UGANDA COMMUNICATIONS COMMISSION

CONSULTATION ON THE PROPOSED UGANDA COMMUNICATIONS COMMISSION FRAMEWORK FOR MONITORING OF COVERAGE OBLIGATIONS OF MOBILE NETWORK OPERATORS IN UGANDA

AUGUST 2022

THIS CONSULTATION IS OPEN FOR 20 DAYS EFFECTIVE THE 25TH OF AUGUST 2022

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 service coverage expansion to under-served as well as unserved areas and coverage obligations as applicable.

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 has been developed to guide data collection, reporting and verification of implementation of coverage obligations of Mobile Network Operators.

3. AMENDMENT OF THE FRAMEWORK

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

4. INTERPRETATIONS

The terms in these guidelines shall carry the interpretation used in the Act and the Uganda Communications (Quality of service) regulations 2019, unless otherwise defined below:

(a) **'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.

(b) **'Call Success Rate/ Successful Call Rate (SCR)'** means percentage of successful calls maintained for a duration of at least 2 minutes.

(c) **'Call Setup Success Rate (CSSR)'** means percentage of call attempts with an indication of call connection (alerting, busy tone, or announcement) within 12 seconds from the instant the user initiates a call request to the network.

(d) **'Coverage Obligation Due'** date means the date on which the respective coverage obligation is required to have been completed.

(e) **'Downlink Data Throughput'** means the amount of data that can be transferred from the network to the user device in a given amount of time.

(f) **'Dropped Call Rate (DCR)'** 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.

Do you have comment(s) on any of the above definitions?
If yes, please provide comment(s) and any supporting information in respect of the comment(s) made.

5. APPLICABLE LEGISLATION AND REGULATION

The implementation of these guidelines shall be governed by:

(a) Section 5(1)(a), (b), (g), (k), and (m) of the Uganda Communications Act 2013,
(b) the Uganda Communications (Quality-of-Service) regulations, Statutory Instrument No.92, 2019,
(c) The Uganda Communications Commission Guidelines on Infrastructure Deployment and Sharing, 2021.

6. SCOPE

This document presents

(a) A guide for self-assessment by Mobile Network Operators (MNOs) of their performance against their mobile coverage obligations,
(b) Coverage performance reporting requirements for MNOs.

(c) The criteria for evaluation by the Commission of the MNOs' coverage obligation(s) performance.

7. APPLICABILITY

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

8. MINIMUM ATTRIBUTES OF SERVICE COVERAGE

The assessment of service coverage shall be governed by the following principles:

(a) An area shall be deemed covered if:

- It has a minimum received signal strength of -90 dBm in at least 90% of the area as determined through prediction analysis.
- In the case of voice service coverage, is able to support calls based on the following quality performance
  - CSSR ≥ 95%,
  - SCR≥98% and,
  - DCR≤2%.
- In the case of data service coverage, it has the ability to download a data file of a minimum of 20MB, at the speed specified in the coverage obligation within the respective license or radio frequency spectrum authorization.

Do you have comment(s) on any of the provisions of the criteria outlined in section 8?
If yes, please provide comment(s) and any supporting information in respect of the comment(s) made.

9. COVERAGE REPORTING REQUIREMENTS

9.1. Technical Plan

This is the multiyear technical plan that was submitted at license application stage.

9.2. Annual coverage implementation plans

Thirty (30) days after every annual license anniversary, the MNOs shall submit an annual coverage implementation plan. The annual implementation plan should contribute toward the technical plan. The annual implementation plan template is provided in Annex II.

9.3. Coverage progress reports

The MNO shall submit to the Commission a detailed status report on the progress in realizing their respective coverage obligations. This report shall be due bi-annually starting six (6) months after the date of the respective license/radio spectrum authorization as applicable, until the point of

operator self-declaration or otherwise advised by the Commission. The report template is provided in Annex III.

9.4. Application for service coverage

An application for service coverage evaluation as detailed in section 11.2 above.

The table below provides a summary of the coverage reporting requirements for the MNOs.

Table 1: Coverage reporting requirements

Reporting Period or Trigger	**Requirement**	**Document Reference**
As part of application for License/spectrum authorization application, the MNO should have submitted a complete Technical Plan	Complete Technical Plan	Section 9.1 of this framework
Thirty days (30) days after every annual anniversary of the effective date of the license/spectrum authorization	Annual coverage obligation implementation plan (Annex II)	Section 9.2 of this framework
Every six months from License date	Coverage progress report (Annex III)	Section 9.3 of this framework
Completion of planning and service rollout phases	Self-declaration and application for service coverage evaluation (Annex IV)	Section 11.2 (a) of this framework
Coverage Obligation Due date	The Commission shall assess the operator's consistent provision of services based on previous progress reports.	Section 11.4 of this framework

Do you have comment(s) on any of the provisions on the "coverage reporting requirements" as outlined in section 9?
If yes, please provide comment(s) and any supporting information in respect of the comment(s) made.

10. CRITERIA FOR EVALUATION OF COVERAGE PERFORMANCE

An MNO will need the following elements to conduct self-assessment.

(a) The technical plan that was submitted to the Commission at application of License/spectrum authorisation,
(b) Annual Implementation (rollout) plan,

(c) Coverage prediction map,
(d) Network Performance statistics at site level,
(e) Drive Test Results per region

Table 2 below defines the method and milestones associated with different phases of the operator's service coverage performance to guide an operator's self-assessment.

Table 2: *Method and milestones associated with different phases of the operator's service coverage performance*

Phase	Milestone	Criteria
Planning	**a) Prediction Map** *(The prediction maps will be informed by the technical and implementation plans)*	The proportion of the area with Minimum Signal of >= 90dbm is 90% of service coverage region. *(All sites indicated in prediction map must be installed, operational and carrying traffic for the last three months)*
Service rollout	**b) Rollout of services** *(Service level per-site from Network Performance Statistics at Busy hour)*	Call Setup Success Rate >= 95%
		Dropped Call Rate <= 2%
		DL throughput per user >= prescribed DL throughput
	c) Service meets Users expectations *(Drive Test)*	70% of sites in the service coverage region contribute to Drive Test results and the drives should cover at least 70% of the service coverage region
		Dropped Call Rate <= 2%
		Successful Call Rate >=98%
		Throughput >= prescribed DL
		-90dBm Minimum Signal level >= 90% of samples
		Call Setup Success Rate >= 95%
Service Continuity	**d) Network is operational for the 5 years of the License** *(Network Operational Report)*	All sites originally contributing to service coverage are still operational by the coverage obligation due date.

N.B.: In a multi carrier environment, the carrier with the shortest propagation distance shall be the basis for determining minimum signal coverage predictions for that area.

Do you have comment(s) on any of the provisions on "criteria for evaluation of coverage performance" as outlined in section 10?
If yes, please provide comment(s) and any supporting information in respect of the comment(s) made.

11. ASSESSMENT OF MOBILE SERVICE COVERAGE IN UGANDA

11.1. Progressive self-assessment

Before completion of service coverage obligations, the operator shall be guided by Table 2 above to carry out self-assessment. This assessment shall be progressive based on the subsequent fulfilment of the milestones. This will feed into the bi-annual progress reports to be submitted to the Commission.

11.2. Post- coverage assessment for completed rollout plans

a) **Declaration and application for service coverage evaluation**

Upon completion of the planning and service rollout phases (Table 2 above) based on self-assessment, the mobile network operator shall declare fulfilment of service coverage and submit, to the Commission, an application for service coverage evaluation in accordance with Annex IV. It is against this submission that the Commission will evaluate the fulfilment by the MNO to meet the respective service coverage obligation.

11.3. Verification and evaluation of service coverage:

To assess and verify service coverage performance of the Licensee, the Commission may utilise the following approaches:

i. Independent audits or verification of the fulfilment of the relevant coverage obligations. In this respect, the Commission will use:
   - field measurements (i.e., either or both Drive tests / Walk tests) and,
   - network information audits based on raw data collected from the operator's network.

ii. Conduct a simulation of the theoretical prediction of the operator's coverage using radio planning tool and thus generate coverage maps based on each operator's underlying network parameters.

iii. Information generated through crowdsourcing.

iv. Any other method deemed necessary in the circumstance.

11.4. Declaration of areas covered

On the coverage obligation due date, the Commission shall evaluate extent of completion of the service coverage obligations and issue a certificate of completion for the qualifying MNOs.

Do you have comment(s) on any of the provisions on "assessment of mobile service coverage in Uganda" as outlined in section 11?
If yes, please provide comment(s) and any supporting information in respect of the comment(s) made.

12. STAKEHOLDER ROLES AND RESPONSIBILITIES

12.1. Mobile Network Operators

MNOs will be required to establish systems to collect data and submit information as provided in Section 11 above.

12.2. Uganda Communications Commission

i. Verify or audit submitted information.
ii. Evaluate and qualify fulfilment of coverage obligation.

Do you have comment(s) on any of the provisions on "stakeholder roles and responsibilities" as outlined in section 12?
If yes, please provide comment(s) and any supporting information in respect of the comment(s) made.

13. ENFORCEMENT AND REMEDIAL MEASURES

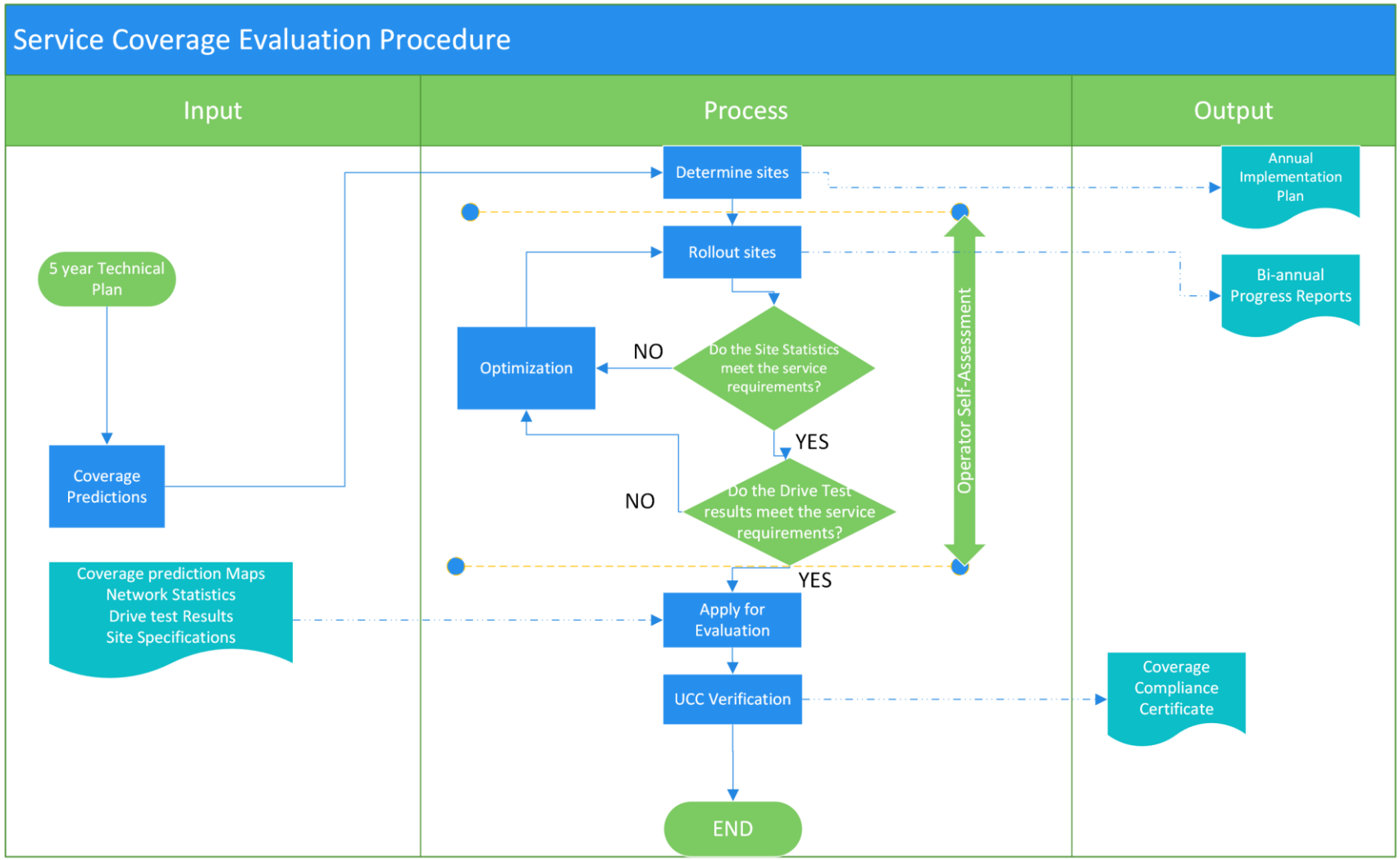
a) An operator who fails to comply with the requirements and obligations contained in these guidelines or fails to submit information as required shall be deemed to be non-compliant and shall be subjected to applicable enforcement and/or remedial measures under the Act.
b) The enforcement and remedial measures to be taken by the Commission in respect of non-compliance with these guidelines shall include, but not limited to:
    i. issuance of a written warning with a deadline for compliance by the respective operator.
    ii. take any other measure that the Commission deems reasonable in the circumstances in accordance with the Act.

Do you have comment(s) on any of the provisions on "enforcement and remedial measures" as outlined in section 13?
If yes, please provide comment(s) and any supporting information in respect of the comment(s) made.

ANNEXURE

ANNEX I: SERVICE COVERAGE EVALUATION PROCEDURE

Figure 1:Service Coverage Evaluation Procedure



ANNEX II: ANNUAL COVERAGE IMPLEMENTATION PLAN

	Infrastructure coverage projections				**Service coverage capacity projections**		
Year	Number of sites	Name of Sub-County	Name of District	Region	Geographical coverage for signal strength >-90dBm (%)	Maximum simultaneous voice users per site	Average download throughput per site per user

ANNEX III: BI-ANNUAL PROGRESS REPORT TEMPLATE

a) Infrastructure

Infrastructure coverage			
Site Name	Sub- County	District	License Region

b) Service

Service coverage performance		
Percentage of geographical coverage with minimum signal strength >-90dBm (%) *(supported by prediction maps)*	Number of sites meeting the minimum voice quality of service i.e. CSSR and DCR *(supported by network performance statistics)*	Number of sites meeting the download speed specified in the coverage obligation within the respective license or radio frequency spectrum authorization

ANNEX IV: SERVICE COVERAGE APPLICATION

Service Coverage Application requirements

An application for coverage evaluation shall constitute a cover letter requesting for service coverage evaluation with supporting information as provided in Table 3, which contains the list of service coverage reporting requirements with associated KPIs, targets, method of assessment and verification of service coverage.

Table 1: Service coverage reporting requirements

	Requirements from MNOs	**KPI**	**Description**	**Target**	**Verification**	**Fulfillment**
1.	**Coverage prediction map**: Reference Annex V • Provide site coverage prediction maps for all your sites including a list of cells and the coverage level calculated on that basis • Specify the tuned propagation model and its specifications. To validate maps, provide sample site coverage maps for the different clutter categories with drive tests superimposed. • File format: geotiff, .shp, .grc, .tab, .map format					
a)	**Coverage prediction map based on the minimum receive signal level:** Provide coverage map predictions with the site radio specifications for licensed area.	Outdoor Receive Signal Strength (RSSI, RSCP, RSRP)	Receive signal power on the user equipment	> -90dBm	**Verification:** The Commission will use either or both Drive tests / Walk tests and crowd sourcing tools for verification to evaluate performance or achievement.	Coverage is fulfilled for a minimum receive signal strength of -90 dBm over 90% of the geographical area.

					The Commission may independently generate the operator geographic coverage prediction map based on each operators' underlying network parameters.	
b)	**Data service prediction map** based on prescribed HTTP-DL Data throughput: Provide throughput map predictions with the site radio specifications for licensed area.	Downlink throughput	The amount of data that can be transferred from the operator to the user device in a given amount of time.	Downlink throughput specified for License or spectrum authorization.	**Verification:** The Commission will use either or both Drive tests / Walk tests (where necessary) and crowd sourcing tools for verification to evaluate performance or achievement. The Commission may independently generate the operator geographic coverage prediction map based on each operators' underlying network parameters.	Data service is fulfilled for the specified speed over the geographical area.
2.	**Network Statistics:** • Provide network statistics per site at peak hour for the last three months, aggregated per week.					

	• Specify the counters & formulae and peak hour. • File format: Excel					
a)	Voice	CSSR	Percentage of call attempts with an indication of call connection (alerting, busy tone or announcement) within 12 seconds from the instant the user initiates a request.	>=95%	The Commission shall Carry out network audits to verify authenticity of statistical Information. **Verification:** The Commission will use either or both Drive tests / Walk tests and crowd sourcing tools for verification to evaluate performance or achievement.	A voice service is fulfilled for a minimum CSSR of 95% for the sites within the geographical area.
		DCR	This is the percentage of calls terminate	<=2%	The Commission shall Carry out network audits to verify authenticity of statistical Information.	A voice service is fulfilled for a minimum DCR of 2% for the sites within the geographical area.

			d by the network before they are ended by either party participating in the call.		**Verification:** The Commission will use either or both Drive tests / Walk tests and crowd sourcing tools for verification to evaluate performance or achievement.	
b)	Data	Prescribed Downlink Throughput	The rate at which data is transferred from the internet to a user's device.	Downlink throughput specified for License or spectrum authorization	The Commission shall Carry out network audits to verify authenticity of statistical Information. **Verification:** The Commission will use either or both Drive tests / Walk tests and crowd sourcing tools for verification to evaluate performance or achievement.	Data service is fulfilled for the specified speed over the geographical area.
3.	**Drives Test Results:** • Provide drive test results for drive tests done at least once a month, for three months for the defined area					

a)	Signal Strength	Outdoor Receive Signal Strength (Rx Lev, RSCP, RSRP)	Receive signal power on the user equipment.	> -90dBm	**Verification:** The Commission will use either or both Drive tests / Walk tests and crowd sourcing tools for verification to evaluate performance or achievement.	Coverage is fulfilled for a minimum receive signal strength of -90 dBm over the geographical area.
b)	Voice	Call Success rate/ Successful Call Rate	Percentage of successful calls maintained for a duration of 2 minutes.	>= 98%	**Verification:** The Commission will use either or both Drive tests / Walk tests and crowd sourcing tools for verification to evaluate performance or achievement.	A voice service is fulfilled for an average Call Success Rate of 98% within the geographical area.
		CSSR	Percentage of call attempts with an indication of call connection (alerting, busy tone	>= 95%	The Commission shall Carry out network audits to verify authenticity of statistical Information. **Verification:** The Commission will use either or both Drive tests / Walk tests and crowd sourcing tools for verification to	A voice service is fulfilled for an average CSSR of 95% for the sites within the geographical area.

			or announcement) within 12 seconds from the instant the user initiates a request.		evaluate performance or achievement.	
c)	Data	Downlink Throughput of a user	The rate at which data is transferred from the internet to a user's device	Downlink throughput specified for License or radio frequency spectrum authorization	**Verification:** The Commission will use either or both Drive tests / Walk tests and crowd sourcing tools for verification to evaluate performance or achievement.	Data service is fulfilled for the specified speed over the geographical area.

ANNEX V: 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.1812-2 as per Table 4 below:

Table 2: 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	Use in Terminal clutter losses7 and add to profile equation for i=1 and n
Water/Sea	0	10
Open/Rural	0	10
Suburban	10	10
Urban/Trees/Forest	15	15
Dense Urban	20	20

III. The 10 m resolution digital terrain map data shall be used.
IV. The 10-meter resolution clutter dataset produced shall be used
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 3: 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

VI. Table 6 contains the key parameters to be used in the SINR calculation for WCDMA and LTE; these are given for the following bands: 800, 900, 1800, 2100 and 2600 MHz.

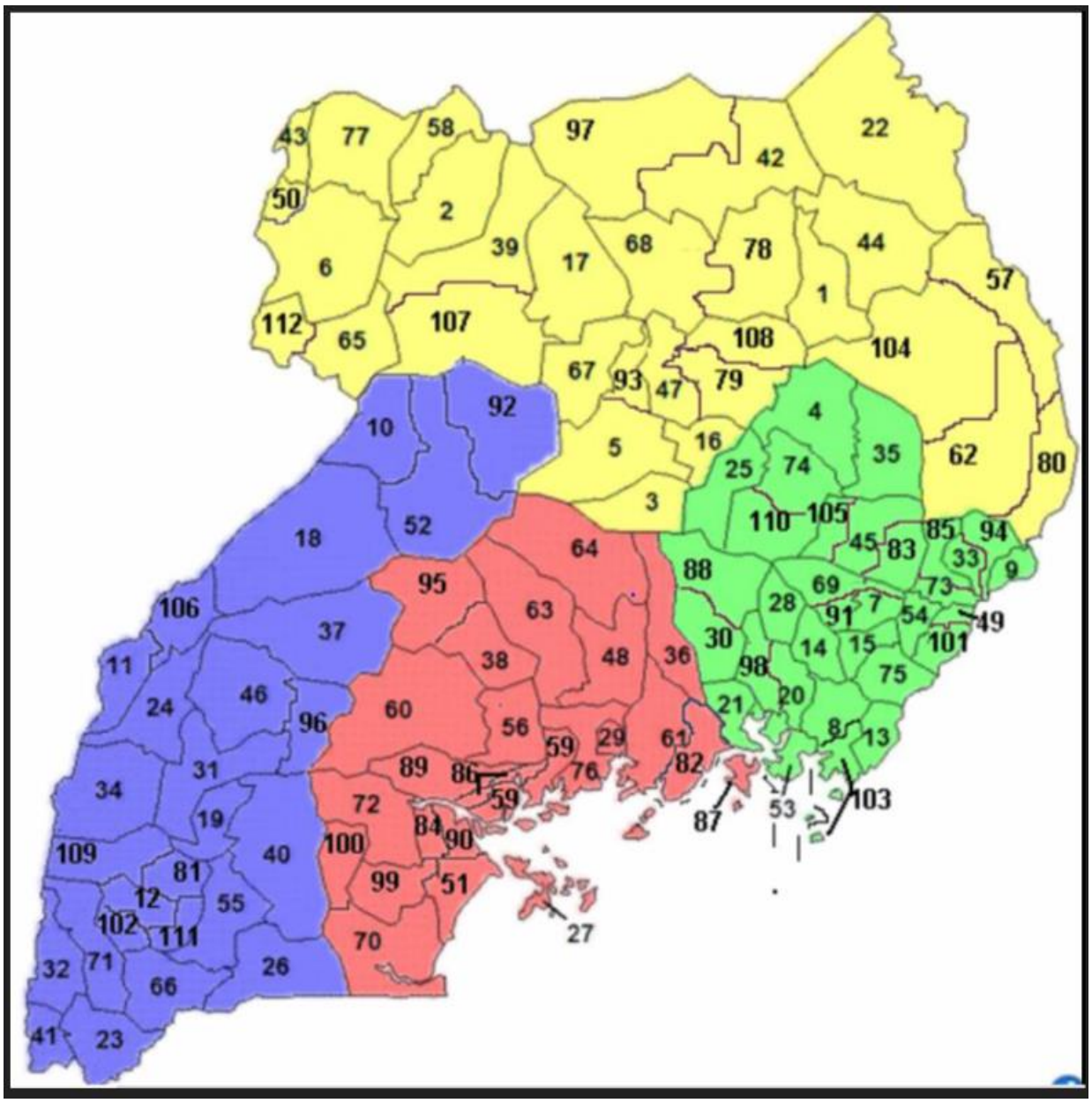
Table 4:Key default parameters for SINR calculation

Parameter	**800 MHz**	**900 MHz**	**1800 MHz**	**2100 MHz**	**2600 MHz**
UE Noise figure	10db	10db	10db	9db	9db
UE Antenna gain	0db	0db	0db	0db	0db
UE Height	1.5m	1.5m	1.5m	1.5m	1.5m
HS-DSCH Power or D-SCH Power	78%	78%	78%	78%	78%
Common channels	22%	22%	22%	22%	22%
Body/orientation loss	2.5db	2.5db	2.5db	2.5db	2.5db
Reference indoor location loss	13.2db	13.7db	13.7db	17db	17.9db

VII. The operator will submit the coverage predictions together with the following Radio Frequency data for each site in its network. This data should include the following:
   a. unique site reference
   b. Site Coordinates
   c. Tower and Antenna heights above ground level (metres);
   d. Technology
   e. Number of sectors; For each sector please provide azimuth, Antenna type and gain, combined mechanical and electrical down tilt (degrees); and EIRP (dBm);

VIII. For given sampled locations, the operators will be required to provide a map of the signal strength drive tests result super imposed on the coverage predications.

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



Districts under each UCC licensing region

Central Region (red)		Eastern Region (green)		Northern Region (yellow)		Western Region (blue)	
Map	**District**	**Map**	**District**	**Map**	**District**	**Map**	**District**
82	Buikwe	4	Amuria	1	Abim	81	Buhweju
84	Bukomansimbi	7	Budaka	2	Adjumani	10	Buliisa
86	Butambala	49	Bududa	78	Agago	11	Bundibugyo
87	Buvuma	8	Bugiri	79	Alebtong	12	Bushenyi
89	Gomba	83	Bukedea	3	Amolatar	18	Hoima
27	Kalangala	9	Bukwa	80	Amudat	19	Ibanda
90	Kalungu	85	Bulambuli	39	Amuru	26	Isingiro
29	Kampala	13	Busia	5	Apac	23	Kabale
36	Kayunga	15	Butaleja	6	Arua	24	Kabarole
38	Kiboga	88	Buyende	16	Dokolo	31	Kamwenge
95	Kyankwanzi	20	Iganga	17	Gulu	32	Kanungu
48	Luweero	21	Jinja	22	Kaabong	34	Kasese
99	Lwengo	25	Kaberamaido	42	Kitgum	37	Kibaale
100	Lyantonde	28	Kaliro	43	Koboko	40	Kiruhura
51	Masaka	30	Kamuli	93	Kole	92	Kiryandongo
56	Mityana	33	Kapchorwa	44	Kotido	41	Kisoro
59	Mpigi	35	Katakwi	97	Lamwo	96	Kyegegwa
60	Mubende	91	Kibuku	47	Lira	46	Kyenjojo
61	Mukono	45	Kumi	50	Maracha	52	Masindi
63	Nakaseke	94	Kween	57	Moroto	55	Mbarara
64	Nakasongola	98	Luuka	58	Moyo	102	Mitooma
70	Rakai	101	Manafwa	62	Nakapiripirit	106	Ntoroko
72	Ssembabule	53	Mayuge	104	Napak	66	Ntungamo
76	Wakiso	54	Mbale	65	Nebbi	109	Rubirizi
		103	Namayingo	107	Nwoya	71	Rukungiri
		14	Namutumba	108	Otuke	111	Sheema
		105	Ngora	67	Oyam		
		69	Pallisa	68	Pader		
		110	Serere	77	Yumbe		
		73	Sironko	112	Zombo		
		74	Soroti				
		75	Tororo				

Do you have comment(s) on any of the provisions in the Annexures?
If yes, please provide comment(s) and any supporting information in respect of the comment(s) made.