



**UGANDA
COMMUNICATIONS
COMMISSION**

**FRAMEWORK FOR MONITORING MOBILE
NETWORK OPERATOR SERVICE COVERAGE
OBLIGATIONS IN UGANDA**

FEBRUARY 2024

Table of Contents

1.	<i>INTRODUCTION</i>	3
2.	<i>OBJECTIVE</i>	3
3.	<i>AMENDMENT OF THE FRAMEWORK</i>	3
4.	<i>INTERPRETATIONS</i>	3
5.	<i>APPLICABLE LEGISLATION AND REGULATION</i>	4
6.	<i>SCOPE</i>	4
7.	<i>APPLICABILITY</i>	5
8.	<i>MINIMUM ATTRIBUTES OF SERVICE COVERAGE</i>	5
9.	<i>COVERAGE REPORTING REQUIREMENTS</i>	5
9.1.	<i>Technical Plan</i>	5
9.2.	<i>Annual coverage implementation plans</i>	6
9.3.	<i>Coverage progress reports</i>	6
10.	<i>EVALUATION OF COVERAGE PERFORMANCE</i>	6
11.	<i>DECLARATION OF COMPLETION</i>	7
12.	<i>COMMISSION’S EVALUATION OF SERVICE COVERAGE</i>	7
13.	<i>STAKEHOLDER ROLES AND RESPONSIBILITIES</i>	8
13.1.	<i>Mobile Network Operators</i>	8
13.2.	<i>Uganda Communications Commission</i>	8
13.3.	<i>Consumers/Users</i>	8
14.	<i>ENFORCEMENT AND REMEDIAL MEASURES</i>	8
	<i>ANNEXURE</i>	9
	ANNEX I: SERVICE COVERAGE EVALUATION PROCEDURE	9
	ANNEX II: ANNUAL COVERAGE IMPLEMENTATION PLAN	10
	ANNEX III: ANNUAL PROGRESS REPORT TEMPLATE	10
	ANNEX IV: MOBILE SERVICE COVERAGE PREDICTION MAPS- TECHNICAL GUIDANCE	11
	ANNEX V: MAP OF UGANDA DETAILING THE DISTRICTS UNDER THE UCC LICENSING REGION	12

1. INTRODUCTION

Uganda Communications Commission (the Commission) is required under Section 5(1) of the Uganda Communications Act 2013 (Act) to, among others, improve communications services generally and to ensure equitable distribution of services throughout the country.

The Commission's approach to ubiquitous coverage of telecommunications services includes subsidizing the expansion of coverage to under-served and unserved areas as well as coverage obligations.

Coverage obligations comprise network enhancements required of the respective licensee or radio spectrum assignee, including but not limited to, population coverage, area coverage, household coverage, location per area coverage, new sites coverage, speed threshold, and signal strength.

The Commission seeks to have a consistent approach to the evaluation of coverage obligations.

2. OBJECTIVE

This document stipulates the data collection, reporting and verification of implementation of coverage obligations of Mobile Network Operators and spectrum assignees.

3. AMENDMENT OF THE FRAMEWORK

This document shall be reviewed regularly to ensure continued relevance and revised to accommodate developments in the industry.

4. INTERPRETATIONS

The terms in this document shall carry the interpretation used in the Act, unless otherwise defined below:

- (a) **'Blocked Call'** means a call attempt that fails to achieve a connection to the destination party and therefore not receiving an alerting or ring tone, busy tone, answer signal or announcement.
- (b) **'Call attempt'** means an attempt made within the coverage area to achieve a connection to one or more devices attached to a telecommunications network which commences when the destination address information required for setting up the call is sent to the network by the user.
- (c) **'Coverage'** is the extent and strength of the mobile network's radio signal in a given area, which determines how well consumers can make and receive calls, send text messages, and use mobile data.
- (d) **'Coverage Obligation Due Date'** means the date on which the respective coverage obligation is required to have been completed.

- (e) **‘Coverage Map or Prediction Map’** is a geographical simulation of the radio signal footprint over a defined area.
- (f) **‘Dropped Call’** means the percentage of calls terminated by the network before they are ended by either party participating in the call.
- (g) **‘Frequency band’** means a continuous set of frequencies lying between two specified limiting frequencies.
- (h) **‘Licensee’** means a person who carries roll out/coverage obligations by virtue of a licence issued by the Commission under section 22 of the Act or a radio frequency spectrum authorization issued under section 24 of the Act.
- (i) **‘Mobile Network Operator (MNO)’** means a licensee who provides mobile communication services using licensed spectrum.
- (j) **‘Successful call’** means a call that has reached the called number, allows the conversation to proceed, is maintained for the call duration and completed without network interruption.

5. APPLICABLE LEGISLATION AND REGULATION

The implementation of this framework shall be governed by the referenced regulation and legislation and take into account the documents as listed below:

- (a) Section 5(1)(a), (b), (g), (k), and (m) of the Uganda Communications Act 2013.
- (b) The Uganda Communications Commission Guidelines on Infrastructure Deployment and Sharing, 2021.
- (c) Licensing Guideline for the Telecommunications Sector, 2019.
- (d) The Uganda Communications Commission Guidelines on Infrastructure Deployment and Sharing.
- (e) The Uganda Communications (Quality of service) regulations 2019.
Uganda Communications Commission Guidelines on Variation and Withdrawal of Radio Spectrum Authorization, 2021.

6. SCOPE

This document presents:

- (a) A guide for self-assessment by licensees of their performance against their mobile coverage obligations,
- (b) Coverage performance reporting requirements for licensees,
- (c) The criteria for evaluation by the Commission of the licensees’ coverage obligation(s) performance.

7. APPLICABILITY

This document shall apply to service coverage obligations of Mobile Network Operators (MNOs) as prescribed in their license and/or radio frequency spectrum authorization(s).

8. MINIMUM ATTRIBUTES OF SERVICE COVERAGE

An area shall be deemed covered if:

- (a) The downlink radio signals' values are above the respective minimum levels shown in the table below, for at least 95% of the measurement samples in the given audit and location.

Technology type ¹	2G/GSM (RxLEV)	3G/UMTS (RSCP)	4G/LTE (RSRP)	5G/NR (RSRP)
Outdoor phone signal strength	-90dBm	-100dBm	-105dBm	-100dBm

- (b) In the case of voice service coverage, 98% of all voice call attempts in the respective area are successfully initiated, maintained for the call duration and completed without interruption (call setup, call block and call drop).
- (c) In the case of data service coverage,
- where the obligation specifies a minimum threshold, a device should achieve upload and/or download speeds meeting or exceeding the minimum values specified within the respective license or radio frequency spectrum authorization,
 - where the obligation specifies an average data rate/throughput, the average transmission speed of all measurements in that audit and location will achieve or exceed the set value specified within the respective license or radio frequency spectrum authorization,
 - Where no speed has been specified in the coverage obligation, all measurements in that audit and location shall achieve a download speed of at least 4Mbps and 75% of these must achieve a download speed of 8Mbps or greater.

9. COVERAGE REPORTING REQUIREMENTS

9.1. Technical Plan

Each licensee shall establish and implement measures to fulfil its multi-year technical plan committed to in application for the operator licence and/or radio frequency spectrum authorisation under which the respective coverage obligations were defined.

¹ GSM (Global System for Mobile Telecommunications); UMTS (Universal Mobile Telecommunications System); LTE (Long Term Evolution); and NR (New Radio). RxLev (received signal level); RSCP (received signal code power); and the RSRP (received signal reference power)

9.2. Annual coverage implementation plans

- i) Within thirty (30) days after every annual license anniversary, each licensee shall submit to the Commission its annual coverage implementation plan highlighting the licensee's plan for the mobile network development in the various areas for that new licence year.
- ii) The annual implementation plan should contribute toward the fulfilment of the technical plan and thus the achievement of the coverage obligation.
- iii) The information to be provided in the implementation plan shall include:
 - a. A plot/mapping of the locations of the licensee's existing sites and search areas or approximate locations of proposed sites for the year ahead, within each of the four (4) licence regions of the Commission.
 - b. A schedule identifying/listing the existing sites with site name and reference number; address, including licence region, district, town/city and grid reference (latitude & longitude); and status (*i.e. proposed, in planning, in build, operational*).
 - c. Where sites on the map in 9.2(ii)(a) above are in dense urban areas and overlap, therefore difficult to differentiate between them, an appropriate scale plan should be provided.
 - d. A single point of contact that shall be the Commission's focal person to the licensee on the subject.
- iv) The schedule in 9.2(ii)(b) shall be compiled using the template provided in Annex II.

9.3. Coverage progress reports

- i) Each licensee shall submit to the Commission a coverage progress report on the realization of their respective coverage obligations.
- ii) This report shall be due six (6) months after each annual anniversary of the respective license/radio spectrum authorization as applicable, until the licensee submits a declaration of completion or the expiry date of the respective coverage obligation.
- iii) The coverage progress report shall include a prediction coverage map and schedule of any additional sites or variations to the annual implementation plan under 9.2, arising out of capacity, market or other demands on the network.
- iv) The report template included in Annex III shall be used.

10. EVALUATION OF COVERAGE PERFORMANCE

- i) Each licensee shall maintain a network prediction coverage map that provides an overview of the licensee's network's signal strength, coverage areas, and potential gaps.
- ii) The licensee shall ensure that the prediction model used in deriving the coverage map is aligned to the attributes prescribed in section 8 above.

- iii) In developing its coverage map, the licensee shall ensure that the digital terrain model used is customised for Uganda and that the correct land type data relating to Uganda is sourced and inputted.
- iv) Each licensee shall use the information derived from the associated theoretical calculations/simulations of network coverage in fulfilling the reporting requirements in section 9 above.

11. DECLARATION OF COMPLETION

- i) A licensee shall submit a declaration of completion to the Commission upon fulfilment of the respective coverage obligations.
- ii) A declaration of completion shall be accompanied by supporting information. This shall include a network prediction coverage map and report on relevant network performance indicators including but not limited to:
 - a. Dropped Call Rate,
 - b. Blocked Call Rate
- iii) The licensee shall include any additional information to validate the declaration of completion and the method of assessment used.
- iv) Upon receipt of the declaration of completion, the Commission shall evaluate the fulfilment by the licensee of the respective coverage obligation.

12. COMMISSION'S EVALUATION OF SERVICE COVERAGE

- i) The Commission may at any time conduct an independent audit or verification of the submissions made by the licensee under section 9, and take appropriate regulatory action.
- ii) To assess and verify service coverage performance of the Licensee, the Commission may utilise a combination of the following measurement approaches:
 - a) Independent audits or verification based on network audits and/or field measurements (i.e., either or both Drive tests / Walk tests).
 - b) Conduct a simulation of the theoretical prediction of the operator's coverage using the Commission's radio planning tool and raw data collected from the licensee.
 - c) Information generated through crowdsourcing.
 - d) Any other method deemed necessary in the circumstance.
- iii) Notwithstanding Section 11 above, the Commission shall, upon expiry of the respective Coverage Obligation due date, evaluate the extent of fulfilment of the coverage obligations due. This shall inform the annual evaluation of compliance of the respective licence/radio frequency spectrum authorisation.

13. STAKEHOLDER ROLES AND RESPONSIBILITIES

13.1. Mobile Network Operators

- i) MNOs will be required to establish and maintain effective systems to collect data,
- ii) Ensure adequate planning and timely procurements towards fulfillment of the coverage obligations,

13.2. Uganda Communications Commission

- i) Quality assure the systems used by the licensee to implement the framework,
- ii) Acquire and maintain relevant tools to implement the relevant provisions herein and,
- iii) Facilitate engagements with other relevant government organisations to enable the realisation of this framework.
- iv) Ensure that the privacy and confidentiality of volunteers providing information for crowdsourcing is protected.

13.3. Consumers/Users

Consumers are encouraged to:

- i) submit information regarding their network coverage experiences using crowdsourcing tools and,
- ii) report areas of inadequate or no network coverage.

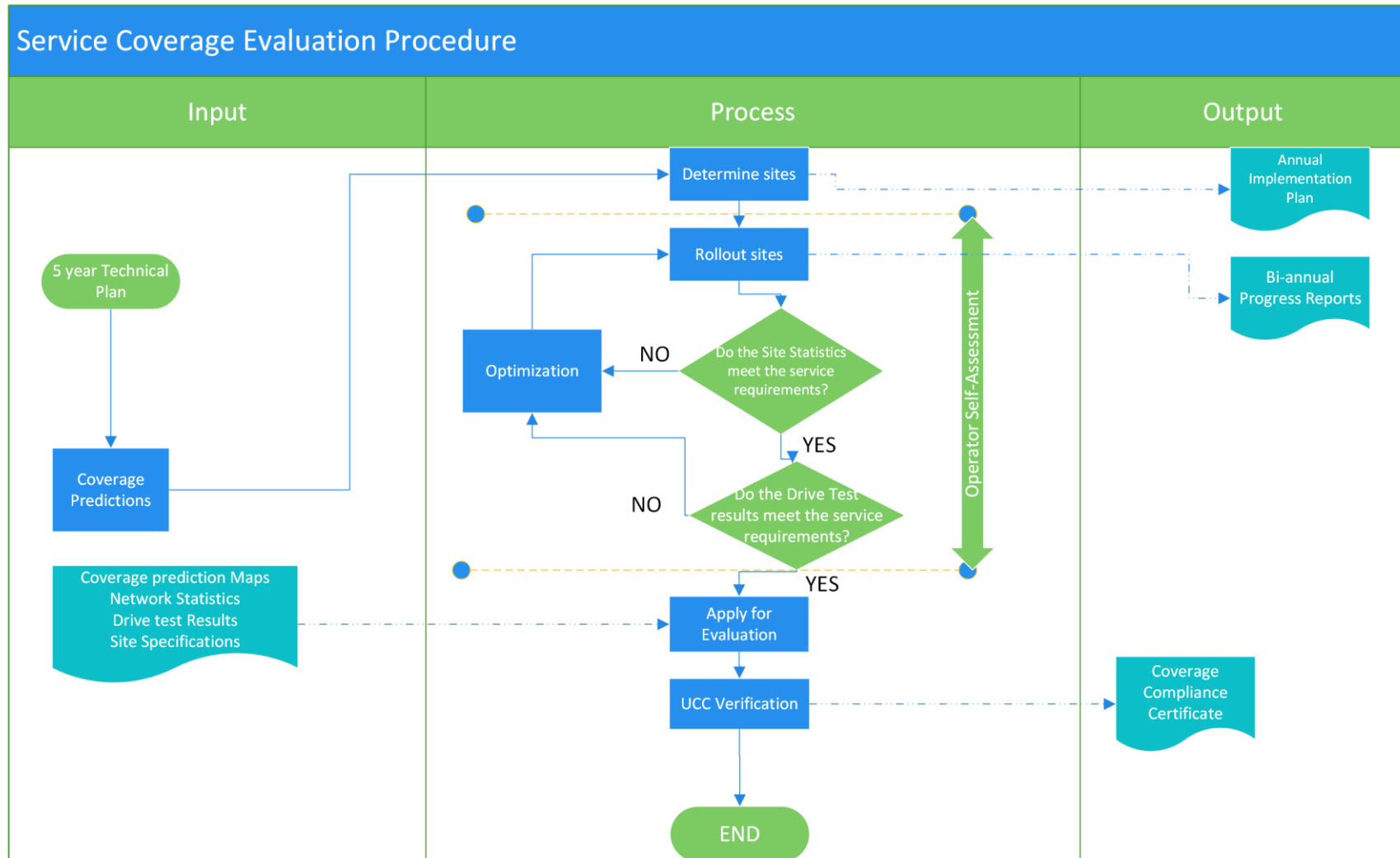
14. ENFORCEMENT AND REMEDIAL MEASURES

- a) A licensee who fails to comply with the provisions contained in this framework or fails to submit information as required shall be deemed to be non-compliant and shall be subjected to applicable enforcement and/or remedial measures under the respective licence or radio frequency spectrum authorization and the Act.
- b) Prior to taking enforcement action for breach of provisions above, the Commission shall provide the licensee with a written notice of non-compliance that specifies:
 - (1) the specific obligations that the Commission deems to be not fulfilled or complied with,
 - (2) the actions that the licensee should take to remedy the alleged violation where applicable and,
 - (3) the timeframe in which the licensee should comply with the notice of non-compliance.
- c) The licensee shall be granted a reasonable opportunity to respond to the Commission's notice issued in accordance with subsection (b).

ANNEXURE

ANNEX I: SERVICE COVERAGE EVALUATION PROCEDURE

Figure 1: Service Coverage Evaluation Procedure



ANNEX II: ANNUAL COVERAGE IMPLEMENTATION PLAN

Year	Licensing Region – as per the Commission’s licence regions designation	District	Town/ city	Site ID	Sitename	Latitude	Longitude	Site Status (proposed, in planning, in build, operational)	Site Clutter	Cell_ID	Cell Name	Antenna Vendor	Antenna Model	Antenna gain (dB)	Tower Height	Antenna height on the base station (meters)	Effective antenna height above ground level in meters	Transmitting Frequency	Bandwidth	frequency band(s) per site per technology – each band on a separate row for each technology	Power Max	Power Actual	Effective isotropic radiated power (e.i.r.p)	Azimuth	Horizontal Beamwidth	Vertical Beamwidth	Tilt_Electrical	Tilt_Mechanical	Technology type (2G, 3G, 4G, 5G etc) per site – each technology on a separate row	Outdoor coverage per site per technology type per frequency band	Number of simultaneous users able to support	Percentage Geographical coverage (%) (aggregated for all sites per technology)
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ANNEX III: ANNUAL PROGRESS REPORT TEMPLATE

1. Coverage prediction map in accordance with the guidance provided in Annex IV
2. Site Information

Year	Licensing Region – as per the Commission’s licence regions designation	District	Town/ city	Latitude	Longitude	Technology type (2G, 3G, 4G, 5G etc) per site – each technology on a separate row	frequency band(s) per site per technology – each band on a separate row for each technology	Outdoor coverage per site per technology type per frequency band	Number of simultaneous users able to support	Percentage Geographical coverage for signal strength ≥ -90 dBm (%) (aggregated for all sites)

ANNEX IV: MOBILE SERVICE COVERAGE PREDICTION MAPS- TECHNICAL GUIDANCE

- I. Predictions are based on the terrain profile and clutter along the path.
- II. A clutter end correction is applied at transmitter and receiver. This is based on a representative clutter height assigned to each clutter category. The representative clutter height depends not only on the typical physical height of clutter objects but also on the horizontal spacing of objects and the gaps between them. Default parameters for representative clutter heights as defined in ITU-R Recommendation P.1812-6 as per Table 4 below:

Table 1: Default Information for clutter-loss modelling in ITU-R Recommendation P.1812

Clutter Type	Representative Height (m)
	Use in profile equation For i=2 to n-1
Water/Sea	0
Open/Rural	0
Suburban	10
Urban/Trees/Forest	15
Dense Urban	20

- III. The 10 m resolution digital terrain map data shall be used for urban and suburban clutter categories (Table 5 below) while 50 m resolution digital terrain map data shall be used for the open clutter category.
- IV. The 10-meter resolution clutter dataset produced shall be.
- V. This dataset identifies 10 different clutter categories. For location variation these are mapped to the required urban, suburban, and open clutter designations as outlined in Table 5.

Table 2: Clutter code mapping

Category	Description	Clutter Designation
1	Dense Urban	Urban
2	Urban	Urban
3	Industry	Suburban
4	Suburban	Suburban
5	Village	Suburban
6	Parks/Recreation	Open
7	Open	Open

8	Open in Urban	Open
9	Forest	Open
10	Water	Open

ANNEX V: MAP OF UGANDA DETAILING THE DISTRICTS UNDER THE UCC LICENSING REGION

