actors are interested in understanding the social and economic impact of fibre infrastructure in order to inform policies, strategies, and investment decisions. Data on the location and availability of fibre infrastructure can also be used to inform policies related to the rollout of digital based public services. For example:

- Multi-lateral financial institutions can use impact analysis to inform investment decisions
- Regulators and other government agencies can use impact analysis to inform strategy, policy development, investment decisions, and decisions about the allocation of state aid
- Academic researchers can analyse the impact of access to broadband on different groups, regions, and sectors
- A province or state might determine that their region is suffering due to a lack of fibre infrastructure investment.
- A government agency could use data on the location and availability of fibre infrastructure to determine whether users will be able to access digital-based public services.

Requirements:

In order to carry out impact analysis, actors need data on:

- The physical location of fibre infrastructure
- The capacity of fibre infrastructure
- The operational status of fibre infrastructure
- The go-live date of fibre infrastructure

It must be possible to connect data on fibre infrastructure to other social and economic indicators.

Advocacy

National and international non-governmental organisations (NGOs) are interested in using fibre data to advocate for improved access to the internet. NGOs can use data on existing and planned fibre infrastructure to identify underserved areas, to advocate for improved access, and to advocate for changes to policies. These actors can also use data on the socioeconomic impact of fibre access to build an evidence base for including internet access as part of advocating for educational, health, employment outcomes, etc.

Requirements:

In order to advocate for improved access, actors need data on:

- The physical location of existing and planned fibre infrastructure
- The capacity of fibre infrastructure

To identify gaps and opportunities it must be possible to connect data on fibre infrastructure to other datasets such as population density or school locations, and to other social and economic indicators.

Statistics and indicators

National statistics offices, regulatory agencies, intergovernmental organisations, and national observatories may all be involved in calculating, monitoring, and/or reporting internationally agreed comparative statistics and indicators for broadband transmission capacity, such as the International Telecommunication Union's Broadband Transmission Capacity Indicators.

Requirements:

In order to calculate the ITU's Broadband Transmission Capacity Indicators, actors need data on:

- Transmission network length
- Node locations
- Equipment type of terrestrial transmission networks
- Network capacity (bit rate)
- Number of optical fibres within the cable
- Operational status of the transmission network

Progress and investment monitoring

Many hundreds of millions of dollars of public and private money are invested in fibre network development. Investors, monitoring groups, NGOs and oversight agencies can use fibre data for progress tracking and investment monitoring. For example:

- The Broadband Commission's Connecting Africa Through Broadband strategy proposes a monitoring framework covering infrastructure location availability: data on exact points and lines – or on an approximate spatial level – representing nodes and routes of the infrastructural network (first mile, middle mile, and last mile)
- Fibre data could be used in initiatives such as the World Bank's Geo-Enabling initiative for Monitoring and Supervision (GEMS)
- National security agencies could use fibre data to understand who owns, operates and invests in critical infrastructure so that they can detect the potential presence of hostile state actors or state-linked entities through further due diligence

Requirements:

In to order track progress and monitor investments, actors need data on:

- The physical location of existing and planned fibre infrastructure
- The capacity of fibre infrastructure
- The operational status of fibre infrastructure
- The go-live date of fibre infrastructure
- The organisations involved in investing, providing physical infrastructure and operating networks

Cross-cutting use cases

The following cross-cutting use cases are relevant to multiple primary use cases:

Mapping and GIS analysis

Mapping and other types of GIS analysis is relevant to all of the primary use cases detailed in the previous section.

Requirements:

To support mapping and GIS analysis:

- The standard should strongly recommend that publishers provide the geographic coordinates of fibre infrastructure.
- The standard must support publication formats that are compatible with common GIS tools.
- The standard and/or data must also declare the coordinate reference system used to specify the location of fibre infrastructure.

Connecting to other datasets

Many of the primary use cases involve combining data on fibre infrastructure with other datasets:

Use case	**Related datasets**
Climate and disaster resilience	Flood projections, sea-level rise projects, temperature rise projects, wildfire risks.
Impact analysis, policy development and decision-making	Social and economic indicators.
Network investment, planning and deployment	Census data, population density data.
Advocacy	Census data, population density data, social and economic indicators.
Statistics and indicators	Census data, population density data.
Progress and investment monitoring	Corporate registers, beneficial ownership data.

Connections to other datasets can involve:

- Using GIS tools to combine data on the geographic coordinates of fibre infrastructure with other geographic data.
- Using reverse geocoding to convert the geographic coordinates of fibre infrastructure to addresses or place names that can be used to join to non-geocoded datasets.
- Using geocoding to convert the addresses of fibre infrastructure to geographic coordinates in order to combine them with other geographic data.
- Using organisation identifiers, such as company registration numbers, for investors, physical infrastructure providers and network operators to connect to other datasets on company ownership and corporate filings.

Requirements:

To support connections to geographic and non-geocoded datasets, the standard should strongly recommend that publishers provide the geographic coordinates of fibre infrastructure.

To support connections to non-geocoded datasets, the standard should also allow publishers to provide standardised address data, for example through the use of common vocabularies for country names and sub-national administrative divisions.

To support connections to datasets on company ownership and corporate filings, the standard should include identifiers for organisations.

Combining data from different networks

Several use cases involved combining data from different networks to get a broader picture at a regional or national level:

- Network investment, planning, and deployment
- Climate and disaster resilience
- Impact analysis, policy development, and decision making
- Advocacy
- Statistics and indicators

Requirements:

Whilst publishing data in a standardised format reduces the need to process and transform data before combining datasets, the standard documentation should include non-normative guidance on combining data from different networks.

Non-fibre technologies

In addition to fibre, broadband networks can utilise microwave, satellite and copper links. Whilst the focus of the standard is on fibre infrastructure, several use cases depend on understanding broadband network access coverage, which may involve non-fibre technologies:

- Network investment, planning and deployment
- Climate and disaster resilience
- Impact analysis, policy development and decision-making
- Advocacy
- Statistics and indicators

Requirements:

To support these use cases, the standard should allow publishers to provide basic information on non-fibre infrastructure such as the physical location of the infrastructure and the transmission medium of non-fibre links in the network.