North Eastern Regional Power Committee

Agenda For

27th NETeST Sub-Committee Meeting

Time of meeting : 12:00 Hrs.

Date of meeting : 21st February, 2024 (Wednesday)

Venue : "Hotel Royale de' Casa", Guwahati.

1. CONFIRMATION OF MINUTES

CONFIRMATION OF MINUTES OF 26TH MEETING OF NETeST SUB-COMMITTEE OF NERPC.

The minutes of 26th meeting of NETeST Sub-committee held on 10th October, 2023 at Shillong were circulated vide letter No. NERPC/SE (O)/NETeST/2023/2504-2547 dated 02nd November, 2023.

Following comment(s)/observation(s) were received from the constituents-

Utility	Agenda Item	Recorded in MoM	Comments (To be modified)
CTUIL	A.20	POWERGRID informed that…….alternate links/route to these SPOF.	POWERGRID informed that……. alternate links/route to these SPOF. However, POWERGRID informed that Redundant FOTE and DCPS is required at Melriat and Imphal despite low utilisation of existing FOTE at these location in view of redundancy. POWERGRID also informed that redundant FOTE and DCPS is not required at Bongaigaon and Dimapur.
DoP, Auranachal Pradesh & M/s PwC	C.2	After detailed deliberation ……. financial implication.	After detailed deliberation ……. financial implication. Additionally with the consent of SLDC Arunachal Pradesh, the forum also approved the replacement of **Vertiv Liebert 600, 20 kVA UPS** with **Delta RT series, 20 kVA UPS** without any additional

			financial implication
NERLDC	B.6	For Kameng, Ranganadi (Panyor), Pare & RC Nagar: "In ROR Plant AGC implementation is not possible".	***

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As per Central Electricity Regulatory Commission (Ancillary Services) Regulations, 2022 Part-I Clause 7:

Eligibility for an SRAS Provider

(1) A generating station or an entity having energy storage resource or an entity capable of providing demand response, on standalone or aggregated basis, connected to inter-State 7 transmission system or intra-State transmission system, shall be eligible to provide Secondary Reserve Ancillary Service, as an SRAS Provider, if it

a) has bi-directional communication system with RLDC, as per the requirements stipulated in the Detailed Procedure by the Nodal Agency:
   Provided that till such bi-directional communication system with RLDC is fully established, communication system with NLDC shall be considered for eligibility;
b) is AGC-enabled, in case of a generating station;
c) can provide minimum response of 1 MW;
d) has metering and SCADA telemetry in place for monitoring and measurement of energy delivered under SRAS, as stipulated in the Detailed Procedure by the Nodal Agency;
e) is capable of responding to SRAS signal within 30 seconds and providing the entire SRAS capacity obligation within fifteen (15) minutes and sustaining at least for the next thirty (30) minutes;

Thus, all the RORs and small size gas units are eligible for AGC. NEEPCO may clarify further on their plan for implementation of AGC.

The Sub-committee may confirm the minutes of 26th NETeST meeting of NERPC with above modifications as observed by constituents.

A. ITEMS FOR DISCUSSION

A.1 Hon'ble CERC issues various Procedures/Guidelines under the Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017.

The Central Electricity Regulatory Commission (Communication System for inter State transmission of electricity) Regulations, 2017 (hereinafter referred to as the 'Communication Regulations') were published on 29.05.2017 in the Gazette of India Extraordinary (Part-III, Section-4, No. 218).

In view of series of order published by CERC on 19.01.2024, following procedures/guidelines under the Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017 has been notified:

a) Guidelines on availability of Communication System:

The guidelines (attached as **Annexure A.1A**) provide the formula to calculate the availability of communication system of the owner. It is applicable to all central sector utilities and state sector utilities until SERC issues similar guideline.

b) Guidelines on Interfacing Requirements:

The guidelines (attached as **Annexure A.1B**) provide minimum number of data to be telemetered from each element till control center(s). It is applicable to all central sector utilities and state sector utilities until SERC issues similar guideline.

c) Procedure on "Centralized supervision for quick fault detection and restoration"

The procedure (attached as **Annexure A.1C**) provides steps to be followed in order for quick fault detection and restoration of communication system. It is applicable to all central sector utilities and state sector utilities until SERC issues similar guideline.

d) "Procedure on Maintenance and testing of Communication System" Maintenance & Testing:

The procedure (attached as **Annexure A.1D**) provides steps to be followed for smooth maintenance and testing of communication system. It is applicable to all central sector utilities and state sector utilities until SERC issues similar guideline.

Members may please discuss.

A.2 Upgradation Activities of SCADA-EMS systems at Regional/State level in North-Eastern Region.

As per the letter dated 18th October 2023 received from PSDF-Secretariat, attached as **Annexure A.2**, it is mentioned in the minutes of meeting of 21st PSDF Monitoring Committee held on 17th August 2023 ***"……The committee has agreed to for the funding of SCADA/EMS project including AMC for the 7 NER states and has directed TESG to examine these proposals.***

It was also suggested that these SCADA/EMS projects may be coordinated/ monitored by Grid-India. The technical document along with BOQ may be prepared and a combined tender may be floated by Grid-India for all states of NER. As per PSDF guidelines, the funds will be sanctioned and released to the respective states of NER through TSA account.

The DPR submitted by the NER states earlier are available with NLDC and same shall be put up for examination of TESG. However, if any NER state wants to incorporate any changes, then the revised DPR may please be submitted by them at the earliest".

After the meeting held on 22nd November 2023, the modified BoQs along with the signed MoM are sent to CC-Engineering, Grid-India for getting budgetary cost estimate from vendors so that DPR could be revised as per the new cost estimate for onwards submission to PSDF for necessary approval.

Members may please discuss.

A.3 Building construction and associated infrastructure requirements for establishment of Backup SLDC at Tripura under ULDC Phase-III in NER

In the special meeting held online on 09th January, 2024 it was decided that all SLDCs shall submit the DPR of "Building Construction (incl. Electrical and Technical Services Works)" to NERLDC within a month time so that the same can be merged with DPR of ULDC Phase-III. This construction related portion will be included as Part-B in the DPR with "SCADA/EMS Upgradation portion" as Part-A.

Members may please discuss.

A.4 Issues related to Maintenance activities of SCADA/EMS system of SLDCs:

It has been found and observed since last few months that various issues related to Hardware/Software (incl. Auxiliary Power Supply System) are getting faced at SLDCs in NER and AMC personnel deployed at NERLDC, Shillong are being involved in resolution of the same by GE. Due to this, the maintenance activities of NERLDC are

getting delayed and affected. So, it is requested that M/s GE T&D India Limited may work upon a comprehensive check-list (daily/weekly/ monthly basis) and share with the SLDCs so that it can be reviewed by them to know the correct status of the SCADA-EMS system. A sample checklist is attached as **Annexure A.4**. In the 26th NETeST meeting, all SLDCs were also advised to minutely follow the checklist as it will help in system maintenance during the extended AMC period.

Members may please discuss.

A.5 Status of State reliable communication scheme:

As per the discussion held in 26th NETeST meeting and special meeting held on 9th January 2024, it was decided that following three separate DPRs will be merged and put forwarded as State reliable communication Scheme for 90:10 PSDF funding.

(i) Establishment of OPGW and Fibre Optical Terminal Equipment (FOTE)
(ii) Establishment of VSAT Communication in selected remote locations for state-utilities in North-Eastern Region.
(iii) Deployment of new Remote Terminal Units (RTUs) in selected substations of NER

As decided in the special meeting held on 9th January 2024, NERLDC has circulated the draft template DPR for "State Reliable Communication Scheme" to all the SLDCs in which entire scope has been divided into 4 parts – Part A (OPGW), Part B (SDH based End Equipment), Part C (VSAT) & Part D (Remote Terminal Units) for 90% PSDF funding and balance 10% from state-utility side.

Further it was also decided that the earlier submitted DPRs by SLDCs for RTUs (which was on-hold at PSDF secretariat) shall be taken back by all SLDCs as the same scope is being included in "State Reliable Communication Scheme" as per deliberations in earlier Appraisal Committee meetings of PSDF secretariat. It was also decided that in case of any state already submitted DPR under "State Reliable Communication Scheme" head to PSDF Secretariat, then also these additional requirements shall be put in form of new DPR and can be submitted under heading "Additional requirements under State Reliable Communication Scheme for real-time data availability strengthening".

Members may please discuss.

A.6 Issues of SLDCs in SCADA AMC:

(a) GST related amendment in AMC of the SCADA-EMS system & Outstanding AMC charges of SCADA-EMS*:*

M/s GE has informed that ₹ 2,15,39,452.17 is pending as outstanding AMC charges of the existing SCADA-EMS system for NER constituents, summarized as follows:

SN	Constituents	Period	Outstanding Amount
1	Manipur	Y5Q1, Y5Q2, Y5Q3, Y5Q4, Y6Q1, Y6Q2	₹ 66,99,025.07
2	Tripura	Y6Q1, Y6Q2, Y6Q3, Y6Q4	₹ 45,05,884.13
3	Mizoram	Y5Q3, Y5Q4, Y6Q1	₹ 34,45,714.35
4	Nagaland	Y5Q1, Y5Q2	₹ 22,97,142.89
5	Assam	Y7Q1, Y7Q2, Y7Q3	₹ 34,53,514.48
6	Meghalaya	Y6Q4	₹ 11,38,171.25
Total			₹ 2,15,39,452.17

In the special meeting held on 30-08-2023, SLDCs assured that the payment shall be cleared after the issuance of the amended LOA signing with the states.

In the special meeting held on 09-01-2024, M/s GE informed the forum that an amount of ₹ 2,15,39,452.17 is pending as outstanding AMC charges from NER-SLDCs. SLDCs informed that they are waiting for GST-amendment related issues in line with that of NERLDC before release of payment. Finance Dept. of respective SLDCs needs clarifications on amendment issue before release of funds.

Meghalaya-SLDC stated that it has already made pending AMC payment to M/s GE which was confirmed by GE.

M/s GE also stated that the GST collected/billed by GE is being paid to the Govt. of India within the stipulated time as per government norms irrespective of the payment made by states.

Further M/s GE also apprised the forum as per the terms and conditions of the ULDC Phase-II contract, there is a provision for extension of the contract for 02 years at the same rate and terms & conditions. However, SLDCs whose existing AMC contact has expired, they are yet to sign the extension of their existing AMC contracts in spite of verbal agreement resulting in difficulty in continuing with resource deployment. As on date, the status of AMC signed is as follows:

SN	Constituents	2 Years AMC Signed	6 Years AMC end date
1	Assam	YES	11-11-2022
2	Meghalaya	NO	31-03-2023
3	Tripura	NO	31-03-2023
4	Manipur	NO	07-11-2023

5	NERLDC	NO	31-01-2024
6	Mizoram		26-04-2024
7	Nagaland		15-01-2025
8	Arunachal Pradesh		28-02-2025

After detailed deliberation, the forum advised all SLDCs to make necessary amendments in existing contract and engage AMC contracts for optimal use of the existing SCADA system. The forum also noted the issue of payments due to GST amendment and decided to adapt the following methodology:

Sl. No.	**Description**	**Existing payment Methodology being followed**	**Revised Payment Methodology**
1	Invoices corresponding to quarters of "6 years of AMC" which have been completed and bills generated/ submitted to SLDCs.	Base rate + 18% GST	Base rate + 18% GST *(Since GST component already paid to Income Tax Department)*
2	Invoices corresponding to quarters of "6 years of AMC" which have been completed but bills not generated/submitted by GE to SLDCs.	Base rate + 18% GST	Reduced Base Rate + 18% GST = Original Contractual AMC Price (incl. taxes) *(Reduced base rate matching calculation in line with RLDC shared by GE separately)*
3	Invoices corresponding to quarters of "6 years of AMC" which have not been completed.	Base rate + 18% GST	Reduced Base Rate + 18% GST = Original Contractual AMC Price (incl. taxes) *(Reduced base rate matching calculation in line with RLDC shared by GE separately)*
4	Invoices corresponding to "Extended AMC period" which have been completed and bills generated/ submitted to SLDCs.	To be decided.	Reduced Base Rate + 18% GST = Original Contractual AMC Price (incl. taxes) *(Reduced base rate matching calculation in line with RLDC shared by GE separately)*
5	Invoices corresponding to "Extended AMC period" which have been completed but bills not generated/ submitted by GE to SLDCs.	To be decided.	Reduced Base Rate + 18% GST = Original Contractual AMC Price (incl. taxes) *(Reduced base rate matching calculation in line with RLDC shared by GE separately)*
6	Invoices corresponding to quarters of "extended AMC period" which have not been completed.	To be decided.	Reduced Base Rate + 18% GST = Original Contractual AMC

Sl. No.	Description	Existing payment Methodology being followed	Revised Payment Methodology
			Price (incl. taxes) *(Reduced base rate matching calculation in line with RLDC shared by GE separately)*

The forum also requested all the SLDCs to clear the outstanding dues before the completion of the financial year i.e., March, 2024.

M/s GE also raised an additional point regarding closure of supply/services contract (SLDCs portion) of ULDC Phase-II which was executed by POWERGRID. POWERGRID informed the forum that the final Time extension was issued on 05-04-2022 as per the term & condition of the contract with an LD of ₹ 2.4 Cr. (approx.). However, M/s GE did not agree to the LD imposition and subsequent meetings were held in this regard. In the last meeting held between POWERGRID & M/s GE on 23-11-2023, the same issue was discussed and inputs from M/s GE was provided on 13-12-2023. Presently, the same is under review of POWERGRID.

The forum noted the same and advised POWERGRID and M/s GE to bilaterally sort out the issues as per the terms and conditions of the contract.

Members may please discuss.

(b) Non-functioning of "Historian" system services at Mizoram SLDC and Arunachal Pradesh SLDC:

The historian system services in SCADA/EMS system of Mizoram SLDC and Arunachal Pradesh SLDC are not functioning since its inception. During 24th NETeST meeting, M/s GE T&D informed the forum that they will resolve the issue by 15th April 2023. Further, NERLDC also requested concerned constituents to calculate the availability according to contract clause if the issues are not resolved by 15th April 2023.

During 25th NETeST meeting, M/s GE informed that historian services have been restored at Mizoram SLDC on 15th May 2023 (Mizoram SLDC confirmed the same) and they will resolve the historian issue of Arunachal Pradesh by July 2023.

During 26th NETeST meeting, M/s GE T&D confirmed that the issues pertaining to the historian of SLDC Arunachal Pradesh & SLDC Mizoram has been resolved.

However, it has been checked and found that historian is not working in Arunachal Pradesh since 25th January 2024. Snapshots are attached as **Annexure A.6B**

Members may please discuss.

A.7 SAMAST Review

M/s PwC & M/s Genus will present a brief overview and work progress of the on-going SAMAST project. However, certain issues are highlighted below for further deliberation.

State	M/s PwC	M/s Genus
Assam Meghalaya	• Warranty support period in progress • Aging of milestone # 2 invoice is 700+ days and that of milestone#5 invoice is 170+ days. AEGCL is yet to receive 16% of funds. PSDF has requested additional documents, which are yet to be submitted by AEGCL. • Aging of milestone# 5 invoice is 170+ days. MePTCL is yet to submit the PSDF requisition for 10% fund	• Release pending 10% payment: work completed in Assam and Meghalaya and have received approval to go live. release of the remaining 10% balance payment is requested.
Arunachal Pradesh	• Supply of IT hardware in progress • Aging of milestone # 3 invoice is 110+ days. DoP, AP is yet to make the payment for the invoice.	• Data Center Readiness: we are awaiting for the confirmation of port availability of VSAT at substation and SLDC end • Release 60% pending payment
Manipur	• Unavailability of AMR data. Significant impact on SAT schedule. • Aging of milestone # 3 invoice is 400+ days and milestone # 2 invoice is 330+ days. MSPCL has received 60% funds from PSDF on 26 Dec 2023. MSPCL is yet to make payment for the pending invoices • SAT of Meter Data Management	• It is requested to Provide the SIM card for AMR • 60%payment is still pending

	module and Energy Accounting & Settlement module are yet to be initiated due to unavailability of AMR data. This has a significant impact on SAT schedule.	
Mizoram	• SAT of all modules completed. SAT milestone sign off pending. • Aging of milestone # 3 invoice is 400+ days and milestone # 2 invoice is 325+ days. State is yet to receive fund from PSDF.	• GOLive: -We have completed installation and AMR as per availability of scope so it is requested to provide Go live of the project. • Release 60 % pending Payment
Nagaland	• Project go-live completed on 12 Feb 2024. • Aging of milestone # 3 invoice is 360+ days, milestone # 2 invoice is 280+ days and milestone# 4 is 125+ days. PSDF is yet to release funds to the state.	• Time Extension: Due to unforeseen circumstances, we require an extension until Feb, 2024. • Release 60% pending payment • Release 10% payment: - Go live has been done on 12th Feb so it is requested to provide 10% payment which is payable after Go Live
Tripura	• SAT is in progress • Aging of milestone#3 invoice is 280+ days.	• It is requested to Provide the SIM card for AMR • 20%Advance Payment is still pending • Release 60 % pending payment

Members may please discuss.

A.8 Implementation of Guwahati Islanding Scheme:

As per the special meeting held by NERPC on 1st December 2023, NERLDC has submitted the draft DPR along with logic and relevant annexures to NERPC for further course of action. After checking, NERPC has forwarded the DPR along with logic and relevant annexures to Assam for onward submission to PSDF for approval under "State Reliable Scheme (90:10)". However, it has been learnt that to match the implementing timeline along with the OPGW (Communication part), approval for the 10% of the state's share has been processed and at present the file in MD's office. Upon receipt of the approval, both the DPRs shall be sent for PSDF for approval.

Members may please discuss.

A.9 Periodic Auditing of Communication System:

Regulation 10 of Communication System for inter-state transmission of electricity Regulation, 2017 states "The RPC Secretariat shall conduct performance audit of communication system annually as per the procedure finalized in the forum of the concerned RPC. Based on the audit report, RPC Secretariat shall issue necessary instructions to all stakeholders to comply with the audit requirements within the time stipulated by the RPC Secretariat. An Annual Report on the audit carried out by respective RPCs shall be submitted to the Commission within one month of closing of the financial year".

Accordingly, Members may discuss on the audit plan and schedule in compliance of CEA requirements

Members may please discuss.

A.10 Procedure on Outage Planning for Communication System:

Regulation 10 of Technical Standards for Communication System in Power System Operations Regulations, 2020 states, "*Monthly outage shall be planned and got approved by the owner of communication equipment in the concerned regional power committee, as per detailed procedure finalized by the respective regional power committee*". Accordingly, the SOP on "Procedure on Outage Planning for Communication System" was approved in the 25th NETeST meeting and the same has been approved/noted by the NERPC forum in the 24th TCC/NERPC meeting in June 2023.

In 26th NETeST meeting, NERPC informed that all the planned outage of communication system will be taken up in sync with Transmission system on

monthly basis. NERPC requested all utilities to strictly follow the procedure.

However, it is observed that it is not being followed properly as utilities are not submitting the outage plan of the month in Shutdown coordination meeting of OCC forum.

Members may please discuss.

A.11 <u>Non-availability of real-time data pertaining to POWERGRID-owned bays installed at AEGCL-owned stations:</u>

It has been observed that the real-time data of POWERGRID-owned bays installed at AEGCL stations are not reporting to NERLDC. These bays have been identified as follows –

a. Nirjuli bay installed at Gohpur station since 16th Dec-2022
b. Silchar bays installed at Srikona station isolator data since 28th Nov -2022.
c. Silchar bays installed at Hailakandi.
d. 132 kV BNC HVDC bays at Pavoi S/s.

All these bays are ISTS elements, thus data availability is important for real-time drawl calculation and monitoring of ISTS element.

During 24th NETeST meeting, it was decided that AEGCL and POWERGRID will jointly work to resolve the matter bilaterally at the earliest.

During 25th NETeST meeting, it was decided that AEGCL and POWERGRID will jointly work to resolve the matter bilaterally within one month.

During 26th NETeST meeting, POWERGRID – ULDC informed the forum that the Nirjuli bay issue was rectified. However, the issue has again propped out in the last month. It was also informed that there is no issue in the communication channel/OPGW & this appears to be hardware issue. SLDC, Assam also agreed to the same. The forum noted the same and referred the matter to the OCC forum.

As per the status of 209th OCC meeting, the following status as updated by utilities:

1. Nirjuli bay at Gohpur – RTU to be commissioned by Jan'24
2. Silchar bays at Srikona – RTU wiring to be done, AEGCL to provide drawing/diagram soon. NERTS will help AEGCL resolve the issue.
3. Silchar bays at Hailakandi – AEGCL stated that configuration in local SCADA has been done and data is reporting now.

Members may please discuss.

A.12 Connectivity of 132 kV Khupi S/s with ULDC network:

132 kV Khupi S/s will be connecting to Kameng HEP over 132 kV line. Thus, it is requested to connect 132 kV Khupi S/s with ULDC network by installing OPGW and associated end equipment.

At present the connectivity between 132 kV Khupi and SLDC Itanagar has been established by via 132 kV Khupi-Kameng-Balipara section line in November 2023. SLDC Arunachal is requested to configure the RTU and VoIP of Khupi over fiber network.

Further in 26th NETeST meeting, Comprehensive-POWERGRID informed that the 7.5 Kms of OPGW stringing is pending in Balipara – Khupi line which is getting delayed due to very tough terrain and unfavourable weather. The forum also requested Comprehensive-POWERGRID for splicing and connecting the LILO portion OPGW of Balipara – Khupi till Tenga.

Comprehensive-POWERGRID team is requested to update on the status.

Members may please discuss.

A.13 Cyber Security aspects in SCADA/IT systems at Load Despatch Centres in North Eastern Region:

State-Utilities may update the status with respect to CII Status by NCIIPC, ISO 27001:2013 implementation, VA-PT twice a year, Cyber Crisis Management Plan (CCMP), Cyber Management Team (CMT), patching of vulnerabilities and virus alerts from CERT-In/CERT-GO, etc, participation in various trainings and workshops on Cyber Security being conducted by CEA, Ministry of Power and Grid-India, etc.

During 26th NETeST meeting, all the SLDCs were advised to ensure VA-PT test by December, 2023 for FY 2023-24.

A summary of the present status of each SLDC is attached in as ***Annexure A.13***

Members may please discuss.

A.14 Concerned regarding shifting of SLDC Arunachal Pradesh from Old building to new building.

It is learnt that SLDC Arunachal Pradesh has completed its new control centre building, which is nearby to exiting SLDC building (Chimpu S/s). However, following are concerns from NERLDC:

a. Plan for shifting of SCADA/EMS system from old building to new building.
b. Plan for shifting VoIP exchange also.

c. Plan for shifting of various communication links of Comprehensive-AP, ULDC and Powertel links (fibre & FOTE) to new building.

In 25th NETeST meeting, DoP, Arunachal Pradesh informed that the discussion is being held with M/s GE T&D for shifting the SCADA/EMS system from old premises to new premises. NERLDC emphasized that along with SCADA/EMS, plan for shifting of VoIP exchange and communication links (POWERTEL, ULDC and Comprehensive-AP) should also be prepared well in advance. Member Secretary, NERPC advised DoP, Arunachal Pradesh to plan the activities with minimal outage. DoP, Arunachal Pradesh informed the forum that the matter is in initial discussion phase and further brainstorming would be done on it before presenting it to the forum.

In 26th NETeST meeting, SLDC Arunachal Pradesh informed the forum that the discussion is being held with M/s GE T&D for shifting the SCADA/EMS system from old premises to new premises & accordingly Techno-commercial offer was sought, which is yet to be furnished by M/s GE. M/s GE agreed to expedite the matter & requested SLDC Arunachal Pradesh to forward the mail to sales team of M/s GE T&D once. GE has reminded on the same email for DoP-AP confirmation with copy to NERPC for information.

In the special meeting held on 10th January, 2024, SLDC, Arunachal Pradesh & M/s GE were advised to bilaterally discuss the issues.

Members may please discuss.

A.15 <u>Restoration of OPGW owned by Manipur</u>

It has been noticed that seven stations i.e., 400 kV Thoubal, 132 kV Chandel, 132 Kv Churachandpur, 132 kV Hundung, 132 kV Kakching, 132 kV Kongba and 132 kV Yiangangpokpi of Manipur are not reporting due to outage of following OPGW links:

a) 132 kV Churachandpur – Ningthoukhong since 08th June 2023
b) 132 kV Yurembam (Imphal) – Yiangangpokpi since 16th September 2023

In the 26th NETeST meeting, the following update was provided:

a) OPGW restoration of 132 kV Churachandpur – Ningthoukhong could not be carried out due to prevailing law and order issues in the state. State could not convey the date for restoration.

b) 132 kV Yurembam (Imphal) – Yiangangpokpi: Due to DC charger issue at Yiangangpokpi, FOTE is not powered up. The issue will be rectified by 14th October 2023.

Manipur is requested to update the status of the OPGW for the mentioned.

Members may please discuss.

A.16 <u>Laying of OPGW by POWERGRID on NETC Infrastructure-Finalization of Commercial Mechanism</u>

This is with respect to letter dtd. 09.12.2023 of NETC. NERPC has approved the project of laying OPGW on 400kV D/C Palatana-Silchar-Byrnihat-Bongaigaon transmission line owned by NETC considering the need of dedicated and reliable communication requirement for the better operation of power system in 15th and 17th NERPC meeting. POWERGRID is laying OPGW in this project as per approval given. NETC further informed that the OPGW laying work is in progress and is near completion.

NETC requested for its entitlement to get share from revenue earning of POWERGRID, in case of POWERGRID commercially utilizing the redundant fiber capacity erected on NETC lines. This issue was also discussed in 19th TCC and 19th NERPC meetings wherein POWERGRID stated that fibers of OPGW as laid over NETC lines is for ULDC purpose. However, any fibers, if used for commercial purpose, commercial issues shall be taken as per CERC norms.

This is a specific case of POWERGRID laying fibers on third party owned transmission lines and as such the commercial mechanism is not available.

Thus, NETC has requested to jointly formulate a commercial mechanism for sharing of additional revenue through telecom business as per CERC Order in petition no 68/2010. Accordingly, for formulating the commercial mechanism for sharing of additional revenue earned through telecom business by TSP, with infrastructure owner, deliberation among members is required.

Members may please discuss.

A.17 <u>Establishment of redundant fibre path between NERLDC and NEHU for reliability of power system communication link till RLDC.</u>

On 05-01-2023 and 06-01-2023, there were two incidents of fibre cut between NERLDC and NEHU, during the incident all communications links, such as internet, all ULDC links of ICCP, URTDSM, VOIP, RTUs and all POWERTEL links catering the

functionality of NERLDC real time system were affected. Consequently, NERLDC control room was not having any data of grid station which led RLDC to operate grid blindly. Due to outage of this link SLDC and NLDC were also not able to receive data from NERLDC. This 24-core fibre currently runs partially as OPGW on 132 kV NEHU-Kheliriat line and partially as UGFO cable. The fibre is under the ownership of POWERTEL & ULDC has been allotted some pair of fibres from it.

Considering the critical functions of LDCs, it is requested to ULDC-POWERGRID to lay 24 core FIBRE between NERLDC Shillong and NEHU, which should be in physically different path to that of POWERTEL fibre and complete ownership of new fibre should be with ULDC-POWERGRID.

During 24th NETeST Meeting, the forum requested NERTS to include this link in the reliable communication project as this is a very important link in the ULDC network under the head of central sector links. Further, Member Secretary, NERPC suggested the forum to carry out a separate meeting between MePTCL, POWERGRID-ULDC, POWERTEL, NERLDC and NERPC to discuss the issues raised by MePTCL regarding Powertel link.

During 25th NETeST meeting, as per request of the forum ULDC-POWERGRID agreed to lay 24 core UG FIBRE between NERLDC Shillong and 132kV NEHU-Kheliriat line-I Tower no.25 under Reliable Communication Scheme.

During the Special NETeST Sub Group Meeting held on 31st May, 2023, MePTCL informed the forum that they desire to BOO (Build – Own – Operate) the OPGW in their Transmission lines. In this regard, POWERGRID informed that due to system constraint, if required, the 7.532KM NEHU – T25 link can be decapitalized subject to TCC/RPC approval. CTU informed the forum that the ownership and maintenance accountability of these links has to be established before such proposed transfer. The forum noted that as these are policy matters which warrants further detailed deliberation, the forum decided to conduct a separate meeting for the same.

During 26th NETeST meeting, forum noted that these are policy matters on the said line which warrants further detailed deliberation, the forum decided to conduct a separate meeting for the same.

Members may please discuss.

A.18 Replacement of FO link for "NERLDC Shillong – NEHU", "132 kV Kahilipara – Sarusajai" and "132 kV Kahilipara – Umiam Stg. III – Umiam Stg. I – NEHU".

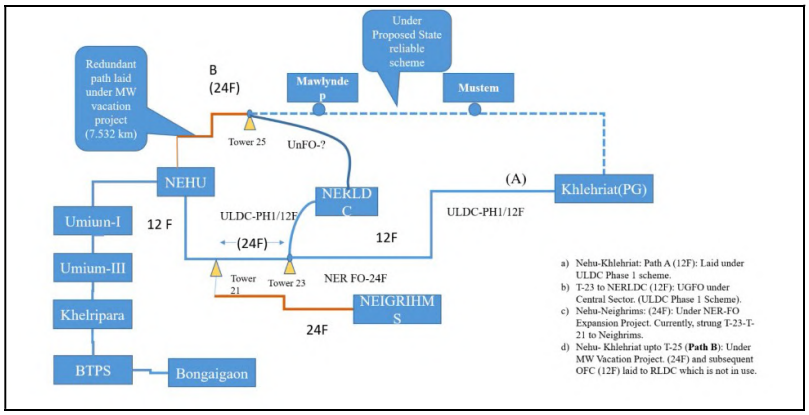
Grid-India stated that in the 23rd TCC and NERPC meeting, TCC forum recommended for replacement of OPGW with 24 Fiber for NERLDC Shillong – NEHU", "132 kV Kahilipara – Sarusajai" and "132 kV Kahilipara – Umiam Stg. III – Umiam Stg. I – NEHU" after RPC and NCT approval. This proposal for replacement shall be substantiated with test report of fiber healthiness. But test report is not available with Meghalaya SLDC as the links have not been handed over to them by POWERGRID. POWERGRID stated that automatic handing over of the link ownership takes place after completion of fifteen years.

Further deliberations were held regarding ownership and maintenance of the said links. CTUIL stated that since these links are being used for ISTS data & voice communication and this communication shall be kept intact. In view of this CTU requested POWERGRID to clarify the entity who is maintaining the above said lines.

Deliberations in 4th CPM: POWERGRID told that this link contains critical ISTS data and this is the only path for NERLDC connectivity with only 12 Fibers. POWERGRID shared the connectivity diagram of NERLDC (as shown in figure below) and explained the criticality of these links. POWERGRID told that if Meghalaya is ready to maintain and takeover the link they have no issue in handing over these links.

However, GRID-INDIA informed that one of the above links i.e 132 kV Kahilipara – Sarusajai section belongs to Assam which is not vital for NERLDC connectivity and replacement of OPGW on this link shall be considered separately in consultation with Assam. Further, GRID-INDIA stated that 132kV NEHU-Umium-I-Umium -III is critical for Grid operation as most of the NERLDC data and AGC data is being routed through this path. In view of this, GRID-INDIA requested CTU for approval for laying of OPGW on these lines to be obtained from NCT. CTU suggested OPGW replacement on all these links may be carried out by single party considering reliability of backbone connectivity to NERLDC. CTU clarified that for approval of OPGW replacement on these lines under ISTS scheme from NCT, the replacement of OPGW shall be substantiated with test report of fiber healthiness which was asked for in the 23rd TCC and NERPC meeting also.

POWERGRID also intimated that Meghalaya is also implementing OPGW on Khleiriat-NEHU section which provides path redundancy for NERLDC. CTU suggested POWERGRID to check whether 48 Fibers can be laid on the "NERLDC Shillong – NEHU" and "132 kV Kahilipara – Umiam Stg. III – Umiam Stg. I – NEHU" paths so that fibers can be shared for ISTS and STU purposes. CTU requested POWERGRID to provide test-report of fiber healthiness of these links so that further review/approval in NETeST/TCC/NERPC & subsequently NCT may be taken up.



Connectivity diagram of NERLDC

Deliberations in 26th NETeST meeting: MePTCL informed the forum that they desire to BOO (Build – Own – Operate) the OPGW in their Transmission lines. POWERGRID – ULDC informed the forum that NEHU – Khlehriat link has been laid in ULDC Phase 1. They are also laying a 12F link from T23 of Nehu – Khlehriat to NERLDC. POWERGRID – ULDC also informed that under MW vacation project, a 7.532KM 24F NEHU – T25 link was laid; whereas T25- Mawlyndep – Mustem – Khlehriat link was to done under State reliable scheme. However, as MePTCL has desired to BOO these links, POWERGRID is ready to handover these link to MePTCL on a mutually agreeable date provided maintenance of these links are also undertaken by MePTCL. POWERGRID also informed that due to system constraint, if required, the 7.532KM NEHU – T25 link can be decapped subject to TCC/RPC approval. CTU also informed the forum that the ownership and maintenance accountability of these links has to be established before such proposed transfer. The forum noted as these are policy matters which warrants further detailed deliberation, the forum decided to conduct a separate meeting for the same.

Members may please discuss.

A.19 <u>Dual reporting of RTU, PMU, VOIP, AGC etc applications on dual channel to RLDC and Back up RLDC.</u>

Presently, all the data channels and voice channels are reporting in main and backup mode with a main channel to RLDC and protection channel to Backup RLDC. It is suggested by ERLDC & WRLDC that for increase of redundancy in the system both main and protection channels should report to RLDCs as well as back up to RLDCs in dual mode considering the criticality of real grid operations by the ERLDC.

For discussing the same meetings were held among POWERGRID, Grid-India, CTU and CEA on dated 09/05/23 and 27/06/23. As per discussion in meeting, POWERGRID had to provide the region wise data of additional requirement for equipment/card/port etc in respective FOTE/Gateway/RTU for the implementation of dual redundancy within 21 days.

Deliberations in 4th CPM:

POWERGRID has submitted the requirement of three equipment and one ethernet card for dual redundancy purpose. The list provided from POWERGRID is enclosed for reference. However, this data is only related to FOTE & ethernet cards. Regarding the expansion SAS gateways/ RTUs ports, POWERGRID stated that they are compiling this data as SAS gateways upgradation which are upgradable and SAS gateway for replacement which are not upgradable. Similarly, new procurement of RTUs shall be done where the RTU have lived their life and addition procurement of RTUs where the RTU ports are insufficient. In case malfunctioning occurs in SAS gateways with expansion of ports, as suggested in another region, POWERGRID shall discuss with OEM to resolve the same. POWERGRID to submit the requisite data within a week.

A virtual meeting with POWERGRID GA &C was held on 02.11.2023(MoM attached as **Annexure A.19A**) for Dual reporting of RTU, PMU, VOIP, AGC etc. applications on 2+2 channel to main RLDC and Backup RLDC for North Eastern Region where in the requirement of one no. of SDH with minimum 8 no. of ethernet ports was agreed in the meeting for Ziro S/s.

POWERGRID CC AM dept. has provided the required data pertaining to SAS/RTU as per attached **Annexure A.19B.** However, for the data provided, certain clarifications as mentioned below are required which POWERGRID may provide at the earliest.

Clarifications required:

a) For SAS based S/s where 5 no. of ports are not available in SAS, what will be requirement (new SAS or SAS card) for facilitating addition port for dual channel redundancy scheme.

b) For RTU based S/s where 5 no. of ports are not available in RTU, what will be requirement (new SAS/RTU or SAS/RTU card) for facilitating addition port for dual channel redundancy scheme.

c)For summary sheet: the cost provided per station is for what item (card/ new SAS/new RTU).

Based on the data provided by POWERGRID AM and GA & C, requirement in NER is as follows:

No. of minimum 8 ethernet port STM 16 FOTE at Ziro S/s:01 No.

No. of new SAS required as per **Annexure A.19B** :14 Nos.

No. of new RTU required as per **Annexure A.19B**: 06 Nos.

Estimated cost for one no. STM 16 FOTE: Rs 30 Lacs

Estimated cost for SAS and RTU as per **Annexure A.19B** :(1.5x 14) + (0.3x 06) = Rs 22.8 Crores

Total estimated cost for NER region: Rs 23.1 Crs

Members may please discuss.

A.20 Additional FOTE at AGC locations

S. No.	Items	Details
1.	Scope of the scheme	Requirement of STM-16 FOTE at AGC locations of North Eastern Region for redundancy.
2.	Depiction of the scheme on FO Map	NA
3.	Objective / Justification	Additional FOTE at all AGC operated generating stations in North Eastern region is required in view of resource disjoint and criticality of AGC operation for grid operation purpose as failure of single equipment may lead to disruption in AGC operation. Further, at many locations redundant ethernet port are not available as per NLDC requirement. The NLDC requirement is as follows: ➢ 1+1 Ethernet port for main NLDC ➢ 1+1 Ethernet ports are for backup NLDC The list of AGC locations and equipment requirement is enclosed as **Annexure A.20A.**

		The total three nos. of FOTE STM16 equipment are required for redundancy as per enclosed list.
4.	Estimated Cost	Rs. 0.90 crores (approx.) (Ninety lacs only)
5.	Implementation time frame	06 months from date of allocation.
6.	Implementation mode	To be implemented by POWERGRID in RTM mode.
7.	Deliberations	The AGC scheme for Loktak and Bongaigaon locations was deliberated in 25th NETeST meeting held on 25.05.2023 wherein the members agreed for the same. This scheme was thereafter discussed and reviewed in 24th TCC & NERPC meeting and approved in 16th NCT meeting for two no. of AGC locations i.e. Loktak and Bongaigaon. In the 4th Communication Planning meeting (CPM) (MoM attached as **Annexure A.20B**) of CTUIL held on 28.07.2023, NERLDC suggested five no. of additional locations for AGC as per enclosed **Annexure A.20A.** The agenda for this scheme was then deliberated in 26th NETeST meeting held on 10.10.2023 (MoM attached as **Annexure A.20C**) wherein NERLDC suggested for adding three no. of additional AGC locations i.e. Kameng, Pallatana, Lower Subansari for redundancy planning. Accordingly, the AGC redundancy scheme has been prepared for all these locations except Kameng and resulted into requirement of three additional FOTE as given in **Annexure A.20A** based on inputs provided by POWERGRID/ISGS. POWERGRID may please update FOTE requirement of Kameng. Accordingly, the FOTE quantity and cost estimate may be revised. This scheme after ERPC review shall be put up to NCT for approval.

Members may please discuss.

A.21 Rectification of long outage of Monarchak data telemetry.

Monarchak real-time data telemetry is unavailable at Tripura SLDC (and NERLDC) since 1st January, 2024 (Monday) 20:28:00 Hours. In the absence of real-time telemetry of Monarchak, any disturbance related to Monarchak Station is going unnoticed to grid operator causing inconvenience in grid operations and financial losses to Tripura SLDC.

It needs to be mentioned here that reference from last few outages, the cause of outage is either fault in BPL-PLCC equipment or Kalkitech protocol converter under Monarchak.

Requesting the forum to guide for a permanent solution.

Members may please discuss.

A.22 Request to provide UNMS onsite (Tripura SLDC) training

Members may please discuss.

A.23 Issue regarding Telemetry Availability of Sub-Stations considered under NERPSIP at Tripura SLDC:

Mohanpur, Dhalabil & Rabindranagar was integrated using NERPSIP project in the year 2022 and since then no further notable progress in work as far as telemetry availability is concerned.

- Number of RTU Stations to be commissioned by POWERGRID under NERPSIP OPGW **by 31st July, 2023 was 07 Nos. (Gournagar, Ambassa, Dhalabil, Kamalpur, Gamaitilla, Bagafa, Udaipur-New).** However, only Dhalabil is reporting among all the stations as per above timeline.
- Number of RTUs to be commissioned by POWERGRID under NERPSIP OPGW **by 31st December, 2023 was 06 Nos. (Belonia, Sabroom, Amarpur, Monarchak, Dharmanagar & Satchand)** However, none of the stations are reporting till now as per the timeline mentioned here.

As per above commitment of Powergrid, TSECL had accordingly committed the same to hon'ble CERC in response to hearing dt 25.04.2023 of PETITION NO. 201/MP/2020 filed by NERLDC in respect of less telemetry availability of Tripura. Requesting the forum for quick closure of the matter is awaited.

Members may please discuss.

A.24 No action taken from Powergrid for repair of faulty cards/ports in Valiant make PDH equipment (under AMC) supplied under NERFO Project.

Recently UNMS project I&C is underway. Few months back service engineer on behalf of Powergrid visited various sub-stations of Tripura and carried out periodical maintenance (under AMC Scope) and found that there are issues of faulty data cards/ports in data cards of Valiant make PDH equipment supplied under NERFO project.

However, till now no action has been taken for rectification of the faulty cards/ports. It was communicated by the service engineer that the complete rectification of the faulty data cards/ports is the prime criteria in view of integration of NEFO NMS with UNMS. Necessary action to be taken by Powergrid in this regard.

Members may please discuss.

A.25 Wideband Network map and status of optical fiber (OPGW, ADSS, UGFO etc.) laying.

PCD Division, CEA vide its letter dated 22.08.2023 (attached as **Annexure A.25A**) to ISTS Licensees and State Transmission Utilities had sought the status of existing and proposed wideband network of their communication infrastructure and the status of optical fiber laying.

Further Ministry of Power vide its email dated 29.01.2024 has requested CEA to ascertain the demand-supply scenario pertaining to the indigenous manufacturing capability vis-à-vis requirement of OPGW/fiber for the next 5 years. Accordingly, PCD Division, CEA vide its letter dated 08.02.2024 (attached as **Annexure A.25B**) to ISTS Licensees and State Transmission Utilities has sought the year wise projected plan for the OPGW/fiber requirement in their Intra-state network for the next 5 years starting 2023-24 and ending 2027-28.

Members may please discuss.

B. ITEMS FOR STATUS

B.1 Project status of NERPSIP and Arunachal Pradesh Comprehensive Scheme:

POWERGRID is implementing two number of projects as follows –

a) **North Eastern Region Power System Improvement Project (NERPSIP)** for six (06) States (i.e. Assam, Manipur, Meghalaya, Mizoram, Tripura, and Nagaland) for strengthening of the Intra-State Transmission and Distribution Systems.

b) Comprehensive Scheme for strengthening of Transmission & Distribution in Arunachal Pradesh

POWERGRID-NERPSIP and POWERGRID-Comprehensive Arunachal may update the status of communication links as per the Annexure B1.A and B1.B.

B.2 Status of FO works under different projects.

Status as updated in the 26th NETeST meeting:

SN.	Link name	Utilities	As per 26th NETeST
I. Fiber Optic Expansion Projects			
Meghalaya State Sector			
1	132kV NEHU - NEIGRIMS	POWERGRID-NERTS	MS, NERPC suggested to carry out a separate meeting between NERPC, NERLDC, SLDC Meghalaya, POWERGRID ULDC & POWERTEL to discuss the matter.
Central Sector			
2	400kV Bongaigaon (PG) - 220kV Salakati - 220kV BTPS	POWERGRID-NERTS	• Work is under progress and expected to complete by November 2023.
3	400kV Mirza (Azara) – Byrnihat		
4	400kV Silchar – Palatana		• Stringing completed. • Unhealthy stretch of 25-30 KM requires replacement. • Due to contractual issue, new tender is being floated. Status is to be updated in the 27th NETeST meeting.
Manipur State Sector			
5	132kV Imphal (State) – Karong	MSPCL and POWERGRID	▪ MSPCL informed that diversion work is not completed due to RoW issue in the line. MSPCL requested NERTS to lay the OPGW on the existing line and gave permission to carry out the work.

SN.	Link name	Utilities	As per 26th NETeST
			▪ NERTS informed that work has already been completed up to the diversion portion. ▪ Target date for completion of link is **September -2023.**

MSPCL and POWERGRID may update the status.

B.3 Status and details of OPGW projects approved in 17th TCC/RPC meeting:

A. Additional Communication Scheme: The commissioning of links is pending for more than three months for lack of installation of FOTE which could have been avoided. Status as per 26th NETeST meeting (attached as **Annexure B.3A**).

POWERGRID-NERTS may update the status.

B. Reliable Communication Scheme:

a. Replacement of existing fibre: Status as per 26th NETeST is attached as **Annexure B.3B.**

POWERGRID-NERTS may update the status.

b. Fibre on new lines: Status as per 26th NETeST is attached as **Annexure B.3B**.

POWERGRID-NERTS may update the status.

B.4 Integration of Dikshi HEP real time data and pending Voice communication:

M/s Devi Energies had earlier informed that due to bandwidth and some technical limitations in VSAT link availed by it, the alternate arrangement for PLCC system has been made which will have provision for speech/data/protection. It was mentioned that installation and commissioning of PLCC will be completed by May 2021.

As per 21st NETeST meeting, NERPC informed the forum that M/s Devi Energies has committed vide e-mail that it will complete the associated works by January-2022. Further, the forum decided that if M/s Devi Energies are not able to complete the work by January-2022, then DoP-Arunachal Pradesh should take strong action against M/s Devi Energies which may include restricting their generation till works are completed.

As per 22nd NETeST meeting, M/s Devi Energies intimated to the forum through e-mail that all associated works will be completed by June 2022.

As per 23rd NETeST meeting, DoP-Arunachal Pradesh informed that PLCC panel at Khupi for the erstwhile 132kV Balipara – Khupi will be shifted to Tenga and one (1) out of the two (2) new panels at Tenga will be shifted to Khupi. Thereafter, PLCC for 132kV Balipara-Tenga and 132kV Tenga-Khupi shall be operational. It was assured that the above works along with data reporting to respective SCADA system shall be completed by Aug'22.

During 24th NETeST meeting, forum requested DoP, Ar. Pradesh to take up the issue with M/s Devi energy and resolve at the earliest as this is very long pending issue.

During 25th NETeST meeting, DoP, Arunachal Pradesh informed that Devi Energies Pvt. Ltd. has purchased PLCC panel for locations Dikhsi, Khupi and Balipara, which are delivered at sites but these PLCC panels are not compatible with PLCC panels present in Khupi and Balipara. Therefore, integration is held up at sites. The forum requested DoP, Arunachal Pradesh to resolve the matter bilaterally with M/s Devi Energies.

During 26th NETeST meeting, the matter could not be updated as Devi Energy was not present in the meeting.

M/s Devi Energies & SLDC, Arunachal Pradesh may update the status

B.5 <u>Automatic Generation Control (AGC) in Indian Grid</u>

Station Name	Background	Status as per 26th NETeST Meeting
AGBPP (Kathalguri)	OEM visits was envisaged as per following – • Some units are of Mitsubishi make which require team from Japan to visit plant. • Other units are of GE-make and BHEL-make	**Four number of Mitsubishi-make GTs:** Mitsubishi informed that they will only report site once AGC panel for BHEL-GE make GTs are successfully commissioned. ▪ **Two number of BHEL & GE-make GTs:** Technical specification (TS) for RTU of AGC RTU prepared. Tender to be floated within Dec'23. ***NEEPCO may update the status.***
Doyang	NEEPCO may update the status	▪ Preparation of Technical Specification SCADA & AGC is under process. Once completed shall be floated for tendering. ***NEEPCO may update the status.***

Station Name	Background	Status as per 26th NETeST Meeting
Kopili Stage -2	25 MW	▪ NLDC has been informed that the unit is ready to be taken into service for AGC. ***For information to the forum***
Kopili	100W	▪ Station commissioning will be completed in the month of March'24. AGC shall be implemented after that only. ***NEEPCO may update the status.***
Khandong	As per new Ancillary Services Regulation 2022, all ISGS plant will be participating in AGC.	▪ Plant will be commissioned on July'25. AGC will be commissioned after that only. ***NEEPCO may update the status.***
Kameng	As per new Ancillary Services Regulation 2022, all ISGS plant will be participating in AGC.	***NEEPCO may update the status.***
Ranganadi (Panyor)	As per new Ancillary Services Regulation 2022, all ISGS plant will be participating in AGC.	***NEEPCO may update the status.***
Pare	As per new Ancillary Services Regulation 2022, all ISGS plant will be participating in AGC.	***NEEPCO may update the status.***
RC Nagar	As per new Ancillary Services Regulation 2022, all ISGS plant will be participating in AGC.	***NEEPCO may update the status.***
Palatana	As per new Ancillary Services Regulation 2022, all ISGS plant will be participating in AGC.	***OTPC may update the status.***

B.6 <u>Pending issues of State Utilities of NER:</u>

The presentation on telemetry status for the month of February 2024 is attached as ***Annexure-B.6***

The utility-wise discussion points for telemetry issues are listed in table below.

Utility	Pending issues	Remarks
Assam	SAS upgradation related works may be updated.	• All SAS upgradation works completed. Telemetry for SAS 132KV Rangia GSS needs some rectification. The same shall be attended shortly. • Dullavchera is not reporting. ***Assam-SLDC may update the status***
Tripura	Dharmanagar Ambassa	• ISTS nodes such as Dharmanagar, Ambassa are not reporting. ***TSECL may update the status.***
Manipur	Chandel, Churachandpur, Rengpang, Tipaimukh, and Yiangangpokpi	• The mentioned stations are not reporting. ***MSPCL may update the status***
	Hundung, Yurembam, Kakching, Konga and Ningthoukhong	• The mentioned stations are reporting partially. ***MSPCL may update the status***
	Elangkhangpokpi, Thanlon, 132kV Thoubal, 132 kv Moreh	• MSPCL has proposed the purchase of RTUs under PSDF. ***MSPCL may update the status***
Nagaland	Kiphire	• Meluri-Kohima line is still under diversion due to road construction work. PLCC is restored, DoP will visit the station to restore the data at the earliest. ***DoP-Nagaland may update the status***
Mizoram	Luangmual Zuangtui Kolasib	• Communication equipment at Lungmual is powered off due to repeated incident in which cards of SDH/PDH were burnt. It is suspected that SDH/PDH are not connected properly to earth. • PE&D-Mizoram informed that survey for restoration of isolator data has been done and proposal to restore the data will be submitted sooner. ***DoP-Mizoram may update the status***
Arunachal Pradesh	VSAT installation and other issues	**UPS installation for VSAT equipment:** • Purchase order for procurement of UPS has been placed for following locations: Along, Daporijo, Deomali and Pasighat. Same will be installed in due time. **RTU failure at Daporijo:** • DoP, Arunachal Pradesh informed that

Utility	Pending issues	Remarks
		joint visit with M/s GE is completed at 132 kV Daporijo S/s to investigate the extent of damage to RTU after fire incident. M/s GE is yet to submit the budgetary offer. • M/s GE T&D asked DoP-AR to confirm on submission of Techno-commercial offer. Accordingly, work will be started. **Power Supply issue at Pasighat:** • 48V to 110V DC Converter is faulty, same has been purchased and issue shall be resolved soon ***DoP-Arunachal Pradesh may update the status.***
Meghalaya	Non reporting of stations	• 220 kV Mawngap is reporting since December 2023. ***SLDC, Meghalaya may update the status***

B.7 Feasibility to connect Lekhi Substation over Fiber-Optic Network:

During 25th NETeST meeting, POWERGRID informed the forum that SDH equipment has been diverted from Monarchak and the same shall be installed by 15th June, 2023. POWERGRID requested DoP, Arunachal Pradesh to provide space for installation & they have agreed to provide the same. POWERGRID also informed that due to DCPS issue, presently they were using DC convertor. DoP, Arunachal Pradesh agreed to look into the matter.

During 26th NETeST meeting, POWERGRID-ULDC informed the forum that new SDH is proposed under NER Reliable communication scheme.

Currently the DC converter of Lekhi S/s is not working due to which Lekhi PDH is not powered up and thus not reporting to SLDC Arunchal Pradesh over fiber network.

DoP-AP is requested to update on the status for providing space DCPS. POWERGRID is requested to update on the status for installation of the DCPS.

B.8 Non-reporting of telemetry data of APGCL owned generating stations:

The status of telemetry data of generating stations owned by Assam Power Generation Corporation Limited is summarized in the *table* given below.

Sl. No.	Name of Generating Station	Status of Telemetry data	Remarks as per 26th NETeST meeting
1.	NRPP (Namrup Replacement Power Project)	• All digital and analog data are not reporting.	The matter could not be updated as APGCL was not present in the meeting
2.	NTPS (Namrup Thermal Power Station)	• All digital data (CB and Isolators) of units are not reporting • Analog data of Units are not reporting.	
3.	Langpi Hydro Station	• CB associated with unit-1 is reporting wrong status. • Isolator associated with unit-2 is reporting wrong status. • CB and Isolators of Bus coupler are not reporting.	

In 25th NETeST meeting, SLDC-Assam informed that APGCL is restoring the analog data in phase-1 and will restore digital data in next phase.

In 26th NETeST meeting, APGCL member were not present thus it could not be discussed.

APGCL and SLDC-Assam may update the status

C. P R E S E N T A T I O N

C.1 Security operation Center:

ESDS Software Solution Ltd will make a brief ppt presentation on the importance and necessities of SOC in the power sector along with its guidelines, for the benefit of all Utlities.

C.2 Introduction to private VSAT communication system for SCADA application by M/s Elcom Innovations and M/s Global Invacom.

Global Invacom and Elcom Innovations brings product to provide dedicated VSAT communication system for telemetry of real-time operational data between Remote Stations and Control centre by using just single hop VSAT communication. The salient features of product are listed below:

- Single Hop communication between Remote Station and Control Centre.
- Easy Installation such as pole mounted system to rooftop installation.
- Private SCADA/Telemetry networks – increased security
- Satellite bandwidth efficient - low communication cost
- Lowest cost VSAT HUB on the market
- Modular, scalable to meet future networking requirements
- Asymmetrical data rates, from 8 to 832ksps per carrier
- Application protocol independent
- Supports TCP/IP and RS232 applications including legacy multi-drop applications – no external mediation devices
- Support for single carrier mesh networking (TDD)
- Secure boot
- Proprietary link protocol
- AES-256 link encryption
- VLAN to segregate traffic (SCADA, VoiP, Video and Admin IT)
- Private network - not on internet

For information of all the members on latest trends in the industry **a brief session will be delivered by M/s Elcom Innovations and M/s Global Invacom.**

Any other item:

Date and Venue of next NETeST Meeting

It is proposed to hold the 28th NETeST meeting of NERPC in the month of May 2024. The date & exact venue will be intimated in due course.

CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

No.- L-1/210/2016/CERC

CORAM:

Shri Jishnu Barua, Chairperson
Shri I. S. Jha, Member
Shri Arun Goyal, Member
Shri P. K. Singh, Member

Date of Order: 19th January, 2024

In the matter of:

Approval of "Guidelines on Availability of Communication System" under the Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017.

Order

The Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017 (hereinafter referred to as the 'Communication Regulations') were published on 29.05.2017 in the Gazette of India Extraordinary (Part-III, Section-4, No. 218).

2. Regulation 7.3 of the Communication Regulations requires NPC to prepare Guidelines on "Availability of Communication System" in consultation with the stakeholders and submit the same for approval of the Commission.

3. Accordingly, NPC has submitted the "Guidelines on Availability of Communication System", after stakeholder consultation, for approval of the Commission.

4. The Commission has examined the Guidelines submitted by NPC, and after incorporating suitable changes, the Commission hereby approves the “Guidelines on Availability of Communication System” which are enclosed as an Annexure to this Order.

Sd/-	**Sd/-**	**Sd/-**	**Sd/-**
(P. K. Singh)	**(Arun Goyal)**	**(I. S. Jha)**	**(Jishnu Barua)**
Member	**Member**	**Member**	**Chairperson**

Annexure

GUIDELINES

ON

AVAILABILITY OF COMMUNICATION SYSTEMS

Prepared in Compliance

To

Central Electricity Regulatory Commission

(Communication System for inter-State transmission of electricity)
Regulations, 2017

January 2024

GUIDELINES ON AVAILABILITY OF COMMUNICATION SYSTEM

1. INTRODUCTION:

1.1 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. Accordingly, these Guidelines have been prepared for determining Availability of Communication System.

1.2 The relevant provisions in the Central Electricity Authority (Technical Standards for Connectivity to the Grid), Regulations, 2007, CEA (Technical Standards for Communication System in Power System Operations) Regulations, 2020 and CERC (Indian Electricity Grid Code) Regulations, 2023 in respect of Communication System are as follows:

1.2.1 **Regulation 6(3) of the CEA (Technical Standards for Connectivity to the Grid)** stipulates that *'the requester and user shall provide necessary facilities for voice and data communication and transfer of online operational data, such as voltage, frequency, line flows and status of breaker and isolator position and other parameters as prescribed by the appropriate load dispatch centre.'*

1.2.2 **Regulation 5(1) of the CEA (Technical Standards for Communication System in Power System Operations) Regulations, 2020** stipulates that user shall be capable of transmitting all operational data as required by appropriate control centre.

1.2.3 **Regulation 11 of the Indian Electricity Grid Code (IEGC) 2023 stipulates as follows:**

"11. DATA AND COMMUNICATION FACILITIES (1) Reliable speech and data communication systems shall be provided to facilitate necessary communication, data exchange, supervision and control of the grid by the NLDC, RLDC and SLDC in accordance with the CERC (Communication System for inter-State Transmission of Electricity) Regulations, 2017 and the CEA Technical Standards for Communication.

(2) The associated communication system to facilitate data flow up to appropriate data collection point on CTU system including inter-operability requirements shall also be established by the concerned user as specified by CTU in the Connectivity Agreement.

(3) 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."

2. DEFINITION:

2.1 Words and expressions used in these guidelines shall have the same meaning assigned in the Electricity Act, Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulation ,2007, CEA (Technical Standards for Communication System in Power System Operation) Regulations, 2020, CERC (Communication System for Inter-State transmission of Electricity), Regulations, 2017 and Indian Electricity Grid Code Regulations, 2023 and amendments thereof.

2.2 Other words have been explained as per the context in these Guidelines.

3. SCOPE AND APPLICABILITY:

3.1 As per Regulation 5 (i) of the CERC (Communication System for inter-State transmission of Electricity), Regulations, 2017, "*These regulations shall apply to the communication infrastructure to be used for data communication and tele -protection for the power system at National, Regional and inter-State level and shall also include the power system at the State level till appropriate regulation on Communication is framed by the respective StateElectricity Regulatory Commissions.*"

3.2 Accordingly, these guidelines shall be applicable to the CTU for the Communication System Infrastructure of inter-State Transmission System. The guidelines shall also be 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.

3.3 The CTU (or STU as the case may be) shall have back to back co-ordination/agreement with transmission licensees, generators, dedicated transmission line owners, bulk consumers and concerned entities for providing power system communication on their network.

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 the performance/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.

c) CTU (or STU as the case may be) shall submit availability reports of configured channel including the redundant channels in format prescribed by RLDC/RPC, generated from the centralized NMS. The availability report of the call logging facility (with time stamp) may be provided till commissioning of centralized NMS for availability computation.

4. TREATMENT OF COMMUNICATION SYSTEM OUTAGES:

4.1 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. However, onus of satisfying the Member Secretary, RPC that element outage was due to aforesaid events shall rest with the communication provider.

4.2 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.

Illustration: If a channel is out for a duration less than or equal to one (01) minute in a time-block, and such outages are more than ten (10) times in a day, all the time-blocks with such outages shall be treated as not available.

4.3 All other outages not covered under 4.1 and 4.2 shall be considered as not available during the whole block for the computation of channel availability.

5. METHODOLOGY FOR COMPUTATION OF AVAILABILITY OF COMMUNICATION SYSTEM:

5.1 Availability of Communication System **(A_{CS})** shall be calculated as under:

$$A_{CS} = \frac{\sum_{i=1}^{N} A_i}{N}$$

Where - N is total number of communication channels as specified in 3.4(a) above.

- A_i is Availability of i^{th} Channel which shall be calculated as given in 5.2 below.

5.2 Availability of i^{th} Channel (A_i) shall be arrived as under:

$$A_i = \frac{B_T - B_{Ni}}{B_T} \times 100$$

Where B_T is Total number of time-blocks in a month

B_{Ni} is the total number of time-blocks, in which i^{th} *channel was not available after considering deemed availability status of 4.1 & 4.2 above.*

$B_{Ni} = B_{ANi} - B_{Gi} - B_{LTTi}$,

Where-B_{ANi} is absolute number of time-blocks in which the i^{th} channel was 'not available' on account of any reason.

-B_{Gi} is Number of time-blocks out of B_{ANi}, in which i^{th} *channel was 'not available' on account of act of God as specified in 4.1 above.*

-B_{LTTi} is Number of time-blocks out of B_{ANi}, in which i^{th} *channel was 'not available' for a duration less than or equal to one (01) minute in a time-block and not more than ten (10) times in a day as specified in 4.2 above.*

Illustrations:

Case1: If there are 2880 time-blocks (B_T) in a month, and a particular channel is not available for a total of 70 time-blocks; and out of this, the above mentioned channel was not available for 20 (B_{Gi}) time-blocks due to act of God, six (06) time-blocks for less than one (01) minute (B_{LTTi}), then B_{ANi}=70, B_{LTTi} =06, B_{Ni} =70-20-06 = 44, and A_i = (2880-44)/2880 = 98.47%

Case 2: If there are 2880 time-blocks (B_T) in a month, and a particular channel is not available for a total of 70 time-blocks; and out of this, the above mentioned channel was not

available for 20 (B_{Gi}) time-blocks due to act of God, 11 time-blocks for less than 1 minute, then B_{ANi}=70, B_{LTTi} = 0, B_{Ni}=70-20-0=50, and A_i = (2880-50)/2880 = 98.26%.

6. Revision of these Guidelines

6.1 As and when required, these Guidelines shall be reviewed and revised by NPC with the approval of the Commission.

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CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

No.- L-1/210/2016/CERC

CORAM:

Shri Jishnu Barua, Chairperson
Shri I. S. Jha, Member
Shri Arun Goyal, Member
Shri P. K. Singh, Member

Date of Order: 19th January, 2024

In the matter of:

Approval of Guidelines on "Interface Requirements" under the Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017.

Order

The Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017 (hereinafter referred to as the 'Communication Regulations') were published on 29.05.2017 in the Gazette of India Extraordinary (Part-III, Section-4, No. 218).

2. Regulation 7.4, read with Regulation 14.2 of the Communication Regulations requires NLDC to prepare Guidelines on "Interfacing Requirements" in consultation with the stakeholders and submit the same for approval of the Commission.

3. Accordingly, NLDC has submitted the Guidelines on "Interfacing Requirements" after stakeholder consultation for approval of the Commission.

4. The Commission has examined the Guidelines submitted by NLDC, and after incorporating suitable changes, the Commission hereby approves the Guidelines on “Interfacing Requirements”, which are enclosed as an Annexure to this Order.

Sd/-	**Sd/-**	**Sd/-**	**Sd/-**
(P. K. Singh)	**(Arun Goyal)**	**(I. S. Jha)**	**(Jishnu Barua)**
Member	**Member**	**Member**	**Chairperson**

Annexure

GUIDELINES ON "INTERFACING REQUIREMENTS"

1. Introduction

1.1. These Guidelines have been prepared in accordance with the Regulation 7.4 (i) of the CERC (Communication System for inter-State transmission of electricity) Regulation, 2017. The relevant extract of the same is as follows:

> "*The National Load Despatch Centre (NLDC) shall be responsible for preparation and issuance guidelines with the approval of the Commission on the "Interfacing Requirements" in respect of terminal equipment, RTUs, SCADA, PMUs, Automatic Generation Control (AGC), Automatic Meter Reading (AMR) Advanced Metering Infrastructure (AMI), etc. and for data communication from the User's point to the respective control centre(s) based on technical standards issued by CEA within 60 days of issuance of technicalstandards.*"

1.2. The Central Electricity Authority (Technical standards for Communication System in Power Systems Operations) Regulations, 2020 was issued by CEA on 27th February, 2020.

1.3. The Guidelines on "Interfacing Requirements" focus on the general data acquisition systems for RTUs, SAS Gateway computers, communications and AMI metering systems required for reliable, secure and economic operations of the control centre(s).

1.4. All Users, SLDCs (State Load Despatch Centres), RLDCs (Regional Load Despatch Centres), NLDC (National Load Despatch Centre), CTU (Central Transmission Utility), STUs (State Transmission Utilities), NHPTL (National High Power Test Laboratory), REMC (Renewable Energy Management Centre), FSP (Forecasting Service Provider), Power Exchanges and ISTS (inter State Transmission System) licensees etc. shall abide by these guidelines as applicable to them.

1.5. Requirement mentioned herein under this document shall be applicable to Main and Backup Control Centre (wherever applicable) irrespective it is mentioned or not mentioned separately in subsequent sections.

2. Definitions

2.1. The words and expressions used in these guidelines shall have the same meaning assigned in the Electricity Act, CERC (Communication System for inter-State transmission of Electricity) Regulations, 2017, Indian Electricity Grid Code Regulations, 2023 and CEA (Technical Standards for Communication System in Power System Operations) Regulations, 2020, and amendments thereof.

2.2. "Remote Station" means transmission substations/ generating stations operated by the users from which data/real-time data is collected.

3. Real time data Telemetry

3.1. All entities as specified in Para 1.4 of these Guidelines, as applicable, shall provide Systems to telemeter power system parameter such as flow, voltage and status of switches/ transformer taps, Sequence of Events (SOE) etc. in line with interface requirements and other guideline made available by NLDC. While many of design details related to control systems are not included in these guidelines, the Users, who are getting connected to the ISTS, shall require to include functionalities and the interfaces compatible with the respective Control Centre data collection systems available and being maintained at NLDC / RLDCs and SLDC/Sub-LDC and other LDC level. Control Centre may request or transmit data periodically or "by exception" (periodically, as the need for information arises) on demand, or interactively.

3.2. A list showing the parameters to be telemetered from various sub-stations and generating stations with respect to various equipment is enclosed for reference as ***Annexure-I***. This list shows minimum required parameters, however, some other parameters shall be provided as per Control Centre requirement. The analog signal sign convention shall be as per IEEE power flow convention and digital status shall be as per IEC standard. Digital status for circuit breaker must be double point while Isolator status can be either single point or double point as per end device. All users shall comply with interface requirements as specified and shall share interface details with respective control centre.

3.3. The typical layout diagram showing point of interface for real time telemetry is attached as ***Annexure- II***.

3.4. The communication media being used for data transfer and data rate shall be in accordance with the Central Electricity Authority(Technical Standards for Communication System in Power System Operations) Regulations, 2020.

4. Communication Interface

The Users shall support at least the following facilities and plan for communication interfaces accordingly at the time of implementation:

1. Real time data exchange including AGC/Control signal with Control Centre (Main & Backup).
2. Phasor data exchange
3. Meter data exchange
4. Protection signal transmission (SPS, Direct Tripping and Permissive Tripping Carrier Signal etc.)
5. Voice communication
6. Video Communication

Other requirements, if any, users may include while designing the local communication interface requirement.

The required communication interfaces shall be provided for both sending and receiving ends based upon jurisdiction/ownership. All the interfaces shall be provided with audio-visual status indication to indicate its normal operation as per relevant standards.

Users shall have functionality to support any of the interfaces given below based on requirement of data flow as per CEA/CERC guidelines from their respective end to control centres.

Interfaces are classified as following: -

1. Remote Station Interfaces
2. Control Centre Interfaces
3. Terminal Equipment Interfaces

4.1. Remote Station

"Interfacing Requirements" in respect of terminal equipment, Remote Terminal Unit (RTUs)/ Substation Automation System (SAS), Supervisory Control and Data Acquisition System (SCADA), Phasor Measurement Unit (PMU) /Phasor Data Concentrators (PDC), Automatic Generation Control

(AGC), Station Protection / System Protection Schemes (SPS), Automatic Meter Reading (AMR), Advanced Metering Infrastructure (AMI), etc. and for data communication is decided based on communication protocol used for transfer of data between user and respective control centres through dedicated and redundant communication channel with route diversity.

Remote end equipment like RTUs, PMUs, SAS, Metering Gateways, Meter Data Collection Unit, PLCs for AGC etc. shall report through communication protocol which is supported at the reporting Control Centre.

While designing the interface requirement of the remote locations, all the interfaces required for data (power system parameter, meter data, AGC/Control Signal), voice, video, protection signal shall be considered and shall be compatible with respective control centre as well as intervening Communication System equipment.

A typical General Arrangement drawing for a Remote Station is enclosed as ***Annexure-III***.

The interfaces shall be designed to operate under single contingency failure condition. Equipment should support interfaces with multiple ports, cards, gateways etc. and configured in redundant mode so that failure of single hardware element, i.e. communication port, card, gateway etc. of the users shall not lead to failure of data communication. Communication system shall be designed as per planning criterion to be notified by CEA.

Availability of communication links shall be maintained as per the CERC Communication Regulations, 2017. Further, the communication channel provided/configured for the real time data communication shall be made error free and shall not lead to intermittency in real time data at respective Control Centre.

4.1.1. Remote Terminal Unit (RTU)/Substation Automation System (SAS)/PLCs

"Remote Terminal Units" (RTU) / Substation Automation System (SAS) is the device suitable for measuring, recording and storing the consumption of electricity or any other quantity related with electrical system and status of the equipment in real time basis and exchanging such information with the data acquisition system for display and control.

The RTU/SAS System /device should communicate with Control Centre front end system in either

IEC-60870-5-101 or IEC-60870-5-104 protocol.

i) IEC - 101 works on serial communication between site and control centre and it requires serial interface. Different Physical interface that can be used for 101 communications which are:
   a) RS-232 / RS 422 / RS 485.

ii) IEC 104 works on TCP/IP based communication and it can use following Physical interface:
   a) Ethernet (IEEE 802.3 / IEEE 802.3u)
   b) Optical communication Port
   c) 10/100 BaseT(Electrical) or 100BaseFX(Optical) Ethernet Link

The communication interface equipment at the remote (RTU/SAS) location shall support the interfaces as mentioned above and the communication provider shall ensure the proposed data sharing protocol by the stations so that the compatible interface is provided.

4.1.2. Phasor Measurement Unit

PMU (Phasor Measurement Unit) provides phasor information (both magnitude and phase angle) for one or more phases of AC voltage or current waveforms including positive sequence phasors and analog quantities like MW, MVAR, frequency, Rate of Change of Frequency (ROCOF) in real time.

Control Centre shall exchange phasor information between their respective Synchrophasor systems via high-speed real-time data acquisition networks, using the protocol specified in latest IEEE C37.118 communication standard preferably.

PMU shall report on C37.118 2011 or higher protocol with configuration Frame 3 or better for data communications. Different Physical Interface for PMU includes:

1. Ethernet (IEEE 802.3 / IEEE 802.3u)
2. Optical Interface (100 BASE-FX Multimode 850 nm/1300nm nm)
3. 10/100/1000 BaseT(Electrical) or 100/1000 BaseFX(Optical) Ethernet Link

All data items, regardless of type, are generally collected and disseminated at a frequency of 25 samples per second (can be higher rate of samples per second in future) and should be sent to Control Centre with the associated data quality codes in compliance with latest IEEE C37.118 communication standards.

4.1.3. Metering gateway

Automatic Meter Reading system uses its front end for transferring meter data from interface meters' gateway / Meter Data Collection Unit to control centre. It uses DLMS protocol for data communication. Different types of interface required are:

1. Ethernet (IEEE 802.3 / IEEE 802.3u) or Ethernet VLAN IEEE 802.1 P/Q).
2. 10/100/1000 BaseT(Electrical) or 100/1000 BaseFX(Optical) Ethernet Link.
3. For Meters-Three ports accessible only through optically isolating modules
4. RS 485/LAN port for communication with Local PC

The internal communication with the main meter data gateway and other meters in a particular location may use available communication and interface may be decided based on local available communication protocol.

4.1.4. Tele-protection/Control

Equipment protection, Tele-protection /control interface shall be used for transmitting control signalfrom one end to other, it can be from one sub-station to other sub-station or control centre to sub- station/generating station. Interface requirement for tele-protection devices are given below:

1. E1 G.703 Interface Option for transmission over E1 Link
2. 10/1000BaseT (Electrical) or 100/1000BaseFX (Optical) Ethernet Link
3. Optical interface
4. IEEE C37.94, ITU-T G.703 interface.
5. 4W Analog / Digital PLCC
6. IEC 61850 GOOSE Interface

4.1.5. Voice communication

Voice communication interface shall have following network interface for voice communication between user location to Control Centre:

a. 2-wire FXO/2-wire FXS

b. 4- wire E&M.
c. VOIP system uses TCP/IP communication and it can use Ethernet (IEEE 802.3 / IEEE 802.3u) or Ethernet VLAN IEEE 802.1 P/Q).
d. 10/100BaseT (Electrical) or 100BaseFX (Optical) Ethernet Link
e. EPABX exchange to be interfaced with Wide-band network

There shall be provision for establishing voice communication to main and backup control Centre. The user end communication equipment shall be compatible with respective Control Centres.

4.1.6. Video Communication

Video communication interface shall be provided on TCP/IP communication and it can use Ethernet (IEEE 802.3 / IEEE 802.3u) or 10/100/1000BaseT (Electrical) or 100/1000BaseFX (Optical) Ethernet Link.

4.2. Control Centre

The communication interfaces to be provided at the control centre end shall support all the interfaces that is required at the remote end. Apart from interface requirements of the remote stations, high bandwidth links are required for inter control centre protocol (ICCP) communication and proprietary protocol like ISD / Multisite for Main & Backup operation. Configurable Ethernet ports supporting up to 1 Gbps may be provided at the control centre end.

The communication equipment shall also support internal VLAN configuration to optimise the communication with the remote end.

Different types of interface required at Control Centre are:

a) E1/ G.703 Interface Option for transmission over E1 Link
b) 10/100/1000BaseT(Electrical) or 100/1000BaseFX(Optical) Ethernet Link
c) Optical interface
d) IEEE C37.94, ITU-T G.703 interface.
e) Gigabit Ethernet or Gigabit optical interface

4.3. Communication Equipments

The various types of Interfaces required in communication equipment at Remote Station and ControlCentre shall be governed in accordance with Schedule II of CEA (Technical Standards for Communication System in Power System Operations) Regulations, 2020, as applicable.

5. Cross-Border Power System Connections

The Regulation 18 (Data and Communication Facilities) of the CERC (Cross Border Trade of Electricity) Regulations2019 stipulates as follows:

> *"Reliable and efficient voice and data communication systems shall be provided to facilitate necessary communication and data exchange, and supervision or control of the grid by the NLDC or RLDC, under normal and extraordinary conditions. Such communication system must be established from generating station or concerned grid substation(s) to control room of System Operator of a neighbouring country and from there to control room of System Operator of India. Provided that the Cross Border Transmission Link shall necessarily have reliable and efficient voice and data communication systems with the System Operators on both the sides."*

Accordingly, at each point of interconnection on Indian side; respective transmission licensee should ensure facilitating interface requirement for cross border interconnections and shall take necessary measures to comply with the aforesaid regulation and the interface guidelines issued by NLDC in this regard.

From Network Security point of view, at Landing Locations (in India Side) a layer of isolation shall be made between interfacing point/node & ISTS (Inter State Transmission System) Communication Network node. Further complete separation shall also be maintained for configuring End-to-End connectivity of Identified Data & Voice Channels.

The provisions mentioned under this Clause 5 shall comply with the cyber security requirements outlined in Clause 6 of this document.

6. Cyber Security Requirements

The communication service provider while providing the interfaces for the data exchange between the control centres, between the user station and the Control Centre must comply with CERT-In, NCIIPC (National Critical Information Infrastructure Protection Centre) guidelines for the interface

being provided to the end user in accordance with CEA (Technical Standards for Communication System in Power System Operations) Regulations, 2020.

Necessary firewall/router as per requirement shall be provided by the respective users while connecting the remote equipment with the control centre network. Direct connectivity with the operational network be avoided while connecting the remote station and shall be through firewall with necessary VLAN configuration.

A typical diagram related to the cyber security requirements is attached at ***Annexure – IV***.

7. Maintenance, Validation and Testing

Users shall facilitate for periodic maintenance and testing of interface equipment owned by them in accordance with procedure for maintenance and testing to be prepared by CTU in accordance with CERC Communication Regulations, 2017.

8. Document Revision

The interface requirement is based on current protocols implemented at different control centres and remote end equipment and the available protocols and communication interfaces available based on the available communication technology. The documents shall be revised as and when there is change in technology, and as and when any deficiency is noticed with approval of CERC.

ANNEXURE-I

A list of parameters to be telemetered from various sub-stations and generating stations with respect to various equipment

A. SCADA System

Sl. No	Description	Analog Points	Digital Points	Protection Signal
1	Line	-MW -MVAR	- line Isolator Status SOE with Time Stamping	Main1/Main2 protection, Over Voltage protection, LBB
2	Bays		- Breaker -Isolator/ Disconnector (Line Selection in DMT scheme) SOE with Time Stamping	
3	Main Buses, Transfer Bus, Bus Coupler, Bus Sectionalizer	-Voltage -Frequency -MW & MVAR flow in case of bus sectionalizer -MW& MVAR flow across Bus Couplers	- Breaker, Isolator, - SOE with Time Stamping	Main1/Main2 protection
4	Transformer	-MW/MVAR for HV/LV Side -Tap Position	-Breaker -Isolator Status SOE with Time Stamping	Main1/Main2 protection
5	(Hot standby) Transformer	-MW/MVAR for HV/LV Side	-Breaker -Isolator Status	
6	Reactor	MVAR	-Breaker -Isolator Status --Bypass isolator status of NGR -SOE with Time Stamping	Main 1 and 2 Protection
	(Hot standby) Spare Reactor	MVAR	-Breaker -Isolator Status	
7	FSC/TCSC	-% compensation	-Bypass Breaker -Bypass Isolator -FSC ON/OFF Status	Oscillation Damping Controller

Sl. No	Description	Analog Points	Digital Points	Protection Signal
			SOE with Time Stamping	(Operated or not) status
8	SVC	-Slope -Gain -Q-Ref -V-Ref -V min -Vmax -Current for each branch -total MVAR compensation	-Isolator Status for each branch with SOE -SVC Mode (Automatic/Manual) -Q Control Mode (Enable/Disable) SOE with Time Stamping	Oscillation Damping Controller (Operated or not) status
9	HVDC (Both Type: Line Commutate Converter & Voltage Source Converter)	-DC Voltage -DC Power Flow -DC Current -Individual Filter MVAR -Firing Angle-Alpha -Extinction angle- Gamma, etc. -Power order, set point Compensation settings if applicable	-Individual Filter Status -HVDC Mode (Metallic return / Ground return) -Isolator/CB Status of DC Switchyard -RPC Status -Run back Status -POD Status -SSDC Status - SOE with Time Stamping -DMR -1 status -DMR-2 status -MRTB status -GRTB status -SoE for HVDC auto-restart	DC line Fault Protection, ESOF (emergency Switch Off) and HVDC Pole Block protection, POD Status (operated or not
10	Converter Transformer	-MW/MVAR for HV/LV Side -Tap Position	-Breaker -Isolator Status	
11	Spare Converter transformer	-MW/MVAR for HV/LV Side	-Breaker -Isolator Status	
12	Generator	-MW (HV/LV) -MVAR (HV/LV) -LV Voltage / Frequency Unit Set point -Unit DeltaP for AGC,	- RGMO/FGMO ON/OFF Status - LV Breaker Status - AGC Local / Remote status - PSS ON/OFF status	Class A, B, C protection status

Sl. No	Description	Analog Points	Digital Points	Protection Signal
		-Droop settings Value, -AVR Reference Voltage	- AVR ON/OFF Status - SOE with Time Stamping	
13	Generator Transformer	-MW/MVAR for HV/LV Side -Tap Position	-Breaker -Isolator Status	Main1/Main2 protection
14	Synchronous Condenser	-MW (HV/LV) -MVAR (HV/LV) -LV Voltage / Frequency	-Breaker -Isolator Status	
15	STATCOM	Qstat, QMSC, QMSR, VHV, VMV, Q_{tra} , P_{aux}, Q_{aux}, Tap Position of Coupling transformer Power Oscillation damping setting Inductive slope Capacitive slope Up set reference/ Down set reference Feedback signal voltage MSC/MSR switching in and out setting (voltage, time)	- CB - Isolator STATCOM modes status (Voltage/Reactive/NSC etc) POD status - SOE with Time Stamping	
16	Phase Shifter	MW / MVAR Angle of shift	- CB - Isolator - SoE with time stamping	
17	Wind	- Wind speed at hub height - Wind direction - Blade Angle - Ambient air temperature - Relative Humidity (%) - Air Density -Atmospheric Pressure - Total MW/MVAR - Individual Turbine MW, -MVAR, wind speed - Total number of turbines online - Total Power Capacity.	WTG CB Status CB and Isolator status of pooling station Turbine Availability PPC modes status (Voltage/PF/Reactive Power) Frequency control (FGMO/RGMO) status	

Sl. No	Description	Analog Points	Digital Points	Protection Signal
		- Available Power Capacity -Available Power (Active and Reactive) at Plant level. -Active Power set point -Reactive Power set point -PPC modes signals: Reference and actual values of Voltage Control mode, Power Factor Control mode and Reactive Power Control mode) -Droop setting of Voltage Control mode -Active power ramp rate UP and down setting	LVRT/HVRT status	
18	Solar	-Global horizontal irradiance -Global plane of array irradiance - Diffusion Irradiance- Watt per meter square - Direct Irradiance- Watt per meter square - Sunrise and Sunset timings -Tilt angle - Dust fall -Ambient temperature (deg C) -Back of PV module temperature -Battery charge -MW/MVAR -Relative Humidity - Performance Ratio - Cloud Cover (Okta)	- Inverter Status (ON/OFF) -Module Availability -CB/Isolator Status -Rectifier Availability -PPC modes status Voltage/PF/Reactive Power) Frequency control (FGMO/RGMO) status AGC status LVRT/HVRT status	

Sl. No	Description	Analog Points	Digital Points	Protection Signal
		-Temperature, Wind Speed, Rainfall, Wind Speed, Wind Direction - Inverter MW/MVAR (AC Side & DC Side) -Available Power (Active and Reactive) at Plant level. -Active Power set point -Reactive Power set point -PPC modes signals Reference and actual values of Voltage Control mode, Power Factor Control mode and Reactive Power Control mode) -Droop setting of Voltage Control mode -Active power ramp rate UP and down setting		
19	Energy Storage Resource	State of Charge MW/MVAR (AC Side & DC Side) Modes (Energy storage, Frequency regulation, etc.)	CB/Isolator Status Controller status, RGMO/FGMO	
20	SPS Signal		DIGITAL STATUS: Enable/Disable, Operated/No Operated. (Condition/Logic Wise)	
21	Weather Parameter	-Temperature - Wind Speed -Humidity -Rainfall		
22	AGC	-Unit Load Set Point (ULSP) -Actual Generation MW -Unit Capability	-Circuit Breaker Status on/off -Governor status on/off	

Sl. No	Description	Analog Points	Digital Points	Protection Signal
		-RGMO/FGMO/Governor input to governor -DeltaP -Reactive Power -AVR Voltage Set Point -Low Voltage (LV) side Actual Voltage -Generator Transformer (GT) Tap Position -Distribution Factor Additional Analog inputs from Hydro power plants -Minimum load at which unit can stably run after synchronization – Unit wise (P1) (in MW) - Forbidden zones or high cavitation zones - Unit-wise (From MW to MW) - P2 to P3 - Maximum loading possible on unit (continuous) (P4) - Declared Energy for the day - Schedule Energy (Cumulative) - Water gross head (m) Additional Analog inputs from Gas power plants - Reference exhaust gas temperature - Actual exhaust gas temperature	- AGC Local/Remote Additional Digital inputs from Hydro power plants - Pumping Status on/off	
23	Loads (Lift Irrigation etc.)	- MW/MVAR	-Breaker -Isolator Status	

B. PMU Signal List

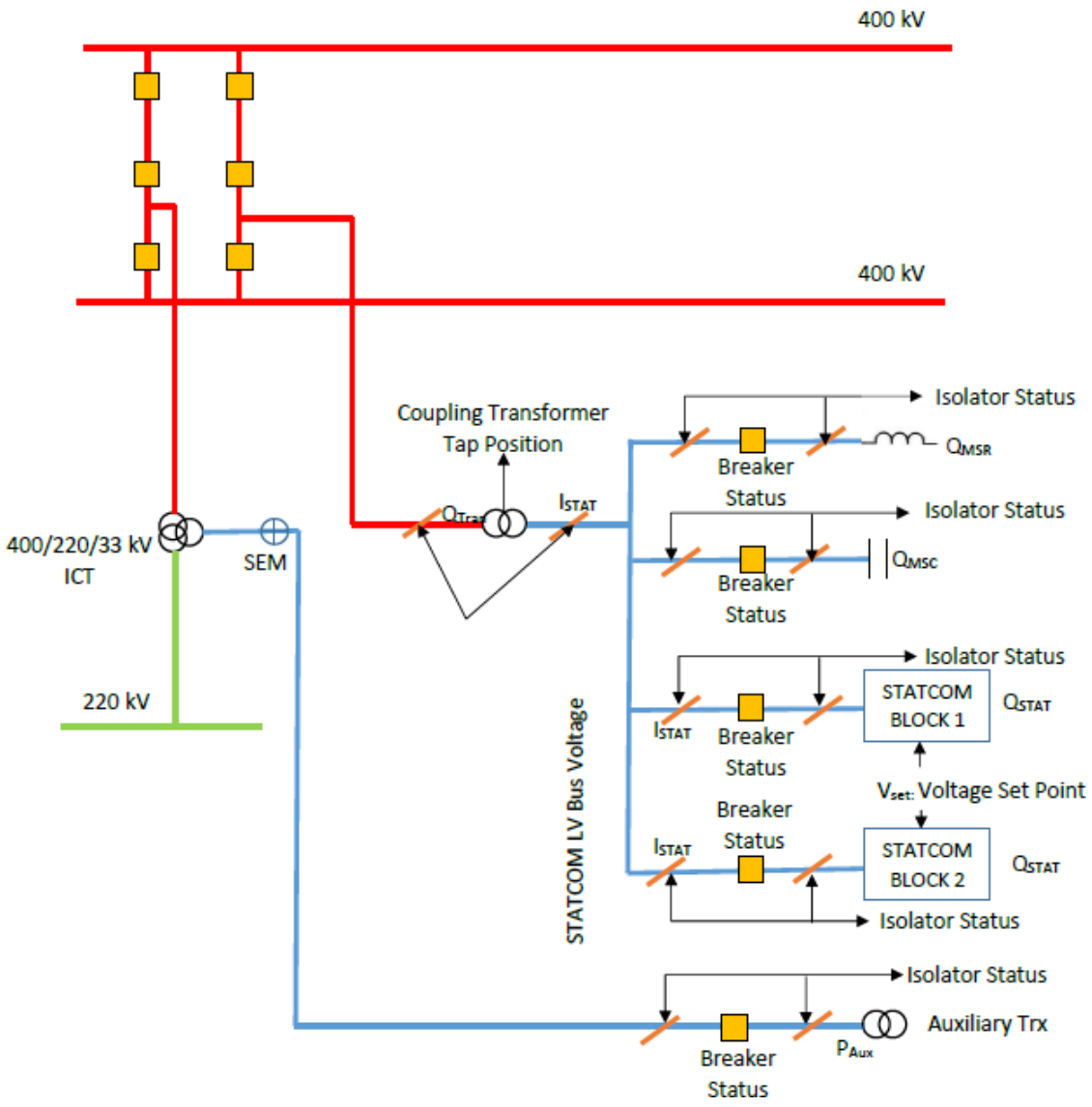
Sl. No	Description	Analog Points	Digital Points	Protection Signal
1	Line	**VOLTAGE** {VRM, VYM, VBM, VPM, VRA, VYA, VBA, VPA} **CURRENT** {IRM, IYM, IBM, IPM, IRA, IYA, IBA, IPA} MW, MVAR, F , DF/DT	-Main Breaker status -Tie Breaker status -Isolators	Main1/Main2 protection,
2	Bays		- Breaker -Isolators	
3	Main Buses, Transfer Buses	- **VOLTAGE** {VRM, VYM, VBM, VPM, VRA, VYA, VBA, VPA} F, DF/DT	Bus Sectionalizer, Bus Coupler Breaker	
4	Transformer/Coupling Transformer/Converter Transformer	- **VOLTAGE** {VRM, VYM, VBM, VPM, VRA, VYA, VBA, VPA} **CURRENT** {IRM, IYM, IBM, IPM, IRA, IYA, IBA, IPA} MW/MVAR for HV& LV Side	-Breaker -Isolators	Main1/Main2 protection
5	Reactor	**VOLTAGE** {VRM, VYM, VBM, VPM, VRA, VYA, VBA, VPA} **CURRENT** {IRM, IYM, IBM, IPM, IRA, IYA, IBA, IPA} MVAR	-Breaker -Isolators	
6	FSC/TCSC	**VOLTAGE** {VRM, VYM, VBM, VPM, VRA, VYA, VBA, VPA} **CURRENT** {IRM, IYM, IBM, IPM, IRA, IYA, IBA, IPA} MVAR	-Bypass Breaker - -FSC ON/OFF Status	

7	SVC	**VOLTAGE** {VRM, VYM, VBM, VPM, VRA, VYA, VBA, VPA} **CURRENT** {IRM, IYM, IBM, IPM, IRA, IYA, IBA, IPA} MVAR	Breaker	
8	Generator	**VOLTAGE** {VRM, VYM, VBM, VPM, VRA, VYA, VBA, VPA} **CURRENT** {IRM, IYM, IBM, IPM, IRA, IYA, IBA, IPA} MW, MVAR, F, DF/DT for HV& LV Side	-RGMO/FGMO ON/OFF Status Breaker Status -Isolators	V
9	STATCOM	**VOLTAGE** {VRM, VYM, VBM, VPM, VRA, VYA, VBA, VPA} **CURRENT** {IRM, IYM, IBM, IPM, IRA, IYA, IBA, IPA} MW, MVAR, F, DF/DT	- CB OF EACH MODULE MSR, MSC	
10	Phase Shifter	**VOLTAGE** {VRM, VYM, VBM, VPM, VRA, VYA, VBA, VPA} **CURRENT** {IRM, IYM, IBM, IPM, IRA, IYA, IBA, IPA} HV & LV MW / MVAR F, DF/DT	- CB	

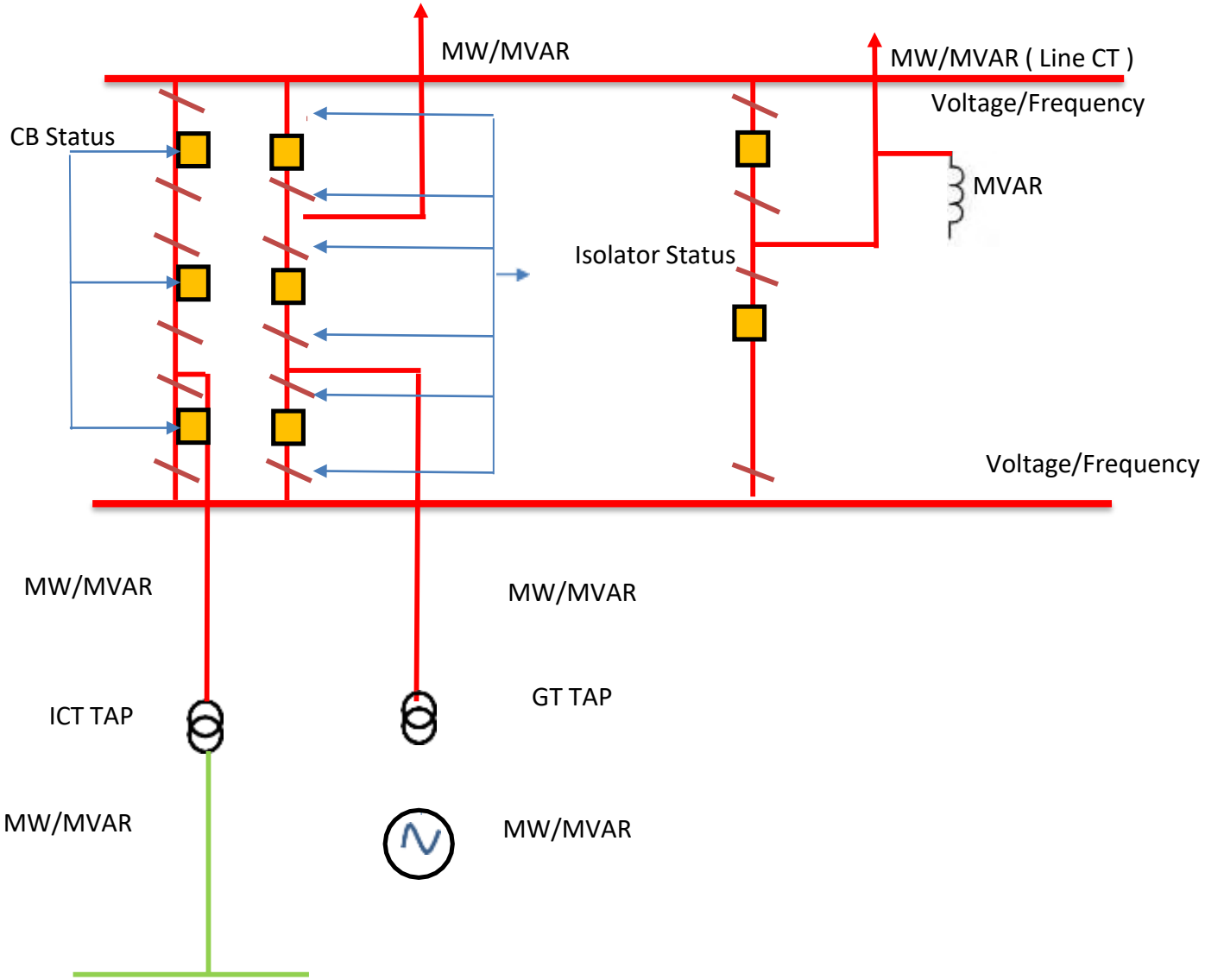
ANNEXURE-II

The layout diagrams showing point of interface for real time telemetry

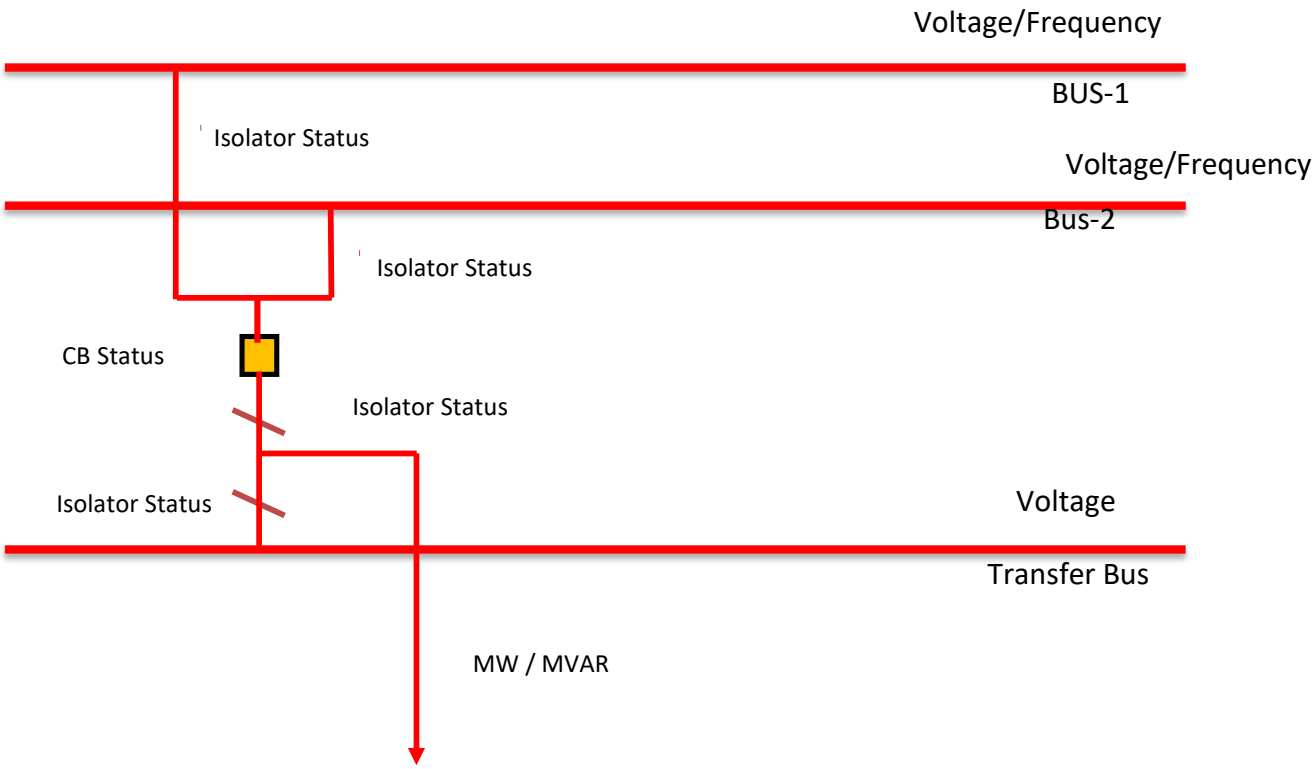
A. TYPICAL BAYS DIAGRAM: *STATCOM*



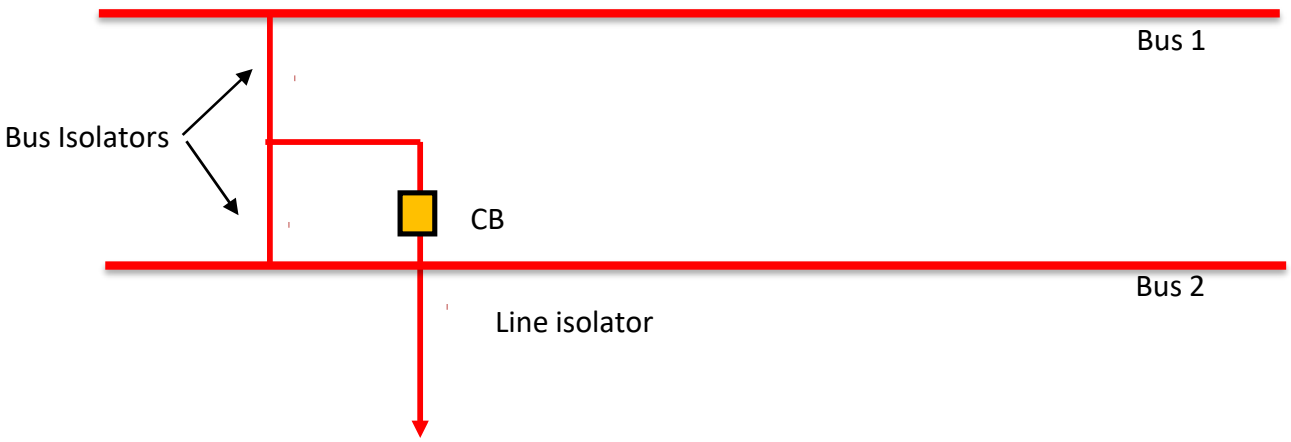
B. TYPICAL BAYS: *One and a half breaker Scheme*



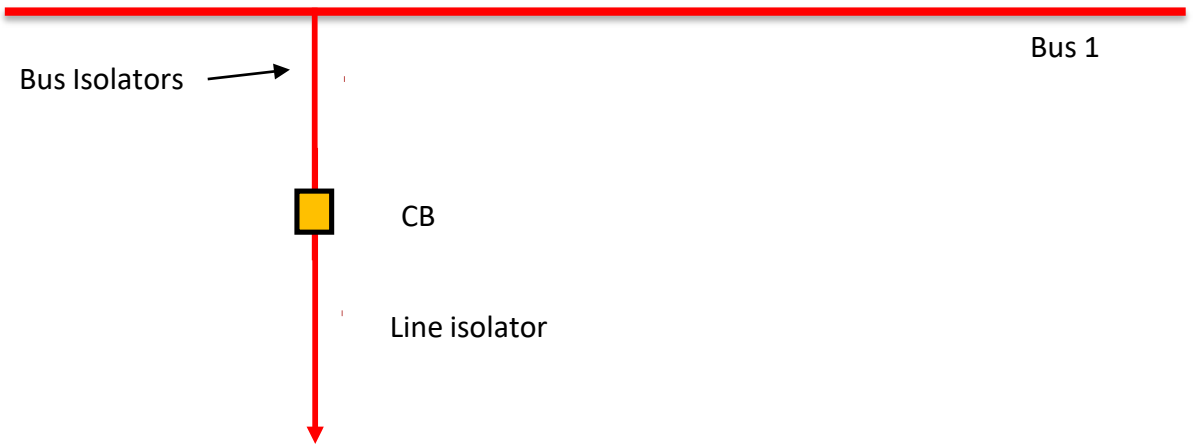
C. TYPICAL BAYS: *Double Bus and Transfer Scheme*



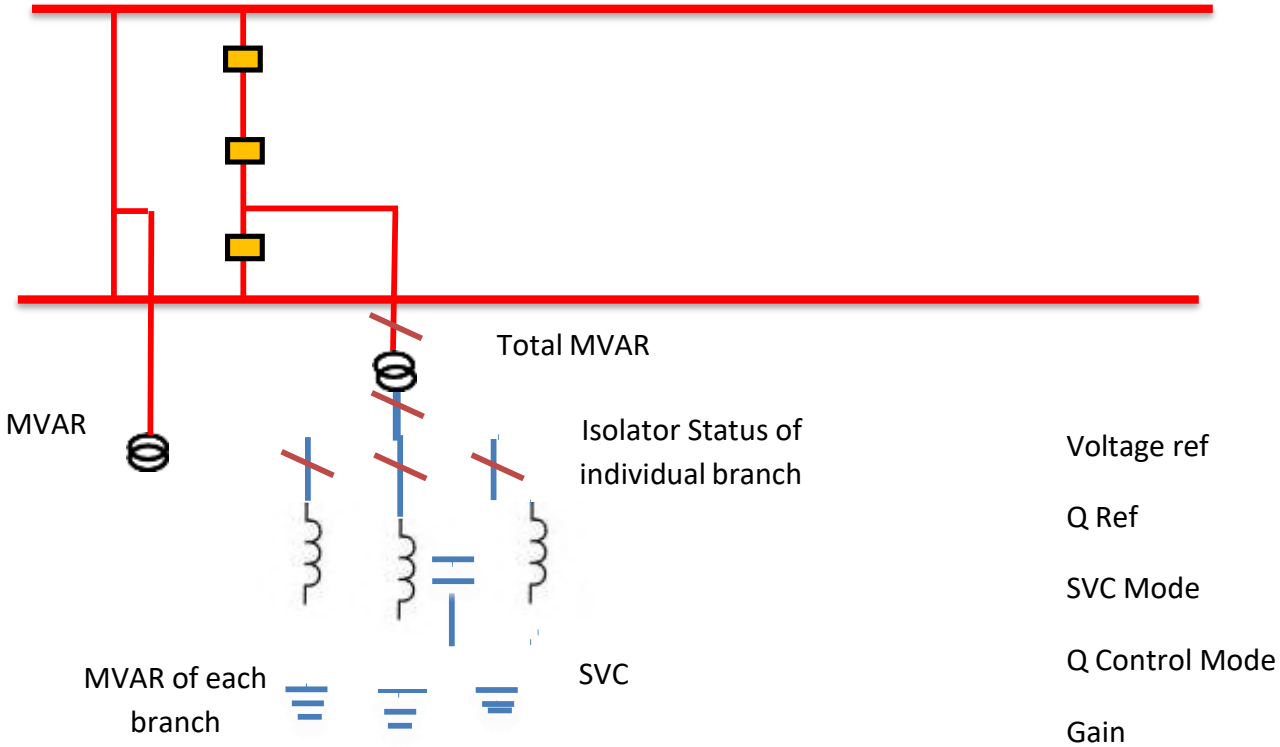
D. TYPICAL BAYS: DOUBLE BUS SCHEME



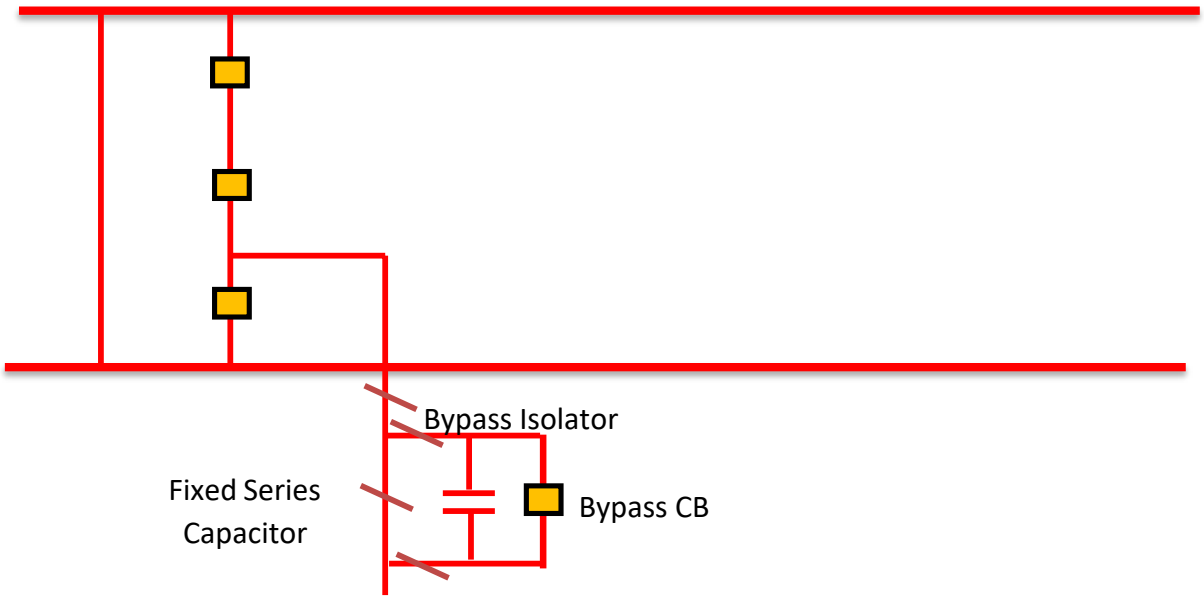
E. TYPICAL BAYS: SINGLE BUS SCHEME



F. STATIC VAR COMPENSATOR/BUS REACTORS

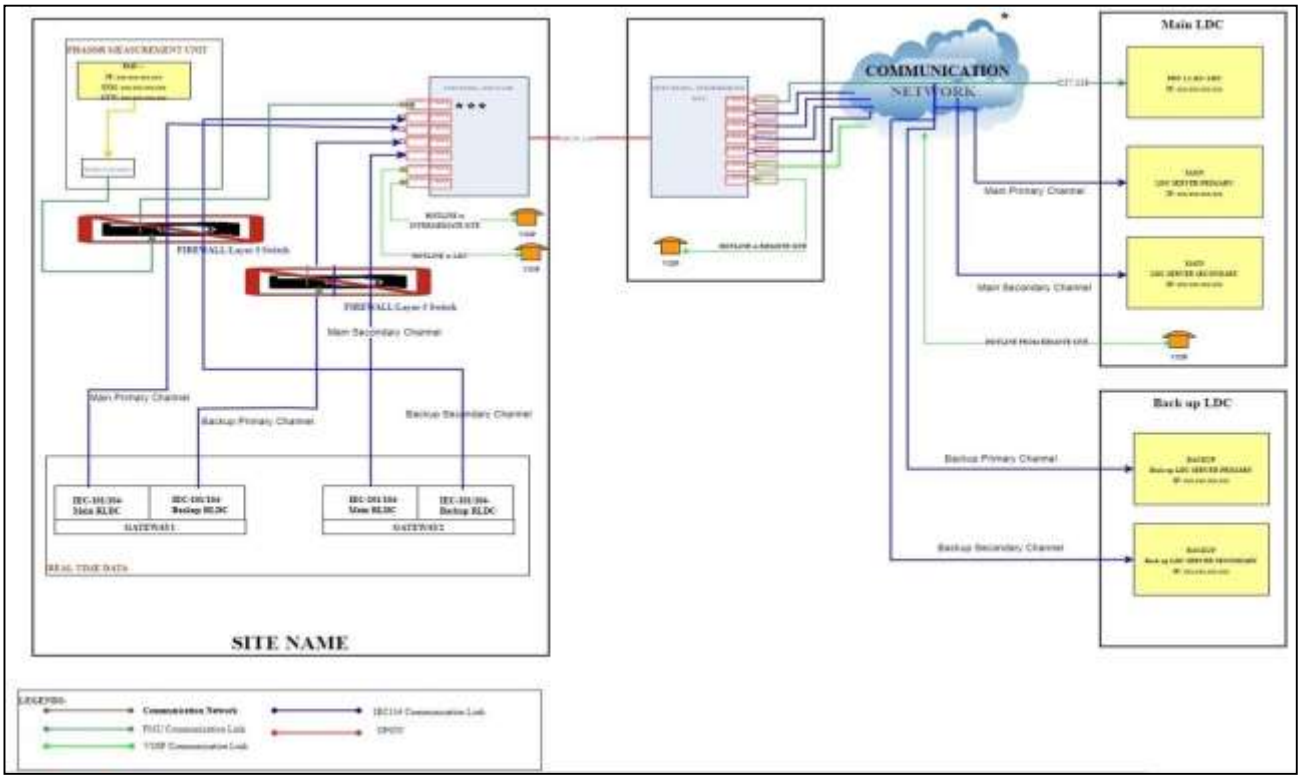


G. Fixed Series Capacitor



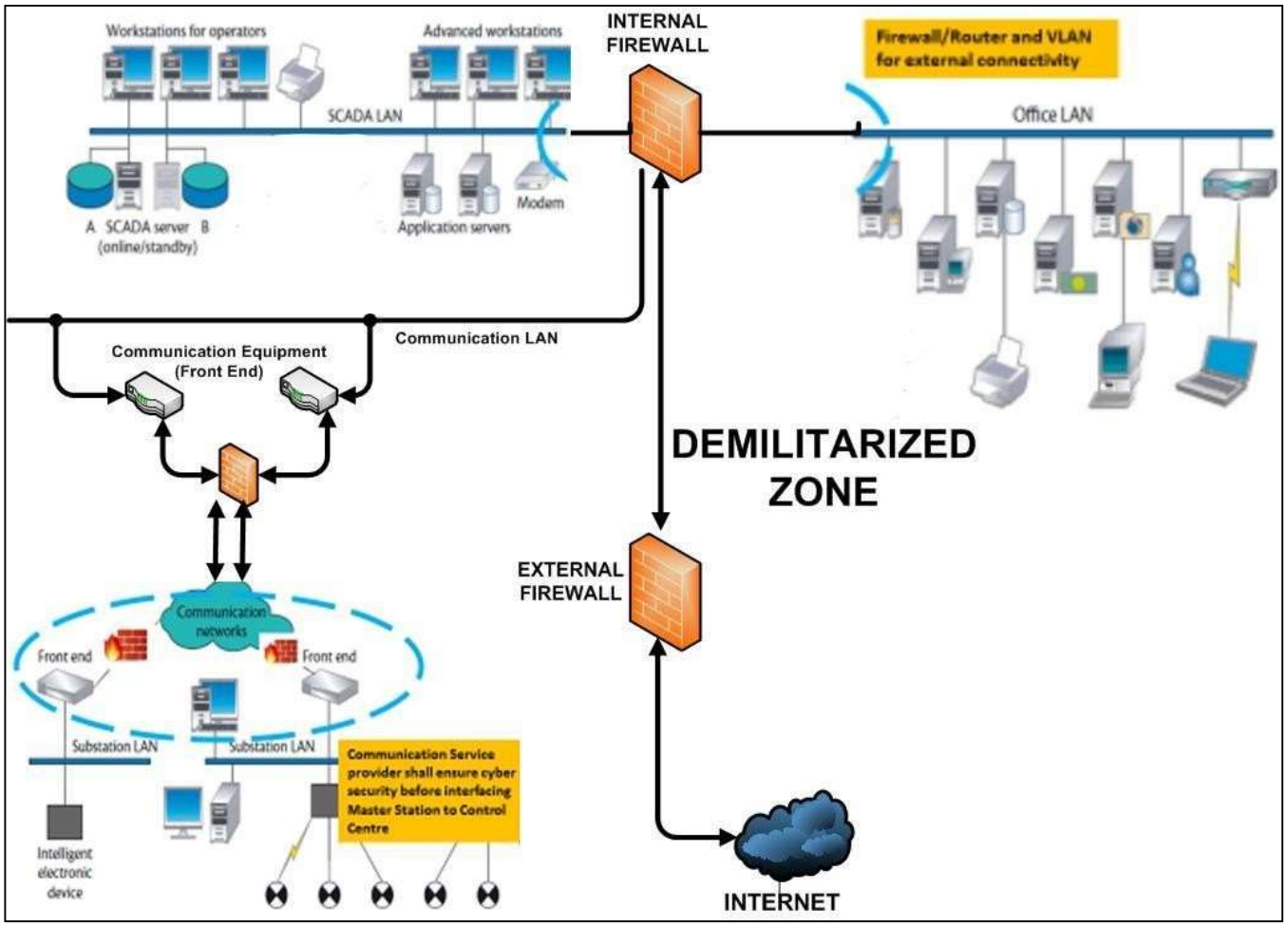
ANNEXURE-III

Typical Remote Station General Arrangement Diagram having IEC-101/104 RTU



ANNEXURE-IV

Typical Diagram showing Cyber Security Measures in Data Transfer



CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

No.- L-1/210/2016/CERC

CORAM:

Shri Jishnu Barua, Chairperson
Shri I. S. Jha, Member
Shri Arun Goyal, Member
Shri P. K. Singh, Member

Date of Order: 19th January, 2024

In the matter of:

Approval of Procedure on "Centralized supervision for quick fault detection and restoration" under the Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017.

Order

The Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017 (hereinafter referred to as the 'Communication Regulations') were published on 29.05.2017 in the Gazette of India Extraordinary (Part-III, Section-4, No. 218).

2. Regulation 7.2 of the Communication Regulations requires CTU to prepare a Procedure on "Centralized supervision for quick fault detection and restoration" in consultation with the stakeholders and submit the same for approval of the Commission.

3. Accordingly, CTU, vide its letters dated 1.9.2017, 28.10.2021 and 18.5.2023, submitted the Procedure on "Centralized supervision for quick fault detection and restoration" after stakeholder consultation for approval of the Commission.

4. The Commission has examined the Procedure submitted by CTU, and after incorporating suitable changes, the Commission hereby approves the Procedure on “Centralized supervision for quick fault detection and restoration”, which is enclosed as an Annexure to this Order.

Sd/-	**Sd/-**	**Sd/-**	**Sd/-**
(P. K. Singh)	**(Arun Goyal)**	**(I. S. Jha)**	**(Jishnu Barua)**
Member	**Member**	**Member**	**Chairperson**

Annexure

PROCEDURE ON CENTRALIZED SUPERVISION FOR QUICK FAULT DETECTION AND RESTORATION OF COMMUNICATION SYSTEM

Prepared in Compliance

To

Central Electricity Regulatory Commission

(Communication System for inter-State transmission of electricity) Regulations, 2017

January, 2024

Abbreviation

ASON	Automatically Switched Optical Network
CMC	Centralized Management Console
DCPS	DC Power Supply
DER	Daily Exception Report
EMS	Element Monitoring System
FSP	Forecasting Service Provider
MPLS	Multi-Protocol Label Switching
NE	Network Element
NMT	Network Monitoring Team
OTN	Optical Transport Network
PDH	Plesiochronous Digital Hierarchy
PIU	Power Interface Unit
PTN	Packet Transport Network
RCA	Root Cause Analysis
SDH	Synchronous Digital Hierarchy
CNMS	Centralized Network Management System
VSAT	Very Small Aperture Terminal

1. Background

This Procedure is issued in compliance to the Regulation 7.2 of the Central Electricity Regulatory Commission (Communication System for inter-State Transmission of electricity) Regulations, 2017 (hereinafter referred to as "the Communication Regulations").

2. Objective

2.1 To lay down Procedure on "Centralized supervision for quick fault detection and restoration" and coordinated operation amongst the concerned users of the interconnected communication systems.

3. Applicability

3.1 This Procedure shall be applicable to the following:

(i) The Communication System Infrastructure of Inter-State transmission system and Intra-State transmission system, till appropriate regulation on Communication is framed by the respective State Electricity Regulatory Commission, being used for communication purpose for Power System Operation at National, Regional, Inter-State & Intra-State level.

(ii) All Users as defined under Regulation 2(i)(aa) of the Communication Regulations (such as Generating Company including Captive Generating Plants, RE Generator, ISTS & Intra-State Transmission Licensee, Distribution Licensee, Bulk consumer whose electrical system is connected to the ISTS or the Intra-State Transmission system), SLDCs, RLDCs, NLDC, CTU, STUs, RPCs, REMCs, FSP and Power Exchanges shall abide by the principles and procedure as applicable to them in accordance with this Procedure.

4. Communication System

The definition of the communication system shall be as per the Communication Regulations.

In order to implement this Procedure, the Communication System has been categorized as following:

(i) Communication System of Inter-State Transmission System.

(ii) Communication System of Intra-State Transmission System.

(iii) Communication System of Cross Border Interconnections.

5. State of The Art System for Centralized Supervision & Monitoring System (CSMS):

In line with the Communication Regulations, for Centralized Supervision for Quick Fault Detection and Restoration, a Centralized Network Management System (CNMS) consisting of necessary Hardware and Software, shall be implemented on National and Regional level by CTU. The CNMS shall be integrated with the existing network management system (NMS) of other users in power system and standalone network elements, which are not being monitored on network management system within its jurisdiction on national and regional basis.

All Users/Owners shall provide necessary support to interface their network management system or network element with CNMS to fully comply the functionalities as mentioned below (in para 5.1) in accordance with the CEA (Technical Standards for Communication System in Power System Operations) Regulations 2020 (hereinafter referred to as "CEA Technical Standards for Communication System").

5.1 Broad Features of the Centralized Supervision and Monitoring System (CSMS):

5.1.1 The CSMS shall provide centralized supervision and monitoring of the communication networks in accordance with the CEA Technical Standards for Communication System.

5.1.2 The CSMS shall be in main and back-up control centre architecture with centralised database and twenty-four hours operations & maintenance on all days.

5.1.3 The Network Management System shall have displays for audio-visual alarm generation and logging facility to facilitate the operator for quick fault detection.

5.1.4 The NMS shall facilitate access to the communication equipment for configuration and fault restoration as well as to facilitate monitoring the performance and alarms of

the communication system element.

5.1.5 The CSMS shall have capability of integration with technologies in line with the CEA Technical Standards for Communication System. The communication equipment installed shall be interoperable, so as to allow seamless integration between different vendors.

5.1.6 The NMS shall have features to store necessary information and facility to generate report on communication system availability of major equipments as well as the data channels on daily /weekly /monthly /annual basis, as applicable.

5.1.7 For very small aperture terminal communication, network management system (NMS) shall have facility of maintaining link availability status along with signal strength of the nodes.

5.1.8 For very small aperture terminal communication, redundant configuration shall be enabled in network management system

5.2 Cyber Security

5.2.1 The Communication infrastructure shall be planned and designed to address the network security needs as per Grid Code Regulations, CEA Technical Standards for Communication System, CEA (Cyber Security in Power Sector) Guidelines 2021 and any such regulations issued from time to time, by an appropriate authority.

5.2.2 NLDC, shall monitor case of cyber security incidences and discuss them at RPC level and take necessary action as deemed fit.

5.2.3 RPC shall ensure that third party cyber security audits shall be conducted periodically (period to be decided at RPC) and appropriate measures shall be implemented to comply with the findings of the audits. The audits shall be conducted by CERT-In certified third-party auditors.

5.2.4 All users and control centres connected to the communication system shall have robust programs in place to adequately and continuously manage cyber security risks that could have adversely impact power system communications infrastructure in compliance to the CEA Technical Standards for Communication System. The cyber security program shall address the following, namely:

(a) compliance with provisions of the Information Technology Act, 2000 (21 of 2000) and National Cyber Security Policy, 2013 as amended from time to time;

(b) implementation of the National Critical Information Infrastructure Protection Centre (NCIIPC) Guidelines;

(c) implementation of guidelines and advisories issued by Computer Emergency Response Team (CERT India) and applicable Sectoral Computer Emergency Response Team (CERT); and

(d) compliance to the Central Electricity Authority (Cyber Security) Regulations, as and when they come into force.

5.3 Till the time, the CSMS system is not in place, the functions for Centralized Supervision including for quick fault detection and restoration shall be carried out as per the existing Procedure enclosed as **Appendix-I** and all the users/ owners shall facilitate CTU/STU to coordinate for the same with all requisite details on periodic manner as brought out in this procedure, as applicable.

6. Process for Implementation of Centralized Supervision and Monitoring System of Communication System:

6.1 CTU and STU shall be the nodal agency for implementation of Centralized Supervision and Monitoring System of communication system for Inter-State transmission system and Intra -State transmission system respectively.

6.2 Network Management System shall be implemented in compliance with the CEA Technical Standards for Communication System.

6.3 Control Centre shall have Centralized Supervision and Monitoring System by integrating its network management system with Network Management System of other users/ owners and standalone network elements, which are not being monitored on network management system within its jurisdiction on national and regional basis.

6.4 Users/ owners shall provide all necessary support to interface their network

management system or network element with Centralized Supervision and Monitoring System.

6.5 Centralized Supervision and Monitoring System shall be in main and back-up control centre architecture with centralized database and twenty-four hours operations & maintenance on all days.

6.6 The Users/ Owners of communication system (ISTS and Intra State)shall cooperate in exchanging information, holding review meetings during integration (as and when required), joint testing and commissioning of their communication system with Centralized Supervision and Monitoring System including Cyber Security Protection, with nodal agencies.

7. Procedure for Resource Deployment by Communication System User/Owner:

7.1 The user/owner shall be responsible for the Operation and Maintenance (O&M) of their respective Communication system and to maintain the availability of the communication system as per the Communication Regulations.

7.2 Operation and Maintenance (O&M) Personnel shall be deployed by user/owner for Operation, Monitoring and Quick Fault Restoration of communication system or any other assistance as may be required for maintaining a seamless network with desired availability. Such O&M Personnel shall be skilled/ trained in maintenance of the communication system Equipment / Optical Fibre, DCPS, Battery & PIU (Power Interface Unit) and NMS. Crew provisioning for physical restoration of FOTE & FODP etc. shall be done by the owner/ user. They should be equipped with necessary test equipment, vehicle, tool kits, laptop, mobile phones etc.

7.3 Specialized training shall be provided to the persons manning the centralized monitoring centre and to the field support staff as well as O&M Personnel deployed for maintenance of the communication system in accordance with the CEA Technical Standards for Communication.

8. Procedure for Centralized Supervision, Monitoring and Fault Reporting of Communication System

8.1 CTU shall deploy a Network Monitoring Team (NMT) at Main & Backup control centres for centralized supervision and monitoring of the communication network and shall coordinate with ISTS communication system Owner, Users, RLDC, SLDCs etc. for quick fault detection and restoration.

8.2 NLDC, RLDC & SLDC in coordination with NMT of CTU shall integrate & supervise the communication systems of ISTS, ISGS, IPP, STU, etc. for monitoring, supervision & control of Power System and adequate data availability in real time. Further RLDCs shall collect and furnish data related to communication system of various users, ISTS, ISGS, IPP, STU, SLDC, RLDC to RPCs for certifying availability of ISTS Communication System on monthly basis. RLDCs & SLDCs shall provide operational feedback to CTU & STU on quarterly basis or as applicable.

8.3 NMT of CTU shall monitor the communication network and logs of fault/ event reporting as raised by the Communication System Owner/ Users and Nodal Agencies in the following manner:

i) Through raised trouble tickets in Centralized Network Management System

ii) Lodged complaint through web portal.

iii) System generated alarms (including standalone NEs)

iv) Through any other communication media (mail,phone etc)

8.4 Whenever any fault/abnormality is observed in the communication system by the Network Management System, it shall automatically notify to the concerned user/ owner for rectification of faults/trouble tickets within agreed time frames, which will subsequently be taken up with maintenance personnel of the concerned faulty communication system at site to take corrective action(s) for rectification of faults/trouble tickets within agreed time frames.

8.5 NMT of CTU shall inform communication system owner/ user in case of critical

alarms/ faults as per escalation matrix provided as **Annexure-I**.

8.6 NLDC, RLDC, SLDC and REMC in case of outage of telemetered data, or communication failure shall register an event through Centralized Management System, the respective owner/user shall be alarmed so that the owner /user shall ensure healthiness of its communication system. In case, outage pertains to fault in communication system of other owner, the owner/ user shall either lodge complaints through Centralized Management System or add response regarding healthiness of its network in the already raised ticket/ event rather than raising a new ticket, as applicable.

9. Procedure for Fault Restoration of Communication System

Restoration activities of the communication system are to be carried out by the owner/ user, as and when, any system related problem is reported primarily by Communication system user/ owner (and reported by NMT of CTU in different scenario), to facilitate rectification of fault and quick restoration. This shall include fault detection, repair or replacement of defective parts, restoration of services and final functional checking by the User/ Owner.

The Communication system owner/user shall identify Nodal officer (s) for their respective area/ system. Nodal officer shall be single point coordinator, responsible for co-ordination with NMT of CTU. Details of Nodal Officer (name, designation, company name, address, contact details email, mobile no. etc.) shall be provided to CTU.

9.1 Following actions shall be taken by Communication System Owner/User after receiving the fault alarm/reporting:

1. Acknowledge faults/ alarms and prioritize them for immediate correctiveactions.
2. Take corrective action by remote diagnostics & troubleshooting through their respective NMS, wherever possible.
3. Inform maintenance Personnel for detection/ attending the faults for rectification and restoration of the fault ensuring inventory availability.
4. Maintenance Personnel shall update status of maintenance/restoration work to the concerned nodal officer of communication system user/ Owner.

5. The nodal officer shall communicate NMT of CTU through Centralized Network Management System for closing the Trouble Ticket / reported fault event and details of the fault restored.
6. For fault restoration, nodal officer may also co-ordinate with NMT of CTU/ other communication owner in respect of spare inventory availability if required, for an integrated/ unified approach.

The communication network is designed with redundancy and automatic take-over of available redundant paths. However, in case the fault restoration is prolonged, the communication owner shall explore the possibility for route diversion/ re-configuration on the existing communication network in close co-ordination with NMT of CTU and concerned nodal officer. No separate charges shall be paid for such route diversion or channel re-allocation. However, such rerouting shall be discontinued once the original channel is restored.

10. Roles & Responsibilities of Communication System Owner/User and CTU

10.1 Communication System Owner/ User Responsibilities:

1. Communication System Owner/ User shall follow the Communication Regulations and Standards as well as follow the guidelines issued by CEA, CTU and NLDC.

2. Users/ owners shall take necessary action for operation and maintenance of their respective interfaces and ensure their communication system availability in line with the Communication Regulations and the CEA Technical Standards for Communication System.

3. Ensure and maintain proper environment for operation of the equipment by providing power supply, Proper Earthing system and dust & rodent free environment with air-conditioned applicable to electronic system and server computers (with proper surge and short circuit protection).

4. Raise trouble ticket/ complaint to Network Monitoring Team (NMT) of CTU for unavailability of Services/ Bandwidth through Centralized Network Management

System in case fault is not located in its communication network or user/owner shall add response in the already raised ticket/ registered complaint regarding healthiness of their respective networks.

5. Provide access to the faulty site/equipment to the designated power system users as the need may be.

6. Associate & Co-ordinate with maintenance Personnel for rectification of the problem.

7. Update Network Monitoring Team (NMT) of CTU for availability of Services/Bandwidth after fault rectification through Centralized Supervision System with all fault rectification details needed for Root Cause Analysis.

8. Communication user/owner shall update status information of alarm/trouble ticket/ fault reported and maintenance work under progress in Centralized Network Management System, record all faults in the fault record sheet and summary of action taken for fault rectifications and share the detailed report as and when required by NMT of CTU.

9. Communication System Owner/ User shall provide inputs to the CTU/ STU in the prescribed formats enclosed as **Annexure-II** with this Procedure.

10.2 Responsibilities of CTU:

CTU through NMT shall discharge all functions in co-ordination with ISTS Owners/ Users, IPPs, ISGS, RLDCs, SLDCs as per followings, for Supervising & Monitoring of the communication system:

1. Supervise and coordinate for Network discovery where route diversion/ re-configuration is needed, the communication system owner/ user shall explore the possibility for route diversion on the existing facility in close co-ordination with other concerned owner(s) in case the fault restoration is prolonged. However, such rerouting shall be discontinued once the original channel is restored.

2. Supervise for Troubleshooting on a network element and its interfaces (eg. where more than one communication system owners/ users network terminates) as and when required and in coordination with Communication system owner/ user, based on the diagnostics on interfaces to locate problems in network elements.

3. Informing the communication system owner for maintenance team deployment for critical cases.

4. Supervise and coordinate for the End-to-end Communication Channel verification with the communication system owner/ user upon receipt of information regarding outage of telemetered data or communication failure (in case end to end communication channel involves multiple owner/user), the respective user shall initiate testing/checking of the communication channel in co-ordination with NLDC/RLDC/SLDC/REMCs as per the procedure in line with the diagnostic features available in the SCADA system. This is to identify the fault whether the failure is due to faulty communication channel or problem with the end equipment.

Illustration:

In case outage pertains to fault in communication system, the users shall examine their NMS for trouble shooting of the failure. If fault pertains to communication system of other user/ owner, the user/ owner shall lodge fresh complaints or shall add response regarding healthiness of its own network in the already raised ticket/ complaint and would alert the other communication system owner(s) for quick fault restoration. In case fault does not pertain to communication system, the NMT of CTU in coordination with user(s) shall take up with the relevant stakeholder/utility.

5. CTU through NMT shall view end to end network or system of the affected section in Centralized Supervision System and supervise & monitor the same for quick restoration of the communication system.

6. CTU through NMT shall escalate the critical alarms/ events etc. as per agreed escalation matrix in case of critical scenario involving more than one

communication system owner/ user. Typical Escalation Matrix shall be submitted by Communication System Owner/ Users in the specified format enclosed as **Annexure-I**.

7. CTU through NMT shall undertake the routine maintenance activities of Centralized NMS and create data backup of the Centralized NMS on daily basis.

8. CTU through NMT shall prepare and publish the report (as given below) on its website;

	Activity	**Frequency**
1	Communication Network operations (Daily Exception Report etc) / Fault status	Daily
2	Communication Network utilization reports	Quarterly
3	MIS report	Monthly
4	Analytics/Predictive Report	Quarterly
5	Availability Report	Monthly

11. Revision of Procedure

11.1 As and when required, this Procedure shall be reviewed and revised by CTU with the approval of the Commission.

Annexure-I

Typical Escalation Matrix

Technical Support Desk Owner/User Name:

Email:

TELEPHONE:

Complaint /Trouble Ticket send email: abc@xyz.com

Escalation Level	Personnel Detail	Remarks
Level A	**XEN/ Alternate Executive ABC** Office: Contact:Email:	To open trouble ticket send email to: abc@xyz.com
Level B	**SE Xxxxxxxx**Office: Contact: Email:	
Level C	**CE Xxxxxxxx**Office: Contact: Email:	
Level D	**Director/MDXxxxxxxx** Office: Contact: Email:	

Escalation Procedure

The escalation level shall be guided based on the severity level (I, II, III, IV) and specified timeline with respect to initial call as specified in the prevailing AMC contract.

Annexure-II

Table-I: Data to be furnished by ISTS Users

Sl. No.	Data/ Information to be submitted	Periodicity of Data submission	Submitted by Entity (as applicable from para 10.1)
1	System Availability Report ● Downtime Report of Link ● Downtime Report of Communication System Components	Monthly (7th day of each billing month)	Communication System Owner/ User
2	Channel Availability Report ● Downtime Report of Link ● Downtime Report of Communication System Components	Monthly (7th day of each billing month)	Communication System Owner/ User
3	Bandwidth Utilization Report vis-å-vis Services	Monthly (7th dayof each billing month)	Communication Syste mOwner/ User
4	Non-Reporting/ Intermittency ofDATA	Monthly (7th dayof each billing month)	NLDC/ RLDC/ SLDC
5	Cyber Security Incident	(within 24 hrs/ asper Cyber Security Guidelines of CEA)	Communication System Owner/ User/REMC/ SLDC/RLDC/ NLDC
6	New Element (Communication System Component) Integration/ Replacement Report/ New Service Provisioning	Monthly (7th day of each month) & within 24 hrs	Communication System Owner/ User/NLDC/RLDC/SLDC/ RE MCs

7	Maintenance Compliance Report	Quarterly	Communication System Owner/ User
8	Performance Audit Report	Annually	Communication System Owner/ User
9	Cyber Security Audit Report	Annually (As per CEA approved guidelines)	Communication System Owner/ User

Formats for DATA Input by ISTS User/OwnerISTS Communication System

Communication System Owner/ User/ Company Name:

System Availability Report **Format-1A**

Sl. No.	Link Name	Link Id	Date Downtime	Date Uptime	Total down Hrs.	Remarks
1						
2						
3						

Link Downtime Report **Format-1B**

Sl. No.	Link Name	Link Id	Date Downtime	Date & Uptime	Total down Hrs.	Remarks
1						
2						
3						

Communication System Component Downtime Report **Format-1C**

No.	Communication System Component Name	Communication System Component Id	Date & Downtime	Date & Uptime	Total down	Remarks
1						
2						
3						

Channel Availability Report **Format-2A**

No.	User (Stn) Node Name	User (Stn/ Control Centre) Node Name	Date Downtime	Date Uptime	Total down Hrs.	Remarks
1						
2						
3						

Channel vs. Link Availability Report **Format-2B**

No.	Channel Id	Details of links				
		Link Name	Date Downtime	Date Uptime	Total down Hrs.	Remarks
1						
2						
3						

Cyber Security Incident Report **Format-3**

Sl. No.	Cyber Security Incident detail	Component Id where Cyber Security breach happened	Time of Security Breach/ Isolation of system	Time of correction/ take back of Comm. System	Total downtime Hrs.
1					
2					
3					

Maintenance Compliance Report **Format-4**

Sl. No.	Communication System Component Name	Component Id	Date of Maintenance	Details of Maintenance Performed	Remark
1					
2					
3					

Designed and Approved Service vs Bandwidth Utilization report **Format-5**

	Services	Application			Bandwidth Utilization	Remark
			From	To		
1	Ethernet	RTU Data			10 Mbps	
		PMU Data			40 Mbps	
		Meter Data				
2	VLAN	ICCP data			100 Mbps	
		PDC to PDC Data				
		Video Conferencing				
3	P to P	PDC to PDC Data				
4	El	Protection Links				
		RTU Data				

Existing Procedure for Supervision & Fault Restoration of ISTS Communication System

(Manual entry of event/fault & It's restoration time- noted down from NMSsystem- into Log Book/ Register entry at Regional/ State level)

At present, different makes of communication equipment are deployed in various regions. These communication equipments are based on standard SDH technology, however the Network Monitoring System (NMS) software (hosted on a PC with limited feature & computational efficiency) of these equipment is proprietary and is different for different OEMs. Accordingly, we have multiple NMSs, each NMS corresponding to a set of communication equipment of specific make. In general, the NMS provided by all OEMs have five functional areas of network management mentioned as under:

1. **Fault Management**: Fault management is the process to identify and fix any errors in the system. There is provision of many alarms that can be distinguished based on faults. Alarms can be classified as Critical, Major & Minor. When any event / fault happens, alarm flashes and is acknowledged and the timing is noted in the register/ log book and subsequently NMT team is informed over phone/message, subsequently they go to site, restores the fault and then informs the up time, same is also shown in NMS system, and that restoration time is noted in log book/ register again. Thus report for link downtime summation & calculations for that particular NMS & its managed nodes/ NEs/ FOTE are calculated.
2. **Configuration Management:** This is the process to monitor and maintain devices and network configurations. NMT (Network Monitoring Team) can create new channels as per requirement. Addition of New NE (Network Equipment), deletion of NE can be done with NMS.
3. **Performance Management:** In this process various data channel (E1, Ethernet, 64 Kbps) performance is measured with defined parameters.
4. **Security Management:** A user can access NMS only if he/she is having user id & password. Administrator has privilege to give certain permissions to any users.
5. **Accounting Management:** Administrator can create multiples user accounts based on requirement. Administrator has privilege to add/delete accounts.

The multiple NMSs in various regions are monitored by placing all the NMSs in a region at one place, which is generally at RLDC. The region wise NMSs (typically)details are as under:

Region	Sl. No.	NMS Make	Model
NR	1	Fujitsu (SDH)	SUN Altra 60
	2	Nokia (PDH)	Netviewer Version 10.1 EP2
	3	Fibrehome (SDH, PDH & DACS)	OTNM 2000-V2.0R5
	4	TEJAS (SDH)	TJ5100 version 4.4, TJ5100 version 7.5
	5	Valiant (PDH)	VCL-MX version 5.7,

			VCL-MX version 6
	6	ECI (SDH, PDH)	EMS-APT version 4.0.20
	7	FIBCOM (SDH)	FIBCOM 6300NM
	8	ABB (SDH)	FOX515H FOXVIEW
ER	1	Coriant (SDH)	Coriant 14.1 12.45.0
	2	Loop (PDH)	Loop Version: V2.08.00.07
	3	ECI (SDH) s	EMS-APT version 4.0.20
	4	FIBCOM (SDH)	FIBCOM 6300NM
SR	1	Tejas (SDH)	TJ1500 Ver 6.1
	2	Valiant(PDH)	VCL-MX version 5.7
WR	1	Tejas (SDH)	TJ1500 Ver 6.1
	2	Valiant(PDH)	VCL-MX version 5.7
	3	ECI (SDH)	EMS-APT version 4.0.20
		FIBCOM (SDH	FIBCOM 6300NM
	4	Loop (PDH)	Loop Version: V2.08.00.07
NER	1	ECI (SDH & PDH)	EMS-APT Version 4.0.20
	2	FIBCOM (SDH)	FIBCOM 6300NM 3.6.08
	3	Valiant (PDH)	VCL MX Version 6
	4	Siemens (SDH)	ENMS V4.50.014
	5	ABB (PDH)	UCST-FOX 515
	6	Loop (PDH)	Loop Version: V2.08.00.07
	7	TEJAS (SDH)	TJ1500 Ver 6.1

From the above table it is evident that there are multiple make NMSs , in Northern, Eastern, Southern, Western, and North Eastern regions respectively. Event/ Faults timing are manually noted from NMS systems and are written down in register/ Log book for report/log generation and this is being followed as present practice for calculating Link/ Channel downtime, communication system availability & its performance. These log books / Registers are maintained by the vendor/ owners at Regional/ State Level Control Centers (typically at RLDCs/ SLDCs) where multiple NMSs are hosted.

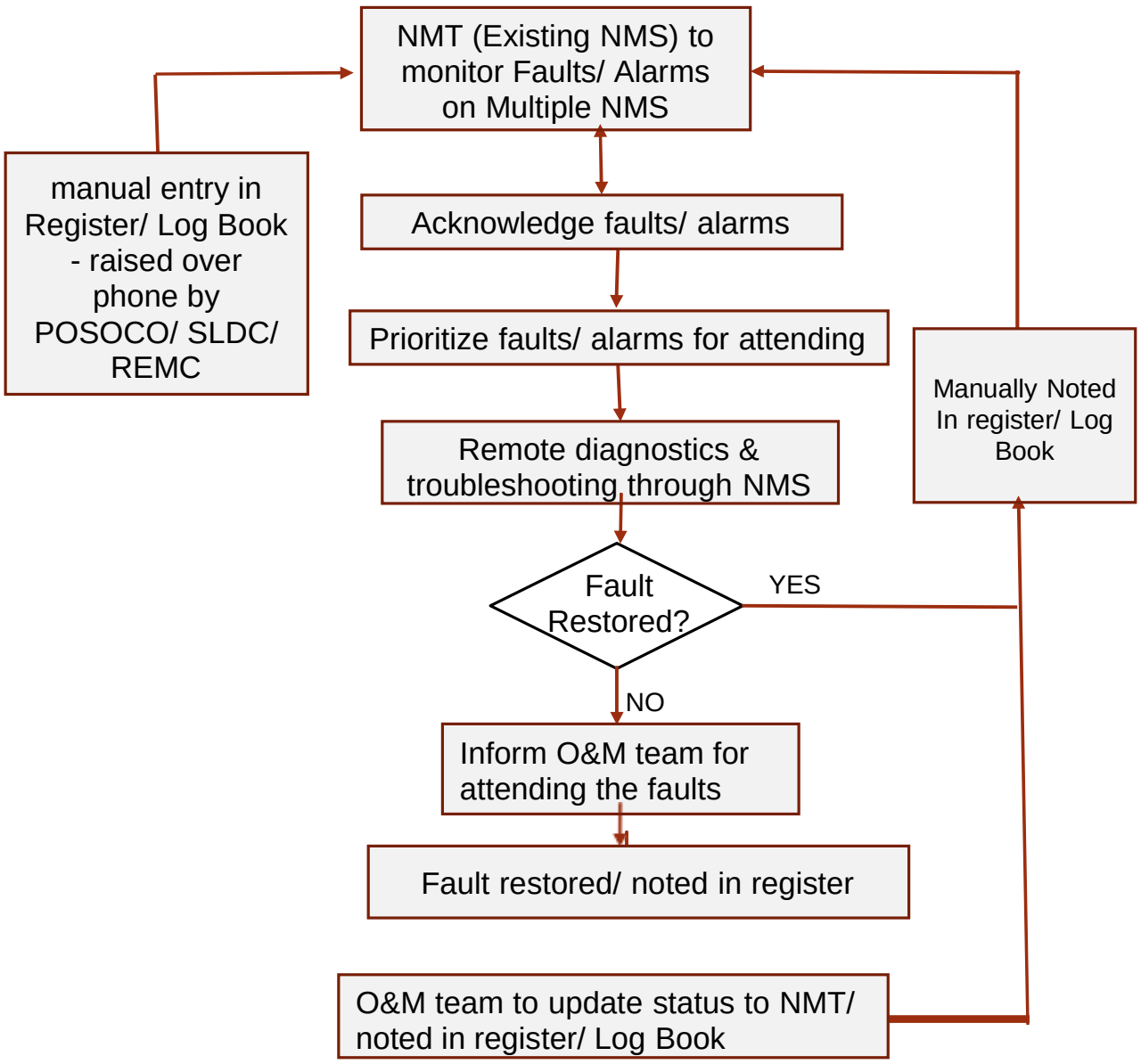
These NMSs for ISTS systems are centrally located at the respective RLDC/Regional Headquarter of POWERGRID and are being monitored by POWERGRID/ OEM teams called as Network Monitoring Team (NMT). These teams are monitoring their respective NMSs at the central location physically during office hours only.

On occurrence of a fault depicted on NMS, the NMT teams first try to diagnose and troubleshoot the fault remotely through NMS. In case the fault is still persistent, then NMT calls their maintenance team deployed in the field to attend and rectify the fault. Once the fault is rectified, the alarm or flag at the NMS is reset and the NMT confirms their maintenance team.

Besides above, there are communication equipment which are of different make other than the available NMSs in the region and are not being captured by the NMS. Faults occurring at such equipment nodes are being attended locally by maintenance

team with the help of local craft terminal (LCT). The LCTs are connected with the communication equipment and the fault is diagnosed and resolved with the help of proprietary software.

Flow chart of Existing Procedure for Supervision & Fault Restoration



CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

No.- L-1/210/2016/CERC

CORAM:

Shri Jishnu Barua, Chairperson
Shri I. S. Jha, Member
Shri Arun Goyal, Member
Shri P. K. Singh, Member

Date of Order: 19th January, 2024

In the matter of:

Approval of Procedure on "Procedure on Maintenance and testing of Communication System" under the Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017.

Order

The Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017 (hereinafter referred to as the 'Communication Regulations') were published on 29.05.2017 in the Gazette of India Extraordinary (Part-III, Section-4, No. 218).

2. Regulation 9 of the Communication Regulations requires CTU to prepare a Procedure on "Maintenance and testing of Communication System" in consultation with the stakeholders and submit the same for approval of the Commission.

3. Accordingly, CTU, vide its letters dated 1.9.2017, 28.10.2021 and 18.5.2023, submitted the Procedure on "Maintenance and testing of Communication System" after stakeholder consultation for approval of the Commission.

4. The Commission has examined the Procedure submitted by CTU, and after incorporating suitable changes, the Commission hereby approves the Procedure on “Maintenance and testing of Communication System” which is enclosed as an Annexure to this Order.

Sd/-	**Sd/-**	**Sd/-**	**Sd/-**
(P. K. Singh)	**(Arun Goyal)**	**(I. S. Jha)**	**(Jishnu Barua)**
Member	**Member**	**Member**	**Chairperson**

Annexure

PROCEDURE FOR

MAINTENANCE AND TESTING

OF

COMMUNICATION SYSTEM

Prepared in Compliance

To

Central Electricity Regulatory Commission

(Communication System for inter-State transmission of electricity)

Regulations, 2017

January, 2024

ABBREVIATIONS

ADSS	All Dielectric Self Supporting
BLVD.	Battery Low Voltage Disconnect
BER	Bit Error Ratio
DCPS	DC Power Supply
DCN	Data Communication Network
DDF	Digital Distribution Frame
DCDB	DC Distribution Board
FODP	Fibre Optic Distribution Panel
GI	Galvanized Iron
HDPE	High Density Poly Ethylene
IPMS	Integrated Power Management System
LLVD	Load Low Voltage Disconnect
MDF	Main Distribution Frame
MSDS	Material Safety Data Sheet
NMS	Network Management System
OPGW	Optical Power Ground Wire
OTDR	Optical Time Domain Reflectometer
OEM	Original Equipment Manufacturer
PPE	Personal Protective Equipment
POP	Point of Presence
PVC	Polyvinyl chloride
PDH	Plesiochronous Digital Hierarchy
SDH	Synchronous Digital Hierarchy
TMN	Telecommunication Management Network
UG FO	Under Ground Fibre Optic
CNMS	Centralized Network Management System
VSAT	Very Small Aperture Terminal

1. Introduction

The Communication System Infrastructure of Inter-State transmission system and Intra-State transmission system being used for communication purpose for Power System Operation at National, Regional, Inter-State & Intra State level needs to be tested and maintained. Owner/ User of this Communication system shall carry out maintenance of their system for twenty-four hours on continuous basis to ensure reliability and availability of their respective system.

The Procedure for Maintenance & Testing of Communication System is being issued in compliance to the Regulation 9 of the Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017 (hereinafter referred to as “the Communication Regulations”).

2. Applicability

2.1 This Procedure shall be applicable to the following:

(i) The Communication System Infrastructure of Inter-State transmission system and Intra-State transmission system, till appropriate regulation on Communication is framed by the respective State Electricity Regulatory Commission, being used for communication purpose for Power System Operation at National, Regional, Inter-State & Intra State level.

(ii) All Users as defined under Regulation 2(i)(aa) of the Communication Regulations 2017 (such as generating company including captive generating plants, RE generator, Transmission Licensee, Distribution Licensee, Bulk consumer whose electrical system is connected to the ISTS or Intra-State Transmission system, SLDCs, RLDCs, NLDC, CTUIL, STUs, RPCs, REMC, FSP and Power Exchanges shall abide by the principles and procedure as applicable to them in accordance with this procedure.

2.2. Till the time the Centralized Supervision System is not in place, the present maintenance and practices shall be carried out as per the existing Procedure enclosed as Appendix-I and all the users/ owners shall facilitate CTU/STU to

coordinate for the same with all requisite details on periodic manner as brought out in this procedure, as applicable.

3. Components/ Sub System of Communication System

This document contains elaborate maintenance and testing procedure of following components / Sub system of communication system.

a) Communication Media

- OPGW
- UG FO
- ADSS
- Associated hardware fittings
- Others (VSAT, leased line)

b) Communication Equipment with Cabling

- SDH
- PDH
- e Cabling
- Network Management System
- VSAT IDU/ODU

c) Auxiliary Power Supply

- DCPS
- Battery Bank
- Sub Station Power Supply

d) Associated Auxiliary Infrastructure

- Repeater Shelter
- Air Conditioner
- DG Set

4. Responsibility & Resources for Maintenance & Testing

All ISTS communication System Owners/ Users, ISTS, ISGS, IPPs, RLDCs, SLDCs shall coordinate with NMTs (Network Monitoring Teams for CNMS) deployed by CTU for maintenance & testing activity for updating the CNMS as applicable. NMT of CTU shall discharge all functions in coordination with ISTS

Owners/ Users, IPPs, ISGS, RLDCs, SLDCs for Maintenance & Testing of the communication system.

The Centralized Supervision and Monitoring System (CSMS) shall be in main and back-up control centre architecture at Regional and National level with centralized database and twenty-four hours operations & maintenance on all days.

4.1 Owner/ User's Responsibility:

4.1.1 Communication system owner/user shall identify Nodal officer (s) who shall be responsible for maintenance of the communication system in their respective area/ system. The Nodal officer shall be single point coordinator, responsible for maintenance of communication system and co-ordination with national/ regional NMT team of CTU. Details of Nodal Officer (name, designation, company name, address, contact details email, mobile no.) to be given to NMT team of CTU.

Nodal officer shall be responsible and initiate advance action for following to ensure timely commencement of maintenance activity as per guidelines/ periodicity brought out in this procedure:

1) Coordinate and allocate maintenance team for maintenance activity.
2) Shutdown/Permit to Work/Right of Work (ROW) and Security Pass for access to site location for maintenance work.
3) Timely issue of Tools and Plant (T&P), spares and test equipment's to maintenance team.
4) Entire coordination right from the time of reporting of fault till restoration shall be done by nodal officer and escalate the same, as per escalation matrix mentioned at **Annexure-I**, if required.
5) Coordinate and allocate maintenance team in case of planned expansion (e.g. LILO of line), upgradation at rated voltage level, reconductoring of line, alteration or relocation when informed by concerned line incharge/substation in-charge of utility.
6) Ensuring availability of Safety Procedure to maintenance team in Hindi/English/Local (Regional) Language.

7) Ensure adequately trained operator/ engineer placed at Repeater/ Point of Presence (POP)/ Sub Station should be deployed for day-to-day operation and maintenance work of Communication System.

4.2 Resources for Maintenance & Testing:

The maintenance shall be part of AMC contract placed for all components/ subsystem of users/owner's communication system in order to meet the availability guidelines mentioned in the document. Nodal officer and maintenance team shall coordinate for working out detailed plan for maintenance and to assess the requirement & procurement of resources such as spares, T&P, Test Equipment, Transportation, mobile sets or other electronic communication devices etc. Based on the assessment during Preventive, Predictive and Breakdown Maintenance, mobilization of maintenance teams shall be coordinated by Nodal Officer along with required resources.

The resources for maintenance and testing are classified into three main categories:

1) Maintenance Team
2) T&P, Spares and Test Equipment
3) Documents to be available with Maintenance Team

1) Maintenance Team

- Availability of trained Maintenance Team for OPGW/ UG FO/ ADSS cables stringing/laying, splicing, DCPS, Battery Bank, DG Set, AC, Repeater Shelter and Network elements along with associated auxiliaries. The maintenance teams should be deployed in shifts & can be placed at central locations considering the geographical spread of the communication network so as to mobilize the team at the fault location for faster restoration for communication to meet the availability requirement as per CERC Communication Regulations and round the clock maintenance requirement as per CEA Technical Standards.

- Maintenance Team shall comprise skilled personnel having technical background and trained in maintenance and testing of the users' communication system. The teams should be supported with transportation/

logistics arrangement and equipped with necessary test equipment, tool kits, personal safety tools, Rapid restoration kit & live line installation tools, laptop, mobile phones. Periodic training to be provided to maintenance team to keep abreast of technological advancement.

- Skilled/ Trained Personal should have minimum 15 days on the site/ field training or experienced professionals from the related field.

2) T&P, Spares Inventory and Test Equipment

- Availability of Tools and Plant (T&P), spares and test equipment and its locations, to be identified for various links to cater to maintenance requirement. The T&P, spares and test equipment should be kept at multiple locations within the owner's area so as to mobilize them at the fault location quickly for faster restoration. (Typical list of T&P and Test Equipment attached at **Annexure-II**)

3) Documents to be available with maintenance team (while carrying out maintenance/ testing activity).

- Details of transmission lines having UG/OH OFC in the area of concerned.
- Typical format for Communication Link details is attached as **Annexure-III**.
- Design Documents of OPGW used in lines including special OPGW design considered for longer span, Approved Tower Schedule of Lines.
- Mandatory spares/ quantity of UG/OH OFC available.
- Drum Schedule of OPGW laid and as built drawing of UG OFC.
- Maintenance register comprising various milestones i.e. Date of commissioning, routine (i.e. Preventive & Predictive) maintenance done, Breakdown maintenance done, if any, and consumption of mandatory spares etcwith regular updates of the same.
- Relevant Design Documents/ Manuals for communication equipment and associated auxiliaries for maintenance and testing.

5. Maintenance and Testing Activity

5.1. Maintenance & Testing of Communication Media

5.1.1 OPGW

The most important thing that must be taken care for OPGW is the fibre and other link losses that may be kept within the limits of design document as per International Standards IEC 60793, 60794, ITU G.652.

In case of OPGW, first of all, the attenuation of fibresis checked followed by implementing preventive measures so as to protect the cable from bending or sagging due to the wind or other environmental factors. Fibre loss can also occur due to the excess tightening of the clamps and the mis-alignment of the hardware accessories which need to be checked.

Secondly, there are possibilities of occurrence of loose kinks on the clamped ends resulting into bending (macro/micro) of the fibres inside the cable. Loose kinks may occur due to extra tension applied for tightening of the earthing clamps to the OPGW or an impulse occurring due to some external force on the cable. Loose kinks may be identified using an Optical Time Domain Reflectometer (OTDR); the exact location of the kinks can also be located from the loss versus distance curve that is generated by the OTDR. Loose kinks may be repaired by tightening clamp / straightening the portion of the cable where the kink has occurred.

Thirdly, the sag of the OPGW cable should be maintained as per the sag tension specifications. Deviations of tension from the specified value might change the alignment of the OPGW and there may be possibilities of OPGW being affected by extreme wind conditions.

The down lead clamping of the OPGW at the splicing locations are to be checked regularly in order to assure the proper routing of the cable. Improper attachments of the down lead clamps might result in bending or kinks in the cable.

The deformation of the surface of OPGW shall be monitored closely during maintenance and in case found damaged, the OPGW in the span shall be spliced/ replaced (as applicable) by the Owner.

5.1.2 Approach Cable

In case of approach cable, the fibre and other link losses have to be kept within the limits of design document.

Regular inspection shall be carried out to check clamping inside the trench. and cable raceways specially during the monsoon season. Similarly, the GI (Galvanized Iron) pipes and the HDPE (High Density Poly Ethylene) pipes through which the approach cable is taken shall be checked regularly for any deformities or damages. The cable should also be checked regularly for rodent attacks.

5.1.3 ADSS

All-dielectric self-supporting (ADSS) cable is a type of optical fibre cable that is strong enough to support itself between structures without using conductive metal elements. It is used by utilities as a communication medium, installed along existing overhead transmission lines and sharing the similar type of support structures as the electrical conductors.

The fibre and other link losses and associated preventive and maintenance activities in terms of ADSS shall be similar to OPGW mentioned under clause 5.1.1 of this procedure.

5.1.4 UG OFC

Underground Optic Fibre Cable (UG OFC) is suitably placed into ducts (PLB HDPE/ PVC/ HUME pipes), which is being laid below the ground surface. In underground installation, the conduit provides protection from both physical and environmental abuse. The conduit protects cable from shifting rocks, aggressive rodents, and/ or damage from hand shovels. There may be breakage/ attenuation in the OFC, due to problems like temperature variation, Fire/ Rodent cuts/ water seepage/ re-digging etc.

UG OFC is prone to cut due to digging done by multiple service providers/ utilities. Accordingly, maintenance team of the communication system owner

shall be equipped with requisite T&P (enclosed as **Annexure-II**) and spares to attend the UG OFC cut on daily basis.

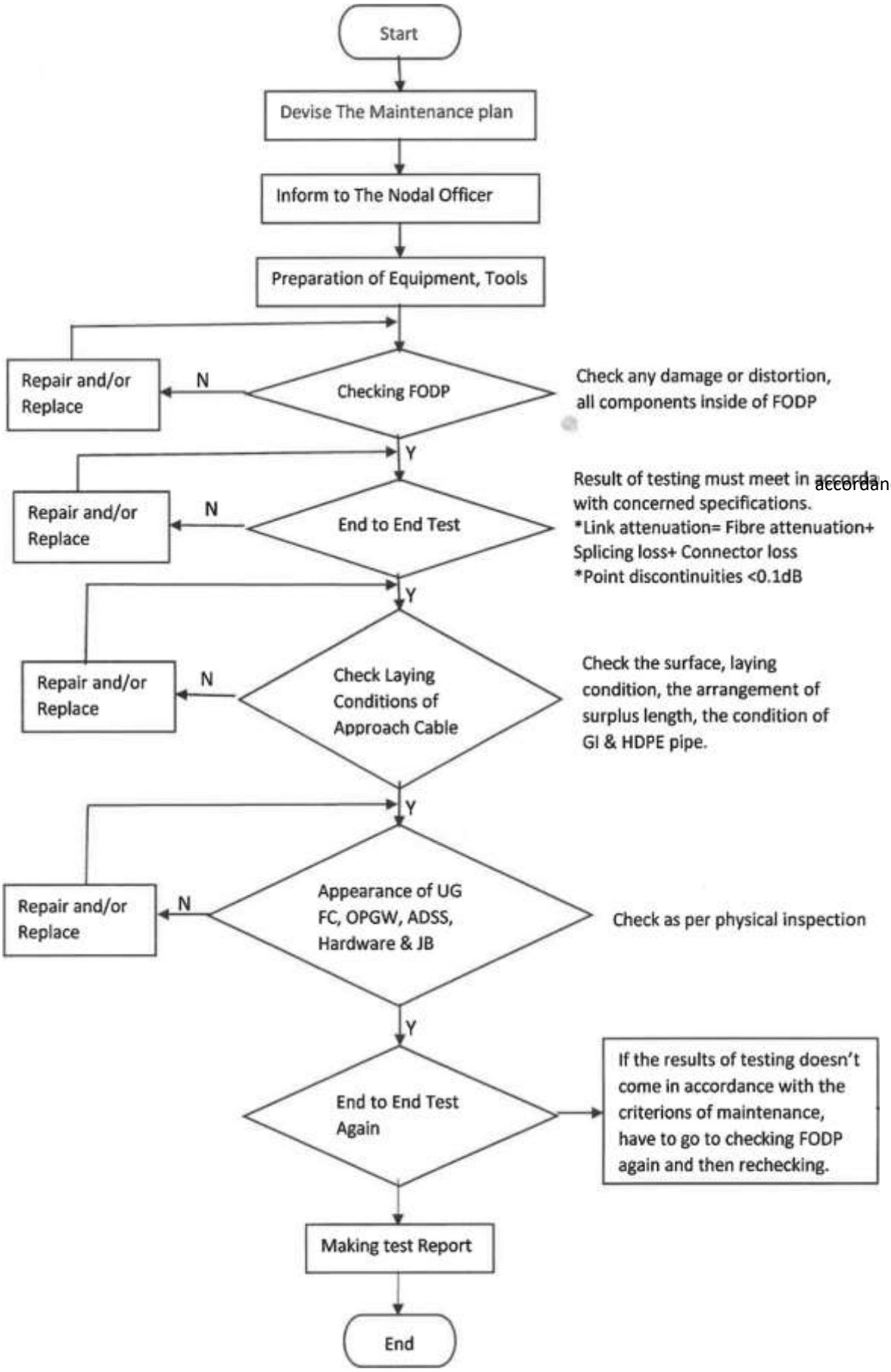
UG OFC laid in cable trenches may be cut by rodents, armoured or unarmoured cable with suitable protection (GI pipe) in addition to ducts (PLB HDPE/ PVC/ HUME pipes), may be used, to ensure protections against rodent cuts.

Water seepage in joint boxes may result in increased fibre attenuation. Cable entry points in joint boxes/ FODP shall be sealed properly to avoid water leakage/ rodent/ insect entry.

Garbage stored/ weeds growth in cable trenches may cause fire to damage UG OFC. So UG OFC route shall be checked for garbage collection/ weeds growth on regular basis. GI/ RCC clamps shall be checked for proper fitting at Nala/ River crossing. Missing/ improper clamps may result in UG OFC cable bending causing increased fibre attenuation.

Typical Flow chart for performing maintenance activity on individual links is as a

5.



ails of Communication Media may be noted in the following format during maintenance.

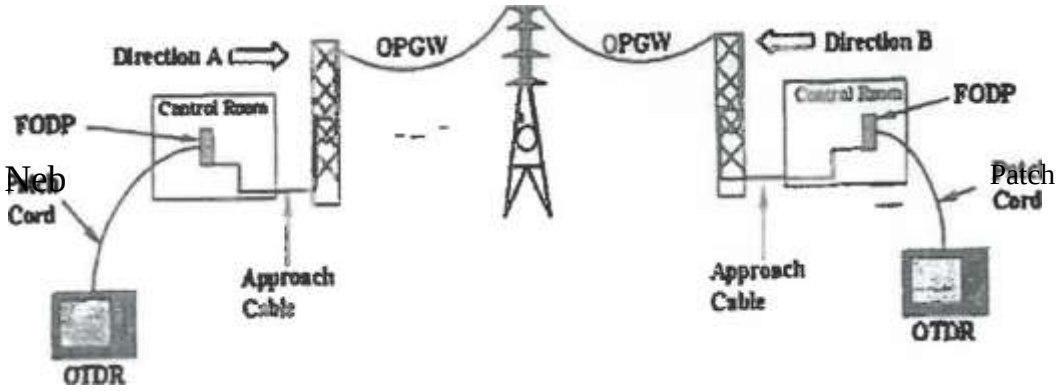
s. No	Details of Owner	Link Detail A to B	Location of Maintenance (A/ B)	OPGW/ ADSS/ UGOFC/ Approach Cable Type (24/48 F)/ Dia	No of Live Fibers	Year of Commissioning	Under AMC (Y/N)	Contact Details of AMC Agency/ Person	Date of last Maint e nance	Maintenance done as procedure (Y/N)	Date of maintenance	Remarks
1												
2												
3												

Prepared by: Approved by:

The maintenance periodicity of the communication media may be carried out as under:

Maintenance Activity	Items	Checking Period	Remarks
Physical Inspection	● OPGW ● UG FO ● ADSS ● Approach Cable ● Associated Hardware & Fittings ● Splicing Enclosure ● FODP	Half Yearly	each link
	● Surroundings Condition	Quarterly	
Measurement of optical properties of spare/dark fibers	1. Transmission Loss by power meter & laser source (1310 nm & 1550nm) 2. Splicing Loss by OTDR (1310nm & 1550nm) 3. Discontinuities of Optical Fibers (1310 nm & 1550nm)	Half Yearly	each link

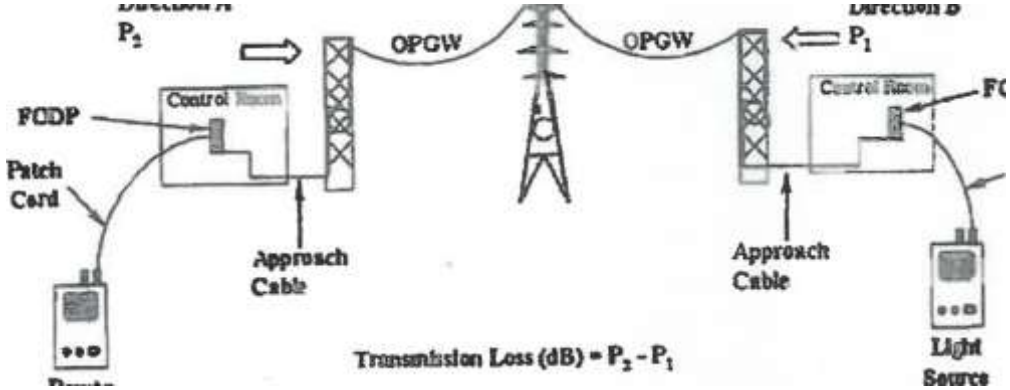
5.1.6. Test Set Up for Measurement of optical properties of spare/dark fibres. The path attenuation shall be measured at both ends of link by OTDR & Power meter and the average value of these two measurements shall be calculated.



Measurement using OTDR

Loss A-B=….. dB

Loss B-A=.. ... dB



Measurement using Power Meter

5.1.6.1 The path attenuation shall be less than the calculated value as below:

- Max Attenuation @ 1550nm: 0.21dB/km+0.05dB/splice+0.5dB/connector
- Max Attenuation @ 1310 nm: 0.35dB/km+0.05dB/splice+0.5dB/connector

5.1.6.2 There shall be no point discontinuities in excess of 0.1 dB

5.1.7. Preventive/ Predictive Maintenance:

Preventive maintenance is to be done to prevent the system from unnecessary hazards and to ensure smooth functioning of the system. Maintenance schedule may be prepared specially for preventive maintenance for entire UG/OH OFC network considering resources identified.

There are three major components of Preventive Maintenance of communication media:

a) Patrolling
b) Maintenance based on inputs from patrolling team
c) Scheduled maintenance

- **Patrolling**: The Maintenance team shall deploy patrollers for patrolling the entire route length of UG/OH OFC. Transmission Line patrolling staff can also take care of OPGW aspects while patrolling the transmission line. Transmission line engineer concerned shall inform Communication Nodal officer about upcoming Transmission line (having OPGW) maintenance outage.
  The patrolling team shall report all issues on route to the concerned Nodal Officer.

The physical inspection (associated with necessary photographs/ GPS details) carried out by the patrolling team shall include the following activities as mentioned in the table below:

Patrolling Items	**Periodicity**	**Method**	**Observation**
Clamp	Half Yearly	Visual inspection with binocular	• If there is any remarkable bent in OPGW • If OPGW is vibrating • If the rust gathered on bolts. • If there is any unusual abrasion

Jumper			on the moving part of hanging clamp. ● How is the status of OPGW in regard to corrosion ● If OPGW secures the allowable bending radius ● Measurement of tightening torque with a torque wrench for all clamp bolt
Cleats & downlead clamps Inserting region of fibre optic joint box	Half Yearly	Same as above	● If all downlead clamps are in position ● If OPGW is hanging away from tower. ● If OPGW is slipping at clamp portion
Span region	Half Yearly	Same as above	● If there is any strand broken in OPGW surface ● If sag of OPGW is normal ● If OPGW is vibrating ● If all dampers and twist prevention weights are in position ● If there are arc marks on the OPGW surface ● How is the state of corrosion on the OPGW surface

Fiber Optic Joint Box	Half Yearly	Visual inspection of external appearance using binocular Internal Visual inspection whenever the Joint Box is opened.	● If there is any bolt look loose or missing. ● If rust or corrosion is observable. ● Any abnormality in the arrangement of housing tray and optical fibre installation into it. ● If moisture penetration or dew condensation is observable

FODP	Half Yearly	Visual inspection	● Appearance: check any damages or distortions ● Check the conditions of pig tails and connectors ● Check presence of any hole/space for rodent entry
Approach Cable UG OFC ADSS	Half Yearly	Visual inspection with binocular	● Appearance: check the surface of approach cable/ ADSS cable. ● Check laying conditions between terminal tower at switch yard and FODP at control room. ● Check the arrangement of surplus length of approach cable. ● Check the conditions of installed GI and HDPE pipe/ duct. ● Check the presence of garbage/ foreign materials/ weeds on the route. ● Check the presence of space/ hole for entry of rodent or any damage caused by rodents.
			● Check the sheath of the ADSS cable for any damage due to tracking problem.
Environments for OH and UG Optical Cables	Quarterly	Visual inspection with the naked eye /binocular	● On the ROW and surrounding areas, check the excavation work and construction works under progress for any abnormality. ● Check the growth of vegetation in surroundings. ● Garbage collection/ weeds growth in cable trenches and manholes.

- **Maintenance based on inputs from Patrolling team**:

Patrolling Item	Observation	Action to be taken
Clamp & Damper	● If there is any remarkable bent in OPGW ● If OPGW is vibrating ● If all dampers and twist prevention weights are in position ● If the rust gathered on bolts, etc. ● If there is any unusual	Replacement and tightening of Clamps/ jumper/ damper and other associated fittings.

Jumper	abrasion on the moving part of hanging clamp. ● How is the status of OPGW in regard to corrosion ● If OPGW secures the allowable bending radius, Measurement of tightening torque with a torque wrench for all clam bolt	
Cleats & downlead clamps	● If all downlead clamps are in position ● If OPGW is hanging away from tower. ● If OPGW is slipping at clamp portion	● Replacement and tightening of Downlead clamps. ● Extra Downlead clamps may be placed.
Span region	If a sag of OPGW is deviated from design value.	Tightening of clamps on both sides to maintain the requisite sag.
	● If there is any strand broken in OPGW ● If there are arc marks on the OPGW ● How is the state of corrosion on the OPGW	Respective span/ section of OPGW may be replaced

Patrolling Item	**Observation**	**Action to be taken**
fibre Optic Joint Box	● If moisture penetration or dew condensation is observable ● If rust or corrosion is observable	Replace the joint box in case of moisture penetration and corrosion.
	● Any abnormality in the arrangement of housing tray and optical fibre installation into it	Splice tray/ Joint Box to be replaced and splicing to be done.
	If there is any bolt looks loose or missing	Loose bolts/clamp to be tightened and missing bolts should be replaced.
	Service Loop are opened/ loosened.	Service loops are to be properly clamped.
	Cable insertion point of joint box not sealed	Proper sealing of cable insertion point.

FODP	● Appearance: check any damages or distortions ● Check the conditions of pig tails and connectors. ● Check presence of any hole/space for rodent entry.	● Replace damaged tray/ rack of FODP. ● Replace the damaged pigtails & connectors. ● Proper sealing of any hole/ space to avoid rodent entry in FODP Panel.
Approach Cable/ UG OFC/ ADSS	● Appearance: check the surface of fiber optic cables for any damage or abnormality. ● Check the following laying conditions of FO cables: ○ the service loop conditions at tower and control room. ○ the conditions of installed GI and HDPE pipe/ duct. ○ the presence of garbage/ foreign materials/ weeds on the route. ○ the presence of space/ hole for entry of rodent or any damage caused by rodents.	● Replace the damaged section of the cable. ● Service loops are to be properly clamped. ● Replace/rectify damaged portion of GI/HDPE pipe. ● Cleaning/ removal of garbage/ foreign materials/ weeds. ● Proper sealing of any hole/ space to avoid rodent entry.
Environments	● On the ROW and surrounding areas, check the excavation work and construction works under progress for any abnormality. ● Check the growth of vegetation in surroundings ● Garbage collection/ weeds growth in cable trenches and manholes.	● Requisite measures to be taken in coordination with local authorities for safety/ route diversion of FO cable. ● Clearance of hindrance/ minimization of risk (removal of vegetation etc.) ● Coordinate with local authorities for clearance and accessibility to manholes

- **Scheduled Maintenance**: Following test shall be performed during Scheduled Maintenance

Maintenance Activity	Periodicity	Testing Observations	Action to be taken

Healthiness of Fibre Optic	Half Yearly	l. Transmission Loss by power meter & laser source(1310nm &1550nm) 2. Discontinuities of Optical Fibres by OTDR (1310 nm & 1550nm)	The results will be compared with previous data and standard data. In case of abnormalities, losses/ discontinuities shall be rectified by replacement of the respective section with healthy fibre optic cable.
		3. Fibre Attenuation/ Splicing Loss by OTDR (1310m & 1550mn)	Re-splicing of fibres at high loss points.

5.1.8 Breakdown Maintenance:

Breakdown maintenance includes the maintenance of the facilities, during the sudden failure of the communication system. On occurrence of any breakdown noted in NMS/CNMS, Nodal Officer/NMT through Nodal Officer of User/Owner shall instruct the maintenance team to take up steps mentioned as under:

- Visit the terminal station of affected link and test the fibre by OTDR to identify the exact location of the fault using Drum Schedule details/ ABD (As Built Drawing).
- Access the fault/damage location of UG/OH OFC.
- Carry out rectification work such as replacement of UG/OH OFC /splicing in Joint Box in minimum time.
- Temporarily lay OFC (Optical Fibre Cable) over temporary structure/tower/ground in the section for restoration of link, in case of fault in link/damage to UG/OH OFC requiring long restoration time viz in case of collapse of tower.
- Carry out testing of UG/OH OFC after rectification/re-stringing to ensure fibre loss within limit and UG/OH OFC ready to take back in service.
- Maintenance Team shall get the confirmation of link restoration from NMS and further CNMS.
- Submit the plan for permanent restoration of temporarily restored section and schedule the permanent restoration activity in consultation with Nodal Officer & NMT of CNMS centre.

5.1.9. Post restoration Activities

- Ensure removal of man and material so that system can be put back in service.
- Submit detailed report on maintenance work carried out including intimation of fault, response time and rectification time, rectification work carried out, consumption of spares, Splicing Test Reports, end-to-end test reports. Typical format for Functional test of OFC is attached as **Annexure-IV**.
- Update History Register incorporating maintenance works carried out by maintenance team.
- After completion of maintenance activity, Maintenance team shall intimate Nodal officer about the same who will coordinate for return of Shutdown/ Pennit to Work and restoration of system.

5.1.10. VSAT

A very-small-aperture terminal (VSAT) is a two-way satellite ground station with a dish antenna. It mainly consists of 3 parts:

1. Antenna
2. VSAT Outdoor Unit: The outdoor unit (ODU) consists of the following devices:
    - Low Noise Block (LNB) which is a down converter and receiver.
    - Block Up Converter (BUC) which is up converter and transmitter.
    - Ortho-Mode Transducer (OMT) which is Tx and Rx waveguide joint.
    - Microwave filters which protect the LNB from the Tx signals.
3. VSAT Indoor Unit: The indoor unit (IDU) usually consists of a single box (normally referred to as a Modem) which should be located in a dry, cool and clean place.

5.1.10.1 Preventive/ Predictive Maintenance Activities

This consists of necessary measures to maintain the VSAT in the proper operating condition and to keep the link functioning. Preventive maintenance includes antenna inspection, functional checking, cleaning and necessary repair/replacement/adjustments. It will be carried out half yearly.

SI No.	Description	Observation	Action To be taken
1	**Antenna**		
	Antenna Mechanical Part	● Check for Dust, Corrosion on the antenna surface, platform and feed cabinet.	● Clean the antenna outdoor platform and feed cabinet. ● Fill grease to each lubricating point when needed.
		● Check condition of greasing on mechanical parts at lubricating points. ● Check the surface of antenna for De-ice system. ● check the outdoor waveguide, various cable connecting and outside surface ● Check for the beacon light.	● Weatherproofing, surface without damage. ● Tighten the waveguide and cable connecting normally. ● Beacon light working normally

	Antenna Tracking and Servo System	● Check surface of each equipment and system. ● Tracking system and mechanical servo system checking. ● Different modes and function transition of ACU (Antenna Control Unit) checking.	● Surface of each equipment and system is dust free and works normally. ● Tracking system and mechanical servo system (Azimuth & Elevation Actuator Boot, gear box, motor) repair and replace. ● Perform Antenna Control Unit Troubleshooting. ● Replace or repair any other faulty parts.
	Antenna Electrical Part	● Check the various RF and AC Power cable connections. ● Check the earthing connections. ● Check Lightening protection system.	● Tighten the loose RF and AC Power cable connections and replace the damaged cables. ● Inform Nodal Officer if problem is in Earthing connections. ● Lightening protection system shall be corrected.
2	Outdoor Unit	● Check for Dust, Corrosion on the ODU surface. ● Check the RF and AC Power cable connections. ● Check the functioning of various electronics module.	● Clean the surface. ● Tighten the loose RF and AC Power cable connections. ● Replace/ repair the faulty module.
3	Indoor Unit	● Check for dust, corrosion on the IDU surface ● Check the cooling fans working. ● Check the cable connections. ● Check the functioning of various electronics module.	● Tighten the loose cable connections. ● Replace/ repair the faulty card/module.
4	Environment	Check the growth of vegetation in surroundings for block in LOS	Removal of vegetation for clearing LOS.

5.1.10.2 Breakdown Maintenance

Details of activities to be carried during Break Down Maintenance of VSAT:

- Repair and replacement of Faulty Module.
- Arranging & commissioning of spare VSAT unit for ensuring link connectivity, in case of fault in VSAT requires longer restoration time.
  Later same shall be replenished by the vendor.
- Analysis report of the fault.
- Plan for preventive measure to arrest recurrence of such faults.

5.2. Maintenance of Communication Equipment

The details of Communication Equipment shall be noted in the following format during maintenance.

No	Detail of Owner	Detail A-B, A-C, A-D	Location of Equipment	Type of Equipment (PDH/ SDH-STM1/ 4/ 16/ 64	Make of Equipment/ Serial No.	Year of Commissioning	Under AMC (Y/N)	Contact Details of AMC Agency/ Person	Date of last Maintenance	Maintenance done as per procedure Y/N	Date of maintenance	Remarks
1												
2												
3												

Preventative/Predictive maintenance shall be carried out half yearly at all the sites in the network.

5.2.1. Preventive/ Predictive Maintenance Activities

- Maintenance team shall be equipped with necessary test equipment like BER (Bit Error Rate) meter, SDH Analyzer, Ethernet Tester, Multi-meter, attenuators, optical jumpers or equivalent test equipment with composite functionalities.
- The planned site visits shall consist of necessary measures to maintain the equipment in proper operating conditions. This shall include visual inspection of the equipment, functional checking, cleaning and necessary repair/replacement/adjustments.

Work to be taken up during half yearly preventive maintenance site visits shall include but not limited to the following:

Sl.no.	Description	Observation	Action To be taken
1	Overall Infrastructure	Overall Infrastructure and environmental requirements (building/ air conditioners), AC/DC system, battery, cabling connectivity and earthing of communication equipment.	

1.1	**Equipment site**		
1.1.1	General conditions	General checking during half yearly /troubleshooting site visits and advise	
a	Dust Proofing	If equipment room is clean, dust free, rodent free.	Proper care shall be taken to make the room dust/ rodent free.
b	Earthing	Check for separate or combined earthing for communication and substation equipment.	Noting of earthing details. Nodal Officer may be informed regarding

		Checking earthing of communication equipment: ● In Kiosks in switchyard. ● In control room. Measurement of earth resistance. Check the equipment Earthing interconnection up to earthing start point. Checking connector cleaning	● any maintenance activity for the connection of equipment earthing. ● Earthing interconnection shall be corrected if it is the probable cause of fault during troubleshooting. Clean the Connector.
c	Air conditioning	General checking of installed AC in line with equipment operating condition (temp.) requirement	Ambient temperature of the equipment room to be noted and inform if AC is not working properly as per equipment operating conditions requirement or is not adequate.
d	Power Cable route	General checking of power cables routing up to the communication equipment.	Advice action if any fault found in power cables.
e	Communication cabling	Check terminations, patch cord, if necessary, based on probable cause of faults.	take corrective action if indoor cabling, patch cord is probable cause of fault.
1.2	EMI issues	Maintenance team shall study in special case of repeated faults if the probable cause is earthing interconnection at the station or possibility of spurious signals through various cable connections to the wideband equipment and advise.	The observations and analysis shall be brought into the notice of Nodal Officer for resolution of the problem.

1.3	Interfacing of MDF/ DDF with other equipment	Check interfacing with other equipment and take corrective actions on its MDFs/ DDFs if required as per cable routing diagram.	Routing/ tracing as per labelling of connected equipment upto MDF/ DDF and ensure proper connection with MDF/ DDF.
2	**Main Equipment**		
2.1	PDH MUX & Digital Cross Connect	Check: Physical Inspection of the equipment ● Cleaning ● Interconnections ● Sealing of cabinets	● Clean the equipment/ equipment filter ● Tighten the connectors ● Seal of cabinets to arrest entry of rodents etc.
		Functional testing of equipment	● Replace the faulty equipment/ module/ Fan module.
2.2	Fibre Optic terminal SDH	Check: Physical Inspection of the equipment • Cleaning • Interconnections • Sealing of cabinets Functional testing of equipment Perform Jitter & wander test on long distance links. Equipment Parameters like laser bias current measurement, equipment/unit temp measurement. .	● Clean the equipment/ equipment filter ● Tighten the connectors ● Seal of cabinets to arrest entry of rodents etc. ● Replace the faulty equipment/ module/ Fan module.
2.3	End user Equipment	Check functioning of all the end user equipment along with associated hardware e.g. IP gateway, Phone.	Replace/ maintenance of end user equipment and their connectivity.
2.4	GPS Clock	Check for the Fault/ signal strength ofGPS clock.	Replace the faulty hardware or adjust antenna.
2.5	**NMS of SDH**		

2.5.1	Computer hardware and Software	Check healthiness of the NMS system e.g. Functionality, data backup, storage. Check for the loading of latest patches/upgrades of the NMS software including security and configuration of the running system.	Replace/ upgrade the faulty hardware/ firmware. Ensure for compliance of the non-conformity, if any, regarding software patches/ upgrade. Data Backups to be ensured as per maintenance plan.
2.6	**NMS of PDH (D/l Mux& DACS)**		
2.6.1	Computer hardware and Software	Check healthiness of the NMS system eg. Functionality, data back up, storage. Check for the loading of latest patches/upgrades of the NMS software including security and configuration of the running system.	Replace/ upgrade the faulty hardware. Ensure for compliance of the non-conformity if any regarding software patches/ upgrade. Data Backups to be ensured as per maintenance plan.

SI. no.	Description	Observation	Action To be taken
2.6.2	Functional Checking	Verify that the configured channel should be in line with approved channel.	

5.2.2 Preventive/ Predictive maintenance of NMS

Communication System Owners have to install Network Management System (NMS) through their OEM for the centralized supervision of communication equipment installed at all ISTS nodes including different POP/Repeaters.

Preventive and predictive maintenance of NMS shall cover the activities (but not limited to) as tabulated below. The report of following activities shall be submitted to respective Network Control Centre:

Sl. No.	**Activity**	**Description**	**Frequency**	**Action To be taken**
1	Network Monitoring	To check upcoming network problems	Daily	Fault Rectification
2	Site Visit	To attend fault/ other operations	Case to case basis	Depute maintenance team as required.

3	Link Loss Measurement	Measurement of losses in Optical Links.	Quarterly	Inform the Nodal Officer for corrective measures through respective maintenance team.
4	Traffic Matrix Check	Verify that the configured channels, should be in line with approved channel.	Half Yearly	Take corrective measures in coordination with Nodal Officer
5	TMN System Data Back Up/ Data Back	Back up shall be taken	Daily	Backup to be taken as per setting Auto/Manual.
6	Traffic Grooming	Optimisation of communication channels	Half Yearly	Reconfiguration/ rerouting of channels.
7	Network Utilization/ Congestion Report/ availability of spare ports		Half Yearly	Inform the Nodal Officer for upgradation of equipment/ rerouting of traffic
8	Network Check wrt approved document (services/connectivity/ Bandwidth/performance parameter)	Network Check shall include but not limited to ● Performance Check ● Bandwidth Check Route allocation of links	Yearly	Infonn the Nodal Officer for corrective measures
9	TMN Remote Check	At Main NMS Centre	Yearly	Take corrective measures in coordination with Nodal Officer
10	Remote Access Channel Check (DCN Check)	For remote access of nodes for diagnostics and troubleshooting	Yearly	Take corrective measures in coordination with Nodal Officer

5.2.3. Breakdown Maintenance

Break down maintenance includes the maintenance of the facilities, during the sudden failure of the communication system. On occurrence of any breakdown noted in NMS, Nodal Officer will instruct the maintenance team to take up following steps mentioned as under:

- Visit the terminal station of affected link and test the communication equipment.

- Carry out rectification work such as replacement of module/patch cord/ hard reset in coordination with NMS team/ Nodal Officer.
- Maintenance Team shall get the confirmation of link restoration from NMS Team/ Nodal Officer.
- In case the fault results in long duration breakdown of the link, Temporary path reconfiguration shall be provided through NMS in coordination with the Nodal Officer and he shall ensure the permanent restoration of temporarily restored links.

5.2.4. Post restoration Activities

- Ensure removal of man and material so that system can be put back in service.
- Submit detailed report on maintenance work carried out including intimation of fault, response time and rectification time, rectification work carried out, consumption of spares, all software in Network, their version, date of previous update, Plan of next update, Major changes after update.

  Typical format for Fault intimation/ status report is attached as **Annexure-V**.

- Update History Register incorporating maintenance works carried out by the maintenance team.
- After completion of maintenance activity, Maintenance team shall return the faulty module to Nodal officer who will further send to OEM for repairing.

5.3. Maintenance of Auxiliary Power Supply

DCPS includes charger, Batteries, DCDB and other associated cables/connectors, Meters, relays, switches, surge protection devices. The Maintenance Team shall carry out both preventive and break down maintenance of the supplied DCPS & Battery System.

The details of DCPS and Battery shall be noted in the following format during maintenance.

S. No	Detail of Owner	DCPS/ Battery Bank No. 1/2/3	Location of DCPS/ Battery	Type of DCPS/ Battery	Make of DCPS/ Battaery / Serial No.	Year of Commissioning	AMC (Y/N)	Contact Details of AMC Agency/ Person	Date of last Maintenance	Maintenance done as per procedure	Date of maintenance	Remarks
1												
2												
3												

5.3.1 Preventive/ Predictive Maintenance Activities

This consists of necessary measures to maintain the equipment in the proper operating condition. Preventive maintenance includes functional checking, cleaning and necessary repair/replacement/adjustments. It will be carried out Quarterly.

Details of activities to be carried out during Preventive Maintenance as follows:

Sl. no.	**Description**	**Observation**	**Action To be taken**
1	**DCPS**		
1.1	General conditions	Check: ● Cleaning ● Connections	● Cleaning of System ● Tightening of all the power and control connection, MCB, wiring, LED, terminations including checking the input power cable terminations at both ends.
1.2	Functional Checking	● Functional checking Of DC System for Normal ● Operation including battery charging. ● Checking for Normal operation of each Module. Checking of present load on charger. ● Matching of DCPS parameters with Centralized system.	● Check the Controller Display working status and it should be showing reading of AC voltage, DC voltage, load current, alarm. ● Faulty Module shall be replaced/ repaired.
1.3	Testing	Following measurements shall be done with multi meter and compare the same with standard value of approved document	Make necessary adjustments/ corrections to match values with standard value of approved document.

		a. Checking of DC Voltage b. Checking for AC Voltage L-L, L-N c. Checking AC Current d. Checking for ripple Voltage ● Reading of the displayed value in the controller and measured through the multimeter should be within the range of ±l % difference. ● Check Load Low Voltage Disconnect (LLVD) and Battery Low Voltage Disconnect (BLVD) setting.	Faulty parts/ modules shall be replaced/ repaired.
2	**Battery (VRLA / Lithium Ion)**		
2.1	General conditions	Checking of the physical conditions of the batteries Connections, marking, wiring, protection cover Checking of battery terminals for corrosion and cleaning thereof, torqueing and greasing. connectivity of battery at battery fuse of DCPS/IPMS.	Cleaning Tightening of all the battery connections. Make necessary adjustments/ corrections.
2.2	Testing	battery parameters setting like charging current @ C-10, Boost voltage and Float voltage in the controller. Checking of each battery voltage & battery impedance/resistance measurement C-3, Three discharge tests per year at normal load for three hours during 1 st, 2nd and 4th quarterly visit. C-10 discharge test on batteries once a year on 3rd quarterly visit.	Faulty Cells/ Battery Bank to be replaced.

3	Earthing Measurement	Checking of earthing of the system by measurement of earth to neutral potential ● For DCPS ● For Battery	Tighten the connectors. Inform the Nodal Officer.

Based on observation noted w.r.t. above mentioned parameters/ aspects, report shall be made for further maintenance/ actions to be taken.

5.3.2. Breakdown Maintenance

Breakdown Maintenance is to be carried out in the event of malfunctioning of DCPS equipment, which blocks the normal operation of the DCPS. Breakdown maintenance includes fault finding, repair or replacement of defective parts and functional checking.

Details of activities to be carried during Breakdown Maintenance:

1. Repair and replacement of Faulty Module/components.
2.
3. Arranging & commissioning of spare DCPS unit for ensuring the supply, in case fault in DCPS requires longer restoration time. Later the same shall be replenished by the vendor.
4. Analysis report of the fault.
5. Plan for preventive measures to arrest recurrence of such faults.

5.4 Maintenance of Associated Auxiliary Infrastructure

5.4.1 DG Set

5.4.1.1 Predictive/ Preventive Maintenance

The Maintenance Team shall carry out both preventive and break down maintenance of the supplied DG Set. Preventive maintenance includes functional checking, cleaning and necessary repair/replacement/adjustments. It will be carried out as per approved design document. The details of DG Set shall be noted in the following format during maintenance.

S. No	Detail of Owner	DG Set	Location of DG Set	Type of DG Set	Make of DGSet/ Serial No.	Year of Commissioning	Under AMC (Y/N)	Contact Details of AMC Agency/ Person	Date of last Maintenance	Maintenance done as per procedure Y/N	Date of maintenance	Remarks
1												
2												
3												

Details of activities to be carried out to examine following parameters during Preventive Maintenance:

Sl. no.	**Description**	**Observation**	**Action To be taken (In case of abnormality)**

1	Fan assembly	Check: ● Radiator fan alignment ● Fan drive bracket bolt tightness ● Fan Belt Condition ● Fan Belt Tension ● Fan clutch resistance or operation hot air circulation from fan shroud area	Faulty parts shall be replaced/ repaired.
		● Water Pump Belt Tension ● Water Pump Belt Condition	Faulty parts shall be replaced/ repaired.
		● Oil leakage from front oil seal ● Oil, Coolant leakage from header assembly ● Fuel Leakage ● Condition of Fuel Hoses ● Supporting of fuel hoses, check for fouling, condition of bradding ● Oil leakage at Actuator ● Oil leakage from rocker cover or cylinder head	Faulty parts shall be replaced/ repaired.
	Cooling & Exhaust System	● Coolant Hose and Clamp condition and tightness ● Coolant level inside reservoir tank ● Coolant Pump belt condition ● Coolant pump belt tension ● Air filter element condition, outer element cleaning if required ● Breather hose, clamp, air filter bracket bolt tightness ● Exhaust gas leakage ● for exhaust manifold and diffuser and shield nuts, if loose, tighten ● Walk around and inspect for coolant and oil leakage during test run	Faulty parts shall be replaced/ repaired.

		• Engine mount bolt tightness • Alternator bolt tightness • Electrical connection check tightness if required at panel and end terminal • Oil level in Engine sump • Static battery charger connection and operation • battery electrolyte level and terminal condition • connectors of sensors and actuator • Condition of centrifuge filter and clean it if required • Inspection of Power cables, termination, condition of lugs inside Alternator extension box • Automatic Voltage Regulator (AVR) connection • Charge Air Cooling (CAC) hose connection, condition of hose and clamps • Battery Charger Available for Coastal area -space heater used for High Moisture area -space heater used	• Make necessary adjustments for rectification. • Faulty parts shall be replaced/ repaired.
	Functional Test	• Testing for Auto Mode Start. • Take the reading of Output Voltage/ Current with Multi	Reading to be Noted and abnormalities to be rectified.
		Meter and compare with Controller Panel Display. • Reading from hour meter to be noted for Servicing/ major overhauling as per approved design document (Quarterly)	

5.4.1.2 Breakdown Maintenance

Details of activities to be carried during Break Down Maintenance of DG Set:

1. Repair and replacement of Faulty Module.
2. Repairing and replacement of faulty components in the system.
3. Arranging & commissioning of spare DG Set unit for ensuring the supply, in case of fault in DG Set requires longer restoration time. Later same shall be replenished by the vendor.
4. Analysis report of the fault.
5. Plan for preventive measure to arrest recurrence of such faults.

5.4.2 Maintenance of Repeater Shelter

Repeater Shelter hosts multiple (Electrical/ Communication) devices/ systems of different vendors and this is under the ownership of the communication system owner/ user. Annual visit for maintenance / upkeep of this infrastructure shall be made by the concerned Maintenance In charge/ Nodal Officer. Repeater Shelter shall be inspected for following check list.

Sl. no.	Description	Observation	Action To be taken (In case of abnormality)
	Repeater Premises		
1	Availability of SOP of Repeater/point of presence (POP) Station in Hindi/English/Local Language.	OK/ Not OK	Nodal Officer to ensure the availability of SOP.
2	Availability & Condition of Repeater/ POP Station fencing & its Earthing (as applicable).	OK/ Not OK	Inform to respective maintenance team for the rectification.
3	Illumination level Condition inside/outside Repeater/ POP station.	OK/ Not OK	Inform to respective maintenance team for the rectification.
4	Availability of Canopy/rain shade for SEB Power meter & Status of SEB Power meter (Installed for Communication Equipment)	OK/ Not OK	Inform to respective maintenance team for the rectification.
5	Battery Bank healthiness/Cleanliness inside the shelter	OK/ Not OK	Inform to respective maintenance team for the rectification.
6.	Material safety Data (MSDS) of Battery/ Diesel storage displayed.	OK/ Not OK	Inform to respective maintenance team for the rectification.
7	Working Status of Air Conditioner in the Shelter Hut.	OK/ Not OK	Inform to respective maintenance team for the rectification.
8	Repeater/ POP Station Housekeeping/Weed Control Status.	OK/ Not OK	Inform to respective maintenance team for the rectification.
9	Smoke Detector CheckK Inspection records & of Healthiness.	OK/ Not OK	Inform to respective maintenance team for the rectification.

11	Availability of First-Aid Box & register as per norms.	OK/ Not OK	Inform to respective maintenance team for the rectification.
12	Availability of Emergency Light in Shelter Hut.	OK/ Not OK	Inform to respective maintenance team for the rectification.
13	Emergency Contact details Displayed.	OK/ Not OK	Inform to respective maintenance team for the rectification.
14	Entry & Exit details of Workmen/Visitors/vehicles entry logs record in register	OK/ Not OK	Inform to respective maintenance team for the rectification.
15	Availability of Fire Extinguisher as per latest norms (eg. minimum one foam & one C02 type).	OK/ Not 0K	Inform to respective maintenance team for the rectification.
16	Fire Extinguishers maintenance/inspection, Annual inspection records as per IS.	OK/ Not OK	Inform to respective maintenance team for the rectification.
17	Provision of locking arrangement at main gate & shelter.	OK/ Not OK	Inform to respective maintenance team for the rectification.
18	Routing of electrical supply through Residual Current Circuit Breaker (RCCB) with sensitivity 30mA.	OK/ Not OK	Inform to respective maintenance team for the rectification.

19	Availability of Danger boards/notices/posters.	OK/ Not OK	Inform to respective maintenance team for the rectification.
20	Compliance of Covid-19 protocol	OK/ Not OK	Inform to respective maintenance team for the rectification.
	Diesel Generator		
1	Annual Maintenance report/record of DG set.	OK/ Not OK	Inform to respective maintenance team for the rectification.
2	Status of Battery Set of DG Set/last replacement date	OK/ Not OK	Inform to respective maintenance team for the rectification.
3	Oil Leakage observed (if Any)	OK/ Not OK	Inform to respective maintenance team for the rectification.

4	Availability of Tank Capacity specified on DG Set diesel storage tank	OK/ Not OK	Inform to respective maintenance team for the rectification.
5	DG should be on auto mode as applicable except during maintenance.	OK/ Not OK	Inform to respective maintenance team for the rectification.
	EARTHING		
1	Earth Pit Visual Inspection (rusting, tightness & cleanness) status & record.	OK/ Not OK	Inform to respective maintenance team for the rectification.
2	Record of date of Testing, Earth resistance value and pit number.	OK/ Not OK	Inform to respective maintenance team for the rectification.
3	Whether earth strip is visible and connected to earth rod or not?	OK/ Not OK	Inform to respective maintenance team for the rectification.
4	Availability of body earthing & separate Neutral Earthing of DG set and connected with two earth Pit.	OK/ Not OK	Inform to respective maintenance team for the rectification.
5	Shelter hut structure is earthed from two sides.	OK/ Not OK	Inform to respective maintenance team for the rectification.
6	DCPS panel & Shelter equipment are connected with earthing as per norms.	OK/ Not OK	Inform to respective maintenance team for the rectification.
7	Check earthing of all electrical panel inside the shelter as per norms.	OK/ Not OK	Inform to respective maintenance team for the rectification.
8	All marshalling box/doors/main gate/fence were linked to earth with flexible connection.	OK/ Not OK	Inform to respective maintenance team for the rectification.
	Personal Protective Equipment (PPE) & T&Ps		
1	Availability of healthy T&P/PPE for Shelter O&M and stored/placed properly.	OK/ Not OK	Inform to respective maintenance team for the rectification.
2	Periodical inspection PPE & of Shelter (Once in a Year)	OK/ Not OK	Inform to respective maintenance team for the rectification.
3	Industrial Safety Helmets Confirming as per IS	OK/ Not OK	Inform to respective maintenance team for the rectification.

4	Electrical Hand gloves confirming as per IS	OK/ Not OK	Inform to respective maintenance team for the rectification.
5	Safety Shoes confirming as per IS	OK/ Not OK	Inform to respective maintenance team for the rectification.
6	Others (If Any)	OK/ Not OK	Inform to respective maintenance team for the rectification.

5.5 Testing of Communication Channel Redundancy for Data Reporting By NLDC/ RLDC/ SLDC:

NLDC/RLDC/SLDC have to test the alternate / redundant channels quarterly for data reporting in coordination with the concerned owner. The non-configuration [unavailability of redundant channel] shall be intimated to the users for corrective measures for ensuring reliability/ availability of the communication network in line with CERC Communication Regulations 2017.

5.6 Cyber Security

Inter-State Communication system user/ provider shall ensure that the communication equipment have got tested as per relevant contemporary Indian or International Security Standards e.g. IT, OT and IT related elements against ISO/IEC 15408 standards, for Information Security Management System against ISO 27000 series Standards, in line with cyber security guidelines of Central Govt.

5.7. Documentation & Reporting Procedure

All the Maintenance & Testing activity conducted by communication system owner shall be recorded/ logged along with necessary evidences including photographs/ GPS details and report shall be generated.

Communication System Owner/ User shall maintain the retention data as per CEA (Technical Standards for Communication System in Power System Operations) Regulations, 2020.

(1) User shall keep evidence of compliance on availability for the previous two calendar years plus the current year for all the interfaces which are in operation.

(2) Historical data of ninety days shall be kept.

The purpose of reporting is to summarize the activities performed during the reporting period. The reports shall include all the completed, ongoing and scheduled activities and transmittals issued and received for the month. Typically following report shall be generated (but not limited to):

I. **Reports generated at Remote End:**

The maintenance engineer shall also maintain a log of events and preventive maintenance carried out on the communication system at various sites. All the exceptional events shall be recorded. The initial condition of the system shall be recorded on the start status to constitute or reference for later events. All events such as incoming and existing alarms, fault occurrence, action taken for remedies shall be recorded. If a unit is replaced or repaired both the new and the replaced or repaired unit details are to be recorded.

II. **Reports generated at NMS Control Centre of Owner/User:**

- Daily/ Monthly/ Annually etc Report shall be generated/prepared at various NMS of communication system owner in coordination with maintenance team and shall be shared with NMTof Regional CNMS centre, A typical format of report is attached as **Annexure-VI**.

- Based on these reports, monthly report (MIS) which shall have details of availability, downtime, performance, trends etc of the network, has to be generated. The monthly report should provide the information on the performance of the services and describe the current status of the network. By analysing the report data, management and expert of concerned utility should be able to focus attention on the areas, where further improvement is needed.

Proper record should be maintained of all the events, activity and store transactions for reference. All the documents/ reports generated at remote

end and control centre shall be stored in physical form (hard copy/ logbook/ register) as well as in electronic form in respective Database, as applicable.

Emergency reports: Maintenance team shall submit reports every time the emergencies call up or call out service is invoked. In these cases, on termination of the emergency all details of the fault and clearance information may be submitted within 5 working days.

6. Safety Procedure

Communication System Owner shall ensure that all safety procedure as applicable, as per prevailing CEA Safety Regulations 2010 and amendments thereof on “Measures relating to Safety and Electric Supply” shall be followed during maintenance and testing activities.

7. Disaster Management

Communication Network along with Transmission lines are prone to damage due to earthquake, cyclone, flood etc. Communication Network plays a very crucial role for efficient & secure Power System Operation and quick restoration of the same needs to be dealt with utmost importance in case of disaster. Disaster management of communication system shall be dealt in line with the latest and related guidelines on “CRISIS AND DISASTER MANAGEMENT PLAN FOR POWER SECTOR” issued by CEA.

In case of failure of communication system due to disaster/ crisis, priority shall be the restoration of critical communication channels of communication system on alternate paths, as a measure/ part of Disaster Management Plan (DMP), and this shall be coordinated by NMT team of CTU with POSOCO/ SLDC/ Other Control Centre and Communication system Owners/ Users (For the same sufficient redundancy shall be planned in our communication system).

8. Maintenance & Testing Meetings

In line with Centralized Supervision for Quick Fault Detection and Restoration of Communication System, NMT of CTU shall coordinate among the communication system users/owners for supervision, quick fault detection and restoration of communication system in respect of Inter-State communication system. For ensuring the desired availability as per the CERC Communication Regulations 2017, it is important that proper monitoring and maintenance of redundant path shall also be done along with the main path and quick restoration of main/ redundant path shall be ensured in case of failure of any path.

In order to address the Maintenance and Testing issues of communication system and to review the same for necessary measures (system improvement plan for recurring and critical issues/ upgradation/ replacement), meeting on quarterly basis may be planned by CTU in coordination with NLDC/RLDC/SLDC along with the concerned stakeholders.

Scheduled maintenance/ Outage Planning in line with RPC approved procedure shall be informed by ISTS system users/owners to NMT of CTU for finalizing the monthly outage planning of ISTS communication system in coordination with RLDC/SLDC and the same shall be updated in CNMS system for further coordination and optimal resource allocation.

This meeting shall be coordinated and held quarterly by CTU as nodal agency with NMT of CTU, Communication System Owners and Users, NLDC/RLDC/SLDC for communication and information flow between parties to tackle the essential issues concerning the services and network performance. Officers shall be designated from all communication system owners/ users, NLDC/RLDCs/SLDCs/REMCs to participate in the said meeting.

Following issues, but not limited to, may be addressed or deliberated in the meeting:

- Services and network performance review based on the Availability Reports (data, main/ protection/ redundant paths)/ DER/ MIS.
- Issues related to unattended faults/problems
- Operational issues
- Operational feedback
- Status of spares/ T&P
- Network/ software upgradation issues
- Review of emergence situation
- System Improvement Plan
- Action plan
- CNMS system generated reports (e.g. Maintenance, Testing, Outage, Redundant path Reports etc.
- Any other issues

Emergency meeting

An emergency meeting may be called by CTU in coordination with the concerned stakeholders, in case of occurrence of any major breakdown in the network. In the meeting, the breakdown shall be discussed in the context of

cause, correction and immediate remedial measures to be taken so as to avoid such breakdown in future.

9. Revision of Procedure

As and when required, the procedure shall be reviewed and revised by CTU with the approval of the Commission.

Annexure-I

Typical Escalation Matrix

Technical Support Desk User/ Owner Name:

Email:

TEL:

Complaint /Trouble Ticket send email: abc@xyz.com

Escalation Level	**Personnel Detail**	**Remarks**
Level A	**XEN/SE** **Alternate Executive** **ABC** Office: Contact: Email:	To open trouble ticket send email to: abc@xyz.com
Level B	**SE** **Xxxxxxxx** Office: Contact: Email:	
Level C	**CE** **Xxxxxxxx** Office: Contact: Email:	
Level D	**Director/MD** **Xxxxxxxx** Office: Contact: Email:	

Escalation Procedure

The escalation level shall be guided based on the severity level (I, II, III, IV) and specified timeline with respect to initial call as specified in the prevailing AMC contract.

Annexure-II

List of T&P and Test Equipment (Typical)

1. Wire/sisal/Manila rope.
2. Rope pulley single/Double Four/Six sheave.
3. Derrick pole.
4. D-Shackle of various sizes
5. Slings.
6. Hammer.
7. Spanner/wrenches.
8. Chain pulley block.
9. Heavy duty Tripole
10. Snatch pulley block.
11. Drum lifting jack
12. Pilot wire.
13. Turntable.
14. Rollers.
15. Ground rollers
16. Pull lift Ratchet.
17. Turfer.
18. Steel measuring tape.
19. Thermometer.
20. Hydraulic compressor (100 M.T.)
21. Dies for Compression Joints.
22. Safety belt.
23. Sag Board.
24. Earthing Chain.
25. Bulldog clamps.
26. Crobar.
27. Come along with clamps.
28. Wrench Machine.
29. Binoculars.
30. Conductor cutter.
31. Cutting plier-
32. Hacksaw frame & blade.
33. Chisel.
34. Punching tool.
35. Anvil.
36. Torch/Petromax.
37. Tent.
38. Tractor.
39. Truck.
40. Wire bench.
41. Articulate joints.
42. Equalizer pulley.
43. Socks for moose conductors.
44. Torque wrench
45. Arial Trolley

46. Sliding Ladder
47. Pengo/ Tensioner.
48. OTDR
49. Protection gears (i.e. Electrical insulation gloves, safety helmet, safety harness, safety shoes etc.)
50. Splicing Machine
51. Fiber spool
52. Power meter
53. Cleaver & Stripper
54. Laser source
55. Digital camera
56. Mobile Phone Duct Tracer

T&P for VSAT

1. Compass
2. Inclinometer
3. Spectrum Analyser
4. RF cables
5. Spare

T&P for Equipment

1. BER Tester
2. El Tester
3. Power Meter
4. Multimeter
5. Patch cord
6. El cable
7. Pigtail
8. Spare

T&P for DG Set

1. Multimeter
2. Power Meter
3. Power Cable

T&P for Battery & DCPS

1. Torque wrench.
2. Tool for opening /closing of pressure regulation valve of battery
3. Power Cable
4. Spare

Annexure-III

Typical Format for OPGW/ ADSS/ UG OFC Link Details (Under Maintenance)

Owner's Name:

Link Details
The Links for the Line..... are classified as below:

1. InterState/ IntraState Links

a) Station A ……. - Station B…….
U/G section in km=……..; Overhead section in km= ……

b) Station C..... - Station D.....
U/G section in km=……..; Overhead section in km=.....…

c) Schematic map of above Links under maintenance.

Annexure-IV

Typical Format for OFC Functional Test; Eg. Splice Testing & Fiber Attenuation

Table - A

Fibre Optic Cable Splice Testing

Item	Description	Acceptance Criteria
1	Physical inspection of Joint Box for proper fiber routing techniques	As per technical specifications/ Relevant standards/ ITU-T
2	Physical inspection of sealing & weatherproofing etc.	As per technical specifications/ Relevant standards/ ITU-T

Table - B

Fibre Attenuation Testing

Item	Description	Acceptance Criteria (as per Standard/ Practicing Norms for ISTS
1	Fibre continuity and link attenuation (bidirectional) of newly laid OFC for each fibre at 1310nm OR at 1550nm by OTDR and Power Meter & Laser Source wherever feasible .	Attenuation 0.35 dB per KM at 1310m < 0.21 dB per KM at 1550nm (The measured attenuation for the links shall be submitted to the Owner.)
2	Fibre continuity and link attenuation (bi- directional) OFC (including newly laid & existing fibre i.e. from POP Location to Customer Location or Customer Location to Customer Location) for each fibre at 131() nm OR at 1550nm by OTDR and Power Meter & Laser Source (wherever feasible	

Annexure-v

Typical- FAULT RECTIFICATION/ STATUS REPORT
(for OPGW/ Communication Equipment)

Name of the Maintenance Personal/Splicer……. Base Location.....

Sl.No.	Name of the Link	Fault Location	Fault Occurrence/ Ticket Opening Time	Fault Restoration/ Ticket Closing time	Action taken	Material Consumed	Cause of Fault
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

For
AMC Contractor

Annexure-VI

Typical- Daily Exception Report

Communication System Owner : XYZ

दैनिक अपवाद रिपोर्ट/ Daily Exception Report :

dd/mm/yyyy (Report for 00:00 hrs to 24:00 hrs of 15th March. 2021)

क्रमांक/ S.No.	आई डी/ ID	शीर्षक/ Title	निर्धारण/ Watcher group	श्रेणी/ Category	विवरण/ Description	प्रभाव/ Impact	प्रारंभिक दिनांक एवं समय / Opening Date & Time	समाधान दिनांक एवं समय / Resolution Date & Time	प्रभावित समय/ Down Time	अद्यतन/ Update

Present Maintenance Practices with Existing NMS
&
The manually generated reports
for Communication System/ Link/ Channel availability calculation

Network Management System:
A network management system (NMS) is an application or set of applications that lets network engineers manage a network's independent components in the supplied system having the limited number of NEs/ FOTE, inside a bigger network management framework and performs functions with limitations of computational efficiency of the existing NMS computer. Manual/Hand-made report/log generation is being followed as present practice for calculating system availability & its performance.

The primary purpose of network management is to deliver a secure, reliable, and high-performing network to end-users. Network management covers the procedures, methods, and tools need to effectively operate, administrate, and maintain networks. As a practice area, it's primarily focused on maintaining reliability, efficiency, and overall performance of data transfer channels. The main functions of network management include remote configuration (of equipment and connections in the network), performance monitoring, and fault management. In addition, security and accounting are also management functions. Monitoring an active communications network to diagnose problems and gather statistics for administration and fine tuning.

Link Downtimes/ Logs are noted manually from theses multiple NMS (Proprietary in nature) computers for the faults/ its restorations of the managed nodes (NEs/ FOTE etc) and are summated manually to calculate & derive the Communication system performance & availability; i.e. Link/ Channel Availability & the Downtime. Theses manually generated signed reports are submitted by the owners (communication system owners of ISTS/ states/ utilities) to the respective RPC/forums for assessing ISTS Communication System Availability & Performance.

Typical maintenance & fault reports to be filled and signed by the vendor/ owner is hereby enclosed.

The Five Functional Areas of Network Management:

1. Fault Management: Fault management is the process to identify and fix any errors in the system. There is provision of many alarms that can be distinguished based on faults. Alarms can be classified as Critical, Major & Minor.
2. Configuration Management: This is the process to monitor and maintain devices and network configurations. NMT (Network Monitoring Team) can create new channels as per requirement. Addition of New NE (Network Equipment), deletion of NE, Basic configuration to advance level configuration can be done with NMS.
3. Performance Management: In this process various data channel (E1, Ethernet, 64 Kbps) performance is measured with defined parameters.
4. Security Management: A user can access NMS only if he/she is having user id & password. Administrator has privilege to give certain permissions to any users.
5. Accounting Management: Administrator can create multiples user accounts based on requirement. Administrator has privilege to add/delete accounts.

Role of NMS: In general practice NMT Engineer collects various data for maintaining network availability.

1. **Network fault management**: NMT engineer can have a designated network fault management to anticipate, detect, and resolve network faults to minimize downtime. In addition to fault resolution, this function is responsible for logging fault information, maintaining records, conducting analysis, and aiding in regular audits.

2. **Configuration data:** There is provision to create new (E1/ ETHERNET/ 64 KBPS) channels as required. These channels can be created within fraction of time. Network fault management, the network configuration management team must also keep detailed records of all changes, their outcomes, and issues, if any. NMS can generate data like configuration of NE's and Inventory of components used in NE.

3. **Performance Data:** An NMT can also measure performance of these new channels or existing channels within the standard parameters available in NMS. These data can be retrieved from NMS. Network performance management involves various tasks that help boost network uptime and service availability.

Network management is the backbone of any system. It determines the uptime and performance of applications running on network.

Periodic monitoring, testing and maintenance of the communication system installed at Substations.

A) List of Inventory

A list of inventory available at substation shall be maintained at each substation in following format

S. No.	Item	Make & Model	Serial No.	Date of Comm.	Remarks
1.	SDH				
2.	PDH				
3.	DCPS				
4.	Battery				
5.	Craft Terminal				
6.	Spares available				

B) Type of Maintenance.

Maintenance can be broadly classified into two categories

1) Preventive maintenance
2) Breakdown Maintenance

C) Preventive Maintenance

Following shall be included in preventive maintenance:

1. Communication Equipment (SDH and PDH)

SDH/PDH **Make and Model** **S.No.**		**Date:**	
S.No.	**Activity**	**Frequency**	**Remarks (OK/NOT OK)**
1.	Visual Inspection of the equipment	Monthly	
2.	General cleaning of the equipment	Monthly	
3.	Alarm measurement verification.	Weekly	
4.	Tightening of connectors	Quarterly	
5.	Sealing of cabinets to arrest entry of rodents etc.	Monthly	
6.	Checking termination, re-kroning of Indoor cable, outdoor cable, Fibre Optic cable (Patch cord) etc.	Quarterly	
7.	Functional checking of Air-Conditioning	Quarterly	
8.	Measurement of earth resistance	Half-Yearly	
9.	Status report of site.	Monthly	
10.	Updating of log records	Monthly	
11.	Proper Labelling of Patch Cord.	Quarterly	

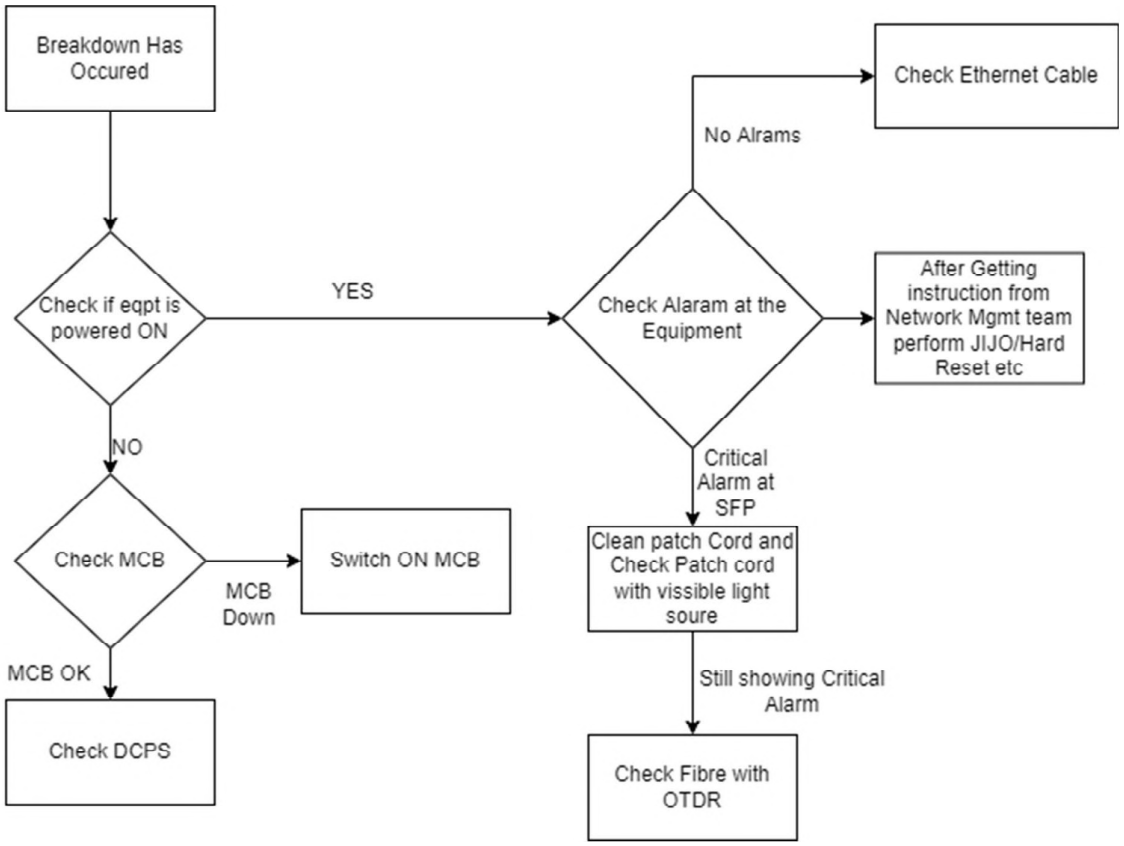
2. DCPS

DCPS and Battery **Make and Model** **S.No.**		**Date:**	
S.No.	**Activity**	**Frequency**	**Remarks (OK/NOT OK)**
1.	Physical inspection of DCPS	Monthly	
2.	Cleaning of System	Monthly	
3.	Tightening of all the power and control connections including checking the input power cable terminations at both ends	Quarterly	
4.	Checking of DC Voltage	Monthly	
5.	Checking for AC Voltage L-L, L-N	Monthly	

6.	Checking AC Current	Monthly	
7.	Functional checking Of DC System For Normal Operation including battery charging	Monthly	
8.	Checking for Normal operation of each Module	Monthly	
9.	Checking of earthing of the system by measurement of earth to neutral potential	Quarterly	
10.	Checking of charging condition of the batteries	Monthly	
11.	Checking of the physical conditions of the batteries	Monthly	
12.	Checking of each battery voltage & battery impedance/resistance measurement	Quarterly	
13.	Checking of present load on charger	Monthly	
14.	Checking of battery terminals for corrosion and cleaning thereof, torqueing and greasing	Quarterly	
15.	C-3 discharge test on batteries	Yearly	

D) <u>Breakdown Maintenance :</u>

In case of fault, breakdown maintenance has to be taken up following steps should be followed:



E) Breakdown maintenance Report Format

Date:_____

Affected Path:_____

Fault Description:_____

A. Event start time (as per NMS) date _____ time_____

B. Reporting time by NMT date _____ time_____

C. Alarms (As per NMS) _____

D. DC Supply Status _____

E. Physical Alarms on Cards _____

F. Patch cord's Status _____

REPORT

Rectification start time date _____ time_____

Fault fixed date _____ time_____

Total Outage time _____

Remarks:

_____

_____

_____

Faulty unit Sl. No: _____

Signature

_____

F) Preventive Maintenance Report Format:

1. 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

Communication room cleanliness

- Check if communication room is in good condition (Over all)

- Check if regular cleaning of telecom room done.

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

- Is the room having any damp wall.

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 Cleaned/Not cleaned

2. Temperature Measurement:

Room temperature

- Check the room temperature (25°C is recommended) _____
- Temperature very near equipment cabinet _____
- Temperature inside the telecom equipment rack _____

3. Power Supply Measurement

- Input DC Voltage at MCB _____
- Input DC Voltage at Cabinet TB _____
- AC Voltage at the time maintenance (Primary source): _____
- Availability of AC Supply in 24 hours _____
- Charger Voltage _____
- Battery Voltage (Charger AC Supply off) _____

4. SDH & PDH Equipment Alarm Check

Visual check for the alarm on SDH & PDH equipment, in case of any alarm present further coordination to be done with regional NMS team and corrective action to be taken.

5. Cable Check

(a) Check the cable terminations at all MDFs visually. Re-krone if any loose wires.
(b) Check cable route for any abnormality.
(c) Are cable trenches covered properly?

6. Earthing Check

- All the cables are connected properly with the ground point.
- Clean the ends, 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: _____Ω

GRID CONTROLLER OF INDIA LTD.
(Erstwhile POSOCO)
National Load Despatch Centre
(Designated as Nodal Agency in accordance with Regulation 5 of CERC (PSDF) Regulations, 2014)
(PSDF-Secretariat)

Office Address: B-9, 1st Floor, Qutub Institutional Area, Katwaria Sarai, New Delhi -16
Tel: 011-26524521, 26536959 Fax: 011-26524525, 26536901
Website: https://psdfindia.in/. Email psdf@posoco.in; nldc.psdf2020@gmail.com

Ref: NLDC-PSDF/21st MoCo/2023-24/ Dated: 18th October 2023

To,

As per distribution list

Subject: Decision taken during the 21st meeting of the Monitoring committee held on 17.08.2023 regarding funding of SCADA/EMS project including AMC for NER States.

Sir,

The request of the NER states to consider the PSDF funding for the SCADA/EMS project including AMC was put up for the direction of the Monitoring Committee during its 21st meeting held on 17.08.2023. The Monitoring Committee has agreed for the funding of SCADA/EMS project including AMC for the 7 NER states and has directed TESG to examine these proposals.

It was also suggested that these SCADA/EMS projects may be coordinated/ monitored by Grid-India. The technical document along with BOQ may be prepared and a combined tender may be floated by Grid-India for all states of NER. As per PSDF guidelines, the funds will be sanctioned and released to the respective states of NER through TSA account.

The DPR submitted by the NER states earlier are available with NLDC and same shall be put up for examination of TESG. However, if any NER state wants to incorporate any changes, then the revised DPR may please be submitted by them at the earliest

Thanking you,

Yours faithfully

Suhas Dambhare
General Manager (PSDF)
NLDC-Grid India

Copy to:

1. CE(NPC), CEA
2. ED, NLDC-Grid India

Distribution List:

State	Head of Organization	Nodal Officer
Arunachal Pradesh	Chief Engineer (Power) Department of Power, Arunachal Pradesh Vidyut Bhawan, 0-Point Tinali, Itanagar Arunachal Pradesh-791111	Executive Engineer Department of Power, Arunachal Pradesh SLDC Itanagar, DoP, 132kV Chimu Substation, Itanagar, Arunachal Pradesh-791111
Assam	Managing Director Assam Electricity Gird Corporation Ltd. Bijulee Bhawan, 1st Floor, Paltan Bazar, Guwahati-781001	Chief General Manager Assam Electricity Gird Corporation Ltd. SLDC, ASEB Colony, Power House, Kahilipara, Guwahati-781001
Manipur	Managing Director Manipur State Power Company Ltd. Electricity Complex, Keishampat, Junction, Imphal, Manipur-795001	General Manager Manipur State Power Company Ltd. SLDC, Yurembam Power House, Imphal West, Manipur-795004
Mizoram	Engineer-In-Chief Power & Electricity Department of Mizoram, Power & Electricity Department, Kawlphetha Building, new Secretariat Complex, Khatla, Aizawl, Mizoram-796001	Superintending Engineer Power & Electricity Department of Mizoram, SLDC, P&E Office Complex, North Block (1st Floor), Electric Veng, Aizawl-796007
Nagaland	Chief Engineer (T&G) Department of Power, Nagaland Electricity House, A.G. Colony, Kohima, Nagaland-797001	Executive Engineer, Department of Power, Nagaland SLDC, Full Nagarjan, Dimapur, Nagaland-797112
Tripura	Managing Director Tripura State Electricity Corporation Ltd. Bidyut Bhawam, Banamalipur, Agartala, Tripura-799001	Dy. General Manager Tripura State Electricity Corporation Ltd. SLDC, 79-Tilla, Agartala, Tripura-7990065 (West)

Hardware Healthiness Daily Report

Sl. No.	Servers	Nomenclature	Quantity	Healthy (Yes/No)	Remarks
1	SCADA /EMS Server	DS	2		
2	Identity Server(ID1 & ID2)	ID	2		
3	DTS Server(DT1)	DT	1		
4	CFE Server(FE1 & FE2)	FE	2		
5	ICCP Server(IC1 & IC2)	IC	2		
6	DDS Server(DD1)	DD	1		
7	Centralised Management Server	CM	1		
8	ISR Server(IS1 and IS2)	IS	2		
9	NMS Server(NS1 & NS2)	NS	2		
10	SAN Management Server(SS1 & SS2)	SS	2		
11	SAN Box(SB1 &SB2)	SB	2		
12	NAS Box(NB1 & NB2)	NB	1		
13	Data Replica Server(RD1 & RD2)	RD	2		
14	Web Server	WB	2		
15	Terminal Server	TL	6		

Sl. No.	Switch	Nomenclature	Quantity	Healthy (Yes/No)	Remarks
1	CFE LAN	CW	2		
2	ICCP LAN	PW	2		
3	Internal DMZ LAN	IW	2		
4	SAN /NAS LAN	BW	2		
5	Server Mnt. Console LAN	MW	2		
6	Data LAN	RW	1		
7	External DMZ LAN	EW	2		

Sl. No.	Routers	Nomenclature	Quantity	Healthy (Yes/No)	Remarks
1	RTU Router	RR	2		
2	ICCP Router	IR	2		
3	DDS Router	DR	1		
4	ISP Router	SR	1		

Sl. No.	Firewall	Nomenclature	Quantity	Healthy (Yes/No)	Remarks
1	Internal Firewall	IF	2		
2	External Firewall	EF	2		

Sl. No.	Consoles	Nomenclature	Quantity	Healthy (Yes/No)	Remarks
1	Operator Console	OC	7		
2	UPS Console	UC	1		
3	Training Console	TC	2		
4	KVM Switch	KW	2		
5	Server Management Console(SC1)	SC	1		
6	Development Console	DC	1		

Sl. No.	Display	Nomenclature	Quantity	Healthy (Yes/No)	Remarks
1	GPS Clock	CK	1		
2	Time Display	TD	1		
3	Day Display	YD	1		
4	Frequency Display	FD	1		
5	ABT Display	AD	1		

Sl. No.	Printers	Nomenclature	Quantity	Healthy (Yes/No)	Remarks
1	Multi-functional printer		2		

Sl. No.	VPS	Nomenclature	Quantity	Healthy (Yes/No)	Remarks
1	Video Projection System (70" LED based)(8*3)		32		
2	VPS Controller		1		

Sl. No.	Auxillary Power Supply	Nomenclature	Quantity	Healthy (Yes/No)	Remarks
1	40 kVA (32kW at 0.8 pf) UPS running in parallel		2		
2	VRLA type Battery banks for above UPS (each bank of 76.8 kVAH)		2		
3	Input ACDB (150kVA rating)		1		
4	Output ACDB (100kVA rating)		1		
5	125 kVA DG set		1		
6	80 kVA isolation XFMR		1		

Sl. No.	Video Calling System	Nomenclature	Quantity	Healthy (Yes/No)	Remarks
1	2X2 video wall				
2	Microphone				
3	Camera				
4	VC Remote				

RLDC/SLDC Representative

GE Representative

Software Healthiness Daily Report

Sl. No.	Switch	Healthy (Yes/No)	Remarks
1	SCADA		
2	ICCP Communication		
3	CFE Communication		
4	SOE Viewer		
5	Dispatcher Training Simulator (DTS)		
6	eDNA Trends		
7	Network Management System		
8	Data Historian Software (eDNA)		
9	Data Historian Software (HDR)		
10	Software for SAN and NAS		
11	Report development and Generation Software		
12	EMS Functions		
13	Web Server Application		
14	Host based IDS for all machines in External DMZ zone		
15	Software for Data Replica server		
16	Software for Centralised Management System		
17	Software for Web Server		
18	Anti Virus Software for all machines		
19	External Firewall License		
20	Intermal Firewall License		
21	Servers windows license		
22	Operating console license		

RLDC/SLDC Representative

GE Representative

Annexure A.6B

[redacted] Non-working of historian installed at SLDC Arunachal Pradesh and SLDC Mizoram

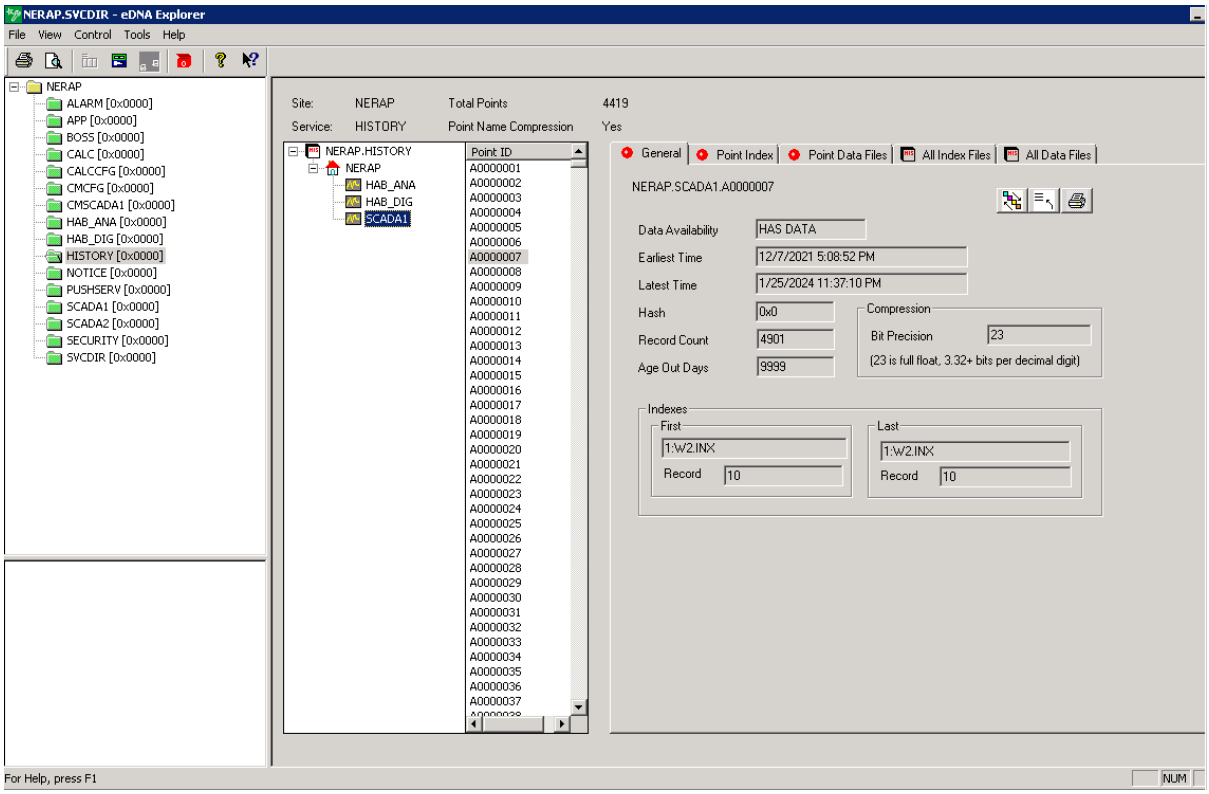


Figure 1: Snapshot Historian of SLDC Arunachal Pradesh

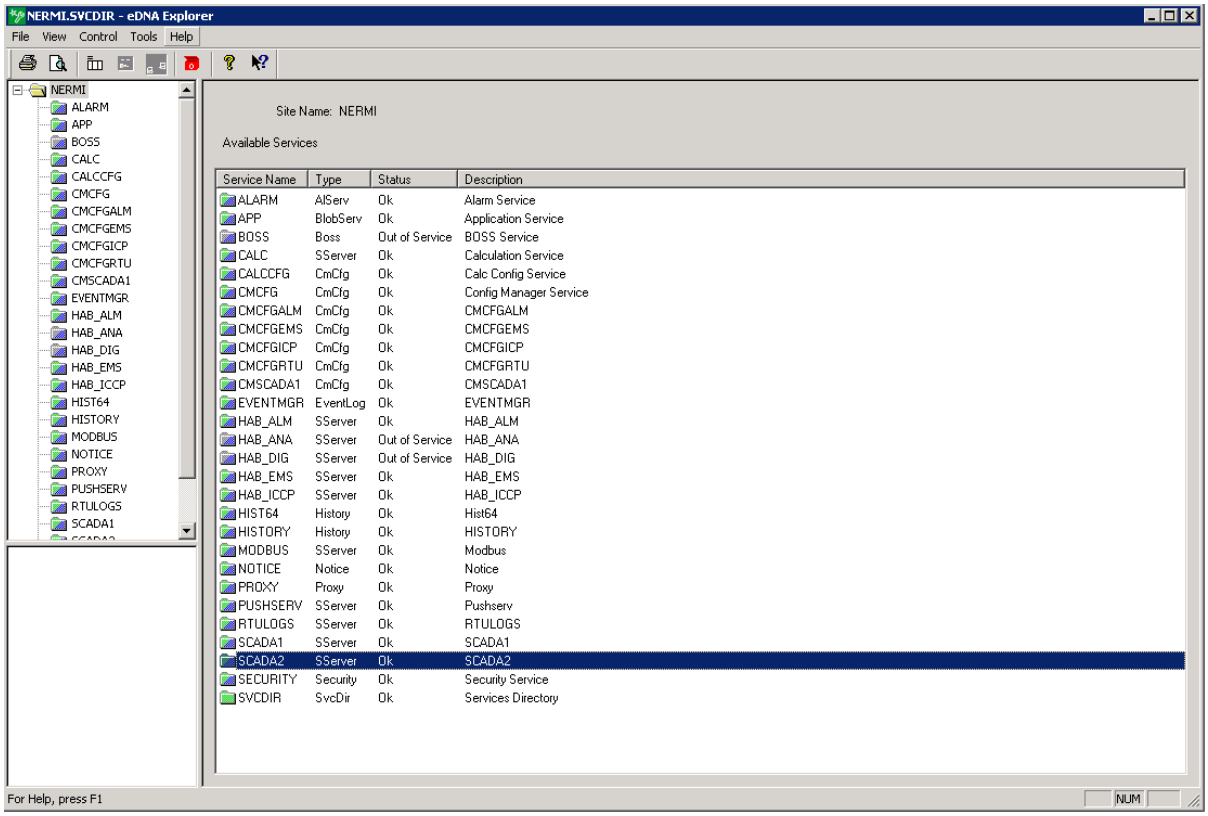


Figure 2: Snapshot Historian of SLDC Mizoram

CYBER SECURITY MEASURES IMPLEMENTATION STATUS FOR NER SLDCs (AS ON 16.02.2024)

SN	Cyber Security Measures	Arunachal Pradesh (last updated on 27.12.2023)	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura
1	Preparation and approval of Cyber Crisis Management Plan (CCMP) for SLDCs	Final CCMP approved by CERT-In. Rev-1 to be issued after incorporation of the comments from CERT-GO.	Final CCMP approved by CERT-In. 3rd Revised version of CCMP issued on 14-09-22 and approved by CERT-In.	Final CCMP approved by CERT-In.	Final CCMP approved by CERT-In. Revision under process.	Final CCMP approved by CERT-In. Revision under process.	Final CCMP approved by CERT-In.	Final CCMP approved by CERT-In.
2	Implementation status of Information Security Management System (ISMS) i.e., ISO 27001 and certification audit for ISO-27001	Implemented. Arunachal SLDC received certification for ISMS (ISO 27001:2013) on 19.09.2023. Rev1 dtd. 06.10.2023. Expiry of certificate 31.10.2025.	Implemented. Assam SLDC has received certification for ISMS (ISO 27001: 2013) on **09.07.22**. **1st Surveillance Audit** has been carried out in **4th July'23**. Report received and **Certificate of First Surveillance Audit** received on **08.07.2023**.	LOA issued to CDAC, Hyderabad on 3rd Nov'21 for Implementation of ISMS (ISO-27001). Implmentation could not be completed as CDAC Hyderabad team could not visit the Manipur. Work extension has been under process to complete the remaining activities .	Implemented. Meghalaya SLDC has received certification for ISMS (ISO 27001: 2013) on 08.07.22. 1st Surveillance Audit has been carried out in June'23 and certificate received.. Certification validity extended up to 8.07.2024.	ISO 27001 being executing. VAPT will be completed by March 2024	Implemented. Nagaland SLDC has received certification for ISMS (ISO 27001: 2013) on 01.06.23.	Contract has been awarded to Certifying Agency and implementation is in final stage.
	Updated Completion Timeline by SLDC:							
3	Status of VA-PT on OT systems	Done for FY 22-23.	Done for FY 22-23.	Done for FY 23-24.	Done for FY 22-23. OT VAPT carried out in January 2024.	Done for the year 2024	Done for FY 23 - 24	Done for FY 24-25 on 29-January-2024 and Final report is awaited.
	i) Date of Last VA-PT (OT):	24/03/2023- 28/03/2023	17/02/2023 - 21/02/2023	21/01/2024-24/01/2024	29-31 January 2024	01-01-2024	10/01/2024-13/01/ 2024	29/01/2024- 01/02/2024.
	Submission of latest VA-PT report carried out on OT systems of SLDC for onward submission to MoP		Revised Report Received. shared with MoP	Reports received and fixed the vulnerabilities. Awaiting final report.	Reports received and will be submitted to MoP	Report not received yet	Reports not received	Report for FY 24-25 is awaited from GE end.
	ii) Due date for Next Audit / Plan for next audit (OT) :	01-02-2024	17-02-2024 As we are on the process of upgrading internal firewalls, we might miss the due date because the next VAPT shall be done once the firewalls are installed and commissioned.	July-August-2024	See (i) above	01-01-2025	Next year(2025)|	31-01-2025
4	Status of VA-PT on IT systems (**to be done once in every six months**)	No IT infrastructure is present in the SLDC. Shall be carried out after implementation of SAMAST and the related IT infrastructure.	Last VAPT completed on 07.02.2024; reports awaited.	Phase -1 of VAPT for IT systems has been completed. Phase-2 was scheduled in June'23; which is still pending due to prevailing situation of unrest in Manipur. It will be done soon.	Last VAPT completed in March-2023. Reports received and closed. Next VAPT in March 2024	VAPT will be completed by March 2024	VAPT on IT systems done from 24 Aug 2023 to 28 Aug 2023.	Last VAPT completed in March-2023; Reports recieved from CDAC.

CYBER SECURITY MEASURES IMPLEMENTATION STATUS FOR NER SLDCs (AS ON 16.02.2024)

ANNEXURE-I

SN	Cyber Security Measures	Arunachal Pradesh (last updated on 27.12.2023)	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura
5	Notification of identified systems at SLDCs as Critical Information Infrastructure (CII)	Final revised CII document has been submitted to NCIIPC after incorporation of comments on 19.05.2023. **NCIIPC requested for re-apply along with transmission and distribution utility. SLDC Arunachal requested NCIIPC to declare SLDC Arunachal as CII in initial step.**	**Identified Systems of SLDC, Assam had been declared as CII by NCIIPC on 10.06.2022.** Notification of CII as **Protected Systems** has been issued by State Govt. **on 11.08.2023**.	Final revised CII document has been submitted to NCIIPC after incorporation of comments on 20.02.2023. Latest clarifications sent to NCIIPC thru' email on 21.07.23. As per latest communication from NCIIPC, it was suggested to go re-apply together with MSPCL (transmission utility). Management asked SLDC to combined with MSPCL. In the process of preparing combine document.	Identified Systems of SLDC, Meghalaya had been declared as CII by NCIIPC on 31.12.2021. Notification of CII as Protected Systems has been issued by State Govt. on 18.04.2022.	Final revised CII document had been submitted. Forwarded by East Zone and presently under approval at NCIIPC head office in New Delhi.	Identified Systems of SLDC, Nagaland had been declared as CII by NCIIPC on 31.12.21. Notification of CII as Protected Systems still pending with the State Govt.	The CII is yet to be approved by NCIIPC. Submitted on 30.09.2023 through email to coord.east@nciipc.gov.in Moreover NCIIPC has forwarded email requesting to prepare presentation for CII in respect of TSECL. However on 19th January 2023, the Transmission wing has been seperated from TSECL and a new company named Tripura power Transmission Limited (TPTL) has been formed and GO & Transmission is under the TPTL. Now it is required to pursue with appropriate authority to resolve the issue.
6	Date of last Risk Assessment by NCIIPC (once in every 2 years):	Not done	Not done	Not done	Not done	Not done	Not done	Not done
7	Compliance of advisories from CERT-In, NCIIPC & other statutory agencies.	Being complied for OT	Being complied	Being complied	Being complied	Being complied	Being complied	Being complied
i	To be updated in Portal for monthly complaince by 10th of every month.	Not updated in the portal	Being Updated in Portal	Being Updated in Portal	Being Updated in Portal	Being Updated in Portal	Being Updated in Portal	Being Updated in Portal
ii	For CERT-In weekly advisories to be complied within 5 days: To be uploaded in the portal after completion.	Being Updated in Portal	Being Updated in Portal	Being Updated in Portal	Being Updated in Portal	Being Updated in Portal	Being Updated in Portal	Being Updated in Portal
ii	Compliance of advisories from Cyber Swachhta Kendra (CSK)	Being Resolved. No new alerts.	Being Resolved. No new alerts.	Being Resolved. No new alerts.	Being Resolved. No new alerts.	Being Resolved. No new alerts.	Being Resolved. No new alerts.	Being Resolved. No new alerts.
8	Compliance of Recommendations of CERT-GO as per SLDC Maturity Model assessment:							
9	Status of Nomination of CISO:	Done	Done	Done	Done	Done	Done	Done
	Alternate CISO (if any):	Nomination of new Alt. CISO is in progress.	Yes	Yes	Yes	Yes	Yes	Yes
10	Cyber Security Certification: (Training attended)	No	Yes. Basic level training and certification on Cyber Security for Power Sector Professionals completed by 7 officers.	Yes. (2 Officials)	Yes. (11 officials undergone Basic level certification course from NPTI and 2 are being nominated for Intermediate level training in March 2024)	Yes (9 Official trained in Two Weeks Basic Level Training and Certification Program on Cyber Security)	1 Official trained for Basic Level Certification Course in Sep 2023.	Yes. 1 Official (Attended by Alternate CISO)
11	IT - OT Integration:	Not present	Present between SAMAST and SCADA	Present Between SAMAST and SCADA	Present between SAMAST and SCADA. As discussed with NCIIPC during ISSC meeting, the same will be discontinued.	Not present	Under process for integration between SAMAST and SCADA.	Not present
12	SOC Implementation status:		Under discussion with Management for consent.	Under discusson with the Management.	Under discussion with Management. (However, main concerns are regarding AMC funding and manpower.) DPR will be prepared subsequent to Standardisation of SOC meeting with CSIRT-POWER	Under cosideration	Discussed with the Head Management and may agree on the condition 100% AMC is funded.	

MoM for virtual meeting held on 02.11.2023 for Dual reporting of RTU, PMU, VOIP, AGC etc. applications on 2+2 channel to main RLDC and Backup RLDC for North Eastern Region

Meeting started with opening remarks from Sr. DGM (CTUIL). He welcomed the participants in the meeting and made them aware about the growing communication requirements for ISTS as renewable energy is being injected into the grid at a very fast pace.

List of participants is attached at **Annexure-I**.

The agenda was discussed in 4th CPM dated 28.07.2023 and in the 26th NETeST meeting for North Eastern region specifically. POWERGRID has provided the requirement of FOTE, Ethernet cards, SAS, cards in SAS as per enclosed list in **Annexure-II**.

Deliberations:

POWERGRID provided following inputs:

1)POWERGRID provided the data for requirement of ports in SAS/RTU as per enclosed **Annexure-III**. However, POWERGRID shall clarify whether new SAS or new ethernet card is required in existing SAS after discussion with their AM department. POWERGRID to provide the cost estimate for required ethernet card/ SAS also.

2)Cost of one ethernet card for FOTE was stated by POWERGRID as 1.25 lacs approx.

3)CTU stated that as per the data provided by POWERGRID, one no. of SDH each at Ziro, Loktak and NTPC BgTPP is required. However, additional SDH for Loktak and NTPC BgTPP have already been considered in 'Additional FOTE for AGC scheme' and the requirement for dual redundancy at these two locations shall be met with these FOTEs at these locations. CTU further stated that for requirement of additional ethernet card at NTPC BgTPP, POWERGRID may include this requirement in the additional SDH requirement at NTPC BgTPP in the 'Additional FOTE for AGC scheme'. POWERGRID agreed with the same.

4)Requirement of one no. of SDH with minimum 8 no. of ethernet ports was agreed in the meeting for Ziro S/s.

Meeting ended with a vote of thanks from CTUIL.

Annexure-I

The list of participants is listed below:

Sr. No.	Name	Company Name	Designation
1	Shri H.S Kaushal	CTUIL	Sr.GM
2	Shri S.K Gupta	CTUIL	Sr.DGM
3	Shri Kaushal Suman	CTUIL	Mgr
4	Shri Vishal Badlas	POWERGRID	Mgr

Annexure A.19B

[redacted]

Availablity of additional requirement of RTU/SAS ethernet port at substation for dual redundancy of channels at Main and Back up RLDC

Region	Name of Substation	RTU/SAS			
		Data reporting RLDC through RTU/SAS GW	Are 5 no. of ethernet port available in existing RTU/SAS?(YES/NO)	If no, please mention requirement of RTU/SAS/Ethernet card.	
NER	Kumarghat S/S	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC. Data reporting to RLDC, RTAMC, BNTAMC, NTAMC from each gateway.	
NER	Jiribam	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC. Data reporting to RLDC, RTAMC, BNTAMC, NTAMC from each gateway.	
NER	Haflong	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC. Data reporting to RLDC, RTAMC, BNTAMC, NTAMC from each gateway.	
NER	Dimapur	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC. Data reporting to RLDC, RTAMC, BNTAMC, NTAMC from each gateway.	
NER	Aizawl	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC. Data reporting to RLDC, RTAMC, BNTAMC, NTAMC from each gateway.	
NER	Roing	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC. Data reporting to RLDC, RTAMC, BNTAMC, NTAMC from each gateway.	
NER	Tezu	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC. Data reporting to RLDC, RTAMC, BNTAMC, NTAMC from each gateway.	
NER	Namsai	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC. Data reporting to RLDC, RTAMC, BNTAMC, NTAMC from each gateway.	
NER	Mokokchung	SAS GW	No	Presently station is reporting on IEC-101 from each gateway to RLDC. If reporting is to be made on IEC-104 then, there shall be requirement of 02 Nos Port in each gateway. Details of ports used in each gateway : 104 ports - RTAMC, NTAMC, BNTAMC, spare, 101 port - RLDC	
NER	Melriat	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC	
NER	Balipara	RTU	No	Data is reporting to RLDC via 01 no. port (101 protocol) of Main & Standby Gateway each. Details of ports used in each gateway : 104 ports - RTAMC, NTAMC, BNTAMC, spare, 101 port - RLDC Being conventional station, data is also reporting through RTU via 1 port. Another 01 no port shall be required for Back up RLDC.	
NER	Misa	RTU	No	Data is reporting to RLDC via 01 no. port (101 protocol) of Main & Standby Gateway each. Details of ports used in each gateway : 104 ports - RTAMC, NTAMC, BNTAMC, spare, 101 port - RLDC Being conventional station, data is also reporting through RTU via 1 port. Another 01 no port shall be required for Back up RLDC.	
NER	Bongaigaon	RTU	No	Data is reporting to RLDC via 01 no. port (101 protocol) of Main & Standby Gateway each.Details of ports used in each gateway : 104 ports - RTAMC, NTAMC, BNTAMC, spare, 101 port - RLDC Being conventional station, data is also reporting through RTU via 1 port. Another 01 no port shall be required for Back up RLDC.	
NER	BNC	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC. For BNTAMC 01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to NTAMC.	
NER	Badarpur	RTU	No	Data is reporting to RLDC via 01 no. port (101 protocol) of Main & Standby Gateway each.Details of ports used in each gateway : 104 ports - RTAMC, NTAMC, BNTAMC, spare, 101 port - RLDC Being conventional station, data is also reporting through RTU via 1 port. Another 01 no port shall be required for Back up RLDC.	
NER	Khelrihat	RTU	No	Being conventional station, data is reporting through RTU via 1 port. Another 01 no port shall be required for Back up RLDC	
NER	Silchar	SAS GW	No	Presently station is reporting on IEC-101 from each gateway to RLDC. If reporting is to be made on IEC-104 then, there shall be requirement of 02 Nos Port in each gateway. Details of ports used in each gateway : 104 ports - RTAMC, NTAMC, BNTAMC, spare, 101 port - RLDC	
NER	Mariani	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC. Details of ports used in each gateway : 104 ports - RTAMC, NTAMC, BNTAMC, spare, 101 port - RLDC	
NER	Nirjuli	SAS GW	Yes		
NER	Ziro	RTU	No	Being conventional station, data is reporting through RTU via 1 port. Another 01 no port shall be required for Back up RLDC	
NER	Salakati	SAS GW	Yes	Existing 02 nos. of D400 gateway has 01 spare port each. From both D400 gateways, 01 port is reporting to RLDC.	
NER	Imphal	SAS GW	No	01 no. of spare port required in 2 gateways each as from each gateway 01 port is already reporting to RLDC. Details of ports used in each gateway : 104 ports - RTAMC, NTAMC, BNTAMC, spare, 101 port - RLDC .	

* Additionally required ethernet port over and above existing capacity.

Note - For additional port reporting to Back up RLDC, necessary configuration in SAS shall be required

	YES	NO
SAS	2	14
RTU	0	6

Availablity details of RTU/SAS ethernet port at various POWERGRID stations for data reporting to Main and Back up RLDC through redundant channels

Sl.No	Region	Total Stations	No of stations				Remarks
			SAS(Are 5 no. of ethernet ports available)		RTU(Are 5 no. of ethernet ports available)		
			Yes(No's)	No(No's)	Yes(No's)	No(No's)	
1	WR1	26	15	9	2	0	
2	WR2	32	9	18	4	1	
3	SR1	21	0	13	0	8	
4	SR2	38	0	25	0	13	
5	ER1	17	11	1	0	5	Upgradation WIP SAS_5, RTU_5
6	ER2	14	4	3	1	6	Upgradation WIP SAS_5, RTU_6
7	NR1	38	8	22	4	4	
8	NR2	25	1	18	5	1	
9	NR3	27	5	15	5	2	
10	NER	22	2	14	0	6	
11	ODISHA	10	5	0	0	5	Upgradation WIP SA_1, RTU_5
Total		**270**	**60**	**138**	**21**	**51**	

Final qty (Stations are Excluded which are under upgradation)	**138**		**35**
		Rate per station(Cr.)	**Amount in Crores**
Total SAS based stations	**138**	**1.5**	**207.00**
Total RTU based stations	**35**	**0.3**	**10.50**
Grand Total			**217.50**

Annexure A.20A

List for Requirement of Additional FOTE in NER at AGC locations

Sr No.	Name	Required FOTE as per input provided by POWERGRID/ISGS (Qty in No.)	Remark
1	Loktak	1	Already approved in 16th NCT
2	Bongaigaon	1	Already approved in 16th NCT
3	Kopili	0	NERLDC suggested additional stations for AGC in 4th CPM
4	Khandong	0	NERLDC suggested additional stations for AGC in 4th CPM
5	Kathalguri	0	NERLDC suggested additional stations for AGC in 4th CPM
6	Kopili Stage-2	0	NERLDC suggested additional stations for AGC in 4th CPM
7	Doyang HEP (NTPC+NEEPCO)	1	NERLDC suggested additional stations for AGC in 4th CPM
8	Kameng (NEEPCO)	**FOTE Data to be updated by POWERGRID**	NERLDC suggested additional stations for AGC in 26th NE TeST
9	Pallatana (OTPC)	1	NERLDC suggested additional stations for AGC in 26th NE TeST
10	Lower Subansiri (NHPC)	1	NERLDC suggested additional stations for AGC in 26th NE TeST, Upcoming Plant
Total FOTE quantity required in this scheme		**03**	

Comprehensive T&D-Arunachal Pradesh and NERPSIP. Map is required because many stations mentioned in the scheme above are connected with existing ISTS/ISGS nodes.

NERLDC had provide the necessary details of Comprehensive T&D-Arunachal Pradesh and NERPSIP to CTUIL via email dated 23rd June 2023.

CTUIL is requested to update about the preparation of the communication map.
Members may deliberate.

Deliberations: As per point number 3.0 above.

5.0 VSAT project for North-Eastern Region (by NERLDC)

Considering the various geographical factors, technological factors and successful pilot projects, it was decided in various NERPC forums that a special project of VSAT technology will be envisaged for all NER states. Subsequently, DPR was submitted by each state and put up to Techno-economic Sub-group (TSEG) committee of PSDF secretariat, where it was deliberated to put the OPGW and VSAT in same DPR on request of CTUIL.
CTUIL is requested not to keep OPGW and VSAT technology as part of same DPR.

Members may deliberate.

Deliberations:
GRID-INDIA stated that DPR of VSAT and OPGW for PSDF funding should not be combined as suggested in recent TESG group meeting. Forum agreed that both technologies are completely different. GRID-INDIA further stated that the tenders of VSAT and OPGW are never clubbed together and vendors handling the two technologies of communication are separate with different expertise. The VSAT technology has been tested on Extended-C band in pilot projects conducted in NER and the same is under operation in around 13 nos. of stations (incl. 3 stations of POWERGRID) located in Arunachal Pradesh. The approvals for adoption of this technology had already been taken in TCC/NERPC Board meeting held in March 2022 at Guwahati. In order to analyse the matter further, CTU requested GRID-INDIA to share minutes of meeting of the TESG held in March-2023 and CTU will revert after getting the details. GRID-INDIA agreed to provide the same.

6.0 Additional FOTE at all AGC operated generating stations in North Eastern region, in view of resource disjoint and criticality of AGC operation for grid operation purpose (by NERLDC)

Additional FOTE at all AGC operated generating stations in North Eastern region, in view of resource disjoint and criticality of AGC operation for grid operation purpose. Failure or single equipment may lead to disruption in AGC operation.
Following AGC Locations may be considered for additional FOTE:

a. Bongaigaon – AGC Operational
b. Loktak – AGC Operational
c. Kopili – AGC under implementation
d. Khandong – AGC under implementation
e. Kopili Stage 2 – AGC under implementation
f. Kathalguri – AGC under implementation

g. Doyang HEP – AGC under implementation
Members may deliberate.

Deliberations: GRID-INDIA informed the forum that five nos. of new AGC stations as stated above are planned for implementing the AGC in NE Region as per CERC order and these stations shall be operational for AGC in next three to four months tentatively. Accordingly, FOTE redundancy may also be planned. Mizoram told that it is not confirmed whether AGC shall be implemented or not at Doyang HEP. GRID-India stated that these stations are approved as per CERC order; however, they will re-check and confirm during discussion of agenda in NETeST meeting. POWERGRID shared the equipment requirement for redundancy as follows via email dated-04/08/23 as below:
Kopili – No
Khandong -No
Kopili stage 2 -No (In the said meeting, it is informed that Kopili stage 2 and Khandong are in same premises. Therefore, Kopili stage 2 is considered as Khandong).
Kathalguri – No (At present only 1 SDH is PRESENT. However, 1 no. is upcoming under Kathalguri – Namsai (NERXV))
Doyang – Yes
Accordingly one FOTE for Doyang-HEP is required for AGC operation .The agenda shall be put up in RPC TeST for review.

7.0 OPGW Connectivity of 220 kV Zahdima (Nagaland/State node) to 400/220 kV New Kohima (KMTL/ISTS node) (by NERLDC)

DoP Nagaland is constructing 220/132 kV Zahdima substation which will be connected with 400/220 kV (KMTL/ISTS node) over 220 kV Transmission line being constructed by State. It has come to notice that OPGW is not envisaged in the Transmission line.
Forum may discuss about the possibility of considering the OPGW over the 220 KV Zahdima – New Kohima transmission line.

Members may deliberate.

Deliberations: POWERGRID informed that 220KV Zahdima- New Kohima transmission line is a state-sector line and for laying OPGW on this line, ISTS approval of NCT is required. CTU clarified that for laying OPGW on state-sector lines under ISTS, it should be utilized for ISTS communication. Further for the same, agreement of owner state and all other stakeholders is required. The agenda shall be further discussed in NERPC meeting in presence of DoP-Nagaland and other states.

Meeting ended with a vote of thanks from CTUIL.

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This agenda was deliberated in 25th NETeST meeting held on 25.05.2023 wherein the forum advised CTUIL to inform the critical node identified by PGCIL/CTU to the forum.

CTU has identified few SPOF nodes such as Bongaigaon, Melriat, Imphal and Dimapur. POWERGRID may confirm status of redundant FOTE and Power Supply at these nodes.

Further, any other SPOF nodes may be suggested by members.

Deliberation of the sub-Committee:

POWERGRID informed that 1 no. FOTE & 1 no. Power Supply is available at Bongaigaon, Melriat, Imphal and Dimapur. However redundant FOTE and Power Supply at Melriat & Imphal may not be useful as the exiting network utilization is around 10% and 20% respectively. After detailed deliberation, the forum opined that due to space/cost, FOTE level redundancy is not recommended. The forum requested CTU to identify to alternate links/route to these SPOF.

The Sub-Committee noted as above.

Action: CTU

A.21 Additional FOTE at AGC locations

Additional FOTE at all AGC operated generating stations in North Eastern region is required in view of resource disjoint and criticality of AGC operation for grid operation purpose as failure of single equipment may lead to disruption in AGC operation. Further, at many locations redundant ethernet port are not available as per NLDC requirement. The NLDC requirement is as follows:

- 1+1 Ethernet port for main NLDC
- 1+1 Ethernet ports are for backup NLDC

This is to be deliberated for additional FOTE and ports/cards at AGC locations.

Following AGC Locations may be considered for additional FOTE:

a) Kopili – AGC under implementation
b) Khandong – AGC under implementation
c) Kopili Stage 2 – AGC under implementation
d) Kathalguri – AGC under implementation
e) Doyang HEP – AGC under implementation

Deliberations in 4th CPM: GRID-INDIA informed the forum that five nos. of new AGC stations as stated above are planned for implementing the AGC in NE Region as per CERC order and these stations shall be operational for AGC in next three to four months tentatively. Accordingly, FOTE redundancy may also be planned.

POWERGRID shared the FOTE equipment requirement for redundancy as follows via email dated-04/08/23 as below:

- **Kopili** – No
- **Khandong** -No
- **Kopili stage 2** -No (In the said meeting, it is informed that Kopili stage 2 and Khandong are in same premises. Therefore, Kopili stage 2 is considered as Khandong).
- **Kathalguri** – No (At present only 1 SDH is PRESENT. However, 1 no. is upcoming under Kathalguri – Namsai (NERXV)
- **Doyang** – Yes

Accordingly, one FOTE for Doyang-HEP is required for AGC operation.

Deliberation of the sub-Committee:

NERLDC informed the forum that as per CERC Ancillary Regulation, 2022 Subhansiri (Upcoming NHPC Plant), Kameng (NEEPCO) and Palatana (OTPC) also qualifies for AGC implementation. Thus, additional FOTE should be considered for Subhanshiri (Upcoming NHPC Plant), Kameng (NEEPCO), Palatana (OTPC) and Doyang-HEP.

The Sub-Committee noted as above.

Action: CTU

A.22 Connectivity of STU node on fibre in view of AMR.

The meter readings from several locations (mostly STU nodes) (list of location shall be provided by Grid-India) in each region are intermittent and having communication issues as the meters at the state nodes are not having secure & reliable communication links and are operational on public domain communication links like GPRS. It is proposed to provide the connectivity of such nodes on captive OPGW network for receiving the data successfully for AMR purpose.

Grid-India has identified a list of such nodes (list attached as **Annexure A.22**) for each region.

The line length (for the STU nodes as listed in **Annexure A.22**) from STU node to nearest ISTS node may be provided by Grid-India/STU/State constituent along with line name, line ownership so as to prepare a scheme for OPGW laying. Based on the inputs received, the scheme shall be made and put up for approval in NCT.

ANNEXURE A.25A

सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत संचार विकास प्रभाग
Power Communication Development Division

वसुधैव कुटुम्बकम्
ONE EARTH • ONE FAMILY • ONE FUTURE

To
As per attached list

Subject: Network map and status of optical fiber (OPGW, ADSS, UGFO etc.) laying - regd

महोदय / Sir,

As you may be aware that the Electricity Act, 2003 under the Section 73 mandates Central Electricity Authority to advise the Central Government on the matters relating to the national electricity policy, formulate short-term and perspective plans for development of the electricity system, and coordinate the activities of the planning agencies for the optimal utilization of resources to sub serve the interests of the national economy. Accordingly, CEA collects and records the data concerning the Indian Power Sector and carries out relevant studies.

2. Communication system is the backbone of the power system for facilitating secure, reliable and economic operation of inter-connected and integrated power system. It is also an important pre-requisite for efficient monitoring, operation and control of the power system.

3. PCD Division, CEA maintains record of the data pertaining to communication system in Power System which is analyzed for optimal utilization of transmission assets for communication purposes. Therefore, it is requested to kindly furnish complete map of existing as well as proposed wideband network of your communication infrastructure and status of optical fiber laying as per the Annexure in soft copy at the earliest at cepcd.cea@gov.in.

Encl.: As above

भवदीय,

22.8.2023

(लन जे. बी. / Len J.B.)
निदेशक /Director

प्रतिलिपि/ Copy to,

(i) Member (Power System), CEA
(ii) Member Secretary, NRPC
(iii) Member Secretary, WRPC
(iv) Member Secretary, ERPC
(v) Member Secretary, SRPC
(vi) Member Secretary, NERPC

With a request to issue suitable instructions to states for expediting furnishing of requisite data.

1.	**Executive Director(AM and LD&C)** Power Grid Corporation of India Ltd., Saudamini, Plot No.2, Sector-29, Gurugram-122001.
2.	**COO** Central Transmission Utility of India Ltd., Plot No. 2, Sector-29, Gurugram, Haryana-122001.

ISTS Licensees:

1.	**Chief-Business & Regulatory** Sterlite Power Transmission Ltd., F-1, The Mira Corporates Suits, Plot No. 1 &2, C-Block, 2nd Floor, Ishwar Nagar, Mathura Road, NewDelhi-110065.	**2.**	**Head Projects** Adani Transmission Ltd., Adani Corporate House, Shantigram, SG Highway, Ahmedabad-382421, Gujarat.
3.	**CFO** Essel Infraprojects Ltd., NRSS XXXVI Transmission Ltd., (Essel Infraprojects Ltd.), Sec 16A, Plot No.-19, Filn City, Gautam Budhha Nagar-201301.	**4.**	**Director** Kalpataru Power Transmission Ltd., Plot No. 101, Part-III, G.I.D.C., Sector-28, Gandhinagar-382028.
5.	**Director** Kudgi Transmission Ltd., Mount Poonamallee Road, Manapakkam, P.B. No. 979, Chennai-600089.	**6.**	**AGM (Comm. & Reg. Affairs)** Sekura Energy Pvt. Ltd., 504 & 505, 5th Floor, Windsor, Off CST Road, Kalina, Santacruz, Mumbai-400098.
7.	**Project Incharge** Raichur Sholapur Transmission Company Ltd., Patel Estate, S.V. Road, Jogeshewari(West), Mumbai-400102.		

Northern Region:

1.	**Director (Projects)** Himachal Pradesh Power Transmission Corporation Ltd., Barowalias, Khalini, Shimla- 171002.	**2.**	**Director(W&P)** Uttar Pradesh Power Transmission Company Ltd., Shakti Bhawan Extn, 3rd floor, 14, Ashok Marg, Lucknow-226 001.
3.	**Director (Technical)** Punjab State Transmission Corp.Ltd. Head Office, The Mall, Patiala - 147001, Punjab.	**4.**	**Director (Projects)** Power Transmission Corporation of Uttrakhand Ltd., Vidyut Bhawan, Near

			ISBT Crossing, Saharanpur Road, Majra, Dehradun.
5.	**Development Commissioner (Power)** Power Development Department, Grid Substation Complex, Janipur, Jammu.	**6.**	**Director (Technical)** Rajasthan Rajya Vidyut Prasaran Nigam Ltd., Vidyut Bhawan, Jaipur, Rajasthan-302005.
7.	**Director (Technical)** Haryana Vidyut Prasaran Nigam Ltd. Shakti Bhawan, Sector-6, Panchkula-134109, Haryana.	**8.**	**Chief Engineer (Operation)** Administration of Chandigarh Electricity Department, UT Secretariat Sector-9 D, Chandigarh – 161009.
9.	**Director (Operations)** Delhi Transco Ltd., Shakti Sadan, Kotla Road, New Delhi-110002.		

Eastern Region:

1.	**CMD** Damodar Valley Corporation DVC Towers, VIP Road, Kolkata-700054.	**2.**	**CMD** Odisha Power Transmission Corporation Ltd. (OPTCL), Bhoinagar Post Office, Jan path, Bhubaneshwar-751022.
3.	**CMD** Bihar State Power Transmission Company Ltd. (BSPTCL), Vidyut Bhavan, 4th floor, Bailey Road, Patna-800021.	**4.**	**CMD** Jharkhand Urja Sancharan Nigam Ltd. (JUSNL), Engineering Building, HEC, Dhurwa, Ranchi -834004.
5.	**Principal Chief Engineer cum Secretary** Power Department, Government of Sikkim, Gangtok, Sikkim.	**6.**	**Managing Director** West Bengal State Electricity Transmission Company Ltd. (WBSETCL), Vidyut Bhavan, 8th Floor, A-Block Salt Lake City, Kolkata-700091.

North Eastern Region:

1.	**Managing Director** Manipur State Power Company Ltd. (MSPCL), Electricity Complex, Patta No. 1293 under 87(2), Khwai Bazar, Keishampat, Imphal West, Manipur- 795001.	**2.**	**CMD** Tripura State Electricity Corporation Ltd., Bidyut Bhavan, Banamalipur, Agartala, Tripura.
3.	**Managing Director** Assam Electricity Grid Corporation Ltd., Bijulee Bhawan, Paltan Bazar Guwahati (Assam) - 781001.	**4.**	**Engineer-in-Chief** Power & Electricity Department, Kawlphetha Building, New Secretariat Complex, Khatla, Aizawl, Mizoram- 796001.
5.	**CMD** Meghalaya Energy Corporation Ltd., Lum Jingshai, Short Round Road, Shillong (Meghalaya) - 793001.	**6.**	**Chief Engineer (T&G)** Department of Power, Electricity House, A.G. Colony, Kohima, Nagaland- 797001.
7.	**Chief Engineer (Power)** Vidyut Bhawan, Department of Power Zero Point Tinali, Itanagar (Arunachal Pradesh)- 791111.		

Western Region:

1.	**Managing Director** Gujarat Energy Transmission Corp. Ltd., Sardar Patel Vidyut Bhawan, Race Course, Vadodara -390007.	**2.**	**Director (Operation)** Maharashtra State Electricity Transmission Co. Ltd., 4th Floor, "Prakashganga", Plot No. C-19, E- Block, Bandra – Kurla Complex, Bandra (East), Mumbai- 400051.
3.	**Managing Director,** Chhattisgarh State Power Transmission Co. Ltd., Dangania, Raipur- 492013.	**4.**	**Chairman & Managing Director** Madhya Pradesh Power Transmission Co. Ltd., Block No. 3, Shakti Bhawan, Rampur, Jabalpur-482008.
5.	**Executive Engineer** Administration of Union Territory of Dadra & Nagar Haveli and Daman & Diu Secretariat, Moti Daman -395 220.	**6.**	**The Chief Engineer** Electricity Department The Government of Goa, Panaji.

Southern region:

1.	**Director (Grid Operation)** Transmission Corp. of Telangana Ltd., Vidyut Soudha, Hyderabad – 500082.	**2.**	**Director (Transmission)** Karnataka State Power Transmission Corp. Ltd., Cauvery Bhawan, Bangalore – 560009.
3.	**Director (Trans. & System Op.)** Kerala State Electricity Board Ltd., Vidyuthi Bhawanam, Pattom, P.B. No. 1028, Thiruvananthapuram – 695004.	**4.**	**Director (Transmission Projects)** Tamil Nadu Transmission Corporation Ltd. (TANTRANSCO), 6th Floor, Eastern Wing, 800 Anna Salai, Chennai – 600002.
5.	**Superintending Engineer –I** First Floor, Electricity Department Gingy Salai, Puducherry – 605001.	**6.**	**Director (Transmission)** Transmission Corp. of Andhra Pradesh Ltd. (APTRANSCO), Vidyut Soudha, Gunadala, Eluru Rd, Vijayawada, Andhra Pradesh – 520004.

Annexure

Format for furnishing status of OPGW/optical fiber laying

Existing (as on 31.07.2023)		Plan (up to 31.03.2024)				
Total ckm of OPGW/optical fiber laid	No. of FOTE nodes connected	Ckm of OPGW/ optical fiber proposed to be laid	No. of Nodes proposed	Are there links where leased line is being used? If yes, furnish the details of the links	Are there links where OPGW/optical fiber is not planned? If yes, details and reasons thereof	Technologies of FOTE (SDH/MPLS-TP/IP-MPLS) being used and details thereof

Azadi Ka Amrit Mahotsav

सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत संचार विकास प्रभाग
Power Communication Development Division
****

To
As per attached list

Subject: Requirement of OPGW/fiber for communication infrastructure in power system – reg

This is in continuation to our earlier letter dated 22.08.2023 (attached herewith) vide which detailed information was sought from ISTS Licensees and State Transmission Utilities regarding the existing and proposed wideband network of their communication infrastructure and the status of optical fiber laying.

This is to state that furnishing of the requisite data is still pending from some State Transmission Utilities. As coordinated and collaborative efforts are required for development of inter-connected and integrated power system, it is once again requested from the States to furnish the required data.

Further, Ministry of Power vide its email dated 29.01.2024 has requested CEA to ascertain the demand-supply scenario pertaining to the indigenous manufacturing capability vis-à-vis requirement of OPGW/fiber for the next 5 years . Accordingly, States are requested to kindly furnish the year wise projected plan for the OPGW/fiber requirement in their Intra-state network for the next 5 years starting 2023-24 and ending 2027-28 in the following format.

Existing km of OPGW/Optical fiber	Projected OPGW /fiber requirement (in km)				
	2023-24	2024-25	2025-26	2026-27	2027-28

As per the Intra-State projected Transmission Data (132 kV and above) for the period 2022-27, available with CEA, the requirement of OPGW/fiber for each of the States by 2026-27 has also been worked out and is tabulated in Annexure I.

STU's are requested to kindly confirm/update the same as per their updated Five Year Plans for OPGW/fiber laying, latest by 15.02.2024 . The updated information may be submitted in soft copy at cepcd.cea@gov.in. In the event of non-receipt of any response, the figure in ckm as stated in the Annexure against each State will be taken as final figure.

Encl.: As above

08/2/24 भवदीय,

(एस.के.महाराणा / **S. K. Maharana**)
मुख्य अभियन्ता /**Chief Engineer**

I/33669/2024

प्रतिलिपि/ Copy to,

(i) Member (Power System), CEA
(ii) Member Secretary, NRPC
(iii) Member Secretary, WRPC
(iv) Member Secretary, ERPC
(v) Member Secretary, SRPC

With a request to issue suitable instructions to states for expediting furnishing of requisite data

1.	**Executive Director(AM and LD&C)** Power Grid Corporation of India Ltd., Saudamini, Plot No.2, Sector-29, Gurugram-122001.
2.	**COO** Central Transmission Utility of India Ltd., Plot No. 2, Sector-29, Gurugram, Haryana-122001.

ISTS Licensees:

1.	**Chief-Business & Regulatory** Sterlite Power Transmission Ltd., F-1, The Mira Corporates Suits, Plot No. 1 &2, C-Block, 2nd Floor, Ishwar Nagar, Mathura Road, NewDelhi-110065.	**2.**	**Head Projects** Adani Transmission Ltd., Adani Corporate House, Shantigram, SG Highway, Ahmedabad-382421, Gujarat.
3.	**CFO** Essel Infraprojects Ltd., NRSS XXXVI Transmission Ltd., (Essel Infraprojects Ltd.), Sec 16A, Plot No.-19, Filn City, Gautam Budhha Nagar-201301.	**4.**	**Director** Kalpataru Power Transmission Ltd., Plot No. 101, Part-III, G.I.D.C., Sector-28, Gandhinagar-382028.
5.	**Director** Kudgi Transmission Ltd., Mount Poonamallee Road, Manapakkam, P.B. No. 979, Chennai-600089.	**6.**	**AGM (Comm. & Reg. Affairs)** Sekura Energy Pvt. Ltd., 504 & 505, 5th Floor, Windsor, Off CST Road, Kalina, Santacruz, Mumbai-400098.
7.	**Project Incharge** Raichur Sholapur Transmission Company Ltd., Patel Estate, S.V. Road, Jogeshewari(West), Mumbai-400102.		

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1.	**Director (Projects)** Himachal Pradesh Power Transmission Corporation Ltd., Barowalias, Khalini, Shimla- 171002.	**2.**	**Director(W&P)** Uttar Pradesh Power Transmission Company Ltd., Shakti Bhawan Extn, 3rd floor, 14, Ashok Marg, Lucknow-226 001.
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5.	**Superintending Engineer –I** First Floor, Electricity Department Gingy Salai, Puducherry – 605001.	**6.**	**Director (Transmission)** Transmission Corp. of Andhra Pradesh Ltd. (APTRANSCO), Vidyut Soudha, Gunadala, Eluru Rd, Vijayawada, Andhra Pradesh – 520004.

Annexure-I

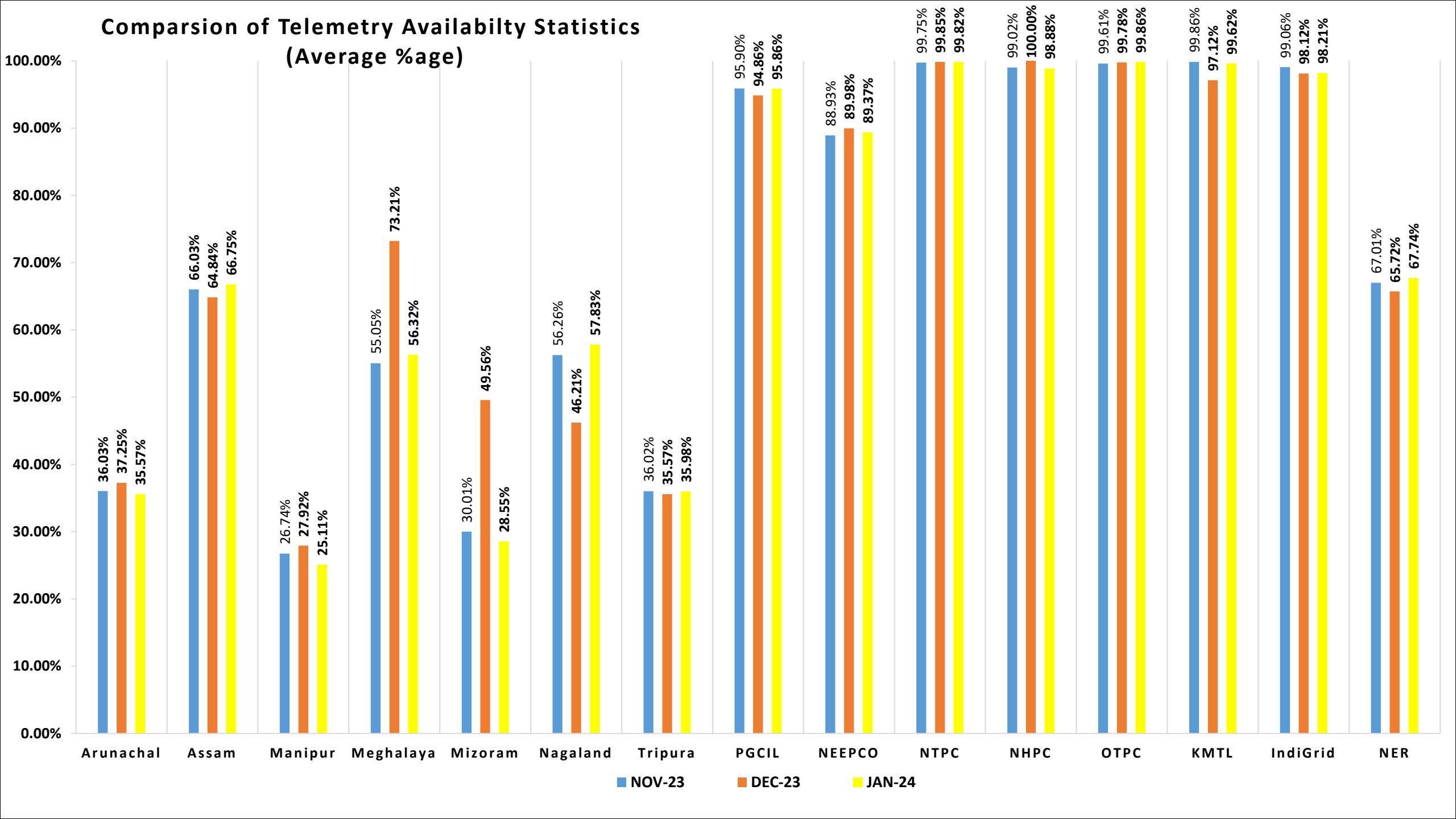
S. No.	**Name of the State**	**OPGW/fiber requirement by 2026-2027 (in km)**
1	Delhi	203.55
2	Haryana	668.77
3	Himachal Pradesh	157.3
4	Jammu & Kashmir	566.9
5	Ladakh	133.5
6	Punjab	333.65
7	Uttar Pradesh	5955.1
8	Uttarakhand	59.7
9	Rajasthan	1996.1
10	Maharashtra	507
11	Gujarat	7983
12	Madhya Pradesh	1900.49
13	Chhattisgarh	0
14	Goa	0
15	DNH & DD	0
16	Tamil Nadu	3096.7
17	Karnataka	501.25
18	Andhra Pradesh	3000.31
19	Kerala	1002.95
20	Telangana	1364.6
21	Bihar	1086
22	West Bengal	1690
23	Jharkhand	662.44
24	Odisha	1296.52
25	Arunanchal Pradesh	0

S. No.	**Name of the State**	**OPGW/fiber requirement by 2026-2027 (in km)**
26	Assam	852.462
27	Meghalaya	709.68
28	Nagaland	353.5
29	Manipur	0
30	Tripura	310.324
31	Mizoram	278.325
32	Sikkim	0
	Total	**36670.12**

Telemetry Statistics for the month of January 2024

Annexure B.6

Sl. No.	Utility	Average Total Percentage	Average Analog Percentage	Average Digital Availability	Average RTU Availability
1	PGCIL	95.86	95.12	94.99	96.8
2	NEEPCO	89.37	90.21	86.35	100
3	NTPC	99.82	99.87	99.68	99.94
4	NHPC	98.88	99.18	98.25	100
5	OTPC	99.86	99.81	99.89	99.78
6	KMTL	99.62	97.48	99.92	100
7	IndiGrid	98.21	98.24	98.11	100
8	Arunachal Pradesh	35.57	37.18	34.25	37.54
9	Assam	66.75	66.12	69.28	78.15
10	Manipur	25.11	26.28	23.77	31.73
11	Meghalaya	56.32	72.63	42.96	80.22
12	Mizoram	28.55	50.18	12.45	60.21
13	Nagaland	57.83	47.21	61.53	46.22
14	Tripura	35.98	36.1	35.25	36.24
	NER	67.74	66.87	68.53	71.37


Comparsion of Telemetry Availabilty Statistics
(Average %age)
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
36.03%
37.25%
35.57%
66.03%
64.84%
66.75%
26.74%
27.92%
25.11%
55.05%
73.21%
56.32%
30.01%
49.56%
28.55%
56.26%
46.21%
57.83%
36.02%
35.57%
35.98%
95.90%
94.86%
95.86%
88.93%
89.98%
89.37%
99.75%
99.85%
99.82%
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98.88%
99.61%
99.78%
99.86%
99.86%
97.12%
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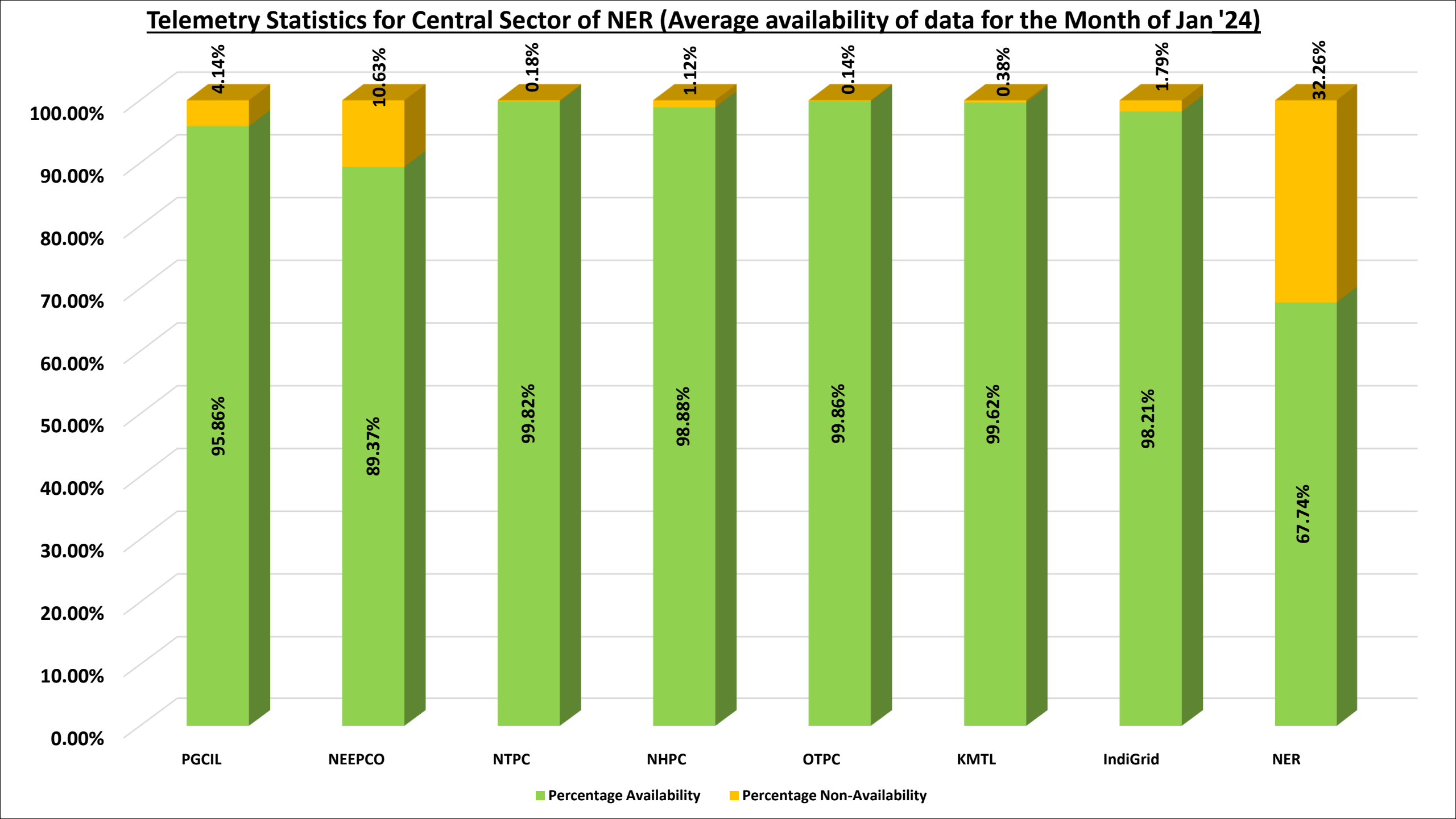
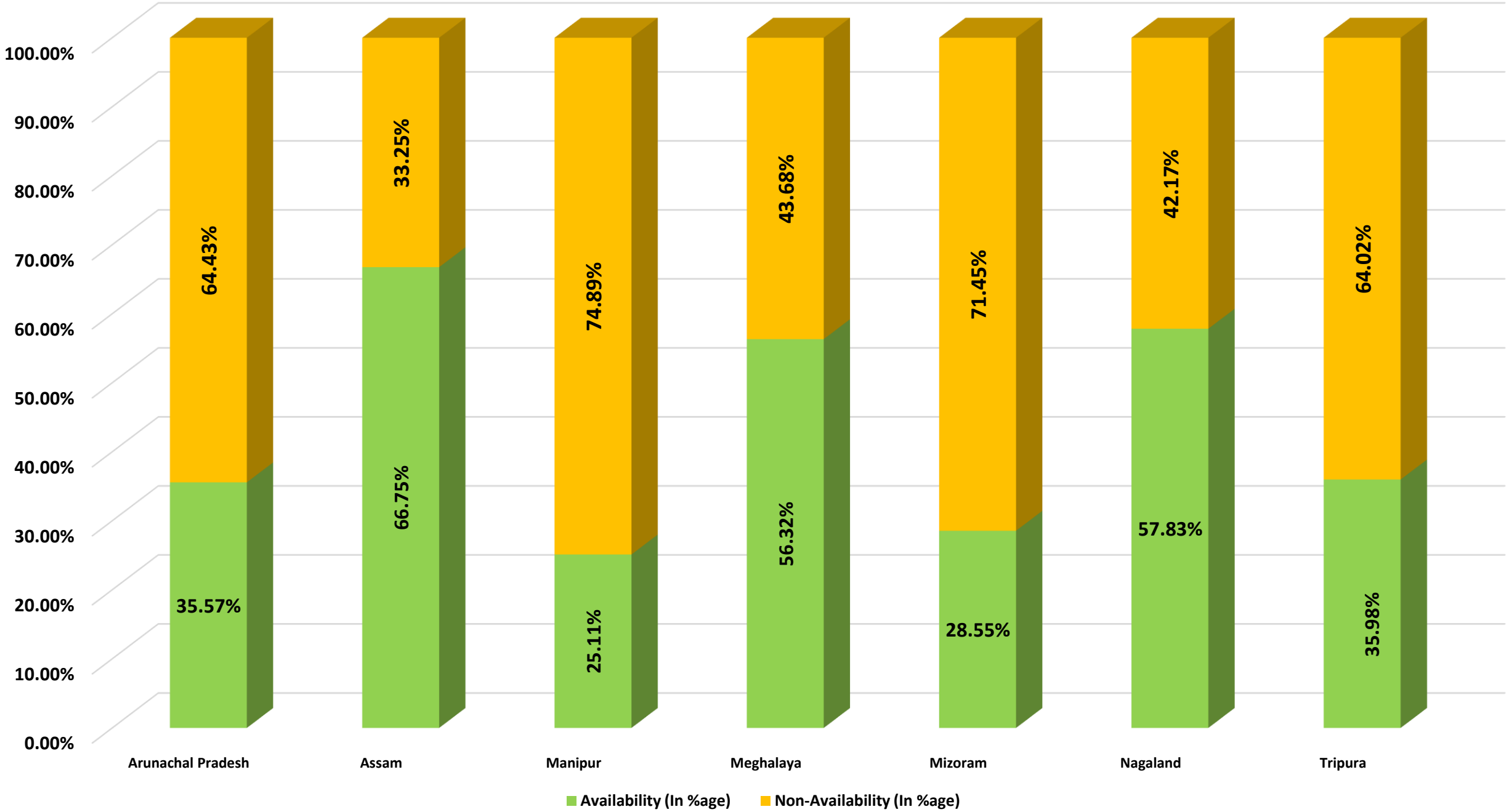
99.06%
98.12%
98.21%
67.01%
65.72%
67.74%
Arunachal
Assam
Manipur
Meghalaya
Mizoram
Nagaland
Tripura
PGCIL
NEEPCO
NTPC
NHPC
OTPC
KMTL
IndiGrid
NER
NOV-23
DEC-23
JAN-24

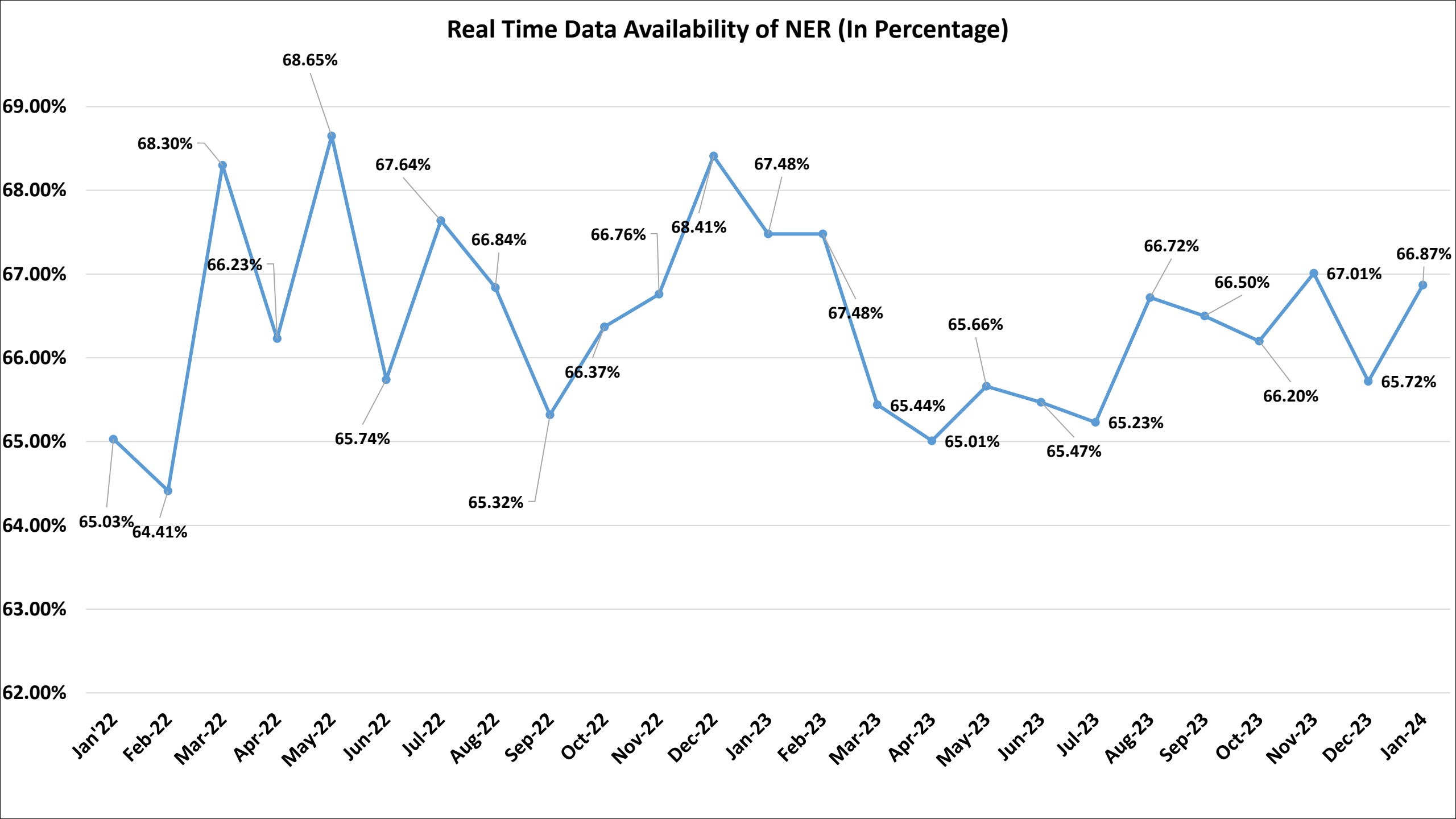
Telemetry Statistics for Central Sector of NER (Average availability of data for the Month of Jan '24)



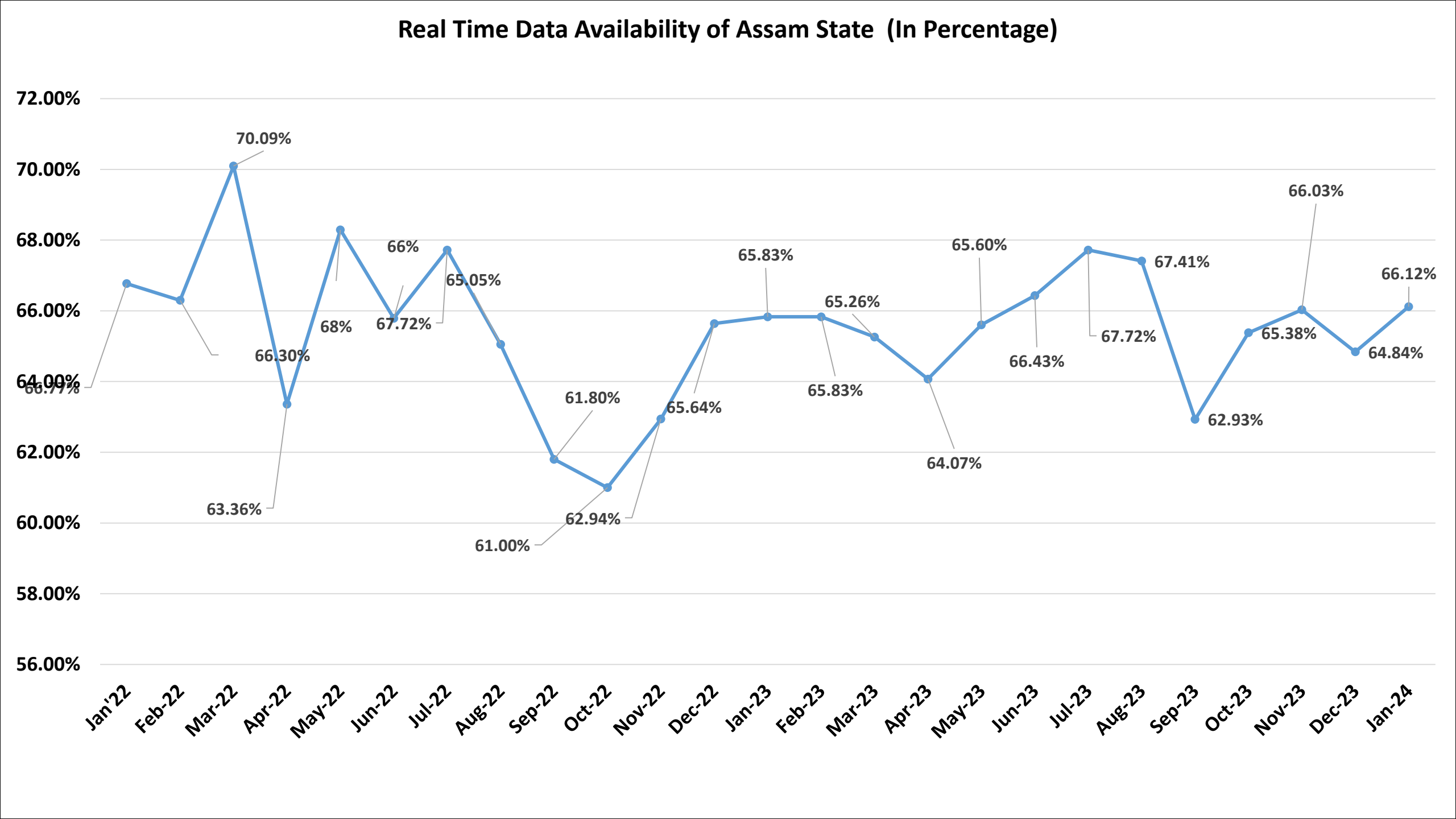
Telemetry Statistics for NER States(Average availability of data for the Month of Jan '24)

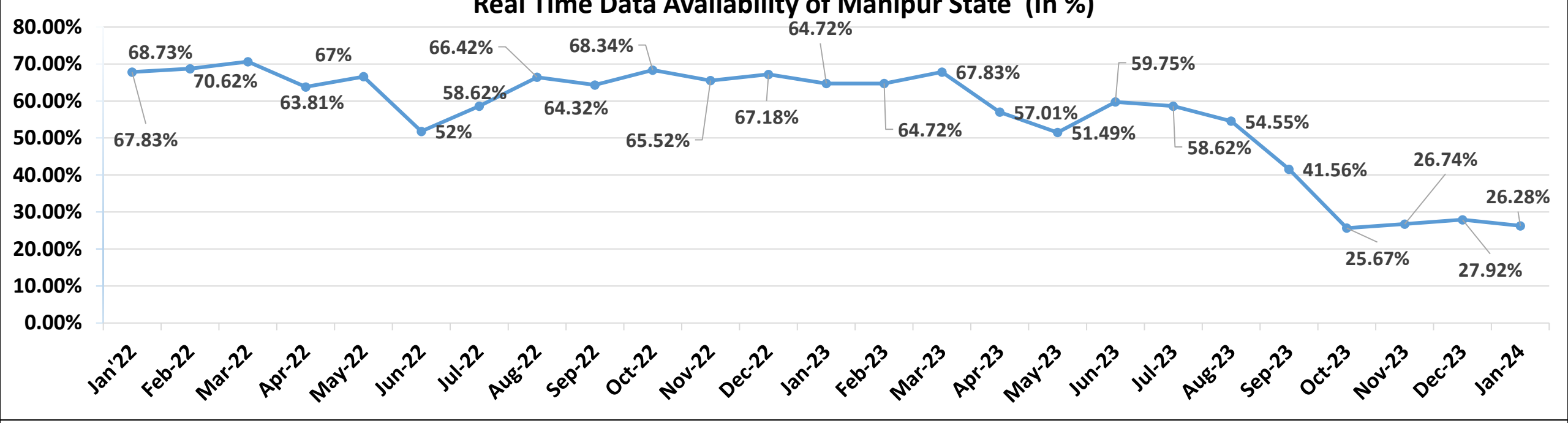


Real Time Data Availability of NER (In Percentage)



Real Time Data Availability of Assam State (In Percentage)




80.00%
70.00%
60.00%
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40.00%
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20.00%
10.00%
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68.73%
70.62%
63.81%
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67.18%
64.72%
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67.83%
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59.75%
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54.55%
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25.67%
26.74%
27.92%
26.28%
67.83%
Jan'22
Feb-22
Mar-22
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Jun-22
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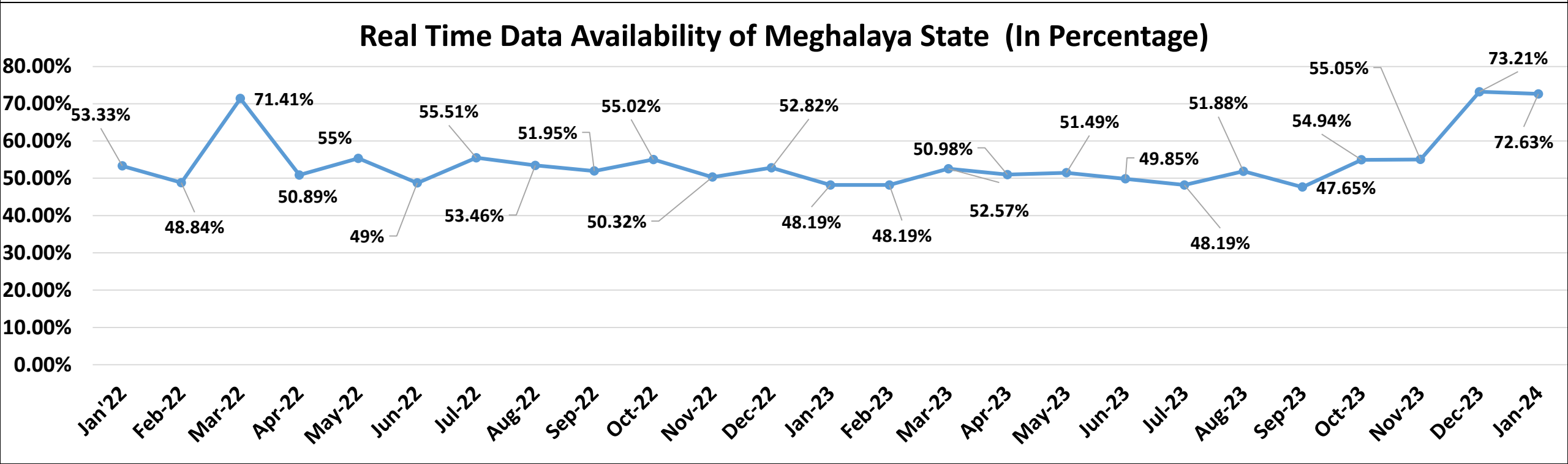
Jan-24


Real Time Data Availability of Meghalaya State (In Percentage)
80.00%
70.00%
60.00%
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55%
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53.46%
51.95%
55.02%
50.32%
52.82%
48.19%
48.19%
50.98%
52.57%
51.49%
49.85%
51.88%
48.19%
54.94%
47.65%
55.05%
73.21%
72.63%
Jan'22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
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Jan-23
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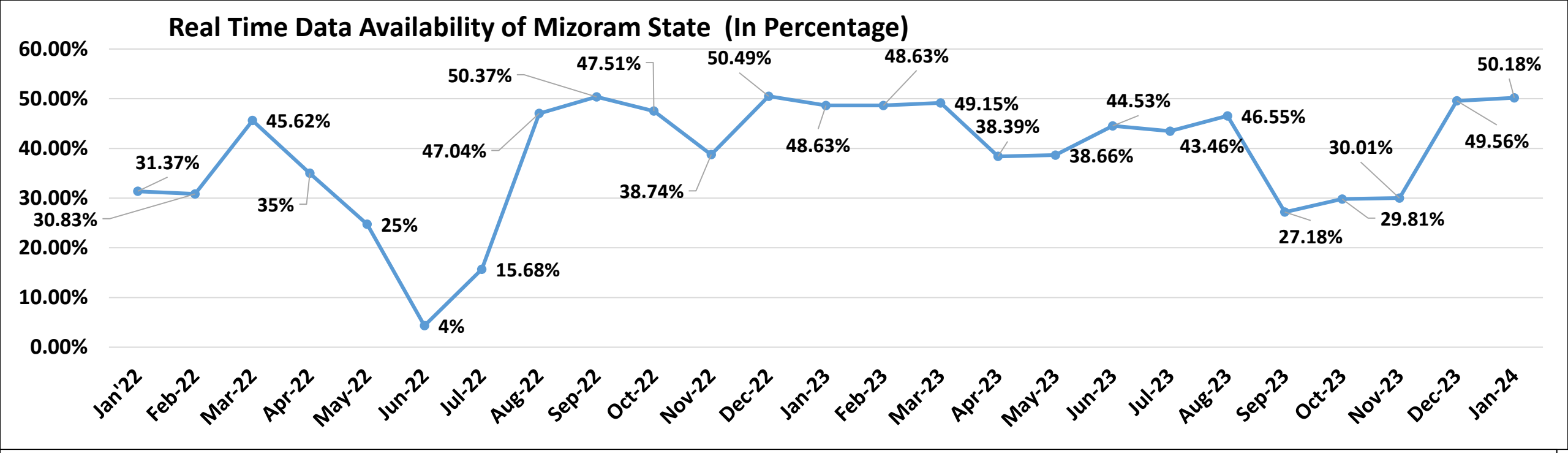
Jan-24


Real Time Data Availability of Mizoram State (In Percentage)
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
31.37%
30.83%
45.62%
35%
25%
4%
15.68%
47.04%
50.37%
47.51%
38.74%
50.49%
48.63%
48.63%
49.15%
38.39%
38.66%
44.53%
43.46%
46.55%
27.18%
30.01%
29.81%
49.56%
50.18%
Jan'22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Jan-23
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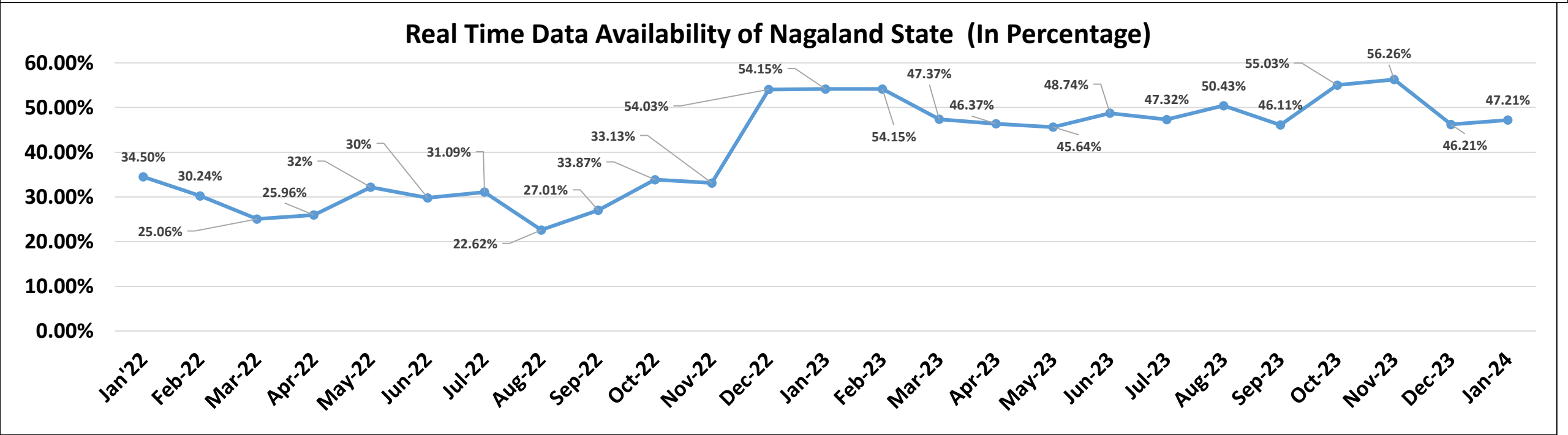
Real Time Data Availability of Nagaland State (In Percentage)
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
34.50%
25.06%
30.24%
25.96%
32%
30%
31.09%
22.62%
27.01%
33.87%
33.13%
54.03%
54.15%
54.15%
47.37%
46.37%
45.64%
48.74%
47.32%
50.43%
46.11%
55.03%
56.26%
46.21%
47.21%
Jan'22
Feb-22
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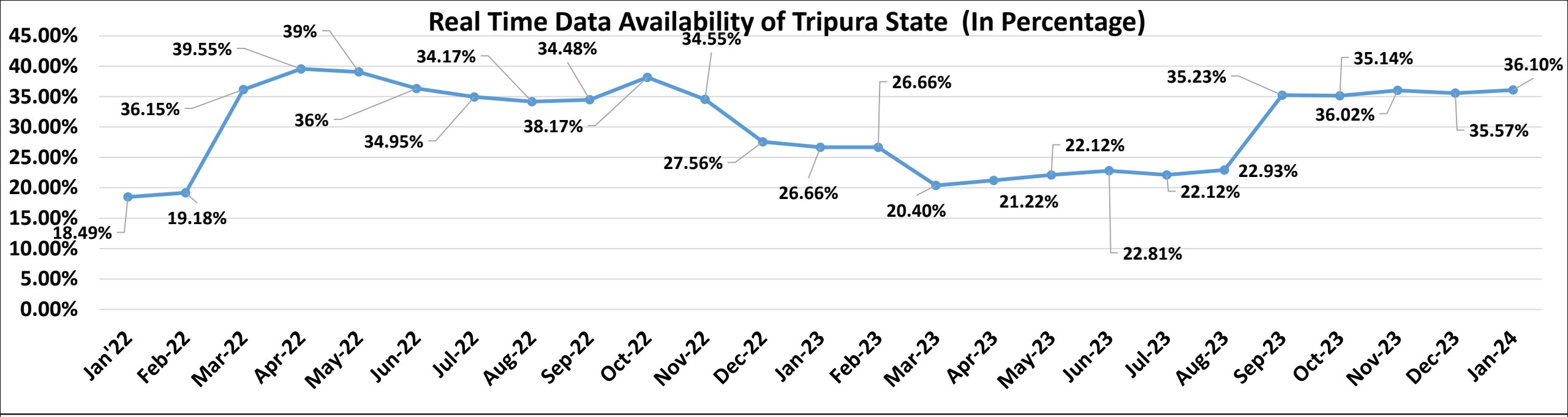
Real Time Data Availability of Tripura State (In Percentage)
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27.56%
26.66%
26.66%
20.40%
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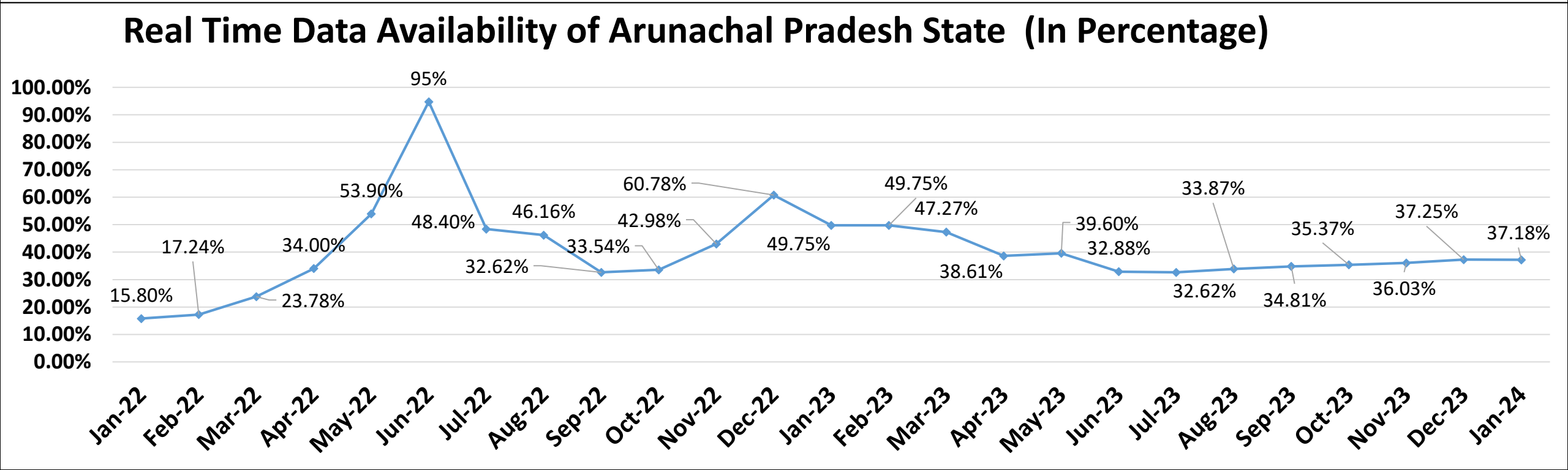
Real Time Data Availability of Arunachal Pradesh State (In Percentage)
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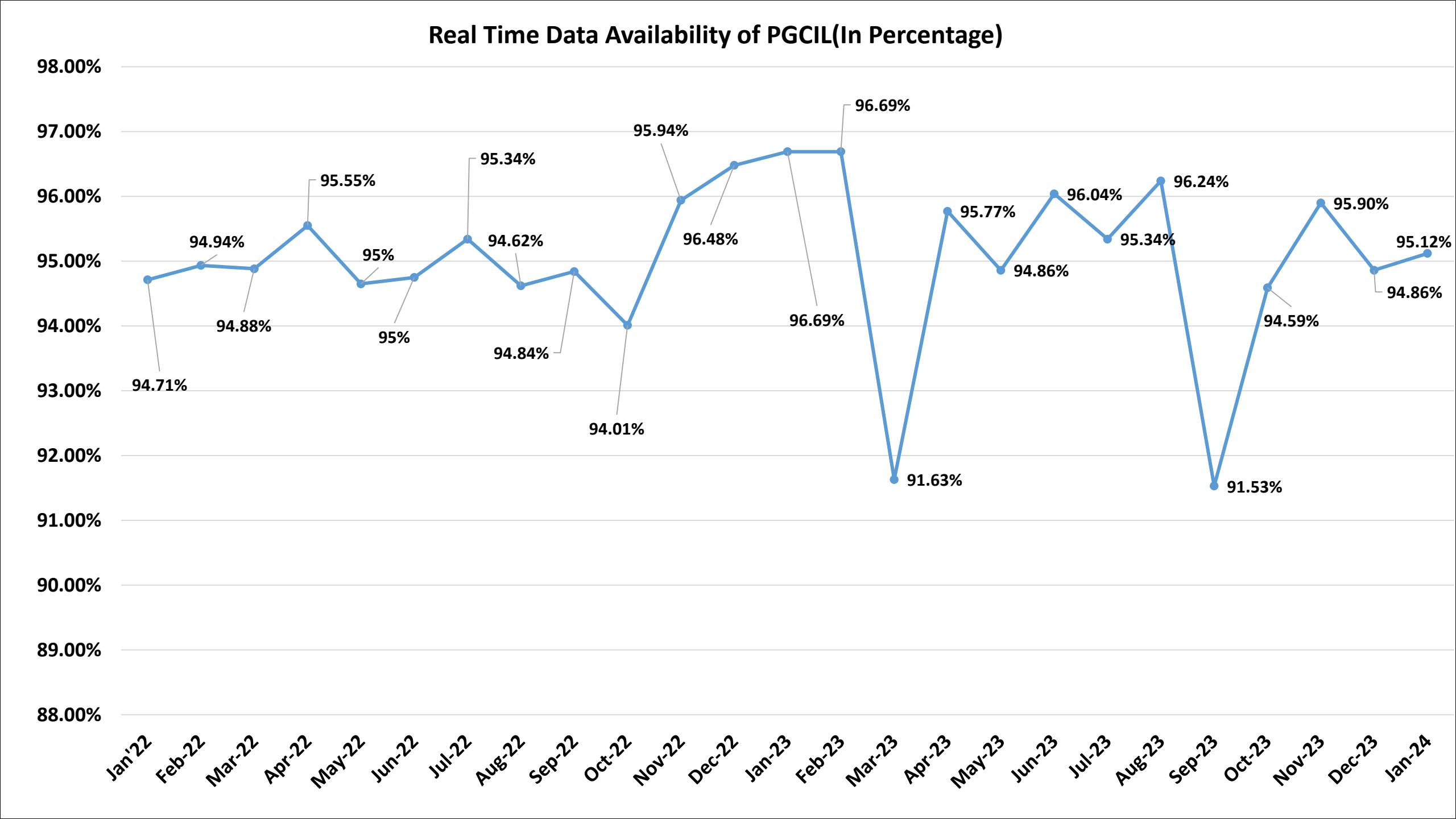
Real Time Data Availability of PGCIL(In Percentage)
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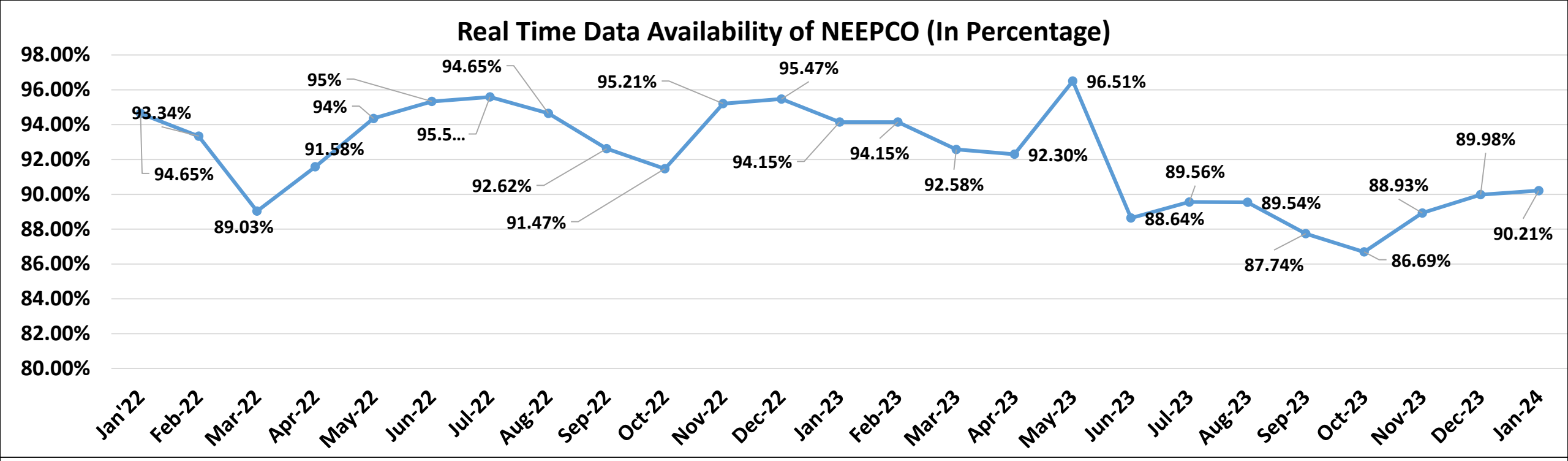
Real Time Data Availability of NEEPCO (In Percentage)
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80.00%
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89.56%
89.54%
87.74%
86.69%
88.93%
89.98%
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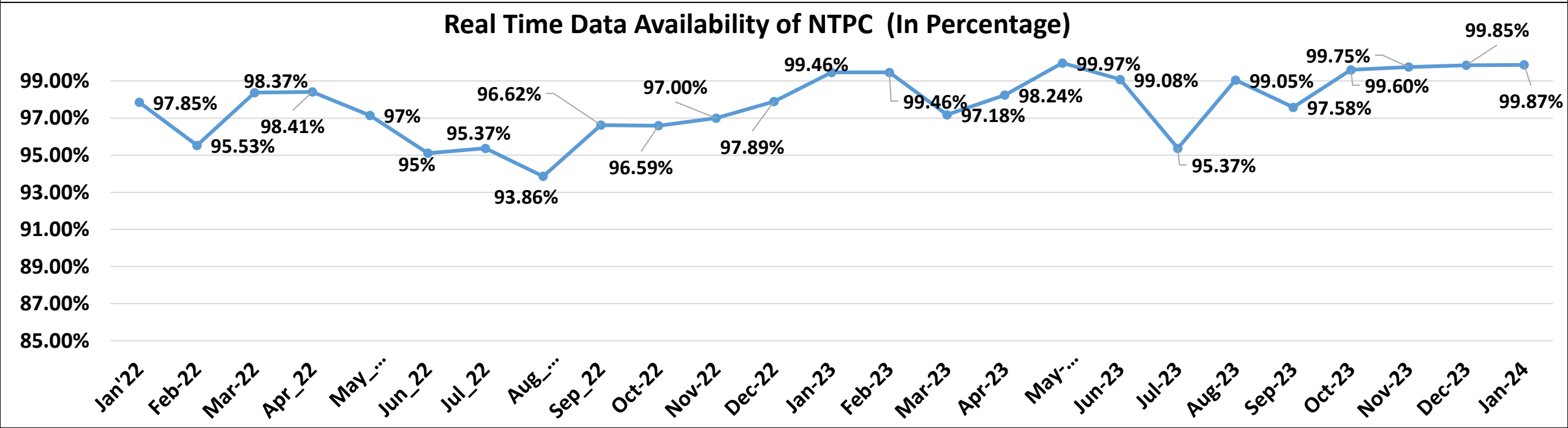
Real Time Data Availability of NTPC (In Percentage)
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97.85%
95.53%
98.37%
98.41%
97%
95%
95.37%
96.62%
93.86%
97.00%
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99.85%
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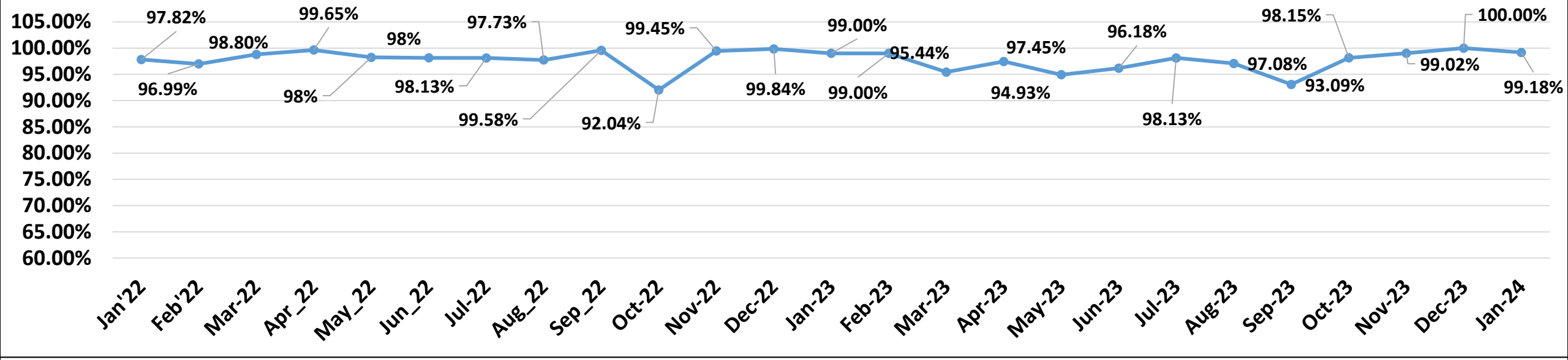
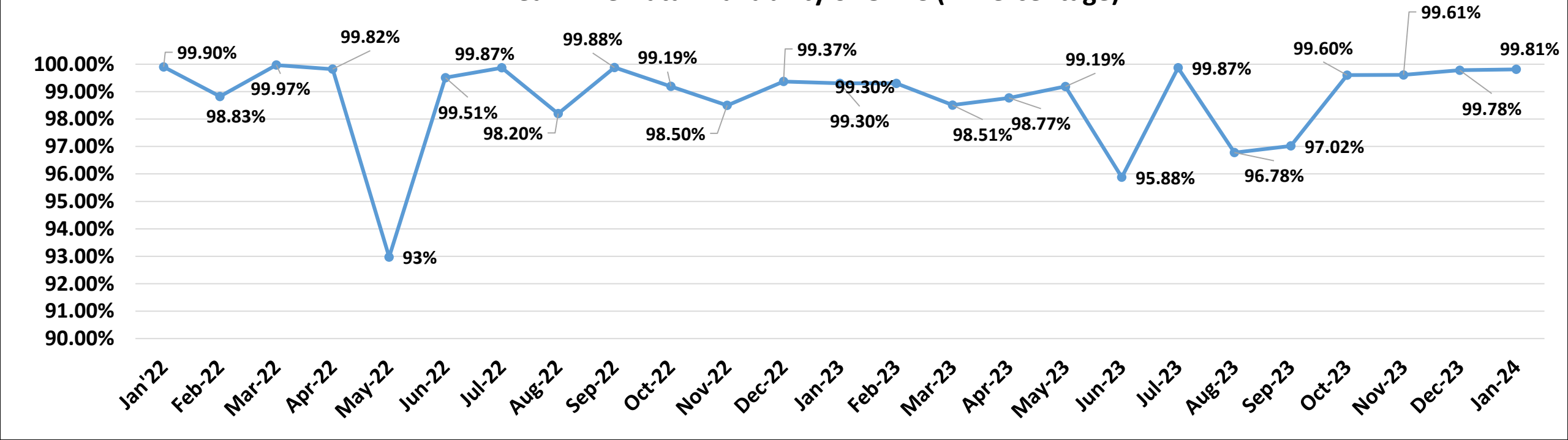
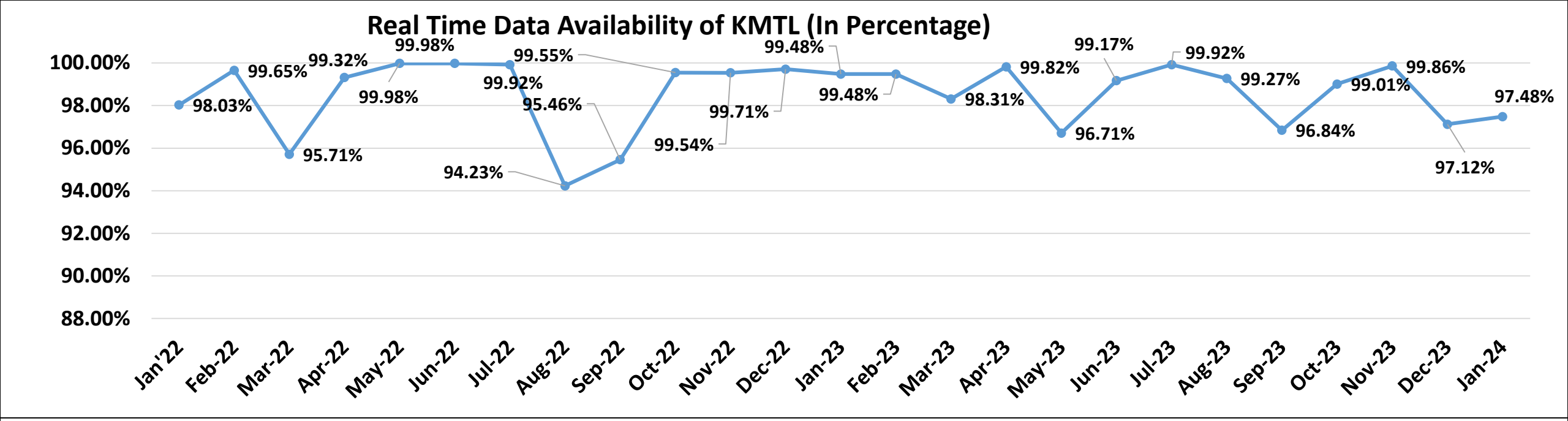
Real Time Data Availability of NHPC (In Percentage)



Real Time Data Availability of OTPC (In Percentage)




Real Time Data Availability of KMTL (In Percentage)
100.00%
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92.00%
90.00%
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98.03%
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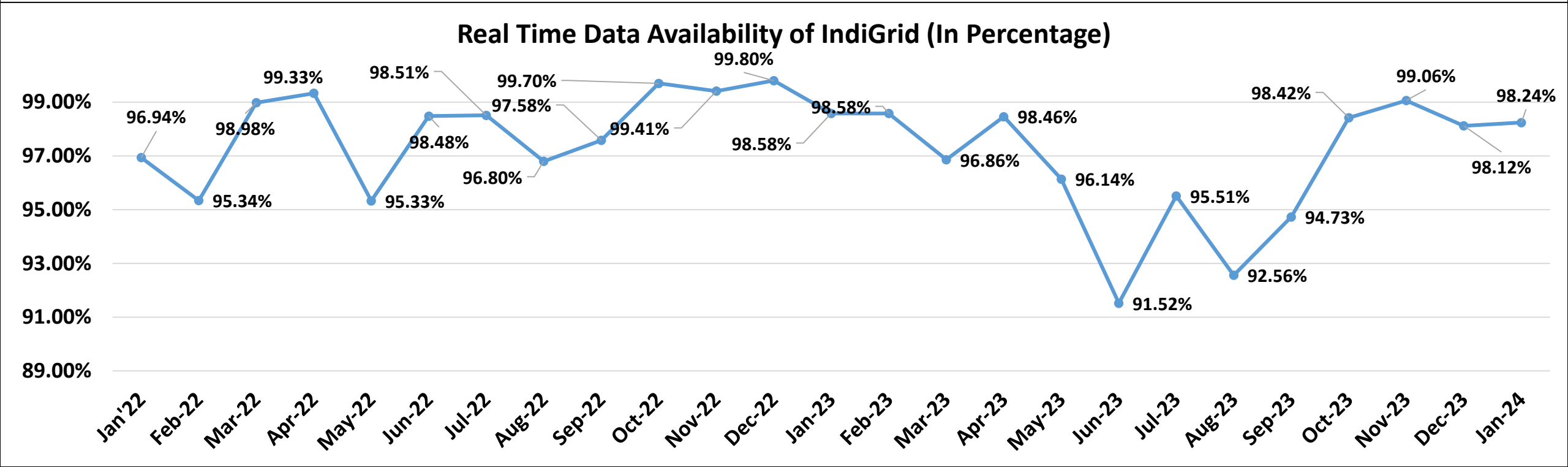
Real Time Data Availability of IndiGrid (In Percentage)
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