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TANZANIA COMMUNICATIONS REGULATORY AUTHORITY
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MINIMUM TECHNICAL SPECIFICATIONS

FOR

DATA CENTER

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PART 1: Introduction

Data Center is a facility dedicated to the centralized accommodation, interconnection and operation of information technology and network telecommunication equipment providing data storage, processing, and transport services together with all the facilities and infrastructure for power distribution and environment control together with the necessary levels of resilience and security required to provide the desired availability.

Data centers are required both by network operators (delivering those services to customer premises) and enterprises within those customer premises. They need to provide modular, scalable, and flexible facilities and infrastructure to quickly accommodate the rapidly changing market requirements.

The needs of the Data Centers vary in terms of availability of service, provision of security, and objectives for energy efficiency. These needs, in return, influences the design, planning, procurement, integration, installation, operation, and maintenance of facilities and infrastructure within the data center.

Among other standard the ISO/IEC TS 22237 series specifies requirements and recommendations to support various parties involved in designing, planning, procurement, integration, installation, operation, and maintenance of facilities and infrastructures within Data Centers. These include the general concepts of data center facilities and infrastructure described in ISO/IEC TS 22237-1; building construction specified in ISO/IEC TS 22237-2, power distribution specified in ISO/IEC TS 22237-3, environmental control specified in ISO/IEC TS 22237-4, telecommunication cabling infrastructure specified in ISO/IEC TS 22237-5, security systems specified in ISO/IEC TS 22237-6, management and operational information specified in ISO/IEC TS 22237-7.

PART 2: Scope and Purpose

2.1 Scope

This document provides minimum technical specifications for all Data Centers offering services and operating in the United Republic of Tanzania.

2.2 Purpose

These specifications provide minimum acceptable practices, security, and implementation methods for public Data Centers operating in Tanzania. They are in line with the international standards of the ISO/IEC TS 22237 series, EN 50600 -

European Standards, TIA, CENELEC, Uptime Institute, and other published Data Center standards in this documents.

PART 3: Definitions and Abbreviations

Abbreviations

ISO	International Organization for Standardization
IEC	International Electrotechnical Commission.
EN	European Standard
TIA	Telecommunications Industry Associations
ANSI	American National Standards Institutes
HVAC	Heating, Ventilation and Air Conditioning
IETF	Internet Engineering Task Force
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
CRAC	Computer Room Air Conditioning
ITU-T	International Telecommunication Union Telecommunication Standardization Sector

Definitions

Availability

The ability of an item to be in a state to perform a required function under given conditions at a given instant of time or over a given time interval, assuming that the required external resources are provided [SOURCE: IEC 60050-191:1990, 191-02-05].

Co-hosting

Means the situation where Data center in which multiple customers are provided with access- to network(s), servers and storage equipment on which they operate their own services/applications.

Co-location

Means the situation where Data center in which multiple customers locate their own network(s), servers and storage equipment.

Data center

Facility dedicated to the centralized accommodation, interconnection and operation of information technology and network telecommunications equipment providing data storage, processing and transport services together with all the facilities and infrastructures for power

distribution and environmental control together with the necessary levels of resilience and security required to provide the desired service availability

Enterprise Data Center	Data center that is operated by an enterprise which has the sole purpose of the delivery and management of service to its employees and customers.
Facility	Space and pathways that accommodate a specific infrastructure
Infrastructure	Technical systems providing functional capability of the data center
Physical security	Measures (combining physical and technological controls), procedures and responsibilities to maintain the desired level of availability for the facilities and infrastructures of the data centers in relation to access control and environmental events.
Private Data Center	Data center that is operated by an entity which has the sole purpose of the delivery and management of service to its employees and customers.
Public Data Center	Data center that provide services for co-location or co-hosting of the customer's network (s), servers and storage equipment.
Telecommunications	Branch of technology concerned with the transmission, emission and reception of signs, signals, writings, images and sounds, that is, information of any nature by cable, radio, optical or other electromagnetic systems [ISO/IEC 11801-1:2017, 3.1.78].

PART 4: References

The following referenced documents are necessary for the application of this Specification. References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

S/N	Reference	Title
1.	Uptime Institute	Data Center Site Infrastructure Tier Standard Topology
2.	ISO/IEC TS 22237-1:2021	Information Technology – Standards for Data Center facilities and infrastructure;
3.	ANSI/BISCI 002 -2019	Standard for Data Center design and Implementation best practices
4.	ITU-T Rec L.1300	ITU Recommendation on Best practices for green data centres
5.	ANSI/TIA-569-B	Standard for Telecommunications Pathways and Spaces. This standard specifies requirements for telecommunications pathways and spaces.
6.	EN 50600-2-5	Information technology - Data centre facilities and infrastructures - Part 2-5: Security systems ; Standard addresses the physical security of data centres based upon the criteria and classifications for "availability", "security" and "energy efficiency enablement" within EN 50600-1
7.	ISO 27001	Information Security Management System
8.	ISO/IEC TS 22237-2	Information technology — Data centre facilities and infrastructures — Part 2: Building construction
9.	ISO/IEC TS 22237-3	Information technology — Data centre facilities and infrastructures — Part 3: Power distribution
10.	ISO/IEC TS 22237-4	Information technology — Data centre facilities and infrastructures — Part 4: Environmental control
11.	ISO/IEC TS 22237-5	Telecommunications cabling infrastructure
12.	ISO/IEC TS 22237-6	Information technology — Data centre facilities and infrastructures — Part 6: Security systems
13.	ISO/IEC TS 22237-7	Information technology — Data centre facilities and infrastructures — Part 7 Management and Operational Information
14.	ANSI/BSCI 002 -2019	Data center design and Implementation Best Practise
15.	EN 50600-2-2	Information technology - Data centre facilities and infrastructures - Part 2-2: Power supply and distribution

16.	ANSI/BICSI 002-2011	4.1 Data Center Design & Implementation best practice
17.	eGA/EXT/IRA/003	Data Center Standards for Public Institutions.
18.	TIA-942-B	Telecommunication Infrastructure standard for data center

PART 5: General Requirements

5.1 Data Center Tier levels

Data Center tiers are an efficient way to describe the infrastructure components being utilized/installed, operational sustainability, and Data Centers performance.

These guidelines adopts the Data Center Levels as defined by Uptime Institute as Tier 1, Tier 2, Tier 3, and Tier 4 with their specifications to be applied to Tanzania.

Any Subsequent update or modification of the definition or specification of the aforementioned standards will be reviewed jointly by the TCRA and the licensee before being adopted for implemetntion in the country.

5.2 Public Data Center Requirements

The Data Center should maintain an ambient and conducive environment for maximum efficiency of the equipment and human resources. The minimum requirements for public data center environments are summarized in **Annex A**.

PART 6: Testing and Certification Requirements

Data Center equipment shall comply with this minimum technical specification and other national and international standards accepted and adopted in our country.

PART 7: Document Administration

7.1 Amendment

TCRA may from time to time, review, and update or modify this document to ensure its continued service and to meet the international and/or national performance requirements as necessary.

In amending the guideline, The TCRA will share proposed draft amendment with stakeholders who shall provide their comments within 30days from date off issuance of the proposed ammendments.

7.2 Compliance

This document shall comply with appropriate provisions of the TCRA Act, 2003, the Electronic and Postal Communications Act, 2010, effective from the date it has been published.

7.3 Publication

This document shall be published on the TCRA website <https://www.tcra.go.tz> for public information, compliance and reference purposes.

ANNEX A

1. The Tier 1 Data Center requirements should be as stated as per the Uptime Institute and comply with the requirements in table 1:

S/N	Parameter	General Requirements
1.	Availability	99.671% Uptime Uptime is 2N (Two times the amount required for operation)
2.	Redundancy	No redundancy capacity component (single power, uplinks, servers, cooling etc)
3.	Downtime per year	No more than 28.8 hours downtime
4.	Maintainability	Complete shutdown required for preventive maintenance and repairs.
5.	Space Planning	<p>Data center space design should ensure an environmentally controlled space for the purpose of housing equipment and cabling related to the data center and other telecommunications systems.</p> <p>The area within premise containing Data Center building should contain/shar:-</p> <ul style="list-style-type: none"> i. building entrance facilities; ii. personnel entrance(s); iii. docking/loading bay(s); iv. transformer space(s); v. electrical distribution space(s); vi. telecommunications spaces(s). <p>The area within the building designated as a Data Center should contain at least space for the following as per ISO/IEC TS 22237-2 or TIA-942-B:-</p> <ul style="list-style-type: none"> i. Personnel entrance(s); ii. Main distributor space(s); iii. Computer room space(s) and associated testing space(s); iv. Electrical space(s); v. Mechanical space(s); vi. Control room space(s); vii. Office space(s); viii. Storage and holding space(s).

6.	Architectural	The data center building construction should be as addressed in the EN 506002-1 or TIA-942-B
7.	Cooling and Airflow Management	<ul style="list-style-type: none"> i. Datacenter room should share same airflow direction ii. There should be raised floor design or suspended ceiling height for more flexible cooling. iii. The air-conditioning system shall be designed to provide the design temperature and humidity conditions recommended by the manufacturers of the servers to be installed within the data center. iv. The cabinets and racks shall be arranged in an alternating pattern to create hot and cold aisle as per ITU-T Rec L.1300.
8.	Site selection	<p>The site for Data Center should not have interfering elements such as:</p> <ul style="list-style-type: none"> i. Vibration ii. Contaminants iii. Security iv. Flood v. Electromagnetic interference vi. Hazardous materials vii. Natural hazards vulnerability as stated in the ANSI/BISCI 002 -2019 Data center design and Implementation best practices.
9.	Electrical Equipment /Power System	Power requirements should be based on the desired reliability tier as per tiered reliability standard – Annex A. (ITU-T Rec L.1300)
10.	Contaminant and Environmental control	The Data Center room and the surrounding area shall be protected from contaminants in accordance with ANSI/TIA-569-B . and environmental control should be as stated in ISO/IEC TS 22237-4
11.	HVAC System	A data Center shall have a dedicated HVAC system that operates on a 24/7 365 days per year basis or as stated in TIA-942-B
12.	Mechanical Systems	Should be as defined in ANSI/BICSI 002-2011

13.	Fire Protection system	The data center shall include the following elements of fire protection. i. Fire detection: Smoke, heat, and early warning detectors connected to an alarm and monitoring panel. ii. Fire alarm systems: to warn occupants about the presence of smoke, heat, or fire using audible or visual alarms iii. Fire suppressions: such as fire extinguishers. (reference NFPA) Also should include procedure, user guide and manual.
14.	Physical security	Physical Security for Data Centers should be as stated in the CSN EN 50600-2-5
15.	Information Security	Information security requirements should be as stated in the ISO 27001/ ISO/IEC TS 22237-6
16.	Lighting System	lightning protection as defined in the IEC 62305
17.	Computer room	Should be as stated in ANSI/BSCI 002 -2019
18.	Rack height	Should be as stated in ANSI/BSCI 002-2019
19.	Cabling	Should be as stated in TIA-942-B
20.	Monitoring capabilities	Should be as stated in ANSI/BSCI 002-2019
21.	Technology changes	Should be as stated in ISO/IEC TS 22237-7
22.	Energy cost/Efficiency	As described by the Recommendation ITU-T L.1300 on the best practice on energy efficiency
23.	ICT Equipment and Services	Should be as stated in EN 50600-2-6 or TIA-942-B Telecommunication Infrastructure standard for data center

Table 1: Tier 1 Data Center Requirements

- 2. Tier 2 Data Center should contains all requirements from Tier 1 Data Center including requirements detailed in table 2.**

S/N	Parameter	General Requirements
1.	Availability	99.749% Uptime
2.	Redundancy	Partial redundancy in power and Cooling
3.	Downtime per year	No more than 22 Hours downtime
4.	Maintainability	Provide select maintenance opportunities and an increased margin of safety against IT process disruptions that would result from site infrastructure equipment failures.

5.	Space Planning	Should be as stated in Tier 1 including: Generators space(s) and fuel storage as per ISO/IEC TS 22237-2 specifications.
6.	Electrical Equipment /Power System	<ul style="list-style-type: none"> i. Power equipment/should include Uninterruptible Power Supplies (UPS), Power Distribution Units (PDUs), and power cabling, but may also include backup generators and other equipment. Power distribution should be as stated in ISO/IEC TS 22237-3 ii. Power requirements should be based on the desired reliability tier as per tiered reliability standard as per ITU-T Rec L.1300.
7.	HVAC System	<ul style="list-style-type: none"> i. A data Center shall have a dedicated HVAC system that operates on a 24/7 365 days per year basis. ii. If cooling equipment, generators, fuel tanks, or access provider equipment is situated outside the customer space, then this equipment shall be adequately secured. <p>Also, the data center owner will need access to this space 24/7.</p>
8.	Generator/UPS	Should be as stated in EN 50600-2-2

Table 2: Tier 2 Data Center Requirements

3. Tier 3 Data Center should include all the requirements in tier 2 Data Center including requirements detailed in table 2.

S/N	Parameter	General Requirements
1.	Availability	99.982% Uptime
2.	Redundancy	N+1 (The amount for operation plus backup) Fault tolerant providing at least 72 power outage protection
3.	Downtime per year	No more than 1.6 Hours downtime
4.	Maintainability	Concurrently maintainable, allowing for any maintenance planned activity to take place

Table 3: Tier 3 Data Center Requirements

4. Tier 4 Data Center Should Include all the requirements in Tier 3 Data Center including requirements detailed in table 3.

S/N	Parameter	General Requirements
1.	Availability	99.995% Uptime
2.	Redundancy	2N+1 fully redundancy structure and 96 hour power outage protection.
3.	Downtime per year	No more than 26.3 minutes downtime
4.	Maintainability	Fault-tolerant, allowing for the occurrence of unplanned activity while still maintaining operations

Table 4: Tier 4 Data Center Requirements