



GOVERNMENT ICT STANDARDS

Data Centre Standard

First Edition 2016

The ICT Authority is a State Corporation under the State Corporations Act 446
www.icta.go.ke

Contents

ICTA STANDARDS DESCRIPTION	4
DOCUMENT CONTROL	6
FOREWORD	7
INTRODUCTION	8
SCOPE	8
APPLICATION	8
NORMATIVE REFERENCES	9
DEFINITIONS	10
ABBREVIATIONS	16
SUB- DOMAINS	17
REQUIREMENTS	17
Data Center Site Space and Layout	17
Cabling Infrastructure	17
Tiered Reliability	17
ANNEXES	18
ANNEX A.1 Requirements for Data Center Site space and Layout	18
Annex A.2: Tiered Reliability and Accessories	19
Annex A.3: Cabling Infrastructure.	20
Annex A.4: Environment and Ambience	22
APPENDIX	24
Appendix 1: Compliance checklist for Site space and layout	24
Appendix 2: Compliance checklist for Tiered reliability	24
Appendix 3: Compliance checklist for cabling Infrastructure	25
Appendix 4: Compliance checklist for Environmental consideration	26
APPENDIX 5: Tiered Reliability	27
Appendix 6: Related Documents	28

ICTA STANDARDS DESCRIPTION

S/No	Thematic Area	Standards	Brief Description
1	Infrastructure	ICTA-2.001:2016 Network Standard	Provides compliant requirements for design, installations and management of all categories of IT Networks to be deployed in government.
		ICTA-2.001:2016 Data Center Standard	Provides compliant requirements for design, installations and management of government data centers
		ICTA-2.001:2016 Cloud Computing Standard	Provides compliant requirements for design, installations and management of cloud computing infrastructures for government
		ICTA-2.001:2016 End-User Equipment Standards	Provides the minimum specifications for all computing devices being deployed in government
2	Systems & Applications	ICTA-6.001:2016 Systems & Applications Standard	Provides compliant requirements for design, installations and management of all government Software and applications Systems.
3	IT Security	ICTA-3.001:2016 Information Security Standard	Provides compliant requirements for design, installations and management of Information Technology Security in government.
4	Electronic records management	ICTA-4.001: 2016 Electronic records and Data Management Standard	Provides compliant requirements for management of government electronic records and data
5	IT Governance	ICTA. 5.001: 2016 IT Governance Standard	Provides compliant requirements for IT Governance in government. This includes compliance requirements for government IT service providers and Professional Staff.
6	ICT Human Capacity	ICTA.7.001:2016 ICT Human Capacity Standard	Provides compliant requirements for development of Human Capital capacity for deployment and support for government ICT infrastructure and services.

REVISION OF ICT STANDARDS

In order to keep abreast of progress in industry, ICTA Standards shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Chief Executive Officer, ICT Authority, are welcome.

©ICTA, 2016

Copyright. Users are reminded that by virtue of Section 25 of the Copyright Act, Cap. 12 of 2001 of the Laws of Kenya, copyright subsists in all ICTA Standards and except as provided under Section 26 of this Act, no Standard produced by ICTA may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from the CEO.

DOCUMENT CONTROL

Document Name:	Data Centre Standard
Prepared by:	ICTA Data Centre Standard Technical Committee
Edition:	First Edition
Approved by:	Board of Directors
Date Approved:	11 th August 2016
Effective Date:	1 st October 2016
Next Review Date:	After 3 years

FOREWORD

The ICT Authority has express mandate to, among others, set and enforce ICT standards and guidelines across all aspects of information and communication technology including systems, infrastructure, processes, human resources and technology for the public service. The overall purpose of this specific mandate is to ensure coherence and unified approach to acquisition, deployment, management and operation of ICTs across the public service, including state agencies, in order to promote service integration, adaptability and cost savings through economies of scales in ICT investments.

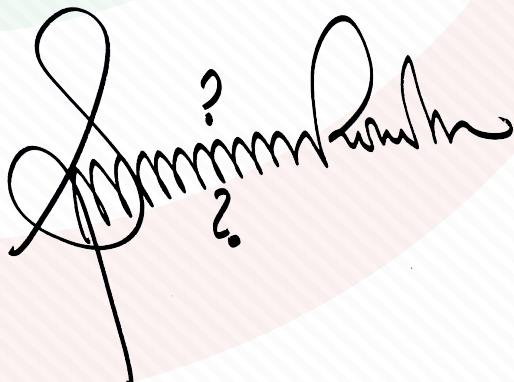
In pursuit of achievement of this mandate, the Authority established a Standards Committee to identify the critical standards domain areas as well as oversee the standards development process. A total of Nine Standards falling under six different domain areas were identified by the committee to be relevant for government ICT Standards. The development of all the identified standards was done through a process which took into consideration international requirements, government requirements, stakeholder participation as well as industry/sector best practices. In order to conform to the format of other existing national standards, the committee adopted the Kenya Bureau of Standards (KEBS) format and procedure for standards development. In addition, through Memoranda of Understanding, KEBS has made invaluable contribution to the development of ICT Authority standards.

The ICTA Data Centre Standard, which falls under the overall Government Enterprise Architecture (GEA), has therefore been prepared in accordance with KEBS standards development guidelines.

The Authority has the oversight role and responsibility for management and enforcement of this standard. The review and approval of the standard is done by the ICTA Board upon recommendation of Standard Review Board. The Authority shall be carrying out quarterly audits in all the Ministries, Counties, and Agencies (MCA) to determine their compliance to this Standard.

The Authority will issue a certificate of compliance to agency upon completion of the audit assessment. For non-compliant agencies, a report detailing the extent of the deviation and the prevailing circumstances shall be tabled before the Standards Review Board who will advise on action to take.

All government agencies are required to ensure full compliance to this standard for effective and efficient service delivery to the citizen.



**Kipronoh Ronoh P.
Director, Programmes and Standards**

INTRODUCTION

The data center is home to the computational power, storage, and applications necessary to support an enterprise business. The data center infrastructure is central to the IT architecture, from which all content is sourced or passes through. Proper planning of the data center infrastructure design is critical, and performance, resiliency, and scalability need to be carefully considered.

All government data centres are expected to provide enough capacity to support all the necessary IT functions of government. The principal goals in data centre design are flexibility and scalability, which involve site location, building selection, floor layout, electrical system design, mechanical design and modularity. The advent of new technologies, such as blade servers, that require substantial incremental power and cooling capacity; the pressure to consolidate multiple data centres into fewer locations; the need for incremental space; changes in operational procedures; and potential changes in safety and security regulations converge to impose constant facilities changes on the modern data centre. Data centre standards will look at the best possible ways of setting up a data centre for government use.

This will involve the design of the data centre, arrangement of equipment, operating conditions, security procedures and practices as well as any other requirement that would go into coming up with a modern and efficiently operational data centre. The data centre infrastructure should therefore be robust enough to support large amounts of data flow that government handles and efficient enough to ensure continues service availability. The conditions in the data centre should also be ideal to support the optimal operations of its infrastructure while the management of the data centre should also be easily adaptable to the current and future government operations.

In order to design, build and operate an efficient data center, there is need to have guidelines that offer the industry acceptable specifications. This section outlines these guidelines that will be adopted by the government to ensure that it reaps the maximum benefits associated with it data centre operations.

SCOPE

These guidelines are grouped into the following domains:

- Physical Security
- Cabling layout
- Space Planning Layout
- Air Conditioning and Room Temperature
- Data center monitoring and management
- Data centre infrastructure management

APPLICATION

This standard will be applicable to the following:

- ❖ Central Government of Kenya
- ❖ County Governments
- ❖ Constitutional Commissions
- ❖ State Corporations

NORMATIVE REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. All standards are subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this standard are encouraged to take steps to ensure the use of the most recent editions of the standards indicated below. Information on currently valid national and international standards can be obtained from Kenya Bureau of Standards.

- ANSI/TIA-569-c
- TIA 492
- TIA-569-c.1
- ANSI/TIA-568-c.1
- ISO/IEC 60793
- IEEE 802.3
- IEEE 802.1
- IETF RFC 3457
- IETF RFC 2709
- IETF RFC 1518
- IETF RFC 1918
- P710-S710 Rev 3.0
- ISO/IEC 27002
- ISACA
- IEEE P2302 (Draft copy)
- NIST SP 509-292
- IETF internet-draft, "Cloud Reference Framework"
- Disposal act Nema

DEFINITIONS

Network

A collection of computers and other hardware interconnected by communication channels that allow sharing of resources and information

Access floor

A system consisting of completely removable and interchangeable floor panels that are supported on adjustable pedestals or stringers (or both) to allow access to the area beneath access provider: The operator of any facility that is used to convey telecommunications signals to and from a customer premises.

Administration

The method for labeling, identification, documentation and usage needed to implement moves, additions and changes of the telecommunications infrastructure.

Backbone

- 1) A facility (e.g., pathway, cable or conductors) between any of the following spaces: Telecommunications rooms, common telecommunications rooms, floor serving terminals, entrance facilities, equipment rooms, and common equipment rooms.
- 2) in a data center, a facility (e.g. pathway, cable or conductors) between any of the following spaces: entrance rooms or spaces, main distribution areas, horizontal distribution areas, telecommunications rooms.

Backbone cable: See backbone.

Bonding

The permanent joining of metallic parts to form an electrically conductive path that will ensure electrical continuity and the capacity to conduct safely any current likely to be imposed

Cabinet

A container that may enclose connection devices, terminations, apparatus, wiring, and equipment.

Cabinet (telecommunications)

An enclosure with a hinged cover used for terminating telecommunications cables, wiring and connection devices.

Cable

An assembly of one or more insulated conductors or optical fibers, within an enveloping sheath.

Cabling

A combination of all cables, jumpers, cords, and connecting hardware

Centralized cabling:

A cabling configuration from the work area to a centralized cross-connect using pull through cables, an inter-connect, or splice in the telecommunications room.

Channel

The end-to-end transmission path between two points at which application-specific equipment is connected

Common equipment room (telecommunications)

An enclosed space used for equipment and backbone interconnections for more than one tenant in a building or campus.

Computer room

An architectural space whose primary function is to accommodate data processing equipment.

Conduit: (1) A raceway of circular cross-section. (2) A structure containing one or more ducts.

Connecting hardware

A device providing mechanical cable terminations

Consolidation point

A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways

Cross-connect

A facility enabling the termination of cable elements and their interconnection or cross-connection

Cross-connection

A connection scheme between cabling runs, subsystems, and equipment using patch cords or jumpers that attach to connecting hardware on each end.

Data center

A building or portion of a building whose primary function is to house a computer room and its support areas

Demarcation point

A point where the operational control or ownership changes

Earthing

see grounding

Electromagnetic interference

Radiated or conducted electromagnetic energy that has an undesirable effect on electronic equipment or signal transmissions.

Entrance room or space (telecommunications)

A space in which the joining of inter or intra building telecommunications backbone facilities takes place.

Equipment cable; cord

A cable or cable assembly used to connect telecommunications equipment to horizontal or backbone cabling.

Equipment distribution area

The computer room space occupied by equipment racks or cabinets

Equipment room (telecommunications):

An environmentally controlled centralized space for telecommunications equipment that usually houses a main or intermediate cross-connect.

Fiber optic: See optical fiber.

Ground

A conducting connection, whether intentional or accidental, between an electrical circuit (e.g., telecommunications) or equipment and the earth, or to some conducting body that serves in place of earth.

Grounding

The act of creating a ground

Grounding conductor

A conductor used to connect the grounding electrode to the building's main grounding bus bar.

Horizontal cabling

The cabling between and including the telecommunications outlet/connector and the horizontal cross-connect. 2) The cabling between and including the building automation system outlet or the first mechanical termination of the horizontal connection

Point and the horizontal cross-connect

In a data center, horizontal cabling is the cabling from the horizontal cross-connect (in the main distribution area or horizontal distribution area) to the outlet in the equipment distribution area or zone distribution area.

Horizontal cross-connect

A cross-connect of horizontal cabling to other cabling, e.g., horizontal, backbone, equipment.

Horizontal distribution area

A space in a computer room where a horizontal cross-connect is located.

Identifier

An item of information that links a specific element of the telecommunications infrastructure with its corresponding record

Infrastructure (telecommunications)

A collection of those telecommunications components, excluding equipment, that together provides the basic support for the distribution of all information within a building or campus.

Interconnection

A connection scheme that employs connecting hardware for the direct connection of a cable to another cable without a patch cord or jumper

Intermediate cross-connect

A cross-connect between first level and second level backbone cabling.

Jumper

An assembly of twisted-pairs without connectors, used to join telecommunications circuits/links at the cross-connect.

Link

A transmission path between two points, not including terminal equipment, work area cables, and equipment cables

Main cross-connect

A cross-connect for first level backbone cables, entrance cables, and equipment cables.

Main distribution area

The space in a computer room where the main cross-connect is located.

Mechanical room

An enclosed space serving the needs of mechanical building systems

Media (telecommunications): Wire, cable, or conductors used for telecommunications.

Modular jack

A female telecommunications connector that may be keyed or unkeyed and may have 6 or 8 contact positions, but not all the positions need be equipped with jack contacts.

Multimode optical fiber

An optical fiber that carries many paths of light

Multipair cable

A cable having more than four pairs

Optical fiber

Any filament made of dielectric materials that guide light.

Optical fiber cable

An assembly consisting of one or more optical fibers

Patch cord

A length of cable with a plug on one or both ends.

Patch panel

A connecting hardware system that facilitates cable termination and cabling administration using patch cords.

Pathway

A facility for the placement of telecommunications cable

Plenum

A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system

Private branch exchange

A private telecommunications switching system

Pull box

A housing located in a pathway run used to facilitate the placing of wire or cables.

Radio frequency interference

Electromagnetic interference within the frequency band for radio transmission.

Screen

An element of a cable formed by a shield.

Screened twisted-pair (ScTP)

A balanced cable with an overall screen

Service provider

The operator of any service that furnishes telecommunications content (Transmissions) delivered over access provider facilities.

Sheath: See cable sheath

Shield

A metallic layer placed around a conductor or group of conductors.

Single-mode optical fiber

An optical fiber that carries only one path of light

Single mode optical fiber: see single-mode.

Splice

A joining of conductors, meant to be permanent.

Star topology

A topology in which telecommunications cables are distributed from a central point

Telecommunications

Any 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.

Telecommunications entrance point: See entrance point (telecommunications).

Telecommunications entrance room or space: See entrance room or space

Telecommunications equipment room: See equipment room (telecommunications).

Telecommunications infrastructure: See infrastructure (telecommunications).

Telecommunications media: See media (telecommunications).

Telecommunications room

An enclosed architectural space for housing telecommunications equipment, cable terminations, and cross-connect cabling.

Telecommunications space: See space (telecommunications).

Topology

The physical or logical arrangement of a telecommunications system

Uninterruptible power supply

A buffer between utility power or other power source and a load that requires continuous precise power

Wire

An individually insulated solid or stranded metallic conductor

Wireless

The use of radiated electromagnetic energy (e.g., radio frequency and microwave signals, light) traveling through free space to convey information

White space

Empty space that can accommodate future racks or cabinets

Zone distribution area

A space in a computer room where a zone outlet or a consolidation point is located

Zone outlet

A connecting device in the zone distribution area terminating the horizontal cable enabling equipment cable connections to the equipment distribution area

ABBREVIATIONS

- AH - authority having jurisdiction
ANSI - American National Standards Institute
AWG - American Wire Gauge
BICSI - Building Industry Consulting Service International
BNC - bayonet Neil-Concelman or bayonet navel connector
CCTV - closed-circuit television
CEC - Canadian Electrical Code, Part I
CER - common equipment room
CPU - central processing unit
CSA - Canadian Standards Association International
DSX - digital signal cross-connect
EDA - equipment distribution area
EIA - Electronic Industries Alliance
EMI - electromagnetic interference
EMS - energy management system
FDDI - fiber distributed data interface
GEA - Government Wide Enterprise Architecture
HC - horizontal cross-connect
HDA - horizontal distribution area
HVAC - heating, ventilation and air conditioning
IC - intermediate cross-connect
IDC - insulation displacement contact
TIA-94218
LAN - local area network
MC - main cross-connect
MDA - main distribution area
NEC - National Electrical Code
NEMA - National Electrical Manufacturers Association
NEXT - near-end crosstalk
NESCC - National Electrical Safety Code
NFPA - National Fire Protection Association
OC - optical carrier
PBX - private branch exchange
PCB - printed circuit board
PDU - power distribution unit
PVC - polyvinyl chloride
RFI - radio frequency interference
RH - relative humidity
SAN - storage area network
ScTP - screened twisted-pair
SDH - synchronous digital hierarchy
SONET - synchronous optical network
STM - synchronous transport model
TIA - Telecommunications Industry Association
TR - telecommunications room
UL - Underwriters Laboratories Inc
UPS - uninterruptible power supply
UTP - unshielded twisted-pair
WAN - wide area network
ZDA - zone distribution area

SUB- DOMAINS

The data center requirements and specifications are based on TIA 942 standard and shall facilitate the conceptualization, design, development and management of government data centers.

- Data Center Site space and layout
- Environment and Ambience
- Tiered Reliability
- Cabling Infrastructure

REQUIREMENTS

Data Center Site Space and Layout

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.

Ambience and Environmental Considerations

The data center should maintain ambient environment for maximum efficiency of the equipment and power usage.

Cabling Infrastructure

Network Architecture is the design of the data center cabling system and equipment that ensures high reliability, availability and efficient delivery of the data center services.

Tiered Reliability

Tiered reliability in the data center shall describe architectural, security, electrical, mechanical and telecommunication reliability.

Sub domain	description	Requirement
Site Space and Layout	This domain describes the requirements for location, space, layout as well as protection against hazards for the data center.	Annex A.1
Tiered Reliability	Tiered reliability in the data center shall describe architectural, security, electrical, mechanical and telecommunication reliability. This tier are based on information from the uptime institute for a consortium dedicated to providing its members with best practices and benchmark comparisons for improving the design and management of the data center.	Annex A.2
Environmental Consideration	The describes the requirement for data center so as to maintain ambient environment for maximum efficiency of the equipment and power usage.	Annex A.3
Cabling Infrastructure	This requirement specifies telecommunication cabling standards for a data center.	Annex A.4

ANNEXES

ANNEX A.1 Requirements for Data Center Site space and Layout

Subject	Requirement
Site space	<ul style="list-style-type: none"> ● A data center shall be designed with plenty of flexible white space that can accommodate future racks or cabinets. ● The space around the data center must also be considered for future growth and planned for easy annexation. ● Protection against hazards: The choice of the location, civil works and other installation shall guard the data center against disasters that are within human control such as floods, fire etc. For requirement of this domain refer to Annex
Functional area	<ul style="list-style-type: none"> ● The data center shall have the following as the functional area; ● Entrance Room ● Main Distribution Area (MDA) ● Horizontal Distribution Area (HDA) ● Zone Distribution Area (ZDA) ● Equipment Distribution Area (EDA)

Annex A.2: Tiered Reliability and Accessories

Parameter	Requirement
Reliability	All data centers shall fall under the four tiers as per TIA 942 Standard that will be determined from Appendix 5
Structural Specifications	The building structural system should be either steel or concrete. At a minimum, the building frame should be designed to withstand wind loads in accordance with the applicable building codes for the relevant institutions charged with building approvals.
Truck Loading	Truck loading docks shall be provided as required to handle anticipated deliveries, and shall be provided with a level of security similar to the other building entrances.
Staging Area	Consideration shall be given to areas for equipment staging, secured storage for valuable equipment, and for equipment burn-in and testing.
CCTV and Intruder detection	<p>The perimeter of the site should be protected by a microwave intruder detection system and monitored by visible or infrared Closed Circuit Television (CCTV) systems.</p> <p>All common areas shall be monitored by cameras, including parking lots, loading docks, and building entrances.</p>
Access Control	Access to the site should be secured by identification and authentication systems.
Generator	Every data center shall be supported by a generators and UPS System and shall be designed to supply the harmonic current imposed by the UPS system or computer equipment loads.
Periodic Testing	All the components of the data centre shall be tested periodically once the data center is in operation to ensure that they will continue to function properly. The records for the test shall be kept always.
UPS	A data center will have a UPS system that will serve as a ride through before the generator starts. The UPS batteries should be able to support the computer systems for at least 1 hr.
Power Distribution Units	All Data Centre shall have a Power Distribution Units (PDUs) for distribution to critical electronic equipment in the data center.
Wrist Straps	Wrist strap ports shall be attached to the rack by a means that ensures electrical continuity to ground for static discharge
Fire Extinguishers	All data centre shall at all times have adequate clean agent fire extinguisher that avoids the dry chemical powder of ordinary ABC fire extinguishers, which can impact associated equipment.
Fire Detection and Suppression System	A data Centre shall have fire detection and a clean agent fire suppression system that provides the highest level of protection for the computer room and the associated electrical and mechanical rooms.

Annex A.3: Cabling Infrastructure.

Parameter	Requirement
Backbone cabling	All data centres shall use lazer-optimized 50 microns multimode fibre for backbone cabling to support higher network speeds over longer distances while being cost-effective
Horizontal cabling	All data centers shall use the highest capacity media available as recommended by IEEE 802.3 standards to reduce the need for re-cabling in the future
Cabling management	A data center shall be designed with separate racks and pathways for each media type, and power and communication cables must be placed with separate pathways or separated by a physical barrier. Adequate space must be provided within and between racks and the cabinet and in pathways for better cable management, bend radius protection, and access.
Labeling	There shall be maintained a labeling scheme for all racks, cabinets, patch panels, patch cords and cables.
Power Cabling	<ul style="list-style-type: none"> ● Branch circuits in data centers shall be in watertight flexible metal conduit. ● Feeder circuits to power distribution units and panels shall be installed in solid metal conduit. ● If the feeder circuits are not in solid metal conduit, they should be in watertight flexible metal conduit. ● In data centers that use overhead cable trays, the normal separation distances provided by standard practices provides adequate separation. As specified in ANSI/TIA-569-B, a minimum of 300 mm (12 in) access headroom between the top of a tray or runway and the bottom of the tray or runway above shall be provided and maintained.

Telecommunication cabling	<p>In data centers that employ access floor systems, adequate separation of power and telecommunications cabling can be accommodated through the following measures:</p> <ul style="list-style-type: none"> ● In the main aisles, allocate separate aisles for power and telecommunications cabling, if possible; ● Where it is not possible to allocate separate aisles for power and telecommunications cabling in the main aisles, then provide both horizontal and vertical separation of power and telecommunications cables. Provide horizontal separation by allocating different rows of tiles in the main aisles for power and telecommunications cabling, with the power and telecommunications cables as far apart from each other as possible. ● Additionally, provide vertical separation by placing the telecommunications cabling in cable trays or baskets as far above the power cables as possible, preferably with the top of the cable tray or basket 20 mm (0.75 in) below the bottom of the access floor tile; <p>- in the equipment cabinet aisles, allocate separate aisles for power and telecommunications cabling.</p>
Cable management	<p>Cables shall not be left abandoned under the access floor. Cables shall be terminated on at least one end in the main distribution area or a horizontal distribution area, or shall be removed.</p> <p>Cables shall not be left abandoned in overhead cable trays. Cables shall be terminated on at least one end in the main distribution area or a horizontal distribution area, or shall be removed.</p> <p>Planning of overhead cable trays for telecommunications cabling should be coordinated with architects mechanical engineers, and electrical engineers that are designing lighting, plumbing, air ducts, power, and fire protection systems. Lighting fixtures and sprinkler heads should be placed between cable trays, not directly above cable trays.</p>

Annex A.4: Environment and Ambience

Parameter	Requirement
E.1: Contaminants	The room shall be protected from contaminants in accordance with ANSI/TIA-569-B.
Cooling	<ul style="list-style-type: none"> ● There shall be adequate cooling equipments as well as raised floor system for more flexible cooling. ● The cabinets and racks shall be arranged in an alternating pattern to create hot and cold aisle. ● 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 ● A 24/7/365 dedicated HVAC system with automatic dampers and connected to a backup generator
Power	Power requirements will be based on the desired reliability tier as per tiered reliability standard – Annex E.
Operational parameters	The temperature and humidity shall be controlled to provide continuous operating ranges for temperature and humidity.
HVAC System	<p>A data Center shall have a dedicated HVAC system that operates on a 24hours a day 365 days per year basis.</p> <p>If cooling equipment, generators, fuel tanks, or access provider equipment is situated outside the customer space, then this equipment shall be adequately secured. Also, the data center owner will need access to this space 24 hrs/day, 7 days/week.</p>
Generator System	The data Centre HVAC System shall be supported by a standby generator system
Batteries Ventilation	Where batteries are used for backup, adequate ventilation and spill containment as required shall be provided
Vibrations	The Building design shall guard against excessive computer room vibration.
Fire Extinguishers	The fire protection systems and hand-held fire extinguishers shall comply with NFPA-75.
Paintings	Floors, walls, and ceiling shall be sealed, painted, or constructed of a material to minimize dust.
Lighting	Finishes should be light in color to enhance room lighting. Floors shall have anti-static properties as per IEC 61000-4-2.
Sprinkler System	Sprinkler systems in computer rooms shall be pre-action systems.
Water Drainage	Where risk of water ingress exists, a means of evacuating water from the space shall be provided (e.g. a floor drain). Any water and drain pipes that run through the room should be located away from and not directly above equipment in the room.
Air Circulation	Equipment should be placed in cabinets and racks with “cold” air intake at the front of the cabinet or rack, and “hot” air exhaust out the back.

Panels	Blank panels should be installed in unused rack and cabinet spaces to improve the functioning of “hot” and “cold” aisles. Perforated access floor tiles should be located in the “cold” aisles rather than in the “hot” aisles to improve the functioning of the “hot” and “cold” isles.
Front Clearance	A minimum of 1 m (3 ft) of front clearance shall be provided for installation of equipment. A front clearance of 1.2 m (4 ft) is preferable to accommodate deeper equipment. A minimum of 0.6 m (2 ft) of rear clearance shall be provided for service access at the rear of racks and cabinets. A rear clearance of 1 m (3 ft) is preferable. Some equipment may require service clearances of greater than 1 m (3 ft). See equipment manufacturer requirements.
Rack Height	The maximum rack and cabinet height shall be 2.4 m (8 ft). Racks and cabinets should preferably be no taller than 2.1 m (7 ft) for easier access to the equipment or connecting hardware installed at the top.
Storage Room	The data center should have an adequately sized storage room so that boxed equipment, spare air filters, spare floor tiles, spare cables, spare equipment, spare media, and spare paper can be stored outside the computer room. The data center should also have a staging area for unpacking and possibly for testing new equipment before deploying them in the computer room. It is possible to dramatically reduce the amount of airborne dust particles in the data center by having a policy of un-packaging all equipment in the build/storage room.
Conformance of the building Building Conformance	<p>The building where the data centre is situated shall conform to all applicable national, state, and local codes.</p> <p>Where the building is not dedicated to the data center, other tenant spaces should be nonindustrial, International Building Code type ‘B’ offices, and non-intrusive to the data center. Avoid buildings with restaurants and cafeterias to minimize fire risk.</p> <p>If the data center is to be on an upper floor of a multi-tenant building, then there should be adequate shaft and conduit space for generator, security, telecommunications, and electrical conduits as well as supplemental HVAC, grounding conductors and cabling to antennas, as needed.</p> <p>The building materials shall be non-combustible. Exterior walls shall be constructed of concrete or masonry to provide security, particularly in areas where brush fires may cause service outages or threaten the structure.</p> <p>The building hosting the data centre shall not be in the flight path of any nearby airports. The building shall be no closer than 0.8 km (½ mile) from a railroad or major interstate highway to minimize risk of chemical spills. The building shall not be within 0.4 km (¼ mile) of an airport, research lab, chemical plant, landfill, river, coastline, or dam. The building shall not be located adjacent to a foreign embassy. The building shall not be located in high crime areas.</p>

APPENDICES

Appendix 1: Compliance checklist for Site space and layout

	Compliance	Yes	No	Comment
	Is the data center designed with flexible white space?			
	Has the space around the data center catered for future growth?			
	Does the location, civil works and other installation guard the data center against disasters that are within human control such as floods, fire etc?			
	Does the data center have the following functional area; i) entrance room ;ii) Main Distribution Area (MDA) iii) Horizontal Distribution Area (HDA), iv) Zone Distribution Area (ZDA; iv) Equipment Distribution Area (EDA)			

Appendix 2: Compliance checklist for Tiered reliability

	Compliance	Yes	No	Comment
	According to TIA 942 where does the data center fall?			
	Is the building structure steel or concrete?			
	Does the building provide for truck loading docks to handle anticipated deliveries?			
	Is the level of security similar to the other building entrance?			
	Is the perimeter of the data centre site protected by a microwave intruder detection system and monitored by visible or infrared Closed Circuit Television (CCTV) systems.			
	Is the Perimeter of the data centre site monitored by visible or infrared Closed Circuit Television System?			
	Is access to the building secured by identification and authentication system?			
	Is the data center supported by a generator and UPS System?			
	Are all the components of the data centre tested periodically?			
	Are the records for the test above kept?			
	Does the data center have a UPS system?			
	Do the UPS batteries be able to support the computer systems for at least 1 hr?			
	Does the Data Centre have a Power Distribution Units (PDUs)?			

Are there wrist straps attached to the rack by a means to ensure electrical continuity to ground for static discharge is achieved?			
Does the data centre have adequate clean agent fire extinguishers?			
Does the data centre shall have fire detection and a clean agent fire suppression system that provides the highest level of protection?			

Appendix 3: Compliance checklist for cabling Infrastructure

Compliance	Yes	No	Comment
Does the data center use lazer-optimized 50 microns multimode fibre for backbone cabling?			
Does the data center use the Highest capacity media available for horizontal cabling?			
Is the data center designed with separate racks and pathways for each media type, and power and communication cables?			
Is there adequate space provided within and between racks, cabinets and in pathways for better cable management?			
Is there a labeling scheme for all racks, cabinets, patch panels, patch cords and cables?			
Are branch circuits in data centers in watertight flexible metal conduit?			
Are feeder circuits to power distribution units and panels installed in solid metal conduit			
Are there any abandoned cables on the floor?			
Are cables terminated on at least one end in the main distribution area or a horizontal distribution area?			
Are any cables left abandoned in overhead cable trays			

Appendix 4: Compliance checklist for Environmental consideration

Compliance	Yes	No	Comment
Is the room be protected from contaminants in accordance with ANSI/TIA-569-B?			
Is there adequate cooling equipments as well as raised floor			
Are the cabinets and racks arranged in an alternating pattern to create hot and cold aisle?			
Are the power requirements based on the tier requirement?(Annex E)			
Is the temperature and humidity controlled to provide continuous operating?			
Does the Data Center have a dedicated HVAC system that operates on a 24hours a day 365 days per year basis?			
Where cooling equipment, generators, fuel tanks, or access provider equipment is situated outside the customer space, Is the equipment adequately secured?			
Does the data center owner have access to this space 24 hrs/day, 7 days/week?			
TIs the data Centre HVAC System supported by a standby generator system			
Where batteries are used for backup Is there adequate ventilation and spill containment?			
Is the fire protection systems and hand-held fire extinguishers in compliance with NFPA-75.			
Is the floors, walls, and ceiling sealed, painted, or constructed of a material that minimize dust?			
Is the data centre finishes in a light color to enhance room lighting. ?			
Is the sprinkler system in computer room a pre-action system?			
Where risk of water ingress exists, is there a means of evacuating water from the space provided (e.g. a floor drain).?			
Where water and drain pipes exists, Are they located away from and not directly above equipment in the room?			

Are all equipment placed in cabinets and racks with “cold” air intake at the front of the cabinet or rack, and “hot” air exhaust out the back?.			
Are blank panels installed in unused rack and cabinet spaces to improve the functioning of “hot” and “cold” aisles			
Is there a minimum of 1 m (3 ft) of front clearance provided for installation of equipment?			
Are all rack or cabinet height a maximum 2.4 m (8 ft) and minimum 2.1 m (7 ft) for easier access to the equipment or connecting hardware installed at the top?			
Does the building where the data centre is situated conform to all applicable national, state, and local codes?			
Is the building materials non-combustible.			
Is the building hosting the data centre on the flight path, not closer than 0.8 km (½ mile) from a railroad or major interstate highway to minimize risk of chemical spills, not within 0.4 km (¼ mile) of an airport, research lab, chemical plant, landfill, river, coastline, or dam? Not be adjacent to a foreign embassy The building shall not be located in high crime areas.			

APPENDIX 5: Tiered Reliability

- Tier 1 = Non-redundant capacity components (single uplink and servers).
- Tier 2 = Tier 1 + Redundant capacity components.
- Tier 3 = Tier 1 + Tier 2 + Dual-powered equipments and multiple uplinks.
- Tier 4 = Tier 1 + Tier 2 + Tier 3 + all components are fully fault-tolerant including uplinks, storage, chillers, HVAC systems, servers etc. Everything is dual-powered.

Data Center Availability According To Tiers

The levels also describe the availability of data from the hardware at a location as follows:

- Tier 1: Guaranteeing 99.671% availability.
- Tier 2: Guaranteeing 99.741% availability.
- Tier 3: Guaranteeing 99.982% availability.
- Tier 4: Guaranteeing 99.995% availability.

Appendix 6: Related Documents

Code Number:	Title
ICTA. 1.001: 2016	Government Enterprise Architecture
ICTA. 2.001: 2016	Infrastructure Standard (Networks, Cloud, End user Computing, Data Centre)
ICTA. 3.001: 2016	Information Security Standard
ICTA. 4.001: 2016	Electronic Records and Data Management Standard
ICTA. 5.001: 2016	IT Governance Standard
ICTA. 6.001: 2016	Systems and Application Standard
ICTA.7.001:2016	ICT Human Capital and Work force Development Standard

ICT Authority

Telposta Towers, 12th Floor, Kenyatta Ave

P.O. Box 27150 - 00100 Nairobi, Kenya

t: + 254-020-2211960/62

Email: info@ict.go.ke or communications@ict.go.ke or standards@ict.go.ke

Visit: www.icta.go.ke

Become a fan: www.facebook.com/ICTAuthorityKE

Follow us on twitter: @ICTAuthorityKE

