सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत संचार विकास प्रभाग
Power System Communication Development Division
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Subject: Comprehensive guidelines for the usage and sharing of optical fibers of OPGW/UGFO cables for power system applications - reg

महोदय / Sir,

The rapid expansion and modernization of the power sector necessitate a robust, secure and efficient communication infrastructure. Optical Ground Wire (OPGW)/Underground Fiber Optic Cable (UGFO) plays a crucial role in ensuring seamless data exchange, real-time monitoring, and reliable operation of power systems. However, with increasing demands and multiple stakeholders involved in fiber usage, it became essential to establish a structured framework governing the sharing and utilization of fiber cores of OPGW/UGFO cable.

A Committee was constituted under the chairmanship of Member (Power System), CEA tasked with formulating comprehensive guidelines for the usage and sharing of fiber cores of Optical Ground Wire (OPGW)/ Under Ground Fiber Optic (UGFO) Cable for power system applications.

With the collective efforts of the Committee, CEA has formulated Comprehensive guidelines for the usage and sharing of fiber cores of Optical Ground Wire (OPGW)/ Under Ground Fiber Optic (UGFO) Cable for power system applications. The list of nominated members and the Terms of Reference of the Committee are attached as Annexure to the guidelines.

It is requested that all utilities/TSPs, power system stakeholders, and users to adopt and adhere to these guidelines.

भवदीय,
Signed by Suman Kumar Maharana
Date: 03-03-2025 13:13:55
(S K Maharana)
Chief Engineer,
Power System Communication Development Division,
Central Electricity Authority

Comprehensive guidelines for the usage and sharing of fiber cores of Optical Ground Wire (OPGW)/ Under Ground Fiber Optic (UGFO) Cable for power system applications

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Ministry of Power

February 2025

Acknowledgement

The rapid expansion and modernization of the power sector necessitate a robust, secure and efficient communication infrastructure. Optical Ground Wire (OPGW)/Underground Fiber Optic Cable (UGFO) plays a crucial role in ensuring seamless data exchange, real-time monitoring, and reliable operation of power systems. However, with increasing demands and multiple stakeholders involved in fiber usage, it became essential to establish a structured framework governing the sharing and utilization of OPGW fibers.

The formulated guidelines establish a structured approach to fiber allocation, safeguarding power system communication needs and mitigating future conflicts. These guidelines also ensure that commercial leasing of fiber cores is managed in a way that does not hinder the grid's operational efficiency and reliability.

A committee was constituted with the approval of the Chairperson, CEA, to formulate comprehensive guidelines for the usage and sharing of fiber cores of OPGW/UGFO cable for power system applications. The complete list of the nominated members of the Committee as well as Terms of Reference of the Committee has been annexed with the guidelines.

As the Convenor of the Committee, I express my deepest gratitude to all committee members for their invaluable contributions in shaping these guidelines. Their collective efforts have resulted in a standardized framework that will ensure transparency and efficiency in the usage and sharing of OPGW fiber infrastructure. The technical insights and dedication of all Committee members have played a crucial role in developing these comprehensive guidelines, which will significantly mitigate conflicts and enhance the reliability of grid communications.

I extend special thanks to Shri Ghanshyam Prasad, Chairperson, CEA, for his vision and leadership in constituting this Committee. I am also grateful to Shri A K Rajput, Member (Power Systems), CEA, for chairing the Committee and steering discussions towards a balanced and effective outcome.

Furthermore, I would like to acknowledge the specific contribution made by the officers of Power System Communication Development Division, CEA namely Ms. Priyam Srivastava, Deputy Director; Shri Akshay Dubey, Deputy Director and Shri Arjun Agarwal, Assistant Director. The guidelines have been brought out by the dedicated and sincere efforts of these officers.

Shri S K Maharana,
Chief Engineer, PSCD Division & Convenor of the Committee

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Abbreviations:

1.	AGC - Automatic Generation Control
2.	CERC - Central Electricity Regulatory Commission
3.	CTU - Central Transmission Utility
4.	FOTE - Fiber Optic Terminal Equipment
5.	GSS - Grid Substation
6.	IEEE - Institute of Electrical and Electronics Engineers
7.	IEC - International Electrotechnical Commission
8.	InSTS - Intra-State Transmission System
9.	IPPs - Independent Power Producers
10.	ISGS - Inter-State Generating Station
11.	ISTS - Inter-State Transmission System
12.	LILO - Loop-in-Loop-Out
13.	NLDC - National Load Dispatch Center
14.	NoC - No Objection Certificate
15.	OPGW - Optical Ground Wire
16.	PMU - Phasor Measurement Unit
17.	PSCD - Power System Communication and Development
18.	RLDC - Regional Load Dispatch Center
19.	RoW - Right of Way
20.	SCADA - Supervisory Control and Data Acquisition
21.	SERC - State Electricity Regulatory Commission
22.	SLDC - State Load Dispatch Center
23.	STU - State Transmission Utility
24.	TSP - Transmission Service Provider
25.	UGFO – Under Ground Fiber Optic Cable
26.	VoIP - Voice over Internet Protocol

Comprehensive guidelines for the usage and sharing of fiber cores of Optical Ground Wire (OPGW)/ Under Ground Fiber Optic (UGFO) Cable for power system applications

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1. Introduction

1.1. These guidelines have been formulated to establish a uniform procedure for the sharing of fiber cores of Optical Ground Wire (OPGW)/ Under Ground Fiber Optic (UGFO) Cable deployed across the power transmission network, ensuring reliable, secure, and continuous monitoring and operation of the grid. They provide a comprehensive framework for fiber allocation, addressing the diverse needs of grid operations, system protection, as well as authorized commercial use. It establishes principles for effective resource allocation, maintaining sufficient redundancy to support future requirements, such as Loop-in-Loop-Out (LILO) expansions, network reconfiguration and scalability to accommodate evolving operational demands.

1.2. In alignment with the *Central Electricity Authority (Technical Standards for Communication System in Power System Operations) Regulations, 2020*, and the *Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022*, these guidelines have been formulated to support seamless communication needs for power system at national level, regional level, inter-state and intra-state level. By fostering a consistent approach to fiber sharing and allocation, these guidelines intends to promote interoperability and efficiency across multiple entities and users within the power system, ensuring reliable and uninterrupted communication system, which is critical for grid stability and operations.

2. Allocation Requirements

2.1. On any transmission line, minimum of 6 fibers are always in use for critical grid communication, supporting Supervisory Control and Data Acquisition (SCADA), Phasor Measurement Unit (PMU), Voice over Internet Protocol (VoIP), Automatic Generation Control (AGC), and other real-time operations (2 Main, 2 Hot Standby, 2 Spares).

Additionally, for transmission lines requiring line differential protection:

- **4 fibers** are used for reliable differential protection of single feeder (S/c line).
- **8 fibers** are used for reliable differential protection of a double circuit (D/c) line.

2.2. Over and above these fibers which are already in use, the fibers that shall be spared for future grid communication requirements, based on need, is tabulated below:

Type of Future Grid Communication Requirements	**Fiber Allocation**	**Remarks**
Alternate Communication Path/Future expansion/Reconfiguration/LILO requirement/Inter-Utility Communication etc.	Upto 6 Fibers	Shall be spared as and when required for future grid communication requirements of ISTS/In-STS/ISGS/Radial feeders etc.

Type of Future Grid Communication Requirements	Fiber Allocation	Remarks
Line Differential Protection with future reconfiguration, if applicable.	Upto 4 Fibers per circuit	Shall be spared in case new differential protection schemes are required due to system expansion, reconfiguration or LILO additions.
Technology Migration/Centralised Asset Management & Control.	Upto 4 Fibers	Shall be spared for simultaneous transition to next-generation communication networks (e.g., packet-based systems).

Additional Considerations:

1. The actual number of healthy fiber cores to be spared free of cost for future grid telemetry requirements, within the limits stipulated in table above, shall be decided as and when the need arises.
2. **Commercial Utilisation of Fiber cores** –

   - While leasing excess fibers for **non-grid applications**, utilities/Transmission Service Providers (TSPs) must **reserve the right to intervene, seek withdrawal, or cease utilization of leased fibers** to address any emerging grid requirements. The contract to include flexibility for renewal or termination based on evolving needs.

   - The **number of fiber cores to be leased** and the **duration of leasing** must be planned in a rational way, such that, whenever the need arises to spare fibers for grid applications, their availability cannot be denied on the premise that the spare fibers are already leased out for commercial purpose. Additionally, under no circumstances should the routing of grid application data to the SLDC/RLDC (State/Regional Load Dispatch Centers) be adversely affected.

3. Commercial Utilization of OPGW Fibers for other purposes

3.1. While Optical Ground Wire (OPGW) is primarily implemented on transmission assets for telemetering power system parameters and ensuring reliable grid communication, spare fiber cores may be commercially utilized under the following conditions:

3.1.1. **Grid Applications Take Priority** – Spare fibers can be leased for commercial purposes, provided that whenever the need arises for grid applications, the number of cores within the limits stipulated in the Allocation Requirements, is made available without exception.

3.1.2. **Assessment of Future Grid Communication Needs –** Before leasing fiber cores, STUs/TSPs must conduct an assessment of impending grid communication requirements for atleast next five years. This assessment shall be holistic considering state/regional/national level requirements for routing of the data to SLDCs/RLDCs. STUs/TSPs intending to lease fiber cores to collaborate with CTU to discuss:

- Upcoming **grid expansion plans** and their communication requirements.
- Possible dependencies where **ISTS/STU networks need mutual data routing support**.
- The spare fiber capacity that should be **retained for future grid needs** before considering commercial leasing.

Based on this assessment, entities must determine **how many cores can be leased** and the **duration of leasing**, without affecting the availability for future grid applications.

3.1.3. **Termination Clause in Leasing Contracts** – All leasing contracts must include a termination clause, mandating at max 18 month notice period for making the fiber cores available for grid applications whenever required. This ensures that grid operator can reclaim the necessary fibers for critical grid operations with adequate notice. However, it is always advisable to retain some spare fibers for emergency or future grid communication needs in advance, rather than having to invoke the termination clause of the contract when the need arises.

3.1.4. **Regulatory Compliance** – Any commercial utilization of spare fibers must adhere to applicable CERC/SERC regulations pertaining to the 'Sharing of Revenue Derived from Utilization of Transmission Assets for Other Business.'

3.1.5. **Intimation to RPCs for ISTS Fiber Leasing** –

Any ISTS licensee/TSPs proposing to lease fiber cores on a commercial basis must provide prior intimation to the concerned Regional Power Committees (RPCs) regarding:

i. The number of fiber cores proposed for commercial utilization.
ii. The duration of the lease.
iii. The mechanism incorporated in the contract to ensure fiber availability in case of future grid requirements.

3.2. It must be emphasized that the primary purpose of fibers in OPGW/UGFO implemented as part of a transmission scheme is reliable telemetering of power system parameters. Commercial utilization of these transmission assets can only be done after a prudent evaluation of future grid communication needs, ensuring that grid operations are never compromised.

3.3. Proper planning and foresight are necessary to ensure that the commercial use of spare fibers does not jeopardize the security, reliability, and expansion needs of the power system communication network.

4. Sharing Scenarios

The table below outlines fiber-sharing arrangements across different transmission line ownership scenarios, ensuring that:

- Fibers essential for grid operations are spared free of cost, irrespective of whether they are required for Intra-State (InSTS) or Inter-State (ISTS) communication needs.
- Entities to spare healthy fibers, within the limits stipulated in the Allocation Requirements, whenever grid needs arise.

Scenario	**Entity to manage the allocation for grid operation purposes.**	**Fiber Sharing**
i) OPGW Laid Under ULDC Scheme on ISTS Lines	Owned and maintained by POWERGRID. Allocation to be managed by CTU.	Fibers to be **spared free of cost** as per Allocation Requirements outlined in Clause 2, whenever required by **STUs, ISTS Licensees/TSPs** for any type of future grid communication requirements.
ii) OPGW Laid Under ULDC Scheme on Intra-State Lines (InSTS)	Owned and maintained by POWERGRID. Allocation to be managed by STU with CTU coordination.	Fibers to be **spared free of cost** as per Allocation Requirements outlined in Clause 2, whenever required by **STUs, ISTS Licensees/TSPs** for any type of future grid communication requirements.
iii) OPGW Laid by STUs on Intra-State Lines	Owned and maintained by STU. Allocation to be managed by STU.	Fibers to be **spared free of cost** as per Allocation Requirements outlined in Clause 2, whenever required by **STUs, ISTS Licensees/TSPs** for any future grid communication requirements.
iv) OPGW Laid by CTU/POWERGRID on Intra-State Lines	Owned and maintained by POWERGRID. Allocation to be managed by CTU with STU coordination.	50% fibers allocated for **ISTS operations**, 50% for **Intra-State operations**. If more than 50% is required by either, fibers to be **spared free of cost**, for any type of future grid communication requirements.
v) OPGW Laid by TSPs on ISTS Lines under TBCB/RTM Projects	Owned and maintained by TSP. Allocation to be managed by CTU	Fibers to be **spared free of cost** as per Allocation Requirements outlined in Clause 2, whenever required by **STUs, ISTS Licensees/TSPs** for any type of

Scenario	Entity to manage the allocation for grid operation purposes.	Fiber Sharing
		future grid communication requirements.
vi) OPGW Laid by TSPs on Intra-State Lines through TBCB	Owned and maintained by TSP. Allocation to be managed by STU	Fibers to be **spared free of cost** as per Allocation Requirements outlined in Clause 2, whenever required by **STUs, ISTS Licensees/TSPs** for any type of future grid communication requirements.
vi) OPGW Laid by POWERGRID/STU's on Deemed ISTS Lines	Owned and maintained by POWERGRID/STU. Allocation to be managed by CTU with STU coordination.	50% fibers allocated for **ISTS operations**, 50% for **Intra-State operations**. If more than 50% is required by either, fibers to be **spared free of cost** for any type of future grid communication requirements.
vi) OPGW Laid by TSPs at their own cost, utilizing the ISTS asset/RoW, with necessary approvals from CERC.	Owned and maintained by TSP. Allocation to be managed by CTU, as the OPGW now, is forming integral part of backbone ISTS Communication network. It is assumed that: • No OPGW was included in the originally approved scheme for the transmission line. • The TSP obtained necessary approvals from the competent authority prior to laying the OPGW.	Fibers to be **spared free of cost** as per Allocation Requirements outlined in Clause 2, whenever required by **STUs, ISTS Licensees/TSPs** for any type of future grid communication requirements.

5. Integration of FOTE for Differential Protection

5.1. Differential teleprotection is a vital component of power system protection, ensuring rapid and selective fault clearance. The choice of communication medium, whether IEEE C37.94 (herein after referred as C37.94) protocol over a shared fiber or separate optical fibers, significantly impacts the reliability and performance of this protection scheme.

5.2. The choice between C37.94 compliant FOTE and separate fiber cores for differential teleprotection depends on a variety of factors, including line length, voltage level, criticality, and network conditions. While C37.94 can be a cost-effective solution for certain applications, separate fibers offer superior reliability and faster fault clearance, making them the preferred choice for critical transmission lines, especially at higher voltage levels.

5.3. The Regional Power Committees (RPCs) generally prioritize a **reliable and dedicated communication link for line differential protection** to ensure the integrity and security of protection signals, especially given the criticality of fast and accurate fault detection for power system stability.

5.4. While specific practices may vary depending on the line's voltage level, length, and criticality, however, in order to guarantee reliable communication for line differential protection systems, the Committee recommends the following provisions:

Condition	**Recommendation**	**Reason**
High-Criticality and High-Voltage Lines (220 kV and above) requiring line differential protection	Preference to dedicated or separate fiber cores for line differential protection rather than shared fibers.	As per IEC 60834, which governs teleprotection equipment, the RPCs lean towards using communication setups that meet high reliability and availability standards, favoring separate fibers to reduce signal attenuation and improve reliability for critical protection.
Lower-Criticality or lines with Voltage below 220 kV requiring line differential protection	Line differential protection may be allowed on shared fibers via Fiber Optic Terminal Equipment (FOTE) using the C37.94 protocol	Multiplexing protection signals over a shared fiber can be a cost-effective solution, particularly when the risk of latency and interference is lower due to shorter transmission distances and moderate fault current levels.
High-Criticality and High-Voltage Lines (220 kV and Above) requiring line differential protection. However, having constraint in availability of dedicated Optical fibers.	Line differential Protection using C37.94-compliant FOTE over shared fiber may be allowed with the following condition: • The setup must meet the provisions of IEC 60834 regarding speed, security, and dependability standards under real-time conditions.	By ensuring reliable and timely communication, C37.94-compliant FOTEs can contribute to meeting the requirements of IEC 60834.

6. Routing of OPGW Fibers during LILO

6.1. In case of Loop-In-Loop-Out (LILO) of transmission lines, routing OPGW fibers must be done in a way that preserves the operational integrity of the grid's communication infrastructure. Key recommendations are elucidated in table below:

Main Line and LILO Configuration	**LILO Tower Type**	**OPGW Installation Requirement**	**Fiber Routing/Splicing in New Substation**	**Configuration Adjustments in Existing Substations**
Main Line: D/c, 24-Fiber OPGW; S/c LILO	M/c Or D/c Tower (Single Tower for Loop In and Out) with two Earth wire peaks	Install 24 F OPGW on both earthwire peaks i.e same Nos. of OPGW as that of main line on both earth wire peaks.	Route required no. of fibers only through the new substation. Splice the required number of fibers for the LILO section at the appropriate point.	Configure protection schemes and data transfer systems to accommodate the new line and substation Ensure fiber continuity for main line traffic.
Main Line: D/c, 24-Fiber OPGW; D/c LILO	Two Separate D/c Towers (Separate Loop In and Out)	Install 24F OPGW i.e same Nos. of fiber cores as that of main line on one earthwire peak per tower.	Route all fibers of OPGW from the main line through the new substation. Splice the required number of fibers for the LILO line at the new substation, if the new S/stn is of different entity.	Configure protection schemes and data transfer systems to accommodate the new line and substation Ensure fiber continuity for main line's traffic through the new S/stn
Main Line: D/C, 24-Fiber OPGW; D/c LILO	Multi-Circuit Tower	Install 24 F OPGW on both earthwire peaks i.e same Nos. of OPGW as that of main line on both earth wire peaks.	Route all fibers of OPGW from the main line through the new substation. Splice the required number of fibers for the LILO line at the new substation, if the new S/stn is of different entity.	Configure protection schemes and data transfer systems to accommodate the new line and substation Ensure fiber continuity for main line's traffic through the new S/stn

Main Line and LILO Configuration	LILO Tower Type	OPGW Installation Requirement	Fiber Routing/Splicing in New Substation	Configuration Adjustments in Existing Substations
Main Line: D/c (220 kV/132 kV), 24-Fiber OPGW; S/c LILO	Tower with Singe Earth wire peak	Install 48F OPGW i.e., double the number of fiber cores as that of main line on single peak available in LILO portion	Route half number of fibers (12F) of OPGW from the main line through the new substation Splice the required number of fibers for the LILO section at the appropriate point.	Configure protection schemes and data transfer systems to accommodate the new line and substation. Ensure fiber continuity for main line traffic.
Main Line: S/C (220kV/132 kV), 24-Fiber OPGW; S/c LILO	Tower with Singe Earth wire peak	Install 48F OPGW i.e., double the number of fiber cores as that of main line on single peak available in LILO portion	Route all fibers (24F) of main line OPGW through the new substation to maintain continuity between the existing stations. Splicing of all the fibers at the new S/stn to be done to integrate LILO traffic.	Configure protection schemes and data transfer systems to accommodate the new line and substation. Ensure fiber continuity for main line's traffic through the new S/stn.

6.2. Whenever a Transmission Licensee implements a Loop-In-Loop-Out (LILO) arrangement on an existing transmission line, adjustments must be made in the **existing Substations**, including **Fiber Optic Terminal Equipment (FOTE)**, **relays**, and **other protection equipment** to ensure seamless integration and reliable protection.

Table summarizing LILO adjustments in existing Substations

Equipment	Adjustments Required	Details
Fiber Optic Terminal Equipment (FOTE)	Signal reconfiguration, routing modifications, capacity upgrades, synchronization, integration with new FOTE, supply of necessary optical	Ensure compatibility with new LILO traffic, enhance capacity if required, and synchronization with relays.

Equipment	Adjustments Required	Details
	interfaces to meet link budget requirement.	
Relays	Reconfiguration of protection schemes, distance zone adjustments, differential protection tuning.	Modify relay settings for fault detection across LILO, adjust impedance settings, and back-up coordination.
SCADA and Telemetry	Data routing, alarm configuration, SCADA system updates.	Integrate new LILO substation data into SCADA, configure additional alarms for LILO events.
Amplifiers/Signal Boosters	Installation if required, signal quality testing.	Ensure strong signal levels across LILO paths, perform attenuation checks.
Protection Redundancy	Ensure redundancy, perform testing and commissioning.	Verify that no single point of failure exists, conduct fault simulations, and document updated settings.

6.3. The entity undertaking the LILO installation and commissioning of the new substation shall ensure that all necessary adjustments, interfaces, and configuration support are implemented to maintain seamless data communication and reliable operation of protection schemes without signal degradation or loss. It is incumbent upon this entity to provide comprehensive support to the owner of the existing substation, facilitating integration and ensuring that all configuration and interoperability requirements are met to uphold continuous, high-integrity signal transmission and effective protection functionality across the network.

6.4. When the LILO is performed at the substation, the leased fiber cores, if any, by the main line owner must be routed continuously through the LILO section. Entity undertaking LILO cannot commercialize fibers routed for main line owner's use to prevent potential disputes.

7. Maintenance of Database:

7.1. CTU for ISTS/ STUs for InSTS shall be responsible for monitoring the utilization of OPGW fibers and ensuring compliance with the established conditions. The CTU/STU shall maintain a comprehensive database that clearly segregates:

1. **Total number of OPGW fiber cores:** The total number of fiber cores available on the OPGW of the transmission lines.
2. **Number of cores utilized for grid applications:** The number of fiber cores currently being used for essential grid operations
3. **Spare cores reserved for grid applications:** The number of fiber cores specifically retained for future grid applications.

4. **Number of fiber cores already being shared for grid applications:** The number of fiber cores shared with other grid entities (e.g., other TSPs, STUs, DISCOMs) for grid-related purposes. This should include details of the entities involved in each sharing arrangement.
5. **Number of cores leased on a commercial basis:** The number of fiber cores leased to entities for non-grid applications (e.g., telecom providers, internet service providers). This should include details of the lease agreements, including the lessee, lease period, and terms of termination.

7.2. CTU/STU shall prepare a standardized format/procedure for the TSPs/Licensees to furnish the above data pertaining to OPGW fibers. CTU/STU shall display the data on its website.

8. OPGW Implementation in New Transmission Projects and Upgradation Schemes

8.1. In all the new transmission projects and upgradation schemes, the Planning agency should ensure that any decision regarding deployment of fiber cores considers both present needs and future expansions, balancing the infrastructure's capability with associated costs.

8.2. Planning of OPGW with a minimum of 48 fiber cores to be done, as per feasibility and requirement. For installations within city limits, OPGW may be equipped with 96 fiber cores to also facilitate usage by DISCOMs, SLDCs, RLDCs, and NLDC for last-mile connectivity, contingent upon the load-bearing capacity of the line. This approach will accommodate any additional future requirements, including Loop-In-Loop-Out (LILO) configurations or increased capacity utilizing the same Right of Way (ROW).

8.3. Additionally, since OPGW fibers can also support long-distance telecommunications network across India, the planning exercise should also take into account the dynamics of the telecom industry while determining the number of fibers to be deployed.

8.4. This strategy will facilitate the establishment of a robust, scalable communication network while maintaining efficiency and responsiveness to evolving operational needs across all areas.

9. Implementation Strategy for Existing ISTS/ InSTS Lines

9.1. Any ISTS TSP/In-STS utility/entity planning to lease out spare fiber cores of its OPGW on existing lines on commercial basis shall adhere to all the provisions and framework for fiber sharing and usage, as outlined in these guidelines.

9.2. For TSPs/utilities that have already leased out fiber cores before the issuance of these guidelines, it is expected that, as and when the need arises to spare fibers for grid applications, they will explore all possible means to make available the minimum no. spare fibers that can serve the purpose, free of cost. In cases where conflicts or stalemate arises regarding the availability of requisite number of fibers, a resolution committee shall be formed. This committee will include representatives from the RPCs, PSCD Division of CEA, CTU, concerned STUs /TSPs , with the goal of resolving the issue in a fair and balanced manner.

10. Conclusion

10.1. These guidelines aim to establish a standardized approach to the allocation and sharing of Optical Ground Wire (OPGW) fibers across power sector, ensuring secure, reliable, and scalable communication infrastructure that meets both present and future grid requirements. By implementing uniform principles for fiber allocation and usage, entities across the power sector—including CTU, STU, TSPs, DISCOMs, SLDCs, RLDCs, and NLDCs—can achieve consistent and efficient communication system for grid operations, protection, and commercial applications. These guidelines provide a clear and standardized framework for the allocation and sharing of Optical Ground Wire (OPGW) fibers, balancing the commercial prospects of fiber usage with the imperative of maintaining secure, reliable, and scalable grid operations.

11. Brief of Recommendations for Adoption

11.1. Uniform Fiber Allocation

Entities should adhere to this fiber allocation guidelines/framework for grid operations, ensuring designated fibers for essential communication and protection. Excess fibers may be designated for commercial use, subject to periodic review and regulatory oversight, thereby maximizing resource utilization without compromising the grid stability.

11.2. Compliance with CEA Regulations

All implementations should align with the CEA (Technical Standards for Communication System in Power System Operations) Regulations, 2020 , CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, CERC Interface Requirements and CEA Cyber Security Guidelines, to promote standardized, high-quality communication infrastructures across the power transmission networks.

11.3. Scalability for Future Needs

In areas with high potential for future growth or within city limits, entities are encouraged to install OPGW with 48/96 fiber cores to provide sufficient capacity for last-mile connectivity, future expansions, and LILO requirements, leveraging the Right of Way (ROW) effectively.

11.4. Commercial Usage Protocol

Any commercial usage should adhere to the applicable CERC/SERC Regulations. All leasing contracts must include a termination clause, mandating at max of 18-month notice period for making the fiber cores available for grid applications whenever required. This ensures that grid operator can reclaim the necessary fibers for critical grid operations with adequate notice. However, it is always advisable to retain spare fibers for emergency or future grid communication needs in advance, rather than having to invoke the termination clause of the contract when the need arises.

11.5. **Coordination and Monitoring**

For LILO implementations and OPGW installations in new and upgraded transmission schemes, the entity responsible for installation of the same must provide continuous support to existing substations, facilitating configuration adjustments and ensuring reliable data transfer. Continuous monitoring by CTU is recommended to assess the impact of commercial use and maintain high standards of operational reliability.

These recommendations will ensure that all stakeholders in power system communication can operate within a unified framework, promoting efficiency, compliance, and grid security.

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Composition of the Committee constituted under the chairmanship of Member (Power System), CEA tasked with formulating comprehensive guidelines for the usage and sharing of optical fibers (OPGW) for power system applications:

S.no	Members	Organisation/Association
1.	Member (Power System) (Chair)	CEA
2.	Chief Engineer, PCD	CEA
3.	Chief Engineer, NPC	CEA
4.	Chief Engineer, ET & I	CEA
5.	Member Secretary, RPCs	RPCs
6.	Executive Director, CTU	CTU
7.	Executive Director, Grid India	GridIndia
8.	Executive Director, Powergrid	Powergrid
9.	Representative of Electric Power Transmission Association – 2 TSPs	EPTA
10.	Representative from STUs (at the level of Chief Engineer or equivalent)	• Northern Region: UPPCL, RRVPNL • Western Region: GETCO, MPPTCL •Southern Region: KSEBL,TANTRANSCO • Eastern Region: WBSETCL, OPTCL • North Eastern Region: AEGC

The Terms of Reference (ToR) of the Committee is as follows:

1) **Scope and Purpose:** Define the need to develop guidelines that address the unique requirements and challenges associated with the sharing of OPGW fibers among CTU, STUs, and Private Transmission Licensees.

2) **Allocation Requirements:** Define/determine the number of fibers required for catering to varied applications/services for grid management such as data, speech, protection etc., including minimum spare fibres to be earmarked for grid applications/requirements.

3) **Sharing Scenarios**: Analyse the scenarios wherein the spare fibers in the OPGW laid by an entity is to be shared amongst several entities (CTU, STU, TSPs) to facilitate real time grid monitoring. Formulating the uniform mechanism governing the access, usage, or other aspects of the shared fibers in following scenarios:

(i) Sharing of OPGW laid under ULDC scheme on the ISTS lines.
(ii) Sharing of OPGW laid under ULDC scheme on the Intra-State lines.
(iii)Sharing of OPGW laid by STUs on the Intra State lines.
(iv)Sharing of OPGW laid by CTU/Powergrid on the Intra State lines.
(v) Sharing of OPGW on the ISTS lines laid by TSPs under TBCB and RTM projects.

Identify and define the role and responsibilities of Centre, State, and Private Transmission Licensees in the sharing of OPGW fibers.

4) Investigate the integration of Fiber Optic Terminal Equipment (FOTE) for differential protection in accordance with the C37.94 protocol and bring out recommendations.

5) Define the uniform mechanism of routing of OPGW fibers in case of LILO taken up on any transmission line.

6) Recommend the scenarios/limit of OPGW fibers beyond which it can be utilized for other commercial purposes.

7) Formulate recommendations for seamless adoption of these guidelines.

Nominated Members of the Committee

S. No.	Nominated Member's Name	Designation	Division & Organisation
1.	Shri A K Rajput	Member (Power Systems)	Central Electricity Authority
2.	Shri V K Singh	Member Secretary	NRPC, CEA
3.	Shri Asit Singh	Member Secretary	SRPC, CEA
4.	Shri N S Mondal	Member Secretary	ERPC, CEA
5.	Shri Deepak Kumar	Member Secretary	WRPC, CEA
6.	Shri K B Jagtap	Member Secretary	NERPC, CEA
7.	Smt Rishika Sharan	Chief Engineer	NPC, CEA
8.	Shri Surata Ram	Chief Engineer	ET&I, CEA
9.	Shri S K Maharana	Chief Engineer	PSCD, CEA
10.	Shri J B Len	SE	SRPC, CEA
11.	Shri Shiv K Gupta	Sr. DGM	Comm, CTUIL
12.	Shri Ankur Gulati	DGM	GRID-INDIA
13.	Shri. Doman Yadav	Executive Director	Grid Automation & Communication (GA&C), Powergrid
14.	Smt S.Kannika Parameswari	Chief Engineer	P&C, TANTRANSCO
15.	Shri. Viju Rajan John	Chief Engineer	Transmission System Operation, KSEBL
16.	Shri Binaya Ku Mallick	DGM(Telecom)	E & Q, OPTCL,HQRS
17.	Shri N. K Patel	SE (Telecom)	TR Department, Corporate Office, GETCO, Vadodara
18.	Shri R. B Kathiria	EE (Telecom),	Telecom Unit, 220kV S/s, GETCO, Gondal
19.	Shri Jayesh A Mehta	DE (Telecom)	Telecom Unit, 220kV S/s, GETCO, Ranasan
20.	Shri Arup Sarmah	AGM	LA Communication Division, Kahilipara, AEGCL
21.	Smt. Punam Biswakarma	AGM	CA Communication Division, Samaguri, AEGCL
22.	Shri Ashutosh Bhattacharjee	GM	(T&C and Comm.)
23.	Shri Rajesh Gupta	SE (SLDC)	MPPTCL
24.	Shri Sudhir Nema	SE (Planning)	MPPTCL

S. No.	Nominated Member's Name	Designation	Division & Organisation
25.	Smt. Kshama Shukla	EE (P&D)	MPPTCL
26.	Shri Debasis Sarkar	Chief Engineer	Communication Department, WBSETCL
27.	Shri Vivek Dixit	Chief Engineer	Sanchar and Niyantran, UPPTCL
28.	Shri Sanjay Johari	VP	Business Development & Adani Energy Solutions Ltd.
29.	Shri Tarun Tayal	Head- Govt. Alliances and Partnerships	Sterlite Power

Special Invitee - Power System Technology Development Division, CEA