सत्यमेव जयते
भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
पूर्वी क्षेत्रीय विद्युत समिति
Eastern Regional Power Committee
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सं. /NO. ERPC/Op/SCADA/2025/ 1832 **दिनांक/DATE: 30.01.2025**

सेवा में/To,

संलग्न सूची के अनुसार/As per list enclosed.

विषय: 22.01.2025 (बुधवार) को आयोजित ईआरपीसी की 16वीं TeST (Telecommunication, SCADA & Telemetry) उप-समिति की बैठक का कार्यवृत्त
Sub: Minutes of 16th TeST (Telecommunication, SCADA & Telemetry)Sub-Committee Meeting of ERPC held on 22.01.2025 (Wednesday)

Please find enclosed **Minutes of 16th Telecommunication, SCADA & Telemetry (TeST) sub-committee meeting of ERPC** held on **22.01.2025 (Wednesday) virtually** on **MS Teams platform** at **10:30 hrs** for your kind information and necessary action. The same is also available at ERPC website (www.erpc.gov.in).

कृपया अपनी जानकारी और आवश्यक कार्रवाई के लिए **22.01.2025 (बुधवार)** को 10:30 बजे वस्तुतः **MS Teams** प्लेटफॉर्म पर आयोजित ईआरपीसी की **16वीं Telecommunication, SCADA & Telemetry (TeST) उप-समिति** की **बैठक** के संलग्न **कार्यवृत्त** देखें। यह ईआरपीसी वेबसाइट (www.erpc.gov.in) पर भी उपलब्ध है।

टिप्पणियाँ, यदि कोई हों, कृपया यथाशीघ्र इस कार्यालय को अग्रेषित करें।
Observations, if any, may please be forwarded to this office at the earliest.

30/01/2025

(S.Kejriwal)
SE(Operation)
एसई (ऑपरेशन)

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MINUTES

OF

16th TeST MEETING

Date: 22.01.2025

Eastern Regional Power Committee

14, Golf Club Road, Tollygunge

Kolkata: 700033

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EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 16th TeST MEETING HELD ON 22.01.2025(WEDNESDAY) AT 10:30 HRS

Member Secretary, ERPC *chaired the* ***16th TeST*** *meeting. On welcoming all the participants, he highlighted the following points:*

- ✓ *Timely availability of data is crucial for effective decision making in real time grid operation. So timely transmission of data must be done to be ensured by RLDC and SLDC.*
- ✓ *OPGW links are not available everywhere. All transmission licencees were requested to coordinate with CTU/STUs(as the case may be) for planning on reliable and robust OPGW network.*
- ✓ *PLCC is gradually getting outdated and so all ER states were urged for adoption of advanced communication technology for reliable performance of protection systems.*

1. PART-A: CONFIRMATION OF MINUTES

1.1. Confirmation of Minutes of 15th TeST Meeting held on 2nd August 2024 physically at ERPC Conference Hall, Kolkata

The minutes of 15th TeST Sub-Committee meeting held on 02.08.2024 was circulated vide letter dated 09.08.2024.

Members may confirm the minutes of 15th TeST meeting.

Deliberation in the meeting

All members confirmed the Minutes of 15th TeST meeting.

2. PART-B: ITEMS FOR DISCUSSION/UPDATE

2.1 Usage and sharing of OPGW for power systems applications: CEA

- The first meeting of Committee for usage and sharing of OPGW was held on **09.08.2024 (**MoM attached as **Annexure B.2.1.2).** The Committee issued a draft report for the usage and sharing of OPGW for usage and sharing of Optical Ground Wire (OPGW) fibers for power system applications (attached as **Annexure B.2.1.2**).
- The report is 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. Various aspects of OPGW usage and sharing has been discussed below:-

➢ OPGW fibre core Allocation:

Type of Transmission Line	Application	Fiber Cores Alloted
Double circuit (D/c) Or Single Circuit (S/c) transmission line with length greater than 30 km,	Grid Applications	6 Fibers
	Spare Fibers for alternate communication path for STUs /Radially	10 Fibers

thus not requiring Line differential Protection.	connected feeders from GSS/Future needs etc	
	Spare Fibers for new technology migration	4 Fibers
	Commercial Use	Remaining fibers
Transmission line is Double circuit (D/c) with length less than 30 km, requiring Line Differential Protection as per Request for Proposal (RfP) documents/as per Regional Power Committee's (RPC's) protection philosophy.	Grid Applications	6 Fibers
	Teleprotection Applications	8 Fibers
	Spare Fibers for alternate communication path for STUs /Radially connected feeders from GSS/Future needs	6 Fibers
	Spare Fibers for new technology migration	4 Fibers
	Commercial Use	Remaining fibers
Transmission line is S/c with length less than 30 km, requiring Line differential Protection, as per RfP documents/as per RPC's protection philosophy.	Grid Applications	6 Fibers
	Teleprotection Applications	4 Fibers
	Spare Fibers for alternate communication path for STUs /Radially connected feeders from GSS/Future needs	6 Fibers
	Spare Fibers for new technology migration	4 Fibers
	Commercial Use	Remaining Fibers

- Sharing of OPGW between various entities

Scenario	**Owned/Maintained by**	**Fibres Shared**	**Commercialization Policy**
OPGW laid under ULDC scheme for ISTS and InSTS Lines	POWERGRID, for ISTS allocation by CTU and for InSTS allocation by STU	Upto 10	Excess fibre commercialization for 2 years with CERC NoC. Renewable every 2 years
OPGW laid by STU on InSTS Lines	Allocation by STU	Upto 10	Excess fibre commercialization for 2 years with SERC/SLDC NoC. Renewable every 2 years

OPGW laid by CTU/Powergrid on InSTS Lines	Allocation by CTU with STU Coordination	50% for both InSTS and ISTS	commercialization for 2 years with SERC/SLDC NoC. Renewable every 2 years
OPGW laid by TSPs on ISTS Lines under TBCB/RTM Projects	TSP, allocation by CTU	Upto 10	commercialization for 2 years with SERC/SLDC NoC. Renewable every 2 years

Number of fibres shared is subject to approval of RPC. the Regional Power Committee (RPC) must ensure prior consultation with the Power System Communication and Development (PSCD) Division, Central Electricity Authority (CEA).

- Integration of FOTE for Differential Protection

- Differential teleprotection is a vital component of power system protection, ensuring rapid and selective fault clearance.
- The communication medium is over a shared fiber or separate optical fibers using **IEEE C37.94** (herein after referred as C 37.94) protocol.
- For **High-Criticality and High-Voltage Lines (220 kV and above)** requiring line differential protection preference is given to dedicated or separate fiber cores for line differential protection rather than shared fibers. If dedicated fibres are not available then an interim setup with shared fibres can be done. However it should meet the IEC 60834 provisions.
- For **Lower-Criticality and Lines below 220kV** differential protection may be allowed on shared fibres via FOTE using C37.94 protocol.

- Routing of OPGW and adjustments for LILO:

- At Transmission Lines:
    - For Main D/C lines with S/C LILO - Splice the required number of fibers for the LILO section at the appropriate point and ensure fiber continuity for main line traffic. Only single tower required (either M/C or D/C) with 2 earth wire peaks.
    - For main D/C lines with D/C LILO - Route all fibers of OPGW from the main line through the new substation and Splice the required number of fibers for the LILO line at the new substation, if the new Substation is of different entity. Either 2 separate D/C towers with one earthwire peak each may be used or M/C tower may be used.
- In both cases OPGW used may use 24 Fibre Cores.
- LILO adjustments at substation:
    - Fiber Optic Terminal Equipment (FOTE) - Signal reconfiguration, routing modifications, capacity upgrades, synchronization, integration with new FOTE and Ensure compatibility with new LILO traffic.
    - Relays - Reconfiguration of protection schemes, distance zone, adjustments, differential protection tuning.
    - SCADA and Telemetry - Data routing, alarm configuration, SCADA system updates.

- Amplifiers/Signal Boosters – may require installation.
- Protection Redundancy - Ensure redundancy, perform testing and commissioning and Verify that no single point of failure exists

➢ Commercial utilization of OPGW Fibres.

- Any commercial use must receive prior approval (NoC) from CERC/SERCs in line with CERC (Sharing of Revenue Derived from Utilization of Transmission Assets for Other Business) Regulations, 2020
- Any entity intending to lease fiber cores for commercial purposes shall provide prior intimation to the relevant Regional Power Committees (RPCs).
- Commercialization of fiber cores may be permitted for a duration of two years, subject to renewal thereafter at the end of each period. Additionally, the right to intervene, seek withdrawal, or cease utilization of spare fibers must be reserved to address any emerging grid requirements.

➢ OPGW Implementation in New Transmission Projects and Upgradation Schemes

In 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

- Planning of OPGW with a minimum of 48 fiber cores in wideband nodes to be done, as per feasibility and requirement. For installations within city limits, OPGW may be equipped with 96 fiber cores.
- In remotely located areas where the demand for extensive fiber optic communication does not justify the installation of 48 fiber cores, a flexible approach is recommended.

Deliberation as per **219th OCC**

❖ All constituents were apprised that a committee chaired by Member (Power System), CEA has been constituted to develop guidelines on the usage and sharing of Optical Ground Wire (OPGW) for power system applications. In this regard, valuable inputs have been sought from all concerned stakeholders.

❖ Inputs received from ER constituents on OPGW fibre sharing summarized below:

- WBSETCL informed: Aprroximately 50% fibres used for own purpose.
- DVC informed: Around one-third of the total fibres used for own purpose.
- Jharkhand submitted : Only two pairs of fibres are used for communication purpose.
- Bihar intimated that major portion of the fibres is leased out for commercial use.
- OPTCL apprised: Four fibres used for own purpose, 4 fibres are kept reserved while rest are having commercial utilization.
- Powergrid ER-II informed: Three pairs of fibres are for own use while rest 9 pairs are in commercial use.

219th OCC Decision

- OCC observed that OPGW has been laid under various schemes like ULDC and various mode by STUs and Central Sector transmission licensees.To accommodate new generation capacity and to cater to increasing power demand there is frequent change in network configuration like LILO of existing transmission lines or addition of new lines.This

has necessitated the sharing of existing fibres among different utilities for establishing reliable communication.

- OCC acknowledged the necessity of optimal utilization of existing OPGW fibres amongst power sector utilities.
- OCC opined that in view of implementation of line differential protectionin short lines and emerging technologies like MPLS,etc , maximum portion of the OPGW fibres(including spare fibres) should be kept for power sector applications.
- OCC further opined that usually 24 fibre OPGW is used while 48 fibre OPGW deployed in LILO portions of the transmission line. This existing practice may be kept unchanged.

Members may discuss.

Deliberation in the meeting

- ❖ *A brief presentation was delivered by ERPC delineating the salient features of the Draft report on usage and sharing of OPGW fibres circulated by CEA.*
- ❖ *BSPTCL apprised:*
- ✓ *24-fiber OPGW links currently operated with 8 fibers allocated for internal use and 16 fibers leased for commercial purpose.*
- ✓ *Presently commercialization period for OPGW fibers spans 10 years. Thus concerns were raised about whether ongoing contracts would be subjected to premature termination under the new guidelines.*
- ✓ *The revenue-sharing arrangement between BSPTCL and leased licensees follows a 50-50 split, with existing contracts expected to conclude around 2032.*
- ❖ *WBSLDC raised a specific concern about the compatibility of Synchronous Digital Hierarchy (SDH) systems with potential changes in OPGW deployment.*
- ❖ *TeST committee observed that :*
- ✓ *There may be proposed changes in the guidelines based on the suggestions/comments received from various stakeholders. Further discussions with CEA would be conducted for the same.*
- ✓ *ER utilities including BSPTCL and WB SLDC were advised to furnish their comments on the draft report to CEA.*

TeST Decision

- ✓ *Most states have leased OPGW fibers to third-party licensees and it was suggested that they should compile their concerns and submit to CEA before finaliztion of the draft guidelines.*
- ✓ *TeST Committee opined that clear picture on applicability of new guidelines (as per CEA committee report) on exisiting as well as new systems will emerge after finalization of the same by CEA.*
- ✓ *TeST Committee encouraged participation from all ER state utilities in upcoming meetings as convened by CEA for addressing their specific concerns on OPGW fibre sharing & usage.*

2.2 Firewall Installation for Existing ISTS Substations: CEA

- Firewalls are not installed at existing substations of POWERGRID and some of the other Private TSPs substations to ensure perimeter security.

- In 2021, Nodal agency for cyber security in Power Sector i.e. (Cyber Security Division of CEA/ CISO-MoP) has issued guidelines for cyber security viz. CEA (Cyber Security Guidelines for Power Sector), 2021. As per guidelines, following points are to be taken care by the responsible entities:

  I. "The Responsible Entity shall ensure that every Critical System resides within an Electronic Security Perimeter".

  II. "Has deployed an Intrusion Detection System and Intrusion Prevention System capable of identifying behavioural anomaly in both IT as well as OT Systems".

- To ensure above requirement, CTU has prepared specification for Firewall after discussion with CERT-Trans (POWERGRID) and CEA. After finalization of the same with CEA, CTU started to include in the inputs to RFP documents from Nov'21 wherever applicable.

- For the existing substations (under RTM & TBCB) also Firewall needs to be installed for providing the cyber security at the ISTS integrated communication system level.

- POWERGRID has submitted a list of 273 no. of existing substations for all five regions which is attached at **Annexure-B.2.2.1**. Where the firewall needs to be installed. POWERGRID has told that installation of firewall at their stations (RTM & TBCB) has a huge cost implication which cannot be covered through O&M expenses specified by CERC.

- As per meeting held on 28.11.2023 among CTU, POWERGRID, CEA, NRPC & Grid-India, a PoC was also proposed for testing of Power System application behaviour by installation of Firewall (MoM of meeting attached at **Annexure-B.2.2.2**). As agreed during the said meeting POWERGRID shall carry out the POC in parallel with this proposal.

- Further, a committee was formed under the Chairmanship of CE (Cyber Security Division), CEA in line with the minutes of meeting dtd. 12.04.24 convened by CEA and chaired by Member, Power System (committee formation letter is attached at **Annexure-B.2.2.3**). Later CEA vide letter dtd. 25.06.2024 (attached at **Annexure-B.2.2.4)** communicated that all utilities (POWERGRID & Pvt. TBCB) are required to comply with the CEA (Cyber Security Guidelines), 2021 and deploy Intrusion Prevention and Intrusion Detection System. In addition, the letter stated that, as Cyber Security Regulations of CEA are in advanced stage so there is no necessity for constitution of aforesaid committee. It is to mention that the draft cyber security regulations are under circulation by CEA.

- This agenda was deliberated in the 48th COM SR meeting held on 29.07.24 (abstract of minutes are attached at **Annexure-B.2.2.5**), where MS, SRPC suggested that agenda can be put up in the upcoming NPC meeting for deliberations. This agenda was also deliberated in the 15th ER TeST meeting held on 02.08.2024 (abstract of attached at **Annexure-B.2.2.6**), where it was suggested to put up the agenda in the upcoming NPC meeting.

- The issue need to be deliberated regarding POWERGRID and private TSPs, concerning the booking of expenditure on the installation of firewalls and compliance with other requirements under the CEA Cyber Security Guidelines for the Power Sector, 2021, as well as the upcoming CEA cyber security regulations. This includes consideration of

additional capitalization for RTM substations and treatment as "Change in Law" under the TSA for TBCB substations, in line with the CERC order in Petition No. 94/MP/2021 **Annexure-B.2.2.7**).

Breakup of **RTM/ TBCB** substations of Powergrid in ER for Firewall requirement is given below:

Region	POWERGRID RTM S/S	POWERGRID TBCB S/S
ER	**44**	**05**
Total: 49		

- For the **RTM** substations, expenditure of firewall installation can be booked in **Add CAP** or a new scheme may be prepared. For the **TBCB** substations, expenses can be booked under change in law as **CERC order on petition no. 94/MP/2021.**

As per deliberation in **15th TeST meeting**:

CTU apprised:

- Basic architecture and tentative modalities for supply & installation of Firewall at POWERGRID sub-stations
- In recent 48th COM-SR meeting, SRPC has opined to place this agenda in NPC.

POWERGRID also suggested that this agenda may be taken up in NPC forum for discussion.

15th TeST decision:

TeST committee opined that detailed methodology of the scheme for supply and installation of firewall at the existing substations of Powergrid may be devised in line with yet to be finalized CEA regulations on cyber security.

TeST committee referred the issue to NPC forum for further deliberation.

During the 15th NPC meeting held on 14.11.2024, Chairperson, NPC/CEA, advised that the proposal of recovery of costs for firewall installation at existing ISTS substations (RTM & TBCB) may be examined by the Power System Wing of CEA in consultation with Cyber Security Division, CEA, F&CA Division, CEA, PSPA-I & II Division, CEA, PCD Division, CEA, GRID-India, RPCs, CTU and POWERGRID at the earliest.

- In the meeting, it was also suggested that the number of firewalls included in the proposal should also be reviewed to ensure alignment with actual requirements.
- As per the direction from 15th NPC meeting, a meeting was convened under chairmanship of **Member (PS), CEA.**
- **The Key Points for Deliberation:**
    - **i.** The cost of firewall installation and associated cybersecurity measures may be managed under the **TSP's O&M expenses**.

ii. The proposal for the installations of number of firewalls may be reviewed to ensure alignment with actual operational and security requirements.

iii. The status of proposal for installation of firewall for STUs/Gencos/IPPs/Bulk Consumers etc. along with integration and updation, patch management and status of working of existing firewall system if any will be reviewed.

Members may discuss.

Deliberation in the Meeting

- ✓ *POWERGRID submitted that they have prepared a draft technical specification and circulated it to stakeholders for their comments.*
- ✓ *POWERGRID submitted that the requirement of firewall at various RTM and TBCB stations has already been reviewed and there is no change in the actual requirement as submitted earlier.*

TeST Decision:

POWERGRID was advised to finalize the technical specifications of Firewall system and submit the same along with detailed cost estimate in the upcoming TCC meeting.

TeST Committee observed that under the directions of Chairman, NPC(CEA) the issue of cost recovery for the proposed scheme is being examined by Power System Wing of CEA. Based on the decision taken, the modalities of cost recovery shall be finalized.

2.3 Guidelines on Availability for Communications Systems: ERPC

- As per **Regulation 7.3** of the Central Electricity Regulatory Commission (Communication System for inter-State transmission of Electricity), Regulations, 2017, National Power Committee (NPC) has been entrusted to prepare Guidelines on Availability of Communication System in consultation with RPCs, RLDCs, CTU and other stakeholders. (Guidelines Report attached as **Annex B.2.3**)
- Accordingly, NPC prepared Guidelines on "Availability of Communication System" in consultation with the stakeholders and submitted the same for approval of the Commission. The said Guidelines was approved in **January 2024** and published in public domain as "Guidelines on Availability of Communication System" Regulations.
- Availability of Communication System adhere to *Regulation 6(3) of the CEA (Technical Standards for Connectivity to the Grid), Regulation 5(1) of the CEA (Technical Standards for Communication System in Power System Operations) Regulations, 2020 and Regulation 11 of the Indian Electricity Grid Code (IEGC) 2023.*

As per clause 3.4 Responsibility of CTU and STU:

a) CTU (or STU as the case may be) shall be responsible for submission of the details of communication channels including the redundant channels configured for use of voice / data / video exchange, protection, Tele-protection / SPS to respective RLDC (SLDC as the case may be) on monthly basis incorporating the details of new channels configured during previous month. The total number of communication channels (N) is based on the requirement of RLDCs/NLDC and the same would be decided in consultation with respective RPCs/NPC.

b) CTU (or STU as the case may be) shall be responsible for submission of theperformance/availability of configured channels of the previous month to respective RLDCs for verification by RLDCs and onward submission to respective RPC for computation of availability of the communication system for previous month.

- Applicability of Guidelines:
- Applicable to CTU for the Communication System Infrastructure of inter-State Transmission System.
- Applicable to STU for the Communication System Infrastructure of intra-State Transmission System, till appropriate regulation on Communication is framed by the respective State Electricity Regulatory Commission.

- Communication System outages:
- Outage time of communication system elements (i.e. channels) due to acts of God and force majeure events beyond the control of the communication provider shall be considered as deemed available.
- Any outage of duration more than one (01) minute in a time-block shall be considered as not available for the whole time-block.
- Any outage of duration less than or equal to one (01) minute in a time-block shall be treated as deemed available provided such outages are not more than ten (10) times in a day.
- Since presently **UNMS** system is under control of the POWERGRID and it was commissioned in **December 2023** and more over said availability calculation is to be generated from system hence it is proposed that said calculations are to be generated and submitted by the POWERGRID to ERPC/ERLDC for further necessary action.

CTU may explain. Members may discuss.

CTU informed that the availability calculation is being done in UNMS system and they have submitted petition in CERC on the availability calculation for which hearing is scheduled on 13 February 2025. Once this is finalised, the availability can be submitted by NMT team.

CTU also confirmed the same status for NR where UNMS is commissioned apart from ER.

Members may discuss.

Deliberation in the meeting

- ✓ *CTU raised concerns regarding Clause 3.4 of the Guidelines and has filed a petition seeking a revision of roles and responsibilities. The petition hearing is scheduled for **13/02/2025**.*
- ✓ *In the meantime, CTU has proposed POWERGRID to utilize their Regional Unified Network Management System (UNMS) to assume the role of the network management team. The UNMS currently maintains comprehensive details of all communication links within the Eastern Region (ER).*
- ✓ *CTU will provide the methodology for sharing link downtime data with RPC after the petition hearing.*
- ✓ *CTU apprised that feature of outage management of communication system is to be deployed in upcoming National UNMS and thereafter in all regional UNMS.*

TeST Decision

- *TeST committee felt that under the existing regulatory guidelines it would not be appropriate to put the availilability certification on hold.*
- *Since the guidelines for availability calculation as finalized by NPC are already in vogue, POWERGRID was advised to utilize the regional UNMS for furnishing the channel availability details to ERPC & ERLDC for validation and certification.*

2.4 Laying of OPGW on Transmission lines in Eastern Region: CTU

OPGW on below mentioned lines have been installed & commissioned by POWERGRID during the period 2004- 2005. The links were commissioned by POWERGRID telecom dept (PDT). These links mentioned at (a) to (e) are catering to ULDC operation.

(a) 400kV Prayagraj(Allahabad)–Sasaram(Length: 214.42 km)

(b) 400kV Farakka –Jeerat (Length: 219.45 km)

(c) 400kV Indravati-Rengali (Length: 377.31 km)

(d) 400kV Malda-Binaguri (Length: 217.69 km)

(e) 400kV Binagauri-Bongaigaon (Length: 103.75 km OPGW +6.75 km UGFO)

(i) The above links are part of ISTS assets as per CERC order with conditions stipulated at para 26(ii) vide order date 17.05.2023 i.r.o. Petition no. 287/MP/2022 as brought out below:

"The ownership, control and management including operation and maintenance of the transmission system including all cores of OPGW cables, transmission towers, substations shall continue to be vested with and controlled by the Petitioner at all time."

POWERGRID was the petitioner.

(ii) It may be mentioned here that Useful life of these links of 15 years is completed as per CERC norms. The link condition is deteriorating now and condition is declining. Optical Attenuation has increased beyond the design limits.

(iii) As per discussion held with POWERGRID on dtd. 18.12.2024 and revised agenda received from POWERGRID through email, OPGW details is modified and revised OPGW list for laying of OPGW on these links is tabulated below:

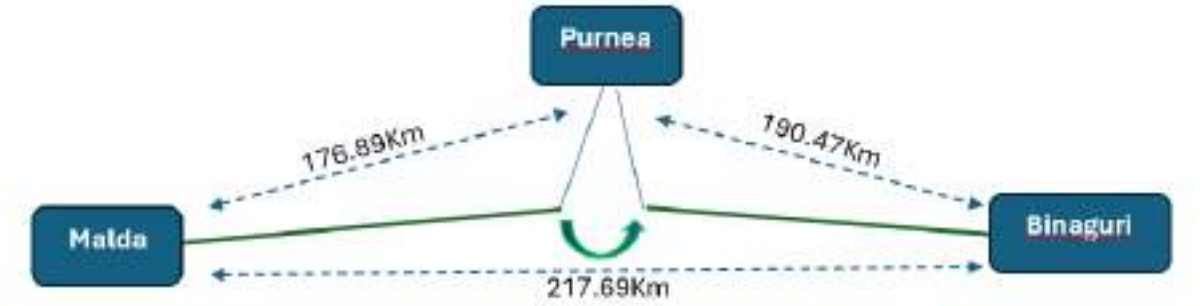
S.N.	Description	Link Length approx. (km)	Design Attenuation(dB)	Actual Attenuation (dB)	Year of Commissioning	FOTE Requirement
1	400kV Prayagraj (Allahabad) –Sasaram	214.42	53.61	71.82 ↑ (+18.21)	2004	Covered in Congestion Scheme

2	400kV Farakka – Sagardighi II -Jeerat	(84.71+ 219.45)304	59.21	73.43 ↑ (+14.62)	2004	1 no STM-64 for Sagardighi. (Farakka, Jeerat covered in Congestion Scheme)
3	400kV Indravati-Rengali-Talcher	377.31	94.33	122.22↑ (+27.89)	2005	2 nos. STM-16 One each at Indravati Rengali. (Talcher covered in AGC scheme.)
4	400kV Malda - Purnea & 400kV Purnea - Binaguri	367.34 (176.89+190.47)	52.73	75.10↑ (+22.37)	2004	1 no. STM-64 for Malda. (Binagudi, Purnea covered in Congestion Scheme)
5	400kV Binagauri-Bongaigaon	239.81	25.94	78.94↑ (+53)	2004	No requirement at Bongaigaon as per POWERGRID input.
	Total=	**Approx. 1503 km**				**2 nos.- STM 16 2 nos. STM 64**

(iv) These links are being utilised for sensitive and critical grid management data to RLDC/NLDC from sub-stations and SLDCs. In view of above, there is need fornew OPGW laying on above mentioned lines.

(v) POWERGRID is making regular efforts to maintain availability of these links. Any outage will most likely have an immense impact on grid management capabilities as these links are very important and backbone original ULDC network established for grid operation.

(vi) As per POWERGRID there is no OPGW in LILO portion link of Farakka-Sagardihi-Jeerat link and also need to be laid in this scheme for system reliability. For Malda-Purnea-Binaguri link, in LILO portion 24F OPGW was laid in 2014 as informed by POWERGRID. However, 48F OPGW was suggested by CEA as per letter dtd.22.11.2024 attached as **Annex – B.2.4**.



Accordingly, it is proposed that 48F OPGW may be laid on above lines along with required FOTEs (2 no STM-64, 2 No STM-16) as mentioned above. The cost of laying OPGW on above links approx. 1503 km is approx. Rs 84.74 Crores. It is proposed to lay OPGW as a new scheme i.e. Eastern Region OPGW Strengthening Scheme (ERSS).

CTU may explain. Members may discuss.

Deliberation in the meeting

- ✓ *CTU briefly explained the proposal.*
- ✓ *Representative of WBSLDC requested for the inclusion of DTPC at Sagardighi end for (LILO portion at Sagardighi) for the 400kV Farakka –Sagardighi II -Jeerat line in the above scheme.*
- ✓ *CTU has asked POWERGRID to submit the requirement of DTPC for Sr. No. 2(LILO portion at Sagardighi) along with cost estimate.*

TeST Decision

- *To ensure continued reliability and performance of the communication infrastructure, TeST committee technically agreed to OPGW replacement on aforementioned 5 links that have completed their designated useful lifespan(15 years) as per CERC norms .*
- *TeST committee referred the proposal to CCM for commercial vetting.*
- *TeST committee suggested that the requirement of DTPC as proposed by WBSLDC may be considered.*

2.5 Dual reporting (2+2) of ISTS stations to Main RLDC and Backup RLDC: CTU

- Presently SCADA data channels are reporting in main and backup mode (1+1) with 1 main channel to RLDC and 1 backup channel to Backup RLDC. To increase the redundancy in the system Grid-India requested that both main and backup channels should report to RLDCs as well as back up RLDCs (in dual mode). In this regard meetings were held among POWERGRID, Grid-India, CTU and CEA dated 09.05.2023 and 27.06.2023 (MoM attached at **Annexure-B.2.5.1**) where dual reporting of SCADA Chanels to main RLDC & Backup RLDC were deliberated.

- Further, CERC has issued Guidelines on “Interface Requirements” under the CERC (Communication System for inter-State transmission of Electricity) Regulations, 2017 (Attached at **Annexure-B.2.5.2**) in Jan’24. Which also mandated that users shall provide communication interfaces with multiple ports, cards, gateways etc. to avoid failure of single hardware element.

- To meet this requirement for new ISTS stations, CTU has started to include this requirement in the RFP inputs for the TBCB projects from Aug'23 onwards. For the existing substations CEA-PCD vide letter dtd.22.07.2024 (attached at **Annexure-B.2.5.3**) also confirms these requirement of 2+2 channels to main and backup RLDC.
- For existing ISTS sub stations, CTU has requested all the TSPs e.g. POWERGRID, Adani, Sterlite, Indigrid, Aparaava, Renew Power etc. to provide status for readiness of 2+2 channels upto RLDC. As per inputs received POWERGRID, Indigrid, Sterlite existing SAS gateway / RTUs needs upgradation or replacement. Further TSPs stated that this requirement has cost implications, and they require a separate scheme to upgrade their existing substations.
- As per discussions held within CTU (Engg & Communication departments), the Engg team suggested that as SAS upgradation comes under substation related work, this type of work can be carried out under O&M /AddCap as no separate transmission schemes are generally required at element level.
- Agenda in this regard was also sent by CTU to NPC for deliberation and seeking their views and issuing guidelines, however NPC is of the view, that this agenda first needs to be put up in RPC level for consensus of all stakeholders. Thereafter CTU has forwarded the same to all the RPCs vide letter dtd. 11.09.2024 (attached at **Annexure-B.2.5.4**)
- Further, as per decision of 14th and 15th ERTeST meeting, POWERGRID has completed the PoC test for Jamshedpur S/s and has submitted the draft test report. The draft PoC report is attached as **Annexure-B.2.5.5**.The proposed architecture is attached in **Annexure-2.5.6.**
- For this purpose, four channels are to be configured - one channel for RTU-1/gateway-1 reporting to ERLDC Main-1, second for RTU-1/gateway-1 to ERLDC Main-2, third for RTU-2/gateway-2 to ERLDC Main-1 and the fourth for RTU-2/gateway-2 to ERLDC Main-2 The aspect of dual channel reporting has been discussed in 14th and 15th Test Meeting, CTUIL communication planning meeting.
- These four channels are in addition to the two existing channels reporting to the present SCADA system at ERLDC MCC and ERLDC BCC. The existing channel will remain in service till taken over by New SCADA implementation in Eastern region which is expected to be completed by March 2026.

Key points for deliberation:

- Forum is requested to deliberate this requirement of SAS/RTU Upgradation/ Replacement for existing substations in **Additional Capitalization for RTM substations** and **under Change in Law of TSA** for the **TBCB substations** in line with CERC order on petition no. 94/MP/2021
- ERLDC and POWERGRID may explain the result of PoC to members.
- All **ISGS/IPPs/private transmission licensees** are requested to check feasibility for dual channel provisions at respective ends to ensure that the requirements for dual reporting of RTUs/SAS gateways can be achieved before commissioning of the upcoming SCADA/EMS upgradation project. An email communication to all utilities have been shared from ERLDC. List of dual reporting feasibility is attached as **Annexure B.2.5.7**

CTU and ERLDC may explain. ISGS, IPPs and Private licensees may update. Members may discuss.

Deliberation in the meeting

- ✓ *The requirement of dual-channel reporting for the new SCADA/EMS system, currently under implementation in the Eastern Region, was explained to TeST forum by ERPC and ERLDC*.
- ✓ *CTU apprised:*

- ➢ *Dual channel reporting needs to be implemented to enhance redundancy, along with the necessary upgradation or replacement of RTU/SAS systems. The same has been deliberated in various forums including 14th& 15th ER TeST meetings and the technical requirement is already established.*
- ➢ *The proposal is now put up for finalizing mode of implementation.*
- ➢ *Since the ULDC Phase 3 scheme of ER is under implementation within a year, hence, the implementation of dual reporting can be directly incorporated as part of this scheme.*

- ❖ *ERLDC confirmed the PoC test for Jamshedpur S/S successfully conducted by Powergrid and the same is technically acceptable.*

ERLDC further informed:

- ✓ *The details on dual reporting have also been communicated via email.*
- ✓ *In line with IEGC 2023 requirements, additional analog and digital signals are required from generating utilities for enhanced monitoring. This requirement has been communicated to the concerned utilities.*

TeST Decision

- *TeST committee technically consented to the proposal and referred to TCC/ERPC meeting for finalization of the implementation mode with consensus of all ER constiuents.CTU was advised to furnish detailed cost estimate and BOQ of the scheme in upcoming TCC meeting for deliberation.*
- *TeST committee advised all generating utilities to ensure the prompt availability of additional analog and digital signals to ERLDC in line with IEGC 2023.*
- *TeST Forum advised all ISTS transmission licensees and ISGS/IPP generating utilities to assess the feasibility of dual-channel reporting to ERLDC and confirm their progress to ERPC and ERLDC.*
- *Further, all utilities were advised to promptly initiate actions to replace old RTUs under the following conditions and communicate the same to ERPC and ERLDC:*

- o *RTUs with limitations in reporting all required analog/digital data to ERLDC.*
- o *RTUs with obsolete technology or those that have completed their useful life of 7 years (as per CERC Tariff Regulation 2024–29).*
- o *RTUs still reporting in the IEC 101 protocol and not supporting the IEC 104 protocol.*

2.6 Findings from communication audit in ER at Subhasgram Substation: ERLDC

As per regulations and NPC procedure for communication system audit , a committee comprising of ERPC, ERLDC , WBSETCL has conducted the audit of communication system at 400 KV Subhasgram , POWERGRID.

Key Findings are as follows:

1. Separation of approach cable and FODP for operation and commercial purpose.
2. Isolation of Control & Communication room.
3. Integration Battery Charger alarms /measurements shall be made available to SAS (if available) or alarms shall be alarmed in common substation annunciator.
4. Third party cybersecurity audit.

Hence it is requested to POWERGRID and SLDC to comply with the above in the up-coming communication nodes.

It is also requested to schedule the next ISTS / Critical Substation for next node of communication audit from the following nodes as discussed in earlier meeting.

a. Durgapur, PG
b. Maithoton , PG & Maithon , DVC,
c. Rourkela, PG and Rourkela OPTCL
d. Bhubaneswar, SLDC , OPTCL

Detailed Communication Audit report of 400 KV Subhasgram station along with compliance reply from Powergrid ER-II is attached in **Annexure-B.2.6.**

ERLDC may explain. Members may discuss.

Deliberation in the meeting

- *The key findings as per Audit Report **Annexure-B.2.6** were highlighted to the forum by ERPC representative.*
- *Powergrid updated that necessary measures have been taken for compliance of the audit observations i.r.o Subhasgram station.*

TeST Decision

- *Issues similar to findings of Audit committee at Subhasgram should be addressed in all other stations by all constituents.*
- *In line with the Audit observations, Powergrid was advised to have separate approach cable as well as separate Control and Communication rooms in all upcoming stations.*
- *It was decided that the next audit shall be carried out at Rajarhat and Jeerat substations.*

2.7 Workshop on adoption of MPLS technology in ISTS network by CTU/POWERGRID: ERLDC

NPC vide letter ref. CEA-GO-15-14/1/2021-NPC Division/256-277 dtd. 14.09.2023, constituted a Joint-Committee to assess Feasibility, Integration & Roll-out of MPLS in ISTS Communication System. CEA has nominated personnel for the Joint-Committee from CEA, all RPCs, CTU, GRID-INDIA, POWERGRID, CSPTCL-Chhattisgarh, KSEB-Kerala, RVPNL-Rajasthan and WBSETCL-West Bengal. The previous Joint Committee Meetings have discussed the following points:

- 1st JC meeting (19 Sep. 2023) - SDH getting obsolete and Compatibility with UNMS.
- 2nd JC meeting (17 Oct. 2023) - Presentations by MPLS-IP/TP vendors.
- 3rd JC meeting (5 Dec. 2023) - Presentation on alternate technologies. Assessment of POC done.
- 4th JC meeting (23 Jan. 2024) - MPLS-IP POC agreed by CISCO. N/w to be finalized for POC.
- 5th JC meeting (11 Mar. 2024) - MPLS/OEMs/Vendor issues, Field visit of RRVPNL & TANTRANSCO.
- 6th JC meeting (8 Aug. 2024) - Test setup shared. Locations finalized.

In the last 7th MPLS Joint Committee Meeting held on 20.12.2024 on Virtual Mode, **Draft Report on Introduction of MPLS technology in ISTS Communication System** was deliberated by CTU for information and discussion with all members. (MoM of 7th MPLS Joint Committee attached as **Annexure-B.2.7)**

- In view of above, it is to intimate that adaptation of MPLS technology for ISTS communication system is in verge of finalization and expected to be finalized in the Month of February 2025.
- Since all the SLDCs, IPPs, ISGS real time data and voice is to be integrated with respective RLDC, a workshop is proposed to be conveyed by the POWERGRID/CTU on said technology with emphasis on integrating constituents' data and voice with the ISTS communication network.

CTU may update. Members may discuss.

Deliberation in the meeting

❖ *CTU informed:*

✓ *The Joint Committee report on introduction of MPLS Technology in ISTS network is expected to be finalized by February 2025.*

✓ *Interoperability and compatibility i.e integration aspects of data and voice of all the constituents operating on other technologies shall be duly addressed before deploying MPLS.*

✓ *Since adoption of said technology is on the verge of finalization, it was agreed to arrange a workshop upon finalization of the same*

✓ *MPLS technology has already been implemented in some intra-state communication systems.*

✓ *It was affirmed that if MPLS technology of existing intra-state networks is found to be non-compatible with the new MPLS technology meant for ISTS network, the same shall not be introduced in ISTS communication.*

❖ *ERLDC submitted :*

✓ *A workshop on adoption of MPLS technology in ISTS communication may be arranged by CTU.*

✓ *State networks and ISTS systems may face integration and cyber security issues while using MPLS.*

✓ *OPTCL is in the process of adoption of OTN (Optical transport network) for their network , which also needs to be seamlessly integrated with ISTS network.*

TeST Decision

- ✓ *Since real time data and voice from all SLDCs, IPPs, ISGS is to be integrated with respective RLDCs, emphasis should be laid on seamless integration of constituents' data and voice with the ISTS communication network in presence of MPLS technology. CTU along with pan-India Joint Committee should duly take care of these aspects before introduction of MPLS.*
- ✓ *Upon finalization of the JC report on usage of MPLS in ISTS communication by the Joint Committee, CTU will initiate training sessions for entities to ensure a smooth transition to MPLS technology*
- ✓ *TeST committee opined that a comprehensive workshop involving ER states, SLDCs, and RLDC shall be convened by CTU to address the potential issues as well as apprising of the modalities of deploying MPLS Technology in ISTS communication network.*

2.8 Strengthening of last mile connectivity of Sikkim SLDC: ERLDC

It is observed that Sikkim SLDC last mile connectivity (Aerial link /UGFO link) fails very frequently there by ICCP links are down and non-availability of data and voice to ERLDC as well as SLDC, it was found that 03 times there is fiber cut between Gangtok and Sikkim SLDC (link length app. 5 Km) in last one to two months.

Moreover, as per guidelines from the technical manual for communication system, same is to be strengthened with redundant communication links.

Hence, it is proposed to CTU to take up said issue on priority for providing alternate link (viz. aerial cable /UGFO / MW point to point link with proper cyber security) to said link.

ERLDC may explain. Members may discuss.

Deliberation in the meeting

ERLDC intimated forum that recently said last mile FO link from Gangtok -Sikkim control room is cut many time and ICCP links of Sikkim to ERLDC is down frequently .

In this regard, SLDC Sikkim intimated:

- ✓ *Approximately with in three months of time redundant link from Rangpo- - Legshippool - Sikkim Control centre will be ready through separate ongoing project.*
- ✓ *Existing FO link is also strengthened by replacing faulty/damaged FO cable shortly.*

TeST Decision

TeST Committee advised Sikkim to enhance redundancy in last mile connectivity for uninterrupted communication of Sikkim SLDC with ERLDC.

2.9 Utilizing the Asset in the Deployment of the OPGW Network: Powerlinks

Powerlinks Transmission Limited carries out O&M of EHV transmission line (220kV and 400kV) having towers spread across 3 states from West Bengal to Uttar Pradesh. In existing transmission infrastructure, of Powerlinks in Eastern Region, is hereby requested for installation of OPGW, which can be utilized for:

- System Integration - OPGW facilitates the integration of Supervisory Control and Data Acquisition (SCADA) systems, which are essential for real-time monitoring, automation and control of the electrical grid.
- High Speed communication/ Data Transmission - The optical fibers within the OPGW are used for high-speed data transmission, which supports a range of communication needs.
- Lightning Protection - OPGW is installed at the top of the transmission tower, where it can intercept lightning and safely divert it to the ground.

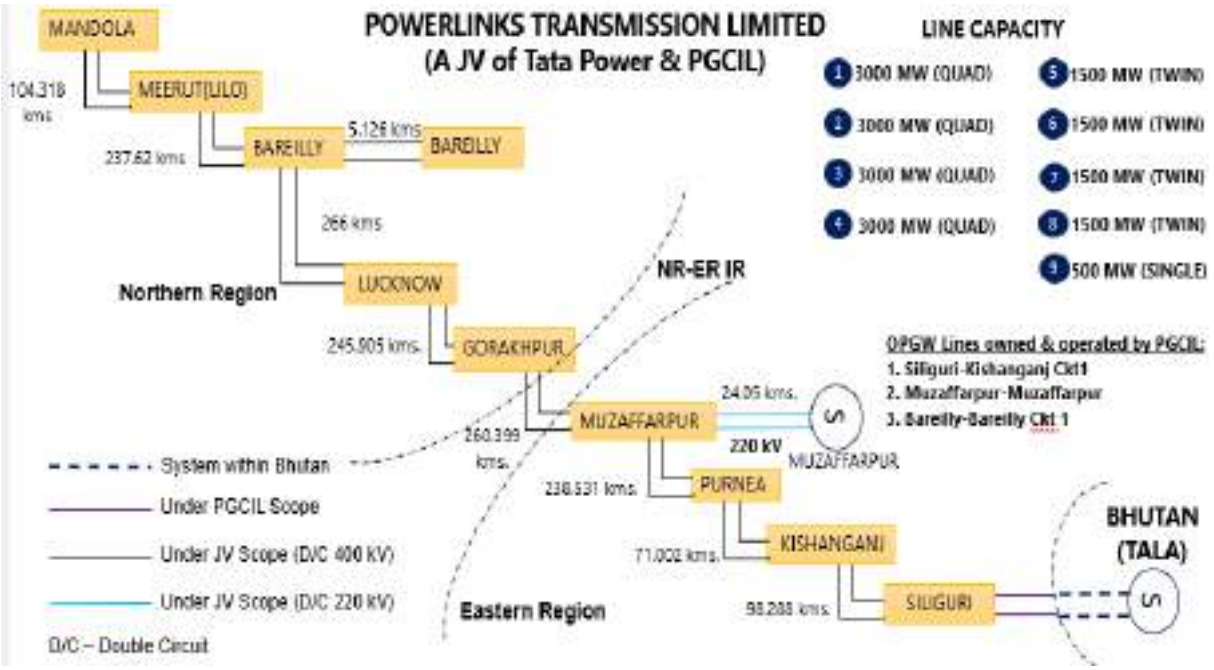
➢ **Also, as per the advisory by Central Electricity Authority dated 22.05.24 (reference attached), Central and State Sector utilities must prioritize the implementation of the OPGW laying across its transmission network to ensure compliance with regulatory requirements.**

➢ **Hence, to optimally utilize the existing transmission assets covering three states with a significant line length and adhere to the compliance with regulatory requirements, we propose to set up OPGW network in entire line length of Powerlinks Transmission Limited.**

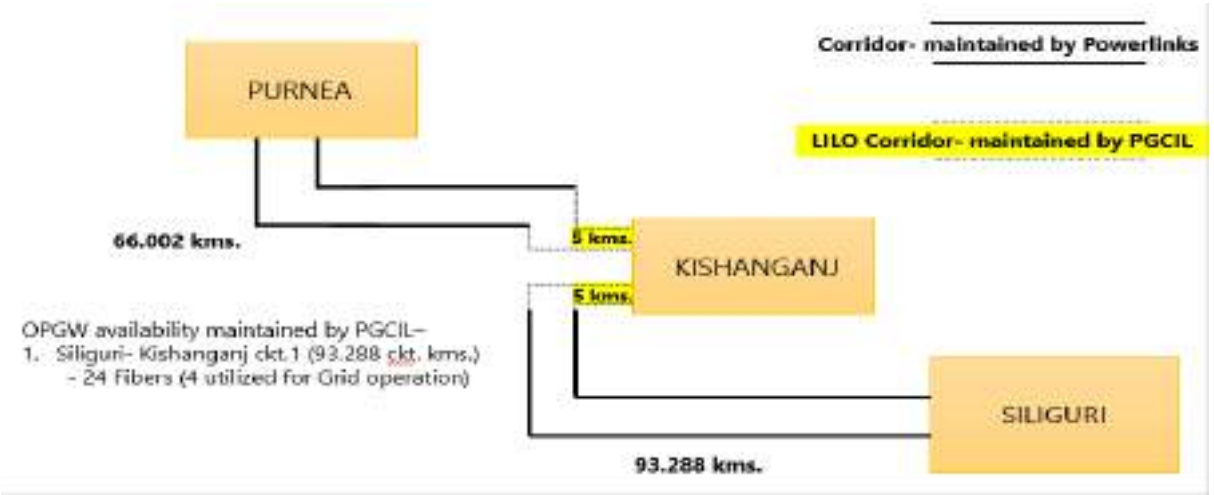
Details of transmission lines owned and maintained by Powerlinks

S.N.	Line name	Line Length (In KM)
1	Siliguri-Kishanganj Circuit-2	98.288
2	Kishanganj-Purnea Circuit 1	71.002
3	Purnea-Muzaffarpur Circuit 1	238.531
4	Muzaffarpur-Gorakhpur Circuit 1	260.399
	Total Length in ER region	**668.22 Km**

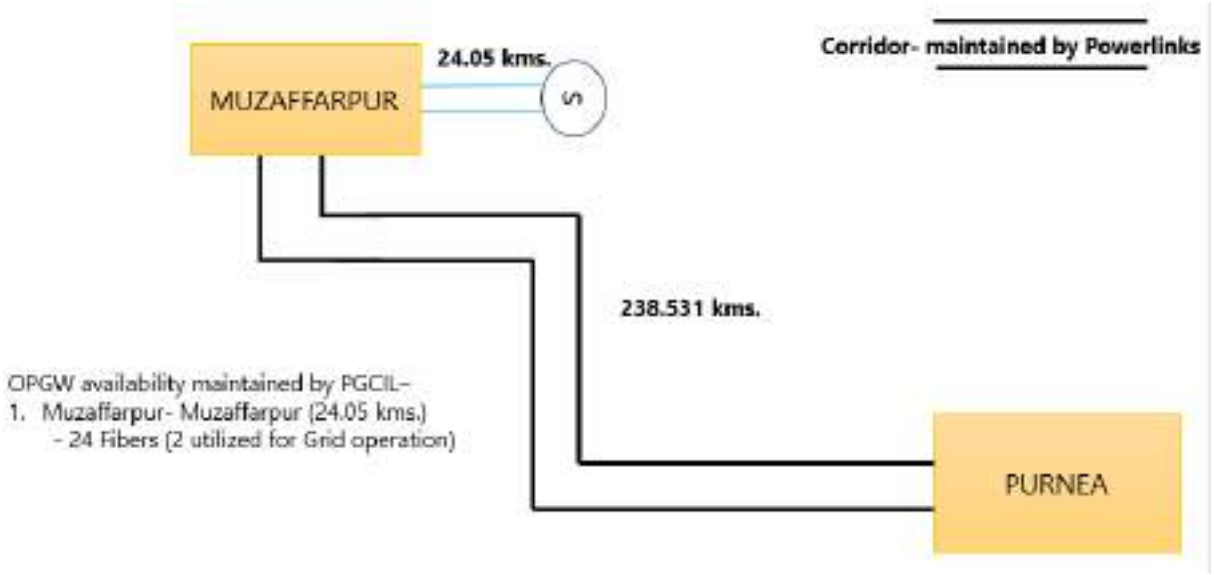
OVERVIEW



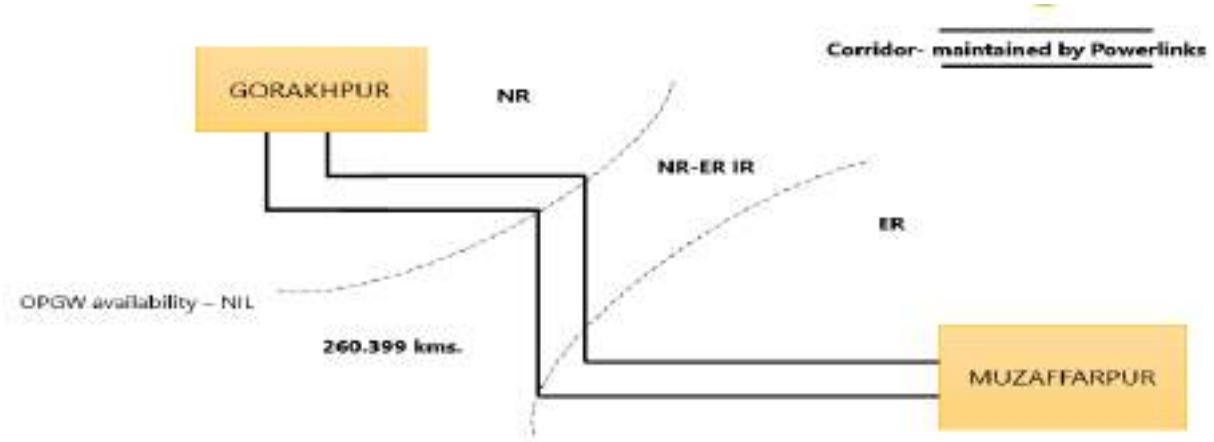
SECTION 1 (SILIGURI-PURNEA)



SECTION 2 (PURNEA-MUZAFFARPUR)



SECTION 3 (MUZAFFARPUR-GORAKHPUR)



Deliberation as per **221st OCC:**

Powerlinks briefly explained the proposal of OPGW laying on 04 no.s of 400 kV lines in line with CEA guidelines.Presently there exists OPGW only on 400 kV Binaguri-Kishanganj line in the vicinity and OPGW needs to be laid on all other lines as mentioned above.

221st OCC Decision

- Since the proposed laying of OPGW shall be carried out in RTM mode, technical requirement of the OPGW links for reliable communication needs to be ascertained.

Powerlinks may explain. Members may discuss.

Deliberation in the meeting

❖ *Powerlinks submitted:*

- ✓ *As per the advisory by Central Electricity Authority dated 22.05.24, Central and State Sector utilities must prioritize the implementation of the OPGW laying across its transmission network to ensure compliance with regulatory requirements.*
- ✓ *Accordingly it has been planned to install OPGW on our existing Transmission Lines of Eastern Region from Siliguri to Muzaffarpur (660 km approx.) to ensure optimum utilization of transmission network and provide alternate path of fibre for Operational purpose.*
- ✓ *Installation of 96-fiber OPGW for the Siliguri-Kishanganj LILO portion of their Siliguri - Mandola ISTS.*
- ✓ *The justification provided is based on the existing Powerlinks network configuration, which predominantly utilizes 96-fiber OPGW across its entire infrastructure. Maintaining this uniformity is considered essential for future scalability of data from Kishanganj.*

TeST Decision

- ✓ *TeST Committee opined that that Kishanganj is not a major urban hub and, as such, may not necessitate a 96-fiber OPGW installation.*
- ✓ *Powerlinks was advised to seek assistance of Powergrid in assessing the requirement of OPGW in the proposed lines in view of redundancy in ER communication network.*

2.10 Status of Eastern Region Communication Schemes awarded to TSPs.: CTU

Following communication projects have been awarded to various TSPs after approval in NCT.

Sl No.	Project Name	Award Date	Implementing Agency	Implementation Time	Status update by TSP
1.	Scheme for OPGW laying in 400kV BokaroA- Kodarma line.	11.03. 2024	POWERGRID	18 months	Installation Completion by March 2025
2.	Scheme for Requirement of Additional FOTE for redundancy at AGC locations in ER.	11.03. 2024	POWERGRID	06 months	Done
3.	Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity	22.11.2024	POWERGRID	12 months	Under tendering
4.	Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and Teleprotection for 400kV lines from PHEP-II, PHEP-I and Jigmeling of Bhutan to Alipurduar, India	22.11.2024	POWERGRID	06 months	Under Tendering
5.	Eastern Region Expansion Scheme-44: Supply and installation of OPGW along with terminal equipment at both ends of Siliguri (POWERGRID) – Kishanganj (POWERGRID)	22.11.2024	POWERLINKS	18 months	Under Process of Supply

	220 kV D/c (HTLS) line (108 km).				

Members may update.

Deliberation in the Meeting

Update on major Communications schemes of Eastern Region summarized as follows:

Sl No.	Project Name	Award Date	Implementing Agency	Implementation Time	Status update by TSP
1.	Scheme for OPGW laying in 400kV BokaroA-Kodarma line.	11.03. 2024	POWERGRID	18 months	✓ Under progress(installation done for more than 50km) ✓ The remaining work is progressing as planned and is expected to be completed by March 2025.
2.	Scheme for Requirement of Additional FOTE for redundancy at AGC locations in ER.	11.03. 2024	POWERGRID	06 months	✓ 2 nos. FOTE installation pending out of total 8. ✓ NTPC apprised that the material for FOTE installation already supplied at Talcher and Darlipalli stations. ✓ The remaining installation work is expected to be completed within the next two weeks.
3.	Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity	22.11.2024	POWERGRID	12 months	✓ Under tendering ✓ Implementation is targeted for completion by November 2025.
4.	Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and Teleprotection for 400kV lines from PHEP-II, PHEP-I and Jigmeling of Bhutan to Alipurduar, India	22.11.2024	POWERGRID	06 months	Under tendering.
5.	Eastern Region Expansion Scheme-44: Supply and installation of OPGW along with terminal equipment at both ends of Siliguri (POWERGRID) –	22.11.2024	POWERLINKS	18 months	In the LILO corridor maintained by POWERGRID, OPGW is laid over a span of 10 km while for the rest 98 km-OPGW laying to be carried out by POWERLINKS .

	Kishanganj (POWERGRID) 220 kV D/c (HTLS) line (108 km).				

TeST Decision

TeST committee noted the progess in execution of awarded communication schemes in ER and advised Powergrid to expedite the pending works for strictly adhering to the implementation timeline.

2.11 Status of ongoing projects in POWERGRID ER-II: POWERGRID

Following is the status of ongoing works in ULDC,ER-II under various approved projects:

A. Fiber Optic Expansion Project (Additional Requirement):

Link Name	Length (Km)	Status	Remarks
Teesta III-Kishanganj	242.062	Commissioned on 28.02.2024	Work was delayed due to severe ROW issues at various location and non-availability of A/R in non-auto mode due to high hydro scenario.
Rangpo-Chuzachen	20.727	Commissioned on 21.12.2024	Work was delayed for more than 3 years due to severe ROW issues in section T34-T37. Matter was taken up repeatedly with owner of TL, Sikkim Energy & Power Dept as well as Administration for resolution of the issue. There was very low ground clearance of conductor which was the main reason of ROW by local villagers. However, Joint Site visit was done by POWERGRID and Sikkim E&PD official on 18.11.2024 to find feasible solution to the problem. After lot of efforts, feasible solution of low conductor clearance was worked out and meeting conducted with local villagers on 09.12.2024 where they has given consent for carrying out the pending opgw work. Accordingly, work re-commenced and completed on 20.12.2024.
TLDP-NJP	82	Deleted from Scope of the Project	Consent rejected by WBSETCL,Owner of the TL, for carrying out OPGW laying on their line.

B. Upgradation of SCADA/RTU/SAS and Strengthening of OPGW In Eastern Region

Link Name	Length (Km)	Status	Remarks
Durgapur-Jamshedpur	183.635	Commissioned on 15.12.2023	
Durgapur-Farakka	157.745	Commissioned on 22.06.2024	Delay due to ROW issue at sites, non-availability of shutdown and entry issue in Farakka NTPC.
Rangpo-Dikchu	32.176	Commissioned on 11.09.2024	Delay due to flash flood in Sikkim in 4th Oct-2023. OPGW installation and equipment installation and commissioning was hampered. Majority of the sites are not reachable. DCPS & Battery Bank washed out at Dikchu HEP. Re-supply done. There was flood scenario again on June-2024 and major landslide occurred on August-2024. However, after reachability of site on September-2024, re-supply was done and pending work completed and link finally commissioned on 11.09.2024.

	SAS/RTU	Status	Remarks
Birpara	SAS	Commissioned	
NewMelli	SAS	Commissioned	
Gangtok	RTU	Commissioned	
Binaguri	RTU	Commissioned	
Subhasgram	RTU	Work in Progress	Delay due to non-availability of shutdown. Shutdown was issued by ERLDC in December-2024 & January-2025 for CT-PT integration and work of majority of the bays has been completed. Only 2 bays remaining. Expected commissioning by Jan-2025.
Maithon	RTU	Work in Progress	Delay due to non-availability of shutdown. Shutdown was issued by ERLDC in December-2024 & January-2025 for CT-PT integration and work of majority of the bays has been completed. Only 2 bays remaining. Expected commissioning by Jan-2025.

Berhampore	SAS	Commissioned	Delay due to non-availability of shutdown. Shutdown was received in December-2024, work has been completed. SAS commissioned on 01.01.2025.
Durgapur	SAS	Considered for keeping at SAS Lab at Rajarhat S/s	

C. Strengthening of OPGW in Eastern Region and Inter-regional Links

Link Name	**Length (Km)**	**Status**	**Remarks**
Jamuria-Ramkanali	51.995	Commissioned on 05.06.2023	
Ramkanali-CTPS	72.074	Commissioned on 23.03.2023	
Purulia-Jamshedpur	87.08	Commissioned on 12.04.2023	
CTPS-Gola	67.639	Commissioned on 22.03.2023	
KTPS-Giridih	105.298	Commissioned on 12.01.2024	
Howrah(DVC)-Howrah(WB)	1.022	Commissioned on 22.05.2024	
Maithon-Durgapur	74.125	Commissioned on 24.01.2024	
Durgapur-Sagardighi	133.572	Commissioned on 24.06.2024	
Farakka-Purnea	179.643	Commissioned on 24.06.2024	
Farakka-Sagardighi-Subhasgram	331.096	Commissioned on 18.12.2024	Delay due to non-receipt of permission from Railways and signing of way leave agreement with Railways for carrying out opgw work in 02 nos. railway crossing span. After repeated communication and followup with Railways (Howrah DRM, Eastern Railways), wayleave agreement signed on 12.09.2024. Several request was made for traffic & power block through official correspondence. Work finally completed and link commissioned on 18.12.2024.

Members may discuss.

Deliberation in the meeting

Powergrid apprised:

- ✓ *RTU upgraded at all stations except Maithon and Subhashgram.*
- ✓ *SAS ugradation done at all designated stations except at Durgapur and Rangpo. The modified proposal for SAS upgradation at Durgapur and Rango stations was deliberated and approved in 222nd OCC.*

TeST Decision

TeST committee noted the status along with reasons of delay as furnished by Powergrid and opined in favor of completion of the pending works at the earliest.

2.12 Proposal for deletion of FOTE in Teesta-V under redundant FOTE scheme for AGC in ER: POWERGRID ER – II

Scheme for redundant FOTE in AGC locations in Eastern Region was approved in 18th NCT. Following is the status:

S/n	Location	Region	Status	Remarks
1	Rangit	ER-II	Commissioned	
2	Teesta-V	ER-II	Pending	Proposed for deletion from scope of project.
3	NTPC Barh	ER-I	Commissioned	
4	MTPS Kanti	ER-I	Commissioned	
5	NPGC Nabinagar	ER-I	Commissioned	
6	NorthKarnpura	ER-I	Commissioned	
7	Talcher NTPC	Odisha Projects	Commissioning In Progress	
8	Darliparli NTPC	Odisha Projects	Commissioning In Progress	

Teesta-V NHPC vide email (copy attached in **Annex B.2.12**) confirmed that plant is under shutdown and installation of FOTE is not possible and it is expected to come in operation in 2026. Hence, it is proposed for deletion of the redundant FOTE in Teesta-V from scope of this project.

Powergrid may explain. Members may discuss.

Deliberation in the meeting

- ✓ *As Teesta-V station is under long outage and expected to resume operation by 2026 only, installation of redundant FOTE is not feasible within the current project timeline.*

- ✓ *CTU proposed that the deletion of Teesta-V from the current project scope be deferred, and install the FOTE for Teesta-V to another location for the time being. Deletion from scope will entail time consuming process of revised approval of the entire scheme.*
- ✓ *Commercial petition for this scheme may be submitted without including the FOTE at Teesta-V. Commissioning of FOTE can be later completed as per the scheme after the operation of Teesta-V resumes.*

TeST decision:

- *TeST Committee suggested that since procurement of a single FOTE may be a cumbersome process,the FOTE proposed for Teesta-V should not be deleted from the scheme. Instead,this asset may be kept as spare by Powergrid for replacement in breakdown or installed at Teesta-V station once it resumes operation.*

2.13 Ensuring Accurate data and Telemetry for the Proper functioning of State Estimator in ERLDC: ERLDC

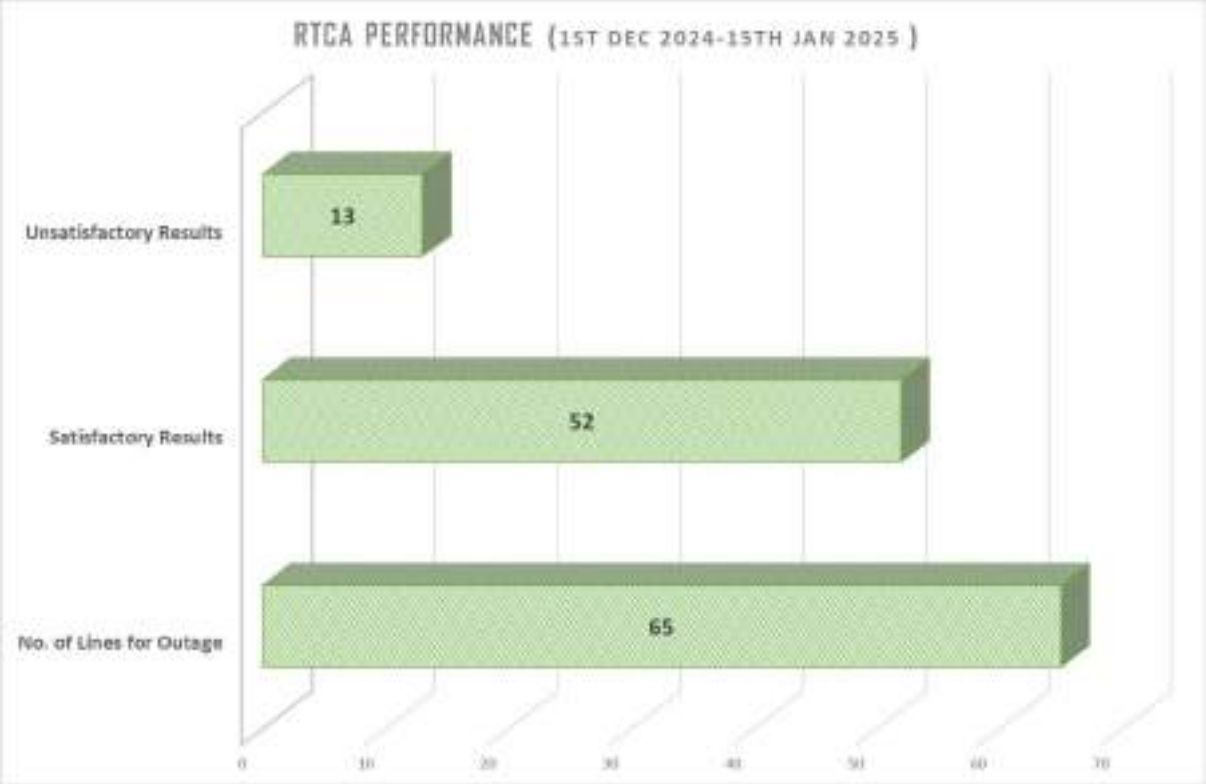
Present SCADA/EMS in SLDCs and ERLDC has State Estimator (SE) and Real-Time Contingency Analysis (RTCA) which are important for real time decision support for providing any planned outage or accessing impact of any forced outage on the grid. Presently SE and RTCA is functioning only at ERLDC and are not properly functional in SLDCs. At ERLDC it's truncated at 220 kV levels due to poor reliability of data at 132 kV levels. Major reasons for non-working of SE and RTCA at SLDCs and truncation at ERLDC at 220 kV level are non-availability of reliable data and telemetry of 132 kV substations specially breaker/isolator status. However, ERLDC is supporting states so that these can be made functional to some extent.

Now new SCADA/EMS system implementation under ULDC Phase III has already commenced in Eastern Region. The new SCADA/EMS system includes several additional decision-support tools apart from SE/RTCA for real-time operations, of which some of prominent ones are listed below:

- Automatic Demand Management System (ADMS)
- Load Forecasting
- Transmission Loss Sensitivity Factors (TLSF)
- Network Sensitivity Applications (LODF, GSDF, LSDF)
- Optimal Power Flow (OPF)
- Short Circuit Analysis (SCA)
- Transmission Line/Corridor Capability Monitor (TCM) for Real time ATC/TTC calculation
- Dynamic Security Assessment (DSA)

Successful integration of these tools at SLDCs as well as ERLDC hinges on accurate data and telemetry from 132 kV and above substations in the Eastern region.

Performance status of running RTCA for Real time outage is provided in below figure from 1st Dec 2024 till 15th Jan 2025 at ERLDC.



During this, out of 13 results major three outages where times SE and RTCA function at ERLDC did not provide satisfactory results due to data availability issues as quoted below. It can be seen that, how analog as well digital status input can impact decision support tools non-availability during real time grid operation. In coordination with SLDCs and Utilities, these observed issues have been rectified bilaterally.

Date	Description of SCADA/EMS Data Issue	Impact on SE/RTCA Performance at ERLDC	Remarks/Corrective Action
03-12-2024	Non-update of correct Status data of 400 kV Meramundali Station	Non-Satisfactory Result in RTCA	Corrected in coordination with SLDC Orissa
07-12-2024	Data Quality issue from Farakka NTPC for Analog and Status Points	Non-Satisfactory Result in RTCA	Corrected in coordination with NTPC Farakka
02-01-2025	Partial Data availability from Maithon and Subhasgram	Non-Satisfactory Result in RTCA	Corrected in coordination with POWERGRID

In view of the above, following points may be discussed:

- SLDCs should utilize existing SCADA SE/RTCA tools for real time contingency analysis and outage processing.
- SCADA data telemetry monitoring and compliance status for all 132 kV and above substations in OCC and TeST meeting of Eastern region.
- All SLDCs to share the complete substation based RTU wise list and its communication availability, integration and reporting in SLDC SCADA, protocol (101/104), RTU/SAS

upgradation plan, Communication system under planning, timeline for completion of activities and any other relevant details

- All SLDCs at present should ensure station wise checking of all analog and status point, checking of suspected isolator/breaker status and its correction at field levels.
- Ensuring integration of all required digital and analog data during new SAS/RTU upgradation work to ensure function of these tools at SLDC level.

- **221st OCC Decision**
  OCC advised all ER constituents to ensure reliable telemetry from all 132 kV and above stations to ERLDC for proper functioning of essential SCADA tools Real-Time Contingency Analysis (RTCA), State Estimator (SE),etc at both ERLDC and respective SLDCs.

ERLDC may explain. Members may discuss.

Deliberation in the meeting

ERLDC stated:

- ✓ *The importance of both analog and digital status data for the proper functioning of the state estimation (SE) and real time contingency analysis (RTCA) tool integrated with SCADA/EMS systems, which is essential for operational planning studies.*
- ✓ *As per IEGC 2023, real-time, error-free operational data is primary requirement to ensure proper execution of network analysis tools.*

TeST decision:

- *TeST Forum opined to establish a core working group under leadership of ERLDC comprising members from SLDCs and ERLDC(SCADA and Communication personnels for monitoring progress of RTU upgradation, actions required to enhance SCADA/EMS data quality, availability and reporting from the sites. The working group is expected to convene meeting every months wherein the group will review progress, discuss improvements, and identify challenges. The updated status and key issues will then be presented in the subsequent TeST meeting for further review and necessary action.*
- *TeST committee advised all SLDCs to provide substation-wise updated status for RTU/SAS covering the following details:*

1. ***Voltage Levels**: Availability of RTU/SAS for 132 kV and above (66 kV and above for Sikkim).*
2. ***RTU Details**: Make of RTU, commissioning date, and the need for upgradation after completing 7 years of service life.*
3. ***Protocol Information**: Reporting protocols being used (IEC 101/IEC 104).*
4. ***Dual channel reporting feasibility to SLDC***
5. ***Communication System**: Availability of the communication system and the plan for upgradation if any.*

This information is critical for ensuring smooth grid operation and planning.

2.14 Ensuring Real-Time Data Telemetry for Newly added/Modified Transmission and Generation Elements with ERLDC for Real time operation and SCADA/EMS Decision support tools functioning: ERLDC

- In the fiscal year 2024-25, numerous requests have been received at ERLDC from ISTS-connected users and users under SLDC jurisdiction for the integration of newly added or modified transmission and generation elements. However, these requests often lack ensured real-time data telemetry prior to first-time charging.
- Users are then providing undertakings from their management stating that real-time data telemetry will be made available within a time-bound manner. Based on the undertaking, though ERLDC has allowed charging of such elements for overall improvement of power supply position in respective control area, but the commitment made in such undertaking are not fulfilled.
- This is resulting in violation of data availability commitment for reliable and secure grid operation, affecting state estimation accuracy, and the effectiveness of the real-time contingency analysis tool within the SCADA/EMS system at the ERLDC level.

A list of applications received in year 2024-25 where charging has been allowed based on undertaking for data and telemetry are listed below where undertaking timelines have not been adhered to.

Applicant	FTC Application	Substation Name/Element Name	Date mentioned for compliance in Undertaking	Compliance Status
Indian Railway	Main Bays of Pusauli(PG)to Durgawati(DFCCIL)	220 kV Durgawati	SCADA (30-10-2023)	No
SLDC Bihar	Charging of 132 kV DMTCL (Motihari)-Motihari D/C tr. line after restoration of fallen and damaged towers at loc 122,123,124.	132 kV Motihari (BSPTCL)	SCADA (18.06.2024)	No
SLDC Ranchi	FTC of LILO 132KV Sonenagar-Nabinagar-Nagaruntari TL at GSS Nabinagar	132 kV Nagaruntari (JUSNL)	SCADA (02.07.2024) and VOIP (04.12.2024)	No

It has been informed to all users that as per the below mentioned regulations, all users, including generating plants and transmission licensees under the control areas of RLDC and SLDCs, must ensure the integration of SCADA and telemetry for real-time data for grid operations at SLDC and RLDC levels as required.

- IEGC Clauses 8.2.3, 8.2.4, 11.1, 11.3
- CERC (Communication System for Inter-State Transmission of Electricity) Regulations 2017, Clause 7.8.i
- CEA (Technical Standards for Connectivity to the Grid) Regulations 2007, Clauses 6.3 and 6.5

- CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations 2022, Clauses 10.1.b, 40.1.c.i & ii, 43.4
- IEGC Clause 33.2, which mandates reliable and accurate real-time data for successful state estimation and real-time contingency analysis through the SCADA/EMS system at RLDC and SLDC levels.

In view of the above, following actions points are envisaged by all users within ERLDC and SLDCs control areas

- All users within the ERLDC control areas and Eastern Region State Control areas must prioritize the successful installation and integration of all communication systems, channels, and interfaces with the ERLDC/SLDC SCADA system before applying for charging any new elements.
- Significant lead time should be provided for integration and checking of real time data availability at ERLDC level.

Further, practice of allowing charging based on undertakings should be discouraged and to be communicated to all users within the State control areas so that they can take up the same during project implementation phase.

Members may discuss these issues and the necessary steps to ensure compliance and improve real-time operations.

ERLDC may explain. Above constituents may update. Members may discuss.

Deliberation in the meeting

Updates received from the constituents summarized below:

Applicant	***FTC Application***	***Substation Name/Element Name***	***Date mentioned for compliance in Undertaking***	***Deliberation in the meeting***
Indian Railway	*Main Bays of Pusauli(PG)to Durgawati(DFCCIL)*	*220 kV Durgawati*	*SCADA* *(30-10-2023)*	✓ *ERLDC informed SCADA data are not available in spite of repeated persuasion with Indian Railway.* ✓ *No representative from Indian railway was present during 16th TEsT meeting.*
SLDC Bihar	*Charging of 132 kV DMTCL (Motihari)-Motihari D/C tr. line after restoration of fallen and damaged towers at loc 122,123,124.*	*132 kV Motihari (BSPTCL)*	*SCADA* *(18.06.2024)*	*BSPTCL informed that they will update the status of digital data availability within 2-3 days.*

SLDC Ranchi	*FTC of LILO 132KV Sonenagar-Nabinagar-Nagaruntari TL at GSS Nabinagar*	*132kV Nagaruntari (JUSNL)*	*SCADA (02.07.2024) and VOIP (04.12.2024)*	✓ *SLDC Ranchi informed that Fibre optic connectivity has been completed. However installation of terminal equipment is pending at Nagaruntari end.* ✓ *SLDC Ranchi assured data will be available by August 2025.*

TeST decision:

- *TeST emphasized all utilities that SCADA/EMS data reporting to SLDC and ERLDC must strictly adhere to regulatory compliance and meet the requirements for real-time grid operation. Data availability of the bays/new elements should be ensured to prior to applying for first time charging (FTC) clearance.*
- *TeST forum opined to avoid FTC of new elements/bays based on any undertaking or commitments.*
- *To inculcate the importance of above decision, it is imperative to communicate SCADA data availability requirement, associated regulatory compliance and its fulfillment effectively to site executives via respective SLDCs/constituents. This will ensure that the critical role of SCADA/EMS data reporting is taken seriously and properly integrated during project commissioning activities.*

2.15 Non availability of SCADA telemetry in Eastern region: ERLDC

- SCADA/EMS system has been installed at SLDC and RLDC and real time operators are performing grid management activities based on real time SCADA data. Further, State Estimation (SE) application and real time contingency analysis (RTCA) application in SCADA/EMS system also utilize these data for decision making. It may kindly be noted that as per **clause 33.2 of IEGC 2023,**
- *"SLDCs, RLDCs and NLDC shall utilize network estimation tool integrated in their EMS and SCADA systems for the real time operational planning study.* ***All users shall make available at all times real time error-free operational data for the successful execution of network analysis using EMS/SCADA. Failure to make available such data shall be immediately reported to the concerned SLDC, the concerned RLDC and NLDC along with a firm timeline for restoration.*** *The performance of online network estimation tools at SLDC and RLDC shall be reviewed in the monthly operational meeting of RPC. Any telemetry related issues impacting the online network estimation tool shall be monitored by RPC for their early resolution."*
- However, it is observed that several important stations under SLDC jurisdiction in Eastern Region are not reporting to respective SLDCs (as shown in table below) and hence ERLDC is also not getting data through ICCP. SLDC wise list of substations is tabulated below. Substations with voltage level 220 kV and above along with 132 kV stations (**in Annexure-B.2.15**) are listed below.

Table: Area wise no of station without data telemetry as on 08-01-2025 for 220 KV and above level.

SLDC Responsible for data integration	No of SS/GS without data Telemetry
BSPTCL	07
JUSNL	09
OPTCL	05
WBSETCL	04

Table: Area wise no of station without data telemetry as on 08-01-2025 for 132 KV level.

Constituent Responsible for data integration	No of SS/GS Integrated with ERLDC	No of SS/GS NOT reporting to ERLDC
BSPTCL	92	71
JUSNL	26	20
OPTCL	68	23
WBSETCL	91	31
DVC	29	2
SIKKIM	3	2
CS	5	2

Detailed list of 132 kV Substation is provided in Annexure B.2.15.

Details of stations, which are not reporting or yet to be integrated at SLDC for 220 KV and above level stations is provided below as per SLDC bifurcation:

Table: Non availability of SCADA Data Telemetry of Bihar Substations

SL No.	BSPTCL	Last Reported	15th TEsT Meeting Status
1	FATUHA_220	27-02-2024, Bus and Feeder Data are not reporting	Not reporting due to Node issue of RTU
2	BEGUSARAI_220	16-05-2024, Bus and Feeder Data are not reporting	Analog data partially reporting. Issue of communication cable which is rectifying at the field end
3	SONENAGAR_NEW_220	27-09-2024, Bus and Status Points are not reporting	Bus and Status Points are now reporting at Bihar SLDC

4	MUSAHARI_220	Reporting intermittently	Partial data were being reported at Bihar SLDC
5	LAUKAHI_220	12-09-2024	Partial data were being reported at Bihar SLDC
6	JAMALPUR_BGCL_220	Reporting intermittently	Partial data were being reported at Bihar SLDC
7	GARAUL_220	08-07-2024	Partial data were being reported at Bihar SLDC

Table: Non availability of SCADA Data Telemetry of Jharkhand Substations

SL No.	JUSNL	Last Reported	15th TEsT Meeting Status
1	BURMU_220	INTEGRATION ISSUE	Burmu will be reporting in next 2 months
2	CHATRA_220	16-01-2024	Additional Time required
3	GIRIDIH_220	INTEGRATION ISSUE	Additional Time required
4	GODDA_220	11-01-2023	Additional Time required
5	JASIDIH_220	01-06-2023	Additional Time required
6	GARHWANEW_220	28-02-2022	Additional Time required
7	SMARTCITY_220	27-02-2023	Additional Time required
8	DUMKA_220	22-05-2023	Additional Time required
9	CHAIBASA_220	25-10-2022	Additional Time required

Table: Non availability of SCADA Data Telemetry of Odisha Substations

SL No.	OPTCL	Last Reported	15th TEsT Meeting Status
1	NALCO_220	21-04-2023	Earlier it was reporting in 101 protocol. NALCO is in the process of data transmission over IEC 104 protocol . 11 KM of OPGW link is already established. It will be completed within 3 months
2	PARADEEP_ESSAR_220	10-11-2021	RTU upgradation for data transmission over IEC 104 is under process. This matter has been already taken up

			with M/s Essar.
3	EMAMI_220	01-11-2021	Letter from CGM (Tel), OPTCL & SLDC has already been issued to EMAMI for rectification of data link to SLDC. EMAMI yet to respond.
4	PARADEEP_IOCL_220	01-11-2021	Because of obsoletion of PLCC equipment, IOCL has already been given BOQ to migrate to 104 communication. Their response is awaited
5	TELKO_220	INTEGRATION ISSUE	220KV Telkoi SAS has been failed since dt 17.06.2023 due to GE SAS gateway issue. This matter has-been already taken up with M/s-GE

Table: Non availability of SCADA Data Telemetry of West Bengal Substations

SL No.	WBSETCL	Last Reported	15th TEsT Meeting Status
1	TLDP4_220	28-08-2023	To be restored within 3 months
2	TLDP3_220	18-05-2024	Reporting at SLDC level
3	KLC_Bantala_220	16-07-2022	Reporting at SLDC level
4	HALDIA TPP_400	Bus-1 and few Status Points are not reporting	

Looking at above aspects, SLDCs may kindly provide a firm timeline for restoration of data from these 220 kV and above level Substations. SLDC may kindly share the RTUs wise data availability to ERLDC so that all substations up to 132 kV level can be integrated at ERLDC level for New SCADA system.

ERLDC may explain.BSPTCL, JUSNL, OPTCL, WBSETCL may update. Members may discuss.

Deliberation in the meeting

TeST decision:

- *TeST committee expressed serious concern on absence of data telemetry from a large number of stations(S/S or generating stations) at 132 kV level which is hampering proper utilization of network estimation tool in SCADA.*
- *BSPTCL, JUSNL, OPTCL and WBSETCL were directed to share the updated status along with action plan of restoring SCADA data telemetry from all substations as listed above in the agenda.This must be furnished to ERPC/ERLDC positively within a week.*

2.16 Non-reporting stations for AMR: ERLDC

Deliberation in the meeting

Below mentioned list of stations are not reporting to ERLDC via AMR due to certain reasons like LAN or Communication related issue. Latest status and course of action detailed below:

Sr. No.	Utility	SUBSTATION_NAME	Issue	Remarks	Update in 16th TeST
1	WBSETCL	New PPSP	Data Not reporting since long	Communication/AMR issue	Testing of links to be done by TCS with coordination of Powergrid and WBSETCL in next 15 days
2	WBSETCL	Bidhannagar 400KV			
3	WBSETCL	Subhasgram			
4	WBSETCL	New Town			
5	WBSETCL	Bidhannagar 220KV			
6	WBSETCL	Jeerat			
7	WBSETCL	Santaldihi			
8	WBSETCL	Sagardighi			
9	WBSETCL	KLC Bantala	Port not configured	No card available	Port configuration issue would be resolved in next 15 days
10	Bihar	KISHANGANJ	LAN DOWN	Network Issue	LAN connectivity issues would be sorted by 15 days.
11	Bihar	DARBHANGA	LAN DOWN	Network Issue	
12	Bihar	SIPARA	Panel Shifted	Network Issue	
13	Bihar	Khagul	LAN DOWN	Network Issue	
14	Bihar	SONNAGAR NEW(BH)	LAN DOWN	Lan need to restore	
15	Bihar	132 KV Baisi	Port not Configured	New Meter integration in-progress	Port configuration issue would be resolved in next 15 days
16	Bihar	132 KV Raxaul	Port not Configured		
17	Bihar	132 KV Kataiya	Port not Configured		

18	*Bihar*	*132 KV BalmikiNagar*	*Port not Configured*		
19	*Bihar*	*400 KV Bakhtiyarpur New*	*Port not Configured*		
20	*Bihar*	*132 KV RAMNAGAR*	*Port not Configured*		
21	*GRIDCO*	*132 KV JALESWAR(GRIDCO)*	*Port not Configured*	*Entry Permission*	*Issue under analysis.*
22	*GRIDCO*	*JODA(GRIDCO)*	*LAN DOWN*	*-*	*Ping not working, would be resolved in 15 days*
23	*GRIDCO*	*Dhulunga CMP*	*Port not Configured*	*No panel*	*Port configuration would be done after supply of panel*
24	*GRIDCO*	*132 KV BHOGRAl(GRIDCO)*	*Port not Configured*	*No panel*	
25	*SIKKIM*	*220 KV LEGSHIP POOl(SIKKIM)*	*Port Configured, Pin not available*	*-*	
26	*JUSNL*	*LALMATIA(JH)*	*LAN DOWN*	*Network Issue*	

TeST decision:

Since AMR data is pivotal for post-despatch analysis and energy settlement of the ER constituents, loss of data from sites may lead to miscalculation and subsequent commercial implications. Thus all non-reporting stations(mentioned in the above list) should resolve the issues as per committed timeline .

2.17 Deviation in SCADA Vs SEM data: ERLDC

ERLDC publishes deviation in tie-lines data of SCADA system while comparing with SEM meter data every week and shares it with all associated utilities and SLDCs. This is for improvement of SCADA data accuracy and to minimize error. This helps in real time decision support tool for deviation management and ensuring grid reliability.

Three key feeders from the shared list is being explained where SCADA data telemetry at field level is required to be checked on urgent basis and actions are envisaged.

- Based on 02 December 2024 to 08 December 2024 data analysis for **400KV Biharsharif - Balia circuit 1** is provided below in tabular form where the analysis of SEM Vs SCADA revealed that Biharsharif end SCADA data need to be checked as showing high % error. Associated plots for the same is attached.

Comparison	**Error %**	**Remarks**
SEM VS SCADA at Biharsharif End	28.7	

SEM VS SCADA at Balia End	3.83	Based on the analysis of error, Biharsharif end SCADA data need to be checked as it is showing high percentage of error.
SCADA(Biharsharif) VS SCADA (Balia)	32.98	
SEM(Biharsharif) VS SEM(Balia)	8.75	

- Based on 09 December 2024 to 15 December 2024 data analysis for **400KV Biharsharif - Balia circuit 2** is provided below in tabular form where the analysis of SEM Vs SCADA revealed that Biharsharif end SCADA data need to be checked as showing high % error. Associated plots for the same is attached in the annexure.

Comparison	**Error %**	**Remarks**
SEM VS SCADA at Biharsharif End	28.4	Based on the analysis of error, Biharsharif end SCADA data need to be checked as it is showing high percentage of error.
SEM VS SCADA at Balia End	3.57	
SCADA(Biharsharif) VS SCADA (Balia)	32.71	
SEM(Biharsharif) VS SEM(Balia)	1.29	

- Based on 09 December 2024 to 15 December 2024 data analysis for **400KV Talcher - Meramundali 1** is provided below in tabular form where the analysis of SEM Vs SCADA revealed that Talcher end SCADA data need to be checked as showing high % error. Associated plots for the same is attached in the annexure.

Comparison	**Error %**	**Remarks**
SEM VS SCADA at Talcher End	9.42	Based on the analysis of error, Talcher end SCADA data need to be checked as it is showing high percentage of error.
SEM VS SCADA at Meramundali End	1.06	
SCADA(Talcher) VS SCADA (Meramundali)	9.45	
SEM(Talcher) VS SEM(Meramundali)	5.51	

Plots available in **Annexure-B.2.17**

ERLDC may explain. Members may discuss.

Deliberation in the meeting

During the 15th NPC meeting, the issue of deviations between SEM and SCADA data was discussed in detail. It was noted during the meeting that detailed deliberation are required at the RPC level to address the reported discrepancies by RLDCs, with the objective of minimizing errors and ensuring data accuracy.

ERLDC informed:

Letters are being sent weekly to the concerned utilities, highlighting observed errors between SEM and SCADA data. All utilities have been requested to take necessary corrective actions to reduce these discrepancies.

TeST Decision

- *TeST committee opined that addressing SCADA vs SEM deviations is critical, as they have a significant impact on real-time grid operation and deviation management by the constituents.*
- *TeST forum emphasized prompt action to be taken by all transmission and generation utilities, at both intra-state and inter-state levels, regarding SCADA data issues reported by ERLDC based on SEM vs. SCADA data analysis.*
- *TeST forum also advised respective SLDCs of ER to undertake SEM vs. SCADA data comparison activities at their end to improve accuracy of SCADA data.*

2.18 Non-reporting of PMUs: ERLDC

PMU data are used at ERLDC for real-time monitoring as well as post-facto analysis of faults and other events. At present, 7 number of physical PMUs from multiple central sector stations are not reporting to ERLDC. Respective Utilities has been informed over mail and other communication about these issues.

List of non-reporting Central Sector PMUs are tabulated below:-

PMU ID	PMU Address	Station	Station ID	Feeder(s)	Issue	Last reported on
5675-5676	ER1KISHN_PG PM05	Kishanganj	KISHN_PG	400DARBH_PG 1	Waiting for configuration frame	23-02-2024
5678-5679	ER1KISHN_PG PM06	Kishanganj	KISHN_PG	400DARBH_PG 2	Waiting for configuration frame	23-02-2024
5762-5763	ER1DARBH_PGPM01	Darbhanga	DARBH_PG	400SITAM_PG2	Waiting for configuration frame	16-05-2024
5765-5766	ER1DARBH_PGPM02	Darbhanga	DARBH_PG	400SITAM_PG1	Waiting for configuration frame	16-05-2024
5226-5228	ER1KAHAL_NTPM01	Kahalgaon	KAHAL_NT	400LAKHI_PG1 and 2	GPS lock and time-stamp issue	>1 year
5229-5231	ER1KAHAL_NTPM02	Kahalgaon	KAHAL_NT	400BANKA_PG 1 and 2	GPS lock and time-stamp issue	>1 year
5232-5234	ER1KAHAL_NTPM03	Kahalgaon	KAHAL_NT	400FARAK_PG 3 and 4	GPS lock and time-stamp issue	>1 year

Further, PMUs at Alipurduar and Birpara are dropping significant numbers of frames:

ERLDC may explain. POWERGRID, NTPC and DMTCL may update. Members may discuss.

Deliberation in the meeting

POWERGRID ER-II updated:

- ✓ *The replacement work of the GPS antenna and cable is in progress at Kahalgaon, and the issue is expected to be rectified by 24.01.2025.*
- ✓ *PMU Data at Kishanganj and Darbhanga is expected to be restored by mid-February 2025.*
- ✓ *Packet loss issues at PMUs in Alipurduar and Birpara substations will be resolved at the earliest.*

TeST Decision

Considering the importance of PMUs in fault anlysis and real time grid operation, Powergrid was advised to take corrective measures as per committed timeline for uninterrupted reporting of PMU data.

2.19 SCADA Integration & Reporting Status of Transnational Tie Lines with Nepal: ERLDC

SCADA data reporting in respect of 132 KV Kataiya-Duhabi Feeder ,132 KV Ramnagar-Valmikinagar Surajpura Feeder is not available at ERLDC.

As per the deliberation in **14th TesT :**

BSPTCL representative apprised:

SCADA data reporting in respect of 132 KV Kataiya-Duhabi Feeder is hampered owing to RTU malfunctioning while there is issue with PLCC i.r.o 132 KV Ramnagar-Valmikinagar Surajpura Feeder.

14th TeST Decision:

TeST committee advised BSPTCL to resolve the persistent issues at the earliest (within 15 days) to ensure reliable reporting of important Trans-national tie lines with Nepal in SCADA.

Further **IEGC 2023, Clause 11.3** states that

"All users, STU and participating entities in case of **cross-border trade shall provide,** in coordination with CTU, the required facilities at their respective ends as specified in the connectivity agreement. The communication system along with data links provided for speech

and real time data communication shall be monitored in real time by all users, CTU, STU, SLDC and RLDC to ensure high reliability of the communication links."

However, real time monitoring cross border power exchange is affected due to non reporting of SCADA data of the cited stations. BSPTCL and Bihar SLDC may share the present status/progress regarding corrective action for the data availability at ERLDC.

Deliberation in the meeting

BSPTCL apprised:

- ✓ *The SCADA data for the 132 kV Kataiya-Duhabi feeder is intermittently reporting.It was assured that the issue will be fully resolved within one month.*
- ✓ *Regarding the 132 kV Ramnagar-Valmikinagar Surajpura feeder, the data reporting is currently functional.*

ERLDC informed that SCADA data from 132 kV Surajpura Substation is not available at ERLDC end.

TeST Decision

TeST committee emphasized the importance of ensuring data availability for all transnational tie lines and advised Bihar SLDC to take necessary corrective action within 15 days for ensuring the availability of SCADA data i.r.o all transnational tie lines with Nepal.

2.20 Submission of MAC/IP address of all end user communication equipment's: ERLDC

TeST committee in 15th TeST Meeting opined that remaining utilities may submit the details to ERLDC in prescribed format. Status of Constituents wise list is attached at **Annexure B.2.20.**

ERLDC may explain. Members may discuss.

Deliberation in the meeting

ERLDC stated:

Most of the data from POWERGRID ER-I/ER-II , OPTCL , DVC and some IPP & ISGS have been received. However the same is pending from JUSNL, BSPTCL and WBSETCL.

TeST Decision

*All remaining utilities are requested to submit the MAC/IP details as per **Annexure B.2.20** to ERLDC in the prescribed format by end of February 2025.*

2.21 Information on Trial Operation Certificate issued for various OPGW links and AGC FOTE in ER: ERLDC

ERLDC issues trial operation certificates for the OPGW links in line with the length and other parameters as approved in ERPC forum. A brief overview of the OPGW links with their commercial operation dates provided below:

Summary of OPGW Links with DOCO.

Sl.No.	Name of link (Rating)	Date of Certificate	DOCO	Link length
1	400 KV D/C Patna-Balia Line-1 OPGW Link (24 F DWSM)	31/01/2024	17.11.2023	180.45 km
2	LILO portion of Biharsharif-Balia at Ara OPGW Link (48 F DWSM)	29/01/2024	30.12.2023	10.192 km
3	400 KV BRBCL Nabinagar- Sasaram OPGW Link (24 F DWSM)	02/02/2024	30.12.2023	81.394 km
4	400 KV Biharsharif- Sasaram OPGW Link (24 F DWSM)	02/02/2024	25.11.2023	199.750 km
5	400 KV Biharsharif- Kahalgaon OPGW Link (24 F DWSM)	02/02/2024	25.11.2023	233.234 km
6	LILO portion of 400kV Angul- GMR OPGW Link (24 F DWSM)	26/03/2024	15.02.2024	30 km
7	765 KV Gaya-Varanasi OPGW Link (24 & 48 F DWSM)	04/03/2024	22.01.2024	310.186 km
8	400 KV DURGAPUR - JAMSHEDPUR OPGW Link (24 F DWSM)	28/05/2024	15.12.2023	183.635 km
9	400 KV DURGAPUR - MAITHAN OPGW Link (24 F DWSM)	28/05/2024	24.01.2024	74.125 km
10	400 KV TEESTA III - KISHANGANJ OPGW Link (24 F DWSM)	28/05/2024	29.02.2024	242.062 km
11	400 KV Durgapur - Farakka OPGW Link (24 F DWSM)	25/07/2024	22.06.2024	157.745 km
12	400 KV Durgapur - Sagardighi OPGW Link (24 F DWSM)	25/07/2024	22.06.2024	133.572 km
13	400 KV Farakka - Purnea OPGW Link (24 F DWSM)	25/07/2024	24.06.2024	179.643 km
14	400KV Rangpo - Dikchu OPGW Link (24 F DWSM)	18/11/2024	11.09.2024	32.176 km
15	765 KV Jharsuguda - Dharamjaygarh OPGW Link (24 F DWSM)	08/10/2024	30.08.2024	148.603 km
16	400 KV Rourkela-Raigarh OPGW Link	ERLDC has given consent to WR.		
17	400KV Rangpo - Chuzachen OPGW Link (24 F DWSM)	16/01/2025	21.12.2024	20.727 km

Details of AGC FOTE enclosed at **Annex-B.2.21.**This is for information to the TeST committee.

ERLDC may elaborate. Members may note**.**

Deliberation in the meeting

*The list of trial run certificate issued to POWEGRID during 2024 is attached(***Annex-B.2.21***) for information to the Forum.*

Members noted.

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सत्यमेव जयते
भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
पूर्वी क्षेत्रीय विद्युत समिति
Eastern Regional Power Committee
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14 Golf Club Road, Tollygunj, Kolkata-700033
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सं./NO. ERPC/Op/SCADA/2024/ 1073 **दिनांक/DATE: 25.09.2024**

सेवा में/To
Substation I/C
400 kV Subhasgram (PG)
Subhasgram ,South Garia , West Bengal 712306

विषय: 400 kV सुभाषग्राम (PG) सबस्टेशनके संचार अंकेक्षण पर रिपोर्ट
Sub: Report on Communication Audit of 400 kV Subhasgram (PG) S/S

As per clause 10 of the Central Electricity Regulatory Commission Regulations on "Communication System for inter-State transmission of Electricity" (2017) *RPC shall conduct annual audit of the communication system annually as per the procedure finalized in the forum of the concerned RPC.*

Accordingly, in line with SOP finalized by NPC Communication Audit was carried out at Subhasgram (PG) S/S on 16.08.2024 by designated audit team.

The detailed report of the audit carried out is enclosed herewith for perusal and necessary compliance of the audit observations.
Update on the compliance to relevant observations may please be reverted at earliest convenience.

This is for your kind information and necessary action.

भवदीय / Yours faithfully

Mondal 25.9.2024

(N.S.Mondal)

Member Secretary,ERPC

सदस्य सचिव, ईआरपीसी

Copy to:

(1) EXECUTIVE DIRECTOR, POWERGRID, ER-II, KOLKATA
(2) GENERAL MANAGER, ULDC, POWERGRID

REGIONAL COMMUNICATION AUDIT REPORT (ER)

BACKGROUND

- Eastern Region is 2nd to commence Communication Audit of Substations after SR and 400 KV Subhasgram(PG) is **1st ISTS Substation** in ER to undergo communication audit.
- In line with **Clause 10** of Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations that mandates conduct of performance audit of ISTS communication system in their respective region by concerned RPC Secretariat, **400 KV Subhasgram (PG)** was selected for Communication Audit vide mail dated **12.08.2024** from **ERPC.** The audit was carried out in line with the SOP finalized by NPC.
- **Eastern Region Communication Audit Team** consisting of members from ERPC, ERLDC & WBSETCL visited **400 KV Subhasgram(PG)** Station on **16th August 2024.**

General Information		
1.	Station name	Subhasgram
2.	S/S voltage level	400 kV
3.	Date of Commissioning	March, 2007
4.	Region and state	Eastern region/ West Bengal
5.	Audit date	**16.08.2024**
6.	Auditee Entity	Powergrid ER-II

Communication Audit Team Members			
Sl. No.	**Name**	**Designation**	**Organisation**
1.	Shri A . Chatterjee	Assistant Director	ERPC
2.	Shri L . Muralikrishna	Sr. DGM (Communication)	ERLDC
3.	Shri R . Jaiswal	Engineer (Communication)	ERLDC
4.	Shri Abu Tahir	Assistant Engineer (Communication)	WBSETCL

Auditee Team Members			
Sl. No.	**Name**	**Designation**	**Organisation**
1.	Shri Santanu Rudrapal	Chief Manager	Powergrid
2.	Shri Anurag Nayak	Manager	Powergrid

Signature of Audit Team:

Attached Documents		
Sl. No.	Name of the Document	Annexure
1.	Communication Audit checklist	Annex-A
2.	Audit Data submitted by Powergrid during scrutiny.	Annex-B
3.	SAT report of 20 kW, 48 V DCPS	Annex-C
	SAT report of 450 AH battery bank	Annex-D
4.	SAT report of SDH (Tejas)	Annex-E
5.	Maintenance report of Communication equipment (including DCPS and Battery bank)	Annex-F
6.	OTDR test report of FO cable n/w Subhasgram and Jeerat, New Jeerat Along with OTDR calibration report.	Annex-G
7.	AMC site visit report of PMU	Annex-H
8.	220 kV and 400 kV SLD of Subhasgram(PG)	Annex-I

Scope of Audit:

The Audit broadly included following activities but not strictly limited to the following aspects:

- ☐ Available communication Network for its redundancy.
- ☐ Availability of channel redundancy for all the functions for which it is configured.
- ☐ Communication equipment (hardware and software configuration) of all the nodes including repeater stations for its recommended performance. Documentation of the configuration of the respective site and its updation.
- ☐ Fibre layout/usage of fibre / Availability of dark fibre and its healthiness.
- ☐ Cable Schedule and identification/tagging.
- ☐ Healthiness of Auxiliary supply including the healthiness of Battery backup.
- ☐ Healthiness of Earthing / Earth protection for communication system.
- ☐ Availability of sufficient cooling equipment at the User's premises to maintain the stipulated temperature for the communication equipment.
- ☐ Optical power level.
- ☐ Alternate modes of communication for speech. Scope of Communication Audit included Checking Healthiness and working condition of Communication Links, Equipment and Auxiliary Power supply and checking of various communication network related parameters.
- ☐ Audit Team also visited 400/220 KV switchyard in addition to Control room, Communication room, Battery room and ACDB Panel room in Subhasgram(PG) Substation.

Signature of Audit Team:

- The following observations have been found and discussed with Sh. Shantanu Rudrapal, CM (ULDC – POWERGROD ER-II) & Sh. Anurag Naik, Manager at 400 KV Subhasgram(PG).

List of Observations during Communication audit at 400 KV Subhasgram Substation (POWERGRID) on 16th August 2024.	
Sl. No.	**Observation**
1	The display of auxiliary power data at the charger / DCPS panel is not visible for monitoring.
2	Approach cable is common for Communication, protection & Commercial application.
3	Non-availability of third-party Cyber Security audit reports.
4	Communication room & Control room is not separated.
5	Preventive maintenance of Auxiliary power is not done at regular intervals.
6	OTDR Results of OPGW Cable for Jeerat is on higher side (0.26 dB/Km) vs prescribed limit of 0.21dB/ Km.

Signature of Audit Team:

Annex-A

Communication Audit Checklist

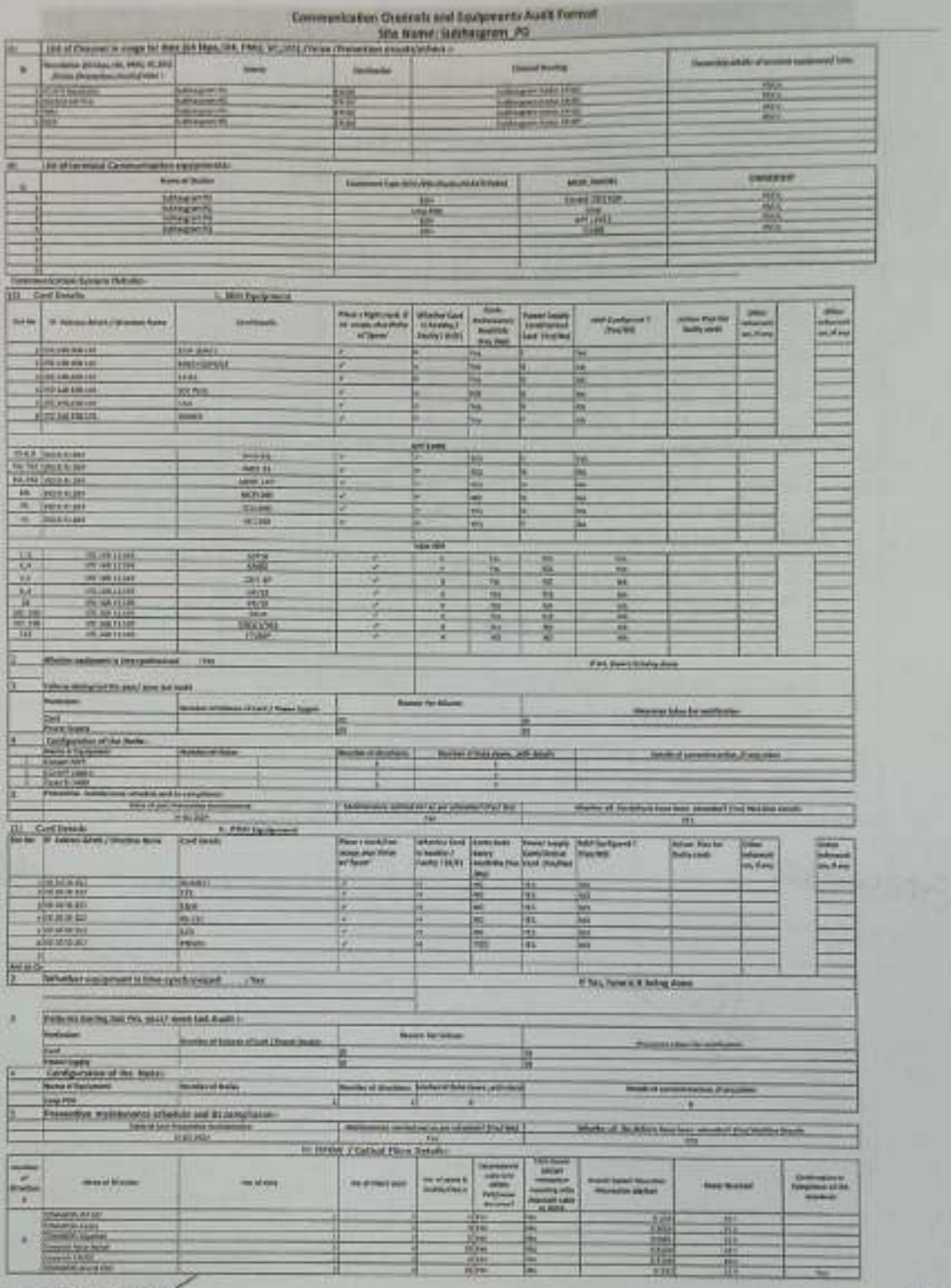
S.No	Check list points	Expected	Actual	Remarks
1	Whether OPGW is terminated properly. Down lead shall be fixed property in sufficient locations. Metallic part shall be connected to earth mat riser.	Yes	Yes	Found Ok
2	Distinct approach cable shall be laid 1 Protection & Communication 2 Fibers for commercial applications. Item no 1 cable shall be terminated in communication room FODP. One number FODP panel shall be available in the communication room.	Yes	Partially Ok.	Approach cable for Protection & Communication 3 Fibers for commercial applications are not separate.
3	Fiber Identification shall be done in FODP properly.	Yes	Yes	Found Ok
4	Whether End to end tests were carried out during installation and records are available. (Both Optical Power Source/receiver Test and OTDR Test results)	Yes	Yes	Found Ok
5	Whether patch chords 1 Cross labelled (source/ receive) 2 Tx Rx Marking 3 Mechanical protection is provided for patch chords laid between panels.	Yes	Yes	Found Ok
6	Whether separate room for communication is available with following:- 1. Air conditioning with standby A/C Unit. 2. AC Distribution board with ELCB. 3. Single point earthing bar which shall be connected to substationEarth mat.	Yes	Partially Ok.	Separate room for communication is not available. Rest is found Ok.
7	Two sets of 48 V (Positive Earthed) DC Systems hall be available with 1. Common DC Distribution board/ Panels with incoming MCB, coupler MCB , out doing MCBs etc. 2. Minimum 200 Ah (2 sets of battery) VRLA batteries are preferred to keep chargers and battery in communication room. 3. Battery Charger shall be Thryristorised/SMPS.	Yes	Yes	Found Ok

BPR Gurgaon

Communication Audit Checklist

8	Battery Charger alarms /Measurements shall be made availableto SAS (if available). It can be achieved through MOD bus or connecting analogue/ digital signals to Common BCU of SAS. If such system is not available major alarms shall be alarmed in common substation annunciator.	Yes	Yes	Local annunciator is available.
9	2 nos. of substation Data (From RTU or SAS Gateway) shall route in different roots to Main and Standby Load Dispatch centres.	Yes	No	RTU Upgradation work is in progress.
10	Kindly assure proper protection is available for AC Distribution (ELCB, MCB, Backup fuse).	Yes	Yes	Found Ok
11	Aux Transformer neutral Earthing shall be connected to Stations earth mat (Aux Transformers shall be installed in yard earth mat area only)	Yes	Yes	Found Ok
12	Whether DG sets with AMF panels are provided for Aux AC Supply	Yes	Yes	Found Ok
13	Whether 2 nos 11 kV (or 33kV) supplies are available for Each station aux Transformer	Yes	Yes	Found Ok

Annex-B



Communication Channels and Equipments Audit Format

Site Name : Subhagram_PG

Annex-C

पावरग्रिड
POWERGRID

पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड
(भारत सरकार का उपक्रम)
POWER GRID CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)

संदर्भ/Ref : CC-ENGG-LD201803-1000980-LD0019-SAT DCPS

Date : 08/09/2023

From : Shyama Kumari
DGM

To : STERLITE POWER TRANSMISSION LTD
2222 P NH 2 Gurgaon 121102
121102

Cc : 1) CGM, ER1, RHQ, PATNA 2) CGM, ER2, RHQ, KOLKATA 3) Sr GM, ODISHA, RHQ, BUBHANESWAR

Subject : Package - Z: Communication System Package for Upgradation of SCADA/RTUs/SAS in central sector stations and strengthening of OPGW network in Eastern Region.

LOA Ref : CC-CS/987-ER1/OPGW-4226/3/G4/NoA-I/ER1-250001 Dated 17/11/2021

Please find enclosed following drawings/ documents for necessary action at your end.

Vendor Drg. No.	:	Z-SAT Procedure
Orgn. Drg. No.	:	LD201803-1000980-LD0019-SAT DCPS
Revision No.	:	00
Drg. Title	:	SAT procedure of DCPS
App. Category	:	CAT-I
Release Date	:	08/09/2023

Scan to verify

Comments : Approved

अनुमोदित श्रेणी/App. Category:

I. फेब्रिकेशन/निर्माण/टाइप टेस्टिंग हेतु जारी।
Approved/released for fabrication/construction.

II. फेब्रिकेशन/निर्माण/टाइप टेस्टिंग हेतु अनुमोदित/जारी करते समय दिए गए टिप्पणियों एवं मार्गदर्शनों को सम्मिलित किया जाये। कृपया विधिवत दस्तावेज अनुमोदनार्थ प्रस्तुत करें।
Approved/released for fabrication/ construction subject to incorporation of comments and modification as noted. Revised drawing required for approval.

III. टिप्पणियाँ सम्मिलित करने के उपरांत दस्तावेज को अनुमोदनार्थ प्रस्तुत करें।
To be resubmitted for approval after incorporating the comments.

IV. सूचनार्थ एवं रिकार्ड हेतु।
For information and record.

REL-CON निर्माण हेतु जारी।
Released for construction.

नोट/Note:

1. Approval/Comments conveyed herein neither relieve the contractor of his contractual obligations and his responsibilities, weights, quantities, design details assemble fits, performance particulars and conformity of the supplies with the Indian Statutory Laws as may be applicable, nor does it limits the purchaser's right under the contract.
2. The approval conveyed vide this letter does not cover the approval of make for sub-vendor items.

Sterlite Power Transmission Limited, DLP Cyberpark, 9th floor, Tower B
Udyog Vihar phase III, sector 20, Gurugram

Sterlite Power

Ref No: SPTL/MSI/ PGCIL ER-1 PKG-Z/ 52

Dated: 08-09-2023

To,
DGM, LD & C Dept.
Power Grid Corporation of India Limited
Plot No- 42, Sector- 44, Gurugram,
Haryana-122001

Kind Attention: Mrs. Shyama Kumari (DGM, LD & C)

Sub: Submission of SAT procedure for DCPS.

Package Description: Communication system package for Strengthening of OPGW network in Eastern regions. Upgradation of Scada RTU/SAS in central sector station.

Ref No:
Supply Contract Agreement No: CC-CS/987-ERI/OPGW-4226/3/G4/NOA-I/ER-I-250001 dated 17/11/2021
Service Contract Agreement No: CC-CS/987-ERI/OPGW-4226/3/G4/NOA-II/ER-I-250002 dated 17/11/2021

Dear Madam,

This is in reference to the above-mentioned subject and Project; we are hereby submitting the below mentioned documents for approval under Package-Z.

1. Submission of SAT procedure for DCPS>

Thanking You.

Your Sincerely
For Sterlite Power Transmission Limited

	Eastern Region Fibre Optic Expansion Project (Additional Requirement) SITE ACCEPTANCE TEST PROCEDURE	Sterlite Power

Package II : Strengthening of OPGW Network in ER

SITE ACCEPETANCE TEST (SAT) FOR DCPS SYSTEM

Customer : Power Grid Corporation of India Ltd.

Contractor : M/s Sterlite Power Transmission Ltd.

Sub-Contractor:

Manufacturer: M/s Delta Electronics Pvt. Ltd.

Constituent / Site location : Subhasgram

DCPS Rating : 48V ; 35A (4k 20kW)

No. of Modules : 4

Equipment Serial No. : 23R2309020048 12436

IP : 198.168.100.100

Username : Admin ; Password : Osian

SAT Results: **Test Pass / Fail**

Observations, if any:

STPL / DELTA	POWERGRID
Signature with date : Name: Amit Kr. Pandey Designation:	Signature with date : K.B.M Nabi Name: काशिफ नबी Kashif Nabi Designation Dy. Manager (E.L.D.C) पावरग्रिड, ईआर-II, क्षेत्रीय मुख्यालय, कोलकाता POWERGRID, ER-II, REGIONAL HQ, KOLKATA

DELTA ELECTRONICS INDIA PVT. LTD.

SUMMARY OF TESTS ON DCPS SYSTEM			
SL No	**TEST**	**PASS/ FAIL**	**REMARKS**
	Tests on DCPS System	Pass	
01	Mechanical & Visual Check Tests	Pass	
02	DCPS Switch ON test	Pass	
03	DCPS Low Voltage & High Voltage limits Checks	Pass	
04	Pre alarm test for Battery Low Voltage	Pass	
05	Battery Low Voltage Disconnect Level Test	Pass	
06	Rectifier Fail Alarm Test	Pass	
07	Total Output Power Tests	Pass	
08	Hot Plug in Test	Pass	
09	Calibration & Parameter settings Test	Pass	
10	Automatic Float cum Boost Charge Mode Change Over Test	Pass	
11	Battery Path Current Limiting Test	Pass	
12	Full Load Current Test	Pass	

K.B.H Nabi

काशिफ नबी
Kashif Nabi
By. Manager (U.L. O.C)
POWERGRID, ER II, HQ, KOLKATA

DELTA ELECTRONICS INDIA PVT. LTD.

DCPS TESTS PROCEDURE

Sr. No.	TEST & PROCEDURE	SPECIFICATION	OBSERVATION	REMARKS
1	**MECHANICAL & VISUAL CHECK TEST**			
1.1	Visual Inspection of Rack Mechanical, Rack should have good finish all Nut & Bolts Must be secured.	Good Finish & Secured	OK	
1.2	Ensure all PCBs in the rack are secured properly in cabinet.	Good workmanship	OK	
1..3	All electrical/ electronic components are secured properly in cabinet.	Good workmanship	OK	
1.4	Ensure all cabling is neat and secured tightened. Proper lugs with heat shrinkable sleeves have been used. Ensure Controller Cables are properly Inserted. Check screening and labeling.	Good workmanship	OK	
2	**Switch On Test**			
2.1	Make all external connections to the system including, Input mains Supply, Dummy Load,		OK	
2.2	Connect the Site Battery Bank to DCPS.		OK.	
2.3	Check Input AC supply at DCPS Input MCB with Multimeter &.turn on the system's main MCB		238V, 237.8V, 237.3V	
2.4	System shall turn on Alarm Module shall also turn ON. Controller Display shall read the System O/P voltage.	System should turn ON & display DC o/p voltage 54V+/-1% V	54.5V	

K.B.M

Kashif Nabi
Dy. Manager (T.L.D.C)
POWERGRID, ER-II, KOLKATA

DELTA ELECTRONICS (INDIA) PVT. LTD.

Sr. No.	TEST & PROCEDURE	SPECIFICATION	OBSERVATION	REMARKS
3	**DCPS Low Voltage & High voltage limit test**		ok	
	(a)DC Low Voltage Limit Test		ok	
3.1	Verify the Low battery Minor & Major set value at 45.0 in controller.	~45 +/- .5V	ok	
3.2	Set External Power Supply nominal output at 54.5 & switch off the external power supply Input.		OK	
3.3	Connect External power supply output Terminals to DCPS Output terminals. Ensure to connect in correct Polarity.		ok	
3.4	Switch On External Power Supply & verify the DC Output at DCPS output terminals.	54.5Volts	ok	
3.5	Switch Off DCPS Battery MCB & DCPS Input Mains MCB.		ok	
3.6	Decrease the External Power Supply nominal Output Voltage up to 44.0Volts through voltage adjustment option	~45.0 +/- .5V	ok	
3.7	Check Battery Major & Battery Minor Alarm on DCPS Controller display & also check the PFC on respective terminal (13 & 14) on PFC terminals.		ok	
3.8	Switch On DCPS Input/Battery MCB & verify output voltage (54.5Volts) . Observe that Low battery Alarm will get reset.		ok	

DELTA ELECTRONICS INDIA PVT. LTD.

काशिफ नबी
Kashif Nabi
Dy. Manager (O.C.)
POWERGRID, ER-II, HQ, KOLKATA

Shyam

Sr. No.	TEST & PROCEDURE	SPECIFICATION	OBSERVATION	REMARKS
	(a) DC High Voltage Test			
3.9	Verify the High battery Minor & Major set value at 58.0V & 58.5V in controller.	~58.0 +/- .5V ~58.5 +/- .5V	ok	
3.10	Reset Battery Major High setting at 57.0Volts & Battery Minor High at 56.8 Volt in controller.		OK	
3.11	Set External Power Supply nominal output at 54.5 Volts.		ok	
3.12	Connect External power supply output Terminals to DCPS Output terminals. Ensure to connect in correct Polarity.		ok	
3.13	Switch On External Power Supply & verify the DC Output at DCPS output terminals.	54.5Volts	ok	
3.14	Switch Off DCPS Battery MCB.		ok	
3.15	Increase the External Power Supply nominal Output Voltage up to 56.9Volts through voltage adjustment option. Observe battery high voltage minor alarm at 56.8 +/- .5v & further increase up to 57.2 Volts & verify major at 57.0 +/- 0.5Volts.	(Battery Minor High) 56.8 +/- .5V (Battery Major High) ~57.0 +/- .5V	ok	
3.16	Check High Battery Alarm on DCPS Controller display & also check the PFC on respective terminal (13 & 14) on PFC terminals.	(There are four DC high value setting starting from 56.8Volts in Controller. It can be verified through Power suit software in Factory only)	OK	
3.17	Decrease External Power Supply Output voltage to Nominal DCPS output Voltage @ 54.5Volts. Verify that Alarms will get reset. Switch on DCPS Battery MCB.		OK	
3.18	Disconnect External Power Supply output Terminals from DCPS. Restore the Original Battery High Minor & Major Alarm settings.		OK	

DELTA ELECTRONICS INDIA PVT. LTD.

K. B. M. Nabi
काशिफ नबी
Kashif Nabi
Dy. Manager (IT), ULDC
POWERGRID, ER-II, KOLKATA

Sr. No.	TEST & PROCEDURE	SPECIFICATION	OBSERVATION	REMARKS
4	**Battery Pre Alarm test for Low Voltage (Battery Discharge)**		ok	
4.1	Verify the Low battery Minor & Major set value at 45.0 in controller.	~45 +/- .5V	ok	
4.2	Set External Power Supply nominal output at 54.5 & switch off the external power supply Input.		ok	
4.3	Switch Off DCPS Battery MCB.			
4.4	Connect External power supply output (-Ve) Terminals to DCPS Battery MCB Power Plant side. Ensure to connect in correct Polarity.		ok	
4.5	Switch On External Power Supply & verify the DC Output at DCPS output terminals.	54.5Volts	ok	
4.6	Switch Off Mains Input MCB.			
4.7	Decrease the External Power Supply nominal Output Voltage to slightly lower than 45.0Volts through voltage adjustment option	~45 +/- .5V	ok	
4.8	Check Battery low Voltage Minor & Major Alarm on DCPS Controller display & also check the PFC on respective terminal (13 & 14) on PFC terminals.		ok	
4.9	Switch On DCPS Input Supply MCB & verify output voltage (54.5Volts). Observe that Low battery Alarm will get reset.		ok	
4.10	Disconnect External Power Supply output Terminals from DCPS. Connect the DCPS Battery by Switching ON battery MCB.		ok	
5.0	**Battery & Load Low Voltage Disconnect Level Test**			
5.1	Verify Low Voltage Battery Disconnect (LVBD = 42.0 V) & Low Voltage Load Disconnect (LVLD = 44.0V) in controller setting.	~44 +/- .5V (LVLD) ~42.0 +/- .5V (LVBD)	OK	
5.2	Set Nominal Voltage 54.5 in External Power Supply & Switch off External Power supply input switch.		OK	
5.3	Connect External power supply output Terminals to DCPS Battery MCB Power Plant side. Ensure to connect in correct Polarity.		ok	
5.4	Switch Off Battery MCCB			

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Dy. Manager (ULDC)
POWERGRID, ER-II, RHQ, KOLKATA

DELTA ELECTRONICS INDIA PVT. LTD.

Sr. No.	TEST & PROCEDURE	SPECIFICATION	OBSERVATION	REMARKS
5.5	Slowly reduce External Power Supply Nominal O/P voltage Up to 43.5 Volts and check LVLD operation (Disconnect)		ok	
5.6	Further reduce External Power Supply Nominal O/P voltage Up to 41.5 Volts and check LVBD operation (Disconnect)		ok	
5.7	Verify that Alarm Controller will switch off.		ok	
5.8	Switch On DCPS Mains Input MCB		ok	
5.9	Verify that LVBD & LVLD contactors will reconnect.		ok	
5.10	Switch ON Battery MCCB		ok	
5.11	Disconnect External Power Supply		ok	
6	**Rectifier Fail Alarm Test**			
6.1	Switch Off Input MCB of one Rectifier & Verify that Rectifier fail Alarm will Appear on respective PFC Terminal (4&5) & Controller Display.	Rectifier Fail LED shall glow	ok	
6.2	Switch On Rectifier MCB & Verify that Alarm will get reset.		ok	
7	**Total output Power Test**			
7.1	Insert all the modules and turn on all Input AC MCBs of SMPS Modules.		ok	
7.2	Put External Load on DC bus so as equipment is loaded at its 50% capacity		ok	
7.3	Adjust float voltage to 54.5 Volts		ok	
7.4	Increase the load to 100% capacity and note down the DC voltage & Current	Based on DCPS Output Current rating	ok	
7.5	Note Down the Total Current (Load +Battery) & Verify that O/P Voltage of PP shall be Constant.	System output power will be based on system Module Rating i.e. n X (3.1KW/1.4KW	R1 - OFF R2 - 25.1A R3 - 24.6A R4 - 24.8A	74.2A
7.6	Disconnect the external Load Bank			

Kashif Nabi
Dy. Manager (ULDC)
POWERGRID, ER-II, RHQ, KOLKATA

	Eastern Region Fibre Optic Expansion Project (Additional Requirement) SITE ACCEPTANCE TEST PROCEDURE	Sterlite Power

Sr. No.	TEST & PROCEDURE	SPECIFICATION	OBSERVATION	REMARKS
	HOT PLUG IN TEST		ok	
8.1	Switch on all rectifier module and pull out one rectifier module in live condition from PR Rack.		ok	
8.2	Reinsert Rectifier Module inside PR Rack & verify that module will get switch on.		ok	
8.3	No Damage/Drift shall occur.	No Drift/Damage	ok	
(9)	**Calibration Test**		ok	
9.1	DC Voltage: Note the DC voltage displayed on Controller Display, Measure DC output Voltage with a standard Digital multimeter & compare results	Better than +/- 1.5%	ok	
9.2	Rectifier Current: Put 50% load on the Load terminals, Note the Rectifier current displayed on Controller, Measure current through DC Clamp meter & compare results.	Better than +/- 1.5%	R_1 - 18.5 R_2 - 18.5 R_3 - 18.4 R_4 - 18.3	Total: 73.5A
9.3	Battery Current: Switch off the Power Plant Input AC Power MCB. Measure the battery current reading on Controller & measure the battery shunt mv & compare the results	Better than +/- 1.5%	ok	
10	**Automatic Mode change over Float to charge (Boost) mode**		ok	
10.1	Connect External Load bank to DCPS Output.		ok	
10.2	Switch Off the SMPS AC Input MCB & Switch on Load.		ok	
10.3	Reset the Automatic Boost Change over threshold setting at 5AH		ok	
10.4	Discharge the Battery for sufficient time, based of Battery Capacity & threshold setting level.		ok	
10.5	Switch On SMPS Input MCB & Verify the all the modules are working fine.		ok	
10.6	Observe the Charging mode.	Should be the Boost Mode	ok	
10.7	Boost mode shall change to float mode subsequently		ok	

K.B.M Nab.
Kashif Nabi
Dy. Manager (ULDC)
POWERGRID, ER-II, RHQ, KOLKATA

DELTA ELECTRONICS INDIA PVT. LTD.

Sr. No.	TEST & PROCEDURE	SPECIFICATION	OBSERVATION	REMARK
11	**Battery path Current Limiting Test**		OK	
11.1	Verify the Battery Path Current Limit (Charge Current limit in Controller) & reset it at 20Amps through Controller Keypad Note down the Power Plant O/P Voltage.	set value will be 10% of battery rating , shall not exceed the set value	OK	
11.2	Connect the External load (According to DCPS rated output capacity/Module availability) on DCPS Load terminals		OK	
11.3	Switch off DCPS Input Mains MCB & switch on Load MCB.		OK	
11.4	Discharge DCPS Batteries through External Load for 30 Minutes.(Discharge Time may vary based on available load at site.)		OK	
11.5	Switch On the DCPS Input Mains MCB & Measure the battery path current. Observe that Power Plant battery path current will be constant. Note current at this point.	Maximum Current at Battery Path should not cross 20A (set Value)	OK	
11.6	Restore the Original Battery Path Current Limit through Controller Keypad.		OK	
11.7	Disconnect External Load from DCPS.			
12	**Full Load Current Test & Battery Charging**		OK	
12.1	Put Maximum specified load (External Load Bank) current on the load terminal / Bus bar.	Individual Module Overload Testing will be done.	OK	
12.2	Now slightly increase the load & simulate overload condition.	System overload alarm shall glow at >100% of system capacity	OK	
12.3	Disconnect External Load Bank.		OK	

K. & M. Nath.

Kashit Nath

DELTA ELECTRONICS INDIA PVT. LTD.

	Eastern Region Fibre Optic Expansion Project (Additional Requirement) SITE ACCEPTANCE TEST PROCEDURE	///SterlitePower

SITE ACCEPETANCE TEST (SAT) FOR BATTERY SYSTEM

Customer : Power Grid Corporation of India Ltd.

Contractor : M/s sterlite Power Transmission Ltd.

Sub-Contractor:

Manufacturer: HBL Power Systems

Constituent / Site location : Subhasgram

DCPS Rating : 35A /48V

Battery Bank Rating : 450 A-h / 48V

SAT Results: Test Pass ✓ / Fail

Observations, if any :

SPTL / DELTA /HBL	POWERGRID
Signature with date :	Signature with date : K.B.N Nabi
Name: Amit Kr Pandey	Name:
Designation:	Designation

कशिफ नबी
Kashif Nabi
उप प्रबंधक (यू.एल.डी.सी)
Dy Manager (ULDC)
पावरग्रिड, पूर्वी क्षेत्र, कोलकाता
POWERGRID, ER-II, KOLKATA

DELTA ELECTRONICS INDIA PVT. LTD.

Annex-D

Battery

The purpose of test is to confirm the requirements of the supplied VRLA Battery for 48V DCPS /Charger at site in accordance to technical specifications & approved DRS /drawings.

The following tests are carried out at site for the purpose of verifying the acceptability of the supplied VRLA batteries.

S. No.	Test	Requirement	Procedure
01.	Visual Observation	a) No damages, scratches on battery container and cover b) Terminals c) Presence of venting device.	Visual inspection for the parameters mentioned in the requirement.
02.	Dimensional Observation/Inspection	Following information shall be indelibly and durably marked on each Cell / Battery Stack. a) Serial Number b) Ah capacity at 10-hour rate. c) Manufacturer type and trade name. d) Month and year of manufacture.	Visual inspection for the parameters mentioned in the requirement.
.03.	Capacity Test @ 10 hr Rate.	The Cell/Battery shall meet/exceed the rated capacity requirements declared by Manufacturer / Specifications	After full charge of battery bank, the cell shall be discharged at a constant current of 0.1C_{10} by using artificial load. The discharge shall be stopped when the closed-circuit voltage of the cell reaches to 1.75V/cell. The time in hours elapsing between beginning and end of discharge shall be taken as period of discharge. The capacity obtained from the cell should not be less than 100%.

K-B-M

Kashif Nabi

DELTA ELECTRONICS INDIA PVT. LTD.

	Eastern Region Fibre Optic Expansion Project (Additional Requirement) SITE ACCEPTANCE TEST PROCEDURE	Sterlite Power

Check list:

1.1 Cable:

A. Check Neatness of Cable.

Conformity	
OK	NOT OK

B. Check Tightness of Cable.

Conformity	
OK	NOT OK

C. Check Continuity of Cable.

Conformity	
OK	NOT OK

1.2 Batteries:

A. Check Terminal Tightness.

Conformity	
OK	NOT OK

B. Check Battery cells for cracks, damage and finish.

Conformity	
OK	NOT OK

C. Check Polarity of cell:

Sr. No	Test	Requirement
3.1	Polarity Marking test	Polarity indications: Red for positive terminal and black for negative terminal

Conformity	
OK	NOT OK

D. Check all cells physically installed and interconnected as per General Arrangement Drawing.

Conformity

DELTA ELECTRONICS INDIA PVT. LTD.

K.B.M Dab.

OK	NOT OK

E. Check covers Installed Properly

Conformity	
OK	NOT OK

F. Check Narking of cells

Conformity	
OK	NOT OK

G. Check capacity of batteries @ C10 rate

Sr. No	Description	Requirement/Specification	Observation
1	a) After 6 Min	≥1.98V	
2	b) After 6 Hrs	≥1.92V	
3	c) After 8 Hrs	≥1.85V	
4	d) After 10 Hrs	≥1.75V	

Discharge test enclosed

Conformity	
OK	NOT OK

K.B.M Rao

DELTA ELECTRONICS INDIA PVT. LTD.

DELTA ELECTRONICS INDIA PVT. LTD.

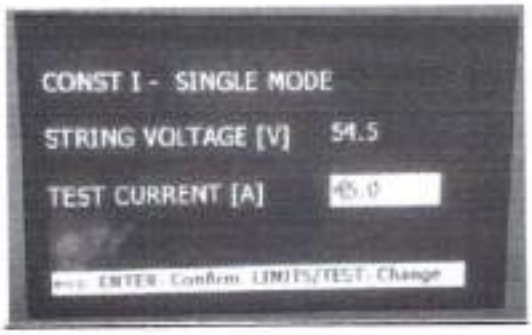
K.B. Nabi

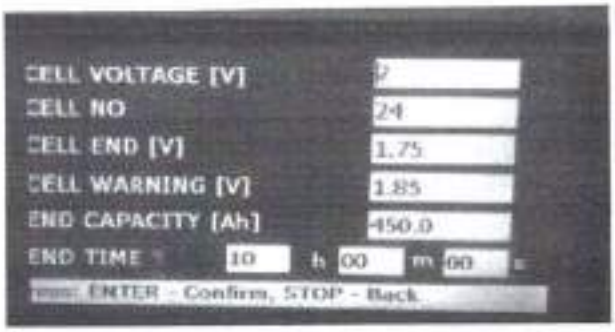
Kashif Nabi

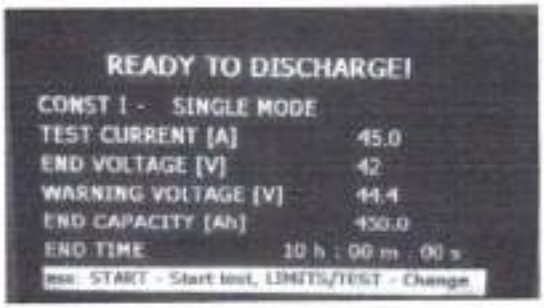
Dy. Manager (O & M)

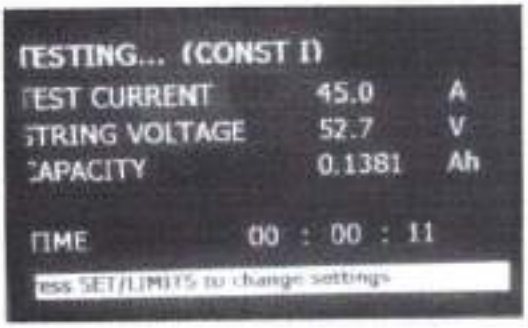
POWERGRID

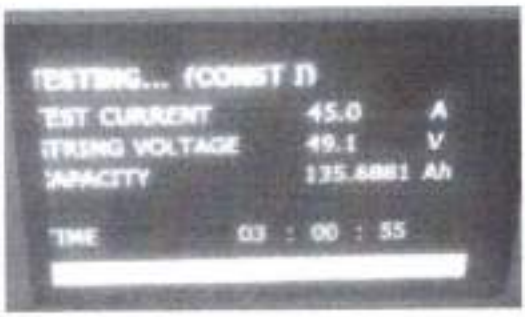
Discharging

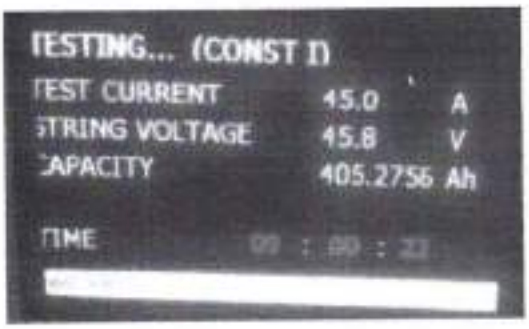










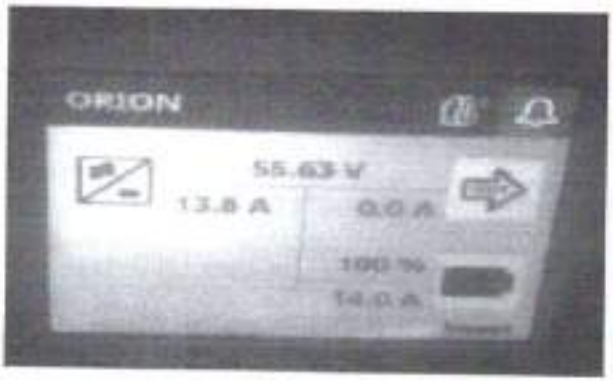


K.B.N Nabi

Kashif Nabi

DELTA ELECTRONICS INDIA PVT. LTD.

Recharging



K.B.M Nabi

कौशल नबी
Kashif Nabi

DELTA ELECTRONICS INDIA PVT. LTD.

Charging / Discharging Log Sheet

Customer Name & Address	PGCIL (Subhasgram)				
Battery Details	Voltage 48V	Capacity 450AH	G.A.D. No	Date	1/12/2023
Load Current (Max)	Charged on Date	Charged Due on Date		Set/Batch No	

Sl No	Cell Serial No	Float Volts	PM → 12:53	1:53	2:53	3:53	4:50	5:53	6:53	7:53	8:55	9:55	Recharging Voltage
			Charging / Discharging Voltage Vs Time (Min.)										
1	022303603	2.280	2.093	2.082	2.065	2.040	2.029	2.010	1.965	1.995	1.924	1.845	
2	022303604	2.282	2.095	2.085	2.060	2.045	2.026	2.016	1.984	1.967	1.940	1.901	
3	022303602	2.289	2.085	2.084	2.068	2.046	2.035	2.015	1.984	1.948	1.942	1.905	
4	022303601	2.282	2.095	2.083	2.064	2.043	2.032	2.011	1.998	1.960	1.930	1.884	
5	022303621	2.284	2.097	2.086	2.070	2.045	2.038	2.014	1.993	1.963	1.936	1.894	
6	022303622	2.282	2.094	2.082	2.064	2.042	2.032	2.019	1.990	1.960	1.932	1.887	
7	022303620	2.286	2.095	2.085	2.069	2.045	2.035	2.017	1.984	1.967	1.940	1.902	
8	022303624	2.286	2.096	2.084	2.070	2.047	2.026	2.018	1.987	1.968	1.940	1.902	
9	022303617	2.285	2.093	2.086	2.066	2.043	2.033	2.012	1.982	1.955	1.933	1.870	
10	022303618	2.285	2.094	2.084	2.068	2.044	2.035	2.016	1.966	1.945	1.938	1.879	
11	022303619	2.288	2.087	2.086	2.067	2.043	2.031	2.011	1.989	1.962	1.925	1.878	
12	022303620	2.287	2.098	2.087	2.063	2.044	2.032	2.012	1.986	1.955	1.921	1.871	
13	022303614	2.286	2.083	2.082	2.064	2.041	2.032	2.012	1.987	1.956	1.929	1.877	
14	022303613	2.285	2.094	2.082	2.066	2.041	2.034	2.011	1.985	1.959	1.929	1.883	
15	022303616	2.285	2.097	2.080	2.065	2.040	2.029	2.010	1.984	1.962	1.934	1.881	
16	022303615	2.286	2.095	2.085	2.070	2.045	2.026	2.018	1.993	1.967	1.940	1.901	
17	022303609	2.287	2.096	2.084	2.068	2.045	2.035	2.016	1.986	1.964	1.936	1.895	
18	022303610	2.282	2.095	2.082	2.065	2.041	2.036	2.010	1.980	1.956	1.924	1.880	
19	022303611	2.283	2.093	2.085	2.067	2.042	2.036	2.014	1.984	1.962	1.933	1.887	
20	022303612	2.282	2.094	2.086	2.071	2.042	2.031	2.014	1.987	1.970	1.944	1.909	
21	022303605	2.283	2.085	2.083	2.066	2.042	2.024	2.011	1.984	1.956	1.926	1.878	
22	022303606	2.282	2.083	2.080	2.064	2.039	2.036	2.006	1.981	1.958	1.916	1.859	
23	022303607	2.288	2.098	2.085	2.070	2.045	2.035	2.016	1.980	1.962	1.934	1.895	
24	022303608	2.283	2.097	2.086	2.071	2.046	2.035	2.017	1.982	1.965	1.934	1.896	
Terminal Voltage		54.55	50.30	50.20	49.63	49.10	48.60	48.23	47.75	47.05	46.35	45.25	
Display Voltage		—	49.70	49.50	49.68	49.01	48.80	48.00	47.20	46.80	46.89	44.60	
Battery Current (A)		—	45A	45A	45A	45A	45A	45A	45A	45A	45A	45A	

K.B.M Nabi

काशिफ नबी
Kashif Nabi
Dy. Manager (O.T.P.C)
POWERGRID, ER-II, RHQ, KOLKATA

Customer

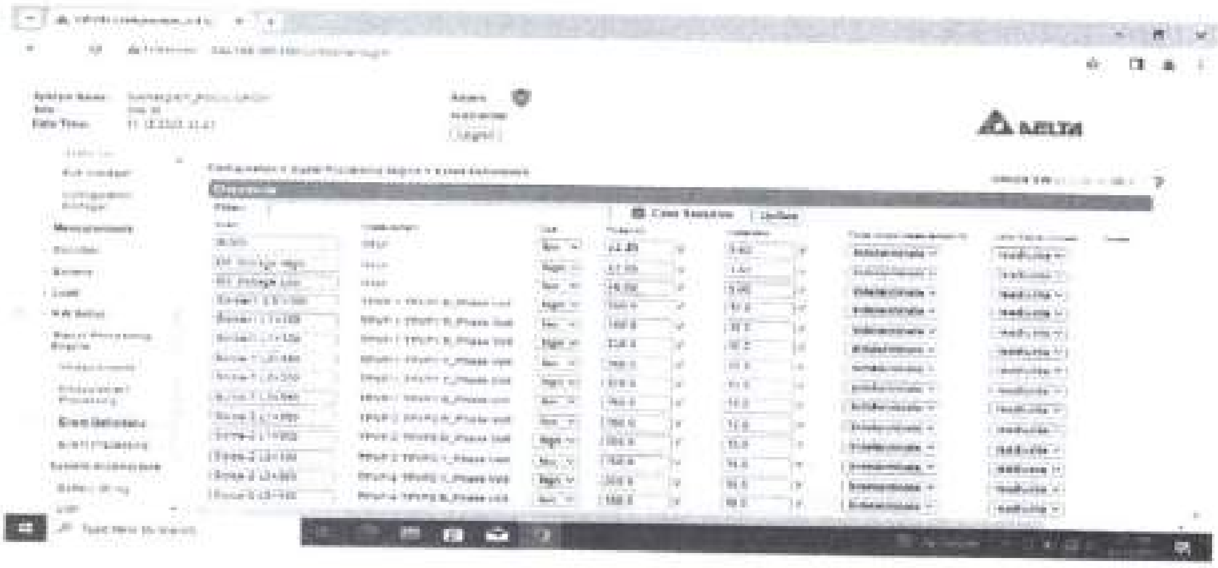
8961736594

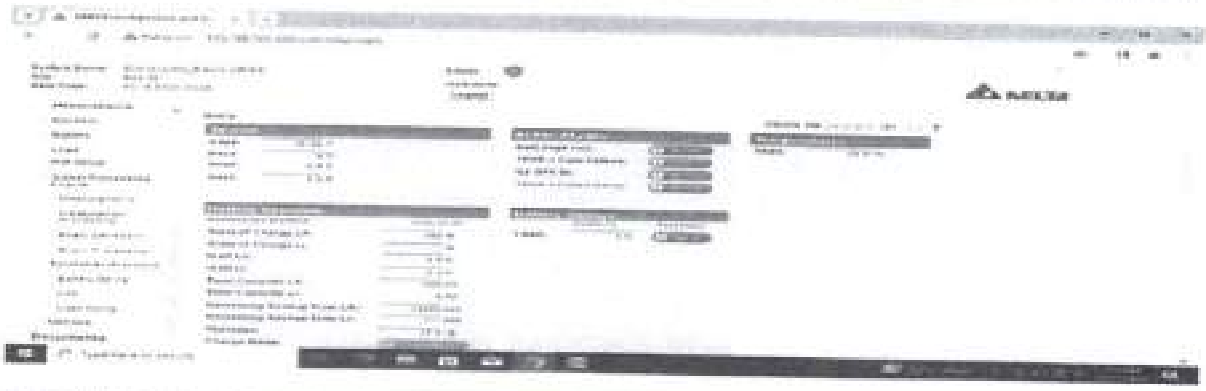
Service Engineer

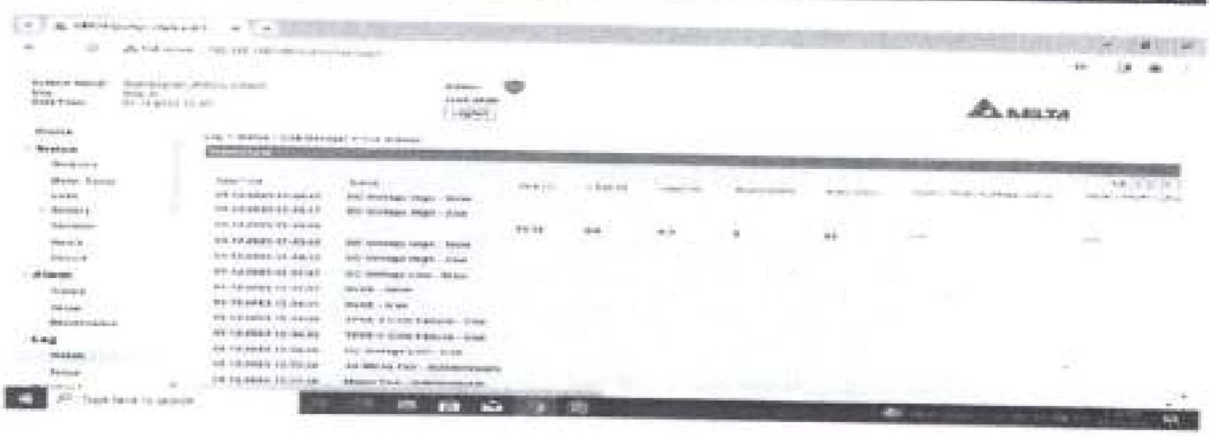
DELTA ELECTRONICS PVT. LTD.

Subhasgram SAT

DCPS Setting







DELTA ELECTRONICS INDIA PVT. LTD.

K.B.M Nabi

Kazi B Nabi

Dy. Manager (U.L.D.C)

POWERGRID, ER-II, RHQ KOLKATA

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Annex-E

SITE ACCEPTANCE TEST PROCEDURE

(FO Transmission system, Termination Equipment sub-system & associated NMS System)

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1. SCOPE OF TESTING

All equipment shall be tested on site under the conditions in which it will normally operate. The tests shall be exhaustive and shall demonstrate that the overall performance of the contract works satisfies every requirement specified.

Phases of Site Acceptance Testing

1.1 Installation Testing

Site Installation Test

The field installation test will be performed for all equipment at each site.

The purpose of installation test is to ensure that all the equipments and cables conform to the BOQ; the installation of equipment and cabling conform to drawings, rack elevations; the appearance of equipment meets the requirements.

(1) **Installation tests on FO Transmission system (SDH Equipments)** :

The installation tests on FO Transmission system (SDH Equipments) mainly include:

1.	Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling
2.	Station power supply input and equipment power supply (DC-DC converter) output voltage measurements
3.	Terminal transceiver performance testing (Tx power, Tx spectrum, receive signal strength, connector losses etc.)
4.	Service channel performance
5.	Craftsperson interface, alarm , control functional performance
6.	Rack and local alarms: No alarms shall be present and all alarms shall be demonstrated to be functional
7.	Network management interface and supervision performance
8.	Correct configuration, level setting & adjustments and termination of Input/ output interfaces
9.	Proper establishment of Safety and signalling earthing system and resistance to ground to be checked.
10.	Simulation of failure conditions and failover of protected components.

(2) **Installation tests on Termination Equipment sub-system (PDH Equipments –Drop-Insert Mux & DACS)**

The installation tests on Termination Equipment sub-system mainly includes:

1.	Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling
2.	Power supply/converter voltage measurements
3.	Muldem performance testing
4.	Craftsperson interface, alarm and control functional performance
5.	Rack and Local alarms
6.	Network management interface and supervision performance
7.	Channel performance
8.	Safety and signalling earthing system
9.	Simulation of failure conditions and failover of protected components.

(3) **Installation Test on NMS system.**

The installation tests on NMS system mainly includes:

1.	Physical inspection for conformance to drawings, rack elevations and appearance of equipment and cabling.
2.	Workstation (Remote & Local) hardware inventory, configuration and characteristics.
3.	Demonstration of proper operation of all hardware, including workstations (Remote & Local) peripherals.

1.2 Link Commissioning Testing

The link commissioning tests shall verify that communication can be performed over the fiber optic link under test. Delay measurement, Bit Error measurements & service channel performance monitoring shall be made on the fibre optic links to verify compliance with designed link performance.

For Ethernet interface: At a minimum the following test requirements shall be demonstrated as per RFC 2544:

a) Ping test

b) Throughput test

c) Latency test

d) Packet Loss

10% of the total links (as chosen by PGCIL/Constituent, generally to cover links from all configurations

used) shall be tested for duration of 12 Hours.

Rest of the links shall be tested for 1 Hour. In case a link does not meet the performance requirements during 1 hour, then the duration of the test shall be increased to 12 hours.

In case any link does not meet the performance requirements during 12 hour, then the cause of failure shall be investigated and the test shall be repeated after rectifying the defects.

This phase of testing shall be conducted by the Contractor and witnessed by the Employer. Field adjustments shall be made to meet established standard, however if the field adjustments fail to correct the defects the equipments may be returned to the Contractor for replacement at his own expense. In case any adjustments are required to be made during the interval of the test then the test shall be repeated.

1.3 Integrated Testing

Prior to commencement of integrated testing the overall system shall be configured as required to provide all the data and voice channel required to interconnect the various control centres and RTU. The integrated testing shall include end-to-end testing of back-bone network. Integrated testing for last batch shall include testing of the entire

back-bone network. The intent of integrated testing is to demonstrate that the equipment is operational end to end under actual conditions, that all variances identified during factory and field installation and communications testing have been corrected, and that the communication equipment is compatible with other equipment at all locations. The Integrated System Test shall include all fibre optic transmission equipment, termination equipment, the network management subsystem and other components.

At a minimum the following tests shall be included in the integrated testing:

1.3.1 Installation testing for NMS as per table given below

1.3.2 Equipment configuration shall be checked to establish that it supports the channel routing.

1.3.3 End to end testing of all individual voice circuits originating from PLCC, PABX or Phones and to establish proper interfacing with PLCC\PABX\Phones and to demonstrate proper operation of channels over wideband systems. Operation shall be checked in terms of quality of voice, call initiation and call termination processes.

1.3.4 End-to-end testing of all individual Data Circuits originating from PLCC, RTU and SCADA Front Ends and to establish proper interfacing with PLCC\RTU\Front End and to demonstrate proper operation of channels over wideband systems. Operation shall be checked in terms of monitoring of BER/packet loss.

1.3.5 Testing of NMS to demonstrate proper operation of all functions: Configuration Management, Performance Management, Fault, Management and Security management. All the standard features of the NMS shall be demonstrated for proper functioning.

1.3.6 Demonstration of Protection switching including ring network whereas applicable and synchronization of equipment as per synchronization plan.

2. TEST PROCEDURES

2.1 Installation Testing

Following is the list of Installation and Link Commissioning tests to be conducted on the selected equipment during the Site acceptance testing: -

Sr. No	Test Description	Test Procedure No.
1	Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling	TPS-01
2	Station power supply input and equipment power supply (DC-DC converter) output voltage measurements	TPS-02
3	Terminal transceiver performance testing (Tx power, Tx spectrum, receive signal strength, connector losses etc)	TPS-03
4	Services channel performance Test	TPS-04
5	Craftsperson interface, alarm and control functional performance	TPS-05
6	Rack and local alarms	TPS-06
7	Network management interface and supervision performance	TPS-07
8	Correct configuration, level setting & adjustments and termination of input/ output interfaces	TPS-08
9	Proper establishment of Safety and signalling earthing system and resistance to ground to be checked.	TPS-09
10	Simulation of failure conditions and failover of protected components.	TPS-10
11	Craftsperson interface, alarm and control functional performance (PDH)	TPS-11
12	Simulation of failure conditions and failover of protected components (PDH)	TPS-12
13	Channel performance tests (PDH)	TPS-13
14	Network management interface and supervision performance (PDH)	TPS-14
15	Muldem performance testing (PDH)	TPS-15

Sr. No	Test Description	Test Procedure No.
16	Simulation of failure conditions and failover of protected components (DACS)	TPS-16
17	Channel Performance Tests (DACS)	TPS-17
18	Physical inspection for conformance to drawings, rack elevations and appearance of equipment and cabling of NMS System Workstation hardware inventory, configuration and characteristics of NMS System	TPS-18
19	Demonstration of proper operation of all hardware, including workstations peripherals of NMS System	TPS-19

2.2 Link Commissioning Testing

The commissioning tests shall verify that communication can be performed over the fiber optic link under test. Delay measurement, Bit Error measurements & service channel performance monitoring shall be made on the fibre optic links to verify compliance with designed link performance.

For Ethernet interface: At a minimum the following test requirements shall be demonstrated as per RFC 2544:

2.2.1 Ping test

2.2.2 Throughput test

2.2.3 Latency test

2.2.4 Packet Loss

10% of the total links (Chosen by PGCIL, generally to cover links from all configurations used) shall be tested for duration of 12 Hours.

Rest of the links shall be tested for 1 Hour. In case a link does not meet the performance requirements during 1 hour, then the duration of the test shall be increased to 12 hours.

In case any link does not meet the performance requirements during 12 hour, then the cause of failure shall be investigated and the test shall be repeated after rectifying the defects.

This phase of testing shall be conducted by the Contractor and witnessed by the Employer. Field adjustments shall be made to meet established standard, however if the field adjustments fail to correct the defects the equipments may be returned to the Contractor for replacement at his own expense. In case any adjustments are required to be made during the interval of the test then the test shall be repeated.

Sr. No	Test Description	Test Procedure No.
1	Ethernet Channel Testing	TPS-20
2	Measurement of BER For SDH Link	TPS-21
3	Delay measurement	TPS-22

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2.3 Integrated Testing

Following is the list of Integrated testing tests to be conducted on the selected equipment during the Site acceptance testing: -

Sr. No	Test Description	Test Procedure No.
1	End to End testing of Voice circuits	TPS-23
2	Testing of NMS Functionality	TPS-24
3	Protection Switching and Synchronization of Equipment	TPS-25
4	End to End Data Channel testing	TPS-26
5	Interfacing with Existing Communication System	TPS-27

3. Test equipment

Prior to start of testing a consolidated list of all test equipment used for the Site Acceptance Testing shall be provided along with Make/Model numbers and valid Calibration Certificates.

Test Equipments/Instruments to be used during SAT :

1) E1 BER Tester
2) Ethernet Tester
3) Optical Power meter
4) Digital Multi meter
5) VF Tester
6) Earth Tester
7) Any other as per testing requirements

4. SAT Procedure

4.1 SAT-I

TPS-01 : Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling

Equipment Under Test : FO EQUIPENTS (SDH) & TERMINATION EQUIPMENT SUB- SYSTEM

Test Parameter : Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling

1. Test Descriptions

To identify correctly given equipment and verify the hardware configuration, and make the equipment ready for software configuration and commissioning.

2. Test Procedure

- Check the hardware configuration as per the configuration drawing.
- Check the installation whether it is as per the site layout drawing.
- Check the workmanship and accuracy of the installation and cabling.
- Check for physical damage
- Check the quantity as per approved BOQ.

3. Test Results Records

Test Parameters	Test Criteria	Test Results
Hardware configuration	Complies with the approved BOQ	Ok / Not Ok
Equipment layout	Equipment layout complies with the approved site layout drawing	Ok / Not Ok
Installation of Rack	• Location should conform to layout drawing • Fixed on floor by bolts	Ok / Not Ok
Installation of subrack and card	• Subrack should be firmly fixed • Cards should be inserted into the slots and locked	Ok / Not Ok
Cabling and terminator	• DC Power cable colour	Ok / Not Ok

processing	to distinguish the polarity • Cable lays smoothly, straight and tidily, without obvious twist and cross. • Cable buffer ares are consistent. • Well colligated. • Stripped length of cable should be consistent. • Good connection. Soldering point should be smooth and tight	
Physical damage	• Any physical damage in equipment	Ok / Not Ok

Make the sketch drawing of actual telecom room layout if any variance.

4. Test Remarks

ok
Rack is not installed, SDH equipment is installed in existing Commtel rack as per PGCIL instruction.

Equipment Under Test: Tejas TJ-1400

Test Date and Time: 31.07.2024 12:15 PM.

Site Name: Subhazgram PGCIL.

Tested By	: Kingshuk Pal	Witnessed By	: [signature]
	(Manufacturer/Contractor)		(POWERGRID/Constituent)
Date	: 31.07.2024	Date	:

POWER GRID CORPORATION OF INDIA LTD.

Ethernet IP- 192.168.111.103
Router ID - 192.168.11.103

TPS-02 : Station power supply input and equipment power supply(DC-DC converter) output voltage measurements

Equipment Under Test : FO EQUIPENTS (SDH) & TERMINATION EQUIPMENT SUB- SYSTEM

Test Parameter : Station power supply input and equipment power supply (DC-DC converter) output voltage measurements

1. Test Descriptions

To check the station Power Supply Voltage and the PDP output Voltage is with in the given range.

2. Test Procedure

- Check the i/p voltage at PDP
- Check the o/p voltage at PDP.

3. Test Equipments Required

- Digital Multimeter

4. Test Results Records

Test Parameters	Test Criteria	Test Results
i/p Voltage at PDP	i/p voltage should be in the range of -42V to -55V	Ok / Not Ok
o/p Voltage at PDP	o/p voltage should be in the range of -42V to -55V	Ok / Not Ok

5. Test Remarks

Equipment Under Test: Tejas TJ-1400

Test Date and Time: 31-07-2024 12:30 PM

Site Name: Subhasgram PGCIL

Tested By	: Kingshuk Pal (Manufacturer/Contractor)	Witnessed By	: (POWERGRID/Constituent)
Date	: 31.07.2024	Date	:

Biplob Sarkar
Sr. Dy. General Manager (ULDC)
POWERGRID, ER-II, KOLKATA

POWER GRID CORPORATION OF INDIA LTD.

TPS-03: Terminal transceiver performance testing (Tx power, Receive signal strength)

Equipment Under Test : FO EQUIPENTS (SDH)

Test Parameter : Terminal transceiver performance testing (Tx power, Receive signal strength)

1. **Test Descriptions**

   To check the Tx Power, Receiving Signal Strength is within the given range.

2. **Test Procedure**

   Tx Power Measurement

   - Connect the output port (Tx) of the tested optical interface card to the optical power meter.
   - Turning the optical power meter to the specified wavelength.
   - Measure the Tx output power level in dBm.
   - Record the result showing on the optical power meter.

   Receiving Signal Strength

   - Connect the output port (Rx) of the tested optical interface card to the optical power meter.
   - Turning the optical power meter to the specified wavelength.
   - Measure the Rx input power level in dBm.
   - Record the result showing on the optical power meter.

3. **Test Equipments Required**

   - Digital Optical Power Meter

4. **Test Results Records**

   Tx Power Measurement:

Sr. No.	Node / Station	Sr.No.	Optical Inteface Type (As per Approved BoQ)	Minimum (dBm)*	Maximum (dBm)*	Actual (dBm)
1	Slot-1, Port-1	APAP2144 CCC1C33	S16.1 1310 nm	-5	0	-2.20
	Slot-3, Port-1	APAP2844 CCC1C34		-5	0	-2.15
2	Slot-2, Port-1	DP34KPF CCC1443	L16.3 1550.12 nm	+3	+7	+5.10
	Slot-4, Port-1	DP34KPF CCC1444		+3	+7	+5.23

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3	Slot-2, Port-2	APAP2224 CCC3956	L16·2 1550nm	-2	+3	+0·47
	Slot-4, Port-2	APAP2224 CCC3955		-2	+3	+0·52
4	Slot-2, Port-3	DP34KPF C2CC117	L16·3 1550·12nm	+3	+7	+5·39
	Slot-4, Port-3	DP34KPF C2CC112		+3	+7	+5·03

*As per Approved DRS

The measured optical output power should be within the limits as expressed in the table given above.

Receiving Signal Strength:

Sr. No.	Node / Station	Sr.No.	Module Type (As per Approved BoQ)	Receiver Signal Strength (dBm)*	Actual (dBm)
1	Slot-1, Port-1	APAP2244 CCC10353	S16·1 1310nm	≤-18	-24·35
	Slot-3, Port-1	APAP2244 CCC1036		≤-18	-23·95
2	Slot-2, Port-1	DP34KPF C2CC143	L16·3 1550·12nm	≤-28	-33·45
	Slot-4, Port-1	DP34KPF C2CC144		≤-28	-34·03
3	Slot-2, Port-2	APAP2224 CCC3956	L16·2 1550nm	≤-28	-32·35
	Slot-4, Port-2	APAP2224 CCC3955		≤-28	-32·42
4	Slot-2, Port-3	DP34KPF C2CC117	L16·3 1550·12nm	≤-28	-33·91
	Slot-4, Port-3	DP34KPF C2CC112		≤-28	-33·27

The measured receiver power should be within the limits as expressed in the table given above.

* As per Approved DRS

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5. Test Remarks OK

Equipment Under Test: Tejas TJ-1400

Test Date and Time: 31.07.2024 1:15 PM

Site Name: Subhagram PGCIL

Tested By : Kangsuk Pal
(Manufacturer/Contractor)

Date : 31.07.2024

Witnessed By :
(POWERGRID/Constituent)

Date :

Biplob Sarkar
Sr. By. General Manager (ULDC)
POWERGRID, ER-II, KOLKATA

TPS-04: Services Channel performance Test

Equipment Under Test : FO EQUIPENTS (SDH)

Test Parameter : Services Channel performance Test

1. **Test Descriptions**

   To identify correct operation of the services channels used for the EOW phones.

2. **Test Procedure**

   - Connect the EOW phone to services channel.
   - Make a call from EOW phone to any station at other end (as per EOW numbering plan)
   - Check the quality of voice
   - Make a Omnibus call to different sites and check

3. **Test Results Records**

   EOW telephone works well conversation quality is satisfactory.
   Selective calling Ok / Nok
   Omnibus calling Ok / Nok

4. **Test Remarks**

   Ok

Equipment Under Test: Tejas TJ-1400

Test Date and Time: 31.07.2024 12:25PM

Site Name: Subhasgram PGCIL

Tested By : Kingsuk Pal (Manufacturer/Contractor)

Date : 31.07.2024

Witnessed By : Biplob Sarkar (POWERGRID/Constituent)

Date :

POWER GRID CORPORATION OF INDIA LTD.

TPS-05: Craftsperson interface, alarm and control functional performance

Equipment Under Test : FO EQUIPENTS (SDH) & TERMINATION EQUIPMENT SUB- SYSTEM

Test Parameter : Craftsperson interface, alarm and control functional performance

1. Test Descriptions

Functions of LCT:
Change configuration
Get alarm of any fault
Get performance information
To simulate defects by using the measurement equipment and LCT
Performance monitoring
Loopback

2. Test Equipments Required

- LCT
- BER Tester

3. Test Procedure

Connect the LCT to equipment under test through management port

- Ensure the equipment under test is working.
- Login the LCT.
- Change some configurations of the equipment.
- Get the fault information from the equipment.
- Get and browse the performance data of the equipment.
- Change configurations of another station indirectly, get its fault information and performance data

Loop back test

- Apply a software loop on remote end E1 channel through LCT.
- Test the loop back with E1 tester on local end.
- Record the result there should be no error during this period.

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4. Test Results Records

Test item	Ok / Not Ok
LCT is able to change the configuration of the connected NE.	OK
LCT can get fault information from the connected NE.	OK
LCT can get performance data from the connected NE.	OK
LCT is able to change the configuration of any NE in the network.	OK
LCT can get fault/alarm information from the unconnected NE.	OK
LCT can get performance data from the unconnected NE.	OK
Check for connection of NMS and LCT on the network at the same time	OK
Check for remote loopback, local loopback	OK
Check for cross connection	OK
Test the loop back with E1 tester on local end	OK
Record the result there should be no error during this period	OK

Alarms should be indicated on LCT and equipment when there is some failure. Equipment can be configured by LCT.
Performance data can be monitored on LCT.

5. Test Remarks

OK

Equipment Under Test: Tejas TJ-1400
Test Date and Time: 31.07.2024 1:40PM
Site Name: Subhasgram PGCIL

Tested By : Kingsuk Pal
(Manufacturer/Contractor)
Date : 31.07.2024

Witnessed By :
(POWERGRID/Constituent)
Date :

POWER GRID CORPORATION OF INDIA

TPS-06: Rack and local alarms

Equipment Under Test : FO EQUIPENTS (SDH) & TERMINATION EQUIPMENT SUB- SYSTEM

Test Parameter : Rack and local alarms: No alarms shall be present and all alarms shall be demonstrated to be functional

1. Test Descriptions

To check the Rack alarm and Local alarms are correctly reflects on Equipment and LCT.

Rack Alarm

- Urgent Alarm's
- Non Urgent alarm's
- No Alarm

Local Alarms on LCT

FO System

- LOS on optical port
- LOS on 2Mbit/s Port
- Card failure by pulling out some cards

Termination Equipments

- AIS (RDI)
- E1_LOF
- E1_LOS

2. Test Equipments Required

- LCT

3. Test Procedure

Rack Alarm

1) Disconnect one of the optical Rx port. There should be Urgent alarm of SDH Sub-Rack.
2) Restore the optical RX port. then there should be no alarm on SDH Sub-Rack
3) Remove the 2Mbps cable from the DDF (Should be working 2M), there should be Urgent alarm on SDH Sub-Rack.
4) Connect the 2Mbps cable on DDF, the Urgent alarm should be cleared.

Local alarm on LCT

For LOS/LOF on SDH System

- Connect the LCT to the SDH and PDH equipment one by one
- Pull out the optical card of SDH Equipment, check the alarm display.
- Pull out the Tributary card of SDH and PDH equipment, check the alarm display.
- Pull out the E1 link from SDH and PDH equipments, check the alarm display.
- Verify the SDH and PDH equipment is configurable by LCT.
- Verify the performance monitoring on LCT.

4. Test Results Records

Rack alarm

S.No.	Test item (SDH)	Test result
1	Urgent Alarm appearing in fault conditions	Ok / Not Ok
2	Non Urgent Alarm appearing in fault conditions	Ok / Not Ok
3	No alarms (during Normal operation)	Ok / Not Ok

Local alarm on LCT

Alarms should be indicated on LCT and equipment when there is fault condition.

5. Test Remarks

OK

Equipment Under Test: Tejas TJ-1400

Test Date and Time: 31.07.2024 1:55 PM

Site Name: Subhasgram PGCIL

Tested By : Kingsuk Pal
(Manufacturer/Contractor)

Date : 31.07.2024

Witnessed By :
(POWERGRID/Constituent)

Date :

POWER GRID CORPORATION OF INDIA LTD.

TPS-07: Network management interface and supervision performance

Equipment Under Test	:	FO EQUIPENTS (SDH) & TERMINATION EQUIPMENT SUB- SYSTEM
Test Parameter	:	Network management interface and supervision performance

1. Test Descriptions

To check the Communication between NMS and Gateway NE through management interface.

Test will be carried out to check the following parameters

- Configuration
- Loopback Testing
- Laser Testing
- Alarm reporting
- Performance monitoring

2. Test Equipments Required

- NMS System
- BER Tester

3. Test Procedure

- Login to the equipment through management port.
- STM-4 /16 Line loop back in software
- E1 Loop back in software and check on BER tester
- Laser switch off/on through software
- Monitor optical power
- Display of alarms
- Performance event collection like ES, SES, BBE for 15Min

4. Test Results Records

Verify all the above listed test procedures is working ok:		Ok / Not Ok
NMS can configure and supervise the whole network	:	Ok / Not Ok
Diagnostics is possible on NMS	:	Ok / Not Ok
Alarms should be displayed if there is any failure	:	Ok / Not Ok

5. Test Remarks

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Equipment Under Test: Tejas TJ-1400

Test Date and Time: 31.07.2024 2:06PM

Site Name: Subhasgram PGCIL

Tested By : Kingsuk Pal
(Manufacturer/Contractor)

Date : 31.07.2024

Witnessed By :
(POWERGRID/Constituent)

Date :

Biplob Sarkar
Sr. Dy. General Manager (ULDC)
पावरग्रिड, पूर्वी क्षेत्र-I, कोलकाता
POWERGRID, ER-II, KOLKATA

POWER GRID CORPORATION OF INDIA

TPS-08: Correct configuration, level setting & adjustments and termination of Input/ output interfaces

Equipment Under Test : FO EQUIPMENTS (SDH)

Test Parameter : Correct configuration, level setting & adjustments and termination of Input/ output interfaces

1. **Test Descriptions**

   To check the Equipment configuration is according to approved Configuration plan. To check the Input/output termination of Optical and Electrical cables are according to approved scheme

2. **Test Equipments Required**

   - LCT
   - Approved Optical and 2Mbps distribution Diagrams

3. **Test Procedure**

   - Connect the LCT to the SDH equipment through f interface.
   - Ensure the SDH equipment is working.
   - Login the LCT.
   - Check the equipment configuration
   - Check the Termination of Input and Output cables.
   - Check different level settings in the SDH Equipment.

4. **Test Results Records**

   Configuration, level setting adjustment and termination should comply with the approved documents : Ok / Not Ok ✓

5. **Test Remarks**

   Ok

Equipment Under Test: Tejas TJ-1400

Test Date and Time: 31.07.2024 2:20PM

Site Name: Subhasgram PGCIL

Tested By : Kingsuk Pal (Manufacturer/Contractor)

Witnessed By : (POWERGRID/Consultant)

Date : 31.07.2024

Date :

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TPS-09: Proper establishment of Safety and signalling earthing system and resistance to ground to be checked.

Equipment Under Test	:	FO EQUIPMENTS (SDH) & TERMINATION EQUIPMENT SUB-SYSTEM
Test Parameter	:	Proper establishment of Safety and signalling earthing system and resistance to ground to be checked

1. **Test Descriptions**

   To check the Earthing cable Terminations To check the Earth resistance.

2. **Test Equipments Required**

   - Clamp Earth Tester

3. **Test Procedure**

   - Check that all the earthing connection are terminated on the earth bus bar are tightened
   - All equipments are connected with Earth bus bar
   - Colour of the Earth cable is yellow-green or green
   - Measure the Earth resistance Clamp Earth Tester
   - Check the wrist strap is available at each station

4. **Test Results Records**

Earthing connections are properly done	:	✓ Ok / Not Ok
Earth resistance measured is less than 10 Ω	:	Ok/ Not Ok

5. **Test Remarks**

OK
Value = 0.006 Ω

Equipment Under Test: Tejas TJ-1400

Test Date and Time: 31.07.2024 2:25PM

Site Name: Subhasgram PGCIL

Tested By : Kingsuk Pal
(Manufacturer/Contractor)

Date : 31.07.2024

Witnessed By :
(POWERGRID/Constituent)

Date :

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TPS-10: Simulation of failure conditions and failover of protected components

Equipment Under Test : FO EQUIPENTS (SDH)

Test Parameter : Simulation of failure conditions and failover of protected components.

1. Test Descriptions

To check the Failure conditions and protection components for following cards :
- Control Cards
- Optical Cards

2. Test Equipments Required

- BER Tester

3. Test Procedure

Control Card

- Control cards work on 1+1 protection. 1 protection card for 1 working card.
- Make the equipment work on normal status.
- Pull out the working Control card.
- The protection Control card should take over, and traffic should be restored.

Optical Card

- Optical cards work on 1+1 protection. 1 protection card for 1 working card.
- Make the equipment work on normal status.
- Pull out the working Optical card.
- The protection STM-4 /16 card should take over, and traffic should be restored.

For both the cards make software loop on any E1 and put in the BER testing mode. Check that during both the test the traffic is restored automatically.

4. Test Results Records

Traffic restored automatically even if one Control card and Optical card terms Faulty : Ok / Not Ok

5. Test Remarks

ok

Equipment Under Test: Tejas TJ-1400

Test Date and Time: 31.07.2024 3:20PM

Site Name: Subhasgram PGCIL

Tested By : Kingsuk Pal (Manufacturer/Contractor)

Date : 31.07.2024

Witnessed By : (POWERGRID/Constituent)

Date :

विनोद सरकार
VINOD SARKAR
Sr. Dy. General Manager (ULDC)
पावरग्रिड, पूर्वी क्षेत्र-II, कोलकाता
POWERGRID, ER-II, KOLKATA

POWER GRID CORPORATION OF INDIA LTD.

TPS-11: Craftsperson interface, alarm and control functional performance

Equipment Under Test	:	TERMINATION EQUIPMENT SUB-SYSTEM
Test Parameter	:	Craftsperson interface, alarm and control functional performance (MUX and DACS)

1. Test Descriptions

Functions of LCT:
Change configuration
Get alarm of any fault
Get performance information
To simulate defects by using the measurement equipment and LCT
Performance monitoring
Loopback

2. Test Equipments Required

- LCT
- BER Tester

3. Test Procedure

Connect the PDH Equipment with LCT.

- Connect the LCT to the PDH equipment
- Ensure the PDH equipment is working.
- Login the LCT.
- Change some configurations of the equipment.
- Get the fault information from the PDH equipment.
- Get and browse the performance data of the equipment.
- Change configurations of another station indirectly, get its fault information and performance data.

Loop back test

- Apply a software loop on any E1 channel thro LCT
- Test the loop back with E1 tester

4. **Test Results Records**

Test item	Ok / Not Ok
LCT is able to change the configuration of the connected NE.	
LCT can get fault information from the connected NE.	
LCT can get performance data from the connected NE.	
LCT is able to change the configuration of any NE in the network.	
Check for remote loopback, local loopback	
Check for branching connection	

Alarms should be indicated on LCT and equipment when there is some failure.
Equipment can be configured by LCT.
Performance data can be monitored on LCT

5. **Test Remarks**

_____

_____

_____

_____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ **Witnessed By** : _____

(Manufacturer/Contractor) (POWERGRID/Constituent)

Date : _____ **Date** : _____

TPS-12: Simulation of failure conditions and failover of protected components

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Simulation of failure conditions and failover of protected components (MUX)

1. **Test Descriptions**

   To check the Failure conditions and protection components for following cards Power supply card

2. **Test Equipments Required**

   - BER Tester

3. **Test Procedure**

   - Power Cards work on 1+1 protection. 1 protection card for 1 working card.
   - Make the equipment work on normal status.
   - Pull out the working power card.
   - The protection power card should take over, and traffic should be restored.

   For this test make software loop on any data channel and put in the BER testing mode. Check that during test the traffic is restored automatically.

4. **Test Results Records**

   Traffic restored automatically even if one Power card terms Faulty : Ok / Not Ok

5. **Test Remarks**

   _____
   _____
   _____
   _____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ (Manufacturer/Contractor) **Witnessed By** : _____ (POWERGRID/Constituent)

Date : _____ **Date** : _____

TPS-13: Channel performance tests(PDH)

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Channel Performance Test (MUX)

1. Test Descriptions

To check the channel performance of interface cards as below :
- FXO/FXS voice cards
- VF E&M 4w Cards
- Async. Data card

2. Test Equipments Required

- BER Tester
- Telephone Instrument
- VF Tester

3. Test Procedure

For FXO/FXS Voice cards

- Connect the Telephone Instrument at station under test and any remote station
- Make a telephone call to remote station
- Check the quality of Voice.

For 4 w VF E&M cards

- Connect the VF Tester to channel under test
- Give the loop back at remote station
- Send the frequency of 1 Khz, Level 4 db thro VF Tester
- Measure the return frequency and level
- Results should be same with ±5% variation
- Perform the test on 30% of all channels

For Async. Data channel card

- Connect the BER tester to channel under test
- Give the loop back at remote end of the channel
- Measure the BER for 5 min.
- There should be no error during this period.
- Perform the test on 30% of all channels

4. Test Results Records

For FXO/FXS cards

Card Serial No. :_____

Call can be established between two stations : Ok / Not Ok
Voice Quality is Good : Ok / Not Ok

For 4w VF E&M Cards

Card Serial No. :_____

Channel No	Tx Frequency (KHz) / Level (db)	Rx Frequency (KHz) / Level (db)	Test Status
1	1 Khz / 4 db		Ok / Not Ok
2	1 Khz / 4 db		Ok / Not OK
3	1 Khz / 4 db		Ok / Not OK
4	1 Khz / 4 db		Ok / Not OK

Card Serial No. :_____

Channel No	Tx Frequency (KHz) / Level (db)	Rx Frequency (KHz) / Level (db)	Test Status
1	1 Khz / 4 db		Ok / Not OK
2	1 Khz / 4 db		Ok / Not OK
3	1 Khz / 4 db		Ok / Not OK
4	1 Khz / 4 db		Ok / Not OK

For Async. data channel card

Card Serial No. :_____

Channel No.	BER	Test Status
1		Ok / Not Ok
2		Ok / Not Ok
3		Ok / Not Ok
4		Ok / Not Ok

Card Serial No. :_____

Channel No.	BER	Test Status
1		Ok / Not Ok
2		Ok / Not Ok
3		Ok / Not Ok
4		Ok / Not Ok

5. Test Remarks

_____

_____

_____

_____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ Witnessed By : _____

(Manufacturer/Contractor) (POWERGRID/Constituent)

Date : _____ Date : _____

TPS-14: Network management interface and supervision performance

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Network management interface and supervision performance (MUX and DACS)

1. Test Descriptions

To check the Communication between NMS and Gateway NE through Management interface.

Test will be carried out to check the following parameters

- Configuration
- Loopback Testing
- Alarm reporting
- Performance monitoring

2. Test Equipments Required

- NMS system
- BER Tester

3. Test Procedure

- Login to the equipment through management interface
- E1 Loop back in software and check on BER tester
- Display of alarms
- Check the MUX board Configuration
- Perform the operation of branching the Timeslots
- Performance event collection

4. Test Results Records

Verify all the above listed test procedures is working ok;		Ok / Not Ok
NMS can configure and supervise the whole network	:	Ok/ Not Ok
Diagnostics is possible on NMS	:	Ok / Not Ok
Alarms should be displayed if there is any failure	:	Ok / Not Ok

5. Test Remarks

_____

_____

_____

_____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ Witnessed By : _____

(Manufacturer/Contractor) (POWERGRID/Constituent)

Date : _____ Date : _____

TPS-15: Muldem performance testing (MUX)

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Muldem performance testing (MUX)

1. Test Descriptions

To check the multiplexing and de-multiplexing is properly happening in MUX Equipment.

2. Test Equipments Required

- BER Tester
- VF Tester

3. Test Procedure

Loop back the main 2mbps transmission Signal of E1 card.
Connect the BER Tester to any data channel of same MUX Check the loop back

Follow the following procedure for different data channels

For 4w VF E&M cards

- Connect the VF Tester to channel under test
- Send the frequency of 1 Khz, Level 4 db thro VF Tester
- Measure the return frequency and level
- Results should be same with ±5% variation

For Async. Data channel card

- Connect the BER tester to channel under test
- Measure the BER for 5 min.
- There should be no error during this period.

4. Test Results Records

Multiplexing and Demultiplexing is happening properly in MUX equipment : Ok / Not Ok

5. Test Remarks

_____

_____

_____

_____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ Witnessed By : _____

(Manufacturer/Contractor) (POWERGRID/Constituent)

Date : _____ Date : _____

TPS-16: Simulation of failure conditions and failover of protected components (DACS)

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Simulation of failure conditions and failover of protected components (DACS)

1. Test Descriptions

To check the Failure conditions and protection components for following cards

Power supply card
Control card

2. Test Equipments Required

- BER Tester

3. Test Procedure

- Power Card and Control Card work on 1+1 protection. 1 protection card for 1 working card.
- Make the equipment work on normal status.
- Pull out the working power card.
- The protection power card should take over, and traffic should be restored.
- Pull out the working Control card
- The protection Control card should take over, and traffic should be restored.

For this test make software loop on any E1 channel on and put in the BER testing mode. Check that during test the traffic is restored automatically.

4. Test Results Records

Traffic restored automatically even if one Power card terms Faulty	:	Ok / Not Ok
Control card terms Faulty	:	Ok / Not Ok

5. Test Remarks

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By	: _____	Witnessed By	: _____
	(Manufacturer/Contractor)		(POWERGRID/Constituent)
Date	: _____	Date	: _____

TPS17: Channel Performance Tests (DACS)

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Channel Performance Test (DACS)

1. Test Descriptions

To check the channel performance of interface cards as below

- Tributary Card
- Cross connect card

2. Test Equipments Required

- BER Tester

3. Test Procedure

For Tributary Card

- Connect the BER tester to E1 channel under test
- Give the local software loop back to the channel
- Measure the BER for 5 min.
- There should be no error during this period
- Perform the test for 30% of total E1 channels

For Cross connect card

- Connect the BER tester to any 64kbps data channel configured between any remote station and station under test.
- Give the Remote Loop back.
- Check the cross connection is properly done in DACS using LCT
- Check the BER
- In case of 64K VF channel
- Send the frequency of 1 Khz, Level 4 db thro VF Tester
- Measure the return frequency and level
- Results should be same with ±5% variation

4. Test Results Records

For Tributary Card

Card Serial No. : _____

Channel No.	BER	Test Status
1		Ok / Not Ok
2		Ok / Not Ok
3		Ok / Not Ok
4		Ok / Not Ok
5		Ok / Not Ok

For Cross connect card

Card Serial No. :_____

Channel Performance of Cross Connect Card : Ok / Not Ok

5. Test Remarks

_____

_____

_____

_____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ Witnessed By : _____

(Manufacturer/Contractor) (POWERGRID/Constituent)

Date : _____ Date : _____

TPS-18: Physical inspection for conformance to drawings, rack elevations and appearance of equipment and cabling of NMS System Workstation hardware inventory, configuration and characteristics of NMS System

Equipment Under Test	:	NMS System (incl. all associated HW & SW supplied with the complete system)
Test Parameter	:	Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling Hardware & Software Inventory, Configuration and characteristic

1. Test Descriptions

To identify correctly given equipment and verify the hardware configuration, and make the equipment ready for software configuration and commissioning.

2. Test Procedure

- Check the hardware configuration as per the configuration drawing.
- Check the installation whether it is as per the site layout drawing.
- Check the workmanship and accuracy of the installation and cabling.
- Check for physical damage
- Check the Hardware & software inventory as per approved DRS & BOQ documents.

3. Test Results Records

Make the sketch drawing of actual NMS room layout if any variance.

No Physical Damage	: Ok / Not Ok
Hardware & Software Inventory as per approved DRS & BOQ	: Ok / Not Ok
Hardware Configuration as per approved DRS & BoQ	: Ok / Not Ok

4. Test Remarks

_____

_____

_____

_____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ Witnessed By : _____

(Manufacturer/Contractor) (POWERGRID/Constituent)

Date : _____ Date : _____

TPS-19: Demonstration of proper operation of all hardware, including workstations peripherals of NMS System

Equipment Under Test : NMS System

Test Parameter : Demonstration of proper operation of all hardware, including workstations peripherals of NMS System

1. **Test Descriptions**

   To identify all the hardware including Workstations and its peripheral devices operates correctly.

2. **Test Procedure**

   2.1. Check the Workstations are connected with all the peripheral devices as per the BOQ
   2.2. Power On the Workstation and devices.
   2.3. Check the operation of all devices

3. **Test Results Records**

   All hardware associated with NMS are working properly : Ok / Not Ok

4. **Test Remarks**

   _____
   _____
   _____
   _____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ **Witnessed By** : _____
(Manufacturer/Contractor) (POWERGRID/Constituent)

Date : _____ **Date** : _____

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4.2 SAT-II

TPS-20: Ethernet Channel Testing (SDH)

Equipment Under Test	:	SDH Equipment along with Ethernet Interface Unit
Test Parameter	:	Throughput, Latency, Packet Loss Measurement and Ping test of Ethernet Interface

1.0 TEST DESCRIPTION

To verify that Ethernet card is in compliance with the specifications of IEEE 802.3/RFC-2544 standards.

2.0 TEST EQUIPMENT

1. Ethernet Analyser
2. Local Craft Terminal (LCT)
3. Low loss optical patch cord & LAN cable

3.0 TEST PROCEDURE

1. Connect the SDH nodes Node-A & B with LCT.
2. At Node-A and B, Configure WAN bandwidth of the Ethernet interface as per channel plan.
3. Connect the Ethernet Analyser to LAN port of SDH equipment with UTP cable. Set the LAN port to Auto Negotiate mode.
4. At Node-B, set the Ethernet Analyser in Layer-2 loop back mode.
5. At Node-A, start the RFC 2544 test in the Ethernet analyser, set the test parameters for throughput, latency and packet loss test, set the frame length to 1518 bytes.
6. Measure the throughput, latency & packet loss.
7. All links will be tested for 1 min.

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4.0 **Test Result Record**

A. **Throughput**

Anticipated result		Actual result
Bandwidth	Throughput	
2Mbps	As per applicable RFC-2544 Standard	2·000
6 Mbps	As per applicable RFC-2544 Standard	6·000
10 Mbps	As per applicable RFC-2544 Standard	10·000

The throughput of the Ethernet card should not be less than the bandwidth configured.

B. **Latency**

Anticipated result		Actual result
Bandwidth	Latency	
2 Mbps	As per applicable RFC-2544 Standard	4·904
6 Mbps	As per applicable RFC-2544 Standard	4·908
10 Mbps	As per applicable RFC-2544 Standard	5·106

The actual latency should be less than the value tolerated in the worst case.

C. **Packet Loss**

Anticipated result		Actual result
Bandwidth	Packet loss ratio	
2 Mbps	As per applicable RFC-2544Standard	0·000
6 Mbps	As per applicable RFC-2544 Standard	0·000
10 Mbps	As per applicable RFC-2544 Standard	0·000

The actual frame loss ratio should be less than the value tolerated in the worst case.

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D. Ping Test

Connect the laptop to Ethernet port under test at both the nodes. Run the ping test

Test Result:
Both laptops ping each other thro Ethernet Channel : Ok / Not Ok

There should be No Packet Loss : Ok / Not Ok

5.1 Test Remarks

OK

Equipment Under Test: Tejas TJ-1400
Test Date and Time: 31.07.2024 3:40PM
Site Name: Subhasgram PGCIL

Tested By : Kingsuk Pal (Manufacturer/Contractor)
Date : 31.07.2024

Witnessed By : (POWERGRID/Constituent)
Date :

Dipak Sarkar
Dy. General Manager (SCADA)
POWERGRID, ER-II, KOLKATA

POWER GRID CORPORATION OF INDIA LTD.

TPS-21: Measurement of BER For SDH Link

Equipment Under Test : FO EQUIPENTS (SDH)

Test Parameter : Bit Error measurements

1. **Test Descriptions**
   To check the BER Measurements for End to End links for SDH Equipment.

2. **Test Equipments Required**
   - LCT
   - BER Tester

3. **Test Procedure**
   - Configure an E1 channel from remote end to local end.
   - Apply a software loop on remote end E1 channel through LCT.
   - Test the loop back with E1 tester on local end for 1 hours/12 hours as required @10% of the link will be test for 12 hours.

   Note: - 1. All BER have to be done for only 1 hour except for 10% of the link (12 hours).

4. **Test Results Records**

Test item	Ok / Not Ok
The test results recorded there should be no error during this period as per ITU-T recommendation G.821	Ok

5. **Test Remarks**

Ok

Equipment Under Test: Tejas TJ-1400

Test Date and Time: 31.07.2024 3:05 PM

Site Name: Subhasgram PGCIL

Tested By : Kingsuk Pal
(Manufacturer/Contractor)

Date : 31.07.2024

Witnessed By :
(POWERGRID/Constituent)
उप महाप्रबंधक (यू.एल.डी.सी.)
Dy. General Manager (ULDC)
पावरग्रिड, पूर्वी क्षेत्र-II, कोलकाता
POWERGRID, ER-II, KOLKATA

Date :

POWER GRID CORPORATION OF INDIA

TPS-22: Delay measurement

Equipment Under Test : FO EQUIPENTS (SDH)

Test Parameter : Delay measurements

1. **Test Descriptions**

To Measure the transmission delay in the path of the network for SDH Equipment.

2. **Test Equipments Required**

- LCT
- BER Tester

3. **Test Procedure**

- Configure an E1 channel from remote end to local end.
- Apply a software loop on remote end E1 channel through LCT.
- Test the loop back with E1 tester on local end.
- Once there is no alarm in tester, open the delay measurement and simulate test.
- Total delay in the path is measured and displayed.

4. **Test Results Records**

Test item	Measured value	Ok / Not Ok
Delay measurement should not be more than 50 msec	1.36 ms	Ok

5. **Test Remarks**

Ok

Equipment Under Test: Tejas TJ-1400

Test Date and Time: 31.07.2024 3:08 PM

Site Name: Subhangram PGCIL

Tested By : Kingsuk Pal (Manufacturer/Contractor)

Date : 31.07.2024

Witnessed By : Biplob Sarkar (POWERGRID/Constituent)

Date :

POWERGRID, ER-II, KOLKATA

4.3 SAT-III

TPS-23: End to End testing of Voice circuits

Equipment Under Test	:	FO EQUIPMENTS (SDH) & TERMINATION EQUIPMENT SUB-SYSTEM
Test Parameter	:	End to End testing of Voice circuits

1. **Test Descriptions**

   To check the individual voice circuits originating from PLCC, PABX or phones are working properly.

2. **Test Procedure**

   - Make a phone call to all configured voice circuits from the station under test.
   - Check the call initiation, Quality of Voice and Call termination is happening properly.

3. **Test Results Records**

Call initiation is proper	: Ok / Not Ok
Quality of Voice is good	: Ok / Not Ok
Call Termination is proper	: Ok / Not Ok

4. **Test Remarks**

_____

_____

_____

_____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By	: _____ (Manufacturer/Contractor)	**Witnessed By**	: _____ (POWERGRID/Constituent)
Date	: _____	**Date**	: _____

TPS-24: Testing of NMS Functionality

Equipment Under Test	:	FO EQUIPMENTS (SDH) and Existing TERMINATION EQUIPMENT SUB-SYSTEM (PDH & DACS)
Test Parameter	:	End to End testing of Voice and Data circuits of Existing System

1. **Test Descriptions**

   To check all Data and Voice circuits originating from RTU, PLCC, PABX or phones are working properly.

2. **Test Procedure**

   - Make a phone call to Existing configured voice circuits from the station under test.
   - Check the call initiation, Quality of Voice and Call termination is happening properly.
   - Check the Existing Data are reporting to corresponding Sub-LDC and SLDC.

3. **Test Results Records**

Call initiation is proper	: Ok / Not Ok
Quality of Voice is good	: Ok / Not Ok
Call Termination is proper	: Ok / Not Ok
Data reporting is proper	: Ok / Not Ok

4. **Test Remarks**

_____

_____

_____

_____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ **Witnessed By** : _____

(Manufacturer/Contractor) (POWERGRID/Constituent)

Date : _____ **Date** : _____

TPS-25: Protection Switching and Synchronization of Equipment

Equipment Under Test : NMS System

Test Parameter : Demonstration of the standard features of the NMS System

1. Test Descriptions

To verify that the entire standard features of NMS System are working properly as per technical specifications requirements.

2. Test Parameters

- Configuration Management
- Performance Management
- Fault Management
- Security Management

3. Test Procedure

CONFIGURATION MANAGEMENT

- Connect the TNMS system with the management interface of SDH equipment by using Ethernet cable.
- Ensure the SDH equipment is working.
- Login NMS as user of advanced level.
- Check the NMS whether it can establish and maintain the network topology.
- Check the NMS whether it provides the tools for planning, establishing and changing the static equipment configuration, this item can be conducted by changing some parameters & cross connection of the SDH equipment.
- Check the NMS whether it provide verification testing to support new equipment installation, this can be tested by adding a new NE.
- For creating the cross connection, establish the cross connection between any of the two ports in the same or different card.

FAULT MANAGEMENT

- Display Equipment Status, Display graphical, topological & Map type and Display the use of colour on links and Nodes.
- Connect the TNMS system with the management interface of SDH equipment by using

Ethernet cable.

- Ensure the SDH equipment is working.
- Login NMS as user of advanced level.
- Generate the various alarms; check the NMS for relevant alarm status.
- For example, pull out one card from SDH sub-rack; check the NMS for alarm of that fault.
- Insert the card, and then the alarm disappears.
- Check the alarm history, which includes all alarm events.
- Check the capability of alarm retrieval filter. Change the setting and retrieve.
- Check the colors for different level alarm events.
- Print alarm report.

SECURITY MANAGEMENT

- Connect the TNMS system with the management interface of SDH equipment by using Ethernet cable.
- Ensure the SDH equipment is working.
- Login as Administrator
- Add a user and define the user profile.
- Login as user and verify that user is able to perform various tasks as per profile.

PERFORMANCE MANAGEMENT

- Connect the TNMS system with the management interface of SDH equipment by using Ethernet cable.
- Ensure the SDH equipment is working.
- Configure a E1 interface and run performance management for specified interval.
- Monitor events & thresholds.
- Generate reports on daily, weekly, monthly and yearly basis containing system statistics.

LCT FUNCTIONALITY TEST

- Connect the LCT to the SDH equipment through LCT interface.
- Ensure the SDH equipment is working.
- Login the LCT.

- Change some configurations of the equipment.
- Get the fault information from the SDH equipment.

4. Test Results Records

Sr. No.	Test Description	Results (OK / Not OK)
1.0	**CONFIGURATION MANAGEMENT**	
1.1	Capability to establish and maintain the backbone topology.	
1.2	Capability to provide graphical maps depicting the sub-rack configurations.	
1.3	Capability to plan, establish and change the static equipment configuration.	
1.4	Verification testing to support new equipment installation.	
1.5	Cross-connect capability between any of the two ports in same or different card.	
2.0	**FAULT MANAGEMENT**	
2.1	After generating an alarm, it is automatically displayed.	
2.2	Alarm has been shown automatically when there is card failure.	
2.3	NMS can maintain an alarm summary of unacknowledged current alarm.	
2.4	NMS can maintain an alarm history.	
2.5	Operator can acknowledge and clear alarms.	
2.6	Alarm retrieval filter is available.	
2.7	Alarms can be classified and configured as critical alarms, major alarms and minor alarms, in different colors.	
2.8	Alarm reports can be extracted.	
3.0	**SECURITY MANAGEMENT**	
3.1	Security Management functionality allows user addition and user profile definition.	
4.0	**PERFORMANCE MANAGEMENT**	
4.1	Performance Management can be enabled for specific interface.	
4.2	The Measurement interval can be selected.	

4.3	Monitor events & thresholds.	
4.4	Generate reports on daily, weekly, monthly and yearly basis containing system statistics.	
5.0	LCT Functionality Test	
5.1	LCT can get fault information from the connected SDH node.	
5.2	LCT is able to change the configuration of the connected SDH node.	
5.3	LCT is able to change the configuration of connected SDH node.	

5. Test Remarks

_____

_____

_____

_____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ **Witnessed By** : _____

(Manufacturer/Contractor) **(POWERGRID/Constituent)**

Date : _____ **Date** : _____

TPS-26: End to End Data Channel testing

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : End to End Data Channel testing

1. Test Descriptions

To check the channel performance of interface cards as below :
- FXO/FXS voice cards
- VF E&M 4w Cards
- Async. Data card

2. Test Equipments Required

- BER Tester
- Telephone Instrument
- VF Tester

3. Test Procedure

For FXO/FXS Voice cards

- Connect the Telephone Instrument at station under test and any remote station
- Make a telephone call to remote station.
- Check the quality of Voice.

For 4 w VF E&M cards

- Connect the VF Tester to channel under test
- Give the loop back at remote station
- Send the frequency of 1 Khz, Level 4 db thro VF Tester
- Measure the return frequency and level
- Results should be same with ±5% variation
- Perform the test on 30% of all channels

For Async. Data channel card

- Connect the BER tester to channel under test
- Give the loop back at remote end of the channel
- Measure the BER for 5 min.
- There should be no error during this period.
- Perform the test on 30% of all channels

4. Test Results Records

For FXO/FXS cards

Card Serial No. :_____

Call can be established between two stations : Ok / Not Ok
Voice Quality is Good : Ok / Not Ok

For 4w VF E&M Cards

Card Serial No. :_____

Channel No	Tx Frequency (KHz) / Level (db)	Rx Frequency (KHz) / Level (db)	Test Status
1	1 Khz / 4 db		Ok / Not Ok
2	1 Khz / 4 db		Ok / Not OK
3	1 Khz / 4 db		Ok / Not OK
4	1 Khz / 4 db		Ok / Not OK

Card Serial No. :_____

Channel No	Tx Frequency (KHz) / Level (db)	Rx Frequency (KHz) / Level (db)	Test Status
1	1 Khz / 4 db		Ok / Not OK
2	1 Khz / 4 db		Ok / Not OK
3	1 Khz / 4 db		Ok / Not OK
4	1 Khz / 4 db		Ok / Not OK

For Async. data channel card

Card Serial No. :_____

Channel No.	BER	Test Status
1		Ok / Not Ok
2		Ok / Not Ok
3		Ok / Not Ok
4		Ok / Not Ok

Card Serial No. :_____

Channel No.	BER	Test Status
1		Ok / Not Ok
2		Ok / Not Ok
3		Ok / Not Ok
4		Ok / Not Ok

5. Test Remarks

_____

_____

_____

_____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ Witnessed By : _____

(Manufacturer/Contractor) (POWERGRID/Constituent)

Date : _____ Date : _____

TPS-27: Interfacing with Existing Communication System

Equipment Under Test : FO EQUIPENTS (SDH) & TERMINATION EQUIPMENT SUB- SYSTEM

Test Parameter : Protection Switching and Synchronization of Equipment

Pre-requisite : All the synchronization clock & associated items installed as per approved Synchronization plan

1. Test Descriptions

a) To check the Failure conditions and protection switching is working properly for all protections on Control cards, Optical Cards (protection switching for ring network wherever applicable).

b) To check the Failure conditions and protection switching is working properly for protections of Optical Cards/interfaces in ring network wherever applicable.

c) To check the Synchronization of the Equipment is as per the approved Sync. Plan.

2. Test Equipments Required

- BER Tester

3. Test Procedure

Control Card

- Control cards work on 1+1 protection, 1 protection card for 1 working card.
- Make the equipment work on normal status.
- Pull out the working Control card.
- The protection Control card should take over, and traffic should be restored.

Optical Card

- Optical cards work on 1+1 protection, 1 protection card for 1 working card.
- Make the equipment work on normal status.
- Pull out the working Optical card.
- The protection Optical card should take over, and traffic should be restored.

For both the cards make software loop on any data/E1 channel at remote end and put in the BER testing mode. Check that during both the test the traffic is restored automatically.

Synchronization

- Check the Synchronization Cabling/connection is as per approved Sync. Plan.
- Check the sync. Priority switching on protected path through LCT/NMS.

4. Test Results Records

a) Traffic restored automatically even if one Control and Optical card terms Faulty : Ok / Not Ok

b) No Clock failure alarm during the protection switching : Ok / Not Ok

c) Check Synchronization cabling/connection/Configuration is as per the approved Synchronization Plan : Ok / Not Ok

d) Check the sync. Priority switching on protected Path through LCT/NMS : Ok / Not Ok

5. Test Remarks

_____

_____

_____

_____

Equipment Under Test: _____

Test Date and Time: _____

Site Name: _____

Tested By : _____ Witnessed By : _____

(Manufacturer/Contractor) (POWERGRID/Constituent)

Date : _____ Date : _____

Annex-F

MAINTENANCE PLAN

Annual Maintenance Contract of Communication Equipment supplied under " Establishment of Fibre Optic Communication System and stand alone equipments supplied under various Substation Packages in Eastern Region "

Annexure-III

FORMAT TO BE FILLED DURING SEMI ANNUAL SITE VISIT

1. **SITE INFORMATION**:

Site name : Subhasgram PG

Address : Subhasgram

Contact Person :

Telephone & Fax :

2. **GENERAL CLEANLINESS**

Communication room air conditioner

- Is air conditioner on? Yes/No
- Are filters clean? Yes/No
- Is air conditioner cooling O.K? OK/NOT OK
- Action Required by POWEGRID/Constituent---------- Not Required

Communication room cleanliness

- Check if communication room is in good condition (Over all)
  Yes
- Check if regular cleaning of telecom room done.
  Yes
- Check if room is manned.
  Yes
- Check if AC/DC supply has been tapped for other uses.
  No
- Is the room having any damp wall.
  No
- Action required by POWERGRID/CONSTITUENT'S.
  Not required

Gautam Mann
14/08/19
CONTRACTOR'S s representative

POWERGRID/CONSTITUENT'S representative

Biplob Sarkar
Sr. Dy. General Manager (U.D.C)
POWERGRID, ER-II, KOLKATA

MAINTENANCE PLAN

Annual Maintenance Contract of Communication Equipment supplied under " Establishment of Fibre Optic Communication System and stand alone equipments supplied under various Substation Packages in Eastern Region "

Annexure-III contd/-

EQUIPMENT RACK CLEANLINESS:

- **Check if cabinets are closed and key available with room in charge.**

Key available ✓ Not Available Cabinet Closed Open

- Clean the equipment with vacuum cleaner. Cleaned

Actions required by POWERGRID/CONSTITUENT'S/Constituent:

Action required by CONTRACTOR'S:

3.0 TEMPERATURE MEASUREMENT:

Room temperature

- Check the room temperature (25ºC is recommended) 25.3°C
- Temperature very near equipment cabinet 24.6°C

Action Required by POWERGRID/CONSTITUENT'S/Constituents :

4.0 POWER SUPPLY MEASUREMENT

- Input DC Voltage at MCB 54.3
- Input DC Voltage at Cabinet TB 54.2
- AC Voltage at the time of station visit (Primary source): 238V
- Availability of AC Supply in 24 hours Yes
- Charger Voltage 55.5V
- Battery Voltage (Charger AC Supply off) 55.1V

Actions required by POWERGRID/CONSTITUENT'S Not required

Santanu Manna 14/03/24
CONTRACTOR'S's representative

POWERGRID/CONSTITUENT'S representative

बिप्लब सरकार
Biplob Sarkar
उप महाप्रबंधक (यू.एल.डी.सी.)
Dy. General Manager (ULDC)
पावरग्रिड, पूर्वी क्षेत्र-II, कोलकाता
POWERGRID, ER-II, KOLKATA

MAINTENANCE PLAN

Annual Maintenance Contract of Communication Equipment supplied under " Establishment of Fibre Optic Communication System and stand alone equipments supplied under various Substation Packages in Eastern Region "

Action required by CONTRACTOR'S _____

5.0 MULTIPLEXER & SDH EQUIPMENT ALARM CHECK

Visual check for the alarm on Mux & SDH equipment, in case of any alarm present further investigation and corrective action.

Action required by CONTRACTOR'S:_____

6.0 CABLE CHECK

- Check the cable terminations at all MDFs visually. Recrone if any loose wires.
- Check cable route for any abnormality.
- Are cable trenches covered properly?

7.0 DOCUMENTS AND TEST INSTRUMENTS

- Check the documents at site. ✓ Available Not available
- Check the availability of test instrument/tool kit at site. (Multi meter, Screwdriver, plier etc.) Yes available

8.0 EARTHING CHECK

- All the cables are connected properly with the ground point.
- Clean the end points if required while removing the earth cable first put temporary earth cable. After correction place the original cable and remove loop cable.
- Clean star point with sand paper and put petroleum jelly.
- Measurement of earth resistance: 0.021 Ω

Sankar Mane 12/03/29

CONTRACTOR'S's representative

POWERGRID/CONSTITUENT'S representative

बिप्लब सरकार
Biplob Sarkar
Chief Manager (S/S & C)
Dy. General Manager (ULDC)
पावरग्रिड, पूर्वी क्षेत्र-II, कोलकाता
POWERGRID, ER-II, KOLKATA

MAINTENANCE PLAN

Annual Maintenance Contract of Communication Equipment supplied under " Establishment of Fibre Optic Communication System and stand alone equipments supplied under various Substation Packages in Eastern Region "

Annexure –IV

DC POWER SUPPLY EQUIPMENT MAINTENANCE FORMAT TO BE FILLED AT SITE

SITE INFORMATION

SITE NAME : Subhasgram PG

ADRESS : Subhasgram

TELEPHONE AND FAX NO

	DESCRIPTION	VALUE, IF ANY	REMARKS
1	Cleaning done		Yes
2	Power connection checked for lightening & Over heating		Yes
3	Control Connections are all tight	Ok	
4	All indications / Meters / Display on the panel are working	Ok	
5	Input frequency		
6	Rectifer LEDs	Ok	
7	Normal Operation on each module	Ok	
8	Float Voltage		
9	Checking for AC voltage L-L, L-M		
A	R – Y	412 V	
B	Y – B	410 V	
C	R – B	411 V	
10	Checking AC current		
11	Checking of DC Voltage	55.6 V	
12	Checking Of earthing	0.219	
13	Battery Voltage / resistance measurement done & enclosed	55.2 V	
14	Check functioning of hooter/ buzzer (Alarm Annunciation)	Ok	
16	Parameters checked in SCADA System	Ok	
17	Proper guidance given for normal day to day operation	Ok	

SUGGESSIONS FROM CONTRACTOR'S :

REMARKS FROM CUSTOMER :

CONSTITUENT / POWERGRID REPRESENTATIVE :

MAINTENANCE PLAN

Annual Maintenance Contract of Communication Equipment supplied under " Establishment of Fibre Optic Communication System and stand alone equipments supplied under various Substation Packages in Eastern Region "

Annexure –VI

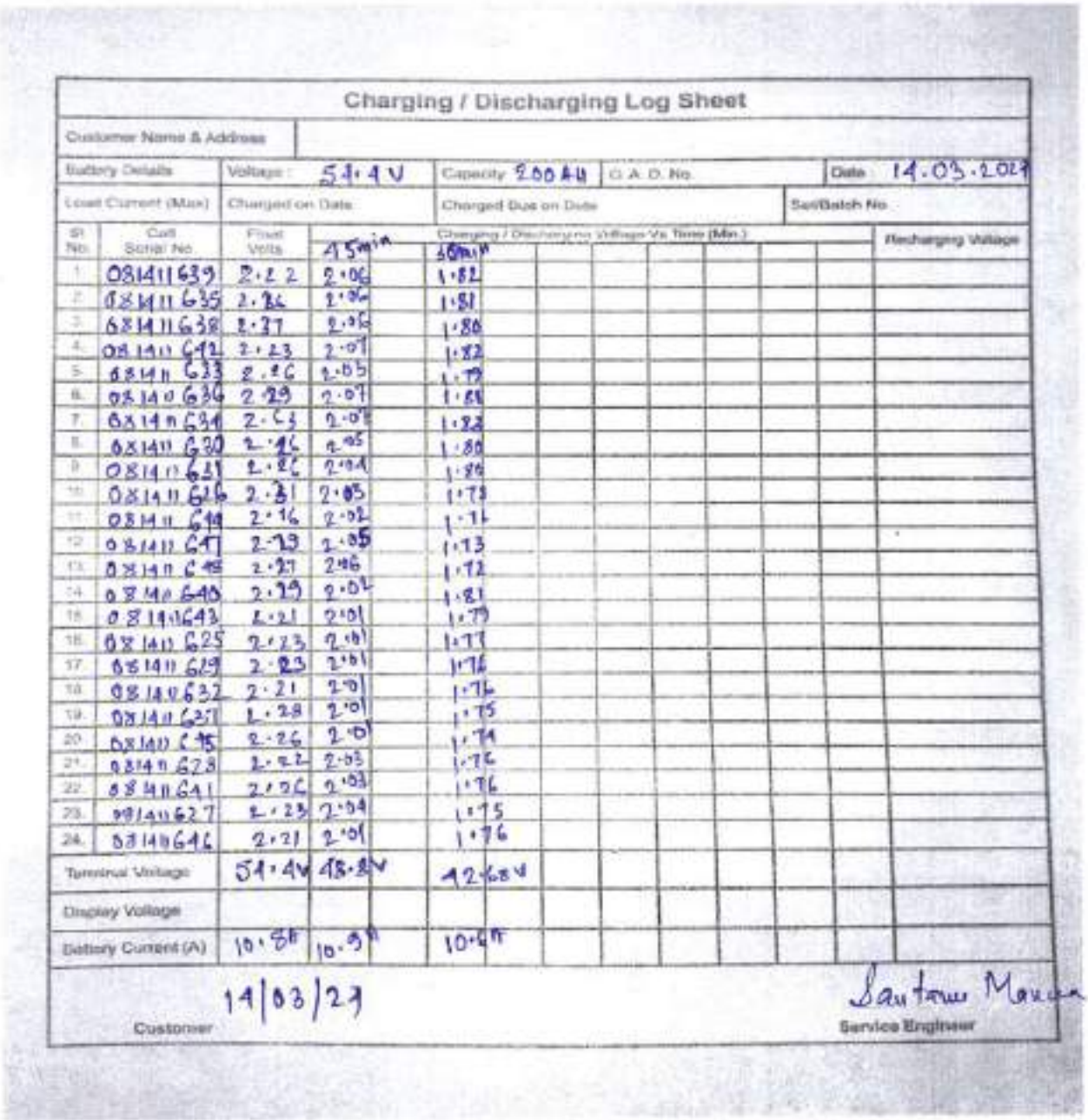
BATTERY BANK MAINTENANCE FORMAT TO BE FILLED AT SITE

SITE INFORMATION

SITE NAME : Subhasgram PG

ADRESS : Subhasgram, WB

TELEPHONE AND FAX NO _____



Charging / Discharging Log Sheet

Customer Name & Address

Battery Details | Voltage : 54.4 V | Capacity 200 AH | C.A.D. No. | Date 14.03.2027

Load Current (Max) | Charged on Date | Charged Bus on Date | Set/Batch No

Sl No.	Cell Serial No.	Float Volts	45 min	60 min							Recharging Voltage
			Charging / Discharging Voltage Vs Time (Min.)								
1	08141639	2.22	2.06	1.82							
2	08141635	2.26	2.06	1.81							
3	08141638	2.27	2.06	1.80							
4	08141632	2.23	2.07	1.82							
5	08141633	2.26	2.05	1.79							
6	08140636	2.29	2.07	1.81							
7	08141631	2.23	2.08	1.82							
8	08141630	2.26	2.05	1.80							
9	08141629	2.26	2.04	1.80							
10	08141626	2.31	2.05	1.79							
11	08141619	2.16	2.02	1.74							
12	08141647	2.23	2.05	1.73							
13	08141645	2.27	2.06	1.72							
14	08140640	2.29	2.02	1.81							
15	08141643	2.21	2.01	1.79							
16	08141625	2.23	2.01	1.77							
17	08141629	2.23	2.01	1.76							
18	08140632	2.21	2.01	1.76							
19	08141627	2.28	2.01	1.75							
20	08141645	2.26	2.01	1.79							
21	08141628	2.22	2.03	1.76							
22	08141641	2.26	2.03	1.76							
23	08141627	2.23	2.04	1.75							
24	08140646	2.21	2.01	1.76							
Terminal Voltage		54.4V	48.8V	42.68V							
Display Voltage											
Battery Current (A)		10.8A	10.9A	10.6A							

14/03/27

Customer

Service Engineer

(April,24 to June,24)

FORMAT TO BE FILLED DURING SEMI ANNUAL SITE VISIT

1. SITE INFORMATION:

Site name : 400/220 kV. Subhangram S/s.
Address : Subhangram.
Contact Person :
Telephone & FAX :

2. General Cleanliness of RTU Room: — Done/ Not done

RTU Room

- Check if RTU room is in good condition Or any physical damage to RTU (Over all)

  Good Condition

- Check if regular cleaning of RTU room is done.

  Done

- Check if AC/DC supply has been tapped for other uses.

  Not Tapped

- Is the room having any damp wall?

  No

- Check, whether rat droppings, lizard or other vermin in RTU /SIC panel and take corrective actions as required by DJSCPL.

  Not Required.

- **Action required by Constituent** Not Required.

EQUIPMENT — Done /Not done

- Check if cabinets are closed and key available with room in charge.
- Blowing & cleaning of RTU/SIC panel.

Action required by Contractor/Constituent

Not Required

3.0 TEMPERATURE MEASUREMENT:

Room temperature: 24°c

Action required by Contractor/Constituent

Not Required.

4.0 POWER SUPPLY MEASUREMENT

- Input DC Voltage at MCB 50.4 V
- Input DC Voltage at Cabinet TB 50.4 V

Signature of DJSCPL Representative

Signature of Constituent Representative.

- AC Voltage at the time of station visit (Primary source) Ph – N.....234.....V
- Charger Voltage.....50.5/47.7.....V

Action required by Contractor/Constituent

Not Required.

5.0 A) RTU/SIC CHECK — Done/ Not done

- **Visual check for LEDs on**

			Rack-1	Rack-2
i)	CPU	→		
ii)	SAU	→	AIU - 06 NOS	AIU - 03 NOS
iii)	AAU Cards	→	DIU - 09 NOS	DIU - 06 NOS
iv)	DAU Cards	→	CPU - 01 NOS	CPU - 01 NOS
v)	ACU Cards	→	PSU - 01 NOS	PSU - 01 NOS
vi)	DOU Cards	→		
vii)	PCU Cards	→		
viii)	Modems	→	MDS08 (Not in Service)	

Action required by Contractor/Constituent Not Required

B) Update & Maintained the record of cards, modem & transducers available in RTU panel.

All record of cards, modem & transducers are available in RTU Panel.

6.0 Loop Back check on modem for main/stand by path on which data communications is not healthy — Done/ Not done

i) Checking of Modem parameters.

ii) Checking of loop back test from Modem to Communication equipment termination point.

iii) Remote loop back test from modem to modem if any noise is observed.

iv) Check the modem to modem loop for communication link in which data is reporting to control centre, if any noise is observed to be intimated constuents.

Action required by Contractor/Constituent Not Required

Done/ Not done

7.0 A) Checking of Reporting Parameters: Check all the parameters by connecting laptop on local RTU and match the parameters with actual value at local site for any discrepancy.

i) Parameter: V/P/Q/F/CB Status/Isolator Status

ii) Name of the line/bus/Xer/Generator

iii) Value/status at RTU on console port

Signature of DJSCPL Representative

Signature of Constituent Representative.

iv) Actual Status at site

v) Is there any discrepancy between RTU value and field value?

If yes then reason for the same

Action taken by Contractor Not Required

Action to be taken by Constituent Not Required.

Separate sheet to be attached for all the above parameters

B) Checking of transducer output at SIC panel & CMR's output in control panel for any suspected/bad input values intimated by Control Centre. Change the Transducer/CMR if faulty.

Any Action required to be performed by Contractor/Constituent to correctness of telemetry value.

Not Required.

8.0 CABLE CHECK Done/ Not done

- Check the cable termination at all Termination Point visually. Tighten if any loose wires in SIC panel.
- Visually Check cable route for any abnormality observed to intimate to constituent.
- Are cable trenches covered properly? yes.

Any Action required to be performed by Contractor/Constituent to correctness of above.

Not Required.

9.0 DOCUMENTS AND TEST INSTRUMENTS Done/ Not done

- Check the documents at site 400/220 kV Gurgaon S/S. Documents Available/Not available

10.0 EARTHING CHECK Done/ Not done

- Check if the earthings are connected properly with the ground point.
- If earthing is not not found proper then Clean the end points if required while removing the earth cable first put temporary earth cable. After correction place the original cable and remove loop cable.

Any recommendation if required to constituents to improve the earthing.

Not Required

Signature of DJSCPL Representative **Signature of Constituent Representative.**

Note:

- DJSCPL would submit the 10 day advance schedule to visit so S/S & accordingly constituents/ POWERGRID also depute their representative for verifications / signing of the aforesaid activities.
- To work in control panel, the permission from respective Constituents with authorized representatives from constituents must be present alongwith DJSCPL.
- The field sheet to be submitted to respective SLDC & ULDC, Kolkata office for further reference & record.

Signature of DJSCPL Representative

Signature of Constituent Representative.

Annex-G

FO CABLE END TO END TEST USING OTDR (1550 nm)

Project: - "Annual Maintenance Contract towards OPGW Cable and Associated Hardware Accessories in ER-II under ULDC and Powertel."

Client: - Power Grid Corporation of India Limited			**Contractor: TEN DOT INFRA PVT. LTD.**		
Report No:				Date : 06-08-2024	
Sector :					
Line link : SUBHASGRAM TO NEW JEERAT					
Loc. Form: SUBHASGRAM			**Loc. To: NEW JEERAT**		

Type of OTDR	Testing Date	Wavelength
	06-08-2024	**1550nm**

Tube Color	Fibre No.	Fibre Color	Length (m)	Attenuation (dB)	
			Direction - A	Total Loss	Remarks
BLUE	1	Blue	LIVE	LIVE	
	2	Orange	LIVE	LIVE	
	3	Green	104.510	23.250	
	4	Brown	94.969	21.109	
	5	Gray	LIVE	LIVE	
	6	White	LIVE	LIVE	
	7	Red	32.372	6.415	
	8	Black	112.859	24.513	
	9	Yellow	107.337	22.374	
	10	Violet	93.646	19.834	
	11	Pink	85.935	18.496	
	12	Aqua	113.56	23.479	
ORANGE	13	Blue	98.196	25.291	
	14	Orange	113.64	23.521	
	15	Green	LIVE	LIVE	
	16	Brown	LIVE	LIVE	
	17	Gray	113.594	23.622	
	18	White	113.602	23.796	
	19	Red	113.618	23.226	
	20	Black	113.635	23.635	
	21	Yellow	104.339	24.574	
	22	Violet	113.512	23.307	
	23	Pink	113.627	23.369	
	24	Aqua	113.602	23.202	

OTDR Trace results attached for all Fiber (Yes/No)

Tested By
Ten Dot Infra Pvt. Ltd.

Approved By
POWER GRID

FO CABLE END TO END TEST USING OTDR (1550 nm)

Project: - "Annual Maintenance Contract towards OPGW Cable and Associated Hardware Accessories in ER-II under ULDC and Powertel."

Client: - Power Grid Corporation of India Limited		**Contractor: TEN DOT INFRA PVT. LTD.**	
Report No:			Date : 06-08-2024
Sector : ULDC			
Line link : SUBHASGRAM TO NEW JEERAT (Starlite)			
Loc. From: SUBHASGRAM		**Loc. To: JEERAT (Starlite)**	

Type of OTDR	Testing Date	Wavelength
	06-08-2024	**1550nm**

Tube Color	Fibre No.	Fibre Color	Length (Km)	Attenuation (dB)	Remarks
			Direction - A	Total Loss	
BLUE	1	Blue	LIVE	LIVE	
	2	Orange	LIVE	LIVE	
	3	Green	LIVE	LIVE	
	4	Brown	LIVE	LIVE	
	5	Gray	67.653	15.906	
	6	White	67.653	15.737	
	7	Red	67.645	15.363	
	8	Black	67.645	15.558	
	9	Yellow	67.628	15.691	
	10	Violet	67.645	16.474	
	11	Pink	67.653	16.183	
	12	Aqua	67.637	15.912	
ORANGE	13	Blue	67.637	15.741	
	14	Orange	67.65	16.064	
	15	Green	67.645	15.698	
	16	Brown	67.628	15.817	
	17	Gray	67.555	21.657	
	18	White	67.596	20.543	
	19	Red	67.645	15.609	
	20	Black	67.653	15.665	
	21	Yellow	67.653	15.928	
	22	Violet	67.653	15.523	
	23	Pink	67.628	15.639	
	24	Aqua	67.653	15.714	

OTDR Trace results attached for all Fiber (Yes/No)

Tested By
Ten Dot Infra Pvt. Ltd.

TEN DOT INFRA PVT. LTD.

Approved By
POWER GRID

FO CABLE END TO END TEST USING OTDR (1550 nm)

Project: - "Annual Maintenance Contract towards OPGW Cable and Associated Hardware Accessories in ER-II under ULDC and Powertel."

Client: - Power Grid Corporation of India Limited			**Contractor: TEN DOT INFRA PVT. LTD.**		
Report No:				Date : 06-08-2024	
Sector :					
Line link : SUBHASGRAM TO PGCIL JEERAT 3NO. TRY & PGCIL JEERAT 4NO. TRY					
Loc. Form: SUBHASGRAM			**Loc. To: PGCIL JEERAT**		
Type of OTDR			Testing Date	Wavelength	
			05-08-2024	**1550nm**	

Tube Color	Fibre No.	Fibre Color	Length (m)	Attenuation (dB)	Remarks
			Direction - A	Total Loss	
Loc. Form: SUBHASGRAM		**Loc. To: PGCIL JEERAT 3NO. TRY**			
BLUE	1	Blue	LIVE	LIVE	
	2	Orange	35868.90	8.735	
	3	Green	LIVE	LIVE	
	4	Brown	LIVE	LIVE	
	5	Gray	35868.90	10.444	
	6	White	LIVE	LIVE	
	7	Red	LIVE	LIVE	
	8	Black	35860.73	11.932	
	9	Yellow	LIVE	LIVE	
	10	Violet	35860.73	9.839	
	11	Pink	LIVE	LIVE	
	12	Aqua	LIVE	LIVE	
Loc. Form: SUBHASGRAM		**Loc. To: PGCIL JEERAT 4NO. TRY**			
ORANGE	1	Blue	69352.53	19.389	
	2	Orange	69360.70	20.537	
	3	Green	69319.86	21.431	
	4	Brown	LIVE	LIVE	
	5	Gray	LIVE	LIVE	
	6	White	69336.20	21.303	
	7	Red	LIVE	LIVE	
	8	Black	LIVE	LIVE	
	9	Yellow	LIVE	LIVE	
	10	Violet	LIVE	LIVE	
	11	Pink	LIVE	LIVE	
	12	Aqua	LIVE	LIVE	

OTDR Trace results attached for all Fiber (Yes/No)

Tested By
Ten Dot Infra Pvt. Ltd.

Approved By
POWER GRID

Yokogawa India Limited

Regd. Office :
Plot No. 96, 3rd Cross
Electronic City Complex, Hosur Road
Bangalore – 560 100. India

Tel : 0091-80-41596000
Fax : 0091-80-28528656

YOKOGAWA

To whom so ever it may concern

LETTER OF CALIBRATION – AQ1000-ASC

Ref.No: 19/11/MLK/AQ1000/CAL certi/051
Date: 09.01.2024

We, M/s. Yokogawa India Limited (herein after referred as Yokogawa), a company duly organized and existing under the laws of India, having its registered office at Plot No.96, Electronics city complex, Hosur Road, Bangalore – 560100, India do hereby confirm that we are the manufacturer of Optical Time Domain Reflectometer (OTDR).

We, Yokogawa, do hereby confirm that following serial no. of OTDR (AQ1000-ASC) is calibrated in the month of JAN 2024 and the calibration of this instrument is valid till 08 JAN 2025.

AQ 1000 OTDR, S. No. : C3YH29018F

For Yokogawa India Limited

KUMARASWAMY.M.L.
Deputy General Manager
Head – Optical Communication Products BHQ,
Mobile : +91 9448041968
E Mail :ML.Kumaraswamy@in.yokogawa.com

Annex-H

AMC – SITE VISIT MOM

s

Name of the Site: SUBHASH GRAM POWERGRID.

Customer: POWERGRID.

Substation: SUBHASHGRAM

Project: WAMS System under Unified Real Time Dynamic State Measurement (URTDSM) Project – Package- I

M/s. GE T&D India Limited,	Site :- SUBHASHGRAM
Gaurab Das.	अनुराग नायक
Name: Gaurab Das (ENG)	Name : Anurag Nayek.
Dated :- 20/03/24	

AMC – SITE VISIT MOM

M/S GE representative **GAURAB DAS** reached SUBHASHGRAM POWERGRID Substation on 20/03/24 and carried out the following work.

Verification of Supplied Material

Sr.no	Equipment Description	Installed Quantity
1	PMU	02
2	GPS Receiver	02
3	Ethernet switch -4 Port	01
4	Antenna Dome	02

Activity Carried Out: -

Sr.no	Activity	Yes	No	Remark
1	CT/PI/DI connection checked	YES		
2	All Measurement Values of PMU verified from Control Center	YES		
3	DI status verified from Control Centre	YES		
4	Connectors of Dome & Receiver side tightened	YES		

Additional Activity:

Equipment Operational status after Troubleshooting.

Sr.no	Equipment Description	Status	Alarm Status
1	PMU	Working fine	No Alarm
2	GPS Receiver **Firmware Version-08A06**	Working Fine	No Alarm
3	Ethernet switch -4 Port	Working Fine	No Alarm
4	Antenna Dome	Working Fine	No Alarm

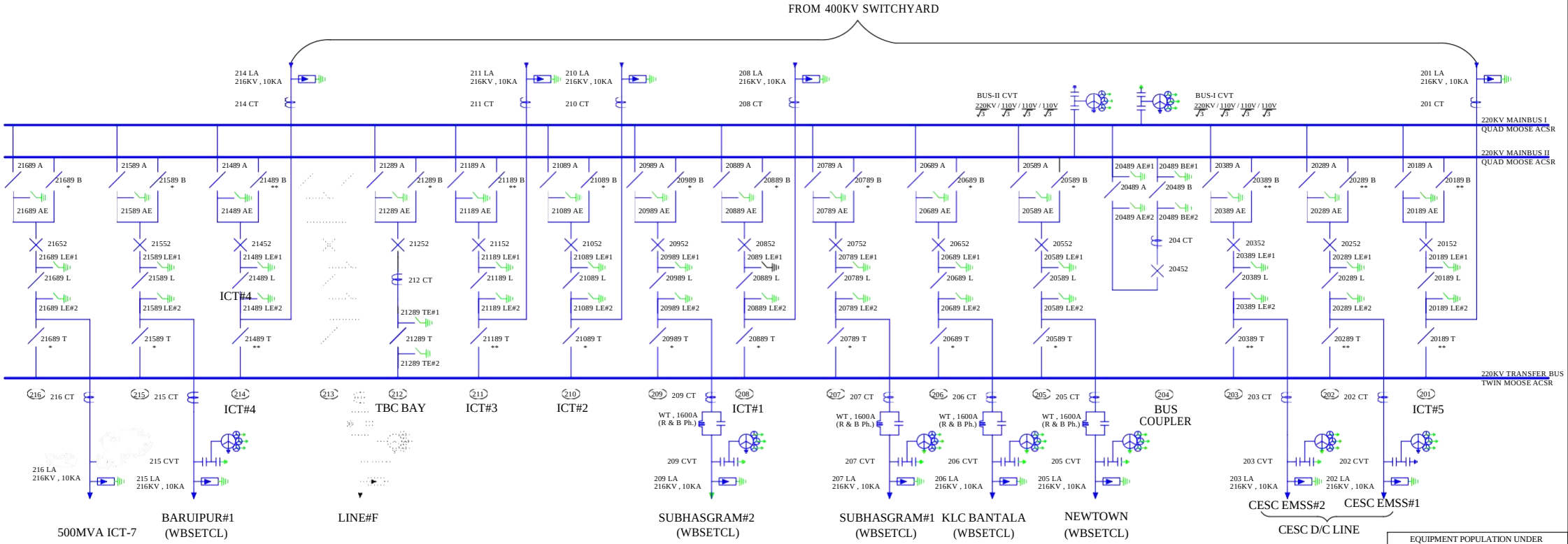
M/s. GE T&D India Limited,	Site :- SUBHASHGRAM
Gaurab Das.	अनुराग नायक
Name: Gaurab Das (ENG)	Name : Anurag Nayek.
Dated :- 20/03/24	

Annex-I

POWER GRID CORPORATION OF INDIA LTD.

400/220KV SUBHASGRAM SUBSTATION

SINGLE LINE DIAGRAM FOR 220KV SWITCHYARD



———	PRESENT
. . . . .	FUTURE
209	BAY NUMBER

Note :- Bay Nos. - 201, 204 , 205 , 206 , 207 , 208 , 209 , 210, 212, 215 & 216 UNDER O&M
Bay Nos. - 202 , 203 , 211 & 214 UNDER CESC CONSULTANCY
Bay Nos. -213 is Future Bay

EQUIPMENT POPULATION UNDER O&M AND CONSTRUCTION			
SYMBOL	DESCRIPTION		QTY.
	CVT	4400 pF	30
	CB	1600A	14
		2500A	1
	D.B. ISO. WITH 1 E/S	1600A	14
	D.B. ISO. WITH 2 E/S	1600A	14
		2500A	2
*	TANDEM ISO.	1600A	17
**	TANDEM ISO. ELECTRICALLY GANGED	1600A	10
	C.T.	1600A	45
	SURGE ARRESTER	216 KV 10 KA	39
	WAVE TRAP	1600A , 0.5 mH	8

POWER GRID CORPORATION OF INDIA LTD.

400/220KV SUBHASGRAM SUBSTATION

SINGLE LINE DIAGRAM FOR 400KV SWITCHYARD

———	PRESENT
(401)	BAY NUMBER

EQUIPMENT POPULATION UNDER O&M AND CONSTRUCTION			
SYMBOL	DESCRIPTION		QTY.
	AUTO TRF.	315 MVA 500 MVA	4 1
	REACTOR	50 MVAR 125MVAR	1 1
	CB WITH C.R.	2000A (3 PH)	6
	CB WITHOUT C.R.	2000A (3 PH)	13
	D.B. ISO. WITH 1 E/S	2000A	47
	D.B. ISO. WITH 2 E/S	2000A	2
	C.T.	2000A 3000A	42 9
	SURGE ARRESTER	336 KV	36
	WAVE TRAP	2000A , 1.0 mH	4
	CVT	8800 & 4400 pF	24

Note :- Bay Nos. - 401 to 406 AND 415 UNDER O&M
Bay Nos. - 408 , 409 , 411 , 412 , 413 , 414 , 416 & 417 UNDER CESC CONSULTANCY
Bay Nos. - 407 & 410 UNDER CONSTRUCTION (ERSS-XVIII) & 418 UNDER CONSTRUCTION (ERSS-XX)

Status/Compliance of Observations during Communication audit at 400KV Subhasgram Substation (POWERGRID)

S/n	Observation	Status/Compliance
1	The display of auxiliary power data at the charger/DCPS panel is not visible for monitoring.	Matter is being taken up with the AMC vendor for resolution of the issue.
2	Approach cable is common for Communication, protection & Commercial application.	As per present design, single approach cable is connected with the OPGW at Gantry upto FODP at control room /Communication room as FODP is the common point for distributing the fibers for communication, protection and commercial applications.
3	Non-availability of third-party Cyber Security audit reports.	SDH at Subhasgram Substation is a part of communication system of central sector of Eastern Region and reporting to NMS and UNMS at Kolkata. Cyber security of UNMS System which is the centralized system for all the communication equipments including Subhasgram was carried out on 08.07.2024. Audit report is traceable.
4	Communication room and Control room are not separated.	In Subhasgram Substation, Communication panels are placed inside Control room which is the most secured placed in the substation as per original plan during substation construction in the year 2005.
5	Preventive maintenance of Auxiliary power is not done at regular intervals.	There are 02 nos. DCPS System at Subhasgram S/s for ULDC network. 1. Delta Make DCPS system is newly supplied and commissioned on May-2024. 2. Eltek make DCPS System: Maintenance is being done regularly on semi-annual basis as per terms of AMC. Last 02 maintenance carried out on May-2024 and December-2023. Report is traceable.
6	OTDR Results of OPGW Cable for Jeerat is on higher side (0.26 dB/Km) vs prescribed limit of 0.21 dB/Km.	OTDR test was carried out on 06.08.2024 for Jeerat line where in one fiber loss seem more than 0.26 db/Km. However, OTDR test reconducted on 20.12.2024 and in the testing it is found that losses are within 0.21 db/Km. Reports is traceable.

30/12/2024

संतनु रुद्रपाल
Santanu Rudrapal
मुख्य प्रबंधक (य. एल. डी. सी.)
Chief Manager (ULDC)
पावरग्रिड, पूर्वी क्षेत्र-II, कोलकाता
POWERGRID, ER-II, KOLKATA

Summary of IP & MAC addresses of the end user equipment connected in Data & voice Network.								
S.N.	**Constituents**	**RTU/SAS/GATEWAY DEVICE**	**ROUTER / FIREWALL**	**VOIP**	**AMR/DCU**	**URTDSM**	**SWITCH**	**Any Other device.**
1	POWERGRID ER-I	MAC & IP	Not Submitted	Not Submitted	MAC & IP (56)	Submitted but not in format	Not Submitted	No Details is reccived.
2	POWERGRID ER-II	MAC & IP (18 No. Stations)	Not Submitted	Not Submitted	MAC & IP(48)	Submitted but not in format	Not Submitted	No Details is reccived.
3	POWERGRID ODISHA PROJECT	MAC & IP (10 No. Stations)	Not Submitted	Not Submitted	MAC & IP(18)	Submitted but not in format	Not Submitted	No Details is reccived.
4	BIHAR	Not Submitted	Not Submitted	Not Submitted	MAC & IP (Submitted by POWERGRID)	Not Submitted	Not Submitted	No Details is reccived.
5	JHARKHAND	Not Submitted	Not Submitted	Not Submitted	MAC & IP (Submitted by POWERGRID)	Not Submitted	Not Submitted	No Details is reccived.
6	ODISHA	MAC & IP	Not Submitted	MAC & IP	MAC & IP (Submitted by POWERGRID)	MAC & IP	Not Submitted	No Details is reccived.
7	WEST BENGAL	Not Submitted	Not Submitted	Not Submitted	MAC & IP (Submitted by POWERGRID)	Not Submitted	Not Submitted	No Details is reccived.
8	SIKKIM	Not Submitted	Not Submitted	Not Submitted	MAC & IP (Submitted by POWERGRID)	Not Submitted	Not Submitted	No Details is reccived.
9	DVC	IP	IP	IP	MAC & IP (Submitted by POWERGRID)	IP	IP	No Details is reccived.
10	RONGNICHU	MAC & IP	MAC & IP	MAC & IP	IP	Not Submitted	Not Submitted	No Details is reccived.
11	JORETHANG	MAC & IP	MAC	MAC	Not Submitted	Not Submitted	Not Submitted	Ethernet adapter MAC & IP
12	TASHIDING	MAC & IP	MAC & IP	MAC & IP	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.

13	ADHUNIK	IP	Not Submitted	Not Submitted	MAC & IP (Submitted by POWERGRID)	Not Submitted	Not Submitted	(DAC & BDAC) IP
14	BARH	MAC & IP	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
15	GMR	IP	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
16	NKTL DHANBAD	MAC & IP	Not Submitted	MAC & IP	Not Submitted	MAC & IP	Not Submitted	No Details is reccived.
17	MPL	IP	Not Submitted	Not Submitted	Not Submitted	Not Submitted	IP	(DC/DR PC & SUX) IP
18	DARLIPALI	MAC	Not Submitted	MAC	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
19	FARAKKA	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
20	KAHALGAON NTPC	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
21	NABINAGAR	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
22	NORTH KARANPURA	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
23	KBUNL	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
24	BRBCL	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
25	RANGIT	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
26	TEESTA V	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
27	DIKCHU	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
28	DMTCL	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
29	CHUJACHEN	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
30	IBEUL	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
31	BTPP	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
32	CHUJACHEN	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.
33	TEESTA III	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.

34	PMJTL	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	Not Submitted	No Details is reccived.

Note: DCU of ISTS substations of Bihar, Jharkhand, West Bengal,Odisha, Sikkim and DVC are included in

Summary of OPGW Links with DOCO and other details.

Sl.No.	Name of link (Rating)	Date of Certificate	DOCO	Link length
1	400 KV D/C Patna-Balia Line-1 OPGW Link (24 F DWSM)	31/01/2024	17.11.2023	180.45 km
2	LILO portion of Biharsharif-Balia at Ara OPGW Link (48 F DWSM)	29/01/2024	30.12.2023	10.192 km
3	400 KV BRBCL Nabinagar- Sasaram OPGW Link (24 F DWSM)	02/02/2024	30.12.2023	81.394 km
4	400 KV Biharsharif- Sasaram OPGW Link (24 F DWSM)	02/02/2024	25.11.2023	199.750 km
5	400 KV Biharsharif- Kahalgaon OPGW Link (24 F DWSM)	02/02/2024	25.11.2023	233.234 km
6	LILO portion of 400kV Angul- GMR OPGW Link (24 F DWSM)	26/03/2024	15.02.2024	30 km
7	765 KV Gaya-Varanasi OPGW Link (24 & 48 F DWSM)	04/03/2024	22.01.2024	310.186 km
8	400 KV DURGAPUR - JAMSHEDPUR OPGW Link (24 F DWSM)	28/05/2024	15.12.2023	183.635 km
9	400 KV DURGAPUR - MAITHAN OPGW Link (24 F DWSM)	28/05/2024	24.01.2024	74.125 km
10	400 KV TEESTA III - KISHANGANJ OPGW Link (24 F DWSM)	28/05/2024	29.02.2024	242.062 km
11	400 KV Durgapur - Farakka OPGW Link (24 F DWSM)	25/07/2024	22.06.2024	157.745 km
12	400 KV Durgapur - Sagardighi OPGW Link (24 F DWSM)	25/07/2024	22.06.2024	133.572 km
13	400 KV Farakka - Purnea OPGW Link (24 F DWSM)	25/07/2024	24.06.2024	179.643 km
14	400KV Rangpo - Dikchu OPGW Link (24 F DWSM)	18/11/2024	11.09.2024	32.176 km
15	765 KV Jharsuguda - Dharamjaygarh OPGW Link (24 F DWSM)	08/10/2024	30.08.2024	148.603 km
16	400 KV Rourkela-Raigarh OPGW Link	ERLDC has given consent to WR.		
17	400KV Rangpo - Chuzachen OPGW Link (24 F DWSM)	16/01/2025	21.12.2024	20.727 km

Location	Requirements	Total ports	FOTE Requirements	Status
FARAKKA STPS II	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4	3	Not Required
FARAKKA STPS III	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4		
KAHALGAON STPS II	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4	1	Not Required
TALCHER STPS I	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4	1	01 Nos. SDH
TALCHER STPS II	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4		
BARH STPS I	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4	1	01 Nos. SDH
BARH STPS II	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4		
KBUNL Stage II	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4	1	01 Nos. SDH
NPGC Stage I	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4	1	01 Nos. SDH
DARLIPALI	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4	1	01 Nos. SDH
NORTHKARANPURA	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4	1	01 Nos. SDH
TEESTA V	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4	1	01 Nos. SDH
RANGIT	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4	1	01 Nos. SDH
MPL	1+1 Ethernet ports for Main NLDC & Back up NLDC.	4	2	Not Required
Total Location - 11, Requirements is at 08.			**14**	**08**

Sl.No.	Name of FOTE	Date of Certificate	DOCO	SDH Capacity	SDH Location
1	Additional FOTE at Rangit NHPC	16/01/2025	10-09-2024	STM-16	Rangit NHPC
2	Additional FOTE at Karanpura NTPC	16/01/2025	09-09-2024	STM-16	North Karanpura

Annex-A

List of Participants

Name	First Join	Last Leave	In-Meeting Duration	Participant ID (UPN)
ERPC Kolkata	1/22/25, 10:45:21 AM	1/22/25, 3:41:18 PM	3h 59m 17s	ERPC@KolkataMST.onmicrosoft.com
BSPTCL (Unverified)	1/22/25, 10:45:31 AM	1/22/25, 2:31:14 PM	3h 45m 42s	
ERLDC IT (External)	1/22/25, 10:45:31 AM	1/22/25, 2:37:17 PM	3h 51m 45s	erldcit@erldc.onmicrosoft.com
Dr. Sanjay Kumar {डा. संजय कुमार} (External)	1/22/25, 10:45:32 AM	1/22/25, 2:38:38 PM	3h 53m 5s	sanjay4kumar@powergrid.in
Gaurav Awal {गौरव आवल} (External)	1/22/25, 10:53:42 AM	1/22/25, 2:02:31 PM	3h 8m 49s	gaurav.awal@powergrid.in
SANTANU (Unverified)	1/22/25, 10:54:50 AM	1/22/25, 2:38:20 PM	3h 43m 29s	
MANOJ KUMAR (External)	1/22/25, 10:54:55 AM	1/22/25, 2:48:42 PM	3h 47m 51s	manoj.kumarcomm@dvc.gov.in
Kumar Niraj (External)	1/22/25, 10:57:34 AM	1/22/25, 1:40:14 PM	2h 42m 39s	nirajkumar@tatapower.com
murali, ERLDC (Unverified)	1/22/25, 10:57:47 AM	1/22/25, 2:38:39 PM	3h 40m 52s	
Phalguni Chaudhuri (MBPCL) (Unverified)	1/22/25, 10:57:48 AM	1/22/25, 11:36:45 AM	38m 56s	
ASHUTOSH KUMAR (External)	1/22/25, 10:58:24 AM	1/22/25, 2:37:17 PM	3h 34m 13s	ashutosh.kumar@dvc.gov.in
Surange Vishwas (External)	1/22/25, 10:58:32 AM	1/22/25, 3:12:37 PM	4h 14m 5s	surangev@tatapower.com
Nishant Kumar Shankwar	1/22/25, 10:59:01 AM	1/22/25, 2:37:22 PM	3h 38m 20s	Nishant.Kumar@energy-sel.com
Diptikanta Panda (External)	1/22/25, 10:59:23 AM	1/22/25, 2:38:21 PM	3h 38m 58s	00022466@gmrgroup.in
Tarun Mondal (Unverified)	1/22/25, 10:59:47 AM	1/22/25, 11:46:24 AM	46m 37s	
sldc bihar (Unverified)	1/22/25, 10:59:57 AM	1/22/25, 11:05:36 AM	5m 39s	
JAYANTA BANERJEE (External)	1/22/25, 11:00:09 AM	1/22/25, 2:17:07 PM	3h 16m 58s	jayanta.banerjee@dvc.gov.in
Mamidi Prasad {मामिडी प्रसाद} (External)	1/22/25, 11:01:30 AM	1/22/25, 3:18:01 PM	4h 16m 30s	mamidi.prasad@powergrid.in
Nisar Husain	1/22/25, 11:02:14 AM	1/22/25, 11:02:37 AM	22s	
Ajay Kumar Sau {अजय कुमार सौ} (External)	1/22/25, 11:02:17 AM	1/22/25, 3:17:09 PM	4h 2m 41s	ajaysau@powergrid.in
R K (Unverified)	1/22/25, 11:02:29 AM	1/22/25, 2:14:45 PM	3h 8m 25s	
PK (Unverified)	1/22/25, 11:03:15 AM	1/22/25, 11:04:18 AM	1m 3s	
THEP (Unverified)	1/22/25, 11:03:30 AM	1/22/25, 11:49:43 AM	46m 12s	
ROSHAN JAISWAL (Unverified)	1/22/25, 11:03:41 AM	1/22/25, 2:35:34 PM	3h 31m 52s	
SHUBHRANIL DHARA (External)	1/22/25, 11:04:11 AM	1/22/25, 3:37:11 PM	4h 33m	shubhranil.dhara@dvc.gov.in
Kumar Vivek (External)	1/22/25, 11:04:35 AM	1/22/25, 1:01:54 PM	1h 57m 18s	vivek.kumar@tatapower.com
Naveen Kumar {नवीन कुमार} (External)	1/22/25, 11:04:40 AM	1/22/25, 2:37:23 PM	3h 32m 43s	naveenkumar@powergrid.in
BIDYUT BISWAS (External)	1/22/25, 11:05:12 AM	1/22/25, 2:37:18 PM	2h 21m 52s	bidyut.biswas@dvc.gov.in
Gulshan, Rongnichu (Unverified)	1/22/25, 11:05:56 AM	1/22/25, 1:05:31 PM	1h 59m 35s	
Pritam (Unverified)	1/22/25, 11:06:10 AM	1/22/25, 11:15:18 AM	9m 8s	
Tomar Arjun (External)	1/22/25, 11:07:38 AM	1/22/25, 3:24:36 PM	4h 16m 58s	arjun.tomar@tatapower.com
PRADHAN SOREN (External)	1/22/25, 11:08:56 AM	1/22/25, 2:37:18 PM	3h 28m 22s	pradhan.soren@dvc.gov.in
MS ERPC (Unverified)	1/22/25, 11:09:12 AM	1/22/25, 4:01:48 PM	4h 52m 36s	
Tapobrata Paul (External)	1/22/25, 11:09:13 AM	1/22/25, 2:39:06 PM	3h 29m 52s	paul.tapobrata@erldc.onmicrosoft.com
sweta (Unverified)	1/22/25, 11:09:23 AM	1/22/25, 5:54:08 PM	6h 44m 44s	

Annex-A

List of Participants

Name	First Join	Last Leave	In-Meeting Duration	Participant ID (UPN)
BONI DHANANJAY (External)	1/22/25, 11:11:43 AM	1/22/25, 3:54:24 PM	4h 42m 41s	BONIDHANANJAY@NTPC.CO.IN
Deshmukh Prashant (External)	1/22/25, 11:12:35 AM	1/22/25, 5:57:16 PM	6h 40m 36s	pvdeshmukh@tatapower.com
Rangit Power House (Unverified)	1/22/25, 11:12:35 AM	1/22/25, 2:37:14 PM	3h 22m 31s	
Vivek_ERLDC (Unverified)	1/22/25, 11:12:36 AM	1/22/25, 12:08:35 PM	55m 59s	
Priya (Unverified)	1/22/25, 11:14:52 AM	1/22/25, 11:16:02 AM	1m 9s	
rps (Unverified)	1/22/25, 11:17:01 AM	1/22/25, 11:19:39 AM	2m 37s	
Ashish Kumar (External)	1/22/25, 11:17:03 AM	1/22/25, 2:37:15 PM	3h 20m 11s	ashish.k@budhilhydro.com
Koustav Pal	1/22/25, 11:17:30 AM	1/22/25, 2:22:42 PM	3h 24s	558640@TCS.com
Pritam (Unverified)	1/22/25, 11:17:32 AM	1/22/25, 11:31:17 AM	7m 32s	
Sikkim SLDC (Unverified)	1/22/25, 11:21:52 AM	1/22/25, 1:31:02 PM	2h 9m 9s	
AEE (Unverified)	1/22/25, 11:22:21 AM	1/22/25, 1:19:07 PM	1h 56m 46s	
H S Kaushal {एच.एस. कौशल} (External)	1/22/25, 11:24:45 AM	1/22/25, 2:37:21 PM	3h 12m 36s	hsk@powergrid.in
Shiv Kumar Gupta {एस.के. गुप्ता} (External)	1/22/25, 11:24:46 AM	1/22/25, 2:37:12 PM	3h 12m 25s	shivkumar@powergrid.in
Tanay Jaiswal {तनय जायसवाल} (External)	1/22/25, 11:27:59 AM	1/22/25, 2:19:19 PM	2h 51m 19s	tanay@powergrid.in
Shukla Brajesh (External)	1/22/25, 11:28:15 AM	1/22/25, 11:32:10 AM	3m 54s	brajesh.shukla@tatapower.com
Pritam (Unverified)	1/22/25, 11:29:39 AM	1/22/25, 11:33:18 AM	3m 39s	
Sundeep Kr Gupta {संदीप कुमार गुप्ता} (External)	1/22/25, 11:33:29 AM	1/22/25, 1:35:24 PM	2h 1m 54s	sundeep.gupta@powergrid.in
Raj Protim Kundu (External)	1/22/25, 11:36:11 AM	1/22/25, 11:45:48 AM	9m 36s	rajprotim@erldc.onmicrosoft.com
Biswajit Madhu (Unverified)	1/22/25, 11:36:21 AM	1/22/25, 2:37:27 PM	3h 1m 6s	
Somnath Chatterjee (External)	1/22/25, 11:36:32 AM	1/22/25, 12:19:03 PM	37m 58s	schatterjee@tatapower.com
Biswajit Madhu,ACE,Howrah Communication (Unverified)	1/22/25, 11:36:57 AM	1/22/25, 4:34:40 PM	4h 57m 43s	
Phalguni Chaudhuri MBPCL (Unverified)	1/22/25, 11:37:35 AM	1/22/25, 2:37:21 PM	2h 57m 14s	
SLDC JUSNL (Unverified)	1/22/25, 11:39:35 AM	1/22/25, 4:35:22 PM	4h 55m 47s	
PRITAM KUNDU	1/22/25, 11:46:27 AM	1/22/25, 12:42:08 PM	55m 40s	
THEP (Unverified)	1/22/25, 11:50:52 AM	1/22/25, 2:37:18 PM	2h 46m 26s	
GM, Telecom, OPTCL (Unverified)	1/22/25, 11:53:14 AM	1/22/25, 2:08:55 PM	2h 15m 40s	
Lily Choudhury (External)	1/22/25, 11:56:52 AM	1/22/25, 12:22:30 PM	25m 38s	LILYCHOWDHURY@NTPC.CO.IN
Jeti Rabisankar (External)	1/22/25, 12:09:11 PM	1/22/25, 2:10:14 PM	2h 1m 3s	jetir@tatapower.com
Gautam Ranjan (External)	1/22/25, 12:10:03 PM	1/22/25, 4:17:04 PM	4h 7m 1s	GAUTAMRANJAN@NTPC.CO.IN
Vivek_ERLDC (Unverified)	1/22/25, 12:10:48 PM	1/22/25, 2:42:47 PM	2h 31m 58s	
JUSNL (Unverified)	1/22/25, 12:34:12 PM	1/22/25, 12:41:59 PM	7m 46s	
Sudhir Kumar (Unverified)	1/22/25, 12:44:29 PM	1/22/25, 12:45:50 PM	1m 20s	
SLDC JUSNL (Unverified)	1/22/25, 1:58:24 PM	1/22/25, 2:38:46 PM	40m 21s	
PRANAB KUMAR NAYAK	1/22/25, 2:12:04 PM	1/22/25, 2:36:56 PM	24m 52s	
MANOJ KUMAR (Unverified)	1/22/25, 2:23:54 PM	1/22/25, 2:37:46 PM	13m 52s	
EEE ULDC BSPTCL (Unverified)	1/22/25, 2:40:36 PM	1/22/25, 2:45:36 PM	5m	
Banerjee R D (External)		1/22/25, 3:28:47 PM	4h 10m 9s	rahuldevbanerjee@tatapower.com