**BOTSWANA COMMUNICATIONS REGULATORY AUTHORITY**

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**DRAFT GUIDELINES ON MINIMUM BROADBAND INTERNET AND INFORMATION COMMUNICATION TECHNOLOGY REQUIREMENTS FOR PUBLIC INTERNET ACCESS CENTRES AND SCHOOLS OFFERING BASIC EDUCATION**



**OCTOBER 2020**

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# DEFINITIONS

* 1. For the purpose of these Guidelines, the terms hereunder shall have the following meaning:

|  |  |
| --- | --- |
| Term | Definition |
| Bandwidth/ internet speed | Means the amount of data transmitted over a network connection at a given time |
| Broadbandd | Means an ecosystem that encompasses high capacity communication networks, the services that the networks carry, the applications they deliver and the user |
| Contention Ratio | Means the number of users sharing the same data capacity |
| Guidelines | Means a general rule, principle or piece of advice  |
| Information and Communication Technologies | Refers to diverse set of technological tools and resources used to transmit, store, create, share or exchange information. These technological tools and resources include computers, the Internet, broadcasting technologies and telephony |
| Information Technology | Means the development, maintenance, and use of computer software, systems, and networks |
| ICT Skills | Means the abilities required to effectively use the ICT components |
| Internet | Means a global wide area network that connects computer systems across the world |
| Internet Café  | Refers to any facility that customers pay to use computers to access the internet |
| Internet Service Provider | Means any licensed operator who provides telecommunication and Internet services. Service provider herein refers to Network Facilities Provider (NFP), Services and Applications Provider (SAP) |
| Kitsong Centre | Refers to a community service centre that offers access to ICT services to the rural communities |
| Library | Means a building or room containing collections of books, periodicals, and sometimes films and recorded music for use or borrowing by the public or the members of an institution. |
| Local Area Network | a computer network that links devices within a building or group of adjacent buildings |
| National Broadband Strategy of 2018  | Refers to the national strategy that aims to establish a coordinated approach to ensure that reliable high-speed networks are universally accessible throughout the country and ensure equitable and affordable access to broadband infrastructure and services by all people over time |
| Post Office | Refers to a public department or corporation responsible for postal services |
| Public Internet Access Centre | Means a place that offers internet services to the public |
| Schools | Refers to aall centres offering basic education covering both public and private schools from preschool to secondary schools |
| Standards | Means the underlying "laws" that govern the emerging Global Information Highway and the existing telephone system |

# INTRODUCTION

* 1. The Botswana Communications Regulatory Authority (BOCRA or the Authority) is a statutory body established under the Communications Regulatory Authority Act No 19 of 2012, (CRA Act). The mandate of the Authority is to regulate and promote the development of the communications sector in Botswana comprising Telecommunications, Internet and Information Communications Technologies (ICTs), Broadcasting, Postal Services and related matters.
	2. BOCRA is furthermore mandated to make standards applicable to regulated services – CRA Act Section 6 (2) (iv). It is; therefore, in line with this regulatory functions that BOCRA has developed **GUIDELINES ON MINIMUM BROADBAND INTERNET AND INFORMATION COMMUNICATION TECHNOLOGY REQUIREMENTS FOR PUBLIC INTERNET ACCESS CENTRES AND SCHOOLS OFFERING BASIC EDUCATION**.
	3. The Guidelines enclosed in this document are developed by the Authority in line with its mandate as outlined in the CRA Act of 2012 and Botswana’s aspirations to become a digitally connected society espoused in the National Broadband Strategy (NBS) of 2018. The NBS requires BOCRA to develop and implement broadband guidelines for different sectors of the economy to improve the quality of service. These Guidelines seek to improve Internet connectivity and quality of ICT services in schools offering basic education and Public Internet Access Centres (PIACs) across the country.
	4. The Guidelines were informed by an assessment of internet and ICTs in PIACs, private and public schools conducted across the country in 2019.
	5. The set standards are in line with the NBS target speeds and the 2019 Quality of Service and Quality of Experience Guidelines. The guidelines are also aligned to international standards for ICT and internet connectivity adopted in countries such as Rwanda, Mauritius, United Kingdom and South Korea.

#  RATIONALE FOR THE GUIDELINES

* 1. In the digital economy, traditional methods of training and education are being transformed through the use of ICTs.  This change is reflected in the mode of education delivery, and in the need to provide a customised and ubiquitous learning environment for learners. The digital economy also demands for learners to have digital skills to be able to participate and compete in the Fourth Industrial Revolution (4IR). Digital skills acquired throughout a learner’s life are critical in producing innovative and creative knowledge workers. As a result, the education system in Botswana needs to be transformed to inculcate digital technologies skills from grassroots level.
	2. Furthermore, to ensure inclusive access to information, public internet access is key. Public internet access plays a critical role in reducing the digital divide within and across countries by providing unhindered access to information for all user groups. Public internet access also enhances the ability to harness the economic value of information access and exchange, learning and digital creativity.

# GENERAL PROVISIONS

# PURPOSE

* + 1. The purpose of these Guidelines is to provide direction in the provision of quality broadband Internet and ICTs to:
			1. Basic Education sector comprising of preschools, primary, junior and senior schools in both the private and public sector in Botswana
			2. Public Internet Access Centres comprising internet cafes, public Wi-Fi hotspots, Kitsong Centres, libraries and post offices in Botswana.

## SCOPE OF THE GUIDELINES

* + 1. The Guidelines will set the required standard to improve quality of service through the provision of fast and reliable broadband internet and ICT equipment to basic education institutions and PIACs.

# OBJECTIVES

* 1. The objectives of these Guidelines are to set minimum ICT and broadband internet requirements for all schools offering Basic Education (preschools, primary, junior and senior schools) and Public Internet Access Centres (internet cafes, Kitsong Centres, libraries and post offices) covering:
		1. Internet Bandwidth
		2. Network Management
		3. Security
		4. ICT Skills
		5. Online Educational Platforms
		6. Specialised Equipment for Learners
		7. Lab and Server Room Specifications
		8. E- waste Handling
		9. ICT Usage Policy
		10. User Charges
		11. Regulatory Interventions
	2. Stakeholders wishing to adopt schools or donate ICT equipment and internet to both schools and PIACs should adhere to the set standards outlined in these Guidelines to maintain high quality of ICT and internet service.

# SECTION A: REQUIREMENTS FOR INTERNET SERVICE PROVIDERS

* 1. Internet Service Providers are required to adhere to the following minimum requirements when providing service to all Public Internet Access Centres (PIACs);

### **MINIMUM INTERNET BANDWIDTH REQUIREMENTS - PIACS**

* + - 1. The following parameters were considered when calculating the recommended bandwidth for Public Internet Access Centres:
* Primary rate as prescribed in the NBS and International Telecommunications Union (ITU) (**Pr**): 2Mbps
* Weekly average number of customers (**Ac**)
* Recommended Contention ratio (**Cr**): 1: 10
* Internet speed (**Is**)

**Is**  = Pr \* Ac\* Cr

**Is** = 2\*25\* 1/10= **5Mbps**

|  |  |  |
| --- | --- | --- |
| Contention Ratio | Weekly Average No. of Internet Users | Minimum Bandwidth (Mbps) |
| 1:10 | <=25 | 5Mbps  |
| <=50 | 10Mbps |
| <=75 | 15Mbps |
| <=100 | 20Mbps |
| >100 | Individual case  |

Note:” <=” means less than and equal to and “>” means greater than

* 1. ISPs are required to adhere to the following minimum requirements when providing service to all schools in basic education:

### **MINIMUM INTERNET BANDWIDTH REQUIREMENTS - SCHOOLS**

* + - 1. The following parameters were considered when calculating the recommended bandwidth for schools:
* Primary rate: 1 Mbps
* Internet speed (**Is**)
* Average school enrolment (**As**)
* Number of devices based on 1:2 ratio
* Recommended Contention ratio (**Cr**)

Formula **Is**  = Pr \* As\* Cr

|  |  |  |  |
| --- | --- | --- | --- |
| Designation | Enrolment | Minimum # of devices (1:2) | Minimum Bandwidth Required |
| Preschool |
| Contention 1:20 | 10 - 99 | 5 - 50 | 1 – 4 Mbps |
| 100 - 200 | 51 - 100 | 5 – 10 Mbps |
| 201 - 300 | 101 - 150 | 11– 15 Mbps |
| 301 - 400 | 151 - 200 | 16 – 20 Mbps |
| 401 - 500 | 201 - 250 | 21 – 25 Mbps |
| 501 & above | 251 & above | 26 Mbps & above |
| Primary |
| Contention 1:15 | 100 - 200 | 50 - 100 | 6 – 13 Mbps |
| 201 - 300 | 101 - 150 | 14 – 20 Mbps |
| 301 - 400 | 151 - 200 | 21 – 26 Mbps |
| 401 - 500 | 201 - 250 | 27 – 33 Mbps |
| 501 - 600 | 251 - 300 | 34 – 40 Mbps |
| 601 – 700 | 301 - 350 | 41 – 47 Mbps |
| 701 – 800 | 351 - 400 | 48 – 53 Mbps |
| 801 - 900 | 401 - 450 | 54 – 60 Mbps |
| 901 & above | 451 & above | 61 Mbps & above |
| Junior |
| Contention 1: 10 | 100 - 200 | 50 - 100 | 10 – 20 Mbps |
| 201 - 300 | 101 - 150 | 21 – 30 Mbps |
| 301 - 400 | 151 - 200 | 31 – 40 Mbps |
| 401 - 500 | 201 - 250 | 41 – 50 Mbps |
| 501 - 600 | 251 - 300 | 51 – 60 Mbps |
| 601 – 700 | 301 - 350 | 61 – 70 Mbps |
| 701 – 800 | 351 - 400 | 71 – 80 Mbps |
| 801 - 900 | 401 - 450 | 81 – 90 Mbps |
| 901 - 1000 | 451 - 500 | 91 – 100 Mbps |
| 1001 & above | 501 & above | 101 Mbps & above |
| Senior |
| Contention 1:5 | 100 - 200 | 50 - 100 | 20 – 40 Mbps |
| 201 - 300 | 101 - 150 | 41 – 60 Mbps |
| 301 - 400 | 151 - 200 | 61 – 80 Mbps |
| 401 - 500 | 201 - 250 | 81 – 100 Mbps |
| 501 - 600 | 251 – 300  | 101 – 120 Mbps |
| 601 – 700 | 301 – 350 | 121 – 140 Mbps |
| 701 – 800 | 351 – 400 | 141 – 160 Mbps |
| 801 - 900 | 401 – 450 | 161 – 180 Mbps |
| 901 - 1000 | 451 – 500 | 181 – 200 Mbps |
| 1001 - 1100 | 501 – 550 | 201 – 220 Mbps |
| 1101 & above | 551 & above | 221 Mbps & above |

**[[1]](#footnote-1)[[2]](#footnote-2)[[3]](#footnote-3)**

### **RECOMMENDED SERVICE LEVEL AGREEMENTS**

* + - 1. ISPs shall enter into Service Level Agreements (SLAs) with PIACs and schools to guarantee best broadband service;
			2. ISPs will be required to provide an itemised bill monthly to the PIACs and schools clearly indicating all services rendered;
			3. ISPs shall stipulate the turnaround times for fault resolution in the SLA. All faults reported shall be responded to within 48 hours; and
			4. ISPs shall notify the PIACs and schools on any planned maintenance and or any outages experienced on their network that directly affect them.

### **BANDWIDTH MONITORING**

* + - 1. The ISP should recommend or provide client software or web-based tool to monitor bandwidth utilisation against the bandwidth provided;
			2. For a dedicated service, the ISP should ensure 95% bandwidth availability to clients; and
			3. For shared service 75% internet speed availability must be availed to clients.

### **SECURITY**

* + - 1. The Service Provider must make every reasonable effort to ensure that the guests or users information transmitted over their networks are secured; and
			2. The Service Providers should ensure that network patches and software are up to date to reduce vulnerability.

# SECTION B: GENERAL ICT REQUIREMENTS FOR PUBLIC INTERNET ACCESS CENTRES AND SCHOOLS

## NETWORK MANAGEMENT AND SECURITY

* + 1. Traffic on the network must not be visible to anyone other than the user who is generating that traffic;
		2. Network connections within the facility must be secured with a password;
		3. The internet system must be configured to prevent users from being subjected to a security risk from the LAN;
		4. Antivirus software should be installed and updated in all the facility computers and be updated regularly;
		5. The Internet system should be continuously monitored to ensure malicious activities are detected on time;
		6. The Internet system should be continuously working as intended and should remain in good working order;
		7. The Internet system must be configured to completely isolate data on the guest and business network;
		8. In PIACS, the IT administrators must ensure that all user browsing history, saved passwords and documents are erased from the computers before the next user can access the computer;
		9. Schools and PIACs should monitor and use content filtering mechanisms to block specific content not suitable for children; and
		10. Excessive and unnecessary levels of content filtering should be avoided.

## LOCAL AREA NETWORK

### **SCHOOLS**

* + - 1. Internet bandwidth from different Service Providers should be consolidated into one pipe and distributed within the school;
			2. Access points should be strategically placed to enable universal Wi-Fi coverage in the school;
			3. LAN cabling should be neat and well labelled to enable ease of troubleshooting;
			4. Create at least two separate VLANs one for pupils and staff the other for school guests;
			5. Avail backup power of at least two (2) hour for LAN equipment; and
			6. LAN access must be authenticated using available authentication realms and tools with clear set firewall rules and Access Control Lists.

## ICT SKILLS

### **Public Internet Access Centres**

* + - 1. PIAC assistants should be trained on at least basic ICT Skills;
			2. PIACs should have services of back-end knowledgeable IT Technicians who can respond to network faults promptly and efficiently; and
			3. PIACs should immediately lodge internet technical faults to Service Providers for timely response.
			4. PIACS must keep a log register of faults received, handled and resolved
			5. All schools should have dedicated ICT Officers who will be responsible for administering and maintaining the network;
			6. Schools should provide regular training for ICT Officers to align them to knowledge on emerging trends in the ICT space;
			7. Teachers should be continuously trained on ICTs to enable transition from Basic to Intermediate to Advanced level.
			8. All teachers must be trained in using ICTs for teaching to support ICT integration in learning;
			9. At least 30% of all subjects in all schools must be taught through use of ICTs; and
			10. Students should undergo mandatory training that includes coding and cyber awareness.

## ONLINE PLATFORMS

* + 1. All schools should have an eLearning platform with nationally or internationally approved educational content;
		2. The online content should be continuously updated;
		3. All schools should adopt blended learning to support both onsite and off-site education;
		4. Each school/ PIAC should have an online and up to date presence e.g. website, social media for ease of access to information by customers; and
		5. Facilities should use BOCRA approved domain name registrars to register for a domain name.

## SPECIALISED EQUIPMENT FOR SPECIAL EDUCATION

* + 1. Each school with students with disabilities, should make provision for availing appropriate ICT equipment for students; and
		2. Schools need to ensure that they match students' needs to the most appropriate technology available.

## STANDARDISED ICT EQUIPMENT FOR SCHOOLS

* + 1. Each classroom should be equipped with a computer connected to the internet for the teacher, a projector and projector screen.

## COMPUTER LAB/ EQUIPMENT ROOM

* + 1. Where possible, each school should have a dedicated Computer Lab for Computer Studies;
		2. The number of Computer Labs should be determined by the number of students in the school;
		3. The lab/ equipment should be airconditioned at all times;
		4. The lab/equipment room should be well ventilated to ensure air circulation;
		5. The furniture (chairs and tables) used in the lab/equipment room should comply to internationally accepted ergonomics standards; and
		6. Where there is no lab/equipment room, mobile ICT devices should be used to enable learning computers in any classroom.

## COMMUNICATIONS ROOM / SERVER ROOM

* + 1. Physical access to the server room must be limited to only those individuals with authorized access and an access log must be kept;
		2. Cabling must be maintained in an orderly fashion to reduce the possibility of an accidental outage;
		3. The IT Officer must maintain an accurate inventory of all systems in the server room;
		4. The server room must be located in an area that can bear the weight of all systems, including foreseeable planned growth;
		5. When feasible, door frame size should be sufficient to allow for easy introduction and removal of equipment;
		6. For new construction, doors should be 42 inches wide and 9 feet tall and an anti-static floor surface should be used;
		7. The ceiling of the room should be at least 9 feet high;
		8. The server room should not have exterior windows;
		9. The arrangement of equipment should provide for adequate clearance around computing racks; 4 feet at the front and 3 feet at the rear is recommended;
		10. The server room should have sufficient dedicated circuits for all equipment, plus one or more additional circuits, as needed for flexibility in the event a circuit fails;
		11. All systems must be properly grounded;
		12. All critical systems should be connected to Uninterruptable Power Supplies (UPS) and/or generator power;
		13. The UPS and/or generator power should be tested at least annually and maintained according to manufacturer specifications;
		14. The server room should have dedicated, redundant air conditioning sufficient to maintain temperatures between 20 and 22 degrees Celsius in the room;
		15. Environmental monitoring should be configured to alert administrators in the event of a cooling failure;
		16. The server room must have some form of fire detection and suppression, adequately maintained and routinely tested;
		17. Server rooms must be reasonably free of fire hazards such as boxes, papers, etc;
		18. The server room should have a clearly visible and accessible fire extinguisher; and
		19. All server software must be kept up to date at all times.

## ICT USAGE POLICY

* + 1. Each school and PIAC should have a clear and up to date ICT Acceptable Usage Policy; and
		2. The policy should be made accessible and shared with all clients.

## USAGE CHARGES

* + 1. Where internet access is charged, PIACs should aim to provide non-discriminatory pricing to all consumers;
		2. The fees applied for public internet access should be made affordable to end users; and
		3. All charges should be made publicly available and visible to all consumers visiting the PIAC.

## OBSOLETE ICT EQUIPMENT

* + 1. The maximum recommended years of use of computers (desktops and laptops) is five (5) years;
		2. The maximum recommended years of use of tablets is three (3) years; and
		3. PIACs and schools should identify ICT refurbishment centres to safely dispose ICT equipment once they become obsolete.

# PROCUREMENT

* 1. Internet access and service must be procured from licenced Internet Service Providers;
	2. Equipment hardware and software must be purchased from authorised dealers and adhere to approved standards and must meet the high-speed Broadband Internet access requirements;
	3. Computer devices procured must have BOCRA type approval certificates/credentials;
	4. The internet system must have basic features such as:
		1. Capability to provide wireless and wired solution;
		2. Simultaneous phone usage;
		3. Compatibility;
		4. Compliance with standards;
		5. Uninterruptible Power Supply; and
		6. Certified or type approved equipment.

# SECTION C: BOTSWANA COMMUNICATIONS REGULATORY AUTHORITY

## REGULATORY INTERVENTIONS

* + 1. Internet Service Providers should connect PIACs and schools in line with minimum bandwidth requirements outlined in these Guidelines; and
		2. The Authority will continuously approve, monitor Internet prices and quality of service to ensure an affordable and quality internet experience.

# SECTION D: MISCELLANEOUS PROVISIONS

## IMPLEMENTATION

* + 1. The Guidelines will come into force with effect from 1st April 2021; and
		2. All facilities (schools and PIACs) are expected to have met the requirements of the Guidelines within one (1) year after coming into effect.

## REVIEW

* + 1. The Guideline shall be reviewed by BOCRA after two (2) years from date of effect to ensure compliance and alignment to national digital strategies and policies. The review will also take into account technological development.

**DONE AT GABORONE, BOTSWANA ON THE 31ST DECEMBER 2020**

**BY ORDER OF THE BOARD OF BOTSWANA COMMUNICATIONS REGULATORY AUTHORITY**

**MR. MARTIN MOKGWARE**

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1. The recommended speed support high-quality video and multimedia education services for preschools, primary, junior and senior schools across the country. [↑](#footnote-ref-1)
2. Schools with combined designation should adhere to upper most designation speeds. That is school with pre and primary should adhere to speeds of the latter. [↑](#footnote-ref-2)
3. The aim is to gradually move to 1:1 student to computer ratio. [↑](#footnote-ref-3)