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**GUIDELINES N°...../GL/UAS-ICS/ RURA/017 OF/...../2017 ON
MINIMUM BANDWIDTH FOR BROADBAND INTERNET CONNECTIVITY IN
GOVERNMENT INSTITUTIONS IN RWANDA**

Version 1.0.

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INTRODUCTION

The main missions of Rwanda Utilities Regulatory Authority (RURA) includes among others to promote efficient development of regulated sectors in accordance with Government economic and financial policy and to protect and promote consumers' interests;

These guidelines are a complement to efforts being undertaken by the Ministry of Youth, Information and Communication Technology in conjunction with Rwanda Development Board to improve the quality of broadband internet access in Rwanda

One of the resolutions of the 9th leadership retreat held in Gako in March 2013 was to improve quality of service delivery;

Rwanda Utilities Regulatory Authority (RURA) by adopting these guidelines seeks to standardize Broadband Internet connectivity in Government Institutions by setting minimum requirements for bandwidth in order to improve service delivery in a bid to attain fast broadband internet access. The availability of bandwidth and the deployment of both high capacity and wireless networks in particular remain at the forefront of the Government of Rwanda that has earmarked ICT sector as a growth engine and catalyst for the complementary sectors of its economy.

Broadband will improve the quality and delivery of public services to people in more rural and remote areas, helping them become more skilled, productive and creating more jobs. Broadband will lead to the creation of virtual classrooms which help to deliver a better quality of education service. Broadband will also play an important role in improving the quality and delivery of healthcare services. The Government of Rwanda expect these trends to increase as the network capacity increases and as bandwidth availability increases.

Based on the Law N°24/2016 of 18/06/2016 governing Information and Communication Technologies especially in its article 72;

Based on the Ministerial Instructions N°001/MINICT/2012 of 12/03/2012 related to the procurement of information and communications technology goods and services by Rwanda public institutions;

The Regulatory Board after consideration and deliberation in its meeting of/...../2017 hereby issues the following Guidelines:

1.0. GENERAL PROVISIONS

1.1. Purpose

The purpose of these guidelines is to provide a framework that governs the provision, operations, maintenance and quality of broadband Internet in Government Institutions in Rwanda.

1.2. Definitions

For the purpose of these guidelines the terms hereunder shall have the following meaning:

- a) **"Bandwidth"**: the amount of data transmitted over a network connection during a given time.
- b) **"Broadband"**: A network connection that is always on, available at home, at work and on the move, that delivers progressively higher bandwidths that are capable of supporting innovative and interactive content and services, as to enhance the user-experience;
- c) **"Co-channel interference, CCI"**: is a phenomenon where transmissions from one access point (AP) covers into the receive range of other APs on the same channel, causing interference and reducing the available spectrum and resulting performance;
- d) **"Contention ratio"**: A measure of the number of users simultaneously sharing the available bandwidth;
- e) **"RS 452:2009"**: is a standard adopted by Rwanda Bureau of Standards intended to facilitate international communication in information processing;
- f) **"RSSI"**: The Received Signal Strength Indicator (RSSI) is a measure of the RF power input to the transceiver. It is measured in decibels from 0 (zero) to -120 (minus 120). The closer to 0 (zero) the stronger the signal is which means it's better, typically voice networks require a -65dbm or better signal level while a data network needs -80 dbm or better.

1.3. Scope of the guidelines

These guidelines shall provide guidance for the quality of Broadband Internet services that should be followed by Government Institutions and Internet Services Providers.

2.0. BROADBAND INTERNET CONNECTIVITY IN GOVERNMENT INSTITUTIONS

2.1. Wireless Internet

Every Government Institutions should have a wireless Internet in public areas, guest rooms, conference room, offices and public space.

2.2. Physical Layout

The communication network in Government Institutions shall have standardised structure as per Rwanda Standards, RS 452:2009 ISO/IEC 2382-25:1992 Information Technology – Vocabulary Part 25: Local Area network adopted by Rwanda Bureau of Standards.

2.3. Network stability and performance

2.3.1. The Government Institutions that have the videoconference facilities and conference rooms should require additional bandwidth on demand covering the period of events in order to cater for applications that require high bandwidth or accommodate a large number of wifi connections.

2.3.2. Login and Password shall be required to be able to log into the system.

2.3.3. Wireless network for Government Institutions must be secured and require a passphrase at the time of connection.

2.3.4. Government Institutions should start planning to upgrade its circuit when peak utilizations average reach out to around 80% as per QoS guidelines, which would allow them a few months of growth to arrange for the circuits to be ordered and installed.

3.0. MINIMUM BANDWIDTH AND COVERAGE REQUIREMENTS

3.1. Bandwidth for Government Institutions

3.1.1. The Government Institutions shall abide by the minimum bandwidth that is hereto attached in appendix A.

3.1.2. For purposes of monitoring the progress, the Regulatory Authority shall publish in partnership with other stakeholders, on a periodic basis, technical characteristics that take cognizance of relevant technological advancements for a network connection to be deemed a Broadband service.

- 3.1.3.** The Regulatory Authority in consultation with other stakeholders may update from time to time the minimum bandwidth capacity standards for Government institutions in Rwanda.
- 3.1.4.** The broadband applications that require more video conference and live streaming bandwidth will require the extra minimum bandwidth as shown in appendix B.
- 3.1.5.** The Government institutions most widely utilizing advanced applications for e-government services like geographic information systems (GIS) with multiple layers of high resolution images and graphics and require an abundant amount of data storage for the network and a connection will require more superfast broadband as shown in appendix B.
- 3.1.6.** Most e-government services, such as filing taxes, purchasing permits do not involve large amounts of data transfer. The speeds become an issue for these services only in the case of institutions, like public institutions that have multiple applications. Multiple and simultaneous use of applications negatively impact network performance, download and upload speeds, and user satisfaction with the connection. The Government institutions will need for higher-speed connections to support the growing use of simultaneous applications.
- 3.1.7.** The line speed and capacity of the universities and school's connection has to be modelled to meet the educational, management and communications usage which are dependent on the size of the university and school, the applications being used to deliver teaching and learning and to support the management and operation of the school. Universities and schools will need the minimum bandwidth as specified in appendix C.

3.2. Wireless network coverage

- 3.2.1.** Access points and hot spot shall be deployed and well positioned to guarantee acceptable signal strength. The normal range in a network would be -45 dbm to -65 dbm depending on power levels and design.
- 3.2.2.** The channels shall be well separated in order to avoid co-channel Interference (CCI), channel access delays as well as collisions in transmissions.
- 3.2.3.** The Government Institutions shall request to ISPs the client software or web-based tool to monitor the broadband received compared to the broadband subscribed to.

3.2.4. As per guidelines for broadband Internet quality of service in force, the monthly average bandwidth should not go below 95% for dedicated bandwidth and 80% for non-dedicated bandwidth of the subscribed bandwidth.

4.0. FINAL PROVISIONS

4.1. Reference tool

These guidelines shall be used by ISPs as reference for the purpose of connecting Government Institutions. These guidelines shall also serve as reference tool for Government Institutions for planning purpose.

4.2. Deadline to comply

These guidelines shall be enforced within six (6) months. Government institutions shall negotiate with the ISPs in order to comply with the bandwidth requirements.

4.3. Compliance

Rwanda Development Board and other stakeholders' joint inspection team shall monitor the compliance to these guidelines in terms of quality of broadband services delivery within the Government Institutions.

4.4. Entry into force

These guidelines shall come into force on the date of its signature by the Chairperson of the Regulatory Board.

Done at Kigali, -----/ -----/ 2017

Eng. Coletha U. RUHAMYA
Chairperson of the Regulatory Board

APPENDIX A: MINIMUM BANDWIDTH FOR GOVERNMENT INSTITUTIONS IN RWANDA

ITU -T Recommendations I.113 & Y.1541 defines the Broadband as a service or system requiring transmission channels capable of supporting rates greater than the primary rates (1.5 Mbps or 2Mbps);

Min. Bandwidth (Mbps) = Primary rate (2 Mbps) x Numbers of rooms / Contention ratio

Therefore, the theoretical minimum bandwidth is calculated based on the number of rooms as well as the primary rate of 2 Mbps; however, there is a need to estimate practical minimum bandwidth with a proper contention ratio, consequently the last column gives the practical minimum Bandwidth and a contention ratio of 10:1 was considered:

Minimum bandwidth requirements in the Government Institutions	
Average number of employees (using computers) per institution	Bandwidth (Mbps)
Between 1-10	2
Between 11-20	4
Between 21-30	6
Between 31-40	8
Between 41-50	10
Between 51-60	12
Between 61-70	14
Between 71-80	16
Between 81-90	18
Between 91-100	20
Between 101-120	24
Between 121-140	28

Between 141-160	32
Between 161-180	36
Between 181-200	40
Between 201-240	48
Between 241-280	56
Between 281-320	64
Between 321-360	72
Between 361-400	80
Above 400	Individual Case Basis

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APPENDIX B: BROADBAND APPLICATIONS FOR GOVERNMENT INSTITUTIONS IN RWANDA

S/N	Broadband and multimedia applications	Minimum bandwidth (Mbps)	Reference
1	Videoconference (Multi-end)	7-10	www.researchgate.net/publication/270161880 , FCC
2	Telemedicine	25-50	www.researchgate.net/publication/270161880 , FCC
3	Distance learning	25-50	www.researchgate.net/publication/270161880 , FCC
4	Live streaming video/Internet TV (SD)	1.75-5.0	Rec. ITU-T G.1080 (12/2008)
5	Live streaming video/Internet TV (HD)	5.0	Rec. ITU-T G.1080 (12/2008)
6	Live streaming (4K)/Internet TV (4K)	16-24	REC.ITU-T H.265 (10/2014)
7	IPTV (SD)	1.75-5.0	Rec. ITU-T G.1080 (12/2008)
8	IPTV (HD)	8.0-18.1	Rec. ITU-T G.1080 (12/2008)
9	E-GOV (GIS)	10	Akamai, 2011

APPENDIX C: BROADBAND FOR SCHOOLS AND UNIVERSITY IN RWANDA

School	Devices	Ratio	Bandwidth
University	500	20 : 1	50 Mbps
	250	20 : 1	25 Mbps
Secondary	100	30 : 1	7 Mbps
	50	30 : 1	4 Mbps
Primary	40	40 : 1	2 Mbps
	20	40 : 1	1 Mbps

SEEN TO BE ATTACHED TO THE GUIDELINES N°...../GL/UAS-ICS /RURA/017 OF/...../2017 FOR BROADBAND INTERNET CONNECTIVITY FOR GOVERNMENT INSTITUTIONS IN RWANDA

Done at Kigali, -----/ -----/ 2017

**Eng. Coletha U. RUHAMYA
Chairperson of the Regulatory Board**

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