UGANDA COMMUNICATIONS COMMISSION FRAMEWORK ON OPTICAL FIBER INSTALLATION, MAINTENANCE, PROTECTION, AND DISPOSAL

This framework seeks to improve the current regulations governing the installation, maintenance, protection, and disposal of OFC network infrastructure in Uganda by setting minimum standards for deploying OFC infrastructure across the country.

Effective Date: 1st January 2026

UGANDA COMMUNICATIONS COMMISSION
FRAMEWORK ON OPTICAL FIBER INSTALLATION, MAINTENANCE, PROTECTION, AND DISPOSAL

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CHAPTER I: PRELIMINARY

1.1 Introduction

1.1.1 Background

1.1.1.1 This framework has been developed under the provisions of the Uganda Communications Act 2013, which vests authority in the Uganda Communications Commission to regulate the communications sector in Uganda.

1.1.1.2 Particularly, to set national standards and ensure compliance with the national and international standards and obligations laid down by international communication agreements and treaties to which Uganda is a party.

1.1.1.3 The framework aims to curb infrastructure duplication, arising from the uncontrolled development and installation of both aerial and underground optical fiber cables (OFC) infrastructure across the country. The framework also aims to protect against damage to existing underground utility and communications infrastructure, such as existing OFCs, sewage and water pipes, electrical cables, or other telecommunication systems.

1.1.2 Objective

1.1.2.1 This framework seeks to enhance the existing regulations on the installation, maintenance, protection, and disposal of OFC network infrastructure in Uganda by setting the minimum standards for OFC infrastructure deployment in Uganda.

1.1.2.2 Particularly, the framework is expected to mitigate the ever-growing duplication of OFC infrastructure, leading to, among other safety concerns, aesthetic degradation of neighborhoods, and rampant damage to underground communication infrastructure by the various utility service providers and infrastructure developers across the country.

1.1.3 Amendment

1.1.3.1 This framework shall be reviewed periodically to align with any changes in the communication industry, the national Information and Communication Technology (ICT) policy, national development objectives, regulatory decisions, as well as emerging regional and international best practices.

1.1.3.2 Where the need for modification arises, the Commission shall announce its intention to review the Framework and consult with the relevant stakeholders in the process.

1.2 Interpretation

In this Framework, unless defined hereunder, the terms used herein shall have the same interpretation in the Act and the regulations issued thereunder.

(a) ***"Act":*** Uganda Communication Act 2013.

(b) ***"Commission":*** the Uganda Communications Commission, as established under section 4 of the Uganda Communications Act 2013.

(c) ***"Communications":*** means telecommunications, data communication, radio communications, postal communications and includes broadcasting.

(d) ***"Duct":*** This is a medium in which underground cabling is housed to protect the fibre cable from any damage or interference.

(e) ***"Hand hole":*** refers to holes constructed under the ground to access telecom cables/components by inserting hands. During installations, these hand holes serve as a space to assist the cable to pass through ducts smoothly.

(f) ***"Fiber Optic or Optic Fiber":*** the medium and the technology associated with the transmission of information as light pulses along a glass or plastic strand or fiber.

(g) ***"Optical Fiber Cable":*** means a telecommunication cable in which one or more fiber optics are used as the propagation medium to transmit large amounts of information at the speed of light.

(h) ***International Telecommunication Union -***Telecommunication (ITU-T): a branch of ITU responsible for standardization.

(i) ***"Infrastructure Owner"***, shall refer to a person responsible for the construction of shared infrastructure.

(j) ***"Manhole"***: top opening, large and deep hole where a man can get inside for installation, making connections, or performing maintenance on underground and buried fiber optic cable and other services including sewers, telephone, electricity, storm drains, and gas.

(k) ***"Maintenance Chambers":*** these shall refer to the access chambers designed for underground conduit systems; they enable access to pipes during pulling, connecting, and maintaining telecommunication cables, fibre-optic cables, and tele-technical ones.

(l) ***"The Micro Duct":*** these are mini ducts bundled together to form one large duct in which micro cables are housed.

(m) ***"Operator":*** a person who is licensed to provide communication or broadcasting services under the Uganda Communications Act 2013.

(n) ***"License":*** refers to the document issued by the Commission which authorises the holder to carry out the activity specified under the conditions prescribed in this Framework.

(o) ***"Right of way":*** the right to pass over someone's land and to have the reasonable use and enjoyment of their property if it is not inconsistent with the network provider's use and enjoyment of the land.

1.3 Applicable Laws and Regulations

Unless otherwise specified, the framework shall be applied in harmony with, and not in contradiction of, the following legal and regulatory instruments.

(a) Uganda Communications Act 2013.

(b) The Uganda Communications (Licensing) Regulations 2019.

(c) The Uganda Communications Commission Guidelines on Infrastructure Deployment and Sharing, 2022.

(d) ITU - T L.10 Optical fiber cables for duct, tunnel, aerial, and buried applications.

(e) National Environmental Management Authority (NEMA) Act 2013.

(f) The National E-waste guidelines.

(g) Public Procurement and Disposal Act & Regulations.

(h) Roads Act 2019 (as amended).

(i) Water Act 1997(as amended).

(j) All the current relevant national policies on Communications.

1.4 Scope

The framework sets out the minimum requirements for regulating the installation, maintenance, protection, and disposal of backbone, metro, and last-mile optical fiber cables to eradicate OFC infrastructure duplication.

1.5 Applicability

1.5.1 This framework shall apply to all communication operators or service providers duly licensed to operate within the national geographical territory of the Republic of Uganda.

1.5.2 An operator shall, prior to developing infrastructure on public roads, obtain approval from the Ministry of Works and Transport (MoWT), or a National Roads Agency, or municipal and city councils responsible for the relevant and affected roads.

1.5.3 This framework merely recommends best practices for OFC deployment in particular situations involving public road infrastructure or networks.

CHAPTER II: OPTICAL FIBER INSTALLATION

2.1 Sharing of OFC Infrastructure

2.1.1 An operator shall not deploy or develop any new OFC Infrastructure, particularly the planting of poles or trenching anywhere in the country, unless where such infrastructure does not exist.

2.1.2 All operators shall seek to share the existing OFC infrastructure with one another. This shall include the sharing of poles (wooden and concrete), trenches or ducts, manholes, OFC cores, pylons, and towers.

2.1.3 Once this framework takes effect, where duplication exists, an operator shall transfer or relocate its OFC to a shared pole or duct as shall be designated by the Commission and proceed to decommission any duplicated infrastructure.

2.1.4 Under this framework, a telecommunication operator shall share its OFC infrastructure with another licensed operator at a reasonable cost agreed upon by the parties involved to:

2.1.4.1 Eliminate duplication of OFC infrastructure.

2.1.4.2 Encourage investments in underserved areas.

2.1.4.3 Foster innovation and enhance the customer service experience through widespread service delivery.

2.1.4.4 Lower infrastructure development costs to reduce entrance barriers.

2.1.4.5 Facilitate the optimal use of existing infrastructure while minimizing the need for frequent excavations.

2.1.4.6 Minimize the damage to national infrastructures such as roads, and utility lines (sewers, water, electricity, etc).

2.1.4.7 Mitigate the environmental impacts arising from unnecessary duplication of infrastructure resources.

2.1.5 For avoidance of doubt, unless stated otherwise, all telecommunications operators shall.

2.1.5.1 Seek and obtain special authorisation/permits from the relevant regulatory agencies, including the Commission, before developing OFC infrastructure, such as the planting of poles, trenching, or the erection of aerial cables and other infrastructure.

2.1.5.2 Coordinate with the Commission all OFC rollouts, including laying of cables, planting poles, and trenching.

2.1.5.3 Participate in the operationalisation and regular updates of a single digital platform for all authorised ICT infrastructure deployments and rollouts, as shall be established by the Commission across the country. The platform shall include any planned and ongoing excavation works or respective services infrastructure deployment from the national Water and Sewerage Corporation (NWSC), the Ministry of Works and Transport (MoWT), Kampala Capital City Authority (KCCA) or other municipal councils, the Ministry of ICT and National Guidance (or NITA-U), and other utility service providers.

2.1.5.4 Public utilities or infrastructure developers, including NITA-U, shall reserve shared space, as applicable, for multiple licensed operators, allocated on fair, transparent, and non-discriminatory terms.

2.1.5.5 Jointly share tunnels, ducts or pipelines and telecommunication cables as provided by ITU-T Recommendation L.11.

2.1.5.6 Share the backbone and metro fibre capacity or cores, as appropriate.

2.1.6 All cross-connects and landing stations shall be shared by all the telecommunications operators and/or licensees to the extent possible. The Commission shall verify any impossibility that may arise.

2.1.7 An operator shall conduct surveys to confirm the feasibility of sharing before embarking on the development of its infrastructure. A feasibility report submitted to the Commission shall inform the decision whether to approve or not the development of a new OFC infrastructure.

2.1.8 The Commission shall be the primary regulatory approver for any new OFC infrastructure where sharing has been determined either not to be feasible or practical. Consideration for approval may be made only upon:

2.1.8.1 Verification by the Commission that no viable shared option exists.

2.1.8.2 Submission of required permits from all relevant infrastructure owners or authorities (e.g., NWSC, MoWT, KCCA).

2.1.8.3 Alignment with the centralised authorisation, permitting, and works coordination platform established by the Commission.

2.1.9 All telecommunication operators shall share peering and meet-me points, where applicable. Otherwise, they shall seek permission from the Commission in advance.

2.1.10 When developing an OFC infrastructure, an operator shall consider future network needs and expansion plans to avert unnecessary digging or pole planting.

2.1.11 An operator shall, under specific arrangements or agreements, share information (in GIS maps and Excel formats) on its OFC deployment routes, maps, etc, with another operator wishing to share infrastructure with it.

2.1.12 Where an operator refuses to share infrastructure deemed technically and economically feasible by the Commission, the Commission shall, after conducting due process, impose any sanctions or penalties as it seems appropriate, and in accordance with the Uganda Communications Act, Cap 103 (as amended) and the Regulations issued thereunder.

2.1.13 Sanctions shall be proportionate and graduated, ranging from formal warnings to monetary fines capped at the operator's annual licence fee as provided by the Act and regulations issued thereunder, and in persistent cases, suspension of works or other lawful measures.

2.1.14 All monetary penalties shall be ring-fenced into an Infrastructure Sharing Development Fund administered by the Commission to finance shared infrastructure initiatives and centralised permitting systems. Operators shall retain the right to appeal, and the Commission shall publish annually a report on sanctions imposed and reinvestment outcomes.

2.1.15 The above notwithstanding, the Commission may allocate the funds as it considers appropriate in the circumstances.

2.1.16 Sharing of Ducts, Buildings, and Poles, and Other Infrastructure

2.1.16.1 A person shall, before installing any fibre infrastructure, including poles, ducts, buildings, and conduits, among others, confirm that these do not exist in the subject area.

2.1.16.2 The Commission shall not recommend and/or authorise/permit fibre installations along certain roads or in cities, unless such installation is done on a shared infrastructure.

2.1.16.3 An operator or licensee shall install at least two (2) pipes with a minimum of twelve (12) cores on the access network and four (4) ducts on the backbone network to facilitate fiber and duct sharing.

2.1.16.4 The payment of these reserved pipes and cores by a new operator shall be agreed upon by the participating parties or sharing parties.

2.1.16.5 The shared building cabling and sharing point for fiber installation in buildings with multiple operators shall be mandatory to:

(a) Reduce fibre installation and maintenance costs in the building.

(b) Reduce disturbance (noise, infrastructure works, dust…) for inhabitants.

(c) In buildings served by more than one licensed FTTH operator, a neutral, shared in-building cabling system shall be deployed to support both Point-to-Point (P2P) and Point-to-Multipoint (P2MP) access topologies. The Commission may mediate negotiations or prescribe a cost-sharing and governance framework to ensure equitable access, capacity planning, and non-discriminatory entry for additional operators.

(d) The first applicant to connect a building should provide a sharing point that might support the sharing of at least eight (8) other future operators or licensees.

2.2 OFC Infrastructure Sharing Mechanism

2.2.1 Joint Construction

2.2.1.1 An operator or licensee shall accept a request from another to co-build an OFC infrastructure for common use on fair and reasonable terms.

2.2.1.2 The request in 2.2.1.1. above shall be made in writing and on an individual operator basis.

2.2.1.3 The costs of co-building infrastructure shall be shared among the parties in proportion to the estimated cost of self-build or as shall be agreed by either party.

2.2.1.4 An operator may be exempted from the obligation to grant a request in 2.2.1.1. above under the following circumstances.

(a) Where a joint building of infrastructure would increase the cost compared to self-building, or

(b) Endangers network security and or the use of the network for its intended purpose.

2.2.1.5 As applicable, an operator shall, before erecting an OFC infrastructure, seek approval from or coordinate with officials from NEMA, MoWT, KCCA, other city councils, district, and local council authorities.

2.2.1.6 The request for approval in 2.2.1.5 above shall be made within a timeline proportionate to the scale and impact of the planned works:

(a) For major works affecting core utility corridors or large public areas, not less than three (3) months before commencement.

(b) For minor or low-impact works, not less than seven (7) calendar days before commencement. The Commission shall issue guidance on classification to ensure predictability and avoid undue rollout delays.

2.2.1.7 Where an operator makes a co-build request with another operator, however, does not receive a response, or the conditions for co-build are not agreed upon within two (2) months or sixty (60) calendar days, it may refer the matter to the Commission.

2.2.1.8 Similarly, where a response has been received within the stipulated timelines, however, that is negative without a sufficiently substantiated justification for the rejection, the requesting operator may refer the matter to the Commission.

2.2.2 Leasing or Sharing

2.2.2.1 An operator shall consider leasing or co-location before developing any OFC infrastructure anywhere in Uganda.

2.2.2.2 An operator shall, upon receiving a leasing or sharing request, grant access to its infrastructure on fair and reasonable terms, or as shall be agreed by the parties involved.

2.2.2.3 The response time to approve or otherwise a leasing or co-location request shall not exceed thirty (30) calendar days, or else the requester may refer the matter to the Commission.

2.2.2.4 The requesting operator shall, at a minimum, specify what it seeks to share or co-locate at, i.e. duct, manhole, poles, lit or dark fiber, equipment, etc, in addition to the following:

(a) Expected date of the desired access to the proposed infrastructure.

(b) Details of equipment to be installed, required space, security, and measures, among others, as shall be requested by the leasing operator.

2.2.2.5 The leasing operator may request any additional information or clarification to facilitate the processing of the leasing request.

2.2.2.6 An operator may decline a request for infrastructure leasing, co-location, or sharing only under the circumstances below:

(a) Limited available capacity or space.

(b) Technical incompatibility of the infrastructure.

(c) Endangering public or national security.

(d) Detriment to other services provided on the same infrastructure.

(e) Operator's current use and a reasonable future need for capacity. This must be sufficiently demonstrated.

2.2.2.7 A rejection based on reservation of capacity for future use shall only be valid if accompanied by a five-year network rollout and capacity utilisation plan, certified by a registered engineer, demonstrating a specific, funded project that will utilise the reserved capacity within twenty-four (24) months of the rejection.

2.2.2.8 A rejection or refusal claim for leasing, co-location, or sharing an OFC infrastructure on a technical basis or any other reason shall be verified by the Commission or any other person on its behalf as it shall deem appropriate.

2.2.2.9 Leasing and Sharing Agreements:

2.2.2.9.1 Parties engaged in an OFC infrastructure leasing, co-location, or sharing shall agree.

2.2.2.9.2 The agreement shall specify the contractual obligations of either party.

2.2.2.9.3 A copy of a signed agreement or its future modifications shall be made available to the Commission within fourteen (14) days of signing for approval and/or ratification.

2.2.2.9.4 As a minimum, the agreements shall, inter alia, include:

(a) The objective of the agreement.

(b) The obligations of either party.

(c) Service levels and maintenance mechanism.

(d) Associated charges and operational costs.
(e) Billing and settlement procedures.

(f) The date of commencement, and amendment provisions.

(g) Grounds for termination and amendment procedures.

(h) A dispute resolution mechanism.

(i) E-waste disposal mechanism for either party's system or infrastructure.

(j) Equipment end-of-life management.

2.2.2.10 The Commission shall not approve any agreements:

(a) That is inconsistent with the law, the terms and conditions of licenses, relevant communications regulations, regulatory decisions, standards, or directives.

(b) That may potentially lead to anti-competitive behaviour.

(c) That may endanger life and safety.

(d) That may cause damage to the environment.

(e) That contradicts national interest or risks national security.

(f) That presents an arrangement for which sharing such infrastructure is not technically feasible.

2.2.3 Relocation of an OFC Infrastructure

2.2.3.1 Except where natural circumstances demand, an operator or infrastructure owner seeking relocation or modification of shared OFC infrastructure shall notify the other operator of its intentions.

2.2.3.2 An operator shall, before relocating or modifying a shared infrastructure, give sufficient notice, in any case not less than sixty (60) calendar days, to the affected operator(s), and notify the Commission, and any other relevant regulatory authority.

2.2.3.3 An aggrieved operator to whom a notice has been served shall, within fourteen (14) calendar days, file a complaint to the infrastructure owner (Infrastructure owner) and seek favourable considerations.

2.2.3.4 Upon receipt of the complaint, the infrastructure owner (an operator) shall accordingly respond within fifteen (15) calendar days.

2.2.3.5 A copy of the complaint and the associated responses shall be made available to the Commission at the earliest opportunity possible, in any case not later than forty-five (45) calendar days.

2.2.3.6 In the case of a re-development of a shared OFC infrastructure, the infrastructure owner shall notify the affected operators of its intentions at least six (6) months in advance.

2.2.3.7 Where the Access Provider undertakes the redevelopment or relocation for optimal utilisation of facilities, the cost of such redevelopment or relocation shall be shared among the participating operators at a percentage mutually agreed upon by all.

2.2.4 Special Obligations for an OFC Operator

2.2.4.1 An OFC operator shall coordinate and share infrastructure with other duly authorised operators to facilitate the expansion of the broadband network in Uganda.

2.2.4.2 For the provision above, an operator shall provide capacity on its infrastructure to other operators on a non-discriminatory "first-come, first-served" basis.

2.2.4.3 An OFC operator shall develop and submit to the Commission for approval an annual infrastructure roll-out plan by the 15th of December of the year preceding the roll-out.

2.2.4.4 The plan in 2.2.4.3 above shall, among other things, indicate the agreements obtained, or ongoing negotiations to share existing OFC infrastructure.

2.2.4.5 Where an OFC operator proposes or wishes to update the approved rollout plan, it shall indicate the proposed variations and resubmit to the Commission for approval, at least sixty (60) days before rollout.

2.2.4.6 In considering an annual rollout submitted for approval, the Commission shall also allow "out of cycle" deployments for confirmed customer orders, with operators notifying the Commission within 30 days and including them in an addendum to the annual plan, and the Commission shall consider:

(a) The obligations associated with the license of the OFC operator.

(b) The need for the proposed OFC network, considering coverage, quality of service, social and economic benefit, or any other.

2.2.4.7 Where co-location or another form of OFC infrastructure sharing is indicated as not possible, a demonstration of the physical or technical limitations shall be provided.

2.2.4.8 Demonstration that the proposed network is an efficient option considering:

(a) Capacity of the OFC network to deal with emerging telecommunications technologies.

(b) Capacity of the OFC network to expand to serve future infill and Greenfield development in both urban and rural areas.

(c) Estimated time the OFC network is planned to be operational.

(d) Timing of a review of the OFC network.

2.2.4.9 An OFC operator shall ensure that electronic data on all its passive infrastructure components is submitted to the Commission within one (1) month of completion of deployment of the respective component, in a standardised format agreed by the industry. The required dataset shall include only essential technical and location attributes necessary for regulatory oversight and infrastructure sharing, as defined in an Annex to this framework, and shall exclude commercially sensitive information. The Commission shall publish and maintain the standard format in consultation with licensed operators.

2.2.4.10 The information in 2.2.4.9 above shall include:

(a) Location and routes (as applicable) with geo-referencing (GIS) maps.

(b) Type (e.g., duct, manhole/handhole, termination/access points, cables, fibres, etc.) and the amount, quantities, or capacity of infrastructure.

2.2.5 Information Depository

2.2.5.1 The Commission shall maintain a copy of all GIS maps showing licensees' OFC infrastructure deployment across the country to facilitate leasing or sharing.

2.2.5.2 The provision of information above shall be to an extent that the disclosure does not jeopardise.

(a) Network security and its integrity.

(b) Public safety or national security.

(c) Confidentiality or operating and business/trade secrets.

2.2.6 Guiding Principles for Setting Leasing or Sharing Fees

2.2.6.1 An OFC operator sharing its infrastructure shall consider the following when setting fees.

(a) Cost-based, with a reasonable rate of return on capital appropriately employed.

(b) Upon request, disclose to the Commission the details as to how fees have been determined.

(c) To the extent possible and as appropriate, fees to access an OFC infrastructure shall be structured in such a manner as to distinguish.

(i) The effecting and commissioning of the access to infrastructure.

(ii) Rental charges for use of the OFC infrastructure.

(iii) Variable charges for ancillary and supplementary services.

2.2.6.2 The entity seeking to lease, or share, shall only be subjected to charges that correspond to the specific infrastructure elements required.

2.2.7 Confidentiality

2.2.7.1 Information provided by one OFC operator to another for infrastructure sharing or leasing purposes shall.

(a) Not be disclosed unless consented to in writing by the other operator or required by law.

(b) Only be disclosed to the relevant persons for the OFC infrastructure sharing or advice thereon.

2.2.7.2 Information disclosed to an OFC operator or coming to its attention because of sharing, co-location, or leasing must not be disclosed to any person involved in the business of retailing services of the other Operator, its partners, or its affiliates.

2.3 OFC Installations Requirements

2.3.1 OTDR Pre-Test

The client shall conduct a minimum OTDR Pre-Test using the checklist in the table below.

Table 2.3—1: Pre-installation for Cable Drum

No.	Item Description
1.	All fibre should be tested before installation begins, using a minimum OTDR or a Scalable OTDR based on the technology.
2.	Testing shall be performed on all fibres in one direction at 1550 nm or 1310 nm, using a 30 ns pulse.
3.	Traces will be stored, and a soft/electronic copy will be submitted to the client.
4.	Should a cable be installed without an OTDR pre-test, a supplier can claim that the installer assumed liability upon installation.

2.3.2 Layout

2.3.2.1 When pulling optical cables into conduits, cable trays, or raceways, the strength member(s) of the cable shall bear all or nearly all the pulling force.

2.3.2.2 Cable-able jackets shall not be directly pulled unless designed for the purpose or unless the run is very short and requires a minimal pulling force. Pulling of cables will only be allowed where blowing is not possible.

2.3.2.3 Optical cables shall not be pulled into place by applying tension directly to the fibers (pulling the fibers).

2.3.2.4 Install junction boxes along the full length of an optic fibre cable (in the middle of the span) to allow pulling the cable into two equal opposite directions.

2.3.2.5 Optical cables shall be attached to a pulling line only by methods recommended by the manufacturer of the cable.

2.3.2.6 Unless stated otherwise by the cable manufacturer, the maximum pulling tension used for optical cables shall be 273 kg for outdoor cables. The pulling force shall be uniform and consistent; cables shall not be jerked.

2.3.2.7 Cable pulling shall be done by hand, except when tension meters, tension-controlled, or breakaway swivels are employed.

2.3.2.8 When powered pulling equipment is used to install optical cable, tension monitoring equipment or breakaway swivels shall be used. Swivels shall be used when pulling optical cables into conduits. Exceptions may be made to this requirement only for very short runs, which require a minimum pulling force.

2.3.2.9 If Pull Boxes are to be used with optical cables, they shall be designed for the purpose of being equipped with cable supports and shall be sized so that no cables in the box shall be tightly bent.

2.3.2.10 A length of free cable shall be provided at each end of a cable pull. Loops of cable (also known as service loops) shall be provided at all intermediate pulling points or Pull Boxes.

2.3.2.11 The cables' minimum bending radii shall not be violated.

2.3.2.12 When pulls are accomplished in two or more stages, and the spare is unreeled, it shall be configured in a large figure-eight on a safe, flat surface, such as the ground or a clean floor.

2.3.2.13 The entry of outside plant cables into a structure may require special fire safety considerations.

2.3.3 OFC Splicing and Termination

2.3.3.1 All fiber terminations and jointing shall be carried out using fusion splicing methods. The maximum allowable signal attenuation shall not exceed 0.3 dB per connector and 0.1 dB per splice, measured at both 1310 nm and 1550 nm, in accordance with recognised international standards such as ITU-T G.671, IEC 61300-3-4, or ISO/IEC 11801.

2.3.3.2 The average loss for all joints in any one fibre link (from one Core substation to another Core substation or one OFC repeater to another) shall not exceed 0.12 dB.

2.3.3.3 OFC fibres shall be arranged in the termination and splicing boxes with loops contained within trays in an orderly and consistent identifiable pattern with sufficient slack to allow re-jointing without resorting to extra optical fibre cable.

2.3.3.4 All splicing boxes shall be sealed to achieve watertight protection (e.g., IP68 or equivalent) and constructed from materials that ensure durability for at least the operational life of the installed optical fiber cable, typically not less than 25 years, under standard environmental conditions.

2.3.4 Post-Installation Testing

2.3.4.1 The attenuation of all fibers shall be checked with an OTDR after installation and splicing of all the fibers.

2.3.5 Slack Installation

2.3.5.1 Slack should be maintained at a minimum of 1% of backbone length and 2% of metro/last-mile link length. For practical field application, this typically equates to approximately 20 m of slack on backbone segments and 10 m on metro or last-mile segments.

2.3.5.2 The maximum slack stored in any manhole shall not exceed 30% of the available internal clearance of that manhole, based on its defined internal dimensions, or an absolute maximum of 10 m of slack—whichever is less. For consistency, manhole internal dimensions shall be defined in the framework or by reference to applicable national civil works standards.

2.3.6 Earthing, Bonding, and Surge Protection

2.3.6.1 The armouring of optical fibre cables shall be lugged and bonded to an earth bar using soft multi-stranded 6 mm2 green/yellow insulated bonding cables.

2.3.6.2 Bonding cables shall be kept as short as practically possible and shall contain no sharp bends.

2.3.7 Work Safety and Infrastructure Protection

2.3.7.1 OFC installers shall wear gloves, hard hats, steel-toe work boots, and brightly colored reflective worker's garments (Clearly marked with a label of the implementing authority).

2.3.7.2 Aerial OFC installers shall always use body harnesses or appropriate rigging gear when climbing and while aloft. Any operation at height will be carried out by technicians certified to work at heights.

2.3.7.3 A ladder shall be secured at the base by one person during the climb and by a safety rope before work on the pole commences.

2.3.7.4 During optic fiber splicing, workers shall wear protective goggles (safety glasses) to protect them from fiber splinters.

2.3.7.5 All cut fiber pieces shall be put in a safe place and away from ingestion and from the public, especially the local community.

2.3.7.6 Transportation or a vehicle shall be made readily available within not more than five (5) km, or twenty (20) minutes away, whichever is less, from the workers in case of an emergency.

2.3.7.7 Where there is no GSM coverage, team leaders shall have two-way radio communication with the nearest vehicle.

2.3.7.8 Each working team shall be equipped with a complete First Aid kit and shall have at least one member who is First Aid certified.

2.3.7.9 Where personal security is at risk due to banditry or hostile people, the village local council (LC-1) chairman or defence secretary shall be engaged to secure the workers.

2.3.7.10 Unskilled labour should, as much as possible, be sought from residents of the villages or communities where OFC shall pass. This will enhance security for the whole team and avert confrontation between company workers and local job seekers.

2.3.7.11 The work team shall place barriers along the trench area to warn people of the "Dangerous Trench" as required by current laws during excavation works.

2.3.7.12 The work team shall place large and visible warning signs to alert road users and pedestrians to "Excavation Works" along the cable route.

2.3.7.13 All open concrete of wooden pole holes shall be guarded with red/white barrier tape to warn the local community of potential hazards.

2.3.7.14 An OFC operator shall ensure that trenches are backfilled as soon as possible and returned to their original state.

2.3.7.15 No environmental pollution or degradation shall be allowed because OFC cable works in any area.

2.3.7.16 If the excavation shall remain open or the road will be otherwise obstructed during the night or under low-visibility conditions, reflective road signs shall be complemented by lighting devices of the color, shape, and size stipulated by the Ugandan traffic code.

2.3.7.17 An OFC operator shall not engage in trench excavation in an urban, semi-urban, town council, city, or township before verifying that all utility lines (water pipes, electric cables, and sewer lines) in the area are marked and known.

2.3.7.18 An operator shall take reasonable steps necessary to protect utility infrastructure, such as water, electricity, and sewer systems, within the area that cannot be located accurately.

2.3.8 Aerial OFC and Supporting Infrastructure Requirements

2.3.8.1 Unless otherwise specified, under this framework, an operator shall, inter alia, apply for special approval from the Commission to plant or erect OFC poles in geographical locations designated as cities, municipalities, urban, suburban, rural, or residential. This approval aims to promote infrastructure sharing and prevent duplication.

2.3.8.2 Provision 2.3.8.1 above shall not apply to the underground installation of OFC in the mentioned geographical areas. However, an operator shall obtain the necessary approvals and permits from other relevant regulatory authorities regulating these areas, including the KCCA, Municipal and District Councils, and Road Authorities, among others.

2.3.8.3 The use of wooden poles for aerial OFC rollout across the country shall be phased out by ***30th June 2027.*** Any existing wooden poles by the set deadline shall be decommissioned and replaced with a concrete pole (See figure 2.3-1) at the owner's cost.

Figure 2.3—1: Proposed Concrete Poles (height ≥12m)

2.3.8.4 All OFC infrastructure after the set deadline shall consist of concrete poles capable of supporting up to ten (10) service providers or OFC Operators. All OFC operators or licensees are therefore strongly encouraged to incorporate the phasing-out element into their strategic plans and to start deploying in line with the proposed transition.

2.3.8.5 All OFC operators, service providers, or licensees shall, where feasible, share the OFC infrastructure already deployed by the Government of Uganda through its relevant ministries, departments, and agencies (MDAs).

2.3.8.6 A service provider or an OFC operator shall not be permitted to develop any OFC infrastructure, whether aerial or ground-based, along all national highways and routes where such infrastructure already exists and is provided by the Government of Uganda, either through NITA-U or other relevant government MDAs.

2.3.8.7 The manufacture of concrete poles shall conform to relevant standards and shall be prescribed by the Uganda National Bureau of Standards or any other competent regulatory body.

2.3.8.8 An OFC pole under transportation shall not exceed the 0.5 m vehicle overhang and shall have a red flag secured on the overhang.

2.3.8.9 A pole on the carrier shall be secured to ensure that it does not move while in transit.

2.3.8.10 To ensure proper cable clearance and given the potential for multiple service providers (with adequate spacing between providers, see figure 2.3-2 below), an OFC pole shall not be less than twelve (12) metres tall measured from the ground surface.

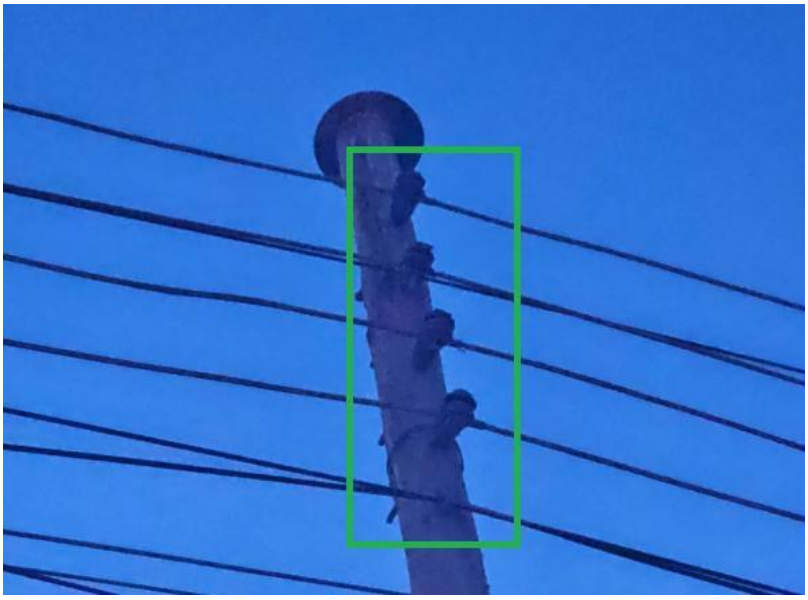

Figure 2.3—2: Proposed pole sharing arrangement (pole height ≥12m)

2.3.8.1 The Commission recommends that for both concrete and Wooden poles, at least 1.5 m should be buried for pole stability (*Figure 2.3—2*) below.

Figure 2.3—3: Technician deploying Government of Uganda fiber in Kiboga District, under NITA-U project)

2.3.8.2 An OFC wooden pole to accommodate at least ten (10) fibre service providers shall, *at a minimum*, comply with the dimensions and technical specifications in Tables 2.3-2 and 2.3-3 below, or any other such standards as shall be provided by the Uganda National Bureau of Standards (UNBS) or other relevant government agency.

Table 2.3—2: Proposed Wooden Pole Dimensions

Pole Class	Pole Length (m)	Min. Pole Top Diameter (mm)	Max. Pole Top Diameter (mm)	Theoretical Ground Line (m)
Fiber	12	190	250	2.0
	14	195	250	2.2

2.3.8.3 An OFC operator, service provider, licensee, or its contractors must ensure they deploy high-quality, properly treated wooden poles supported by treatment certificates from reputable pole treatment plants. The chemical penetration and retention are key performance indicators. These treatment facilities should, at a minimum, hold Uganda National Bureau of Standards (UNBS) and ISO certifications

to guarantee quality. This information must be submitted to the Commission for verification as part of the permit application.

2.3.8.4 Licensees and respective contractors shall ensure the pole is fitted with end plates and strapping at both ends. In addition, poles must be appropriately labelled to indicate the manufacturer, service provider, type of treatment, tree type, and year of manufacture.

Table 2.3—3: Technical Specifications for Wooden Poles

No.	Description	Unit	Requirement
1	Manufacturer's Name	-	
2	Pole Species	-	Eucalyptus Saligna, Eucalyptus Grandis, Eucalyptus Grandis Crossed with Uerophylla, Eucalyptus Grandis Crossed with Camaldulensis
3	Country of Origin		Uganda
4	Minimum age of Pole	Years	8 Years
5	Type / Form	-	Round shape/slanting
6	End plates installed		Yes
7	Fiber stress	MPa	55
8	Method of seasoning	-	Air Drying
9	Average moisture content before treatment	%	28%
10	Preservation chemical	-	Chromated Copper Arsenate (CCA)
11	Method of preservation	-	Vacuum-pressure impregnation
12	Minimum depth of penetration of the preservative	mm	20
13	Minimum retention of preservative	Kg/m^3	15

2.3.8.5 The specification for concrete poles supporting at least ten (10) OFC service providers shall not be less than fourteen (14) metres above the ground surface.

2.3.8.6 The concrete poles shall conform to Ugandan National Standards (US EAS 489) and international standards (JIS A 5373, EN 12843), or any other standards as may be specified by the UNBS, or other relevant government agency from time to time (*See Figure 2.3—4*).

Figure 2.3—4: Examples of Concrete Poles to support 10 fibre cables (Pole height ≥14m).

2.3.8.7 Both concrete and wooden poles installed in cities, municipalities, towns, and rural areas shall be scalable to support additional installations (as applicable) such as surveillance cameras, lighting bulbs, and cable television as appropriate.

2.3.8.8 All excavations for pole holes must be carried out so that the survey peg shows the centre line.

2.3.8.9 Holes for poles shall be excavated to a depth equivalent to at least 10% of the pole height plus 0.6 m, with the diameter (or width) determined by structural and soil stability requirements, but not less than 200 mm wider than the pole base. Site-specific geotechnical conditions shall be considered in determining final dimensions.

2.3.8.10 Where a hole is dug on the sloping ground, the depth of the hole shall be measured from the lowest point on the ground surface.

2.3.8.11 In extreme rocky conditions where holes cannot be excavated to the specified depth, poles may be set in concrete to achieve the required stability. This procedure shall be carried out in accordance with approved engineering standards and documented in the as-built report submitted to the Commission.

2.3.8.12 Where poles are planted in soil that is difficult to compact, such as sand and swampy areas, and in extreme rocky conditions, the poles shall be cast in concrete.

2.3.8.13 A uniform span length shall be maintained and only depart from this when it is rendered necessary by conditions such as uneven ground, or sharp bends, thus necessitating the planting of additional poles or the omission of poles.

2.3.8.14 All-Dielectric Self-Supporting (ADSS) span lengths should be guided by cable manufacturer specifications, route design, and field conditions. While typical ranges may be up to 50 m for short spans, up to 80 m for medium spans, and up to 120 m for long spans, final spans shall be determined by engineering design considering obstacles, junctions, and structural load limits.

2.3.8.15 Road crossing poles should have a minimum height of fourteen (14) meters measured above ground surface.

2.3.8.16 Route length poles should have a minimum of 12-16 meters measured above ground surface.

2.3.8.17 Poles shall be erected vertically and in straight lines, aligned as much as possible (Figure 2.3-5 below), except where the road curves. When other street furniture exists, poles shall be positioned to maintain a minimum horizontal clearance of 1–2 metres from existing power poles, overhead lines, or other permanent structures, in accordance with applicable electrical safety and civil works standards.

Figure 2.3—5: Well aligned Power and fibre deployment on a single infrastructure (Belem City, Para State, Brazil)

2.3.8.18 To ensure long-term reliability, protection from severe weather, and aesthetic appeal, all last-mile OFC connectivity shall be installed underground unless otherwise proven to be unfeasible.

2.3.9 Optical Fiber Cables

2.3.9.1 Labelling

(a) All newly procured optical fiber cables shall be marked at 1 m intervals with: (a) organization logo/initials, (b) year of manufacture, (c) owner, and (d) number of cores, per recognized standards. Existing cables are exempt from retroactive marking, but their routes and ownership must be recorded in the National Infrastructure Database.

(b) An operator engaged in laying OFC and/or vendors may determine the appropriate color coding, however, black shall be the standard color for the backbone fiber for ease of identification and protection.

(c) All cables shall conform to the ITU -T specifications for the required service as detailed in Table 2.3—4.

2.3.9.2 Minimum Optical Fiber Characteristics

(a) Based on characteristics, the International Telecommunications Union Standards ITU-T G. series (ITU-T G.652 - G.657) classifies OFCs into six types as shown in Table 2.3—4.

Table 2.3—4: Optical Fiber Characteristics

No.	OFC Standard	Item Description
1.	G.652	Specifies the characteristics of a Single-mode optical fiber cable.
2.	G.653	Specifies the characteristics of a dispersion-shifted, single-mode optical fiber cable.
3.	G.654	Specifies the characteristics of a cut-off shifted, single-mode optical fiber cable.
4.	G.655	Specified the characteristics of a non-zero dispersion-shifted single-mode optical fiber cable.
5.	G.656	Specifies the characteristics of a fiber and cable with non-zero dispersion for wideband optical transport.
6.	G.657	Specifies the characteristics of a bending-loss insensitive single-mode optical fiber and cable for the access network.

Backbone Deployments		
7.	ITU-T-Rec G 652 D	Characteristics of optical fiber used in cable manufacturing (Specific for general fiber installations).
8.	ITU-T-Rec G 655 D	Characteristics of optical fiber used in cable manufacturing (More specifically for backbone and high-capacity long haul links with DWDM equipment).
9.	ITU-T-Rec G 656 D	Characteristics of optical fiber used in cable manufacturing (More specific for backbone and high-capacity long haul links with DWDM equipment).
10.	ITU-T-Rec G 657	Characteristics of optical fiber used in cable manufacturing (More specific for last mile installations with limited bending areas and thus small bending radius appropriate).

(b) An operator shall conduct an on-site pre-installation inspection of the cable drum using the checklist in Table 2.3—5.

Table 2.3—5: Pre-installation for Cable Drum

No.	Item Description
1.	Check that the cable specified has been procured.
2.	The cable drum shall be inspected for signs of excessive weathering and/or damage
3.	Drums shall be transported or stored with their battens intact.
4.	Never accept delivery of a cable if the drum is damaged.
5.	Plastic foil wrap shall remain in place until cable placement.
6.	To remove plastic foil wrap on a cable, do not use sharp tools

7.	Ensure that all cable drum bolts are tightened
8.	Verify that nails, bolts, or screws on the inside surface of drum flanges are counter-sunk to avoid damage to the cable during placement.
9.	Place the cable drum in line with the intended direction of deployment, to prevent reel flange-cable rubbing
10.	The cable end shall always be sealed – using pre-formed or heat-shrinkable end caps.
11.	Using tape for sealing cable ends is considered unsuitable.
12.	Always roll the drum following the direction of the arrow.
13.	Drums shall be choked to prevent them from moving.
14.	Branding: The branding of the cables, ducts, poles, and any other accessories should meet the following minimum requirements. All the text shall be electronically printed The printed text on the fiber cables shall have the organization name, logo, year of manufacture, number of cores, and the physical location of the route reading From….. To…... The printed text on the ducts shall have the organization name, logo, year of manufacture, and the physical location of the route reading From….. To…... The text shall be printed in intervals of 1-meter spacing for the cables and ducts. The printed text shall be legible, which typically means they should be printed on high quality to ensure the text is easy to read. The text should be consistent.

	The text should be able to last for a long period, therefore durability is key as the ducts, cables, and other accessories last for many years. The text shall be permanently placed on the products.
15.	Label Plastic cable labels shall be mechanically printed and shall be attached to all fiber optic cables using black UV-rated cable ties or stainless-steel cable ties within six inches of the splice closure and 6 “from all ducts and sleeves. Provide electronically printed, waterproof, self-adhesive, laminated labels installable on the external surface of the outside panel of all FDUs and closures.

2.3.9.3 Cable Placement Condition

Unless otherwise specified, however, subject to prior approval by the Ministry of Works and Transport, it is recommended that the highest point of the optic cable duct shall be.

(a) Backbone, Spur Route, and Metro.
  (i) Not less than 1.5 m below the current centreline level of the carriageway or roadway.
  (ii) Not less than 1.5 m below the surface of the road reserve or side drain or verge at any point along the cable alignment.

(b) Last Mile:
  (i) Not less than 1.5 m below the current centreline level of the carriageway or roadway.
  (ii) Not less than 1 m below the surface of the road reserve, side drain, or verge at any point along the cable alignment.

2.3.9.4 Optical Fiber Cable Installation Considerations

2.3.9.4.1 To facilitate the effective sharing of national backbone infrastructure (active OFC), the following OFC capacities are recommended.

(a) Backbone management – minimum of 96 cores – should have 2 (96 cores) running in parallel.
  (i) Cable 1 is the actual backbone (Express).

(ii) Cable 2 is the access cable.

(b) Spur Cable Installation.
  (i) Minimum of Metro, 48 cores.
  (ii) Minimum of Access, 48 cores.

(c) Metro Cable Installation
  (i) Minimum of Metro 144 cores,
  (ii) Minimum of Access 48 cores.

(d) Category A- International Network Capacity 144 Core.
(e) Category B - National Network Capacity 96 Core.
(f) Category C - County Network Capacity 48 Core.
(g) Category D - Subcounty Network Capacity 24 Core.
(h) Last Mile - Minimum of 2 – 24 cores.

2.3.9.4.2 Cables running parallel to the road reserve shall be placed not more than two (2) meters from the edge of the road reserve as provided.

2.3.9.4.3 The method for placing cables across the carriageway or roadway shall be strictly through micro-tunnelling.

2.3.9.4.4 Where ducts and sleeves have been provided by the Road Authority, they shall be used for crossing the carriageway.

2.3.9.4.5 The level of workmanship shall be to the highest standards. Supervision shall be provided by an Engineer.

2.3.10 Environmental Management and Disposal

An OFC operator shall:

2.3.10.1 Obtain a Certificate of Approval for an Environmental and Social Impact Assessment from the National Environmental Management Authority (NEMA) in accordance with the National Environment Act and submit a copy of the said Certificate to the Commission prior to the commencement of any works.

2.3.10.2 Adhere to the submitted mitigation plan in x and submit reports regularly to the Commission to facilitate compliance assessment.

2.3.10.3 Conduct periodic reviews to establish and report to the Commission on the effectiveness of the mitigation plan in x above.

2.3.10.4 Develop procedures and operational controls for the onsite storage of project materials.

2.3.10.5 Dispose of all e-waste resulting from ICT infrastructure deployment, maintenance, or upgrade according to the Guidelines for e-Waste for Management in Uganda, 2016, and the National Environmental Act 2019.

2.4 Installations of OFC along the Roads and Streets

2.4.1 Cable Installation along Roadway

2.4.1.1 An OFC operator shall, when laying optical fiber cables (OFCs) along Roadways, comply with the following aspects:

2.4.1.1.1 All OFCs shall be laid in ducts buried to depths of not less than 1500 mm.

2.4.1.1.2 All OFCs shall be laid at a horizontal offset of 1.0–1.5 m from the edge of the Road Right of Way on Class A roads, and 0.5–1.0 m on Class B and other roads, unless site conditions or safety considerations dictate otherwise.

2.4.1.1.3 Consideration to vary the requirements immediately above may, however, be made based on a substantiated justification, the approval of which shall be made by the MoWT, and/ or other relevant government agency as shall be deemed appropriate.

2.4.1.1.4 Any deviation from the requirement above, due to technical or practical reasons, will be documented, and the authority to do so shall be given by the MoWT.

2.4.1.1.5 All OFC deployment designs shall be approved by MoWT or other relevant bodies as shall be deemed appropriate before implementation.

2.4.1.1.6 An OFC operator shall maintain a horizontal distance of one (1) meter between the existing underground utilities and the new OFC cable, or appropriate duct protection shall be ensured.

2.4.1.1.7 An OFC operator shall ensure that appropriate barriers are put in place, as well as road signs to warn the public of ongoing excavation work.

2.4.1.2 Surface markers to indicate the route of the cables shall be planted on the roadsides.

2.4.1.3 The markings shall be placed at intervals between 300 m to 500 m. A longer distance could be considered on a case-by-case basis.

2.4.1.4 Visible pole markers shall indicate the fibre network provider and cable depth. It shall be placed along the trenches 30 cm below the ground surface.

2.4.1.5 It is recommended that OFC be laid in ducts buried to depths of not less than 80 cm or 1.5 m in road reserves. This shall, however, be subject to prior approval by the Ministry of Works and Transport.

2.4.1.6 A special request may be made to the Commission for lesser depths, where the soil conditions do not allow for achieving the instituted minimum required depths.

2.4.1.7 Upon receipt of the request, the Commission shall then assess and provide feedback based on case specifications, provided that the requester:

2.4.1.7.1 Comply with all provisions and guidelines established by the Regulatory Authority and concerned authorities in the subject areas.

2.4.1.7.2 Reserve at least the horizontal distance of one (1) meter between the existing underground utilities and the new cable, and if not, possibly use tape marking to indicate the location of fiber optic cable and inform the network provider of the existing utility five days before excavation.

2.4.1.7.3 Place the barriers and road signs required by current laws during excavation works.

2.4.1.7.4 If the excavation must remain open or the road will be otherwise obstructed during the night or under low-visibility conditions, road signs shall be complemented by lighting devices of the color, shape, and size stipulated by the traffic regulations.

2.4.1.7.5 Trenches should be backfilled to the original state, and the backfill shall be strong enough to support any kind of stresses thereafter.

2.4.1.7.6 Where the fiber has crossed the road, the backfill shall conform to the MoWT's standards and an acceptance certificate shall be issued against the backfill.

2.4.1.7.7 Put an identification sign (marker) stated by these guidelines to illustrate your cable route.

2.4.1.8 The installation requirements shall apply to the ducts, maintenance chambers, hand holes, way leaves, poles, fiber cables, markings, equipment, security, and aerial cables to facilitate affordability (CAPEX and OPEX), reliability, and orderly deployment.

2.4.1.9 To achieve ultimate affordability while maintaining reliability, all infrastructure provider licensees shall share the existing communication infrastructure, including poles.

2.4.1.10 Laying optical fibre cables along walkways in cities/urban and suburban establishments is prohibited.

2.4.1.11 When laying fiber in a forest or unexplored land, a walking trail shall be created by cutting trees and branches or removing obstacles for cable installation and later maintenance.

2.4.1.12 In steep or vertical terrains/routes, clamps and/or cable loops to avoid excessive fiber strain and movement when the cable is placed on the surface of steep terrain or vertical routes.

2.4.2 Installation in the trench

During the installation in the trench, the following requirements shall be complied with:

2.4.2.1 Fiber optic cables shall be laid in trenches.

2.4.2.2 Trenches along road networks shall be sufficiently deep to provide appropriate fiber cable protection. They shall be placed at least 1.5 m from the edge of pedestrian walkways or storm drainages along paved roads.

2.4.2.3 Approval for shorter clearance distances may be sought where there is an unavailability of the required clearance distance due to soil or terrain conditions.

2.4.2.4 Upon receipt of an approval request for a shorter clearance distance, the Commission may approve or reject.

2.4.2.5 In the absence of pedestrian walkways, the cable must be located at a minimum distance of 2.5 meters off the roadway.

2.4.2.6 Road surfaces where cable crossings have been installed shall be restored to their original state in compliance with MoWT, local council authorities, and other concerned authorities' specifications.

2.4.2.7 No cable installation will be permitted in a ditch line. Cable installations will be permitted along the back of the ditch line only.

2.4.2.8 Where there are cable crossings along roads, ducting shall be of galvanized steel pipes buried deep enough (1 m or more) for protection from vehicular or pedestrian traffic stresses. Similar galvanized steel pipe ducts shall be used at bridge crossings.

2.4.3 Trench Specifications

2.4.3.1 Where applicable, trenchless installations shall be used to reduce environmental damage, social costs, and provide an economic alternative to open-trench methods of installation.

2.4.3.2 Whenever possible, the trenchless OFC installation shall be considered for road crossing, as shall be guided by the MoWT or any other relevant authority.

2.4.3.3 The installation of optical cables inside sewer ducts, railway, water, electricity, and under utility ducts is compulsory wherever such ducts are available, and the respective utility companies are ready to share.

2.4.3.4 Installation of OFC in sewer ducts shall be approved by the National Water and Sewerage Corporation (NWSC) or a relevant agency in the circumstances.

2.4.3.5 The operator shall, before laying optical fiber cable in the sewer duct, conduct a feasibility assessment in consideration of;

2.4.3.5.1 Applicable sewer pipe diameter.

2.4.3.5.2 Position in the sewer.

2.4.3.5.3 Maintenance feasibility of the sewer.

2.4.3.5.4 Risk of blockage.

2.4.3.5.5 Upgrading of the optical network.

2.4.3.5.6 Maximum number of cables and fibers.

2.4.3.5.7 Flexibility of the optical network.

2.4.3.5.8 Access to optical network for maintenance purposes.

2.4.3.5.9 Cable type.

2.4.3.6 Any person conducting trenchless excavation shall take all reasonable steps necessary to protect and support underground utility lines.

2.4.3.7 These steps shall include, but are not limited to, the following:

2.4.3.8 Call before digging to ascertain the existence of infrastructure underground. The Commission shall develop an appropriate App that shall act as a common platform for sharing information.

2.4.3.9 The excavator should verify that all utility lines in the area are marked.

2.4.3.10 The excavator shall ensure that bore equipment stakes are installed at a safe distance from marked utility lines

2.4.3.11 The excavator shall ensure that sufficient clearance is maintained between the bore path and any underground utility lines during pullback.

2.4.3.12 The excavator shall give special consideration to water, electricity and sewer systems within the area that cannot be located accurately.

2.4.3.13 The excavator shall ensure that the drill head locating device is functioning properly and within its specifications.

2.4.4 Road Crossings

An operator shall, before crossing any roads, obtain approval from the MoWT or a relevant government agency (ies) responsible for Road Network Infrastructure across the country;

2.4.4.1 Unless approved otherwise by the MoWT, all OFC crossings are to be made perpendicular to the roadway.

2.4.4.2 Road crossing machines should be used with a depth of not less than 1 m, or shall be guided by MoWT or the relevant Road network Infrastructure agency;

2.4.4.3 Any cables should be protected with appropriate ducts along the whole crossing length.

2.4.5 Damages to the Existing Utility Infrastructure

2.4.5.1 The party responsible for excavation shall be held strictly liable for any damage caused to existing, properly marked utility infrastructure. The cost of repair, as determined by an independent assessor agreed upon by the affected parties, shall be borne by the excavating party. Disputes over liability or cost may be referred to the Commission for binding arbitration.

2.4.5.2 The form provided in the Appendix herewith may be used, as appropriate, by the two parties to sign an agreement on the restoration of damages.

2.4.5.3 Where the negotiations fail, the affected party may refer the matter to the Commission for mediation.

2.5 Fiber Optic Specifications

To maintain high optical fiber cable and protection from theft and vandalism, an OFC operator shall ensure that:

2.5.1 Optical fiber cables comply with the provisions of the relevant ITU-T Recommendations and the Guidelines for ICT Infrastructure Installations, by Uganda's Ministry of ICT and National Guidance.

2.5.2 An optical fiber cable facilitates the traceability of the fiber optic back to the original fiber ID number and test parameters as provided by the fiber manufacturer.

2.5.3 An optical fiber cable is distinguishable from other fibers in the same duct using color-coding ink visible throughout the design life of the cable (as defined by TIA5987C).

2.5.4 Optical fiber cables maintain a high level of splice compatibility with fiber-optic cables from other manufacturers. Performance specifications for standard single-mode Fibre optic (ITU-T G.652) and recommended multimode Fibre optics (ITU-T G.651) are detailed Table 2.5—1 and Table 2.5—2 below.

Table 2.5—1: Optical performance for standard (ITU-T G652) Single Mode Fibres

No.	Parameter	Requirement
1.	Attenuation at the water peak	≤2.1 dB/km
2.	Attenuation coefficient at 1310 nm	≤ 0.5 dB/km
3.	Attenuation coefficient at 1550 nm	≤ 0.4 dB/km
4.	Optical discontinuities at 1310 and1550 nm	< 0.1 dB
5.	Chromatic dispersion between 1285 and 1330 nm	≤3.5 ps/nm·km
6.	Chromatic dispersion at 1550 nm	≤ 18 ps/nm· km
7.	Cable cutoff wavelength	≤1260 nm

Table 2.5—2: Optical Performance for Multimode Fibres (ITU-T G651.1)

No.	Parameter	Requirement
1.	Attenuation coefficient at 850 nm	≤3.0 dB/km
2.	Attenuation coefficient at 1300 nm	≤0.7 dB/km
3.	Optical discontinuities at 1310 and 1550 nm	< 0.1 dB
4.	Bandwidth Distance Product at 850 nm	≤160 MHz.km
5.	Bandwidth Distance Product 1300 nm	≤500 MHz.km

2.6 Cable Specifications

2.6.1 The cables must be circular in cross-section and free from pinholes, joints, repairs, and other defects.

2.6.2 Materials used in the construction of the cable shall not affect the physical or optical properties of the fibers and shall be compatible with each other.

2.6.3 It shall be the responsibility of an operator to identify and procure OFC that complies with the requirements.

2.7 Special Permission for Fiber Deployment

An OFC Operator or Licensee shall comply with the following.

2.7.1 A physical pre-survey of the route for all types of installations will be conducted to establish the exact cable routing, termination points, jointing locations, and cutting lengths before the commencement of any work or the commitment of any materials.

2.7.2 If a change in route is required for any practical reason, prior approval should be obtained from the Commission.

2.7.3 The optical power link loss budget shall be calculated for any FOC link. Parameters to be included in the calculation of link losses are specified in the table below.

Table 2.7—1: Recommended parameters to be included in the link losses calculation

No.	Link Losses	dB (Maximum Loss)
1.	Cable loss (for standard SMF)	0.5 dB/km
2.	Splice loss (for standard SMF)	0.1
3.	Connectors loss	0.5

2.7.4 The maximum length of any optical path between two optical fiber repeater stations shall be calculated. This shall consider the total loss across all components along the path, including fibre-optic cable, optical connectors, star couplers, and splices, among others.

2.7.5 All components, such as additional connectors, star couplers, and splices, along with cable attenuation, should be considered in calculating the loss.

2.7.6 The sum of the losses in all components used in the optical path must not exceed the specified Power Loss Budget for the chosen cable type.

2.7.7 The specified Power Loss Budget includes the loss of the two ST–type connectors connecting at the two repeater ends and includes the system margin of 3 dB.

2.7.8 Requirements When Applying for a Deployment Permit

2.7.8.1 The original copy of the plans showing the proposed work, schedule, and procedures. However, an additional copy will be required if there is a bridge attachment, road crossing, box culvert crossing, limited access, or inter-district involvement.

2.7.8.2 The route/ street name/ location where the work is to be performed.

2.7.8.3 Color highlights to show the demanded right-of-way (red) and the existing cable (blue).

2.7.8.4 A vicinity map or drawing showing the routes, total layout, and locations of all manholes that will be included in the permit, and the surrounding area of the work.

2.7.8.5 The legend showing the symbols used on the plans and the color coding used to mark the plan if more than red and blue colors are used.

2.7.8.6 A clearance distance of the minimum vertical (while crossing) and the horizontal (while in parallel) distance to the nearest affected utility and/or right-of-way object.

2.7.9 Section views

An OFC operator or licensee shall comply with the following.

2.7.9.1 Not include sections that are not relevant to the proposed work.

2.7.9.2 Provide an individual section view for any crossing that might create a potential conflict, including but not limited to cable crossings over or under large storm pipes, culverts, electrical lines, water, transmission lines, and other affected utilities.

2.7.9.3 Include a section showing the distance from all features of the structure for any proposed work in the vicinity of a bridge or box culvert.

2.7.10 Labelling:

An OFC operator or licensee shall comply with the following:

2.7.10.1 Indicate the length and type of cable proposed for installation on each page.

2.7.10.2 Show the distance of the proposed cable from the roadway.

2.7.10.3 Identify the proposed cable installation method on each plan sheet, such as hand, machine trenching, or directional bore.

2.7.11 Drilling Site Information to Be Submitted with Permit Demand

2.7.11.1 Exhaustive knowledge of the work site and the subsoil, right from the first design phase, is essential to reduce the number of failures and/or limit damage to preexisting services or infrastructure.

2.7.11.2 The following information shall be submitted together with the application for a special permit to the Commission:

(a) A copy of the existing utility documentation made available by local authorities and other companies.

(b) Details of the site investigation equipment used, such as pipe and cable locators or Ground Penetrating Radar systems.

(c) The drilling plan, accompanied by obstacles; Infill materials (rubble, sand).

2.7.12 Application Requirements for Special Authorisation

An OFC applicant shall comply with the following:

2.7.12.1 Applicant shall submit a completed form provided in Annexure-1 to this Framework.

2.7.12.2 The application for a special installation authorisation shall be accompanied by the documents listed in the design stages and submission part.

2.7.12.3 The application for special authorisation shall bear the signature and the name of the OFC network provider or licensee who shall be responsible for the installation and maintenance of the cable.

2.7.12.4 Additionally, the application shall list the name, address, and emergency 24-hour phone number of the contact person. Sub-contractor information may be provided separately.

2.7.12.5 The application for special Authorization and the associated documentation shall be submitted in a soft copy via registry@ucc.co.ug or in hard copy to the Commission's offices at UCC House, Bugolobi, or at any of its Mbale, Masindi, Gulu, and Mbarara regional offices.

2.7.12.6 Upon approval, the special authorisation will be issued to the applicant specifying the scope in terms of the distance or the geographical areas for which it shall be valid.

2.7.12.7 It shall be prohibited to conduct any work at an additional distance or geographical area outside the permitted and specified scope in the Authorisation.

2.8 Works Notification

2.8.1 The list of routes, street names, and locations where the work is to be conducted shall be communicated to other telecommunications service providers and utility providers by the OFC operator using a common App that the Commission shall develop.

2.8.2 Comments from concerned utility providers shall be provided within ten (10) days from the date of receipt of the works notification. Otherwise, the notifier may refer the matter to the Commission.

2.9 Capacity Needs

2.9.1 All licensees and respective constructors shall identify and address specific capacity needs for the respective OFC installers concerning standards for deployment, maintenance, and protection of underground and overhead optical fiber infrastructure and associated facilities, including but not limited to manholes.

2.9.2 The capacity needs shall include, among others, sensitization on common challenges such as call before you dig, right of way, dig once, building codes & utility corridors policies, and coordination with other authorities (Local Government, National Environmental Management Authority (NEMA), etc).

2.9.3 The sensitization shall additionally include the standards on issues such as GIS mapping, depth of fiber deployment below the ground, duct/conduit size, inner duct installation standards, method of installation, route definition and bends, as well as the effective usage of defined tools and materials to protect the fiber from damage.

2.10 Manholes

The following considerations shall be made by an OFC operator when constructing manholes.

2.10.1 OFC manholes shall be covered using a flat lid indicating, in a permanent and legible manner: (a) the service provider name or initials, (b) the size, (c) the depth of the manhole, and (d) the load-bearing capacity/class in accordance with recognised engineering standards (e.g., EN 124, ASTM C857).

2.10.2 OFC manholes shall be located at a minimum horizontal distance of two (2) meters from walkways and three (3) meters from roadways. In dense urban areas or locations with limited right-of-way where these distances cannot reasonably be achieved, operators may propose alternative placements supported by an engineering risk assessment. Such proposals shall be subject to Commission review, with priority given to ensuring safety, accessibility, and minimal disruption.

2.10.3 The special request for a shorter clearance distance shall be sent to the Commission, which will assess and provide feedback based on case specifications.

2.10.4 OFC manholes shall not be installed in the drainage system.

2.10.5 All OFC joints shall be housed inside the manhole.

2.10.6 The pulling of the cable shall be hand-assisted at each Manhole or Handhole. The cable shall not be crushed or forced around a sharp corner. Sufficient slack shall be left at each end of the cable to allow proper cable termination.

2.10.7 The cable shall be marked and labelled at each manhole and at all entry and end points of the fiber optic cables.

2.10.8 The area around the manhole shall be compacted. Upon final acceptance of the conduit/duct system, all manholes shall be free of debris.

2.11 As-Built Site Visit

2.11.1 The OFC network operator or the licensee shall invite the Commission for a pre-inspection exercise and share a GIS map indicating its fiber deployment plan and intended routes.

2.11.2 After completion of each section, either by trench or trenchless, the optical fibre network provider shall prepare a site visit with the relevant authorities, including the Commission, to confirm, inter alia, the excavated area or the aerial route that the subject fibre will likely take, the feasibility of sharing existing infrastructure, among others.

2.11.3 Where works have been scheduled in phases, the Commission may issue a special permit or permissions for subsequent phases after the completion of the previous section site visit and report of the acceptance.

2.11.4 The site visit by the relevant regulatory agencies shall consist of conformance to the engineering plans, codes, guidelines, and general

accuracy. It shall be made at the completion of each section including the last section of installation works.

2.11.5 Additionally, the site visit of the constructed areas shall focus on or particularly seek to establish the following:

2.11.5.1 Whether restoration has been accomplished.

2.11.5.2 Permanent markers have been installed immediately beside the cables.

2.11.5.3 Road bores, if used, are properly completed and will not collapse a portion of the road.

2.11.5.4 Debris and trash have been removed from the site.

2.11.5.5 Other instructions specific to the installation have been completed to the drawing's specifications and the relevant institution's requirements.

2.11.6 Final As-Built Reporting

An OFC operator or licensee shall comply with the following:

2.11.6.1 The as-built drawings and documents shall identify the actual apparatus units at each structure and other information such as the structure type and dimensions, cumulative distance to each termination point from the structure, any grounding or bonding detail, etc.

2.11.6.2 These drawings and documents are typically the construction detail sheets that have been corrected to reflect any changes during construction.

2.11.6.3 As-built drawings shall record all deviations, removals, and additions with respect to the original scope.

2.11.6.4 Referring to the schedule provided by an applicant, the Fiber optic network provider shall provide an accomplishment report to the Commission within five (5) working days and as-built documentation containing the following information, not later than thirty (30) working days from the accomplishment of the installation works:

(a) Position of the installed pipes.

(b) Locations of installed cables.

(c) Soil conditions, and;

(d) Network loss link budget.

2.11.7 Active Permit

An OFC operator who shall have obtained a Special Permit shall comply with the following:

2.11.7.1 The permit holder shall maintain accurate records of each permit status and be ready to provide any record to the Commission at any time. All work being performed on the district right-of-way must be with an active permit.

2.11.7.2 The right-of-way permit validity period before works commencement shall be limited to three (3) months from the date of permit issuance by the Commission.

2.11.7.3 The permits that are expired shall not be legally valid.

2.11.7.4 If the permit holder desires a reinstatement of the permit, it is his/her responsibility to request the same in writing to the Commission.

2.11.7.5 The installation project should be considered as completed after validation of the inspection report.

2.11.7.6 In case of unsuccessful installation works, all non-accomplished tasks indicated by the site visit team must be handled within ten (10) working days from the date of issuing the inspection report.

2.11.7.7 If the applicant does not complete non-accomplished tasks within the requested time, a warning letter shall be issued.

2.11.7.8 Failure to complete non-accomplished items within five (5) working days after the reception of the warning letter shall be subject to placing a hold on processing new permit applications.

CHAPTER III: MAINTENANCE OF OPTICAL FIBER INSTALLATIONS

3.1 Maintenance and Operation:

An OFC operator or licensee shall put in place and comply with the following:

3.1.1 **Maintenance mechanisms:** this shall guide the maintenance works, how to obtain internal authorization for the works, highlight the necessary approvals required for the works, and the human and other resources needed for the work.

3.1.2 **Network Monitoring and Operation Centre:** this shall coordinate the fiber network operations and other activities between all relevant stakeholders.

3.1.3 **Network incident reporting:** this shall include a description of the incident, contact details of the reporting entity, location of the incident, time of occurrence, a fault ticket, and the responsible entity for the resolution.

3.1.4 **Fault Categorization:** network incidents shall be categorized as either a Critical Fault when total loss of service is experienced, Severe if significant degradation of services occurs, or a Minor Fault if only minor service degradation occurs.

3.1.5 **As-built Diagram:** Operators shall submit and update the as-built diagram monthly, regardless of whether changes have occurred, to ensure the accuracy and currency of infrastructure records.

3.1.6 **Preventive Maintenance:** Quarterly testing shall be done for all fibre installations to detect performance deterioration and apply corrective measures within acceptable parameters (Annexe 2).

3.1.7 **Unscheduled Maintenance:** Unscheduled or emergency maintenance activities shall require the issuance of a notice to service subscribers within an hour of the emergency occurrence.

3.1.8 **Planned Maintenance:** Where the fiber requires conducting a planned maintenance activity, the licensee shall issue a Change Request Notice to subscribers ten (10) days in advance.

3.1.9 Installation and Maintenance Personnel: The technical personnel shall.

3.1.9.1 Possesses a valid certificate issued by the Commission or any other relevant body as shall be specified by the Commission from time to time, or a;

3.1.9.2 A valid Certified Fiber Optic Technician by the Uganda Institute of Information and Communications Telecommunications (UICT) or its equivalent from another recognized institute or university.

3.2 Documentation

An OFC operator or Licensee shall, after completion of the Installation, comply with the following:

3.2.1 The as-built drawings associated with the cabling and all other facilities shall be prepared and submitted to the Commission.

3.2.2 The as-built, at a minimum, shall be provided in standard formats:

3.2.2.1 Auto-CAD drawings (In soft copy).

3.2.2.2 KMZ files.

3.2.2.3 Hard copy drawings (one copy).

3.2.3 Such documentation shall contain the following information:

3.2.3.1 Photos taken of every procedure as proof of existence.

3.2.3.2 Position of the completed trenches.

3.2.3.3 Position and location of installed Gabions and Bores and their lengths.

3.2.3.4 Position of the installed conduits and cables.

3.2.3.5 Position and location of installed Hand-holes.

3.2.3.6 Position and location, and span length of installed poles.

3.2.3.7 Soil Stabilization accomplished, position, and length of the stabilized area.

3.2.3.8 The fiber optic network loss link budget.

3.2.3.9 Equipment Shelter and Power Connectivity.

3.2.4 The subject drawings shall consist of a properly geo-referenced location map and longitudinal profile of the power line (UTM Map projection on Arc 1960 datum), on A3-size paper, indicating the exact locations of all installed underground fiber cable line placements along or across the roads.

3.2.5 A copy of the map shall also be forwarded in digital AutoCAD format.

3.2.6 The map shall be accurately labelled and shall show the plots abutting the road.

3.2.7 The coordinates (X, Y) list for all the utility line bends and road crossings shall also be included in the map.

3.3 Quality Assurance

3.3.1 The Commission shall inspect OFC installations and infrastructure to ascertain conformance with this framework.

3.3.2 The OFC network operator shall regularly schedule and invite the Commission to inspect achieved milestones.

3.3.3 An OFC network operator shall verify the installation and the OFC material used before it is enclosed within building features, buried, or otherwise hidden from view.

3.3.4 An OFC network operator shall, before installation, test the cables and termination hardware for defects to verify cable performance under installed conditions.

3.4 Marking

An OFC network operator or installation shall comply with the following:

3.4.1 An optical fiber cable shall be marked using polymer markers.

3.4.2 The markers shall have a length of not less than 1.8 m and a diameter of not less than 100 mm.

3.4.3 The markers shall be planted 600 mm deep opposite a Maintenance chamber and well compacted.

3.4.4 The distances - Intervals shall be marked not more than 500 meters.

3.4.5 Standard equipment shall be used for GIS coordinates.

3.4.6 An OFC shall use a black text for– manhole number, Handhold Number, Joint and Joint Number, whether is Backbone or access, Operator/Owner.

3.4.7 The electromagnetic markers shall be built in a hand hole and be placed under the manholes.

3.5 Network Quality of Service

To maintain an acceptable level of Quality of Service, an OFC network operator shall comply with the following:

3.5.1 Availability

3.5.1.1 The availability of fiber optic links and equipment end-to-end (E2E) shall be at least 99.95%.

3.5.1.2 The average per link subscriber-to-subscriber availability shall be at least 99.97%.

3.5.1.3 The downtime of available standard fiber optic cable shall also be considered in the aforesaid availability calculations.

3.5.1.4 The calculated failure rates of the units and the calculated availability of the equipment being offered shall be provided every quarter.

3.5.1.5 The analysis shall be based on an availability block diagram and shall include the mean time between failure (MTBF) and the mean time to repair (MTTR) of all of the components on the link.

3.5.1.6 An MTTR of not more than four (4) hours shall be observed.

3.5.1.7 All active equipment shall provide a built-in mechanism for testing installed modules and the associated subsystem components.

3.5.1.8 Equipment specifications as per accompanying data sheets and white papers shall conform as specified and be testable.

3.5.1.9 The optical fiber network equipment datasheet and all testing criteria shall be maintained and made available to the Commission upon request.

3.5.2 Built-in Testing

3.5.2.1 All active equipment shall provide a built-in mechanism for testing installed modules and their subsystem components.

3.5.2.2 Equipment specifications as per accompanying data sheets and white papers shall conform as specified and be testable.

3.5.2.3 The datasheet and all testing criteria shall be available to facilitate inspections by the Commission and compliance reporting.

3.5.3 End of Equipment Life

3.5.3.1 End of Manufacture: supplied fiber transmission equipment shall have an end-of-manufacture date no less than five (5) years from the

manufacture start date, to ensure sustainable CAPEX planning, reduced waste, and alignment with standard OEM lifecycle practices.

3.5.3.2 End of Support: The supplied optical transmission equipment shall provide guaranteed ten (10) years of equipment support.

3.5.3.3 End of Life: The supplied optical transmission equipment shall provide a guaranteed twelve (12) years End of Life Specification.

3.5.4 Interoperability Requirements

An OFC operator shall ensure its network complies with a multi-manufacturer environment.

3.5.5 Aerial Cable

An OFC network operator shall comply with the following requirements.

3.5.5.1 All aerial cables shall conform to the requirements of IEC 60794-4-20.

3.5.5.2 Aerial fiber cable installations in the arid and semi-arid regions of Uganda, such as the Northern and Northeastern parts of Uganda, shall be able to withstand temperatures over 60 degrees by design.

CHAPTER IV: OPTICAL FIBER PROTECTION

4.1 Theft and Vandalism

4.1.1 To ensure cost-effective safeguarding of the optical fiber cable, an operator shall implement the following measures as appropriate.

4.1.1.1 Bury the cable to hide it.

4.1.1.2 Facilitate patrol of OFC infrastructure by the local community.

4.1.1.3 Display short cable pieces at some intervals during installations to show that a non-value material is used.

4.1.1.4 Post a notice indicating that a "no-value material is used" and "significant social loss if cable is damaged".

4.2 Optical fiber cable visibility

4.2.1 To avoid on-surface cables being damaged during civil works, an OFC operator shall ensure that.

4.2.1.1 The optical fiber cable is made noticeable using a shiny color outside the cable jacket or warning tapes.

4.2.1.2 However, such a cable may be more prone to theft or vandalism. The cable visibility issue may need to be decided on a case-by-case and community-by-community basis.

4.3 Cable Shallow Burial

In a protected area like national parks, or forest reserves, an OFC operator shall directly bury an OFC cable in a shallow, simple trench or groove to protect the landscape and the environment while avoiding theft or vandalism by the local community.

4.3.1 Trench width and depth

4.3.1.1 The depth of the trench or groove shall not be less than 1.0 m. Where site conditions make this depth unachievable, alternative protection methods such as reinforced concrete or asphalt capping shall be applied to ensure equivalent physical protection, security, and service longevity.

4.3.1.2 The trench depth in remote locations can be between 0.1 m to 0.2 m at some points due to protection reasons.

4.3.2 Bottom of trench

4.3.2.1 Where threatening pressure is expected to be applied to the in-trench cable, an OFC operator shall backfill the bottom of the trench with soil that should not contain cable-damaging obstacles or materials.

4.3.3 For stony or rocky areas

4.3.3.1 For stony or rocky areas where cable burial is not always possible, any on-surface part of the cable can be covered by sand and/or soil.

4.3.3.2 Installation on an asphalt road or concrete pavement shall be avoided to protect the cable.

4.4 Cable aerially suspended

An OFC operator shall:

4.4.1 Aerially suspend an optical fiber cable using either a wooden or concrete pole whose specifications are provided herein, or a utility infrastructure, for a short length to cross a river, valley, or road, or to avoid a potential flood, or landslide.

4.4.2 Not use tilting or collapsing trees, or unstable rock. Cable aerial span length shall be determined by considering that the maximum tension will depend on the span length, sag, level change, wind force, and temperature change.

4.4.3 Use suppress vibration, rotation, and jumping to protect the cable from wind counterweight(s), thus cancelling the cable-rotating wind.

4.5 Cable Submerging

An OFC operator or licensee shall:

4.5.1 Use cables with welded metallic core tubes under the lake, pond, or shore, which may be placed for water depths up to 100 m. Other types of cables may be used in shallower depths.

4.5.2 Do not lay OFC in places used for fishing or ship and ferry anchoring.

4.5.3 Place a warning, publicity, and bulletin board to minimize human disturbances.

4.5.4 Avoid underwater cable joints, and the gradient of the cable route along the riverbed or lake shore shall be selected so that the gradient is as gentle as possible.

4.6 Planning and Criteria Installation

4.6.1 An OFC operator shall consider the route of the fiber cable installation based on the following aspects:

4.6.1.1 Low cost by prioritizing the sharing of the existing infrastructure and the use of qualified technicians.

4.6.1.2 Moisture/water block capability, water pressure resistance (when submerged).

4.6.1.3 Temperature range.

4.6.1.4 Rodent /animal resistant.

4.6.1.5 Vibration resistant.

4.6.1.6 Fire-resistant.

4.6.1.7 Accessibility to the cable.

4.6.2 Fiber Route

To take advantage of the community vigilantes, an OFC operator shall consider the following protection mechanism.

4.6.2.1 As appropriate, an OFC operator may jointly conduct a route survey with some community members through unexplored land, as they may later protect the cable.

4.6.2.2 The cable route should be selected where a walking trail can be created by cutting trees, branches, or removing obstacles.

4.6.3 Direct Burying

4.6.3.1 To protect the landscape, avoid theft/vandalism, and mitigate extreme environmental impacts, an operator shall, at an appropriate depth, bury an OFC cable with an effective protective mechanism.

4.6.4 Installation Temperature

4.6.4.1 Ambient temperature when undertaking installation should be within the limits set by the cable manufacturer. Although cables with polyethene sheath are usually rated for storage and operating temperature between −40°C and +70°C, it is recommended that the installation temperature range be −15°C to +50°C.

4.6.4.2 Installation above the temperature limit may result in softening of the polyethylene sheath material, thus increasing friction and inviting physical damage.

4.6.5 Installation Crew

4.6.5.1 The installation crews should be trained not only to install optical fiber cable cost-effectively but also to sensitize the local community to proactively protect and maintain the cable as an important lifeline for health, education, and businesses.

4.6.5.2 Additionally, the training should also cover potential changes on site, if any, to the pre-determined cable route and installation scheme (on land, water, and air).

4.6.5.3 The installation crew should, therefore, appropriately understand the cable durability, pros and cons of cable installation under different terrains, and installation key points, including the use of jigs and tools such as bend protectors, metal fittings, and suspension wire.

4.6.6 Minimum Specifications

When selecting an optical fiber cable for installation, an Operator shall consider the following.

4.6.6.1 All optical fiber cables shall comply with the relevant requirements of the ITU-T Recommendations.

4.6.6.2 Each optical fiber cable shall have traceability back to the original fiber ID number and test parameters as provided by the manufacturer.

4.6.6.3 Each fiber shall be distinguishable from other fibers in the same duct by means of color-coding ink visible throughout the design life of the cable (as defined by TIA-5987C).

4.6.6.4 Fiber optics shall have a high level of splice compatibility with optical fiber cables from other manufacturers.

4.6.6.5 Performance specifications for standard single-mode optical fiber cable (ITU-T G.652) and recommended multimode Fibre optics (ITU-T G.651) are detailed in Table 2.5—1 and Table 2.5—2.

4.6.7 Manholes Installations

An OFC operator shall comply with the installation of manholes as follows:

4.6.7.1 Optical fiber network manholes shall be covered by a flat lid on which the size and depth of this are indicated.

4.6.7.2 All-optical fiber network manhole lids shall bear the respective network provider's name.

4.6.7.3 All-optical fiber network manholes must be located outside of sidewalks and roadways.

4.6.7.4 Manholes shall be located at a minimum distance of two (2) meters from the edge of the pedestrian walkway, and three (3) meters from the motorways if there is no space reserved for pedestrian way.

4.6.7.5 In case of unavailability of the required clearance distance due to the soil or terrain condition, approval for a shorter distance may be sought, against which the Commission shall accordingly advise.

4.6.7.6 The laying of optical fiber cable shall be hand-assisted and shall not be bent sharply. Sufficient slack shall be left at each end of the cable to allow for termination.

4.6.7.7 All optical fibre cable installations shall be marked and labelled at each manhole at the entries and endpoints of the fibre optic cables.

4.6.7.8 The area around the manhole shall be compacted and free of debris.

4.6.8 Ducts

Unless specified otherwise, an OFC duct shall comply with, among others, the following technical requirements.

4.6.8.1 An OFC operator shall, before constructing an optical fiber duct, apply for special authorization from the relevant national authorities including but not limited to the MoWT and NEMA, or any other as deemed applicable.

4.6.8.2 Optical fiber cables shall be laid in ducts buried to depths of not less than 1.5 m in road reserves, or as shall accordingly be advised by MoWT or the relevant agency.

4.6.8.3 An OFC operator shall, before laying optical fiber ducts or erect poles confirm sharing feasibility and/or may be required to subsequently prove to the Commission that sharing of existing ducts or poles is not feasible.

4.6.9 Fiber Optic Labelling

An OFC operator or a licensee shall:

4.6.9.1 Plant the roadside surface markers to indicate the route of the cables.

4.6.9.2 Place the markings at intervals between 300 m to 500 m.

4.6.9.3 Ensure that the visible pole markers indicate the fiber network provider and cable depth. It shall be placed along the trenches 30 cm below the ground surface.

4.6.10 Cable Installation Along Public Roads

An operator shall, before installing an OFC infrastructure along public roads:

4.6.10.1 Seek authorization from the MoWT, NEMA, and other relevant agencies, as shall be deemed appropriate.

4.6.10.2 An OFC cable shall be laid at a depth of at least 1.5 m.

4.6.10.3 Where the soil condition does not allow for achieving 1.5 m, authorization for special consideration shall be obtained from the national road authority and the respective municipal council authority before laying ducts.

4.6.10.4 All installations shall comply with the relevant regulations and guidelines prescribed by the sister regulatory agencies. These may include, but are not limited to, the agencies in charge of roads, the environment, etc.

4.6.10.5 During and before sealing any road excavation, barriers or road signs shall be put in place to warn other facility or infrastructure users of ongoing works.

4.6.10.6 Where the excavation must remain open or the road will be otherwise obstructed during the night or under low-visibility conditions, road signs shall be complemented by lighting devices of the color, shape, and size stipulated by the traffic code.

4.6.10.7 All trenches shall be backfilled to regain their initial state and labeled to warn future excavations of the optical fiber's existence underground.

CHAPTER V: SECURITY CONSIDERATIONS

5.1 Security Consideration

An OFC operator or licensee shall comply with the following.

5.1.1 Adhere to Information Security & Cybersecurity measures prescribed in the operational license and relevant national laws and regulations.

5.1.2 Comply with the requirement to have National-born infrastructure, equipment, and accessories that have inbuilt protective cybersecurity and data protection mechanisms.

5.1.3 Security controls are implemented in accordance with the prevailing, relevant, and applicable national information security, data protection, and privacy laws and standards.

5.1.4 Comply with the requirement to uniquely identify all authorized users of a major network element (NE) to support individual accountability.

5.1.5 Comply with the requirements for Identification, including but not limited to the following:

5.1.5.1 Within a specific NE, the NE shall enforce unambiguous User-IDs to identify its users.

5.1.5.2 All NE interfaces and ports that accept user command inputs shall require unambiguous User IDs before performing any actions.

5.1.5.3 The NE shall internally maintain the identity of all current active users.

5.1.5.4 The NE shall restrict a User ID to only one active session.

5.1.5.5 All operations-related processes running on the NE shall be associated with the User ID of the invoking user.

5.1.5.6 If a user ID has not been used for three (3) months, the NE shall disable that User ID.

5.1.5.7 In addition, the security administrator shall have a choice of automatic or manual disabling of these User-IDs.

5.1.5.8 The NE shall log all activities carried out by the user during each session. All logs must include timestamps and activity, or system accessed.

5.1.6 All-optical fiber installations shall conform to both physical and virtual security considerations accordingly.

5.1.7 Shall be built for suitability to use and connection to the national broadband infrastructure.

5.1.8 Security measures shall be implemented in line with the relevant Uganda national information security standards and laws, such as the Uganda Data Protection and Privacy Act 2019, and Regulations issued thereunder.

5.1.9 All building sites and equipment (and all information and software contained therein) shall be protected from theft, vandalism, natural disasters, man-made catastrophes, and accidental damage (e.g., from electrical surges, and extreme temperatures, among others).

5.1.10 The optical fiber network shall be appropriately segmented to ensure security and performance.

5.1.11 The segmentation shall allow for the main backbone network to run from point to point, and the access network, typically used for last-mile connections.

CHAPTER VI: INSTITUTIONAL FRAMEWORK AND RESPONSIBILITY

6.1 The Commission

6.1.1 In implementing this framework, the Commission shall coordinate and verify OFC operators' compliance with the requirements of other regulatory sister agencies specified herein when deploying infrastructure.

6.1.2 The Commission shall assess applications and associated plans submitted in accordance with the provisions of this framework for special permissions, and if successful, process a permit for OFC infrastructure deployment.

6.1.3 The Commission shall collaborate with the relevant authorities to establish and implement effective mechanisms to grant or reject requests for OFC infrastructure installation under certain conditions within the scope of this Framework.

6.1.4 The Commission shall, before rejecting any request for OFC infrastructure development, follow a transparent process and provide its decision in writing.

6.1.5 Where it is necessary for the use of land, buildings, and infrastructure owned by the Government, local government, or public institution to establish a common communications network or for the joint installation of communications equipment and facilities, and the access request fails to lead to agreement on the use of such land, buildings, etc., the participating Operators may request the assistance of the Commission in obtaining access for the use of the relevant land, buildings, etc.

6.1.6 Where the Commission receives a request for assistance under 6.1.4, the Commission may engage the Government ministry, department, or agency, local government, or the head of a public institution, to respond to the access request. In such cases, the Government ministry, department, or agency, local government, or the head of a public institution shall respond to the access request by:

6.1.6.1 Accepting the request and stating its minimum requirements for access or.

6.1.6.2 Declining the request with justification for its refusal.

6.1.7 The Commission shall regularly review and update the provisions of this guide to ensure continued relevance and effectiveness.

6.1.8 Facilitate and monitor the implementation of this framework.

6.1.9 Convene regular forums for operators, urban planners, and local authorities to align deployment plans as well as conflict resolutions.

6.1.10 Develop a costing mechanism for shared poles. The mechanism shall consider the costs of decommissioning duplicated poles and establishing new shared poles, ensuring equitable and sustainable pricing models for all stakeholders.

6.1.11 Work with licensed operators to comprehensively and regularly audit existing poles and cables. This audit should leverage GIS mapping to identify redundant infrastructure and areas requiring rationalisation. This data-driven approach should facilitate effective planning and prioritisation for corrective actions.

6.2 Cities, Districts, and Municipal Councils

6.2.1 The city authority or local municipal council shall ensure that no telecom operator duplicates an OFC infrastructure in the geographical areas of its jurisdiction.

6.2.2 The provision above may be achieved by requiring the optical fibre infrastructure providers to seek approval of the OFC deployment route plans, and the nature of the infrastructure, i.e. trenches or poles.

6.2.3 The council or authority shall also ensure that in-building access solutions for telecom installation, such as OFC, form part of the criteria for approving building plans in the geographical areas of its jurisdiction.

6.2.4 Integrate communications infrastructure, particularly, those for OFC within road construction and other city development infrastructure projects to minimize costs and disruptions. For example, India, constructs roads (highways) and OFC infrastructure (ducts and tunnels) as one component, later leased to the operators. This is aimed at preventing future diggings that may compromise the integrity of the Roads.

6.3 National Environmental Management Authority

6.3.1 The National Environment Management Authority (NEMA) is a semi-autonomous institution, established in May 1995 as the principal agency in Uganda, charged with the responsibility of coordinating, monitoring, regulating, and supervising environmental management in the country.

6.3.2 In the implementation of this Framework, NEMA shall guide the installation and/or fiber deployments in areas under its charge, including but not limited to wetlands, rivers, streams, etc. The optical fiber installers or operators shall seek guidance from NEMA accordingly.

6.4 Ministry of Works and Transport

6.4.1 The Ministry of Works and Transport (MoW&T) is a government ministry mandated to develop and maintain the national road network, advise the government on general road policy, contribute to addressing national transport concerns, and perform certain other functions.

6.4.2 In the implementation of this Framework, MoWT shall guide the installation and/or fibre deployments in areas under its mandate, including but not limited to digging trenches along the national, district, or municipal roads, crossing of bridges, railways, Airstrips or fields, etc., accordingly.

6.4.3 The optical fiber installers or operators shall seek guidance and the relevant approvals from MoW&T accordingly. These shall then be presented to the Commission as supporting material when applying for a deployment permit.

6.5 An Optical Fibre Operator or Licensee

6.5.1 Fully adhere to the provisions of this Framework and other relevant laws and UCC Frameworks concerning the sharing, development and/or deployment of Communications Infrastructure in Uganda.

6.5.2 GIS-Based Monitoring and Planning: Use GIS tools to map and monitor infrastructure deployment.

6.5.3 Adhere to planned routes and infrastructure-sharing requirements.

6.5.4 Establish and maintain appropriate mitigation techniques to limit the optical fiber damage and subsequently avoidable network interruption.

6.5.5 Provide information to the Commission as and when requested.

6.5.6 Accordingly, the OFC network operators or licensees shall document deployment activities. Recording this information is important, particularly in fiber cuts investigations and the associated dispute resolution.

6.5.7 All negotiations for sharing agreements shall be conducted by all parties in good faith.

6.5.8 Before the construction of any new infrastructure, an OFC Operator shall seek the relevant approval from the respective authorities, including the approval to dig trenches and/or planting poles in the cities and municipal councils.

6.5.9 Granting of a communications license is NOT an authorization to build unless all reviews and authorizations required under the laws of Uganda have been met.

6.5.10 Operators shall provide proof to the Commission that equipment is installed safely and respect all applicable infrastructure requirements, including the painting and lighting of antenna structures that may pose a hazard to air navigation.

6.5.11 In every infrastructure-sharing arrangement, both parties (operators) shall ensure compliance with their respective license obligations and compliance with all applicable laws.

6.6 National Water and Sewerage Corporation

6.6.1 The National Water and Sewerage Corporation (NWSC) is a Ugandan public utility company established in 1972 under Decree No. 34. Revised in 1995, it aims to deliver water and sewerage services in Uganda on a commercial and sustainable basis.

6.6.2 In implementing this Framework, NWSC shall oversee the installation and/or fibre deployments in areas under its responsibility, including, but not limited to, submerging cables in rivers, lakes, and other bodies of water.

6.6.3 The optical fibre installers or operators shall seek guidance from NWSC as appropriate.

6.7 Electricity Regulatory Authority (ERA)

6.7.1 The Uganda Electricity Regulatory Authority (ERA) is a government agency established to regulate and supervise Uganda's electricity supply industry, handling licensing, setting tariffs, ensuring fair competition, and protecting consumer rights for the generation, transmission, distribution, sale, import, and export of electricity. Mandated by the Electricity Act, ERA licenses operators, approves electricity rates, resolves consumer complaints, and promotes a sustainable electricity sector for all Ugandans.

6.7.2 ERA shall provide guidance to communications licensees on best and safe practices (safety standards) for co-location of communication and power infrastructure and collaborate (as applicable) in shared resources schemes as agreed between the relevant parties for joint infrastructure development and use, to avoid duplication.

6.7.3 The optical fibre installers or operators shall consult ERA as appropriate.

CHAPTER VII: DISPUTE RESOLUTION, INFORMATION MANAGEMENT, AND ENFORCEMENT MECHANISM

7.1 Dispute Resolution

7.1.1 Either Operator may refer to the Commission to resolve a dispute initiated under any section of this framework, including the determination of fair and non-discriminatory terms, conditions, and charges.

7.1.2 The Commission shall consider all appeals received, taking full account of the principle of proportionality, and resolve the dispute within the shortest possible time frame, and in any case within two months from the date of receipt of the complete request, except in exceptional circumstances.

7.1.3 Where the Commission intervenes in an OFC infrastructure-sharing dispute, the Commission is entitled to request and receive all such necessary information as may be required to reach a decision.

7.1.4 Any aggrieved party affected by a decision made by the Commission out of dispute may apply to the courts within thirty days.

7.1.5 In considering an infrastructure sharing dispute, the Commission shall consider relevant matters, including, but not limited to, the following:

7.1.5.1 The existence of technical or other alternatives.

7.1.5.2 Whether the infrastructure is critical to the supply of services by the Operators.

7.1.5.3 Whether the infrastructure meets the technical requirements of the Access Seeker's network.

7.1.5.4 The availability of space to host the Access Seeker, including the Access Provider's demonstrated future space needs.

7.1.5.5 Safety and public health concerns.

7.1.5.6 The impact on the operational integrity of the Access Provider's network or any existing equipment at the collocation or sharing site that is under the control of the Access Provider or any other third party.

7.1.6 Any risk of interference with the planned communications services with the provision of other services over the same physical infrastructure.

7.1.7 The Access Seeker and Access Provider's record of infrastructure sharing.

7.2 Information Management

7.2.1 All relevant information submitted to the Commission in support of an application for a license will only be used to inform its consideration.

7.2.2 The Commission may, however, make it public if this is in the interest of the public or national security.

7.3 Enforcement and Remedial Measures

7.3.1 Any person (s) found in contravention of any provision of this framework shall be deemed to have contravened the Uganda Communications Act 2013, and Regulations issued thereunder.

7.3.2 Potential measures to remedy the contravention may include, but are not limited to, the following:

7.3.2.1 Issuance of violation notices, specifying, among others, specific remedial actions, as well as a deadline for implementing these.

7.3.2.2 Taking any other action deemed reasonable in the circumstances under the Uganda Communications Act, Cap 103, and Regulations issued thereunder, including formal warnings for minor infractions, monetary fines or penalties for serious breaches, suspension of deployment permits for repeated violations, and license revocation in cases of gross and persistent non-compliance.

7.3.3 Commencement

These guidelines shall come into force effective, 1st January 2026.

Annexure-1:

Application form for Special Authorisation to Deploy OFC Infrastructure (To be completed in duplicate)

Application form for authorisation/notification to deploy OFC Infrastructure (To be completed in duplicate)

Name of Applicant
……

Address of offices
……
……..

Phone …….. Fax…… E-mail
……..

Contact person
……

Contact telephone number
……..

Planned district or town of installation:
……

Localities where Application for Right-of-way is required:
……
……

Attach network diagram(s): Yes….. No…… (Tick one)

Attach design drawing(s) Yes….. No……

Attach time plan for fiber rollout: Yes….. No……

Enclosed copy of specifications: Yes….. No……

Name and address of cable supplier and/or manufacturer:
……
…… ……
……
…… ……

Proposed services application:
……
……
…… ……

Declaration by the applicant: I certify that the information provided in this application form, including the attachments, is true and correct.

Signature and stamp of applicant Date of application:
……

Annexure-2:

Technical details of fiber optic cable 8,24,48,72 96 & 144 fiber (g652d) dry core, multi loose tube design, single sheath, glass yarn armoured ofc suitable for duct installation.

No.	S/No.	Item Description
		Glass Yarn armoured, Rodent protected, in full compliance with ITU-T G 652 D.
Cable Design		
	(a)	Single-mode and Multimode fiber in full compliance with ITU-T G 652 D
	(b)	Water-blocking yarns are used helically over the PE up-coated FRP Rod.
	(c)	Loose buffer tubes filled with Thixotropic Jelly.
	(d)	Loose buffer tubes S-Z Stranded
	(e)	Water blocking tape wrapping over S-Z core
	(f)	Glass yarn is used as a peripheral strength member
	(g)	UV-stabilised HDPE Outer sheath, black
Mechanical Characteristics		
	2.	Temperature Range (IEC6079-1-2-F1)
	3.	Operation -30° to +70°C
	4.	Transport and Storage -40° to +70°C
	5.	Cable Bending Radius (IEC 60794-1-2-E11)
Optical Characteristics		
	Optical fiber used in cable manufacturing fully complies with ITU-T-Rec G 652 D. For detailed characteristics.	
	2.	at 1310 nm < 0.35 dB/Km
	3.	at 1550 nm < 0.22 dB/Km
	4.	at 1625 nm < 0.26 dB/Km
OFC Capacities		
5.	*(a)*	For 144 F Cable: 12 loose tubes each having 12 fibers
	(b)	For 96 F Cable: 8 loose tubes each having 12 fibers
	(c)	For 72 F Cable: 6 loose tubes each having 12 fibers
	5.	For 48 F Cable: 4 loose tubes each having 12 fibers & 2No. Filler
	6.	For 8 F Cable: 2 loose tubes each having 8 fibers & 4No Filler
Cable Drum Packing		
6.	*(a)*	Arrow shows the direction, in which the drum can be rolled.
	(b)	Country of origin.
	(c)	The manufacturer's name.

	(d)	Number of fibers
	(e)	Nominal cable length in meters
	(f)	Net and gross weight
	(g)	Customer's name.
	(h)	Both ends of the cable shall be sealed to prevent the ingress of moisture during transportation and storage, and physical damage.
General Characteristics		
(1)	3.	All accompanying documentation and brochures shall be in English language.
	4.	Optic Fiber Cable (G.652.D)
	5.	Standards Compliance
	6.	The cables should be tested and proven to conform to the TIA/EIA 568B.3 and ISO/ IEC 11801:2002, IEC 60794-3-12, IEC 60794-3-21, IEC 60794-3-21, EN 60794-3-21:2006 requirements for optical fiber cable performance.
	7.	Should support and exceed all the performance requirements for current and proposed applications such as 100BASE-F, 155/622 Mbps ATM Gigabit Ethernet 10 Gigabit Ethernet
Specifications		
	6.	The optical fiber cable shall comprise [4, 6, 12, 24, 36, 48, 96, 144] fibers.
	7.	The fiber color sequence is compiled with TIA-598.
	8.	The filler elements are manufactured with PE to the same outside diameter as the loose tubes
	9.	The elements are SZ stranded around a non-metallic central strength member (FRP with coating if required) and the formation is retained with polyester-blocking tape binders.
	10.	To prevent the ingress of water, the cable core should be jelly-filled. Over this core is applied a polyester tape.
	11.	This sheath should be black HDPE in a figure 8 formation with the upper part carrying a 7X1.2mm (for 4-72Fiber), 7X1.3mm (for 96Fiber), 7X1.6 mm (for 144Fiber) stranded zinc-coated steel strand bearer
	12.	The nominal radial thickness of the sheath around the cable core is 1.5mm, and around the bearer, the nominal radial thickness is 1.0mm. The web dimensions are 2.0mm wide X 2.0mm high.
Performance Specifications		
	(a)	The Fiber Aerial Figure 8 Cable should be designed and tested in accordance with TIA-568-B.3 and ISO 11801, ITU G.652D.

	(b)	The Performance specifications should be measured in accordance with the Fiber Optic Test Procedures (EIA/TIA-455 documents) and the test procedures of IEC 60793-2-50, B1.3, and IEC 60794.
		The vendor shall provide documentary evidence/certification of proving conformity to the above performance.
	(c)	Typical Attenuation: ≤ 0.36/0.36/0.23 dB/km
	(d)	Maximum Attenuation: 0.4/0.4/0.4 dB/km

Annexure-3:

Summary of Values Recommended by Framework

No.	**Item Description**	**Value**
	Excavation and backfilling duration	≤3days
	Excavation notification to the other utility operators	operators ≥ 5 days before commencement
	Distance of the cable from the edge of the shoulder	1.5m
	A minimum distance of the cable from the off-roadway	2.5metres
	Interval distance between FOC and existing underground infrastructure	1m
	Trench depth	≥80cm
	Trench depth while crossing	≥1mete
	Visible tape along the trenches below the ground surface.	30 cm
	The interval distance between two visible tape markers indicates the cable route	300m to 500m
	Distance of Manhole/Hand hole from the edge of the shoulder	2metres
	A minimum distance of the Manhole/Hand hole from the off-roadway.	3m
	Accomplishment report submission	≤5 working days from the date mentioned on the schedule
	As-built documentation report submission	≤30 working days from the date mentioned on the schedule
	Right-of-way permit delivery	10 working days
	Right-of-way permits validity	3months

Effective Date: 1st January 2026