भारत सरकार Government of India
विद्युत मंत्रालय Ministry of Power
उत्तर पूर्वी क्षेत्रीय विद्युत समिति
North Eastern Regional Power Committee
एन ई आर पी सी कॉम्प्लेक्स, डोंग पारमाओ, लापालाङ, शिल्लोंग-७९३००६, मेघालय
NERPC Complex, Dong Parmaw, Lapalang, Shillong - 793006, Meghalaya

Ph. No: 0364 - 2534039
Fax No: 0364 - 2534040
Website: www.nerpc.nic.in

No. NERPC/SE (O)/NETeST/2020/***1577-1614*** Dated: December 23, 2021

To,

1. Managing Director, AEGCL, Bijuli Bhawan, Guwahati – 781 001
2. Managing Director, APDCL, Bijuli Bhawan, Guwahati – 781 001
3. Managing Director, APGCL, Bijuli Bhawan, Guwahati – 781 001
4. Director (Generation), Me. PGCL, Lumjingshai, Short Round Road, Shillong – 793 001
5. Director (Distribution), Me. ECL, Lumjingshai, Short Round Road, Shillong – 793 001
6. Director(Transmission), Me. PTCL, Lumjingshai, Short Round Road, Shillong – 793 001
7. Managing Director, MSPDCL, Secure Office Bldg. Complex, South Block, Imphal – 795 001
8. Managing Director, MSPCL, Electricity Complex, Keishampat, Imphal – 795 001
9. Director (Tech.), TSECL, Banamalipur, Agartala -799 001.
10. Director (Generation), TPGCL, Banamalipur, Agartala -799 001.
11. Chief Engineer (WE Zone),Department of Power ,Govt. of Arunachal Pradesh, Itanagar- 791111
12. Chief Engineer (EE Zone),Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791111
13. Chief Engineer (TP&MZ),Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791111
14. Engineer-in-Chief (P&E), Department of Power, Govt. of Mizoram, Aizawl – 796 001
15. Chief Engineer (P), Department of Power, Govt. of Nagaland, Kohima – 797 001
16. CGM, (LDC), SLDC Complex, AEGCL, Kahilipara, Guwahati-781 019
17. Group General Manager, NTPC, Bongaigoan Thermal Power Project, P.O. Salakati, Kokrajhar- 783369
18. ED, NERTS, PGCIL, Dongtieh-Lower Nongrah, Lapalang, Shillong -793 006
19. ED (O&M), NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong-793003
20. ED (Commercial), NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong-793003
21. ED (O&M), NHPC, NHPC Office Complex, Sector-33, Faridabad,Haryana-121003
22. Vice President (Plant), OTPC, Badarghat Complex, Agartala, Tripura - 799014
23. GM, NERLDC, Dongtieh, Lower Nongrah, Lapalang, Shillong -793 006
24. Member Secretary, ERPC, 14 Golf Club Road, Tollygunge, Kolkata-700033
25. Chief Engineer, GM Division, Central Electricity Authority, New Delhi – 110066
26. Chief Engineer (NPC), NRPC Complex, Katwaria Sarai, SJSS Marg., New Delhi - 110016

Sub: Minutes of 21st NETeST Meeting.

Sir/Madam,

Please find enclosed herewith the minutes of 21st NETeST Meeting held at "Hotel Nandan, Guwahati" on the **25th November, 2021** for your kind information and necessary action. The minute is also available on the website of NERPC, **www.nerpc.nic.in**.

Any comments/observations may kindly be communicated to NERPC Secretariat at the earliest.

Encl: As above

Yours faithfully,

S.Mukherjee
Dy. Director (O)

Copy to:

1. CGM, AEGCL, Bijuli Bhavan, Guwahati - 781001
2. CGM, APGCL, Bijuli Bhavan, Guwahati - 781001
3. CGM, DISCOM, Bijuli Bhavan, Guwahati - 781001
4. Head of SLDC, Me.ECL, Lumjingshai, Short Round Road, Umjarain, Shillong – 793 022
5. Head of SLDC, Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791 111
6. Head of SLDC, Department of Power, Dimapur, Nagaland
7. Head of SLDC, Electricity Department, Govt. of Manipur, Keishampat, Imphal – 795 001
8. Head of SLDC, Department of Power, Govt. of Mizoram, Aizawl – 796 001
9. Head of SLDC, TSECL, Agartala – 799 001
10. Chief Engineer(Elect), Loktak HEP,Vidyut Vihar, Kom Keirap, Manipur- 795124
11. Addl. GM (EED), NTPC Ltd., Bongaigoan Thermal Power Project, P.O. Salakati, Kokrajhar- 783369
12. DGM (C&M), OTPC, 6th Floor, A-Wing, IFCI Tower -61, Nehru Place, New Delhi – 110019.

Dy. Director (O)

North Eastern Regional Power Committee

MINUTES OF THE 21th NER Telecommunication, SCADA & Telemetry (NE-TeST) COORDINATION SUB-COMMITTEE MEETING OF NERPC

Date : 25/11/2021 (Thursday)

Time : 10:30 hrs

Venue : "Hotel Nandan", Guwahati.

The List of Participants in the 21st NETeST Meeting is attached at **Annexure–I**.

Member Secretary i/c NERPC welcomed the participants to the 21st NETeST meeting of NERPC. He emphasized the importance of communication system due to advancement of technology and complexity of grid operation. With the emergence of cyber security threat from inside and outside; communication system has gained prime focus. Since restriction due to Covid-19 has been lifted in all places, he requested the implementing agencies to expedite all pending projects and maintain the healthiness of communication systems.

Thereafter Member Secretary i/c NERPC requested Sh S. Mukherjee, Deputy Director, NERPC to take up the agenda items for discussion.

A. CONFIRMATION OF MINUTES

CONFIRMATION OF MINUTES OF THE 20th MEETING OF "NORTH EASTERN TELECOMMUNICATION, SCADA & TELEMETRY (NETeST)" SUB COMMITTEE OF NERPC.

Deputy Director, NERPC informed that minutes of the 20th NETeST Meeting held on 20th April, 2021 at Shillong were circulated by NERPC vide letter No. NERPC/SE(O)/TeST/2021/1041-1077 dated 17th May, 2021.

The Sub-committee confirmed the minutes of the 20th NETeST Meeting of NERPC as no comments/observations were received from the constituents.

A.1 Status of FO works under different projects:

Latest status of various FO Project in NER:

Project		No. of Links/Nodes	Status
ULDC Upgradation		17	All nodes completed.
MW Vacation		12	All links completed.
NER FO Expansion	Central Sector	16	12 Completed. 4 Pending.
	Manipur	11	10 Completed. 1 Pending
	Meghalaya	4	3 Completed. 1 Pending
	Mizoram	1	1 Completed.
	Nagaland	3	3 Completed. 1 Pending
	Tripura	12	10 Completed. 2 Pending

The status of NER FO Expansion project as given in 20th NETeST meeting:

States	Current Status	Comments/ Issues
Central Sector	400kV Bongaigaon (PG) - 220kV Salakati - 220kV BTPS	Work started along Silchar-Palatana Line. Work was halted due to ROW issue at location 234/1, 237/0 and 238/1. Target completion is **June, 2021** for Silchar –Palatana and Pare- Chimpu line. For rest target completion is **July, 2021**.
	400kV Mirza (Azara) – Byrnihat	
	400kV Silchar – Palatana	
	132kV Pare – Chimpu	
Manipur	132kV Imphal (State) – Karong	MSPCL representative informed that line will be completed within three (03) months. NERTS informed the forum that 20kms. of link is already completed. The line is still under construction/diversion by MSPCL-Transmission. NERTS informed that if MSPCL can complete the line within three (03) months of period, then only M/s TCIL will be able to work on the link else NERTS may have to short-close the project (as the project is getting completed).
Mizoram	Aizawl – Zemabawk I	**Target: May, 2021.**
Meghalaya	132kV Nehu - Neigrims	TCIL to start work after completion of work at Pare- Chimpu line. **Target: June 2021.**
Nagaland	132kV Doyang- Sanis Target: Feb/March 2021.	Completed on10.04.2021.

Tripura	132kV Rokhia - Surjamani Nagar 132kV Surjamani Nagar - Monarchak (NEEPCO)	Tripura informed the forum that the line is under construction and will be completed by August-2021. NERTS informed that if TSECL can complete the line within three (03) months of period, then only M/s TCIL will be able to work on the link else NERTS may have to short-close the project (as the project is getting completed).
States	**Current Status**	**Comments/ Issues**
Central Sector	400kV Bongaigaon (PG) - 220kV Salakati - 220kV BTPS 400kV Mirza (Azara) – Byrnihat	There is RoW issue in the 400kV Mirza (Azara) – Byrnihat, which is expected to be resolved soon. Once the RoW issue is resolved, teams will work on both the links i.e. "400kV Bongaigaon (PG) - 220kV Salakati - 220kV BTPS" and "400kV Mirza (Azara) – Byrnihat". Target date: **March, 2022.**
	400kV Silchar – Palatana	For 400kV Silchar-Palatana Target date is **January, 2022.**
	132kV Pare – Chimpu	During the month of June-July 2021, DoP-AP didn't give permission for work. Thereafter, NERTS informed that they have approached Chief Engineer, DoP-Arunachal Pradesh & convinced him after which DoP-Arunachal Pradesh agreed to give permission to carry out the work. Target date for completion of link is **February-2022.**
Manipur	132kV Imphal (State) – Karong	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. Target date for completion of link is **March-2022.**
Mizoram	Aizawl – Zemabawk I	Completed.
Meghalaya	132kV Nehu - Neigreims	During preliminary survey of the line, it was found that there is crossing of 11kV line under the concerned line. NERTS will do a joint survey with MePTCL and MePDCL in 1st week of December 2021 and request for shutdown of 11kV feeder so that stringing work can be done. Target: **December-2021.**
Nagaland	132kV Doyang- Sanis Target: Feb/March 2021.	Completed on10.04.2021.
Tripura	132kV Rokhia - Surjamani Nagar	Tripura informed the forum that the line is under construction and will be completed by

	132kV Surjamani Nagar - Monarchak (NEEPCO)	August-2021. NERTS informed that if TSECL can complete the line within three (03) months of period, then only M/s TCIL will be able to work on the link else NERTS may have to short-close the project (as the project is getting completed). TSECL has raised objection against short-closing of project. If the project is short closed OPGW connectivity will not be able to come up in those lines.

Deliberation in the meeting

AGM, AEGCL informed the forum that material reconciliation for MW vacation project is not completed. He requested NERTS to share the list with respective states. NERTS agreed for the same.

States	Current Status	Comments/ Issues
Central Sector	400kV Bongaigaon (PG) - 220kV Salakati - 220kV BTPS	There is RoW issue in the 400kV Mirza (Azara) – Byrnihat, which is expected to be resolved soon. Once the RoW issue is resolved, teams will work on both the links i.e. "400kV Bongaigaon (PG) - 220kV Salakati - 220kV BTPS" and "400kV Mirza (Azara) – Byrnihat". Target date: **March, 2022.**
	400kV Mirza (Azara) – Byrnihat	
	400kV Silchar – Palatana	Stringing for 150 out of 204km completed. Target date is **January, 2022.**
	132kV Pare – Chimpu	Target date for completion of link is **February-2022.**
Manipur	132kV Imphal (State) – Karong	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. Target date for completion of link is **March-2022.**
Mizoram	Aizawl – Zemabawk I	Completed.
Meghalaya	132kV Nehu - Neigreims	During preliminary survey of the line, it was found that there is crossing of 11kV line under the concerned line. NERTS will do a joint survey with MePTCL and MePDCL in 1st week of December 2021 and request for shutdown of 11kV feeder so that stringing work can be done. Target: **December-2021.**

Nagaland	132kV Doyang- Sanis Target: Feb/March 2021.	Completed on10.04.2021.
Tripura	132kV Rokhia - Surjamani Nagar	NERTS requested for short closure of the project as it cannot be delayed indefinitely. MS, NERPC requested NERTS to wait till March, 2022 for the construction of the line. It will be reviewed in the next NETeST meeting.
	132kV Surjamani Nagar - Monarchak (NEEPCO)	

The Sub-committee noted as above.

Action: State Utilities, NERTS.

A.2. <u>Status and details of Fiber Optic projects approved in 17th TCC/RPC meeting:</u>

Status as per 20th NETeST meeting

a) Additional Communication Scheme: NERTS informed the forum that stringing works of 400kV Balipara–Kameng link has been completed. There is delay of supply of material by M/s SDGI (China-based Company) due to COVID-19 and other reasons. Target: December, 2021 (All links).

b) Reliable Communication Scheme: NERTS informed the forum that due to no bids received in initial tendering, the re-tendering was done. The technical evaluation is under progress. LOA will be placed by June-2021.

<u>Deliberation in the meeting</u>

a) Additional Communication Scheme: Sr.GM, NERTS informed that DCPS for terminal equipments at Kameng HEP will be delivered by Apr'22. However, in the meantime to put through the link, he requested for extension of existing DC at Kameng HEP. NEEPCO agreed to the same. POWERGRID has informed that there are total eight (08) links which are coming under the project and status is attached in **Annexure A.2a**.

b) Reliable Communication Scheme: POWERGRID-NERTS has informed that there is total twenty-two (13+9) links which are coming under this project and status is attached in **Annexure – A.2b**. Members requested that few additional links be included in the Scheme viz. 132kV Longlak-Mokokchung, 132kV Umiam Stg-I – Stg-II, 132kV Umiam Stg-III to Umiam Stg-IV, 132kV Khliehriat –Mustem, 132kV NEHU- Mawlyndep and 132kV EPIP - Killing

NERTS agreed to the same.

The Sub-Committee noted as above.

Action: NERTS.

A.3. Status of implementation of U-NMS in NER:

In the 20th NETeST meeting, NERTS informed the forum that technical evaluation of the bid is in progress which will be completed by June-2021 due to complexity of the contract involving integration of different systems. The award of works can be expected by end of July-2021.

Deliberation in the meeting

NERTS informed the forum that the package has been awarded to M/s Sterlite Technologies Ltd on 09/08/2021. Technical Documents is under approval. Party has completed survey in (7/7) SLDC's and at NERTS, Shillong and Guwahati.

AGM, AEGCL raised the query that whether the existing state communication network and upcoming network having NMS will be integrated with the UNMS.

Sr. GM, NERTS informed the forum that the Scope of the project included integration of existing and new NMS during the implementation and AMC Period.

The Sub-Committee noted as above.

Action: All constituents.

A.4. Status of URTDSM:

The status on various issues related to URTDSM and other PMU related matters needs to be updated to the forum as listed below:

ASSAM: Agia PMU is not reporting correct value.

NERTS :

NERTS informed the forum that the development of the pending analytical application software has been completed by IIT-Bombay recently but due to prevailing COVID-19 pandemic conditions, the same has not been deployed at WRLDC, Mumbai.

Deliberation in the meeting

ASSAM: Assam requested NERTS to send GE team to rectify as link is ok but data is not reporting correctly. NERTS agreed to send GE T&D team to investigate the issue.

NERTS : NERTS informed that Analytical application software under URTDSM has been upgraded with new features along with installation of 6th module at all RLDCS,NLDC & Backup NLDC.

Upon enquiry of Member Secretary i/c, NERPC regarding Phase-II of URTDSM project, NERLDC informed the following:

- Uniform Philosophy for PMU locations - PMUs are required in all the generating stations above 132kV and ISTS lines. The PMUs recommended by 18th RPC to be given high priority.
- New Analytics – Presently performance of all the analytics are under review. After Dec'21 some observations may be given by POSOCO for development of further analytics.
- Requirement for Upgradation of PMU CC at NERLDC/SLDCs – Present CC are fully scalable. However final views shall be put forth after consultation with NLDC - POSOCO.

The Sub-Committee noted as above.

Action: NERTS.

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

NERLDC informed the forum that as per the CERC order on AGC, all the ISTS stations need to get connected with NLDC for receiving AGC signals. The status is as follows:

SN	Station Name	Status as in 20th NETeST
1.	BgTPP	Letter of Award has been issued to M/s Siemens but material is yet to be delivered at site.
2.	AGBPP	NEEPCO informed the forum that OEM (Joint-Venture of GE and BHEL) has quoted very huge amount for necessary modifications in the plant's controllers. Thus, NEEPCO is planning for negotiation with OEM and will be able to update in next NETeST meeting regarding it.

<u>Deliberation in the meeting</u>

The status is as follows:

Sl. No.	Station Name	Status as in 21th NETeST
1.	BgTPP (Unit #2)	Work is under progress. Completion by **December 2021.**
2.	AGBPP	NEEPCO informed that final offer is yet to be received from OEM. The same is taking considerable time due to involvement of 3 OEMs viz. GE, ABB and Mitsubishi. He further added that work is expected to be completed by April-2022.

The Sub-Committee noted as above.

Action: NTPC & NEEPCO.

A.6. Status of RGMO to the Load Dispatch Centers:

The status is as follows:

	Station Name	**RGMO Status**	**FGMO Status**
1.	**Khandong (2 units)**	Completed.	
2.	**Kopili Extension (1 unit)**	Target date: **March, 2021**.	
3.	**Ranganadi (3 units)**	NEEPCO is requesting GE for site survey for implementation but GE is not able to visit due to COVID-19 pandemic situations. The Forum suggested exploring the possibility to expedite the work remotely as done in Kameng station.	
4.	**DHEP**	Letter of Award has been placed but OEM is not able to visit site due to COVID-19 pandemic situations.	
6.	**OTPC (4 units)**	Target date: **October, 2021**. (Delay due to COVID-19)	
7.	**BgTPP (3 units)**	For unit 1 & 3 status is going to NLDC. NTPC informed that FGMO/RGMO status will be provided in next SCADA system upgradation project. Will update in Next NETeST meeting.	

The NERLDC will share Input-Output (I/O) list related to RGMO and FGMO points to all power as and when the utilities are ready to provide the status.

Deliberation in the meeting

The status is as follows:

	Station Name	**RGMO Status**	**FGMO Status**
1.	**Khandong (2 units)**	Completed.	
2.	**Kopili Extension (1 unit)**	Target date: **July, 2022**.	

3.	**Ranganadi (3 units)**	MFTs are required. Scope finalization ongoing and offer expected by Dec'21.
4.	**DHEP**	Letter of Award has been placed. Target date: **January, 2022**.
6.	**OTPC (4 units)**	Target date: **March, 2022**.
7.	**BgTPP (3 units)**	Completed.

The Sub-Committee noted as above.

Action: NEEPCO & OTPC

A.7. <u>Project status of NERPSIP and Arunachal Pradesh Comprehensive Scheme being implemented by PGCIL:</u>

POWERGRID is implementing two numbers of projects namely:

a. Northeastern Region Power System Improvement Project (NERPSIP) for Six (6) States (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

<u>Deliberation in the meeting</u>

Agenda item could not be discussed as POWERGRID, NERPSIP & Comprehensive teams were not present in the forum MS i/c, NERPC informed the forum that a special meeting will be called to review the progress of the scheme.

The Sub-Committee noted as above.

Action: NERPC

A.8. <u>Telemetry status of Fixed Series Compensators (FSC) equipment in stations of NER:</u>

Two number of FSCs are installed at 400 kV Balipara substation, the telemetry data of the same are not available at NERLDC. Thus, NERLDC grid operators are not able to monitor operation status of FSCs. POWERGRID may update the progress on the providing respective telemetry.

Deliberation in the meeting

NERTS informed the forum that the issue is being taken up with Balipara S/S. Currently, only CB status can be made available. Further, other parameters such as kVAR and Isolator positions will be provided once the new RTU is installed.

The Sub-Committee noted as above.

Action: NERTS

B. NEW ITEMS

B.1 Upgradation Activities of SCADA-EMS systems at Regional/State level in North Eastern Region:

A MoU related to free-of-cost consultancy with a detailed responsibility matrix was circulated in 19th and 20th NETeST meeting under which it was proposed that al SLDCs and NERLDC can upgrade in a unified manner to get benefits of seamless integration, joint capacity building and economies of scale in terms of cost implications.

It was agreed in-principle to sign the draft MoU and corresponding funding through PSDF by routing the DPR through TCC/NERPC meeting. As present the status of signing of MoUs is mentioned in table below.

S N	States	Remarks
1.	Arunachal Pradesh	Under administrative approval process in Secretariat office.
2.	Assam	Under administrative approval process in MD office.
3.	Manipur	Under internal discussion between SLDC and Senior Management.
4.	Meghalaya	Signed on 28th October 2021. Draft technical specifications submitted by CC-Engg. Dept of POSOCO for suggestions/ inputs.
5.	Mizoram	Signed on 01st November 2021. Draft technical specifications submitted by CC-Engg. Dept of POSOCO for suggestions/ inputs.
6.	Nagaland	Under internal discussion between SLDC and Senior Management.
7.	Tripura	Under administrative approval process in MD office.

All SLDCs are requested to put up the matter of MoU signing on priority so that other technical activities can be started at the earliest. A draft DPR prepared for PSDF funding is attached as **Annexure-B.1** for placing it in next TCC/NERPC meeting for approval.

Deliberation in the meeting

NERLDC stated that Meghalaya-SLDC and Mizoram-SLDC have signed MoU with POSOCO-NERLDC as a consultant for SCADA-EMS Upgradation works. He also explained the need for upgradation of SLDCs and NERLDC in a unified manner. He requested the state-utilities to execute the upcoming SLDC-Upgradation projects on its own for better implementation and capacity building of the internal teams at SLDCs.

States raised the issues related to funding of SCADA-EMS upgradation project for which POSOCO-NERLDC and NERPC conveyed that feasibility of the same will be explored from NPC and NLDC before placing the associated Detailed Project Report in next TCC/NERPC meeting.

NERPC also requested the SLDCs not to wait for the PSDF funding approval and go ahead with signing of the MoU with POSOCO-NERLDC at the earliest and begin with the Technical Specifications related aspects.

POWERGRID offered that SCADA-EMS upgradation works of NERLDC and SLDCs can be undertaken by POWERGRID as done in ULDC Phase-I and Phase-II in a successful manner, and also offered to cover AMC as constituents faced difficulty in earlier projects. NERPC mentioned that it can be taken as an option in case PSDF funds are not sanctioned for it.

The Sub-Committee noted as above.

Action: All State Utilities, NERLDC & NERPC.

B.2 Establishment of VSAT Communication in selected remote locations for state-utilities in North-Eastern region:

As per deliberations against Agenda Item B.6 in MoM of 17th NETeST meeting it was mentioned that NERPC and NERLDC will sit together for cost analysis and explore the possibility of PSDF funding. After successful pilot projects in Tezu (Arunachal Pradesh) and Killing (Meghalaya), it was proved that the VSAT will function in extreme climatic conditions and hilly terrain areas of NER if Extended-C band is used.

In view of above, a draft Detailed Project Report (DPR) was prepared and circulated amongst all state-utilities and necessary inputs were taken and incorporated in it; subsequently a budgetary quotation was collected for 129 nos. of remote locations in NER and 7 SLDCs. The DPR along with budgetary quotation is attached as **Annexure-B.2** for kind consideration of NERPC.

No. of locations on state-wise basis are mentioned below.

- Meghalaya: 6 stations.
- Manipur: 8 stations
- Mizoram: 17 stations
- Arunachal Pradesh: 14 stations.
- Nagaland: 51 stations.
- Assam: 18 stations.
- Tripura: 15 stations.

Deliberation in the meeting

All state-utilities agreed for the proposal and requested for PSDF funding for which NERPC & NERLDC stated that that feasibility of the same will be explored from NPC and NLDC before placing the associated Detailed Project Report in next TCC/NERPC meeting.

The forum requested POWERGRID(to be booked under tariff and without any consultation charges) to take up this project on behalf of all state-utilities of NER along with SCADA-EMS Upgradation project, in case PSDF funding is not sanctioned Sr.GM, NERTS conveyed his acquiescence.

Further it was unanimously agreed to include NMS, Dynamic Bandwidth allocation and Cyber Security component in the project prior to DPR finalization.

The Sub-Committee noted as above.

Action: NERPC.

B.3 Deployment of new Remote Terminal Units (RTUs) in selected substations of NER:

On request of state-utilities related to RTUs, a draft DPR (**Annexure B.3**) with technical specifications has been prepared by NERLDC which may be put up for PSDF funding (after taking inputs from SLDCs). A total of 112 locations have been identified by state-utilities for it with break-up as mentioned below:

- Meghalaya: 5 stations (incl. 2 spares).
- Manipur: 3 stations
- Mizoram: 14 stations
- Arunachal Pradesh: 15 stations.
- Nagaland: 42 stations.
- Assam: 33 stations.
- Tripura: Nil.

SLDCs are requested to provide inputs such as requirements of MODEM, OLTC Transducers, Analog/Digital Cards, Multifunction transducers, Time Synchronization Units, DC to AC Convertors, etc. so that the quantity in BoQ can be finalized and budgetary quotation can be taken on the basis of it.

Deliberation in the meeting

NERLDC stated that on request of SLDCs a DPR related to procurement of RTUs has been prepared for PSDF funding for which some inputs related to Modem, OLTC Transducers, Analog/Digital Cards, Multifunction transducers, Time Synchronization Units, DC to AC Convertors, etc. are required from all NER SLDCs (except Tripura SLDC) so that the quantity in BoQ can be finalized and budgetary quotation can be taken on the basis of it.

Nagaland-SLDC requested for a template in which all the required inputs can be populated from stations and submitted to NERLDC and NERPC for further action.

After detailed deliberation the following were decided:

(i) Respective state utilities shall explore the present communication system for the stations in the list as well as the medium of reporting, terminal equipments etc.

(ii) Respective state utilities shall prepare the list of equipments required at each of the stations.

(iii) After that the compiled data has to be sent to NERLDC/NERPC

(iv) Subsequently a Special Meeting shall be convened by NERPC wherein vendors shall also be invited for assistance in preparation of BoQ.

The forum requested NERLDC to explore various vendors who may be invited for the said meeting above.

The Sub-Committee noted as above.

Action: all state utilities, NERLDC, NERPC.

B.4 Strengthening of PLCC System by NER States:

In 20th NETeST meeting Director, NERPC requested states to update the progress on strengthening of PLCC systems. The summary of discussion is mentioned below:

SN	States	Current Status
1.	Meghalaya	Commissioning activities are in progress except for Umiam Stage 2, Leshka and Khleriat. Meghalaya informed that FSX card are not part of project, thus voice integration between stations and SLDC is not possible. However, MePTCL will discuss with higher management for the amendment of project to procure FSX card.
2.	Tripura	NERPC conveyed that TSECL has not submitted any DPR for PSDF funding yet as requested in earlier NETeST meetings also. TSECL was requested again for submitting the DPR at the earliest. TSECL agreed to submit the DPR before next NETeST meeting.
3.	Manipur	MSPCL stated that it will discuss with higher authorities of MSPCL in their upcoming meeting scheduled on 26th April 2021 and will update the forum.
4.	Nagaland	Nagaland informed the forum that PLCC projects of all 132 kV sub-stations in Nagaland are completed on 12th April 2021. Nagaland further informed that it is proposing for fiber optics in 66kV sub-stations also for which details may be shared in next NETeST meeting. Necessary modification can be suggested to DoP, Nagaland.

Deliberation in the meeting

S N	States	Current Status
1.	Meghalaya	Commissioning activities will be completed for Umiam Stage 2, Leshka and Khleriat once Siemens people are available.
2.	Tripura	DPR halted due to same administrative issue at TSECL.
3.	Manipur	NHPC informed the forum that they are planning to implement PLCC in 4 lines in Manipur. Thus, there will be wastage of resources. MS i/c, informed the forum the matter

		will be taken up with management of Manipur and NHPC will be informed accordingly.
4.	Nagaland	Nagaland informed the forum that they have submitted the DPR for reliable communication scheme in the last TCC/ NERPC meeting.

The Sub-Committee noted as above.

Action: All State Utilities & NERPC.

B.5 Testing of Primary Frequency Response of generators as per IEGC Clause 5.2(g):

Please find the copy of communication from Executive Director(NLDC)-POSOCO to Hon'ble Commission on subject " Testing of Primary Frequency Response of generators as per IEGC Clause 5.2(g)" dated 12th Nov 2021 in **Annexure B.5.**

Deliberation in the meeting

This agenda item was referred to OCC forum for better monitoring.

The Sub-Committee noted as above.

Action: Agenda item may be dropped.

B.6 Length of OPGW in transmission system in NER:

NITI Aayog has requested to provide list of Indian companies using Optical ground wire (OPGW) network for transmission & communication and their OPGW network in KM in India on urgent basis.

Name of the Utility	**Length of OPGW commissioned (km)**	**Length of OPGW under laying (km)**
PGCIL		
NEEPCO		
NHPC		
Indigrid		
NETC		
OTPC		
NTPC		
Arunachal Pradesh		

Assam		
Manipur		
Meghalaya		
Mizoram		
Nagaland		
Tripura		

Deliberation in the meeting

Generating utilities do not have any OPGW. The data as provided by respective utilities is given below:

Name of the Utility	**Length of OPGW commissioned (km)**	**Length of OPGW under laying (km)**
PGCIL	2659.623	854
Indigrid	356	0
NETC	0	662
KMTL	508	0
DoP AP	0	0
AEGCL	1515	715
MSPCL	357.257	358.987
MeECL	316.424	515.68
P&ED mizoram	127.221	112
DoP Nagaland	66	0
TSECL	421.14	155

The Sub-Committee noted as above.

Action: All utilities.

B.7 Allocation of ULDC Fiber for State Utilities Protection Scheme:

In the 20th NETeST meeting, State-utilities requested that apart from six (06) fibers under ULDC scheme, around four (04) fibers i.e. two (02) pairs may be given to implement protection related schemes of states. NERPC conveyed that feasibility of the

same may be explored jointly by NERTS and respective state-utilities and updated in the next NETeST meeting.

Deliberation in the meeting

Members from state utilities noted that NERTS require 8 fiber for ULDC(6- ULDC, 2, Protection) thus the rest of the fiber state utilities may be allowed to use. Sr.GM, NERTS conveyed his disagreement for the same. The agenda item is referred to next TCC/NERPC for discussion.

The Sub-Committee noted as above.
Action: Refereed to next TCC/NERPC meeting.

B.8 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 POSOCO, etc.
A summary of the present status of each SLDC is attached in as **Annexure–B.8**.

Deliberation in the meeting
A summary of the present status of each SLDC was presented by NERLDC, which is attached in as **Annexure–B.8**. NERPC requested SLDC to comply with all the requirements at the earliest.

The Sub-Committee noted as above.
Action: All state utilities.

B.9 GPRS connectivity for substations in SLDC:

Many stations which are still working on GPRS for real-time data transfer are –

Tripura: Dharmanagar, Gamitilla, Rabindranagar, Satchand, Belonia, Bogafa and Amarpur.
Nagaland: Nagarjan and Powerhouse
Mizoram: Luangmual

As per the Technical Standards for Communication System released in 2020 by CEA, the following major points need to be followed –

- Cellular communication may be used for data acquisition system, where feasibility of access to wideband network is not possible.
- Cellular communication shall be adopted after ensuring the available signal level up to the required strength and dual or more Subscriber Identification Module (SIM) with different service provider with automatic changeover to ensure 99.5 per cent link availability for interruption free operation of the communication system.
- Router shall be capable of handling Virtual Private Network (VPN) based security by assuming a fixed IP issued by the Multi Wide Area Network Virtual Private Network (WAN VPN) concentrator at the supervisory control and data acquisition (SCADA) end.
- Device shall have capability to decide and act according to the best available link in redundant mode configuration with automatic switch over.
- Design shall be for satisfactory and continuous operation in open environment with operating temperature range of -10 deg. C to 55 deg. C and humidity up to 95 per cent noncondensing.
- Other technical and cyber security compliances

NERLDC request all the SLDCs using GPRS or other cellular communication technologies to submit the compliance report of GPRS technology as per the Communication Standards before 20th NETeST meeting.

In the 20th NETeST meeting, TSECL submitted to the forum that NERTS was implementing agency of the GPRS projects through M/s PMAS and hence the compliance report may be provided by NERTS itself.

NERTS informed that it will investigate and update the status to the forum in next NETeST meeting.

Deliberation in the meeting

JE, SLDC, DoP Nagaland informed that Nagarjan station is reporting over Broadband, with PDH being available at the station. For POWERHOUSE station he informed that OPGW alongwith terminal equipments have been proposed under Reliable Communications Scheme. The forum requested DoP Nagaland to prepare a detailed plan for reporting of the two stations over PLCC.

EE, SLDC, P&ED Mizoram informed that at 132kV Luangmual station RTU is available which is reporting via GPRS. Further he intimated that intermittency in data transmission is due to Static IP problem at SLDC. The forum requested P&ED Mizoram to prepare a detailed plan for reporting of 132kV Luangmual Station over PLCC.

POWERGRID has submitted the compliance status report to NERLDC. Compliance status report is attached at **Annexure-B.9**.

The Sub-Committee noted as above.

Action: All state utilities.

B.10 Selected cases of sub-stations for rectification of corresponding data/communication related issues:

Utility	Station	Latest Status/ Issues
NEEPCO	Ranganadi-2nd channel	Target: 15th February, 2021.
NEEPCO	Doyang	After changing/upgradation work of Current Transformer (CT) of all feeders, the real-time SCADA data is reporting wrong.
OTPC	Palatana	Unit side (LV of GT) data needs to be telemetered. Was to be done in sync with RGMO/FGMO target deadline of October 2021.

Deliberation in the meeting

Utility	Station	Latest Status/ Issues
NEEPCO	Ranganadi-2nd channel	It was decided that second channel for Ranganadi will be provided once 132kV Pare–Chimpu Fiber-Optic link is completed.
NEEPCO	Doyang	NEEPCO informed that LOA for correction of RTU and MFTs database has been placed but OEM is not able to visit due to COVID-19 pandemic situations. NEEPCO will update the status to NERLDC and NERPC. NEEPCO confirmed that Unit side (LV of GT) data will be extended to NERLDC by next NETeST meeting.
OTPC	Palatana	Unit side (LV of GT) data needs to be telemetered. Target date: **April, 2021**.

The Sub-Committee noted as above.

Action: NEEPCO & OTPC.

B.11 VSAT For Roing Tezu Namsai:

The present status of data availability from above mentioned stations is stated in table below:

Sl. No.	Name of Station	Communication link	Telemetry status
1	**Roing**	Not healthy, highly intermittent. (only 20% availability of link)	Intermittent due to link issue.
2	**Tezu**	Healthy	Healthy
3	**Namsai**	Healthy	Intermittent due to SCADA Gateway software issues at site.

Deliberation in the meeting

The present status of data availability from the above mentioned stations is stated in table below.

Sl. No.	Name of Station	Communication link	Telemetry status
1	**Roing**	Not healthy, highly intermittent. (only 20% availability of link)	NERTS informed that OEM was giving remote support but couldn't solve the issue, thus they will instruct OEM to send engineer at site.
2	**Tezu**	Healthy	Healthy
3	**Namsai**	Healthy	NERTS will update the firmware of SCADA software at the site.

The Sub-Committee noted as above.

Action: NERTS.

B.12 Pending issues of State Utilities of NER:

The presentation on telemetry status for the month of October-2021 is attached as **Annexure-B.12.**

The utility-wise discussion is tabulated below:

SN	Utility	Stations Not Reporting	Latest Status/ Issues
1	**Assam**	SAS upgradation	AEGCL informed that the project is hampered as OEMs are not showing up at site for commissioning related activities. Assam-SLDC was requested to get prepared on this matter and update in next NETeST meeting.
2	**Tripura**	Dhalabil,	FO link completed. The RTU data is not reporting.
		Ambassa	PLCC link completed. The RTU data is not reporting. A joint checking will be carried out by TSECL and Indigrid for rectification of the issue.
		Sabroom, Satchand	Island FO link. Needs PLCC to bring data to WB location Udaipur. Satchand is reporting over GPRS.
		13 station not covered by NERFO expansion project	TSECL to submit action plan for remaining 13 stations, as NERPSIP project will take a longer duration to complete. TSECL submitted to the forum that they will submit their proposed PLCC scheme and other modalities of making remaining stations by 29th January 2021 to NERPC with a copy to NERLDC but the same was not updated.
3	**Meghalaya**	Procurement of DI card from PSDF.	MePTCL informed the forum that it is waiting for reply form PSDF committee for approval.
5	**Manipur**	Churachandpur, Kongba and	After integration of 400kV Thoubal S/s, the SCADA database of the mentioned stations

		Kakching	are not reporting to SLDC and NERLDC
		Elangkokpki, 132kV Thoubal, Thanlon	MSPCL informed the forum that NIT drafting is in progress for procurement of RTUs.
		400kV Thoubal	Due to unavailability of UPS supply to SCADA gateway at the site, the real-time data of 400kV Thoubal is not reporting consistently and interrupts in case of failure of main power supply.
6	**Nagaland**	Melrui	DoP-Nagaland will propose procurement of RTU under PSDF fund.
7	**Mizoram**	Zuangtui	FO link has been completed, however RTU data is reporting partially.
		Luangmual	GPRS established but not functional.
		Kolasib	RTU is reporting partially.
		Saitual, Khawzawl, Champai, Serchhip, Lunglei	No communication link and RTU available for stations.
8	**Ar. Pradesh**	VSAT installation	In all eight (08) stations installation is completed, however commissioning is pending. NERLDC submitted to the forum that necessary RTU works should be taken care by DoP-Arunachal with the help of GE for reporting of the data.

Deliberation in the meeting

The utility-wise discussion is tabulated below:

SN	Utility	Stations Not Reporting	Latest Status/ Issues
1	**Assam**	SAS upgradation	AEGCL informed that the project is expected to be completed by September 2022.
2	**Tripura**	Dhalabil,	TSECL representative was not present in the meeting.
		Ambassa	
		Sabroom, Satchand	
		13 station not covered by NERFO project	
3	**Meghalaya**	Procurement of DI card from PSDF.	MePTCL informed the forum that it is waiting for reply form PSDF committee for approval. The forum requested MePTCL to submit a copy of DPR to NERPC for taking up with TEC Sub-Group of CEA.
5	**Manipur**	Churachandpur, Kongba and Kakching	MSPCL will place LoA to M/s GE T&D to integrate the new bays in the existing RTUs.
		Elangkokpki, 132kV Thoubal, Thanlon	MSPCL informed that RTUs are being proposed under DPR prepared by NERPC for the project of deployment of new RTUs in NER.
6	**Nagaland**	Melrui	DoP-Nagaland will propose procurement of RTU under PSDF fund.
7	**Mizoram**	Zuangtui	FO link has been completed, however RTU data is reporting partially.
		Luangmual	PE&D, Mizoram will look into the matter for restoration of GPRS connectivity.
		Kolasib	

		Saitual, Khawzawl, Champai, Serchhip, Lunglei	PE&D, Mizoram informed that RTUs are being proposed under DPR prepared by NERPC for the project of deployment of new RTUs in NER. PE&D, Mizoram informed that stations will be covered under communication links of NERPSIP.
8	**Ar. Pradesh**	VSAT installation	DoP, Arunachal Pradesh will take up the matter with OEM to expedite the project within a month.

All the SLDCs were requested to calculate data availability and RTU availability as per 17th & 18th NETeST meeting decisions. The SLDCs were requested to submit the same by 5th of every month to NERLDC/NERPC.

The Sub-Committee noted as above.

Action: All SLDCs.

B.13 <u>Feasibility to connect Lekhi substation over Fiber-Optic network:</u>

In the 20th NETeST meeting, NERTS informed that there is delay in supply of material from M/s SDGI and suggested to shift material of Tripura sector links to Lekhi as lines of 132kV SM Nagar–Monarchak and 132kV Rokhia–SM Nagar are still under construction.

<u>Deliberation in the meeting</u>

NERTS requested the forum to divert the material of 132kV Surjamani Nagar (TSECL) - Monarchak (NEEPCO) or 132kV Rokhia (GBPP) - Surjamani Nagar (TSECL) to Lekhi S/S, but NERPC informed that proposal may be kept on hold as NERPC will take up the matter with TSECL for completion of the above mentioned links.

The Sub-Committee noted as above.

Action: NERTS, NERPC & TSECL.

B.14. <u>Wrong status of Isolators and CB status at 132 kV SM Nagar S/s:</u>

TSECL requested NERTS to rectify the issue of CMR for the 132 kV SM Nagar – Comilla Line 1 and 2; 132 kV Palatana – SM Nagar line in SM Nagar station as the above lines

are maintained by NERTS itself. TSECL will rectify the issue of all other bays in coordination with GE. A summary is tabulated below:

Sl. No.	Name of the bay	Status
1.	Comilla Bay - 1	Line Isolator status is wrong.
2.	Comilla Bay - 2	Line Isolator status is wrong.
3.	Palatana Line	Line Isolator status is wrong.
4.	Bus Coupler	CB and Isolator status is reporting wrong value.
5.	SM Nagar (Indigrid) Line	CB and Isolator status is reporting wrong value.
6.	BJ Nagar Line	CB and Isolator status is reporting wrong value.
7.	Agartala Line-1	CB and Isolator status is reporting wrong value.
8.	Agartala Line-2	CB and Isolator status is reporting wrong value.
9.	132/33 kV ICT - 1	CB and Isolator status is not reporting.
10.	132/33 kV ICT - 1	CB and Isolator status is not reporting.

Deliberation in the meeting

From point no. 1 to 3 NERTS informed the forum that it was rectified once. NERTS will resolve the issue of point no. 1 to 3. Rest could not be discussed as TSECL was absent.

The Sub-Committee noted as above.

Action: TSECL & NERTS.

B.15 Feasibility to connect Sterlite owned OPGW with ULDC network:

Under NER Strengthening scheme, Sterlite has constructed following lines along with OPGW:

1. 132 kV R C Nagar – PK Bari (TSECL) D/c: Will provide additional path between Agaratala and PK Bari

2. 400 kV Silchar – Misa D/c: Will provide additional link between south NER and North NER.

Feasibility to connect the above links with existing ULDC network may be explored.

In the 20th NETeST meeting, the forum agreed and requested NERTS and Indigrid to explore the possibility of utilization of the link as alternate path.

Deliberation in the meeting

NERTS informed that after fibers are provided by M/s INDIGRID patching will be done at the terminal equipments. Subsequently the links can be integrated with NMS and the availability may be confirmed by NERLDC. The forum requested NERTS, M/s INDIGRID to take necessary action at the earliest.

The Sub-Committee noted as above.

Action: NERTS & INDIGRID, NERLDC.

B.16 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 summarised in the table given below:

Sl. No.	Name of Generating Station	Status of Telemetry data
1.	LRPP (Lakwa Replacement Power Project)	All digital and analog data associated with units are not reporting.
2.	LTPS (Lakwa Thermal Power Station)	All digital and analog data associated with units are not reporting.
3.	NRPP (Namrup Replacement Power Project)	All digital and analog data associated with GTG are not reporting.
4.	NTPS (Namrup Thermal Power Station)	All digital and analog data associated with units are not reporting.
5.	Langi Hydro Station	All digital data associated with units are not reporting.

Deliberation in the meeting

AGM(SCADA& Communications), SLDC Assam intimated the forum that in the visit on 13th and 14th Nov'21 exact deficiencies for non-reporting were assessed. Further he informed that limited procurement is required to be done by APGCL. The report(s) are attached at **Annexure-B.16.** The forum requested SLDC, Assam to take up the matter with APGCL to provide the telemetry at the earliest. NERPC informed that it will write a letter to higher officials of APGCL to restore the telemetry at the earliest.

The Sub-Committee noted as above.

Action: DoP AP & M/s Devi Energies.

B.17 OPGW link from RHEP to Pare via state line:

In view of the straightening of 132kV RHEP-Pare-Lekhi-Nirjuli link the presently established OPGW communication (under MW vacation) between RHEP and Pare will be discontinued. As line differential portion for 132kV RHEP- Pare-2 is established via this link, separate link (State line) has to be provided 132kV RHEP and Pare via state link. So, POWERGRID is requested to de- string OPGW from present 132kV RHEP-Pare-1 (AP-10 to Pare HEP) and string the same for 132kV RHEP-Pare-2. As the terminal equipment are already present same shall continue to be used for new configuration(link). Any additional OPGW and RTU gateway configuration works to be included under NERFO project.

Deliberation in the meeting

Sr.GM, NERTS informed that due to a misunderstanding he could not attend the Special Meeting on 18th November, 2021 convened by NERPC. He requested NERPC to convene another meeting for the same so that the Communication& Telemetry issues may be discussed in presence of SPV executing the project i.e 132kV Pare-N.Lakhimpur D/C. Further NERTS informed that presently Fiber Connectivity is only present between Pare and RHEP, with no OPGW being strung in the Pare- Lekhi section of the erstwhile NDTL line.

The Sub-Committee noted as above.

B.18 Diversion of existing PLCC panels at Pare for NDTL line to Lekhi:

Presently NDTL line is LILO'ed at 132kV Lekhi Sub-station of Arunachal Pradesh. In view of straightening of the line and re-configuration as 132kV Ranganadi-Lekhi-Nirjuli it is recommended that the PLCC panels at Pare HEP be shifted to Lekhi for established of voice, data and speech communication. This is to be included under PGCIL scope as existing line as well as communication is under PGCIL scope.

Deliberation in the meeting

The issue will be discussed once straightening of 132kV RHEP-Pare-Lekhi-Nirjuli link is finalised.

The Sub-Committee noted as above.

B.19 Integration of Dikshi HEP real time data and pending Voice communication:

M/s Devi Energies 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.

Deliberation in the meeting

JE, SLDC, DoP Ar.Pradesh informed that the Communication equipment viz. PLCC panel etc. have been installed at site, however Wave Trap, CVT are yet to be procured by M/s DEVI Energies. NERPC informed the forum that M/s Devi Energies has committed via mail that they will complete the work by January, 2022. Further, the forum decided that if M/s Devi Energies are not able to complete the work by January, 2022, DoP, Arunachal Paresh should take strong action against M/s Devi Energies which may include restricting their generation till work is completed.

The Sub-Committee noted as above.

Action: DoP AP & M/s Devi Energies.

Date & Venue of next NETeST meeting

It is proposed to hold the 22nd NETeST meeting of NERPC in second week of February, 2022. However, the exact date and venue will be intimated in due course.

The meeting ended with thanks to the Chair.

****

Annexure-I

List of Participants in the 21st NETeST Meeting held on 25.11.2021

SN	Name & Designation	Organization	Contact No.
1	Sh. Geyi Yinyo, J.E	Ar. Pradesh	09436200050
2	Sh. Dani Byai, JE, SLDC	Ar. Pradesh	07085693297
3	Sh. P.Bora, CGM, SLDC, AEGCL	Assam	08638174429
4	Sh. Raj Sharma, DGM SLDC	Assam	09435561717
5	Sh. Pranab Saha, AGM (SLDC)	Assam	09707854367
6	Sh. Arup Sarmah, AGM(Communication)	Assam	09707854367
7	Sh. Arnab Chakraborty, AGM	Assam	08638964147
8	Sh. H.M.Singh, DGM, MSPCL	Manipur	08974007300
9	Sh. B.Wankhar, SE, SLDC	Meghalaya	07005673697
10	Sh. D.J.Lyngdoh, EE (SM), SLDC	Meghalaya	-
11	Sh. Y.Iakai, AEE, SLDC	Meghalaya	09402133552
12	Sh. S.W.Khyriem, AEE (CSD)	Meghalaya	08787346704
13	Sh. H.K.Malngiang, AE (C&C)	Meghalaya	09774459674
14	Sh. Y.Kharpuri, AEE (C&C)	Meghalaya	09774607325
15	Sh. H. Lalruatkima, Sr. E.E, SLDC	Mizoram	09862925462
16	Sh. Lalrinawma, SDO, MRT	Mizoram	09436791567
17	Sh. E.Pongmei Phom, SDO, SLDC	Nagaland	09436607867
18	Sh. P.Tiakaba Yinchunger, JE, SLDC	Nagaland	08974020151
	No Representative	**Tripura**	-
19	Sh. Rajendra Dubey, Sr.GM	PGCIL	08275039218
20	Sh. Kamlesh Baishya, Engineer	PGCIL	09859723132
21	Sh. N. Roy, CGM (I/C)	NERLDC	09869080265
22	Sh. S.P.Barnwal, GM	NERLDC	09433041812
23	Sh. Sakal Deep, Engineer	NERLDC	09774528218
24	Sh. Akhil Singhal, Ch. Manager	NERLDC	09650598187
25	Sh. Bhaskar Goswami, GM	NEEPCO	09436163983
26	Sh. Sanjib Pal, Manager	OTPC	09436583737
27	Sh. Anirban Bhattacharjee, Manager(E)	NHPC	08811071048
28	Sh. B. Lyngkhoi, Member Secretary I/c	NERPC	09436163419
29	Sh. S. Mukherjee, Dy. Director	NERPC	08794277306
30	Sh. Sadiq Imam, Dy. Director	NERPC	07004133772
31	Sh. R.Das, AE	NERPC	09954947474

Annexure 2A - Additional Communication Scheme

Sl. No.	Name of the link	Length of OPGW	Status as in 17th RPC/TCC	Status as in 18th RPC/TCC	Status in 18th NETeST Meeting	Status in 19th NETeST Meeting	Status as in 21st NETeST Meeting	
							OPGW Status	End Equipment Status
1	132 kV Silchar - Hailakandi (Part of line)	17 KM	Approved	Approved	Supply of material hampered due to COVID19	Material yet to reach site. **Target date: December'21**	Stringing work is under progress.	Work under progress
2	132 kV Roing – Pasighat	103 KM	Approved	Approved	Supply of material hampered due to COVID19	Material yet to reach site. **Target date: December'21**	Material is delivered in the month of November 2021. OPGW stringing is yet to be started.	Material is delivered in the month of November 2021. Installation is yet to be started.
3	132 kV Roing – Tezu	73 KM	Approved	Approved	Supply of material hampered due to COVID19	Material yet to reach site. **Target date: December'21**	Material is delivered in the month of November 2021. OPGW stringing is yet to be started.	Material is delivered in the month of November 2021. Installation is yet to be started.
4	132 kV Tezu – Namsai	96 KM	NA	Approved	Supply of material hampered due to COVID19	Material yet to reach site. **Target date: December'21**	Material is delivered in the month of November 2021. OPGW stringing is yet to be started.	Material is delivered in the month of November 2021. Installation is yet to be started.
5	132 kV Tuirial – Kolasib	70 KM	Approved	Approved	Supply of material hampered due to COVID19	Material yet to reach site. **Target date: December'21**	Material is delivered in the month of November 2021. OPGW stringing is yet to be started.	Material is delivered in the month of November 2021. Installation is yet to be started.
6	400 kV Balipara – Kameng	75 KM	Approved	Approved	Supply of material hampered due to COVID19	Material yet to reach site. **Target date: December'21**	Completed.	SDH/PDH installed but DCPS (DC Power Supply) is yet to deliver.
7	400 kV Bongaigoan – Killing (Brynihat)	200 KM	Approved	Approved	Supply of material hampered due to COVID19	Material yet to reach site. **Target date: December'21**	Stringing work is completed except a small portion in which line is under diversion due to upcoming railway line. POWERGRID-NERTS will complete the stringing after diversion work is completed.	Material is delivered in the month of November 2021. Installation is yet to be started.
8	400 kV Silchar – Killing (Brynihat)	217 KM	Approved	Approved	Supply of material hampered due to COVID19	Material yet to reach site. **Target date: December'21**	Material is delivered in the month of November 2021. OPGW stringing is yet to be started.	Material is delivered in the month of November 2021. Installation is yet to be started.

Annexure - 2B List of Links to be implemented for replacement of old FO under Reliable Communication Scheme in NER region (page 1 of 2)

SN	FROM	TO	KM	18th RPC	18th NeTEST	19th NeTEST	20th NeTEST	21st NeTEST
1	NEHU	Shillong UNDER GROUND FO	6.23	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
2	Khliehriat(MESEB)	Khliehriat(PGCIL)	7.791	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
3	Khliehriat	Khandong(PGCIL)	40.99	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
4	Khandong(PGCIL)	Koplili(PGCIL)	11.191	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
5	Misa(PGCIL)	Koplili(PGCIL)	73.186	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
6	Misa(PGCIL)	Balipara(PGCIL)	94.046	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
7	Misa(PGCIL)	Dimapur(PGCIL)	119.192	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
8	Badarpur(PGCIL)	Khliehriat(PGCIL)	73.183	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
9	Badarpur(PGCIL)	Kumarghat(PGCIL)	117.519	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
10	Agartala Gas(PGCIL)	Kumarghat(PGCIL)	99.817	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
11	Agartala(PGCIL)	Agartala Gas(PGCIL)	7.416	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
12	Dimapur (PGCIL)	Kohima(PGCIL)	59.8	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
13	Kohima(PGCIL)	Imphal(PGCIL)	105.64	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
Sub Total SC&C			816					

Annexure - 2B List of Links to be implemented for replacement of old FO under Reliable Communication Scheme in NER region (page 2 of 2)

S No	Name of Link	From	To	Voltage in KV	Length in Kms 17th TCC	Length in 18th TCC	Remarks	18th RPC	18th NeTEST	19th NeTEST	20th NeTEST	21st NeTEST
1	Mariani (new)- Misa II	Mariani (new)	Misa	400	223	223	No fibre	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
2	Bongaigaon III (quad)-Balipara	Bongaigaon	Balipara	400	309	309	Redundant path for reliable communication as line have Four ckts and Telecom fibre in ckt-I only.	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
3	Silchar - P. k. Bari	Silchar	P. k. Bari	400	127	0	Administrative Issue for Laying OPGW over Silchar-PK Bari. Connectivity achieved through Silchar-Palatana repeater at PK Bari	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
4	Misa - Kopli	Misa	kopli	220	73	73	Redundant path for reliable communication as Line have three ckts and OPGW in only one ckt.	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
5	Jiribam - Haflong	Jiribam	Haflong	132	101	101	Redundant path for relaible communication	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
6	Biswanath Chariali - Biswanath Chariali(Pavoi)	Biswanath Chariali	Pavoi	132	13	13	No fiber. Double ckt line	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
7	Tezu-Namsai	Tezu	Namsai	132	96	0	Shifted to Add Communication	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
8	Silchar - Byrnihat	Sichar	Byrnihat	132	217	0	Shifted to Add Communication	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
9	Balipara -Bongaigaon-1	Balipara	Bongaigaon	400	0	290	No ULDC fiber	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
10	Kopili Khandong-other circuit	kopili	khandong	132	0	12	redundant path	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
11	Khandong Khliehriat other circuit	khandong	khliehriat	132	0	43	redundant path	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
12	Other Line Future	CS1	CS2	400/220/132	0	95	Provision Kept for CS or redunadnat link as required for ring formation	Project Approved	Tender is yet to be awarded	Tender is yet to be awarded	Tender is yet to be awarded	Tender awarded on 12-November-2021 to M/s Apar Industries with completion target of 24 Months
				Total	**1158**	**1158**						

Detailed Project Report (DPR)
for
Upgradation of Hardware, Software and Associated Systems for SCADA-EMS in Load Despatch Centres of North Eastern Region (NER)

2021

North Eastern Regional Power Committee
NERPC Complex, Dong Parmaw
Lapalang, Shillong – 793006 (Meghalaya)
Website: www.nerpc.nic.in
email: nerpc@ymail.com

Format A1

Summary of Proposal

For Official Use – To be filled by the Nodal Agency of PSDF	
Project Proposal Number: _____	**Date of Receipt: _____**

To be filled by the Applicant Organization / Utility		
1	Name of the requesting Organization/ Utility	• Department of Power, Arunachal Pradesh • Assam Electricity Grid Corporation Limited • Manipur State Power Company Limited • Meghalaya Power Transmission Corporation Limited • Power & Energy Department of Mizoram • Department of Power of Nagaland • Tripura State Electricity Corporation Limited
2	Short Summary of Project/ Scheme/ Activity	
a	Name of the Project/ Scheme/ Activity	Replacement of Upgradation of SCADA-EMS systems at State Load Despatch Centres (07 in nos.) of North Eastern Region of India.
b	Objective of the Project/ Scheme/ Activity	Replacement and Upgradation of SCADA-EMS systems at State Load Despatch Centres after its end of 7-years life cycle for deploying new state-of-the-art systems to ensure reliable and economical power system operation in the country.
c	Authorised Person for this Project/ Scheme/ Activity	• **Arunachal Pradesh:** Executive Engineer, SLDC Itanagar, DoP, 132kV Chimpu Substation, Itanagar, Arunachal Pradesh – 791111 • **Assam:** Chief General Manager, State Load Despatch Centre, Assam Electricity Grid Corporation Ltd., ASEB Colony, Power House, Kahilipara, Guwahati-781019 • **Manipur:** General Manager, State Load Despatch Centre, Yurembam Power House, Imphal West-795004, Manipur • **Meghalaya:** Superintending Engineer, State Load Despatch Centre, Meghalaya Power Transmission Corp. Ltd., Umjarain Mawkynroh, NEHU Campus, Shillong-793022, Meghalaya • **Mizoram:** Sr. Executive Engineer, State Load Despatch Centre Division, P&E Office Complex, North Block (III Floor), Electric Veng, Aizawl-796001, Mizoram

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

		• **Nagaland:** Executive Engineer, State Load Despatch Centre, Full Nagarjan, Dimapur, Nagaland – 797112 • **Tripura:** Dy. General Manager (System Operation), State Load Despatch Centre, TSECL, 79-Tilla, Agartala, Tripura (West) – 799006
d	Nature of the Project/ Scheme/ Activity: Inter-state/ Intra-state (Please specify)	Intra-state incident to state-level grid operation
e	Identified Beneficiaries	The state constituents of North Eastern Region of India
f	Merits of the Scheme	With implementation of the scheme, overall improvement in the Load Despatch functions will be achieved which is mission critical operation of national importance to manage the expanding power system network in North-Eastern region. Moreover, the current systems will be obsolete in near future leading to maintenance and Cyber Security issues which will be eliminated by upgrading the system through this proposal.
g	Limitations, if any	No limitation envisaged. Only parallel reporting of RTUs to existing system as well as new system needs to be ensured for the "Validation" and "System Availability" period.
h	Time frame for Implementation	The scheme is scheduled to be implemented within 24 months from the date of receipt of sanction of the fund/grant.
i	Estimated Cost of Project/ Scheme/ Activity	2,40,69,61,200 incl. GST
j	Category under which the project is classified (Please refer to para 5.1 of the Guidelines/ Procedure)	As per PSDF Guidelines *Clause 5.3* – Quote *Other Schemes benefitting large no. of utilities collectively and having a significant impact towards the power system development and grid operation shall also be considered for funding from PSDF, on case-to-case basis.* Unquote

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Format A2

Detailed Proposal (DP)

1. Details of the Requesting Organization/ Entity

1.1 Details of Organization/ Entity

A1) Name of Organization / Entity	Department of Power, Arunachal Pradesh
A2) Acronym or Abbreviation (if applicable)	**DoP-AP**
B1) Name of Organization / Entity	Assam Electricity Grid Corporation Limited
B2) Acronym or Abbreviation (if applicable)	**AEGCL**
C1) Name of Organization / Entity	Manipur State Power Company Limited
C2) Acronym or Abbreviation (if applicable)	**MSPCL**
D1) Name of Organization / Entity	Meghalaya Power Transmission Corporation Limited
D2) Acronym or Abbreviation (if applicable)	**MePTCL**
E1) Name of Organization / Entity	Power & Energy Department of Mizoram
E2) Acronym or Abbreviation (if applicable)	**P&ED-Mizoram**
F1) Name of Organization / Entity	Department of Power of Nagaland
F2) Acronym or Abbreviation (if applicable)	**DoP-Nagaland**
G1) Name of Organization / Entity	Tripura State Electricity Corporation Limited
G2) Acronym or Abbreviation (if applicable)	**TSECL**

1.2 Details of Head of the Organization

- **DoP-AP**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief Engineer (Power), Western Electrical Zone
E-mail address	
Landline Number	
FAX No.	
Address	Department of Power, Govt. of Arunachal Pradesh, Vidyut Bhawan, O-Point Tinali, Itanagar, Arunachal Pradesh
City	Itanagar
Postal Code	791111

- **AEGCL**

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Name (Mr./ Ms./ Mrs.)	Dhrubajyoti Hazarika
Designation	Managing Director (I/C)
E-mail address	
Landline Number	0361-2739520
FAX No.	
Address	Bijulee Bhawan, 1st Floor, Paltan Bazar, Guwahati, Assam
City	Guwahati
Postal Code	781001

- **MSPCL**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief Secretary, Government of Manipur
E-mail address	
Landline Number	0385-2450050
FAX No.	
Address	Electricity Complex, Keishampat Junction, Imphal, Manipur
City	Imphal
Postal Code	795001

- **MePTCL**

Name (Mr./ Ms./ Mrs.)	Arunkumar Kembhavi
Designation	Chairman Cum Managing Director
E-mail address	
Landline Number	
FAX No.	
Address	Meghalaya Energy Corporation Limited, Lumjingshai, Short Round Road, Shillong, Meghalaya
City	Shillong
Postal Code	793001

- **P&ED-Mizoram**

Name (Mr./ Ms./ Mrs.)	
Designation	Engineer-In-chief
E-mail address	
Landline Number	
FAX No.	
Address	Power & Electricity Department, Kawlphetha Building, New Secretariat Complex, Khatla, Aizawl, Mizoram
City	Aizawl
Postal Code	796001

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

- **DoP-Nagaland**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief Engineer (Power)
E-mail address	cepower1helpdesk@gmail.com
Landline Number	0370-2243149
FAX No.	0370-2240178
Address	Electricity House, A.G. Colony, Kohima, Nagaland
City	Kohima
Postal Code	797001

- **TSECL**

Name (Mr./ Ms./ Mrs.)	
Designation	Managing Director
E-mail address	
Landline Number	0381-2318001, 0381-2319427
FAX No.	
Address	Electricity House, A.G. Colony, Kohima, Nagaland
City	Kohima
Postal Code	797001

1.3 Details of Project In-Charge/ Project Manager (Authorized Person) for this project/ scheme/ activity (Not below the rank of Dy. Gen. Manager/ Superintending Engg.)

- **DoP-AP**

Name (Mr./ Ms./ Mrs.)	
Designation	Executive Engineer
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	SLDC Itanagar, DoP, 132kV Chimpu Substation, Itanagar, Arunachal Pradesh
City	Itanagar
Postal Code	791111

- **AEGCL**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief General Manager
E-mail address	
Landline Number	
Mobile Number	
FAX Number	

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Address	State Load Despatch Centre, Assam Electricity Grid Corporation Ltd., ASEB Colony, Power House, Kahilipara, Guwahati
City	Guwahati
Postal Code	781019

- **MSPCL**

Name (Mr./ Ms./ Mrs.)	
Designation	General Manager
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, Yurembam Power House, Imphal West, Manipur
City	Imphal
Postal Code	795004

Tripura: Dy. General Manager (System Operation), State Load Despatch Centre, TSECL, 79-Tilla, Agartala, Tripura (West) – 799006

- **MePTCL**

Name (Mr./ Ms./ Mrs.)	
Designation	Superintending Engineer
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, Meghalaya Power Transmission Corp. Ltd., Umjarain Mawkynroh, NEHU Campus, Shillong, Meghalaya
City	Shillong
Postal Code	793022

- **P&ED-Mizoram**

Name (Mr./ Ms./ Mrs.)	
Designation	Sr. Executive Engineer
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre Division, P&E Office Complex, North Block (III Floor), Electric Veng, Aizawl, Mizoram

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

City	Aizawl
Postal Code	796001

- **DoP-Nagaland**

Name (Mr./ Ms./ Mrs.)	
Designation	Executive Engineer
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, Full Nagarjan, Dimapur, Nagaland
City	Dimapur
Postal Code	797112

- **TSECL**

Name (Mr./ Ms./ Mrs.)	
Designation	Dy. General Manager (System Operation)
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, TSECL, 79-Tilla, Agartala, Tripura (West)
City	Agartala
Postal Code	799006

Any change in above mentioned details will be notified to the Nodal Agency of PSDF immediately.

2. Justification of the Proposal

2.1 Analysis of the Objective

With the growth of transmission and generation systems in North-Eastern region, it is imperative to upgrade the existing monitoring and supervision facility at SLDCs which is functioning at state-level to coordinate the real-time operation of respective state-grids.

SLDCs in NER are catering to the need for a state-level Load Despatch Centre, to effectively monitor, supervise and coordinate the interconnected state grids on real-time basis. SLDCs also facilitates optimum use of resources by leveraging the benefits from diversity in load & generation profiles. Hence with the available resources across the power sector, the Peak deficit condition can be partially mitigated.

The existing SLDCs were upgraded in January 2017 and will complete its life-cycle of seven (07) years in January 2024 in compliance to the depreciation of 15% for IT Equipment and Software Systems specified by CERC. The project will replace

existing SCADA/EMS system to latest SCADA/EMS control systems for State-Grids of NER to facilitate integrated power system operations at State-level. The project will facilitate effective monitoring and control of the power system network; activities for the same include monitoring power system conditions, scheduling tie-line interchanges, etc.

The overall project includes the planning, design, engineering and implementation of SCADA/EMS at SLDCs located in North Eastern region.

Under this project new SCADA/EMS system shall be established at existing locations of SLDCs in NER i.e. Itanagar, Guwahati, Imphal, Shillong, Aizawl, Dimapur and Agartala. The new system shall replace the existing system without affecting the operation of the existing system. The existing and new system shall be operated in parallel for maximum period of three (03) months before shifting the entire operation to the new system.

A joint upgradation of the SCADA-EMS in SLDCs (along with NERLDC i.e. Regional-level LDC of NER) will help in smooth integration, standardization of systems, reduction in cost due to bulk-order, etc.

2.2 Identified Beneficiaries of the Project

The states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura in particular and the Nation in general.
With implementation of the scheme, all the stakeholders in the power sector of North Eastern Region will be able to run more efficiently and effectively. So, reliability of the NER grid can be achieved at desired level.
Further, it will also mitigate the risks of using obsolete systems with greater Cyber Security threats to the mission critical systems of Load Despatch Centres.

2.3 Identified Source of Funding

100% of the total project cost is to be funded through grant from PSDF.

2.4 Details of Activities for Project/ Scheme/ Activity

After getting approval of the project towards funding, the following activities will be undertaken to achieve desired results:

a) Signing of MoU with POSOCO for Consultancy Works at NIL financial implications
b) Pre-NIT Activities
   - BoQ finalization
   - Preparation of Qualification Requirement
   - NIT Cost-Estimate
   - Technical Specifications preparation
   - Preparation of General Conditions of Contract, Bid Proposal Sheet, Special Conditions of Contract and other Tender Documents
   - Issuance of NIT
   - Preparation of clarifications if any, required by the Bidder
   - Issuance of Clarifications
c) Post-NIT Activities

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

- Bid-Opening
- Evaluation of Bids
- Preparation of Recommendation Report
- Approval of Recommendation Report
- Post-Bid discussions with bidders
- Preparation of Letter-of-Award and Contract Agreement
- Placement of Letter-of-Intent
- Placement of Letter-of-Award
- Signing of Contract Agreement

d) Post-Award activities – SCADA/EMS

- Survey
- Approval of Design Documents (FDS)
- Approval of DRS
- Submission of Data
- Approval of Testing (FAT & SAT) Documents
- Factory Acceptance Tests
- Issuance of MICC/ CIP
- Testing with existing ICCP and existing RTUs
- Database and Displays Development
- Engineering Inputs for Post-Contract Amendment
- Post-Contract Amendment
- Installation and Commissioning
- Site Acceptance Tests
- Issuance of Taking Over Certificate
- Payments

2.5 Executing Agencies

Projects will be executed in fork of different independent work-orders on state-wise basis and the state-utilities/ SLDCs will be the executing agencies for respective works. POSOCO will facilitate various activities in the project as part of its free-of-cost Consultancy works.

2.6 *Timeline for implementation of Project/ Scheme/ Activity*

Timeline for implementing this project/ scheme/ activity is given hereunder considering date of receipt of PSDF grant approval as zero-date:

a) Issuance of Work-Order: 9 months
b) Procurement of Equipment (Delivery of Material at site after FAT): 9 months
c) Erection and Commissioning: 6 months

Timeline of the Project/ Scheme/ Activity	
Likely duration of Project (in months)	**24 months**
Start Date	**Date of receipt of approval of PSDF Funding**
Likely Completion Date	**December 2023**

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Timeline of Activities

Project Implementation Schedule – 15 Months (Months after Letter of Award – LoA)																
S. No.	**Task Name**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
	(Subject Package)															
1	**Letter of Award (LoA)**															
2	**Engineering**															
3	**Database Development**															
4	**Factory Testing of Equipment**															
a	**Auxiliary Power Supply System**															
b	**SCADA/EMS Control Centre**															
5	**Supply, Installation and Commissioning of Equipment**															
a	**Auxiliary Power Supply System**															
b	**SCADA/EMS Control Centre**															
6	**Site Acceptance Testing of Equipment**															
a	**Auxiliary Power Supply System**															
b	**SCADA/EMS Control Centre**															
7	**Parallel operation of existing & new system, availability test and taking-over**															

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Format A3

Summary of Detailed Project Report (DPR)

Cost Break-up of various components

Sl. No.	Item Description	Total Price (in INR), incl. GST
	Price Implications as per Budgetary Quotations collected from M/s OSI, M/s GE and M/s Siemens (attached as Annexure)	
1	Software, A	14,37,08,000
2	Hardware (incl. Furniture), B	12,05,76,200
3	Services (incl. Training), C	7,24,52,000
4	Warranty of 1 year, D	71,15,400 *
5	**Sub-total for one (01) SLDC, E = A + B +C +D**	**34,38,51,600**
6	**Total for Seven (07) SLDCs in NER, F = E x 7**	**2,40,69,61,200**
7	Comprehensive AMC for 6 years, G *(after expiry of warranty period for 1 SLDC)*	10,07,90,880 **
8	Comprehensive AMC for 6 years, H = G x 7 *(after expiry of warranty period for 7 SLDCs)*	70,55,36,160 **

Note: * The systems may have one (01) year warranty period.
** The costing for Comprehensive Annual Maintenance Contracts for the period of six (06) years will be borne by SLDCs directly.

Targets for financial Milestones

Description	Total Amount (in INR)	1st Installment *(09th Month after sanction of Grant)*	2nd Installment *(14th Month after sanction of Grant)*	3rd Installment *(15th Month after sanction of Grant)*
PSDF Grant	2,40,69,61,200	21,14,27,200	5,28,57,000	7,95,67,400
Internal Resource	NIL	NIL	NIL	NIL
Total	2,40,69,61,200	21,14,27,200 #	5,28,57,000 ##	7,95,67,400 ###

Note: # 80% of "software and Hardware" price may be released after FAT
20% of "Software and Hardware" price may be released after Parallel Operation
Amount to be paid for Warranty services

Date: _____

Signature: _____

Name: _____

(Authorized Representative)

Format A4

Financial Implication of the Scheme

1. Summary

S. No.	Item	Amount (in INR) incl. GST
1	Total Cost Estimate	**2,40,69,61,200**
2	Funding Proposed from PSDF	**2,40,69,61,200**
3	Contribution from Internal Sources	Nil
4	External Borrowings	Nil

2. Details

2.1 Cost Estimate

The Unit rates for all equipment have been obtained from budgetary offers obtained from reputed vendors; attached as ***Annexure-1***.

The detailed cost-estimate for implementing the project/ scheme/ activity has been under approval by higher management of SLDCs.

3. Funding

3.1 Funding proposed from PSDF

100% of the estimated cost is proposed to be funded from PSDF.

3.2 Contribution from Internal Resources

Nil.

3.3 External Borrowings

No external borrowings will be necessary.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Format A5

Brief Details of the Project Appraisal by ~~CTU~~/ STU/ ~~RPC~~

Item	Details to be filled by Applicant Utility		
Appraisal By	CTU _____	STU ___✓_____	RPC _____
Date of Submission to ~~CTU~~/ STU/ ~~RPC~~ for approval	xx.xx.2021		
Name of the Scheme	Upgradation of Hardware, Software and Associated Systems for SCADA-EMS in Load Despatch Centres of North Eastern Region (NER)		
Copy of the Appraisal Report by ~~CTU~~/ STU/ ~~RPC~~ (attached at ***Annexure)***	Yes _____ **Ref. No.:** **Date:**	No ____✓____	
Summary of observations from ~~CTU~~/ STU/ ~~RPC~~ Appraisal Report	Summary of Proposal Appraised	Replacement and Upgradation of SCADA-EMS system's Hardware and Software at SLDCs related proposal has been prepared has been prepared based on CERC guidelines which mandates the life-cycle of SCADA-EMS at LDCs as seven (07) years from the date-of-commissioning. Its replacement needs to be considered in view of obsolescence of Hardware/Software in near future and increasing cyber security risks. Moreover, many new functionalities in terms of SCADA and EMS applications are available in market which should be made available at SLDCs for reliable grid operation.	
	Technical Observations	The proposed scheme fulfils the technical requirement as per relevant standards and fund to be in order. With implementation of the scheme, overall efficiency, reliability and cyber security of the systems will be improved and any contingency can be tackled.	

Date: _____

Signature: _____

Name: _____

(Authorized Representative)

Item	Details to be filled by Applicant Utility	
	Financial Observations	The estimated cost arrived on the basis of earlier Letter-of-Awards appears to be right.
	Compliance of Grid Standards/ Codes by Applicant	Yes
	Limitations/ Shortcomings pointed out by ~~CTU~~/ STU/ ~~RPC~~, if any	No limitation envisaged. Only some intermittency may be observed due to configuration/integration of RTUs in new system which can be managed judiciously.
	Recommendations of ~~CTU~~/ STU/ ~~RPC~~	Recommended for immediate implementation and posing for 100% PSDF funding.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Format A6

Undertaking

(On a Non-judicial Stamp paper of Rs.50 only duly notarized and attested)

I, Dr./ Mr./ Ms. …….. son/daughter/wife of ……
resident of ……
(full address) and presently working as …….. in the ……
hereby undertake to comply with the following terms and conditions with regard to funding of the …….. (name of scheme) with disbursement from PSDF:

- **No tariff shall be claimed for the portion of the scheme funded from PSDF.**
- **Amount of grant shall be refunded in case of transfer/disposal of the facility being created under this proposal to any other scheme for funding.**
- **Shall specifically mention if for the scheme under the proposal, the grant from any other agency is being taken / proposed to be taken.**
- **The grant shall be refunded back to PSDF in case of non-utilisation of the grant within one (01) year of release of installment.**

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Detailed Project Report (DPR)
for
Establishment of VSAT Communication System in Stations at Hilly and Remote Terrain locations of North Eastern Region (NER)

2021

North Eastern Regional Power Committee
NERPC Complex, Dong Parmaw
Lapalang, Shillong – 793006 (Meghalaya)
Website: www.nerpc.nic.in
email: nerpc@ymail.com

Format A1

Summary of Proposal

For Official Use – To be filled by the Nodal Agency of PSDF	
Project Proposal Number: _____	**Date of Receipt: _____**

To be filled by the Applicant Organization / Utility		
1	Name of the requesting Organization/ Utility	• Department of Power, Arunachal Pradesh • Assam Electricity Grid Corporation Limited • Manipur State Power Company Limited • Meghalaya Power Transmission Corporation Limited • Power & Energy Department of Mizoram • Department of Power of Nagaland • Tripura State Electricity Corporation Limited
2	Short Summary of Project/ Scheme/ Activity	
a	Name of the Project/ Scheme/ Activity	Establishment of VSAT Communication System in Stations at Hilly and Remote Terrain locations of North Eastern Region (NER).
b	Objective of the Project/ Scheme/ Activity	Supply, Installation, Testing and Commissioning of VSAT Communication System in selected stations at Hilly and Remote Terrain locations of North Eastern Region (NER) for Real-Time Data Telemetry purposes.
c	Authorised Person for this Project/ Scheme/ Activity	• **Arunachal Pradesh:** Executive Engineer, SLDC Itanagar, DoP, 132kV Chimpu Substation, Itanagar, Arunachal Pradesh – 791111 • **Assam:** Chief General Manager, State Load Despatch Centre, Assam Electricity Grid Corporation Ltd., ASEB Colony, Power House, Kahilipara, Guwahati-781019 • **Manipur:** General Manager, State Load Despatch Centre, Yurembam Power House, Imphal West-795004, Manipur • **Meghalaya:** Superintending Engineer, State Load Despatch Centre, Meghalaya Power Transmission Corp. Ltd., Umjarain Mawkynroh, NEHU Campus, Shillong-793022, Meghalaya • **Mizoram:** Sr. Executive Engineer, State Load Despatch Centre Division, P&E Office Complex, North Block (III Floor), Electric Veng, Aizawl-796001, Mizoram

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

		• **Nagaland:** Executive Engineer, State Load Despatch Centre, Full Nagarjan, Dimapur, Nagaland – 797112 • **Tripura:** Dy. General Manager (System Operation), State Load Despatch Centre, TSECL, 79-Tilla, Agartala, Tripura (West) – 799006
d	Nature of the Project/ Scheme/ Activity: Inter-state/ Intra-state (Please specify)	Intra-state incident to state-level grid operation
e	Identified Beneficiaries	The state constituents of North Eastern Region of India
f	Merits of the Scheme	With implementation of the scheme, overall real-time data telemetry from the grid-connected stations will improve which will help is secure and reliable grid operation and load despatch functions in NER. The improvement in the Load Despatch functions through data-visibility of all the grid connected stations is of utmost importance to perform mission critical operation of national importance related to management of expanding power system network in North-Eastern region. It can act as a redundant path of communication in case of no alternate physical path available in Fiber-Optic infrasctructure. The VSAT technology, if implemented, can be utilized for needs of various other schemes, which require data from remote locations such as SAMAST, AMR, etc.
g	Limitations, if any	No limitation envisaged.
h	Time frame for Implementation	The scheme is scheduled to be implemented within 18 months from the date of receipt of sanction of the fund/grant.
i	Estimated Cost of Project/ Scheme/ Activity	5,32,76,206 excl. GST.
j	Category under which the project is classified (Please refer to para 5.1 of the Guidelines/ Procedure)	As per PSDF Guidelines *Clause 5.3* – Quote *Other Schemes benefitting large no. of utilities collectively and having a significant impact towards the power system development and grid operation shall also be considered for funding from PSDF, on case-to-case basis.* Unquote

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Format A2

Detailed Proposal (DP)

1. Details of the Requesting Organization/ Entity

1.1 Details of Organization/ Entity

A1) Name of Organization / Entity	Department of Power, Arunachal Pradesh
A2) Acronym or Abbreviation (if applicable)	**DoP-AP**
B1) Name of Organization / Entity	Assam Electricity Grid Corporation Limited
B2) Acronym or Abbreviation (if applicable)	**AEGCL**
C1) Name of Organization / Entity	Manipur State Power Company Limited
C2) Acronym or Abbreviation (if applicable)	**MSPCL**
D1) Name of Organization / Entity	Meghalaya Power Transmission Corporation Limited
D2) Acronym or Abbreviation (if applicable)	**MePTCL**
E1) Name of Organization / Entity	Power & Energy Department of Mizoram
E2) Acronym or Abbreviation (if applicable)	**P&ED-Mizoram**
F1) Name of Organization / Entity	Department of Power of Nagaland
F2) Acronym or Abbreviation (if applicable)	**DoP-Nagaland**
G1) Name of Organization / Entity	Tripura State Electricity Corporation Limited
G2) Acronym or Abbreviation (if applicable)	**TSECL**

1.2 Details of Head of the Organization

- **DoP-AP**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief Engineer (Power), Western Electrical Zone
E-mail address	
Landline Number	
FAX No.	
Address	Department of Power, Govt. of Arunachal Pradesh, Vidyut Bhawan, O-Point Tinali, Itanagar, Arunachal Pradesh
City	Itanagar
Postal Code	791111

- **AEGCL**

Name (Mr./ Ms./ Mrs.)	Dhrubajyoti Hazarika
Designation	Managing Director (I/C)
E-mail address	
Landline Number	0361-2739520

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

FAX No.	
Address	Bijulee Bhawan, 1st Floor, Paltan Bazar, Guwahati, Assam
City	Guwahati
Postal Code	781001

- **MSPCL**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief Secretary, Government of Manipur
E-mail address	
Landline Number	0385-2450050
FAX No.	
Address	Electricity Complex, Keishampat Junction, Imphal, Manipur
City	Imphal
Postal Code	795001

- **MePTCL**

Name (Mr./ Ms./ Mrs.)	Arunkumar Kembhavi
Designation	Chairman Cum Managing Director
E-mail address	
Landline Number	
FAX No.	
Address	Meghalaya Energy Corporation Limited, Lumjingshai, Short Round Road, Shillong, Meghalaya
City	Shillong
Postal Code	793001

- **P&ED-Mizoram**

Name (Mr./ Ms./ Mrs.)	
Designation	Engineer-In-chief
E-mail address	
Landline Number	
FAX No.	
Address	Power & Electricity Department, Kawlphetha Building, New Secretariat Complex, Khatla, Aizawl, Mizoram
City	Aizawl
Postal Code	796001

- **DoP-Nagaland**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief Engineer (Power)
E-mail address	cepower1helpdesk@gmail.com
Landline Number	0370-2243149
FAX No.	0370-2240178

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Address	Electricity House, A.G. Colony, Kohima, Nagaland
City	Kohima
Postal Code	797001

- **TSECL**

Name (Mr./ Ms./ Mrs.)	
Designation	Managing Director
E-mail address	
Landline Number	0381-2318001, 0381-2319427
FAX No.	
Address	Electricity House, A.G. Colony, Kohima, Nagaland
City	Kohima
Postal Code	797001

1.3 Details of Project In-Charge/ Project Manager (Authorized Person) for this project/ scheme/ activity (Not below the rank of Dy. Gen. Manager/ Superintending Engg.)

- **DoP-AP**

Name (Mr./ Ms./ Mrs.)	
Designation	Executive Engineer
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	SLDC Itanagar, DoP, 132kV Chimpu Substation, Itanagar, Arunachal Pradesh
City	Itanagar
Postal Code	791111

- **AEGCL**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief General Manager
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, Assam Electricity Grid Corporation Ltd., ASEB Colony, Power House, Kahilipara, Guwahati
City	Guwahati
Postal Code	781019

- **MSPCL**

Name (Mr./ Ms./ Mrs.)	
Designation	General Manager
E-mail address	
Landline Number	

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Mobile Number	
FAX Number	
Address	State Load Despatch Centre, Yurembam Power House, Imphal West, Manipur
City	Imphal
Postal Code	795004

Tripura: Dy. General Manager (System Operation), State Load Despatch Centre, TSECL, 79-Tilla, Agartala, Tripura (West) – 799006

- **MePTCL**

Name (Mr./ Ms./ Mrs.)	
Designation	Superintending Engineer
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, Meghalaya Power Transmission Corp. Ltd., Umjarain Mawkynroh, NEHU Campus, Shillong, Meghalaya
City	Shillong
Postal Code	793022

- **P&ED-Mizoram**

Name (Mr./ Ms./ Mrs.)	
Designation	Sr. Executive Engineer
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre Division, P&E Office Complex, North Block (III Floor), Electric Veng, Aizawl, Mizoram
City	Aizawl
Postal Code	796001

- **DoP-Nagaland**

Name (Mr./ Ms./ Mrs.)	
Designation	Executive Engineer
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, Full Nagarjan, Dimapur, Nagaland
City	Dimapur
Postal Code	797112

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

- **TSECL**

Name (Mr./ Ms./ Mrs.)	
Designation	Dy. General Manager (System Operation)
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, TSECL, 79-Tilla, Agartala, Tripura (West)
City	Agartala
Postal Code	799006

Any change in above mentioned details will be notified to the Nodal Agency of PSDF immediately.

2. Justification of the Proposal

2.1 Analysis of the Objective

The power system network of North Eastern Region has a big inter-connected transmission network operating at various voltage levels such as - ±800kV HVDC, 400kV AC, 220kV AC, 132kV AC, 66kV AC, etc. The current installed generation capacity in NER is around 4373 MW, transmission lines are spanning over a large circuit-kilometres and a high total transformation capacity of the substations. Many transmission and generation projects are under implementation, which are expected to be completed within few years leading to a more complex, meshed and interconnected network. Keeping the vast scope and possibility of the expansion in the generation and transmission sector in NER, government has established dedicated State Load Despatch Centres in all the seven (07) states of NER and NERLDC at the regional level to ensure reliable and secure operation of the grid.

One of the main factors in functioning of State/Regional Load Despatch Centres is the real-time data from stations under its control area; failing of which can lead to formation of blind spots in the power system, which are non-monitored and can lead to major grid disturbances, which may subsequently propagate to other regions as well. At present, the real-time data availability in NER is less than 50% most of the times which is primarily due to non-availability or disruption in communication links. Hence, establishment of reliable and redundant communication links is need-of-the-hour for improvement and stability of the power system operation in NER.

Various technologies available in the communication systems are Optical Fiber, Power Line Carrier Communication, Radio Communication like VHF/UHF, GPRS, etc. All such technologies have its own advantages, disadvantages and needs to be adopted based on its feasibility and economy for the operations in power sector of India. At present, the communication system planning in NER is based on the Fiber-Optic related projects, which are majorly being executed, by POWERGRID-NERTS and POWERGRID-NERPSIP. However, most of the area of NER being hilly terrains, the site conditions are not suitable for easy laying of Optical Fiber and further restoration in case of any fiber cut can take many days. Moreover, the

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Right-of-Way (RoW) issues are also getting faced by all utilities in North-Eastern region.

The major backbone of transmission in NER is at 132kV voltage level which needs to be monitored and operated in a secure manner by the SLDCs and NERLDC. But for monitoring and operation of the power system in NER, the real-time data availability from the stations in NER has been quite low of the order of 30%-50% in the past few years majorly due to communication related issues.

The Power Line Carrier Communication (PLCC) systems are primarily working in Assam and Meghalaya states and are not available for data transfer at majority of the places in other states. Many Fiber-Optic laying works under Fiber-Optic Expansion Project and Microwave Vacation Project are under progress in NER but getting delayed due to tough/hilly terrain, weather conditions, natural calamities, critical law-and-order situations, RoW issues, etc. Several stations in NER are tail-end stations (with radial feeders) for which no alternate communication path has been planned yet.

Due to non-availability of a reliable and suitable communication system in NER, the state constituents under various commercial mechanisms are paying heavily towards penalty against Zero Crossing Violations (ZCV), Deviation Settlement Mechanisms (DSM), etc. If the data availability gets improved, then the corresponding SLDCs of the states will be able to monitor respective over-drawl/under-drawl and can significantly maintain its actual drawl close to the entitles schedule leading to significant cost savings. The ***heavy penalties of the order of 141 crores*** were paid by state-utilities of NER in the period from 31-December-2018 to 10-February-2020.

Seamless uninterrupted connectivity is the cornerstone for ensuring success of real-time data acquisition for mission critical power system operation in any part of the country. As power system is growing, any disruption in connectivity of communication system leading to non-availability of real-time data for monitoring in the Load Despatch Centres, can potentially be a threat to the safety and security of the grid. It is also imperative that all voice communications are also dependent on reliable and redundant communication links. Moreover, the economic and commercial aspects play major role in power system operation these days.

In addition, the North Eastern Region faces unique challenges due to the hilly terrain and geographical location of the substations; lack of adequate network connectivity remains a major challenge for providing real-time data to the load despatchers at state level as well as regional level in North Eastern Region. As most NER States have hilly terrain, in many places laying optical fiber cable (OFC) is difficult and even if it is executed further maintenance and rectification in case of outages is a major challenge for the utilities. Hence, the satellite communication technology such as VSAT should be considered as a communication media for the substations of NER. It should also be considered for substations with an optical fiber connectivity as a redundant communication channel so as to meet the criteria of 100% availability of real-time data for main and redundant data channel as mandated by the Hon'ble Commission.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Various pilot projects with VSAT as communication medium have been installed-and-tested in North Eastern Region in recent past with satisfactory results; some of such locations are Tezu, Dikshi, Tenga and Killing. Many new projects of VSAT technology deployment for getting the real-time data from sub-stations such as Roing, Tezu, Namsai, etc. are under pipeline and expected to be installed in near future.

The VSAT bandwidth connectivity charges have fallen in the past few years making it viable for being used in the power sector for the utilities. Hence, by adopting a reliable and easy-to-install communication technology such as VSAT will remove the communication related issues which is the single most major hurdle resulting in non-availability of real-time data to the Load Despatchers in North-Eastern region.

The VSAT technology, if implemented, can be utilized for needs of various other schemes, which require data from remote locations such as SAMAST, AMR, etc.

2.2 Identified Beneficiaries of the Project

The states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura in particular and the Nation in general.

With implementation of the scheme, all the stakeholders in the power sector of North Eastern Region will be able to run more efficiently and effectively. So, reliability of the NER grid can be achieved at desired level. Further, it will also mitigate the risks of losing data-availability in case of any Optical-Fiber cut which generally takes many days to get restored due to difficult hilly terrains in NER.

2.3 Identified Source of Funding

100% of the total project cost is to be funded through grant from PSDF.

2.4 Details of Activities for Project/ Scheme/ Activity

After getting approval of the project towards funding, the following activities will be undertaken to achieve desired results:

- Tendering Activities with award of work to qualified L1 Bidder.
- Site Survey
- Factory Acceptance Tests (FAT)
- Supply, Installation and Commissioning of VSAT Equipment along with associated Hardware suitable for integration with respective LDCs.
- Integration of data with existing SCADA/EMS system for transfer of real-time data from the substations to the associated State Load Dispatch Centre (SLDC) on IEC-101 or IEC-104 protocol as found suitable.

List of stations to be covered under this project are mentioned in ***Appendix-1***.

2.5 Executing Agencies

Projects will be executed in fork of different independent work-orders on state-wise basis and the state-utilities/ SLDCs will be the executing agencies for respective works. Necessary guidance, if required, can be taken from NERPC, NERLDC and POWERGRID-NERTS in various forums such as Operation

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Coordination Committee (OCC), North Eastern Telecommunication, SCADA and Telemetry (NETeST), etc.

All the technical specifications required for the execution works and material procurement works will be prepared as per the guidelines in applicable IS standards and CEA recommendations by calling open tenders on e-procurement platforms.

2.6 *Timeline for implementation of Project/ Scheme/ Activity*

Timeline for implementing this project/ scheme/ activity is given hereunder considering date of receipt of PSDF grant approval as zero-date:

a) Issuance of Work-Order: 7 months
b) Procurement of Equipment (Delivery of Material at site after FAT): 4 months
c) Erection and Commissioning: 7 months

Timeline of the Project/ Scheme/ Activity	
Likely duration of Project (in months)	**18 months**
Start Date	**Date of receipt of sanction of PSDF Grants**
Likely Completion Date	**18 months from date of sanction of PSDF Grants**

Timeline of Activities

Project Implementation Schedule – 18 Months (Months after Letter of Award – LoA)																		
S. No.	**Task Name**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
	(Subject Package)																		
1	**Engineering**																		
2	**Tendering Activities**																		
3	**Letter of Award**																		
4	**Site Survey**																		
5	**Factory Acceptance Tests and Drawing DRS Approvals**																		
6	**Supply of Equipment**																		
7	**Installation and Commissioning**																		
8	**Integration with SLDCs**																		

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Format A3

Summary of Detailed Project Report (DPR)

Cost Break-up of various components

- **Opex Type of financial model for establishment VSAT communication set-up in NER on hiring (hub services) basis**

  In the Opex type of model, the hub services can be taken on hiring basis from the service provider of VSAT communication. Some tentative figures corresponding to the associated financial implications are mentioned in *table* below.

Tentative financial implications of VSAT communication in case of hiring of hub (for 129 sites)				
VSAT CAPEX for Real Time SCADA data for 129 Sites – With 1 year Warranty and 2 year AMC				
Sl. No.	**Details**	**Quantity**	**Unit Price (in INR)**	**Total Cost (in INR)**
1	VSAT Equipment including: HT Modem with 4 LAN Port,1.2 M INSAT-C Band Tx/Rx Antenna, 2W INSAT C-Band BUC with LNB, Integration Material, Freight Charges with 1 Year Warranty	129	85,500	1,10,29,500
2	VSAT Equipment including: HT Modem with 4 LAN Port,1.8M INSAT-C Band Tx/Rx Antenna 5W INSAT C-Band BUC with LNB Integration Material, Freight Charges with 1 Year Warranty	7	2,65,595	18,59,165
3	Installation and Commissioning for 1.2 Mtr Antenna+ License liasioning charges for WPC/SACFA Clearance	129	8,950	11,54,550
4	Installation and Commissioning for 1.8 Mtr Antenna+ License liasioning charges for WPC/SACFA Clearance	7	16,761	1,17,327
5	DC Power Supply -48VDC	136	13,667	18,58,712
6	VSAT Platform Charges	136	18,595	25,28,920
	Capital Expenditure			**1,85,48,174**

VSAT OPEX for Real Time SCADA data for 129 Sites - Per Annum				
Sl. No.	**Details**	**Quantity**	**Unit Price (in INR)**	**Total Cost (in INR)**
1	XC band, Upto 128 Kbps site-wise bandwidth plan (64kbps upload/download speeds) for NERs per annum	129	27,535	35,52,015
2	XC band ,Upto 512 Kbps sitewise bandwidth plan (256kbps upload/download speeds) for SLDCs per annum	7	75,091	5,25,637

Date: _____

Signature: _____

Name: _____

(Authorized Representative)

3	AMC support at 1.2m remote per annum (from 2nd year onwards)	129	7,895	10,18,455
4	AMC support at 1.8m SLDC per annum (from 2nd year onwards)	7	16,867	1,18,069
5	NMS Charges	1	0	0
	Operational Expenditure for 6 Years (6 year Bandwidth & 5 Year AMC)			**3,01,48,532**

Miscellaneous CAPEX				
Sl. No	**Description**	**Unit**	**Unit Price (in INR)**	**Total Price (in INR)**
1	IEC 101 to 104 Protocol Converter	129	30,000	38,70,000
2	Session Initiated Protocol Phones	129	5,500	7,09,500
	Miscellaneous Capital Expenditure			**45,79,500**

Note: a) Total amount Including Taxes will be 5,32,76,206 INR excl. GST.

Targets for financial Milestones

Description	**Total Amount (in INR)**	**1st Installment *(12th Month after sanction of Grant)***	**2nd Installment *(18th Month after sanction of Grant)***
PSDF Grant	5,32,76,206	4,26,20,964.8	1,06,55,241.2
Internal Resource	NIL	NIL	NIL
Total	**5,32,76,206**	**4,26,20,964.8**	**1,06,55,241.2**

Date: _____

Signature: _____

Name: _____

(Authorized Representative)

Format A4

Financial Implication of the Scheme

1. Summary

S. No.	Item	Amount (in INR) incl. GST
1	Total Cost Estimate	5,32,76,206
2	Funding Proposed from PSDF	5,32,76,206
3	Contribution from Internal Sources	Nil
4	External Borrowings	Nil

2. Details

2.1 Cost Estimate

The rates for all equipment have been obtained on the basis of the Budgetary Quotations collected from reputed VSAT OEMs and attached herewith as ***Appendix-2***.

3. Funding

3.1 Funding proposed from PSDF

100% of the estimated cost is proposed to be funded from PSDF.

3.2 Contribution from Internal Resources

Nil.

3.3 External Borrowings

No external borrowings will be necessary.

Date: _____

Signature: _____

Name: _____

(Authorized Representative)

Format A5

Brief Details of the Project Appraisal by ~~CTU~~/ ~~STU~~/ RPC

Item	Details to be filled by Applicant Utility		
Appraisal By	CTU _____	STU _____	RPC _____✓_____
Date of Submission to ~~CTU~~/ STU/ ~~RPC~~ for approval	xx.xx.2021		
Name of the Scheme	Procurement and Installation of Remote Terminal Units in selected stations of North Eastern Region (NER) for Real-Time Data Telemetry purposes.		
Copy of the Appraisal Report by ~~CTU~~/ ~~STU~~/ RPC (attached at ***Annexure)***	Yes _____ **Ref. No.:** **Date:**	No ____✓____	
Summary of observations from ~~CTU~~/ STU/ ~~RPC~~ Appraisal Report	Summary of Proposal Appraised	Establishment of VSAT Communication System in Stations at Hilly and Remote Terrain locations of North Eastern Region (NER).	
	Technical Observations	Technical Specifications attached as ***Appendix-3***.	
	Financial Observations	The estimated cost arrived on the basis of budgetary quotations collected from reputed VSAT OEMs.	
	Compliance of Grid Standards/ Codes by Applicant	Yes	
	Limitations/ Shortcomings pointed out by ~~CTU~~/ ~~STU~~/ RPC, if any	No limitation envisaged. Only some intermittency may be observed due to configuration/integration of RTUs with new communication system which can be managed judiciously.	
	Recommendations of ~~CTU~~/ ~~STU~~/ RPC	Recommended for immediate implementation and posing for 100% PSDF funding.	

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Format A6

Undertaking

(On a Non-judicial Stamp paper of Rs.50 only duly notarized and attested)

I, Dr./ Mr./ Ms. …….. son/daughter/wife of ……
resident of ……
(full address) and presently working as …….. in the ……
hereby undertake to comply with the following terms and conditions with regard to funding of the …….. (name of scheme) with disbursement from PSDF:

- **No tariff shall be claimed for the portion of the scheme funded from PSDF.**
- **Amount of grant shall be refunded in case of transfer/disposal of the facility being created under this proposal to any other scheme for funding.**
- **Shall specifically mention if for the scheme under the proposal, the grant from any other agency is being taken / proposed to be taken.**
- **The grant shall be refunded back to PSDF in case of non-utilisation of the grant within one (01) year of release of installment.**

Date: _____

Signature: _____

Name: _____

(Authorized Representative)

Appendix-1

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
A.	**Meghalaya**						
1	Mendipathar	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
2	Khliehriat	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
3	Lumshnong	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
4	Killing	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
5	Umtru	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
6	Umiam Stage-IV	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
B.	**Manipur**						
7	Rengpang	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							monitoring.
8	Tipaimukh	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
9	Thanlon	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
10	Hundung	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
11	Karong	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
12	Chandel	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
13	Tamenglong	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
14	Moreh	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
C.	**Mizoram**						
15	Champhai	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
16	Khawzawl	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
17	Saitual	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
18	Bukpui	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
19	Khawiva	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
20	E.Lungdar	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
21	Lawngtlai	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
22	Bairabi	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
23	Mamit	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
24	W.Phaileng	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
25	Marpara	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
26	Lungsen	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
27	Sihhmui	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
28	Melriat	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
29	Zuangtui	132	P&ED-Mizoram	--	--	--	Real-time operationa

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							l data to be telemetered for grid monitoring.
30	Luangmual	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
31	Bawktlang	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
D.	**Arunachal Pradesh**						
32	Lekhi Industry	33	DoP, Arunachal Pradesh	--	--	--	Located in Papum Pare District. Drawing power from Grid Lekhi S/s.
33	Bandardawa Industry	33	DoP, Arunachal Pradesh	--	--	--	Located in Papum Pare District. Drawing power from Grid Nirjuli S/s.
34	Holongi Industry	33	DoP, Arunachal Pradesh	--	--	--	Located in Papum Pare District. Drawing power from Grid Chimpu S/s.
35	Tippi Industry	33	DoP, Arunachal Pradesh	--	--	--	Located in West Kaming District. Drawing power

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							from Grid Tippi S/s.
36	Liker MHP, Kamba, Aalo	33	DoP, Arunachal Pradesh	--	--	--	Located in West Siang District District. Power being injected in grid.
37	Tago MHP, Ziro	33	DoP, Arunachal Pradesh	--	--	--	Located in Lower Subansiri District. Power to be injected in grid.
38	Nuranang MHS, Jung	33	DoP, Arunachal Pradesh	--	--	--	Located in Tawang District. Power to be injected in grid.
39	Mukto MHS	33	DoP, Arunachal Pradesh	--	--	--	Located in Tawang District. Power to be injected in grid.
40	Sippi MHS, Daporijo	33	DoP, Arunachal Pradesh	--	--	--	Located in Upper Subansiri District. Power to be injected in grid.
41	Liromoba MHS	33	DoP, Arunachal Pradesh	--	--	--	Located in West Siang District. Power to be injected in grid.
42	Kitpi Ph-II MHS	33	DoP, Arunachal Pradesh	--	--	--	Located in Tawang District. Power to be injected in grid.
43	Subung MHS, Boleng	33	DoP, Arunachal Pradesh	--	--	--	Located in Siang District.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							Power to be injected into Grid.
44	Jengging MHS	33	DoP, Arunachal Pradesh	--	--	--	Located in Upper Siang District. Power to be injected into Grid.
45	Paciha MHS	33	DoP, Arunachal Pradesh	--	--	--	Located in East Kaming District. Power to be injected into Grid.
E.	**Nagaland**						
46	Sanis	132/33	DoP-Nagaland	Yes	No	Existing	Tail-End station with no path diversity
47	Kiphire	132/33	DoP-Nagaland	Yes	No	Existing	Tail-End station with no path diversity
48	Zadima	220/132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
49	Philimi, Zunheboto	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
50	Chiephobozou, Kohima	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
51	Nagaland University, Kohima	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
52	Pfutsero, Phek	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							path diversity
53	Wokha	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
54	Meluri	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
55	Power House	66/33	DoP-Nagaland	Yes	No	Existing	Tail-End station with no path diversity
56	Ganeshnagar	66/33	DoP-Nagaland	No	No	Existing	Tail-End station with no path diversity
57	Tuli	66/33	DoP-Nagaland	Yes	No	Existing	Tail-End station with no path diversity
58	Tuensang	66/33	DoP-Nagaland	No	No	Existing	Tail-End station with no path diversity
59	Mon	66/33	DoP-Nagaland	Yes	No	Existing	Tail-End station with no path diversity
60	Zunheboto	66/33	DoP-Nagaland	No	No	Existing	Tail-End station with no path diversity
61	Chumukedima	66/33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
62	Sovima	66/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							path diversity
63	Dairy Farm	66/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
64	Nito Farm	66/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
65	Tizit	66/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
66	Naginimora	66/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
67	Mon Power House	66/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
68	Likimro HEP	Nov-66	DoP-Nagaland	No	No	Existing	Tail-End station with no path diversity
69	Forest	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
70	Supermarket	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
71	Padampukhuri	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
72	Medziphema	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							path diversity
73	Peren	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
74	Jalukie	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
75	Referral	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
76	Rangapahar	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
77	Dhansiripahar	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
78	Niuland	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
79	Lerie	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
80	Keyake	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
81	Jakhama	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
82	New Secretariat Complex	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							path diversity
83	IG Stadium	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
84	ITI	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
85	Naga Bazar	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
86	Pungro	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
87	Kiphire Town	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
88	Zubza	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
89	Sataka	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
90	Tuensang Town PH	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
91	3rd NAP Camp	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
92	Noklak	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							path diversity
93	Mokokchung	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
94	Amphuto	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
95	Longnak	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
96	Hospital Power House Mokokchung	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
F.	**Assam**						
97	CTPS	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
98	Hailakandi	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
99	Hatsingimari	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
100	Narengi	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
101	Pavoi	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
102	Rangia	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
103	Khaloigaon	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
104	Umrangshu	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
105	Haflong	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
106	Dullavcherra	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
107	Ghoramari	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
108	Matia	132	AEGCL, Assam	--	--	--	Real-time operationa

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							l data to be telemetered for grid monitoring.
109	Dispur (Capital)	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
110	APM	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
111	Jorhat West	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
112	Bokakhat	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
113	Sibsagar (Betbari)	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
114	Sonapur	220	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
G.	**Tripura**						
115	Dharmanagar	132	TSECL, Tripura	--	--	--	Real-time operational data to be

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							telemetered for grid monitoring.
116	Ambassa	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
117	Dhalabil	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
118	Baramura (GTP)	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
119	Rokhia	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
120	Monarchak GS	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
121	Kanchanpur	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
122	Gandacherra	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed / Existing	Remarks
							monitoring.
123	Ompi	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
124	Gokulnagar	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
125	Sabroom	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
126	Satchand	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
127	Bogafa	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
128	Belonia	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
129	Gumi HEP	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Appendix-3

Technical Specifications for VSAT Project (State Sector Stations) in North-Eastern Region

1.0 Introduction

This VSAT scheme is for Telemetering voice & data from various sub-stations of state-utilities in NER to respective State Load Despatch Centres (SLDCs).

The VSAT communication scheme (based on Extended C Band technology) is proposed for State-Utilities of NER for 129 nos. of stations to respective SLDCs to facilitate connectivity for Power system telemetry (data on IEC-60870-5-104 & Voice) using third-party (Vendor/Contractor) Hub. This Hub shall act as a communication media to communicate with respective SLDCs and remote locations in different places of NER. Its major application will be mainly for real-time data and voice (Telemetry data & voice) from various stations to respective SLDCs. The list of stations with reporting to specific SLDCs is attached with this document.

Transport protocol will be TCP/IP and UDP/IP supporting unicast and multicast routing. The system shall be in compliance to the *Central Electricity Authority (Technical Standards for Communication System in Power System Operation) Regulations, 2020* available at https://cea.nic.in/regulations-category/technical-standards-for-communication-system-in-power-system-operation/?lang=en.

The Project requires establishment of satellite network with the following key requirements:

- VSAT based voice and data network operating on Indian satellite will be leased from a licensed Telecom Service Provider (TSP).
- The network will operate in Extended C band frequencies for reliable operations.
- VSATs will be installed at all State-Utilities of NER for 129 nos. of stations to respective 7 SLDCs to facilitate connectivity.
- VSAT links will be used for real-time data and voice (Telemetry data & voice) from various stations to respective SLDCs.
- The supply, installation and maintenance of VSAT equipment as well as lease of necessary satellite spectrum, as well as satisfactory operations during Defect Liability Period (i.e. 12 months) and subsequent C-AMC period (i.e. 06 years) of operation of the network will be under the scope of the VSAT service provider.

2.0 Technology & Bandwidth

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

It shall be state-of-the-art TDMA technology or equivalent in line with approved Detailed Project Report (DPR) to cater requirements of state-utilities for connecting specified nos. of remote locations/sub-stations with its respective SLDCs over the following bandwidths –

- 512kbps (Ext-C at SLDCs)
- 128kbps (Ext-C at each remote site).

The solution shall be robust and stable, while offering better performance than any other technologies. The proposed solution is designed to cater to support Data (SCADA) traffic. This scheme facilitates supply, installation and maintenance of Ext-C band TDMA (or equivalent) VSAT using the following –

a) The network proposed shall be fully IP compliant and shall operate on XC Band of ISRO Satellite
b) Service shall be provided from Service-Provider's Central Site (Hub) which shall be working on 9m or above XC Band antenna system in India catering for the different applications of the network.
c) The Baseband system shall cater for the MF-TDMA links.
d) Remote locations shall run on 1.2 m XC Band antenna terminal with 2W BUC and LNB.
e) The SLDCs site shall have 1.8m Antenna setup with a 5W BUC to cater remote site traffic.
f) Total power consumption of VSAT terminals shall be in the range of 80-100W.
g) Latency of <=750ms (less than or equal to) shall be maintained for single-hop and <=1700ms (less than or equal to) for double-hop.

Extended C Band is useful for all-weather conditions. It will have more than 99.5% uptime on quarterly basis for VSAT connectivity. There shall be an online portal to know the VSAT Up/Down status & Single Point of Contact (SPoC) for Project Management purposes.

The average latency per site shall be around 700-750ms. The remote to HO/remote no-load latency shall be max 1,700ms. The remote sites LAN shall be able to communicate with SLDC LAN (SCADA) servers over IP connectivity at output of IDU connected to switch/router at each remote-site location & respective SLDCs.

[**Note:** During successful Demo at Tezu in Arunachal Pradesh done in 2020, the bandwidth utilization is found to be up to 37-50kbps usage at low peak traffic hours and get up to 100kpbs at maximum. Hence, the SCADA-RTU application shall work fine over Ext-C VSAT hardware and 128Kbps satellite bandwidth from each of the remote site locations should be taken.]

The Bandwidth for SIP voice link will be as per requirement & usage w.r.t. matrix/SIP exchange connected Vendor/Contractor Hub. For voice, one SIP hardware (Telephone set) and one voice channel per location shall be required. There will be maximum fourteen (14) concurrent active SIP at any instant which implies that if there is all 7 SLDCs making simultaneous calls to one of its associated substations, then other substations shall not attempt to make call.

The Contractor will be responsible for overall designing, managing, maintaining & securing State-Utilities VSAT system for remote site locations.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

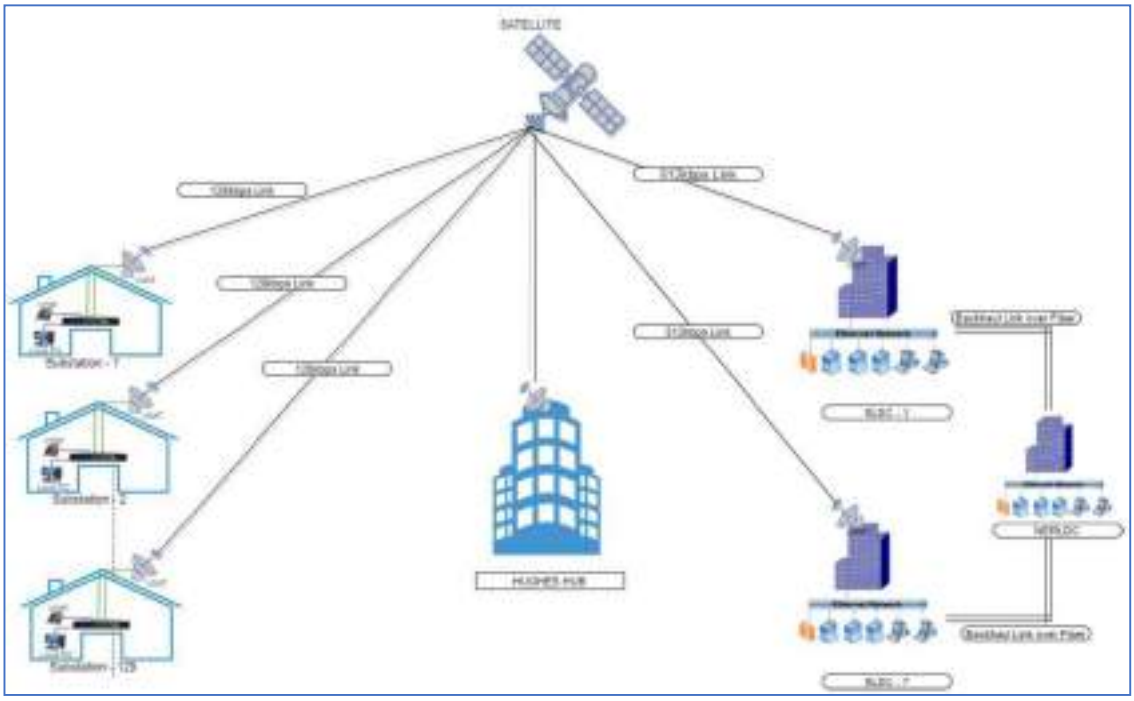


Figure 1: General illustration of connectivity diagram

In *figure* above, back-haul connectivity can be direct or through VSAT again as 2nd hop. The proposed applications to be used are SCADA data and SIP only.

All remote sub-stations' VSATs will operate at 128Kbps (64kbps In-route and 64kbps Out-route per site) link and all SLDCs will operate at 512kbps (256 kbps In-route and 256kbps Out-route per site) link and the data traffic (SCADA) from remote sites will first come to Service Provider's Hub and subsequently routed to SLDCs through VSAT. The return traffic will also flow through same path. The traffic travelling on the VSAT link/SIP phone connection shall be highly secured as it will be within the CUG network on a private Network.

3.0 Components of VSAT

It has some basic components as mentioned below.

- The FSS (Fixed Satellite System) VSAT antenna comes with NPM base which is installed & fixed on terrace with proper cement casting or ballast. This provides proper stability to antenna system. Hence, this will not be portable.
- Pole mounting is not feasible, non-penetrating roof mount will be provided to mount on RCC roof.
- 1.2m antenna with 2W EXT-C can generally upload upto 220 kbps maximum.
- 1.8m antenna with 5W EXT-C can generally upload upto 768 kbps maximum as per current configurations.
- Wind survival upto 200kmph under standard conditions.
- Reflector material shall be Compression Molded GFRP (glass-fiber-reinforced-polymer) latest technology.
- **Indoor Unit (IDU) and Outdoor Unit (ODU):** IDU shall provide Ethernet RJ-45 interface between the VSAT and the customer's Equipment. The signal strength of the ODU unit shall

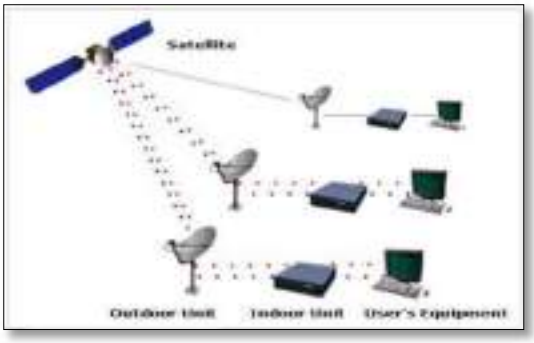
Date: _____ **Signature: _____**

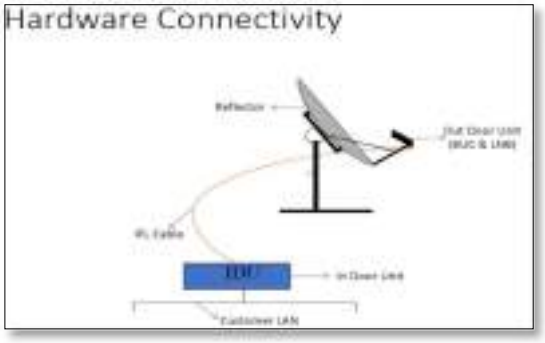
Name: _____

(Authorized Representative)

be checked at IDU unit before IDU unit is connected to the SCADA Server/RTU/Gateway via L2 LAN Switch via router. The IDU unit will be connected over Ethernet LAN to Existing LAN switch/Router of the SCADA System/RTU/Gateway for reporting of the data at SCADA Server. IDU shall be mounted such that its connectors shall not get damaged due to disturbance of co-axial cable.

- Space Segment namely satellite.





4.0 Traffic Flow

The data traffic (SCADA) from remote sites will first come to Vendor/Contractor Hub and subsequently routed to SLDCs through dedicated backhaul link or through VSAT. As Vendor/Contractor Hub is not in NER, hence VSAT link is to be established between Vendor/Contractor Hub to SLDCs. The return traffic will also flow through same path. The traffic travelling on the Backhaul link/VSAT link/SIP phone connection shall be highly secured as it will be within the CUG network on a private cloud. Logical separation shall be provided to keep the traffic segregated and secured.

5.0 Support

Vendor/Contractor shall have 365 x 24 x 7 Network Operating Centre (NOC), which enables centralized remote network monitoring and management of VSAT network(s) with the help of experienced and skilled network & technology experts, and state of the art monitoring tool-sets and devices. Vendor/Contractor uses a combination of self-developed and open-source software tools to provide advanced monitoring and management services. N+1 redundancy for Hub equipment shall be available and provide 99.5% quarterly uptime SLA with exclusions of special conditions like force majeure, planned downtime etc.

6.0 Trouble Ticket management and Call handling

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

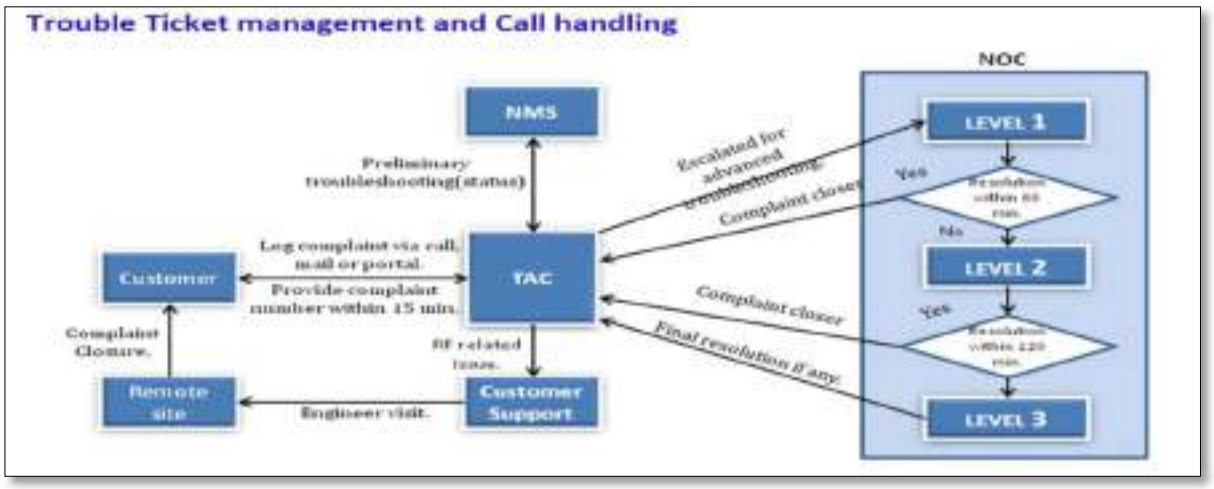


Figure 2: Trouble Ticket Management and Call Handling

a) Vendor/contractor provides different access for call logging –
   - Through Mail
   - Through Telephone

b) Customer will have to log a call with VENDOR/contractor if they face any issue related to VSAT connectivity.

c) Once the call is logged with VENDOR/contractor on its call management portal, it is assigned to L1 shift engineer.

d) The L1 engineer does the basic troubleshooting and tries to fix the issue. If the issue is resolved, it will confirm the same with customer and then close the complaint.

e) If the L1 engineer is not able to resolve the call within 1 hr., it is escalated to L2 engineer who does a detailed diagnosis of the issue and resolves it.

f) If the L2 engineer is not able to resolve the issue remotely then he escalates the call to field support team for filed visit to the site for rectification of the issue.

g) The support team assigns the JOB to the field engineer who is nearer to the remote location.

h) The field engineer will attend the site within the stipulated timelines and rectify the problem onsite.

i) The field engineer then co-ordinates with the NOC team for resolution.

j) Then the same is confirmed with customer before closure of the call.

k) Vendor shall station its dedicated Engineer(s) at Guwahati which shall be mobilized for attending Fault-Ticket (FT). The vendor will attend the site as & when technically required and as required, scheduled visit will be planned during AMC.

Vendor shall establish the following –

a) Vendor/Contractor Portal should be available to check the VSAT site status (UP /Down).

b) Vendor/Contractor Customer Portal for Service Desk and Trouble Ticket Management.

c) There will be one fault ticket logging portal for TT logging and getting ticket status. Username/password shall be provided to allow access portal.

7.0 Proposed Connectivity for Data & Voice

<u>Data and Voice related connectivity</u>

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

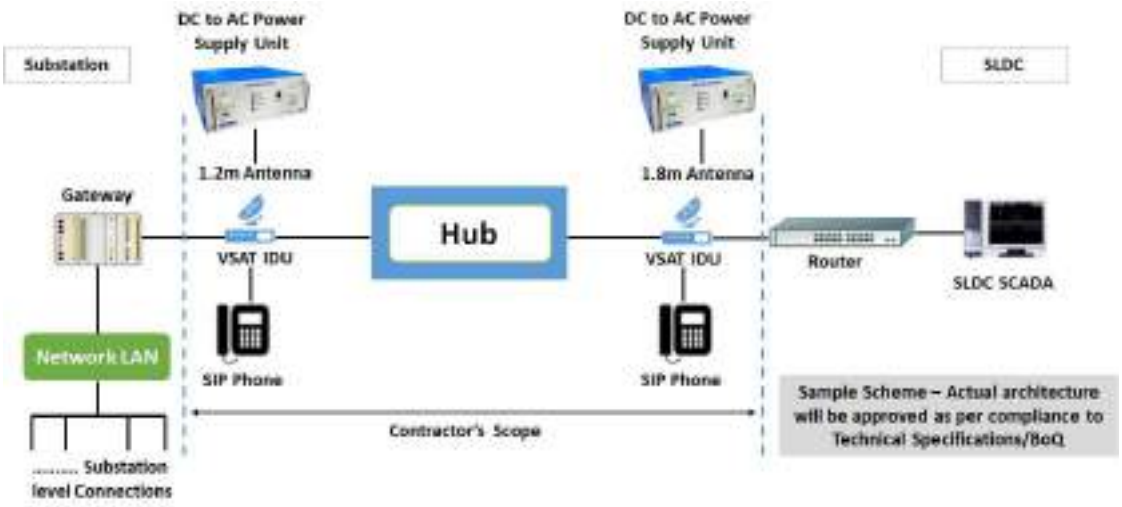


Figure 3: Proposed data/voice related connectivity

The detailed architecture, BoQ, Data Requirement Sheets, Model Types, etc. shall be approved by SLDCs in later stages.

8.0 Scope of Work

A. Contractor's Scope:

a) The scope of work under this contract shall include Supply, Delivery to site, Unloading, Insurance till handing over, Handling, transportation to final locations, supervision on Installation-Termination-Testing and Commissioning including configuration/integration of VSAT communication system for communicating of 129 nos. of Gateways/RTU locations in NER with total seven (07) nos. of VSAT communication system at SLDCs so that the telemetry data of the respective site can be reported to existing SCADA communication server at SLDCs. The scope shall be limited to VSAT link connectivity only and same shall be demonstrated by pinging from remote LAN-SCADA server. Any issues pertaining to SCADA application not working during integration or O&M phase shall be taken care by respective SLDCs.

b) The scope also includes establishment of Voice communication (SIP) of stations over VSAT network with respective SLDCs. One SIP hardware and one voice channel per location as per Bandwidth requirment shall be provided by the Contractor. The configuration of SIP phone of the stations in NER along with one nos. at each SLDC over the VSAT Communication network shall be done by the Contractor. The SIP phone at remote stations can be connected directly to modem (or via switch with minimum 5 ports which is to be provided by Contractor free-of-cost) . Other ports in Modem (or additional switch provided by Contractor) will be connected to Primary-RTU-GW and Backup-RTU-GW.One port will connect to SIP phone and rest of the ports for future maintenance part. SIP Phone at SLDCs will be connected to 1*Port GE NIM Card supplied.

c) The contractor shall suggest route and length for connection of IDU unit with the existing RTU/SCADA server after site survey. For bidding purpose, bidder to quote for 30 Mtr length per site with "per meter charges" also in case extra cable at any site is required. Advance intimation is to be given by Contractor to complete work within a specific time frame (15-21 days) to make site/front ready. Laying, clamping, conduiting and termination at both ends shall also be done by Contractor. The Contractor shall deploy

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

adequate & experienced manpower to achieve the project completion within the stipulated time frame. The VSAT equipment shall be well tied/fixed/mounted while installation.

d) The contractor should also ensure proper earthing of all the equipments installed under VSAT Communication network by connecting all equipment with nearest earthing point.

e) **Power supply requirement:** Normally, 230V AC Power Supply input shall be required for IDU, router, SIP etc. DC-AC convertor shall be provided by the Contractor to keep the setup simple and less point of power failures. Input of 48V DC shall be provided by Owner.

f) **Site Survey:** The Contractor shall carry out survey of all stations at least 2 months in advance before installation for the following –

- To check the site conditions
- To check the location of placement for installation of IDU as well as ODU unit
- To check the proper route for cable laying, to measure the exact cable requirement
- Feasibility of using existing power supply source as available at site
- To check the earthing connection point

Survey report would be through a format which is to be submitted & proposed by supplier/integrator/party and same would be approved by Employer/Owner before survey begins. Survey shall also cover the requirment of Cables (type, length, route) for connection of IDU unit with the existing RTU (for remote locations) and with SCADA Server/Gateway /Router etc. (at SLDCs ends). For bidding purpose, bidder is required to quote for 5 mtr CAT cable per SLDC. Bidder also need to provide per meter quote in case extra length is required, accordingly customer will place the order on successful bidder. Any requirement of prerequsite like furniture/space etc. is to be intimated during survey.

g) **Power/Communication Cable/Co-axial cable:** All cables (Power supply cable, Communication cable, Co-axial cable) and wires shall be supplied & installed as required for the scheme. The Contractor will provide 3-pin AC power cord of 5 meter length with Operating voltage 240 V AC and upto 5A current rating. The communication cable shall be STP Cat 6 cable and IFL cable will be standard RG-6 or RG-11 cable used for VSAT. Proper cabling, cable dressing, cable tagging/ferruling, conduiting of cable, cable connector shall be provided and done by the party.

h) **Submission of Test report:** Some mandatory test reports for supplied electronic equipment shall be submitted by the Contractor as follows –

- Submission of ATP test procedure at site
- Routine test report
- OEM test report for supplied equipment

If test reports are not provided by OEM, any authenticated proof from OEM/Bidder to be shared with Employer/Owner for exclusions. The Contractor shall submit Internal TRC (Testing Requirements Checklist) Certificate report.

As Cisco-make products are already approved make in POWERGRID (holding CTU status), hence test reports are not required for this device. The contractor shall share its internal test certificate.

i) **Submission of SAT reports:** Site Acceptance Test (SAT) commissioning format for the whole scheme (from remote site-RTU site & to SLDCs SCADA) site is to be developed by party and on approval by Employer/Owner, same shall be followed in all locations. On successful installation and integration of all VSAT communication system equipment with existing system, Contractor shall arrange/conduct SAT in the presence of

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Employer/Owner's Engineer & submit SAT reports for approval of Employer/Owner. The Contractor shall submit the routine test report of all items supplied.

j) **Documentation:** For all schemes, after commissioing, the contractor shall submit as-built drawing, as-built connection details, cable termination schedule including earthing termination & power supply connection, network topology, etc. After the completion of the work at the respective sites, the Contractor shall do & get sign in all required documents from the respective site of state-utilities as well. The party shall also submit the material reconciliation report (signed by both Contractor & respective site) for all the site locations.

   All technology/architecture/routing method/path/channel/networking schme, etc. as adopted for this scheme shall be shared by Contractor with Employer/Owner.

k) **Statutory Clearance:** Necessary clearance, License, etc. from all applicable statutory authority shall be taken care by Contractor. However, if any fees to be deposited in govt. authority, the same would be re-imbursed by employer/Owner based on documentary evidence. Contractor shall study the same and intimate to Employer/Owner in advance.

l) **Annual Maintenance Contract:** The scope also includes AMC for 7 years (including AMC under warranty period/defect liability period) for maintenance of VSAT equipment and Bandwidth in all sites. AMC after defect liability period shall start after completion of 12 months from the date of issuance of TOC (Taking Over Certificate). TOC will be issued within 2 weeks of signed SAT report submission for start of billing. The 12 months period from date of TOC will be considered as defect liability period or warranty period. AMC methodology including remote support & site support shall be approved by Employer/Owner (after submission by vendor as per Technical Specifications) before commissioing of system. It is the responsibility of Contractor to keep authorised representative in NER who can attend in case of physical defects to be attended at site during warranty & AMC period.

m) During the defect liability period, the manufacturing defect will be under Contractor's scope. AMC will be limited to Contractor supplied equipment/link itself. During AMC period, if any VSAT equipment along with cable is found faulty or not working, the Contractor shall replace/repair the equipment/cable as per availability of spares. Hardware damage due to issues not attributable to Contractor or Owner attributed issues like mishandling, theft, power, short circuit, etc. shall be replaced on chargeable basis. Hindrance Register/Records shall be maintained by Contractor in this regard.

n) The Contractor shall give the remote support through Teamviewer/Anydesk/any other software in case of issue in the VSAT network system & through video-call support or as required when phyiscal access to site is not possible.

o) There shall not be any other network or LAN traffic connected to VSAT Network apart from data & voice.

p) The Contractor shall provide 99.5% uptime for VSAT connectivity. Link availability percentage report shall be provided on quarterly-basis for all sites.

q) The Contractor shall provide Online portal to check the site uptime / online status, etc.

r) Necessary SACFA/ other DOT/WPC permission/Govt. clearance will be required which shall be arranged by Contractor. Necessary cost shall be included in the bid itself.

s) Any defect found in equipment/item/material shall be replaced by a new one of same model/type/specification.

t) Road-Permit shall be arranged by the Contractor for the supply of required items/materials/equipment as per the scheme as per new GST regime rule.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

u) Contractor shall have to use all required licensed Software & hardware.
v) Monthly reporting format (VSAT data & voice link availability percentage or similar) shall be developed by vendor which would be sent to Employer/Owner e-mail during AMC.
w) While raising invoice for payment purposes, place of supply/service shall be clearly mentioned.
x) Earthing requirement (i.e. limited to connection with existing earthing) points shall be clearly mentioned during survey at intial stage. Further any spike guard/earthing protection required shall be taken up by Contractor under miscellaneous item head of BoQ, if required.
y) High quality DC to AC converters shall be provided for all locations. The type model shall be suggested by vendor for approval.
z) The commissioing works/troubleshooting method shall be shared by Contractor with Employer/Owner.
aa) All LAN cables to be supplied by Contractor and STP/FSTP (individual shielded and over all shielded cable will be used).
bb) Vendor shall not share any data of system in use/adopted/approved for Employer/Owner with any external agency without approval of Employer/Owner. Cyber security norms as required for VSAT system & associated networking shall be fullfilled by vendor.

B. <u>Employer/Owner's Scope</u>:

a) The Power supply for IDU shall be given from existing UPS power supply output available at the site. The power supply shall be provided by the employer/Owner but feasibility of power supply shall be checked during site-survey by the Contractor.
b) In case of any change in application or module addition, Employer/Owner shall inform/test the module on VSAT.
c) The material and civil work activity shall be carried out by Employer/Owner; however, Contractor shall provide Engineer on field for specifying design and location of platform in advance (preferably during material verification on delivery, survey shall be done by Contractor) in advance. Some time of approx. 15-21 working days time to be provided for platform preparation by site technicians. Space/platform for placement of IDU, ODU unit and earthing connection point (if required) shall be provided by the customer. The space has to be decided during joint survey with the party.
d) The IP address defined in SCADA site/RTU or Gateway of Remote stations (different subnet) which will be required during the configuration of VSAT network system shall be discussed and shared between Employer/Owner and Contractor during the execution of work.
e) Based on site-survey, if additional/separate LAN switch/LAN Cable is required, the employer/Owner shall provide the same.

9.0 Technical parameters related general requirements

In the VSAT Network, VSAT based voice and data network operating on Indian Satellite shall be leased from a licensed Telecom Service Provider (TSP). The network shall operate in Extended C band frequencies for reliable operations even during heavy rains normally associated with cyclonic conditions.

VSATs shall be installed at respective sub-stations' and VSAT links shall be used for telemetry data of the respective site can be reported to existing SCADA

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

communication server at SLDCs of NER. The average latency per site shall be around 700-750ms for single-hop and around 1500-1700ms for double-hop..

Nominal Diameter of Extended-C band VSAT antenna shall be 1.2 meter, RF equipment and modem shall be designed by VSAT service provider, keeping in view very high reliability (better than 99.5%) requirement of the network. Structure of VSAT antenna and foundation should be designed to withstand peak wind speed of 200 Kilometres/ hour.

VSAT at SLDCs shall operate with MF-TDMA technology and will operate at 512 Kbps data rate. Substations will also be connected with 128 Kbps data rate at each site.

For the Network Monitoring System (NMS), the Telecom Service Provider shall do proactive monitoring and fault management of the network on an End–to-End basis remotely from its own Network Operations Centre (NOC) and provide the following link wise report on monthly basis incl. the following –

- Link downtime / Uptime analysis calculation to be available online via portal.
- Bandwidth utilization report with committed information rate for all links
- Network availability reports as per Service Level Parameters defined.
- Throughput, Latency, Jitter for all the locations

Note: The Service Provider shall allocate to SLDCs, with separate User-ID & Password for web-access to monitor in real time all network statistics and reports as mentioned above.

The minimum requirement has been mentioned below for which the Contractor shall quote in such a way that all requirements of the scheme are fulfilled and best quality of the items available in market are offered. Any item left to be mentioned but required for best & optimised performace of system shall be offered by bidder at its own cost.

i) All the hardware units shall work in all weather conditions and the parts shall be rust proof.
ii) This is minimum requirement and higher or better shall be acceptable in it. Technical approval shall be taken for each model/type.

1. **Antenna:** Minimum specifications mentioned in *table* below in which same or better or higher shall be offered by Contractor.

S. No.	Particulars for 1.2 m Antenna	Specifications
A.	**Electrical Performance**	
1	Band of Operation	Antenna shall operate in INSAT XC band
2	Reflector Size	1.2 metre
3	Operating Frequency	**Tx:** 6.725 – 7.025 GHz **Rx:** 4.500 – 4.800 GHz
4	Polarization Sense	Linear Orthogonal Orientable
5	VSWR	**Tx** – 1.3 : 1 **Rx** – 1.33 : 1
6	Mid-band Gain (± 0.5dB)	**Tx:** 36.8 dbi

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Particulars for 1.2 m Antenna	Specifications
		Rx: 33.2 dbi
7	Antenna Noise Temperature	50°K @ 30°EL
8	Antenna Cross Polarization on Axis (dB)	30db
9	Feed Interface Port	**Tx:** Coaxial N-Female o WR137 **Rx:** WR229
B.	**Mechanical Performance**	
1	Reflector Material	Glass Fibre Reinforced Polyester
2	Antenna Optics	Prime Focus, Offset Fed
3	Mount Type	Elevation Over Azimuth
4	Steerability Azimuth	±360° Coarse, ±20° fine
5	Elevation	5° to 90° fine
C.	**Environmental Performance**	
1	Wind Speed Operation/ Survival	The mechanical structure shall be suitable to operate within specifications in wind-speed upto 70km/hr and survive upto 200km/hr
2	Temperature Operational	-40°C to 60°C
3	Temperature Survival	-50°C to 70°C
4	Rain Operational	½"/hr
5	Solar Radiation	360 BTU/h/ft^2
6	ITU recommendations	Antenna shall meet ITU recommendations

Table 1: Specifications for 1.2m Antenna

S. No.	Particulars for 1.8 m Antenna	Specifications
A.	**Electrical Performance**	
1	Band of Operation	Antenna shall operate in INSAT C band
2	Reflector Size	1.8 metre
3	Operating Frequency	**Tx:** 6.725 – 7.025 GHz **Rx:** 4.5 – 4.8 GHz
4	Polarization Sense	Polarization of antenna shall support either circular polarization (in case of international satellite) or linear polarization (in case of working with INSAT satellites) as per service provider's satellite requirements. However, bidder need to quote antenna with any one option.
5	VSWR	The VSWR shall be 1.3:1 Max
6	Mid-band Gain (± 0.5dB)	The mid-band gain shall be 35.5.9 dBi (Rx) and 39.4dBi (Tx)
7	Antenna Noise Temperature	10° Elevation - 56K 20° Elevation - 49K 30° Elevation - 47K
8	Feed Interface Port	**Rx** CPR229F, WR229

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Particulars for 1.8 m Antenna	Specifications
		Tx CPR 137 or Type N, WR137
B.	**Mechanical Performance**	
1	Reflector Material	Glass Fibre Reinforced Polyester SMC
2	Antenna Optics	Prime Focus, One-Piece Offset Feed
3	Mount Type	Elevation Over Azimuth
C.	**Environmental Performance**	
1	Wind Speed Operation/ Survival	The mechanical structure shall be suitable to operate within specifications in wind-speed upto 70km/hr and survive upto 200km/hr.
2	Temperature Operational	-40°C to 60°C
3	Climate Condition	The antenna shall not corrode due to effect of Salt, Pollutants and Contaminants as encountered in coastal or industrial areas.
4	Rain Operational	½"/hr
5	Solar Radiation	360 BTU/h/ft^2
6	ITU recommendations	Antenna shall meet ITU recommendations

Table 2: Specifications for 1.8m Antenna

2. **Outdoor Unit (ODU):** Minimum specifications mentioned in *table* below in which BUC shall be same or better or higher model. Its mode shall be compatible model with the Antenna-2W/5W.

S. No.	Description of Parameters	Specification
1	RF Frequency	6.725-7.025 GHz/ 6.725-7.025 GHz
2	LO Frequency	4.90 / 5.76 GHz
3	IF Frequency	965 to 1,265MHz MHz/ 965 to 1,265MHz MHz
4	Output Power	Minimum 2W / Ref. (10MHz from modem) Input: F-type, Female Connector
5	DC Power Input	IF Connector
6	Input Impedance	75 ohms nom<F-type Model>

Table 3: Specifications for Outdoor Unit (ODU)

3. **Low Noise Block (LNB):** Minimum specifications mentioned in *table* below under which LNB shall be same or better or higher model.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Description of Parameters	Specification
1	Model	AN1395 or Higher or equivalent RF Frequency: 4.5 to 4.8 GHz
2	Local Oscillator	5.95 GHz, Total Frequency Accuracy: ±1 MHz max
3	Input/Output Connector	Waveguide WR-229G with groove with gasket/F-Type
4	Supply Voltage	DC through IF cable from IDU
5	Operating Temperature	-40°C to +60°C (operating)
6	Outdoor Relative Humidity	upto 90%

Table 4: Specifications for Low Noise Block (LNB)

4. **Indoor Unit (IDU) Modem:** Minimum specifications mentioned in *table* below under which LNB shall be same or better or higher model.

S. No.	Particulars	Specifications
A.	**Forward Channel**	
1	Technology	DVB-S2/DVB-S2X with Adaptive Coding and Modulation (ACM)
2	Frequency	IDU Should operate in INSAT C Band
3	Modulation	QPSK, 8PSK, 16APSK, 32APSK, 64APSK
4	Encapsulation	GSE / Equivalent
5	Symbol Rates	Up to 235 Msps
B.	**Return Channel**	
1	Communication Network	Shall be designed based on MFTDMA
2	Modulation	OQPSK/QPSK, 8PSK/16APSK/16QAM
3	Symbol Rates	256 Ksps to 12 Msps
C.	**Network Interfaces**	
1	LAN Ports	4 GigE LAN ports
2	USB	1 USB
D.	**Power Supply**	
1	Input Voltage Range	The system should work with nominal A/C 230 volts single phase input or DC voltage of +/-48VDC
2	Power Consumption	The input power requirement of the VSAT system shall not be more than 200 Watts
E.	**Environmental**	
1	Operating Temperature	0°C to 50°C
2	Relative Humidity	0 to 90% (non-condensing)
F.	**Regulatory**	
1	Safety	UL/CSA/EN 60950-1
2	EMC	FCC Part 15 Class B, ICES-003

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Particulars	Specifications
3	RoHS	RoHS-2 compliant
4	IP Features	Modem should support below features: • Dual stack IPv4/IPv6 • Static and Dynamic Addressing • NAT/PAT • RIPv2, RIPNG • VLAN tagging • VRRP • Access Control List (ACL) • DNS Caching • SIP Call Proxy • Advanced Web Acceleration

Table 5: Specifications for Indoor Unit (IDU) Modem

5. **SIP Phones:** Minimum specifications mentioned in *table* below under which phones shall be same or better or higher model. SIP Phones to be supplied shall be compatible with the VSAT network system. It shall enable high quality SIP. The proposed IP phones shall comply with the following features –
   - 12-part keypad
   - Graphical display
   - Navigator keys (min 3)
   - Message waiting with LED
   - Speaker with LED
   - Freely programmable keys (min 8)
   - Open listening
   - Full duplex
   - Hands-free speaking
   - Integrated Ethernet switch for PC connection
   - Power over Ethernet IEEE 802.3af class 1
   - LAN interface, 10/100 MBit/s autosensing,
   - Mute function
   - Directory access and dial by name
   - Display of call ID by name and number
   - Option for wall mounting
   - LAN Cable length shall support upto 60 m

10.0 Special Technical Conditions of Contract

a) In the SCADA Control Room (SLDCs end), the configuration/integration of the IDU unit (A fixed IP address should be allocated in the IP series of the existing SCADA LAN switch or SCADA Router) is to be done by the Contractor after deciding the mutually accepted IP addresses during the execution of the work. Approval for configuration of IP will be taken by Employer/Owner.

b) AMC criteria will be as per mutually agreed upon between the Contractor and Employer/Owner.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

c) Procedure to check/rectify the issue in respect of SIP phone; in case the phone is not working, same shall be handed over to respective site.
d) After supply of materials, the materials shall be jointly verified in comparison to Technical Specifications/BoQ. All materials to be approved by Employer/Owner.
e) **Delivery Schedule & Installation Completion schedule:** 9 months from date of Notification of Award/Letter of Award. Break-up of activities (as per L2 Schedule) w.r.t. 9 months shall be given by the Contractor before award.
f) **Freight and Insurance:** Materials shall be sent through reputed party & documentary evidence to be shared during supply invoicing.
g) **Quantity Variation:** 30% (Thirty percentage) of total contract price.
h) **Warranty:** 1 year from date of VSAT commissioning for manufacturing defect. Any replacement/repair of any item including to-and-fro transportation cost is in scope of bidder. Replacement/repair to be done within one month during warranty period.
i) **After Sales and Service Support:** Contractor shall have after-sales and service support in NER India for next 7 years and it will be responsibility of Contractor to provide contact details, email id, service support center details at the time of bidding.
j) **Project In Charge:** To be appointed by Employer/respective Owners.
k) Consignee details will be provided by Employer/Owner.
l) All the Contractor supplied equipment/devices shall be of reputed make or any other Employer/Owner approved brand. If the Contractor offers any other brand, then same shall comply all technical requirements and shall have been type-tested & supplied in any other Employer/Owner/NTPC/SAIL or similar Central PSU project.
m) The time-frame break up/schedule is as follows –
    - Scheme Approval by 15 days - 30 days.
    - Survey & report submission within 3 months of LoA/NoA.
    - Supply readiness/ prototype demo & Inspection by 6th month of LoA/NoA, if required.
    - Drawing/DRS/Item approval by 6th month from date of LoA/NoA.
    - Delivery by 7th month w.r.t. NoA/LoA.
    - Supervision/Commissioing & Installation & others by 8th-10th month w.r.t. NoA/LoA.
    - Integration with SLDCs by 11th-12th month w.r.t. NoA/LoA.
n) The Contractor shall deploy adequate manpower to achieve the project completion within the stipulated time frame. Wherever site is not ready, Contractor will simulate/supply the item in other locations with full details of installation procedure by employer/state representative at later stage with full-remote support or as required from Contractor.
o) Respective site in-charge shall sign the SAT (approved Site Acceptance Report Template after commissioning) and based on same TOC will be issued per site.

11.0 Annual Maintenance Contract Scope & Agreement

These Technical Specifications of Annual Maintenance Contract is extension of Scope of AMC as mentioned in brief in initial part of the document. Contractor shall be responsible for comprehensive maintenance of all the VSAT equipment and Bandwidth of all sites. This Contract also includes AMC of 7 years (including AMC under warranty period/defect liability period) for maintenance of VSAT equipment and Bandwidth at all sites.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Defect liability period for twelve (12) months shall start from the date of TOC (Taking Over Certificate) along with operational acceptance after completion of the contract. During the defect liability period and AMC period, if any VSAT equipment along with associated cables, Bandwidth/Hub/Link issues are found faulty/damaged/burnt or not working or down, the Contractor shall replace/repair/rectify the equipment/cable free-of-cost and resolve the issues at minimum possible time. Contractor shall have to make their own assessment of the network and deploy manpower accordingly. The details of AMC procedure shall be submitted by Contractor & approved by Employer/Owner after award of Contract.

The Contractor shall give the remote support through Team-Viewer/Anydesk/any other software whenever there is issue in the VSAT network system. It is to be ensured that fault shall be attended within the specified response time. Contractor shall arrange for adequate transportation for their staff as per the demand of works.

Contractor's staff (at all locations) shall be equipped with necessary tool kits, mobile phones, vehicle, etc. The Maintenance of the system supplied & installed by the Contractor shall be comprehensive in nature and all the spares (if any) required during maintenance period shall be provided by the Contractor at no additional cost to the Employer/Owner.

a) Resource Deployment

In order to cover the entire network, it is imperative that Contractor's maintenance engineers are strategically located so as to reach the site within shortest possible time frame to maintain required system availability of more than 99.5% for VSAT Network System. Accordingly, Contractor shall access the actual manpower requirement and place them suitably. The exact location for deploying engineer shall be finalized during detailed engineering.

b) Monitoring

The network will be monitored by Employer/Owner at respective SLDCs. Network Monitoring Team (NMT), whenever, notices any fault/abnormality in the system shall notify to the Contractor's maintenance Co-ordinator, over phone with an unique event number. An event report shall be generated by Employer/Owner as per the enclosed formats. On issuance of Event report (may be recorded over phone in case of non-availability of Contractor's representative) by NMT, corrective action(s) shall be carried out by Contractor's maintenance personnel for rectification. Contractor's representative must report within four (04) hours at locations where Contractor's engineers are stationed and within reasonable time at all other location which shall in no case exceed more than 12 hours (including travel time). Time mentioned here is irrespective of normal working hours or holidays. The NMT shall co-ordinate and control any site visits to ensure that communication network is operating with a minimum of disruption during these visits. The NMT will inform the relevant Owner Constituent to facilitate the access to the site/equipment where fault is suspected.

The main responsibilities of the Employer/Owner's Network Monitoring Team are as follows –

- Telemetry of data/Voice communication monitoring.
- Detect faults, prioritizing them and notifying to the Contractor for immediate corrective actions.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

- Follow up on corrective actions to verify that the agreed time frames are met.
- Record all faults in the fault record sheet and summary of action taken for fault rectifications.
- Co-ordinate all planned / breakdown site visits to minimize disturbance of service.
- Update status information of operated network to user's communication network.

c) Maintenance

The maintenance activities are either Event Based (Fault/breakdown maintenance,) or planned site visits (Semi-annual site visit, testing of link/channels, augmentation and modification in the network if end equipment for data/speech does not communicate with corresponding equipment as and when required. Planned visits shall mainly carried out during working days.

Event based work is to be carried out round-the-clock seven (07) days a week, A start status shall be jointly filled by Employer/Owner & Contractors representative at 10:00 Hrs. of commencement date of maintenance contract.

Planned site visits shall be carried out once in a year (annually) at all the sites in the network or time-to-time if speech is affected at a particular site. Thus, in a year, not less than one (01) planned site visit to all locations will be undertaken.

Contractor will maintain record of events during the maintenance services; simultaneously Employer/Owner Constituent shall also record the events in the respective log-books available in the SLDCs.

The tasks during the planned site visits for the system include but are not limited to following:

- Updating of log records
- Measurement of earth resistance (to be measured by respective site in charge during Preventive Maintenance visits)

The works to be taken up during annual site visits is given in enclosed Format.

Fault/Breakdown maintenance is a process of fault correction/troubleshooting as per the fault reported by NMT. Contractor shall maintain a log of activities carried out at all locations and necessary History will include site name, visit date, actions taken and site condition. A detailed report in this respect shall be submitted by the Contractor in the monthly meeting.

The representatives of Employer/Owner Constituents will associate in trouble shooting, change of unit as per programme notified/intimated by the contractor; however, due to any reason if Employer/Owner cannot depute their representative then Contractor will proceed for the work so as to attend the breakdown/testing as per their scheduled programme.

The scope of corrective maintenance is as follows –

- Troubleshooting on a network element and its interfaces as and when required and directed by NMT, engineer/coordinator of Employer/Owner.
- Diagnostics on interfaces to locate problems in network. If required, the Contractor shall depute maintenance engineer for joint inspection with other vendors for pin-pointing the fault.
- Identification of the faulty hardware unit and replacing it.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

- Performance of function verification in co-ordination with the NMT operators.
- Handing over of faulty unit to Employer/Owner at site or respective SLDC.

d) Hardware Services

In case any failure or malfunction is discovered, the maintenance team shall identify the problem, organize to promptly attend the fault, replace the faulty equipment/card/module or any other hardware component with a spare unit and ship the faulty unit to specified location. Each faulty unit shall be accompanied with correctly filled-out Event Report.

The Contractor shall carry out the following tasks for hardware services –

- Faulty spare will be taken back by the Contractor.
- Replace faulty units from their own spares stock. However, in case of hardware replacement with refurbished unit, the Contractor shall give self-declaration for warranty. In general, otherwise, new item (may be from store or so) shall be provided by Contractor.

e) Hub Uptime Availability

The party will provide quarterly Hub uptime of 99.5% with exclusions of force majeure, sun outage, satellite failure and planned maintenance. Link availability percentage report should be provided on quarterly basis for 24 x 7 x 365 days operation meeting Network performance. The Hub Uptime will be calculated based on the following formula –
Hub Uptime (HU) in % = ((Hub $_{POT}$ – Hub $_{DT}$) / Hub $_{POT}$)*100 Where,
Hub $_{POT}$ = Hub power on time, Hub $_{DT}$ = Hub down time

- ***For high capacity MFTDMA / DVB-S2 latest technology VSAT links***
  - MFTDMA / DVB-S2 latest technology VSAT link availability = 99.5% (averaged on quarterly basis)
  - Maximum Time To Repair/Replace (MTTR) the items of MFTDMA VSAT link (at remote side) = 24 hours from the time of reporting of fault.
  - Maximum Time To Repair (MTTR) MFTDMA = 05 hours from the time of reporting of fault (using redundant items if any supplied with VSAT)
  - In case, the contractor is unable to meet any of the above condition, the contractor shall pay penalty of ₹ 2,000 per day.

f) MFTDMA / DVB-S2 latest technology VSATs Uptime / Availability

The contractor should guarantee that each Ext C-Band remote VSAT Uptime of 99.5%. VSATs should meet Network Performance as mentioned in the tender.

- Individual VSAT downtime refers to the time for which the VSAT equipment is unable to support the satellite link with the Hub, due to failure of the VSAT IDU, RFT/BUC, LNB, Antenna system, IFL cable, connectors, etc. The VSAT fault means that remote VSAT not meeting the Performance of VSAT mentioned in the tender**.**
- The maximum time to repair (MTTR) of VSAT will not exceed the following –
  - 72 Hrs. for SLDCs.
  - 120 Hrs. for remote stations (considering the difficulty areas of NE region).
- In case the maximum time to repair the VSAT exceeds the above-mentioned duration or unable to meet the desired uptime, Contractor would pay penalty of an amount of ₹ 500 per remote VSAT per week and maximum upto 10% of AMC value of that problematic site (NE).
- The downtime starts from the time complaint is logged. Any delay in logging the

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

complaint by user shall be excluded from the downtime calculations.

- Penalties whichever shall be at the higher side shall be imposed.

For the purpose of the above clause, non-availability/degradation in the throughput of service on account of the following shall not be construed as defect or interruption in 'Remote VSAT availability' –

- Failure or fluctuation of electric power.
- Accident, neglect of the equipment.
- Any fault in any attachments or associated equipment, which is not supplied by the Contractor.
- Downtime caused due to optimization and preventive maintenance of VSAT Hub.
- Event of Force Majeure conditions like natural calamities, civil disturbance, strike, war, curfew, flood, serious accident during traveling for attending fault etc.
- Non-Availability / degradation of satellite / Transponder.

g) Documentation during Maintenance Period

Events shall be recorded by using of event form. The forms shall be filled in duly dated, timed and signed by representatives of both the parties. Absence of one or the other party's representative shall not render the record invalid but assumes only that such representative signs the record at his earliest convenience.

The initial condition of the system shall be recorded on the start status form to constitute or reference for later events. All the events recorded in the start status form shall have to be rectified. If a unit is replaced or repaired both the new and the replaced or repaired unit is to be recorded in the event report form. Contractor shall submit the detailed report for fault occurrence after the cards/equipment is rectified at the works of supplier.

The Contractor shall submit the Maintenance Service Report for each VSAT site duly signed by the official of the site for the confirmation of satisfactory maintenance services and functionality of the link during the period of warranty as well as AMC (yearly report). Employer/Owner and Contractor shall mutually decide the format of Maintenance Service Report.

h) Intimation on Team & Support System

The vendor shall give details of support system (in NER, how maintenance will be done, details of office address, manpower strength, availability of authorized representative in NER for all sites) during bidding.

i) Scope of Work during Maintenance Period

Sl. No.	Description	Detailed Scope
1.0	Overall Infrastructure	Infrastructure includes the building, air conditioners, AC/DC system, UPS, cable trenches, Earthing, etc. provided by Employer/Owner. They will be maintained by Employer/Owner.
1.1	Equipment site	
1.1.1	General conditions	General checking during quarterly / troubleshooting site visits and advise.
1.1.2	Cleanliness of the room	General checking during quarterly / troubleshooting site visits and advise.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Sl. No.	Description	Detailed Scope
1.1.3	Earthing interconnections	Earth resistance measurement shall be done by Employer/Owner station team during Preventive Maintenance. The Contractor shall get the earthing resistance value noted in visit report.
1.1.4	Cable route	General checking during quarterly / troubleshooting site visits and advise.
1.1.5	EMI issues	This shall be under Employer/Owner scope. The Contractor intimated this is general practice that whenever there is fault or outage, fault analysis report is shared by Contractor with customer.
1.2	UPS	Checking of output values, earthing interconnection during quarterly site visits and advice. It shall also be checked during troubleshooting site visits if it is considered the probable cause of fault.
1.3	Indoor cabling	Checking terminations, re-kroning, if necessary, during semi-annual/troubleshooting site visits. It shall also be checked during troubleshooting site visits if it is the probable cause of faults.
1.4	Out-door cabling	Checking terminations, re-kroning, if necessary, during semi-annual/troubleshooting site visits. It shall also be checked during troubleshooting site visits if it is the probable cause of faults.
2	**Main Equipment**	
2.1	VSAT System	Faulty equipment to be replaced at site as per conditions of Maintenance Plan.
2.2	Monitoring and general operation of VSAT System	Regular monitoring of the VSAT link. Investigations for abnormal behaviour and take corrective actions.
2.3	Provisioning/ Re-provisioning of channels	As per requirement.

Other associated works:

- Prior intimation shall be given to the respective sites via email/letter before going for AMC at sites.
- Physical checking of antenna footing for corrosion, breakage, loosening/breakage of cemented footing shall be done during the AMC visit.
- Measurement of Earth Resistance of Antenna Footage and VSAT equipment shall be done during the AMC.
- Input Power Supply voltage shall be checked and measured.
- Cable dressing if any and cleaning of VSAT equipment shall be done during AMC.
- For voice communication, voice quality of IP phone shall be checked. If any faulty/defective/issue found in phone, the contractor shall send for repairing/replacement free of cost.
- Software and firmware maintenance shall be done (if any).
- Employer shall be informed of all alterations or improvements to the hardware supplied under this Specification. Employer shall be placed on the Contractor's mailing list to

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

receive announcements of the discovery, documentation, and solution of hardware problems as well as other improvements that could be made to hardware which is provided with the communication equipment. The service shall begin at the time of contract award and shall continue for seven years. The Contractor shall also include a subscription to the hardware subcontractors' change notification service from the time of contract award through the warranty period, with an Employer renewable option for extended periods.

j) Coordination Requirements

- **Meeting Practice**

Regular meeting between Employer/Owner and the Contractor is vital for communication and information flow between these two organizations. The purpose of the meeting is to tackle the essential issues concerning the services and network performance. The suggested schedule for meeting is once in every month. The meeting agenda shall be decided between Employer/Owner and Contractor and could for example consist of the following issues:

- Services and network performance according to the report during last month
- Review of emergency situation
- Status of spare
- Action plan
- Next Meeting
- Alarms/events unattended till the date of meeting

The following participants shall be present in the meeting –

- Co-ordinator (Contractor)
- Members of the Contractor team as needed
- Co-ordinator Employer/Owner representative
- Operation and maintenance staff as designated to attend (Employer/Owner)

Virtual platform shall be used for meeting unless both parties feel site/office visit is required under some technical urgency or so as exception.

- **Emergency Meeting**
  - Whenever a major outage occurs in any part of the network, an emergency meeting may be called if desired by Employer/Owner. In the meeting, the outage will be discussed in the context of cause, correction and prevention.
- **SCADA, Telecommunication and Telemetry Meeting (NETeST)**
  - NETeST meeting is being conducted by NERPC on quarterly-basis in which all the communication elated issues are taken up in the forum. Contractor shall participate in such meetings as and when requested by Owner or NERPC.
- **Interface between Employer/Owner and Contractor**

Contractor Interfaces

Contractor shall submit detail of personnel deployed in the enclosed format through which all problems identified by Employer/Owner are to be reported to Contractor via duty phone.

Description		
Name		
Telephone		
Fax		
Email		

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Note: The total value of penalties which can be imposed during one year due to non-compliance of AMC Agreement shall not exceed the total value of Work Awarded to the Contractor for the services (like AMC, Hub operation, etc.) for that one year period plus Bank Guarantees available with Employer/Owner under this tender/rate contract.

Date: _____

Signature: _____

Name: _____

(Authorized Representative)

Annexure-1

Form-I

EVENT REPORT FORM

Event Report No _____ Date:_____

Station:_____ Constituent:_____

Affected circuit:

_____ _____

Fault Description: _____

_____

A) Event start time date _____ time_____

B) Reporting time by NMT date _____ time_____

REPORT

i) Failure within contractor system

Yes ____ No _____ (If No then date _____ time_____)

ii) Entrance to site and room for rectification date _____ time_____

iii) Rectification start time by Contractor date _____ time_____

iv) Fault fixed date _____ time_____

Total Outage time _____

Comments:

_____

_____

_____

_____

Faulty unit Sl. No:_____

New Unit Sl. No.: _____

Date:

Employer/Owner _____ Contractor_____

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Form-II

START STATUS FORM Page: (1)

Report no:

Start: Date :_____ **Time :** 10.00 Hrs:

	Station	**Description**
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____
7	_____	_____
8	_____	_____
9	_____	_____
10	_____	_____

Special test conditions or action:
Attachments:
Initials:
Employer/Owner _____ Contractor _____

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

Annexure-2

List of stations for VSAT Installation in NER

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
A.	**Meghalaya**						
1	Mendipathar	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
2	Khliehriat	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
3	Lumshnong	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
4	Killing	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
5	Umtru	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
6	Umiam Stage-IV	132	MePTCL, Meghalaya	--	--	--	Real-time operational data to be telemetered for grid monitoring.
B.	**Manipur**						
7	Rengpang	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
8	Tipaimukh	132	MSPCL, Manipur	--	--	--	Real-time operational

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							data to be telemetered for grid monitoring.
9	Thanlon	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
10	Hundung	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
11	Karong	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
12	Chandel	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
13	Tamenglong	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
14	Moreh	132	MSPCL, Manipur	--	--	--	Real-time operational data to be telemetered for grid monitoring.
C.	**Mizoram**						
15	Champhai	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
16	Khawzawl	132	P&ED-Mizoram	--	--	--	Real-time operational

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							data to be telemetered for grid monitoring.
17	Saitual	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
18	Bukpui	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
19	Khawiva	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
20	E.Lungdar	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
21	Lawngtlai	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
22	Bairabi	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
23	Mamit	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
24	W.Phaileng	132	P&ED-Mizoram	--	--	--	Real-time operational data to be

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							telemetered for grid monitoring.
25	Marpara	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
26	Lungsen	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
27	Sihhmui	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
28	Melriat	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
29	Zuangtui	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
30	Luangmual	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
31	Bawktlang	132	P&ED-Mizoram	--	--	--	Real-time operational data to be telemetered for grid monitoring.
D.	**Arunachal Pradesh**						
32	Lekhi Industry	33	DoP, Arunachal Pradesh	--	--	--	Located in Papum Pare District.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							Drawing power from Grid Lekhi S/s.
33	Bandardawa Industry	33	DoP, Arunachal Pradesh	--	--	--	Located in Papum Pare District. Drawing power from Grid Nirjuli S/s.
34	Holongi Industry	33	DoP, Arunachal Pradesh	--	--	--	Located in Papum Pare District. Drawing power from Grid Chimpu S/s.
35	Tippi Industry	33	DoP, Arunachal Pradesh	--	--	--	Located in West Kaming District. Drawing power from Grid Tippi S/s.
36	Liker MHP, Kamba, Aalo	33	DoP, Arunachal Pradesh	--	--	--	Located in West Siang District District. Power being injected in grid.
37	Tago MHP, Ziro	33	DoP, Arunachal Pradesh	--	--	--	Located in Lower Subansiri District. Power to be injected in grid.
38	Nuranang MHS, Jung	33	DoP, Arunachal Pradesh	--	--	--	Located in Tawang District. Power to be injected in grid.
39	Mukto MHS	33	DoP, Arunachal Pradesh	--	--	--	Located in Tawang District. Power to be

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							injected in grid.
40	Sippi MHS, Daporijo	33	DoP, Arunachal Pradesh	--	--	--	Located in Upper Subansiri District. Power to be injected in grid.
41	Liromoba MHS	33	DoP, Arunachal Pradesh	--	--	--	Located in West Siang District. Power to be injected in grid.
42	Kitpi Ph-II MHS	33	DoP, Arunachal Pradesh	--	--	--	Located in Tawang District. Power to be injected in grid.
43	Subung MHS, Boleng	33	DoP, Arunachal Pradesh	--	--	--	Located in Siang District. Power to be injected into Grid.
44	Jengging MHS	33	DoP, Arunachal Pradesh	--	--	--	Located in Upper Siang District. Power to be injected into Grid.
45	Paciha MHS	33	DoP, Arunachal Pradesh	--	--	--	Located in East Kaming District. Power to be injected into Grid.
E.	**Nagaland**						
46	Sanis	132/33	DoP-Nagaland	Yes	No	Existing	Tail-End station with no path diversity
47	Kiphire	132/33	DoP-Nagaland	Yes	No	Existing	Tail-End station with no path diversity
48	Zadima	220/132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							no path diversity
49	Philimi, Zunheboto	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
50	Chiephobozou, Kohima	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
51	Nagaland University, Kohima	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
52	Pfutsero, Phek	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
53	Wokha	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
54	Meluri	132/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
55	Power House	66/33	DoP-Nagaland	Yes	No	Existing	Tail-End station with no path diversity
56	Ganeshnagar	66/33	DoP-Nagaland	No	No	Existing	Tail-End station with no path diversity
57	Tuli	66/33	DoP-Nagaland	Yes	No	Existing	Tail-End station with no path diversity
58	Tuensang	66/33	DoP-Nagaland	No	No	Existing	Tail-End station with no path diversity
59	Mon	66/33	DoP-Nagaland	Yes	No	Existing	Tail-End station with no path diversity
60	Zunheboto	66/33	DoP-Nagaland	No	No	Existing	Tail-End station with

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							no path diversity
61	Chumukedima	66/33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
62	Sovima	66/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
63	Dairy Farm	66/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
64	Nito Farm	66/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
65	Tizit	66/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
66	Naginimora	66/33	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
67	Mon Power House	66/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
68	Likimro HEP	Nov-66	DoP-Nagaland	No	No	Existing	Tail-End station with no path diversity
69	Forest	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
70	Supermarket	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
71	Padampukhuri	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
72	Medziphema	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							no path diversity
73	Peren	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
74	Jalukie	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
75	Referral	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
76	Rangapahar	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
77	Dhansiripahar	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
78	Niuland	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
79	Lerie	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
80	Keyake	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
81	Jakhama	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
82	New Secretariat Complex	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
83	IG Stadium	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
84	ITI	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							no path diversity
85	Naga Bazar	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
86	Pungro	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
87	Kiphire Town	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
88	Zubza	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
89	Sataka	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
90	Tuensang Town PH	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
91	3rd NAP Camp	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
92	Noklak	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
93	Mokokchung	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
94	Amphuto	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
95	Longnak	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with no path diversity
96	Hospital Power House Mokokchung	33/11	DoP-Nagaland	No	No	Proposed	Tail-End station with

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							no path diversity
F.	**Assam**						
97	CTPS	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
98	Hailakandi	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
99	Hatsingimari	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
100	Narengi	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
101	Pavoi	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
102	Rangia	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
103	Khaloigaon	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
104	Umrangshu	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							for grid monitoring.
105	Haflong	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
106	Dullavcherra	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
107	Ghoramari	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
108	Matia	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
109	Dispur (Capital)	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
110	APM	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
111	Jorhat West	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
112	Bokakhat	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							for grid monitoring.
113	Sibsagar (Betbari)	132	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
114	Sonapur	220	AEGCL, Assam	--	--	--	Real-time operational data to be telemetered for grid monitoring.
G.	**Tripura**						
115	Dharmanagar	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
116	Ambassa	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
117	Dhalabil	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
118	Baramura (GTP)	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
119	Rokhia	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
120	Monarchak GS	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							for grid monitoring.
121	Kanchanpur	132	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
122	Gandacherra	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
123	Ompi	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
124	Gokulnagar	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
125	Sabroom	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
126	Satchand	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
127	Bogafa	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.
128	Belonia	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

S. No.	Stations Proposed for VSAT Project	Voltage Level (in kV)	Ownership	Telemetry Available (Yes/ No)	Fiber-Optic Available Yes/ No)	RTU Proposed/ Existing	Remarks
							for grid monitoring.
129	Gumi HEP	66	TSECL, Tripura	--	--	--	Real-time operational data to be telemetered for grid monitoring.

Date: _____

Signature: _____

Name: _____

(Authorized Representative)

Annexure-3

Bill of Quantity: Cost Break-up of various components

- **Opex Type of financial model for establishment VSAT communication set-up in NER on hiring (hub services) basis**
  In the Opex type of model, the hub services can be taken on hiring basis from the service provider of VSAT communication. Some tentative figures corresponding to the associated financial implications are mentioned in *table* below.

Tentative financial implications of VSAT communication in case of hiring of hub (for 129 sites)				
VSAT CAPEX for Real Time SCADA data for 129 Sites – With 1 year Warranty and 2 year AMC				
Sl. No.	**Details**	**Quantity, A**	**Unit Price (in INR), B**	**Total Cost (in INR), C = A x B**
1	VSAT Equipment including: HT Modem with 4 LAN Port (or additional switch with 5 ports along with Modem), 1.2 M Ex-C Band Tx/Rx Antenna, 2W BUC with LNB, Integration Material, Freight Charges with 1 Year Warranty	129		
2	VSAT Equipment including: HT Modem with 4 LAN Port (or additional switch with 5 ports along with Modem), 1.8M Ex-C Band Tx/Rx Antenna, 5W BUC with LNB Integration Material, Freight Charges with 1 Year Warranty	7		
3	Installation and Commissioning for 1.2 Mtr Antenna+ License liasioning charges for WPC/SACFA Clearance	129		
4	Installation and Commissioning for 1.8 Mtr Antenna+ License liasioning charges for WPC/SACFA Clearance	7		
5	DC Power Supply - 48V DC	136		
6	VSAT Platform Charges – 1.2 Mtr Antenna	129		
7	VSAT Platform Charges – 1.8 Mtr Antenna	07		
	Capital Expenditure			

VSAT OPEX for Real Time SCADA data for 129 Sites - Per Annum				
Sl. No.	**Details**	**Quantity, A**	**Unit Price (in INR), B**	**Total Cost (in INR), C = A x B**

Date: _____

Signature: _____

Name: _____

(Authorized Representative)

1	Extended-C band, 128 Kbps site-wise bandwidth for each remote site per annum	129		
2	Extended-C band, 512 Kbps site-wise bandwidth for SLDCs per annum	7		
3	AMC support at 1.2m remote per annum (from 2nd year onwards)	129		
4	AMC support at 1.8m SLDC per annum (from 2nd year onwards)	7		
5	NMS Charges	1		
	Operational Expenditure for 6 Years (6 year Bandwidth & 5 Year AMC)			

Miscellaneous CAPEX				
Sl. No	**Description**	**Quantity, A**	**Unit Price (in INR), B**	**Total Cost (in INR), C = A x B**
1	IEC 101 to 104 Protocol Converter	129		
2	Session Initiated Protocol Phones	136		
	Miscellaneous Capital Expenditure			

Date: _____

Signature: _____

Name: _____

(Authorized Representative)

Detailed Project Report (DPR)
for
Procurement and Installation of Remote Terminal Units in selected stations of North Eastern Region (NER)

2021

North Eastern Regional Power Committee
NERPC Complex, Dong Parmaw
Lapalang, Shillong – 793006 (Meghalaya)
Website: www.nerpc.nic.in
email: nerpc@ymail.com

Format A1

Summary of Proposal

For Official Use – To be filled by the Nodal Agency of PSDF	
Project Proposal Number: _____	**Date of Receipt:** _____

To be filled by the Applicant Organization / Utility		
1	Name of the requesting Organization/ Utility	• Department of Power, Arunachal Pradesh • Assam Electricity Grid Corporation Limited • Manipur State Power Company Limited • Meghalaya Power Transmission Corporation Limited • Power & Energy Department of Mizoram • Department of Power of Nagaland • Tripura State Electricity Corporation Limited
2	Short Summary of Project/ Scheme/ Activity	
a	Name of the Project/ Scheme/ Activity	Procurement and Installation of Remote Terminal Units in selected stations of North Eastern Region (NER) for Real-Time Data Telemetry purposes.
b	Objective of the Project/ Scheme/ Activity	Supply, Installation, Testing and Commissioning of Remote Terminal Units in selected stations of North Eastern Region (NER) for facilitating Real-Time Data Telemetry in respective State Load Despatch Centres.
c	Authorised Person for this Project/ Scheme/ Activity	• **Arunachal Pradesh:** Executive Engineer, SLDC Itanagar, DoP, 132kV Chimpu Substation, Itanagar, Arunachal Pradesh – 791111 • **Assam:** Chief General Manager, State Load Despatch Centre, Assam Electricity Grid Corporation Ltd., ASEB Colony, Power House, Kahilipara, Guwahati-781019 • **Manipur:** General Manager, State Load Despatch Centre, Yurembam Power House, Imphal West-795004, Manipur • **Meghalaya:** Superintending Engineer, State Load Despatch Centre,

		Meghalaya Power Transmission Corp. Ltd., Umjarain Mawkynroh, NEHU Campus, Shillong-793022, Meghalaya • **Mizoram:** Sr. Executive Engineer, State Load Despatch Centre Division, P&E Office Complex, North Block (III Floor), Electric Veng, Aizawl- 796001, Mizoram • **Nagaland:** Executive Engineer, State Load Despatch Centre, Full Nagarjan, Dimapur, Nagaland – 797112 • **Tripura:** Dy. General Manager (System Operation), State Load Despatch Centre, TSECL, 79-Tilla, Agartala, Tripura (West) – 799006
d	Nature of the Project/ Scheme/ Activity: Inter-state/ Intra-state (Please specify)	Intra-state incident to state-level grid operation
e	Identified Beneficiaries	The state constituents of North Eastern Region of India
f	Merits of the Scheme	With implementation of the scheme, overall real-time data telemetry from the grid-connected stations will improve which will help is secure and reliable grid operation and load despatch functions in NER. The improvement in the Load Despatch functions through data-visibility of all the grid connected stations is of utmost importance to perform mission critical operation of national importance related to management of expanding power system network in North-Eastern region.
g	Limitations, if any	No limitation envisaged. Only replacement of few old RTUs will lead to temporary data interruption which can be managed for that minor interim period.
h	Time frame for Implementation	The scheme is scheduled to be implemented within 12 months from the date of receipt of sanction of the fund/grant.
i	Estimated Cost of Project/ Scheme/ Activity	xx,xx,xxx incl. GST
j	Category under which the project is classified (Please	As per PSDF Guidelines *Clause 5.3* – Quote

	refer to para 5.1 of the Guidelines/ Procedure)	*Other Schemes benefitting large no. of utilities collectively and having a significant impact towards the power system development and grid operation shall also be considered for funding from PSDF, on case-to-case basis.* Unquote

Format A2

Detailed Proposal (DP)

1. Details of the Requesting Organization/ Entity

1.1 Details of Organization/ Entity

A1) Name of Organization / Entity	Department of Power, Arunachal Pradesh
A2) Acronym or Abbreviation (if applicable)	**DoP-AP**
B1) Name of Organization / Entity	Assam Electricity Grid Corporation Limited
B2) Acronym or Abbreviation (if applicable)	**AEGCL**
C1) Name of Organization / Entity	Manipur State Power Company Limited
C2) Acronym or Abbreviation (if applicable)	**MSPCL**
D1) Name of Organization / Entity	Meghalaya Power Transmission Corporation Limited
D2) Acronym or Abbreviation (if applicable)	**MePTCL**
E1) Name of Organization / Entity	Power & Energy Department of Mizoram
E2) Acronym or Abbreviation (if applicable)	**P&ED-Mizoram**
F1) Name of Organization / Entity	Department of Power of Nagaland
F2) Acronym or Abbreviation (if applicable)	**DoP-Nagaland**
G1) Name of Organization / Entity	Tripura State Electricity Corporation Limited

G2) Acronym or Abbreviation (if applicable)	**TSECL**

1.2 Details of Head of the Organization

- **DoP-AP**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief Engineer (Power), Western Electrical Zone
E-mail address	
Landline Number	
FAX No.	
Address	Department of Power, Govt. of Arunachal Pradesh, Vidyut Bhawan, O-Point Tinali, Itanagar, Arunachal Pradesh
City	Itanagar
Postal Code	791111

- **AEGCL**

Name (Mr./ Ms./ Mrs.)	Dhrubajyoti Hazarika
Designation	Managing Director (I/C)
E-mail address	
Landline Number	0361-2739520
FAX No.	
Address	Bijulee Bhawan, 1st Floor, Paltan Bazar, Guwahati, Assam
City	Guwahati
Postal Code	781001

- **MSPCL**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief Secretary, Government of Manipur
E-mail address	
Landline Number	0385-2450050
FAX No.	
Address	Electricity Complex, Keishampat Junction, Imphal, Manipur
City	Imphal
Postal Code	795001

- **MePTCL**

Name (Mr./ Ms./ Mrs.)	Arunkumar Kembhavi
Designation	Chairman Cum Managing Director
E-mail address	
Landline Number	
FAX No.	

Address	Meghalaya Energy Corporation Limited, Lumjingshai, Short Round Road, Shillong, Meghalaya
City	Shillong
Postal Code	793001

- **P&ED-Mizoram**

Name (Mr./ Ms./ Mrs.)	
Designation	Engineer-In-chief
E-mail address	
Landline Number	
FAX No.	
Address	Power & Electricity Department, Kawlphetha Building, New Secretariat Complex, Khatla, Aizawl, Mizoram
City	Aizawl
Postal Code	796001

- **DoP-Nagaland**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief Engineer (Power)
E-mail address	cepower1helpdesk@gmail.com
Landline Number	0370-2243149
FAX No.	0370-2240178
Address	Electricity House, A.G. Colony, Kohima, Nagaland
City	Kohima
Postal Code	797001

- **TSECL**

Name (Mr./ Ms./ Mrs.)	
Designation	Managing Director
E-mail address	
Landline Number	0381-2318001, 0381-2319427
FAX No.	
Address	Electricity House, A.G. Colony, Kohima, Nagaland
City	Kohima
Postal Code	797001

1.3 Details of Project In-Charge/ Project Manager (Authorized Person) for this project/ scheme/ activity (Not below the rank of Dy. Gen. Manager/ Superintending Engg.)

- **DoP-AP**

Name (Mr./ Ms./ Mrs.)	
Designation	Executive Engineer
E-mail address	

Landline Number	
Mobile Number	
FAX Number	
Address	SLDC Itanagar, DoP, 132kV Chimpu Substation, Itanagar, Arunachal Pradesh
City	Itanagar
Postal Code	791111

- **AEGCL**

Name (Mr./ Ms./ Mrs.)	
Designation	Chief General Manager
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, Assam Electricity Grid Corporation Ltd., ASEB Colony, Power House, Kahilipara, Guwahati
City	Guwahati
Postal Code	781019

- **MSPCL**

Name (Mr./ Ms./ Mrs.)	
Designation	General Manager
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, Yurembam Power House, Imphal West, Manipur
City	Imphal
Postal Code	795004

Tripura: Dy. General Manager (System Operation), State Load Despatch Centre, TSECL, 79-Tilla, Agartala, Tripura (West) – 799006

- **MePTCL**

Name (Mr./ Ms./ Mrs.)	
Designation	Superintending Engineer
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, Meghalaya Power Transmission Corp. Ltd.,

	Umjarain Mawkynroh, NEHU Campus, Shillong, Meghalaya
City	Shillong
Postal Code	793022

- **P&ED-Mizoram**

Name (Mr./ Ms./ Mrs.)	
Designation	Sr. Executive Engineer
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre Division, P&E Office Complex, North Block (III Floor), Electric Veng, Aizawl, Mizoram
City	Aizawl
Postal Code	796001

- **DoP-Nagaland**

Name (Mr./ Ms./ Mrs.)	
Designation	Executive Engineer
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, Full Nagarjan, Dimapur, Nagaland
City	Dimapur
Postal Code	797112

- **TSECL**

Name (Mr./ Ms./ Mrs.)	
Designation	Dy. General Manager (System Operation)
E-mail address	
Landline Number	
Mobile Number	
FAX Number	
Address	State Load Despatch Centre, TSECL, 79-Tilla, Agartala, Tripura (West)
City	Agartala
Postal Code	799006

Any change in above mentioned details will be notified to the Nodal Agency of PSDF immediately.

2. Justification of the Proposal

2.1 Analysis of the Objective

Electricity plays an important role in the overall economic development of the country. In the last six (06) decades, since independence, Indian Power Sector has achieved phenomenal growth from a few scattered small generators supplying load to local process of elite customers, to strong regional grids spanning throughout the length and breadth of the country, and supplying to even remote corners of most of the states, With the growth of transmission and generation systems in North-Eastern region, it is imperative to upgrade the existing monitoring and supervision facility at SLDCs which is functioning at state-level to coordinate the real-time operation of respective state-grids.

Considering the complexity & growth of Power System, need of effective management of Power System was felt essential. Accordingly, Unified Load Despatch & Communication (ULDC) Projects were established on regional-basis for providing advance SCADA/EMS and Communication system for management of regional power grids. These ULDC projects were commissioned progressively from July 2002 to February 2006 in southern, Northern, North-Eastern, Eastern and Western regions.

Under North Eastern Region, to facilitate smooth and efficient operation of regional grid, POWERGRID undertook implementation of State-of-the-Art ULDC projects, under ULDC schemes, and which was put in commercial operation in 2003.

At present, many stations in the North-Eastern region have obsolete or non-repairable RTUs; RTUs with spares cost high; no RTUs, etc. The present DPR covers replacement of some old RTUs as well as installation of many new RTUs at state-level in grid-connected stations which includes the planning, design, engineering and implementation of aforesaid RTUs.

2.2 Identified Beneficiaries of the Project

The states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura in particular and the Nation in general.

With implementation of the scheme, all the stakeholders in the power sector of North Eastern Region will be able to run more efficiently and effectively. So, reliability of the NER grid can be achieved at desired level. Further, it will also mitigate the risks of using obsolete systems and frequent failure at RTU level.

2.3 Identified Source of Funding

100% of the total project cost is to be funded through grant from PSDF.

2.4 Details of Activities for Project/ Scheme/ Activity

After getting approval of the project towards funding, the following activities will be undertaken to achieve desired results:

- Tendering Activities with award of work to qualified L1 Bidder.
- Site Survey
- Factory Acceptance Tests (FAT)
- Supply, Installation and Commissioning of RTUs along with associated Hardware suitable for integration with respective LDCs.
- Integration with existing SCADA/EMS system for transfer of real-time data from the substations to the associated State Load Dispatch Centre (SLDC) on IEC-101 or IEC-104 protocol as found suitable.

List of stations to be covered under this project are mentioned in *table* below.

S. No.	Station Name	Owner Utility	Voltage Level (in kV)	Remarks
I	**Assam**			
1		AEGCL	132	No RTU installed at present.
2		AEGCL	132	No RTU installed at present.
3		AEGCL	132	No RTU installed at present.
4		AEGCL	132	No RTU installed at present.
5		AEGCL	132	No RTU installed at present.
II	**Meghalaya**			
6		MePTCL	132	No RTU installed at present.
7		MePTCL	132	No RTU installed at present.
8		MePTCL	132	No RTU installed at present.
9		MePTCL	132	No RTU installed at present.
10		MePTCL	132	No RTU installed at present.
III	**Manipur**			
11		MSPCL	132	No RTU installed at present.
12		MSPCL	132	No RTU installed at present.
13		MSPCL	132	No RTU installed at present.
14		MSPCL	132	No RTU installed at present.

S. No.	Station Name	Owner Utility	Voltage Level (in kV)	Remarks
15		MSPCL	132	No RTU installed at present.
IV	**Mizoram**			
16		DoP-Mizoram	132	No RTU installed at present.
17		DoP-Mizoram	132	No RTU installed at present.
18		DoP-Mizoram	132	No RTU installed at present.
19		DoP-Mizoram	132	No RTU installed at present.
20		DoP-Mizoram	132	No RTU installed at present.
V	**Tripura**			
21		TSECL	132	No RTU installed at present.
22		TSECL	132	No RTU installed at present.
23		TSECL	132	No RTU installed at present.
24		TSECL	132	No RTU installed at present.
25		TSECL	132	No RTU installed at present.
VI	**Arunachal Pradesh**			
26		DoP-Arunachal	132	No RTU installed at present.
27		DoP-Arunachal	132	No RTU installed at present.
28		DoP-Arunachal	132	No RTU installed at present.
29		DoP-Arunachal	132	No RTU installed at present.
30		DoP-Arunachal	132	No RTU installed at present.
VI	**Nagaland**			
31		DoP-Nagaland	132	No RTU installed at present.
32		DoP-Nagaland	132	No RTU installed at present.
33		DoP-Nagaland	132	No RTU installed at present.
34		DoP-Nagaland	132	No RTU installed at present.

S. No.	Station Name	Owner Utility	Voltage Level (in kV)	Remarks
35		DoP-Nagaland	132	No RTU installed at present.

2.5 Executing Agencies

Projects will be executed in fork of different independent work-orders on state-wise basis and the state-utilities/ SLDCs will be the executing agencies for respective works. Necessary guidance, if required, can be taken from NERPC, NERLDC and POWERGRID-NERTS in various forums such as Operation Coordination Committee (OCC), North Eastern Telecommunication, SCADA and Telemetry (NETeST), etc.

All the technical specifications required for the execution works and material procurement works will be prepared as per the guidelines in applicable IS standards and CEA recommendations by calling open tenders on e-procurement platforms.

2.6 *Timeline for implementation of Project/ Scheme/ Activity*

Timeline for implementing this project/ scheme/ activity is given hereunder considering date of receipt of PSDF grant approval as zero-date:

a) Issuance of Work-Order: 9 months
b) Procurement of Equipment (Delivery of Material at site after FAT): 9 months
c) Erection and Commissioning: 6 months

Timeline of the Project/ Scheme/ Activity	
Likely duration of Project (in months)	**18 months**
Start Date	**Date of receipt of sanction of PSDF Grants**
Likely Completion Date	**18 months from date of sanction of PSDF Grants**

Timeline of Activities

Project Implementation Schedule – 18 Months (Months after Letter of Award – LoA)																		
S. No.	**Task Name**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
	(Subject Package)																		
1	**Engineering**																		
2	**Tendering Activities**																		
3	**Letter of Award**																		
4	**Site Survey**																		

5	**Factory Acceptance Tests**																	
6	**Supply of Equipment**																	
7	**Installation and Commissioning**																	
8	**Integration with SLDCs**																	

Format A3

Summary of Detailed Project Report (DPR)

Cost Break-up of various components

Sl. No.	Item Description	Unit	Quantity	Total Price (in INR)
I	**Supply of Equipment (with warranty of 3 years)**			
1	Remote Terminal Units (with accessories such as Panels, Racks, Sub-racks, Power Supply Modules, Communication Modules, Interfacing Equipment, Required A/D Converters & all other required items incl. complete wiring for all modules)	Nos.		
a	Cable for RTU	Set		
b	Splitter for RTU Communication	Nos.		
c	LDMS system along with software	Set		
d	Furniture for LDMS system (1 table and 1 chair)	Set		
e	Inverter	Nos.		
f	Modems	Nos.		

Sl. No.	Item Description	Unit	Quantity	Total Price (in INR)
g	Weather Sensors	Set		
h	OLTC Transducer	Nos.		
i	Heavy Duty Relay	Nos.		
j	Contact Multiplying Relay (CMR)	Nos.		
k	Multi-Function Transducers (MFTs)	Nos.		
l	Supervisory Interface Cubicles (SIC) panel for mounting MFTs, Relays, etc.	Nos.		
m	Time Synchronization Equipment with display	Nos.		
n	CPU	Nos.		
o	Analog Input Module	Nos.		
p	Digital Input Module	Nos.		
q	Digital Output Module	Nos.		
II	**Services**			
2	Freight and Insurance	Lump-Sum		
3	Installation, Testing and Commissioning *(with preparation of RTU Database; Associated Cabling, Wiring, etc.)*	Lump-Sum		
III	**Integration with SLDCs**			
4	Site activities to facilitate integration of RTUs with respective SLDC *(incl. RTU database preparation)*	Lump-Sum		
IV	**Spares**			
5	Spare parts of the supply equipment @10%	--		

Note: a) The AMC cost after completion of warranty period will be borne by the respective state-utilities.

b) The spare parts of price around 10% has been considered while estimating the life of equipment as 15 years.

Targets for financial Milestones

Description	Total Amount (in INR)	1st Installment *(11th Month after sanction of Grant)*	2nd Installment *(18th Month after sanction of Grant)*
PSDF Grant	xx,xx,xxx	xx,xx,xxx	xx,xx,xxx
Internal Resource	NIL	NIL	NIL
Total	xx,xx,xxx	xx,xx,xxx	xx,xx,xxx

Format A4

Financial Implication of the Scheme

1. Summary

S. No.	Item	Amount (in INR) incl. GST
1	Total Cost Estimate	xx,xx,xxx
2	Funding Proposed from PSDF	xx,xx,xxx
3	Contribution from Internal Sources	Nil
4	External Borrowings	Nil

2. Details

2.1 Cost Estimate

The Unit rates for all equipment have been obtained from last Letter-of-Awards placed by POWERGRID on behalf of SLDCs during ULDC Phase-II and budgetary offer obtained from reputed vendors verbally. The detailed cost-estimate for implementing the project/ scheme/ activity has been under approval by higher management of SLDCs.

3. Funding

3.1 Funding proposed from PSDF

100% of the estimated cost is proposed to be funded from PSDF.

3.2 Contribution from Internal Resources

Nil.

3.3 External Borrowings

No external borrowings will be necessary.

Format A5

Brief Details of the Project Appraisal by ~~CTU~~/ STU/ ~~RPC~~

Item	Details to be filled by Applicant Utility		
Appraisal By	CTU _____	STU ___✓_____	RPC _____
Date of Submission to ~~CTU~~/ STU/ ~~RPC~~ for approval	xx.xx.2021		
Name of the Scheme	Procurement and Installation of Remote Terminal Units in selected stations of North Eastern Region (NER) for Real-Time Data Telemetry purposes.		
Copy of the Appraisal Report by ~~CTU~~/ STU/ ~~RPC~~ (attached at ***Annexure)***	Yes _____ **Ref. No.:** **Date:**	No ____✓____	
Summary of observations from ~~CTU~~/ STU/ ~~RPC~~ Appraisal Report	Summary of Proposal Appraised	Supply, Installation, Testing and Commissioning of Remote Terminal Units in selected stations of North Eastern Region (NER) for facilitating Real-Time Data Telemetry in respective State Load Despatch Centres.	
	Technical Observations	The proposed scheme fulfils the technical requirement as	

Item	Details to be filled by Applicant Utility	
		per relevant standards and fund to be in order. With implementation of the scheme, overall efficiency, reliability and secure operations of the systems will be improved and any contingency can be tackled.
	Financial Observations	The estimated cost arrived on the basis of earlier Letter-of-Awards appears to be right.
	Compliance of Grid Standards/ Codes by Applicant	Yes
	Limitations/ Shortcomings pointed out by ~~CTU~~/ STU/ ~~RPC~~, if any	No limitation envisaged. Only some intermittency may be observed due to configuration/integration of RTUs in new system which can be managed judiciously.
	Recommendations of ~~CTU~~/ STU/ ~~RPC~~	Recommended for immediate implementation and posing for 100% PSDF funding.

Format A6

Undertaking

(On a Non-judicial Stamp paper of Rs.50 only duly notarized and attested)

I, Dr./ Mr./ Ms. ……………………………….. son/daughter/wife of ………………………………………… resident of ……………………………...……………………………...……………………………............. .... (full address) and presently working as ……………………………...………………………………...... in the ……………………………...……………………………...…………………………...…… ………………… hereby undertake to comply with the following terms and conditions with regard to funding of the ……………………………...……………………………….. (name of scheme) with disbursement from PSDF:

- **No tariff shall be claimed for the portion of the scheme funded from PSDF.**
- **Amount of grant shall be refunded in case of transfer/disposal of the facility being created under this proposal to any other scheme for funding.**
- **Shall specifically mention if for the scheme under the proposal, the grant from any other agency is being taken / proposed to be taken.**
- **The grant shall be refunded back to PSDF in case of non-utilisation of the grant within one (01) year of release of installment.**

TECHNICAL SPECIFICATION OF RTU

Contents

Section 1: TECHNICAL SPECIFICATION OF RTU

1.0 General

The Remote Terminal Unit (RTU) shall be installed at Substations & Power stations to acquire analog data, device status signals and Event Signals. RTU shall also be used for control of station devices from Master station. The supplied RTUs shall be interfaced with the Control & Relay (C&R) panels, Transducers, IEDs, Metering Equipment, Communication Equipment, Power Supply Distribution Boards; for which all the interface cables shall be supplied by the Contractor.

This document describes the specifications for the Remote Terminal Unit (RTU). Contractor shall supply RTU, associated equipment such as transducers, relays, weather sensors, modems, cabling etc. and required number of panels for housing of all the hardware envisaged for the RTU and System Interface Cubicle (SIC).

The contractor shall be responsible for supplying all hardware, software, installation, cabling and field implementation for RTU as defined in this Specification. The contractor shall also provide complete documentation, training and testing to fully support the hardware and software provided. The RTU shall be used for real-time supervision and control of substation/ power plant through SCADA system. RTU configuration/ point count, MFT/MFM transducer count and requirement of weather sensors quantity is given in **Appendix – A.**

The contractor shall also be responsible for integration of supplied RTUs with the existing SCADA/EMS System of the owner as per the specified protocols (IEC 101 and IEC 104) and interoperability profile. Necessary additions/modifications in SCADA System databases and displays for integration of RTU with SCADA/EMS System shall be in the Owner's scope.

The manufacturer's whose RTU is being offered shall have manufactured and supplied at least 50% of the tendered value at any EHV environment of 132 kV or above Substation/Power Plant and the same shall be in successful operation for more than 2 years as on the date of bid opening.

Shall the Contractor elect to subcontract manufacturing, installation, testing & commissioning or any other work defined herein, it shall remain the Contractor's responsibility to complete the assigned work.

It is Employer's/Owner's intent that the Contractor uses as much standard hardware and software as possible; however, all of the functional requirements of this Specification must be satisfied. The use of the Contractor's standard hardware and software may cause the Contractor to conclude that there is a need for additional items not specifically mentioned in this Specification. The Contractor shall supply all such necessary items and provide a complete RTU design that meets all of the Employer's/Owner's functional requirements defined in this Specification.

Cabling should be minimized; system design should be as much modular as possible and CMRs should be used only when absolutely essential. However, the system supplied by the Contractor should fulfil all the requirements of this specifications.

In event of the configuration of RTU given in specification undergo changes during detailed engineering, the prices of particular RTU shall also be adjusted based on the unit prices of Transducers, Meters, Status Input Cards, Analog Input Cards, Control Output Cards, Control Output Relays, CMRs, Modems, etc. only.

Employer/Owner may not initially procure all capabilities specified in this document. Regardless of the RTU configuration purchased, the RTUs shall be capable of all functions specified herein with the addition of the necessary hardware and software modules in the field when required by Employer/Owner. Each function is presented in sufficient detail to provide the Contractor with as much insight as possible into both the initial and future requirements of the RTUs.

The Weather Sensors to be supplied under the project shall be field proven and shall have been in successful operation for meteorological application for at least one year as on date of Bid opening. The Bidder shall furnish the documentary evidence in support of the above and submit the same along with the bid.

1.1 Design Standards

The RTUs shall be designed in accordance with applicable International Electro-technical Commission (IEC), Institute of Electrical and Electronics Engineer (IEEE), American National Standards Institute (ANSI), and National Equipment Manufacturers association (NEMA) standards and British Standards, unless otherwise specified in this Technical Specification. In all cases, the provisions of the latest edition or revision of the applicable standards in effect shall apply.

1.2 RTU Functions

All functional capability described herein shall be provided by the Contractor even if a function is not initially implemented. The term master station is used to denote the SCADA systems. As a minimum, the RTUs shall be capable of performing the following functions:

(a) Collecting and processing the digital status inputs, analog inputs, event records, accumulated values and transmitting to master station(s).

(b) Receiving and processing digital & analog control commands from the master station(s).

(c) Accepting polling messages from at least three (03) master stations simultaneously using separate logical databases for each master station.

(d) Communication simultaneously on all Communication ports (as per cl. 1.3) and using multiple concurrent protocols, including the IEC 60870-5-101, 60870-5-104, IEC 61850 & MODBUS/103 protocol.

(e) Data transmission rates from 300 to 9600 baud for serial ports (for both IEC 60870-5-101 & MODBUS/103) and 10/100 Mbps for TCP/IP Ethernet ports.

(f) RTU shall be compatible with protocol 61850 for communication with IEDs.

(g) RTU shall have the capability of automatic start-up and initialisation following restoration of power after an outage without need of manual intervention. All restarts shall be reported to the connected master station(s).

(h) RTU shall have dual redundant CPU and Power Supply Unit.

(i) RTU shall support time synchronization through messages received from master station using IEC 60870-5-101 protocol.

(j) RTU shall support downloading of RTU database from the master station using Intranet.

(k) RTU shall support SOE (Sequence of events) feature.

(l) Acting as a data concentrator for acquiring data from Slave RTUs, MFMs/MFTs and exercising supervisory control on slave RTUs using IEC 60870-5-101 and IEC 60870-5-104 and Modbus protocol.

(l) RTU shall support archiving facility for reporting and analysis. The archived data shall be saved to user defined file duration at user defined interval-eg. Every 5 minutes for a period of 1 week. The computation of the archived data shall also be supported – eg. Maximum, Minimum and Average.

(m) Harsh Environmental Coating.

1.3 Communication ports

The RTUs shall support simultaneous communications with multiple independent master stations (SCADA system), maintenance and configuration terminal (Laptop PC), a local logger (printer), Multi-function transducers and Local Data Monitoring System (LDMS)/Logger.
The RTUs shall have the following minimum number of communication ports as follows:

a) Two Ethernet ports for connectivity to Master Station on IEC 60870-5-104 and to relays on IEC 61850.

b) 2 nos. RS232 ports – for communication with IEDs on IEC 61850, master stations on IEC 60870-5-101, energy Meters on Modbus/TCP/IP, etc.

c) 2 nos. serial ports for communication on IEC 60870-5-101 in dual standby mode (with single master) of Active/Active mode (with dual master) as per Owner's requirements.

d) One port for the RTU maintenance and configuration terminal.

e) Two ports for Local Data Monitoring System (LDMS).

f) Required number (minimum two) of RS 485 ports for polling Multi-function transducers using MODBUS/103 protocol in multi-drop (party line) mode. Maximum 8 nos. MFMs shall be connected to each port

It shall be possible to increase the number of communication ports in the RTU by addition of cards, if required in future. The RTU shall respond to independent scans and commands from Master Station, LDMS and Configuration & Maintenance Terminal simultaneously. The RTU shall support the use of a different communication data exchange rate (bits per second) and scanning cycle on each port.

The RTU shall provide feature of being configured into point-to-point and party-line communication mode.

1.4 CPU and Power Supply

The RTU shall have redundant CPU and Power Supply unit so that the RTU can communicate with the Master Stations even when one of the redundant units fails. A failover process shall cause the assignment of all the functions of the failed unit to the healthy unit. The failover between the two redundant units shall not require any manual intervention and shall not cause any interruption in the functioning of RTU. The failover process of the CPU shall not take more than 30 seconds after the failure of primary CPU. All the functions of RTU shall be operational within 30 seconds of the failover operation i.e, within one minute from the time of failure of primary CPU.

1.5 Modems

The modems can be used for RTU communicating to master station. The Contractor shall supply two (2) number modems one at Control Centre/Stand alone and other at RTU end. For Critical RTUs, 4 nos. modems are required, 2 nos. at Control Center and 2 nos. at RTU End.

The modem for remote end, complete in all respects including power supply unit & rack shall be supplied. These modems can be located either in the FEP at Control Center end or at other Communication nodes (Stand Alone Modem).

The modems shall meet the following requirements:

a) Use CCITT Standards including V.24, V.28.

b) Use frequency shift keying (FSK) modulation.

c) Communicate at data rates of 300, 600 and 1200 bps.

d) Use CCITT R.38a, and R.38b standard tones for the selected RTU data rate.

e) Use PLCC bandwidth upto 4khz and shall accommodate multiple data channels over and above voice channels.

f) Use both 2-wire and 4-wire communication lines.

g) Receive level adjustable from -8 to -40 dBm @ 600 ohms.

h) Transmit level adjustable from 0 to -24 dBm @ 600 ohms.

i) Have a minimum sensitivity of -48 dBm.

j) Shall operate on 48 VDC power supply

k) Compatible with IEC 60870-5-101 protocol

1.6 Cellular (GPRS/3G/4G) Modem and Gateway

The RTU shall be equipped with Cellular Modem for data communication with Master Station over IEC 60870-5-101/104. In case PLCC or Optical Fibre network is available at RTU Station, the Cellular Communication Modem will provide a manually switchable redundant communication link to Master Station, which may be enabled by the owner's personnel in the event of failure of PLCC/Optical Fibre network. In such case Cellular Communication will use the same protocol as is used for PLCC or Optical Fibre network. However, in case no PLCC/Optical Fibre network is available at RTU Station, the Cellular Communication will act as main communication link with Master Station. The provision of SIM and payment of data charges for GRPS shall be in the scope of vendor up to operational acceptance; thereafter the monthly data charges for GRPS shall be borne by the owner. The RTU port used for Cellular communication shall be adequately protected and firewalled to avoid any cyber security attacks.

The provision of PLCC or Optical Fibre Network between RTU and Master Station is in the scope of owner, however the supply, installation and commissioning of necessary cabling and Integration of RTU with Master Station(s) using the owner's communication system will be in the scope of contractor.

The contractor shall also provide and integrate the GRPS Gateway at Master Stations (Main & backup). The Gateway shall be equipped with requisite number of RS 232 Ports (minimum 10) for IEC-101 and Ethernet Ports (minimum six) for IEC-104 communication. The Gateway shall have at-least 50% spare ports of each type for future expansion. Provision of Internet connectivity with Static IP address at Master Station end shall be in the Owner's scope. The communication between RTU and Master Station using Cellular Communication shall be point to point and no intermediate hub shall be used by the contractor to route the Cellular traffic between RTU and Master Station(s). The Gateway shall be equipped with a firewall to avoid any cyber security threat emanating from public Interface used for Cellular traffic.

1.7 Splitters

Splitters shall be provided for splitting of 60870-5-101 protocol communication ports to communicate with two terminal servers. The splitters shall be mounted in the panel for Terminal Servers and shall operate on 24 or 48 VDC.

1.8 Local Configuration & Maintenance Interface

The RTUs shall include the interface to support the portable configuration and maintenance terminal (PCMT). The interface shall provide easy access to allow Employer/Owner to use the maintenance terminal at the RTUs installed in the field using Ethernet.

1.9 Local Data Monitoring System (LDMS) Interface

The RTUs shall include the interface for communication with the LDMS system. The LDMS shall be used for local data acquisition, monitoring and control of substation parameters through RTU. The scope of LDMS shall include installation and integration of LDMS software on a Personal computer.

The LDMS shall be a mini SCADA system providing MMI capability for use in the sub-station control room building. The LDMS software shall include following functions:

I. data acquisition for analog, digital, events and pulse accumulator type data

II. data processing – Conversion to engineering units, limit monitoring, data validity test, calculated data

III. calculated data (such as maximum, minimum, average values with associated time-stamping etc.) of all the station parameters.

IV. Time Synchronization

V. Sequence of Events Processing

VI. Supervisory control

VII. Alarm, tagging, trending, quality codes etc.

VIII. Single Line Diagrams, Trends, daily, weekly, monthly reports etc. shall be prepared by the bidder and integrated on LDMS system. The LDMS shall also have capability to generate additional displays, single line diagrams, reports, and trends.

The LDMS shall store all real-time telemetered & calculated data every 5 minutes (adjustable to 15min, 30min, 45min, 60 minutes as required by Owner). The software and hardware shall be sized for storage of all above data at every 5 minutes for at least six (06) months duration. All alarms, events, SOE etc. shall also be stored on regular basis. It shall be possible to define daily, weekly, monthly Substation reports on LDMS. It shall be possible to generate reports highlighting the maximum, minimum, average with associated time-stamping etc. of all the station parameters. The historical data stored on the storage medium shall be in standard format and necessary tools for its export to standard spreadsheet programs (MS-Excel and Comma-Separated-Value format) shall be provided.

The LDMS shall update analog data from RTU every 5-10 seconds (programmable) and status data by exception. The SOE status data shall be recorded with resolution of 10 ms timestamp.

The contractor shall provide 1 no. 2 kVA inverter of reputed make without battery. (Input from 48 VDC with -10% to 20 % variation, Output 230 V AC +/- 2% suitable for single computer load) with each LDMS system. The contractor shall use the 48V DC power supply available in RTU.
The contractor shall also provide 1 no. 1 KVA UPS of reputed make (Input: single phase 230 V with variation from 190 to 270 V, Output: single phase 230 V with +/- 1% variation with 8 hrs. recharge time and suitable for single computer load) with each LDMS system.

1.10 Communication interface between RTU & MFMs

The RTU shall acquire data from the MFMs. The MFMs will act as slave to the RTU. The RTU shall have the ability of issuing retry scan to acquire data from the MFMs in case of communication failure between RTU and MFMs. All data from the devices connected on a single port shall be acquired within 5 seconds.

1.11 Communication Protocol between RTU & IEDs

The RTU shall use the IEC 61850 protocol for communication with IEDs over Sub-station LAN. The RTU shall act as a Client and collect data from the IEDs).
The contractor shall be provided an Ethernet Port on the existing IEC 61850 Sub-Station Switch by the owner to connect RTU to the existing Sub-Station data from the IEDs). The necessary IED Configuration (.icd and .scd) files required to configure the RTU for communication with IEDs shall be provided by the owner.

The RTU shall store the data acquired from the MFMs & IEDs in its database and do processing like change detection/deadband processing on the data for optimizing its transmission to the Master Station (SCADA Control Centre). The processing shall include requirements of mapping of information from the protocol of MFM/IEDs to the protocol requirement for communication with Control Center.

1.12 Master Station Communication Protocol

The Contractor shall provide a communication protocol for communicating with SCADA master stations using the IEC 60870-5-101 and IEC 60870-5-104communication protocol standard. The communication protocol shall support all the requirements of this standard. The communication protocol shall be non-proprietary and the Contractor shall provide complete description and documentation of the protocol to Owner.

The RTU shall perform as a slave to SCADA master station when using the IEC 60870-5-101 protocol. All communication shall be initiated by the SCADA master stations. RTU must notify the master stations of unusual conditions at the RTU (such as a power fail/restoration or RTU malfunction), the transfer of changed data etc. All the notifications shall be accomplished within the framework of the periodic data acquisition exchanges.

The RTU shall store the data acquired from the MFT/MFMs & IEDs in its database and do processing like change detection/deadband processing on the data for optimizing its transmission to the Master Station (SCADA Control Centre). The processing shall include requirements of mapping of information from the protocol of MFT/MFM/IEDs to the protocol requirement for communication with Control Center.

The RTU shall process the various messages/commands for communication to the Master station using the following priority.

a) Control command

b) Status data by exception

c) Analog data by exception

d) Analog data periodic

e) Status data integrity scan

The communication interface to the master station(s) shall allow scanning and control of defined points within the RTU independently for each master station using a separate logical database in the RTU. It shall be possible to pick points from the RTU database randomly and assign it for reporting to a Master station. Further, the RTU shall support the use of a different communication data exchange rate (bits per second), scanning cycle, and/or communication protocol to each master station.

1.12.1 Scan groups

Analog and digital input points (including points reported by exception) shall be assignable to scan groups using the IEC 60870-5-101and IEC 60870-5-104 protocol profile communication protocol standard. A scan group shall be a specified set of data points within the RTU central database which will be communicated to a master station when requested by a specific (addressed) scan request. A scan group size shall only be limited by the communication protocol message length. Any RTU input point shall be assignable to any scan group. The RTUs shall support at least sixteen scan groups and all scan groups per communication port (i.e. master station/ LDMS interface). The Contractor shall provide a convenient and flexible scheme for assigning points in the RTU to scan groups.

1.12.2 Reporting of status points

The RTU communication protocol shall be configured to report digital status changes by exception to master station using the IEC 60870-5-101 and IEC 60870-5-104 protocol profile communication protocol standard. Digital status data shall have higher priority than the Analog data. All the digital status data shall also be assigned to scan groups for integrity check by Master stations at every 10 minutes.

1.12.3 Reporting of Analog points

The analog data shall be reported periodically to update all the values at the master station within 10 to 15 seconds (configurable from 5 to 20 seconds as per requirements of Owner) using IEC 101 /104 protocol profile. Analog data shall also be reported by exception if the analog value exceeds its previous value by more than 20% (configurable from 1% to 20% in the RTU itself as per Owner's requirements).

1.12.4 Digital control commands

The RTU shall follow the select-and-execute sequence for operation of digital control commands from the master station using the IEC 60870-5-101 and IEC 60870-5-104 protocol profile communication protocol standard. The RTU shall reset its control logic upon any error in the sequence.

1.13 Data Concentrator Communication Protocol

The RTU shall have the in-built functionality to act as an IEC 60870-5-101 and IEC 60870-5-104 protocol master and collect data and also perform supervisory control from/on the slave RTUs and communicate it to the Control Center. The Master protocol implementation shall be such that the data polling requirements mentioned at section 1.11 is at least accomplished.

In case the RTU is proposed to be used as a Data concentrator (as per relevant Appendix), it shall be provided with at least ten (10) IEC 101 input ports/ cards and shall have capability to report to two master stations on IEC 104 interface. Data concentrator shall support at least 1,500 (fifteen hundred) data points. The RTU as a Data Concentrator shall be supplied with GPS receiver system with antenna, cable etc. for time stamping of Data concentrator which in turn shall synchronize the IEC 101 protocol connected RTU/device. The RTU as a Data Concentrator shall be complete with built-in monitoring mechanism to avoid loss of any data, especially the one reported by exception. The data concentrator shall have dual CPU and dual Power supply unit. The overall data update requirement from any Sub-RTU to Control Centre shall not affect the functionality defined elsewhere in the specification.

The Data concentrator shall have the provision for remote login from Control Centre. The SLDC computer system shall be able to configure and poll health of Data concentrator from remote on 104 connected interface after due authentication of the users.

It shall support diagnostic & maintenance activities remotely. Individual RTU configuration shall be possible from Data Concentrator including accommodating devices from heterogeneous suppliers. The RTU as a Data Concentrator shall have following communication ports & support for protocols:

i. IEC 60870-5-104 for SCADA control centers.
ii. IEC 60870-5-101 for Sub-RTUs.
iii. IEC 101/104 for local SCADA

The other requirements given for RTU elsewhere in the specification shall be applicable to RTU as a Data concentrator also. Necessary ports shall not only be demonstrated to Employer/Owner but shall also be kept configured for future use or emergency use.

1.14 Analog Inputs

The RTU shall accommodate analog inputs which are unipolar or bipolar, 2-wire ungrounded differential signals. All analog signals are generally of the order of +4 to +20 mA but RTU shall be capable of accepting other standard analog input ranges (0 to 5V, 0 to 10mA, +/- 10 mA, 4-20 mA) also as per Owner's requirements.

The RTU shall make all appropriate signal level conversion and conditioning to allow full utilization of analog inputs and meaningful reasonability checking. The analog-to-digital converter shall have a minimum resolution of 2048 counts (sign plus 11 data bits). Each type of analog input shall be converted with full resolution. The RTU shall monitor the drift in characteristics of its ADC and mark the analog points with a drift quality code if a drift is detected. This drift quality code shall be sent to the master station also.

The RTU accuracy, for analog input measurement, shall be 99.8% or better at 25 degree C ambient temperature. Mean accuracy shall drift no more than 0.002% per degree C within the temperature range of –5 to +55 degree Celsius. Determination of accuracy shall be made while the analog multiplexer is operating at rated speed.

Each input shall have suitable protection and filtering to provide protection against voltage spikes and residual current at 50 Hz, 0.1 ma (peak-to-peak) and overload. Loading upto 150% of the input value shall not sustain any failures to the RTU input. The total input impedance offered by the RTU shall not be greater than 250Ω (for +4 to +20 mA range).

All analog inputs shall be scanned by the RTU from the field at least at 1 second periodicity.

1.15 Status Inputs

RTU shall be capable of accepting isolated dry (potential free) contact, internally wetted @ 48V DC of Dry (Potential Free) contact @220V DC or 110V DC (+/-30%) for status inputs. All status inputs shall be wired by the Contractor to MFT/MFM or RTU through 220V DC or 110V DC or 48V DC (+/- 30%) wet contact wired directly from semaphores in the C&R panels as available at site. The RTU shall provide necessary sensing voltage, current, optical isolation and de-bounce filtering independently for each status input. The sensing voltage shall not exceed 48V DC. The sensing voltage source shall be isolated from that of the RTUs logic power so that any noise or a short circuit across the sensing supply of a digital status input terminals would not disrupt the RTU operation other than the shorted digital status input.

The RTU shall be set to capture contact operations of 20 ms or more duration. Operations of less than 20 ms duration shall be considered no change (contact bounce condition). The RTU shall accept two types of status inputs i.e. Single point Status inputs and Double point status inputs.

Single point status input will be from a normally-open (NO) or normally-closed (NC) contact which is represented by 1-bit in the protocol message.

Double point status input will be from two complementary contacts (one NO and one NC) which is represented by 2-bits in the protocol message. A switching device status is valid only when one contact is closed and the other contact is open. Invalid states shall be reported when both contacts are open or both contacts are closed.

All status inputs shall be scanned by the RTU from the field at 1 millisecond periodicity. The RTU shall also store all status changes detected for retrieval by the Master Stations. For communication delays or short-term failure of communications with a master station, the RTU shall store a minimum of 300 status change events. The RTU shall report any overflow of this status change buffer to the Master Stations.

It is the Employer's/Owner's intent to minimize the use of Contact Multiplying Relays (CMRs) in order to subsequently minimize the nos. of components and its associated failures. The Contractor shall use CMRs to convert wet contact to isolated dry contact only when it is necessary for satisfactory performance of the system.

1.15.1 Contact Multiplying Relay

Contact multiplying relays (CMRs) are required to multiply the auxiliary contacts of breaker/isolators etc. as per site conditions. The contacts of these relays shall be used to provide status input to the RTUs. The relays shall be of self-reset type. The relay shall have a minimum of two changeover contacts each with minimum current carrying capacity of 5 A at 110V/220 V DC.

The relays shall conform to the following requirements:

a) Power frequency withstand voltage: 2 kV for 1 minute as per IEC standards.

b) Insulation resistance of 100 Mega-Ohms at 500V DC.

c) 5 KV Impulse test as per IEC standards

The CMRs shall be generally mounted in existing control & Relay panel but in case of non-availability of space, it shall be accommodated in the System Interface Cabinets (being supplied by the Contractor).

The CMRs shall have a LED indication which shall light up when the CMR is in energized (picked-up) condition. The CMR coil shall be rated for the voltage existing at the site.

1.15.2 Momentary Change Detection

Two-state status input points with momentary change detection shall be used by Employer/Owner for points where multiple operations (changes of state) can occur between scans from the master station (such as breakers with auto-reclosing devices that operate faster than the master station scan rate). The RTU shall capture and maintain all of the momentary changes, up to 4 per MCD digital status point. The MCD status input points shall be set to capture operations of greater than 20 ms duration.

Alternatively, the RTU can store and report the multiple state changes of a digital input as discrete events. It shall be ensured that all the changes are reported to the Master station in the sequence in which they occur in the RTU.

1.16 Digital Telemetry

Digital telemetry input points shall be provided for sixteen bit inputs from employer telemetry contacts. The digital telemetry may use BCD, (4 bit decimal character without sign) and/or binary (16 bit) codes.

1.17 Sequence of Events (SOE) feature

SOE is the time-stamped digital status data. SOEs will enable Employer's/Owner's personnel to determine the sequential operation of digital status input devices for their state changes. The RTU shall time-stamp the digital status data with a time resolution of one millisecond.

Initially, all breakers & protection contacts digital status input points in the RTU & events captured from IEDs shall be configured as SOE points. However, it shall be possible to assign any digital status input data point in the RTU as SOE point.
Each time a SOE status input point changes state, the RTU shall time-tag the change and send it to the Master station. The RTU shall maintain a SOE buffer within the RTU for communication delays and communication failure. SOE buffer shall be sized to store, as a minimum of 5,000 events. The RTU shall transmit the SOE data stored in its buffer to master station. An acknowledgement of receipt by the master station shall be made prior to the loss of any data in the RTU SOE buffer. Data not received at the master station shall be retransmitted. The RTU shall send a message to the master station to indicate the RTU SOE data buffer overflow condition.

1.18 Control Outputs

The RTU shall provide the capability for a master station to select and change the state of digital output points either directly or through MFT/MFM. In case the Control Output is provided through MFT/MFM, the communication between RTU & MFT/MFM shall also support select before operate functionality. Device control will be used by employer to control power system devices including:

(a) Two-state Devices: Circuit breakers, motor-operated switches, auto/manual switches, relay disable/enable, and other two-state devices

(b) Variable Output Devices: Raise/lower control of generators, transformer load-tap-changers (LTC), and other variable output devices.

The RTUs shall have the capability for control outputs as described in the following sub-sections below.

1.18.1 Two State Momentary Control

A pair of outputs shall be supplied for each two-state (open/close) control output point that drive control relays. One output shall be supplied for open, the other for close. Upon command from a master station using the check-before-execute sequence, the appropriate control output shall be operated for a preset (momentary) time period. The operation period shall be adjustable for each point from 0.1 to 2 seconds.

1.18.2 Raise/Lower Pulse Output

A pair of outputs shall be supplied for each (raise/lower) control output point that drive control relays. One output shall be supplied for raise, the other for lower. When commanded from the master station, the appropriate raise or lower output shall be
operated for the selected time interval. The closure time interval for raise/lower pulse output points shall be specified in the operate command from the master station. The raise/lower output for each point shall operate over a range of 0.1 to 4 seconds in a minimum of eight equal increments.

1.18.3 Timed Supervisory Control

The RTU shall store Timed Supervisory control command received from the SCADA system. This supervisory control command from the SCADA system shall contain the 'time' up to a resolution of milliseconds and the type of control Operation.

The RTU shall then perform the supervisory control command at the specified time. The SCADA system shall be able to cancel this command prior to the occurrence of the specified Time of Operation.

1.18.4 Control Output Interposing Relays (Double Contact Digital Output)

Control output interposing relays shall be supplied by the Contractor for each control output specified in appendix. Each control relay shall consist of two isolated single-pole double-throw contacts. The output contacts shall be rated to carry minimum current of 10 amps at 220 V DC, and shall provide arc suppression to permit interruptions of an inductive load. Relay coils shall be shunted with diodes to suppress inductive transients associated with energizing and de-energizing of the relay coils. The relays shall conform to the IEC standards.

1.18.5 Latching (Dummy Breaker) Relay

The Contractor shall provide a latching relay to be used to simulate and test supervisory control from the RTU. The simulation relay shall accept the control signals to open and close from the RTU, and shall provide the correct indication response through a single contact indication input point. This point is not included in the RTU point count in **Appendix A.**

1.18.6 Control Security and Safety Requirements

The RTU shall include the following security and safety features as a minimum for control outputs:

(a) Select-and-execute sequence for control output.

(b) No more than one control point shall be selected at any given time.

(c) The control selection shall be automatically cancelled if after receiving the "control selection" message, the "control execute" command is not received within the set time period.

(d) The control selection shall be automatically cancelled if after receiving the "control selection" message, the "operate" command is not the next received message and is not received within the set time period.

(e) No control command shall be generated during power up or power down of RTU.

1.18.7 Local/Remote selector switch

A manual Local/Remote selector switch shall be provided for each RTU to disable all control outputs by breaking the power supply connection to the control outputs. When in the "Local" position, the Local/Remote switch shall allow testing of all the control outputs of RTU without activating the control outputs to field devices. A status input indication shall be provided for the Local/Remote switch to allow the SCADA system to monitor the position of the switch. This point is not included in the RTU point count defined in Appendix A.

1.19 Time facility

The RTU shall have an internal clock with the stability as defined in **Table-1.** The RTU shall be synchronised through synchronisation message from master station at every 10 minutes using IEC 60870-5-101 protocol. The RTU shall support the calculation of the propagation delay dynamically by the Master station. However, all the RTUs shall have a suitable interface for receiving synchronization signals from a local GPS receiver.

The RTUs communicating over IEC-60870-5-104 shall be supplied with a GPS receiver for synchronization of RTU clock.

The RTU shall synchronize its internal clock with the master station system clock when time synchronization messages are available and shall mark all the time stamped information/data as invalid when the RTU clock is not synchronised with the Master station.

To achieve the RTU internal clock stability of atleast 1 ppm, the contractor shall supply RTUs with GPS. The internal GPS should also provide positional information for asset management.

1.20 Diagnostic features

The RTU design shall facilitate isolation and correction of all failures. The following features which promote rapid problem isolation and replacement of failed components shall be provided:

a) Self-diagnostic capabilities within each RTU which can be initiated at the RTU site. The diagnostic software shall check for memory, processor, and input/output ports errors and failures of other functional areas defined in the specification of the RTU.

b) On-line error detection capabilities within the RTU and detailed reporting to the connected master station of detected errors. It shall be possible to choose the errors to be sent to the Master station within the framework of the communication protocol.

c) Local indication of major RTU failures

d) A non-volatile event buffer that shall record all fatal errors/restarts/ faults. The RTU should archive the events on an External Storage device.

e) RTU should support SNMPv3 and Syslog.

f) RTU should have a inbuilt Web Browser application which can be accessed over Intranet from the Control Centre.

1.21 Input DC Power Supply

The RTU will be powered from a 48 V DC (+ve earthed) system. The RTU shall not place additional ground on the input power source. The characteristics of the input DC power supply shall be

(a) Nominal voltage of 48V DC with operation between 36V DC and 72V DC.

(b) Maximum AC component of frequency equal to or greater than 100 Hz and 0.012 times the rated voltage peak-to-peak.

The RTU shall have adequate protection against reversed polarity, over current and under voltage conditions, to prevent the RTU internal logic from being damaged and becoming unstable causing mal-operation.

1.22 Environmental Requirements

The RTU will be installed in control room buildings with no temperature or humidity control. The RTUs shall be capable of operating in ambient temperature from -5 to +55 degree C with rate of temperature change of 20 degree C/hour and relative humidity less than 95%, non-condensing. At some locations, environmental temperature may go below –5 degree C for which the contractor shall take suitable measures for successful operation of RTU.

1.23 Noise level

RTU shall be solid state and acoustically quiet. The audible noise generated by the RTU equipment shall not exceed 50 dbA one meter from the enclosure.

1.24 RTU Size and Expandability

The software and the database shall be sized to accommodate growth within the ultimate sizing parameters as defined in this specification for the RTU without requiring software or database structure regeneration.

The point counts for the RTUs have been defined in the **Appendix A**. The RTU shall have additional wired available reserve capacity of twenty percent (20%) for each type of points defined in the BOQ. This reserve capacity shall be used without any additional hardware such as I/O cards and terminal blocks.

The RTUs delivered shall have the capability to accommodate additional I/O modules to expand the overall point count of the RTU by a minimum of fifty percent (50%) i.e. 80% more than the actual RTU count defined in the BOQ. The I/O modules here means Status Input module, Analog input module and the Control output module. Other modules, such as processor module, racks etc. as required to meet the overall expandability requirement defined above shall also be supplied by the contractor.

1.25 RTU and SIC panels

The Contractor shall provide RTU & System Interface Cabinet (SIC) panels. The SIC shall primarily house all MFMs, interposing control relays and interface terminal blocks. Generally, CMRs and MFMs shall be installed in the Customer Control/Relay panels and all other equipment like Heavy Duty Relays, etc. shall be housed in the RTU panel. However where it would not be possible to mount the MFMs in the existing customer panel SIC panel shall be provided.

The SIC shall be mounted adjacent to the RTU panel. However, in a few cases, the SIC may be mounted separately at a different locations. All RTU signals shall be connected to the MFMs, interposing relays, and field signals in the interface cabinet. The panels shall meet the following requirements:

(a) Shall be free-standing, floor mounted and height shall not exceed 2100 mm.

(b) Shall have maintenance access to the hardware and wiring through lock-able full height doors.

(c) Shall have the provisions for bottom cable entry

(d) The safety ground shall be isolated from the signal ground and shall be connected to the ground network. Safety ground shall be a copper bus bar. The contractor shall connect the panel's safety ground of to the Employer's grounding network. Signal ground shall be connected to the communication equipment signal ground.

(e) All panels shall be supplied with 230 Vac, 50 Hz, single-phase switch and 15/5A duplex socket arrangement for maintenance.

(f) All panels shall be provided with an internal maintenance lamp, space heaters and gaskets.

(g) All panels shall be indoor, dust-proof with rodent protection, and meet IP41 class of protection.

(h) There shall be no sharp corners or edges. All edges shall be rounded to prevent injury.

(i) Document Holder shall be provided inside the cabinet to keep test report, drawing, maintenance register etc.

(j) All materials used in the enclosures including cable insulation or sheathing, wire troughs, terminal blocks, and enclosure trim shall be made of flame retardant material and shall not produce toxic gasses under fire conditions.

(k) The structural frame of the panels shall be of cold rolled sheet steel of thickness not less than 3 mm for the weight bearing members of the panels such as base frame, front sheet & door frames and 2mm for sides, door, top and bottom portions.

(l) All sheet steel work shall be degreased, pickled, phosphated in accordance with IS6005. The phosphate coating shall be sealed with application of two coats of ready mixed, stoving type zinc chromate primer. Two coats of synthetic enamel paint RAL7032 shade) shall be applied both in the exterior and the interior of the panel.

Note: since the project may involve replacement of existing RTUs, hence the dismantled RTUs and associated hardware shall be handed over to Employer/Owner itself.

1.26 Interconnections

All cabling between component units of the RTU, RTU to interface cabinet, RTU to MFTs/MFMs and to the Employer/Owner control and relay panels (located in the substation control room) shall be supplied and installed by the Contractor and shall be shown on Contractor supplied drawings. Plug-type connectors with captive fasteners or compression type connectors shall be used for all internal interconnections. The connectors shall be polarized to prevent improper assembly. Each end of interconnection cables shall be identified by a marker which includes the cable number and the identifying number and location of each of the cable's terminations. This information shall match with the Contractor's drawings.

Adequate space and hardware shall be provided for routing of the field wiring within the enclosures. Contractor wiring within enclosures shall be neatly arranged and shall not be directly fastened to the enclosure frame. All internal interconnection wiring and cables shall be routed separately from field wiring to the RTU terminals & power wiring. All wiring shall use copper conductors and have flame retardant insulation. Conductors in multi-conductor cables shall be individually colour coded.

The use of non-flammable, self-extinguishing, plastic wire troughs is permissible. Metal clamps must have insulating inserts between the clamps and the wiring. Wiring between stationary and movable components, such as wiring across door hinges or to components mounted on extension slides, shall allow for full movement of the component without binding or chafing of the wiring.

1.27 Wiring/Cabling requirements

Shielded (screened) cables shall be used for external Cabling from the RTU/ SIC panels. These external cables (except communication cables) shall have the following characteristics:

a) All cables shall have stranded copper conductor.

b) Minimum core cross-section of 2.5 mm^2 for PT cables, 4/2,5 mm^2 for CT cables or as per site requirements and 2.5 mm^2 for Power & Control outputs and 1.5mm^2 for Digital Status inputs, transducer mA current output

c) Rated voltage Uo/U of 0.6/1.1KV

d) External sheathing of cable shall have oxygen index not less than 29 & temperature index not less than 250. Cable sheath shall meet fire resistance test as per IS 1554 Part-I.

e) Shielding, longitudinally laid with overlap.

f) Dielectric withstand 2.5 kV at 50 Hz for 5 minutes

g) External marking with manufacture's name, type, core quantity, cross-section, and year of manufacture.

h) The Communication cable shall be of shielded, twisted pairs and of minimum 0.22sq mm size

1.28 Terminal Blocks

Terminal blocks shall be having provision for disconnection (isolation), with full-depth insulating barriers made from moulded self-extinguishing material. Terminal blocks shall be appropriately sized and rated for the electrical capacity of the circuit and wire used. No more than two wires shall be connected to any terminal. Each analog input signal, digital status input and digital output signals shall require two terminals per point plus a common shield termination for each cable.

All terminal blocks shall be suitably arranged for easy identification of its usages such as CT circuits, PT circuits, analog inputs, status inputs, control outputs, auxiliary power supply circuits, communication signals etc.

Terminal Blocks for CT circuits shall have feature for CT shorting (on CT side) & disconnection (from load side) to facilitate testing by current injection. Similarly, TBs for PT circuit shall have feature for disconnection to facilitate voltage injection for testing.

1.29 RTU Architecture

Bidder has the option to offer RTUs having following architectural design:

a) Centralized RTU design where all I/O modules are housed in RTU panels and communicating with master station through communication port.

b) Distributed RTU design where I/O modules are housed in respective bay C&R panels. All these distributed I/O modules shall be connected to a central processor for further communication with master station. The bidder shall asses the requirement of RTU/SIC panels for such design and supply panels accordingly.

1.30 RTU Security Process

a) Web access shall be secured on https.

b) Role Based Access Control permissions shall be provided.

c) Services shall be encrypted using SSL.

d) Open ports access shall be restricted to specific IP Addresses.

e) Rate Limiting against DOS (Denial of Service) shall be supported.

1.31 Transducer & Weather Sensor Requirements

All transducers shall use a 48 VDC auxiliary power supply as provided for the RTU. All transducers shall have a maximum power consumption of 10 watts.

1.31.1 Transducer Protection

The input, output and auxiliary circuits shall be isolated from each other and earth ground. The transducer output shall be ungrounded and shall have short circuit and open circuit protection. The transducers shall comply to the following requirements, in addition to the requirement of IEC 60688, without damage to the transducer:

(a) Electromagnetic Compatibility: IEC 61000-4-3, Level 1

(b) Electromagnetic Compatibility: IEC 61000-4-4, Level 1

(c) Shock Resistance: Minimum severity 50 A, IEC 68-2-27 requirements

(d) Vibration Strength: Minimum severity 55/05, IEC 68-2-6 requirements.

(e) Input Circuit Consumption: Less than 0.5 VA for voltage and current circuits.

1.31.2 Multi-Function Transducers (MFMs)

The contractor shall provide the multi-function transducers for acquiring the real time analog inputs through 3 phase 4 wire CT/PTs circuits. The multi-function transducer shall be designed for nominal 110 V (Ph-Ph voltage) and 1A/5A (per phase current).

The MFM shall be suitable for 20% continuous over load and shall be able to withstanding 20 times the normal current rating for a period one second. The MFM shall be able to accept the input voltages up to 120% of the nominal voltage. The MFMs shall have low VA burden. These MFMs shall be mounted in the interface cabinet to be supplied by the contractor.

- CT and PT ratio shall be programmable at site.
- CT withstand capacity: 3 times RMS continuous and at least 20 times for 1 second.
- CT Burden: < 0.1 VA
- Voltage withstand capacity: 1kV continuous and 2kV for 1 second.
- PT Burden: < 0.15 VA
- Communication Speed: < 50 milli-seconds.

Multi-function transducers shall provide at least the following parameters as a minimum with the specified accuracies.

Sl. No.	Parameters	Accuracy
(i)	Voltage	±0.5%
(ii)	Current	±0.5%
(iii)	Frequency	± 0.2%
(iv)	Active Power/Reactive power	±0.5% / ±1%
(v)	Import & Export Energy (active/reactive)	±1% / ± 2%
(vi)	Power Factor (measuring range shall be 0.6 to 1.0 lag & lead)	

The parameters to be acquired from multifunction transducers shall be selectable. MFM shall provide the 15 minute values (configurable 15 minute/1 hour) of Active Energy Import, Active Energy Export, Reactive Energy Import and Reactive Energy Export.

Multi-function transducers shall accept nominal 48 V DC (positive earthed) as auxiliary power supply. Multi-function transducer shall be provided with RS485 interface to communicate with RTU over Modbus protocol in multi-drop mode.

The MFMs shall be suitable for mounting on DIN rails. The MFM terminals shall accept upto two 2.5 mm^2 / 4 mm^2 for PT/CT circuit terminations as applicable.

The Multi-function transducer shall have a local display to show all the parameters. The parameters being displayed shall be selected through a push button. The display parameters shall include at least the following –

- 3-phase voltage
- 3-phase current
- Frequency

- Total Power Factor (incl. Lead/Lag) – per phase
- Total Active Power (incl. Export/Import) – per phase
- Total Reactive Power (incl. Export/Import) – per phase
- Total Apparent Power (MVA) – per phase
- Energy – Import and Export

The Multi-function transducer shall comply to the EMI/EMC level test requirements as specified for the RTU except for Fast transient burst test requirement which shall be for level 4. The test reports shall be submitted during detailed engineering.

1.31.3 Transformer Tap Position Transducer

The existing transformer tap position indications are of two types.

(i) Variable resistance type
(ii) Lamp type

The Contractor shall provide suitable resistance tap position transducers which shall have the following characteristics

(a) The input measuring ranges shall be from 2 to 1000 ohms per step, which is tuneable at site with at least 25 steps.

(b) Dual output signal of 4 to 20 mA DC, 0.5% accuracy class as per IEC 688 shall be provided. One output will be used for driving a local digital indicator (to be provided by the contractor) and the other will be used for interfacing with the RTU.

(c) In case of lamp type, additional resistance/potentiometer unit shall be provided to convert the dry type contacts to a variable resistance as defined in (a) above, suitable for the remote indication.

1.31.4 Weather Sensors

All weather sensors shall be maintenance free and of Industry standard design. The design of sensors shall permit calibration on site. The sensing mechanism shall be rugged enough to avoid frequent recalibration.

The weather sensor shall be a robust ultrasonic sensor with Aluminium alloy construction. The sensor shall be a solid-state device with no moving parts, and shall use ultrasonic measurement technology. The robust Aluminium alloy housing shall be hard-anodised to ensure suitability in harsh environments. The sensors shall be supplied with the complete support/mounting structure as required.

The sensor, support structure shall have built-in protection against lightning stroke/electrical surges, etc.

The output of all the sensors except rainfall sensor shall be 4 to 20 mA at 0-500 ohm impedance.

The output of rainfall sensor shall be in the form of potential free contact and its closure shall be accumulated (over a configurable time period) and reported at master station through RTU. The sensors shall be located in open and in the electrical environment such as 400 KV EHV outdoor stations. The equipment offered should be suitable for satisfactory operation in above environment.

1.31.4.1 Air Temperature Sensor

Sensor	Air Temperature Sensor
Output	As per specification 1.29.4
Temperature Range	-5 ^{o} C to + 60 ^{o} C
Resolution	0.1^{o} C
Accuracy	$\leq$ 0.5 ^{o} C or better
Radiation Shield	Radiation Shield made of weather resistant Material and suitable to sensor used.

1.31.4.2 Relative Humidity Sensor

Sensor	Relative Humidity Sensor
Output	As per specification 1.28.4
Range	0 to 99 %
Resolution	1%
Accuracy	3 % or better
Radiation Shield	Radiation Shield made of weather resistant material and suitable to sensor used.
Operating Temperature Range	-5 ^{o} C to + 60 ^{o} C

Note: The Air Temperature and Relative Humidity sensors may be supplied in a single enclosure or separately.

1.31.4.3 Rainfall Sensor

Sensor	Tipping Bucket Rain Gauge
Output	As per specification 1.29.4
Capacity / Range	Unlimited
Resolution	0.2 mm per tip or better
Accuracy	4%
Collecting Area	Minimum 200 sq.mm
Operating Temperature	-5 ^{o} C to + 60 ^{o} C

1.31.4.4 Wind Speed Sensor

Sensor	Anemometer 3 cup assembly, very robust to Withstand strong wind gust.
Output	4 to 20 mA at 0-500 ohm impedance or RS 485 with MODBUS protocol
Starting Threshold	0.5 m/s or better
Range	0.9 - 60 m/s
Resolution	0.1 m/s
Accuracy	2 % or better

Mechanical	3 Cup assembly and housing (complete), should be very robust and capable to withstand strong wind gust and made up of suitable non-rusting material
Mounting Accessories	Made of suitable good quality material like steel or high strength fibre.
Operating Temperature	0^0C to + 60^0C (-5^0C to + 55^0C for project area with snowfall history)

Note: The Wind Speed and Wind Direction sensors may be supplied in single enclosure or separately.

1.31.4.5 Wind Direction Sensor

Sensor	Wind Direction sensor
Output	4 to 20 mA at 0-500 ohm impedance or RS 485 with MODBUS protocol
Starting Threshold	0.5 m/s or better
Range	0 – 360° (Degrees)
Resolution	1° (Degree)
Accuracy	3° (Degrees) or better
Construction of Housing and vane	Housing (complete) should be very robust and capable to withstand strong wind gust and made up of suitable-non-rusting material having high mechanical strength. Wind vane and control head may be of Aluminum or other light UV resistant material
Operating Temperature	0°C to + 60°C (-5°C to + 55°C for project area with snowfall history)

1.31.4.6 Air Temperature Sensor

Sensor	Air Temperature Sensor
Output	4 to 20 mA at 0-500 ohm impedance or RS 485 with MODBUS protocol
Temperature Range	0^0C to + 60^0C (-5^0C to + 55^0C for project area with snowfall history)
Resolution	0.1^0C
Accuracy	< 0.5°C or better
Radiation Shield	Radiation Shield made of weather resistant material and suitable to sensor used.

1.31.4.7 Weather Sensor Installation Requirement

The weather sensor shall be supplied along with necessary accessories (e.g. tripod, stand, clamps etc.) for installation/ fixing of sensors, signal/power cables etc. as part of weather sensors station. All the accessories shall be made of stainless steel or other suitable material having sufficient mechanical strength and corrosion resistance to withstand atmospheric temperature, pressure, wind speed and relative humidity up to the working range(Minimum to Maximum) of sensors for these parameters as defined.

The Employer will prefer to install the sensors on roof top of control centre/substation or other building. The mounting arrangement for all the sensors shall be designed suitably for installation on the roof top.

1.32 Portable Configuration and Maintenance Terminal (PCMT)

Contractor shall supply a Portable Configuration and maintenance Terminal (Laptop PC) which shall provide followings capabilities:

(a) RTU Data base configuration & Maintenance

(b) Local Operator Interface & RTU Diagnostics

(c) Master Station and RTU simulator cum protocol analyzer

a) RTU Data base configuration

The **RTU database Configuration** software being supplied with the PCMT shall have the following features

i) Full graphics windows User Interface

ii) Standard editing capabilities e.g. cut, paste, copy, sorting etc.

iii) Capable of controlling revisions of various RTU database files and storing multiple versions of databases for all the RTUs.

iv) Capable of uploading database from the RTU and compare that with another version of database stored in the PCMT.

v) Provide standard template for database modeling required for I/O modules, MFMs & IEDs, communication setting.

vi) Provide mapping of the individual data points acquired from one Protocol to another protocol for transmission.

The database configuration software shall use the same terminology for configuration of the various protocol parameters as specified in the communication protocol standard i.e. it shall be possible to define these parameters by the user discreetly. Also, it shall be possible to select an ASDU type to be used for transmission of a measurand e.g. measured value to be transmitted as ASDU 9 or ASDU 11.

b) Local Operator interface and RTU diagnostics

The Local **Operator interface** software shall support operator inquiries to demand current status and data values of various RTU points, or an overall substation snap-shot, or of the status change buffer.

The local operator interface software shall provide the following reports:

i) Status Reports: Display of all substation status indications, of all tele-metered values, and the RTU's status.

ii) Event Report: Display all the stored events in the event buffer of the RTU.

iii) Print Request: Provide user interface for requesting print out of the Reports on the Logger

iv) Maintenance activities: User interface for interacting with the RTU for maintenance activities like diagnostics, database online requests.

The **RTU** shall have inbuilt features for monitoring the healthiness of the RTU modules and detecting the type of error. The **diagnostics software** shall have diagnostics for the RTU's processor(s), memory, I/O ports, and any other functional areas of the RTU. It shall list the errors recorded by the RTU and provide troubleshooting tools for the RTU.

c) Master station-cum-RTU simulator & protocol analyzer software tool

The Master station and RTU simulator cum Protocol Analyser software shall be used to monitor and test the RTU's operation using the master station communication protocol. It shall have the following features

i) capable of emulating both the master station and the RTU messages in all the communication protocols used in the RTU subject to minimum of IEC 60870-5-101, 104 & MODBUS/103. When the Master station and RTU simulator cum Protocol Analyser software has received or transmitted a message, it shall be possible to immediately "turn around" and transmit or receive a response message.

ii) capability of interfacing to digital side of the RTU for the above purpose.

iii) capable of receiving single and repeated messages using the supplied RTU communication protocol. Each received message shall be checked for validity, including the checksum code. The messages shall be displayed in HEX format or in the 'interpreted form' as desired by the user . It shall maintain and display error counters so that the number of errors during a period of unattended testing can be accurately determined.

iv) capable of formatting and transmitting, both as one-time and periodic transmissions, any master station-to-RTU command.

v) capable of preparing illegal messages, such as messages having invalid check codes, for transmission.

The Master station and RTU simulator cum Protocol Analyser software shall also be capable of passively monitoring all communication traffic on a channel without inter-fering with channel operation.

Channel traffic captured in the active or passive modes of operation shall be displayed. All fields of a message shall be displayed. A pass/fail indication for the security check code shall be included with each code displayed.

1.33 Training, Documentations and Testing

1.33.1 Training

The contractor shall provide training to the Employer's personnel. The training program shall be comprehensive and provide for interdisciplinary training on hardware and software. The training program shall be conducted in English. RTU/FRTU training course shall cover the following:

a) RTU/FRTU operation including data flow.
b) Troubleshooting, identification and replacement of faulty Modules.
c) Preventive maintenance of the RTU/FRTU
d) Use of RTU/FRTU configuration and Maintenance tool

e) All functional and Diagnostic testing of RTU/FRTU
f) Database modification and configuration of RTU/FRTU

1.33.2 Documentation

The Contractor shall submit 3 sets of all the standard and customized RTU documents for review and approval which includes the following:

a) RTU Function Design Document
b) RTU Hardware description document & all the documents referred therein to meet all the clauses of the specification.
c) RTU Test equipment user documents
d) RTU user guide
e) RTU Operation & Maintenance document
f) RTU Training documentation
g) RTU database document
h) RTU I/O list
i) RTU Test procedures
j) Data Requirement Sheet (DRS) of all items
k) Protocol documentation including implementation profile etc.
l) RTU installation and Layout, GA, BOQ, schematics and internal wiring drawings for each RTU site
m) RTU to C&R panels/ field device cabling details for each RTU site
After approval of all the above documents, the Contractor shall submit three sets as final documents. The site-specific drawings as indicated at item (i) and (j) above shall be submitted in three sets for each site before installation of RTU. In case some modifications/corrections are carried out at site, the contractor shall again submit as built site-specific drawings in three sets after incorporating all such corrections as noticed during commissioning of the RTU.

1.31.3RTU/SIC Testing

(a) Type Testing

A complete integrated unit shall be type tested to assure full compliance with the functional and technical requirements of the Specification. The testing sample shall include at least one of each type of cards/modules and devices. The list of Type tests to be performed on the RTU/SIC is mentioned in **Table-2**& type test requirements are mentioned in **Table-3**.
The contractor may optionally submit type test reports for all the EMI/EMC tests conducted at accredited laboratory for review & approval by Employer/Owner. However, in the event, the type test reports are not meeting the specification requirement, Employer/Owner may ask for the type testing of any or all of the above tests as required at no additional cost to the Employer/Owner.

The type test of RTU w.r.t. functional tests shall be carried out in all cases. Contractor shall commence commercial production of RTUs/SICs after successful completion of all type tests and approval from Employer/Owner.

Further, type test reports for meters, transducers and relays shall be submitted as per relevant standards. All weather sensors shall be calibrated as per Indian Metrological Department standards and certificate shall be submitted in this regard.

(b) Routine Testing

Each complete unit shall undergo routine testing. The list of Routine tests to be performed in the factory is mentioned in **Table-2**.

(c) Field Tests

After RTU/SIC panel installation and interface cabling with C&R panels and communication equipment, the Contractor shall carry out the field-testing. The list of field tests is mentioned in **Table-2**.

(d) Availability Tests

After field testing, RTU/SIC shall exhibit 98% availability during test period of 500 hours. Availability tests shall be performed along with Master station. The RTU/SIC shall be considered available only when all its functionality and hardware is operational. The non-available period due to external factors such as failure of DC power supply, communication link etc., shall be treated as hold-time & availability test duration shall be extended by such hold time.

Table-1: Technical Particulars of RTU

Sr. no.	Item Description	Value	Remarks
1	Data transmission rate	300 to 9600 bps for serial port & 10/100 Mbps for Ethernet port	Configurable
2	Communication ports	Minimum 9 Ports	• 2 Ethernet port for Connectivity to Master Station on IEC 60870-5-104 and IEDs/Numerical Relays on IEC 61850 •Two RS232 ports –for communication. With 2 master stations on 60870-5-101. •1 Port– for RTU configuration & Maintenance tool •2 port for LDMS •Required Nos (Min 2 Nos) RS 485 ports for polling MFMs/Energy Meters
3	Communication protocol with Master stations	IEC 60870-5-101 & 104	
4	Communication Protocol with LDMS	IEC 60870-5-101/ 104	
5	Communication Protocol with MFMs	MODBUS/103	
6	Communication Protocol with	IEC 61850	

	IEDs		
7	Status data transfer to Master station	by exception	
8	Analog data transfer to Master station	Normally Periodic For major change – by exception	
9	No. of Scan Groups supported	16	
10	Separate Logical Database for each Master Station		
11	RTU shall be able to capture contact operations	of 20 ms or more duration.	
12	SOE buffer size	atleast 1024 events	
13	Time stamping accuracy for SOE	1 ms	
14	Supporting Control of Devices	Two state & OLTC capacitors	
15	Down loading of RTU database from master station	Supported	
16	RTU internal clock stability	Atleast 1 ppm	
17	Nominal Power supply voltage	48V DC	
18	Compliance to cl. 1.29.1 – Transducer Protection		

Table-2: List of Tests on RTU/SIC

Test Nos.	DESCRIPTION OF THE TEST	Type test	Routine test	Field test
	FUNCTIONAL TESTS FOR RTU/SIC			
1.	Check for BOQ, Technical details, Construction & Wiring as per RTU/FRTU/SIC drawings	√	√	√
2.	Check for RTU database & configuration settings	√	√	√
3.	Check the operation of all Analog inputs, Status input & Control output points of RTU/SIC	√	√	√
4.	Check operation of all communication ports of RTU/FRTU	√	√	√
5.	Check for communication with master stations or master station simulator for RTU/ FRTU	√	√	√
6.	Test for downloading of RTU database from Master station	√		
7.	Test for RTU time synchronization from Master	√		√
8.	Test Power Supply Voltage Margin, Ripple Levels and Short Circuit Protection	√		
9.	Test for RTU operation with DC power supply voltage variation	√		
10.	Check for auto restoration of RTU on DC power recovery after its failure	√	√	√
11.	Test for RTU/ FRTU diagnostic feature	√		
12.	Test for RTU SOE feature	√		
13.	RTU Analog accuracy test for analog input	√		
14.	Transducer accuracy test	√	√	
15.	Test for IEC 60870-5 -104, 61850 & Modbus protocol implemented	√		
16.	Test for RTU internal Clock stability	√		
17.	Test for RTU Noise level measurement	√		
18.	Test for Control Security and Safety for Control outputs	√		
19.	Other functional tests as per technical specification requirements	√		
20.	End to end test (between RTU/ FRTU & Master station) for all I/O points			√
	EMI/EMC IMMUNITY TESTS FOR RTU/ FRTU			
21.	Surge Immunity Test as per IEC 60870-2-1	√		
22.	Electrical Fast Transient Burst Test as per IEC-60870-2-1	√		
23.	Damped Oscillatory Wave Test as per IEC 60870-2-1	√		
24.	Electrostatic Discharge test as per	√		
25.	Radiated Electromagnetic Field Test as per IEC 60870-2-1	√		
26.	Damped Oscillatory magnetic Field Test as per IEC-60870-2-1	√		
27.	Power Frequency magnetic Field Test as per IEC-60870-2-1	√		
	INSULATION TEST FOR RTU/ FRTU			
28.	Power frequency voltage withstand Test as per IEC 60870-2-1	√		
29.	1.2/50 µs Impulse voltage withstand Test as per IEC 60870-2-1	√		
30.	Insulation resistance test	√		
	ENVIRONMENTAL TEST FOR RTU/ FRTU			
31.	Dry heat test as per IEC60068-2-2 / 2-3	√		
32.	Damp heat test as per IEC60068-2-78	√		
33.	Cold Test as per IEC60068-2-1	√		

Note: Test levels for above type tests are elaborated in Table 3

Table-3: RTU Type Test Requirements

Test Nos.	Test Name	EUT Status	Test Level	Power Supply Points		I/O Points	Passing Criteria
				CM	DM	CM	
1	Surge Immunity Test	ON	Level 3	2 kV	1 kV	2 kV	A
2	Electrical Fast Transient Burst Test	ON	Level 3	2 KV	-	1 kV	A
3	Damped Oscillatory Wave Test	ON	Level 3	2.5 kV	1 kV	2.5 kV	A
4	Electrostatic Discharge Test	ON	Level 3	+/- 6 kV in Contact discharge mode or +/- 8 kV in Air discharge mode			A
5	Radiated Electromagnetic Field Test	ON	Level 3	10 V/m electric field strength			A
6	Damped Oscillatory Magnetic Field Test	ON	Level 3	30 A/m at 1MHz of magnetic field strength			A
7	Power frequency magnetic field	ON	Level 3	30 A/m of magnetic field strength (Continuous duration sine wave)			A
8	Power frequency voltage withstand	OFF	-	1 KVrms for 1 minute			No break down or flashover shall occur
9	1.2/50µs impulse voltage withstand	OFF	-	2 kVp			No break down or flashover shall occur
11	Insulation Resistance Test	OFF	-	Measure Insulation resistance using 500 V DC Megger before & after Power Freq& Impulse voltage withstand tests			As per manufacturer standard
12	Dry heat test	ON	-	Continuous operation at 55^0 C for 16 hrs			0
13	Damp heat test	ON	-	at 95% RH and 40^0 C for 16 hrs			0
14	Cold test	ON	-	Continuous operation at 0^0 C for 96 hrs			0

Note:-

1. EUT - Equipment Under Test
2. CM - Common Mode; DM - Differential mode
3. I/O pints do not include Communication ports
4. Passing Criteria
   0 - no failure: normal performance within the specified limits
   A : minor failure : temporary degradation or loss of function or performance which is self-recoverable
5. Functional test as per the sl. nos. 1-18 of Table-2 shall also be done during type testing.

1.34 Annual Maintenance Works

The entire delivered system shall be under Warranty for a period of three (03) years and under Service-AMC for subsequent seven (07) years. The Contractor will be responsible for attending faults, equipment failures, replacement of faulty parts and RTU configuration during the warranty period.
During the Warranty period as well as AMC period, it may be required that due to change in communication media or bay addition/modifications at site, Owner may need to change the RTU configurations. Hence, the modifications in RTU Configurations as well as RTU Database modifications during the entire Warranty and AMC period shall be under scope of Contractor.

Contractor shall maintain sufficient spares to comply with the Warranty and AMC requirements. In case the spares of Owner are used, then same shall be replaced with new spares by Contractor at its own cost.

Date: _____ **Signature: _____**

Name: _____

(Authorized Representative)

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Government of India Enterprise)

केन्द्रीय कार्यालय : 61, आई एफ सी आई टावर, 8 एवं 9वीं मंजिल, नेहरु प्लेस, नई दिल्ली -110019
Corporate Office : 61, IFCI Tower, 8 & 9th Floor, Nehru Place, New Delhi - 110019
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococc@posoco.in, Tel.: 011-40234672

संदर्भ : POSOCO/NLDC/Primary Response/137 **दिनांक:** 12th Nov 2021

सेवा मे,

The Secretary
Central Electricity Regulatory Commission
3rd & 4th Floor, Chanderlok Building,
36, Janpath, New Delhi- 110001

विषय : **Regarding:** ***Testing of primary frequency response of generators as per IEGC clause 5.2(g)***

संदर्भ:

1. Indian Electricity Grid Code (Fifth Amendment) Regulations, 2017 dated 12th April 2017
2. POSOCO Communication dated 12th Oct 2018 to Hon'ble Commission about modus-operandi for carrying out testing of generators
3. POSOCO Communication dated 15th May 2021 to Hon'ble Commission about allocation of generating units to testing agencies (enclosed as Annexe-1 for perusal)

महोदय,

The Hon'ble Central Electricity Regulatory Commission (CERC), vide notification dated 12th April 2017, had notified Indian Electricity Grid Code (Fifth Amendment) Regulations, 2017. As per this notification the following proviso was added at the end of Regulation 5.2 (g) of Part 5 of the Principal Indian Electricity Grid Code (IEGC) Regulations:

"***Provided that periodic checkups by third party should be conducted at regular interval once in two years through independent agencies selected by RLDCs or SLDCs as the case may be. The cost of such tests shall be recovered by the RLDCs or SLDCs from the Generators. If deemed necessary by RLDCs/SLDCs, the test may be conducted more than once in two years.***"

In compliance of the regulation mentioned above, POSOCO identified two agencies (M/s Solvina India Pvt. Ltd. and M/s Siemens Ltd.) for carrying out onsite testing. The generating plant owners are required to place Work Orders to the testing agencies for carrying out primary response testing. The brief summary of Testing allocation alongwith status is given in Table-1 below.

पंजीकृत कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली - 110016
Registered Office : First Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016

Testing Agency	Generating Units allocated	No. of units for which Work Order placed as on date	No. of units for which Onsite Testing Completed as on date
M/s Solvina India Pvt. Ltd.	200	173	107
M/s Siemens Ltd	40	40	10

Table-1: Summary of onsite testing

As indicated in Table above, the testing agencies in coordination with RPCs/RLDCs/Generation plant owners have completed testing on 117 no. of generating units out of allocated 240 no. of generating units. The detailed summary of testing by two agencies as on date 12th Nov 2021 is enclosed as Annexe-2. The onsite testing of generating units is followed by preliminary report, final report and model validation. The test reports indicate that primary response from generating units during tests are broadly satisfactory in nature. The onsite testing has also helped in validating the Turbine-Governor model of generating units. The onsite testing has helped in improved understanding of primary frequency response across the stakeholders. The overall effect has been regular improvement in primary response at regional as well as all India level. The sample plots as captured during onsite testing of generating units are enclosed as Annexe-3.

The onsite testing is progressing well and all efforts are being taken by testing agencies in coordination with RLDCs/RPCs/Generating plant owners to complete the process. However few generating plants (total 27 number of units) which were allocated to testing agencies, are yet to place Work Order. The matter is being taken up with such generation plants and regular reminders are being issued by RLDCs/NLDC. The list of generating units which are yet to place Work Order to the testing agencies is available in Annexe-2.

This is for the kind information to Hon'ble Commission and further directions in this regard.

सधन्यवाद

भवदीय,

(देबाशिस दे)

कार्यपालक निदेशक-रा.भा.प्रे.कें.

संलग्न: उपरोक्तानुसार

प्रतिलिपि:

1. Member Secretary, NRPC/WRPC/SRPC/ERPC/NERPC: with a request to advise generation plants to schedule the testing as per procedure
2. Executive Director, SRLDC
3. Chief General Manager (I/c), NRLDC, ERLDC, WRLDC, NERLDC
4. Member, GO&D, CEA, New Delhi
5. Chief Engineer, NPC, CEA

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)
केन्द्रीय कार्यालय : 61, आई एफ सी आई टावर, 7,8 एवं 9वीं मंजिल, नेहरु प्लेस, नई दिल्ली -110019
Corporate Office : 61, IFCI Tower, 7,8 & 9th Floor, Nehru Place, New Delhi- 110019
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococc@posoco.in, Tel.: 011- 40234672

Ref: POSOCO/NLDC/Primary Response/ **Date:** 15th May 2020

To,
Secretary
Central Electricity Regulatory Commission
3rd & 4th Floor, Chanderlok Building,
36, Janpath, New Delhi- 110001

Sub: Testing of primary frequency response of generators as per IEGC clause 5.2(g)

Reference:

1. Indian Electricity Grid Code (Fifth Amendment) Regulations, 2017 dated 12th April 2017 .
2. POSOCO Communication dated 12th Oct 2018

Dear Sir,

The Hon'ble Central Electricity Regulatory Commission (CERC), vide notification dated 12th April 2017, had notified Indian Electricity Grid Code (Fifth Amendment) Regulations, 2017. As per this notification the following proviso is added at the end of Regulation 5.2 (g) of Part 5 of the Principal Indian Electricity Grid Code (IEGC) Regulations:

"***Provided that periodic checkups by third party should be conducted at regular interval once in two years through independent agencies selected by RLDCs or SLDCs as the case may be. The cost of such tests shall be recovered by the RLDCs or SLDCs from the Generators. If deemed necessary by RLDCs/SLDCs, the test may be conducted more than once in two years.***"

In compliance of the regulation mentioned above, POSOCO formulated a procedure to carry out the testing of primary response, the details of which were informed to Hon'ble Commission vide POSOCO communication dated 12th Oct 2018. The copy of communication is enclosed as Annexe-1. POSOCO completed bidding process to identify independent agencies and price per unit to carry out testing. The selected testing agencies have been allocated generating units as identified by POSOCO. The number of generating units allocated to testing agencies is also based on capability to carry out testing in a year which was declared by respective agency during initial stage of bidding process. The following

पंजीकृत कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली - 110016
Registered Office : First Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016

two agencies have been identified through tendering process and allocated generating units to carry out testing and generators have been informed accordingly by POSOCO:

S.No.	Testing Agency	Capability to carry out testing in two years	Intimation to Allocated Generator on
1	M/s Siemens Ltd.	40	22nd Apr 2020
2	M/s Solvina India Pvt. Ltd.	200	13th May 2020

The copy of communication informing generators in this regard is enclosed as Annexe-2 & Annexe-3 respectively. In line with the procedure mentioned at Annexe-1, the generators have been requested to directly place award to allotted testing agency at identified discovered price per unit. This is for kind information for the Hon'ble Commission and further directions, if any, in this regard.

Thanking you,

Yours faithfully,

(Debasis De)
Executive Director-NLDC

Encl.: As above

Copy to:

1. Member Secretary, NRPC/WRPC/SRPC/ERPC/NERPC
2. Executive Director, NRLDC/WRLDC/SRLDC/ERLDC/NERLDC
3. Chief Engineer, NPC, CEA

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)

पंजीकृत एवं केन्द्रीय कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110016
Registered & Corporate Office : Ist Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococc@posoco.in, Tel.: 011- 41035696, Fax : 011- 26536901

संदर्भ.सं.: POSOCO/NLDC/Primary Response/ दिनांक: 12th Oct 2018

सेवा में,

सचिव,
केन्द्रीय विद्युत विनियामक आयोग,
तीसरा तथा चौथा तल,
चंद्रलोक भवन, 36 जनपथ,
नई दिल्ली-110001

विषय: Regarding: ***Testing of primary frequency response of generators as per IEGC clause 5.2(g)***

संदर्भ: Indian Electricity Grid Code (Fifth Amendment) Regulations, 2017 dated 12th April 2017

Dear Sir,

The Hon'ble Commission, vide notification dated 12th April 2017, had notified Indian Electricity Grid Code (Fifth Amendment) Regulations, 2017. As per this notification "The following proviso shall be added at the end of Regulation 5.2 (g) of Part 5 of the Principal Regulations:
"*Provided that periodic checkups by third party should be conducted at regular interval once in two years through independent agencies selected by RLDCs or SLDCs as the case may be. The cost of such tests shall be recovered by the RLDCs or SLDCs from the Generators. If deemed necessary by RLDCs/SLDCs, the test may be conducted more than once in two years.*"

In compliance to the regulation mentioned above, National Load Despatch Centre (NLDC) on behalf of RLDCs has formulated a procedure for carrying out the primary frequency response tests. The notice inviting Expression of Interest (EOI) from interested agencies was released in leading daily newspapers of 1st October 2018 and 3rd October 2018 edition of Indian Trade Journal (ITJ). The modus operandi for carrying out tests is enclosed at Annexure. As this is the first of its kind exercise in the country, it has taken some time. This is for kind information for the Hon'ble Commission and further directions, if any, in the matter.

सधन्यवाद

भवदीय
एस आर नरसिम्हन
(एस आर नरसिम्हन)
कार्यपालक निदेशक(रा.भा.प्रे.के.)

संलग्न: उपरोक्त अनुसार

प्रतिलिपि सूचनार्थ:

1. सदस्य-सचिव, उ./द./प./पू./उ.पू. क्षे.विद्युत समीति
2. कार्यपालक निदेशक, उ./द./प./पू./उ.पू. भा.प्रे.कें.
3. मुख्य अभियंता (एस-पी.सी.)

Modus –Operandi for carrying out testing of Generators

1. As per IEGC regulations, the tests are to be carried out by independent third party agencies to be selected by RLDCs or SLDCs and costs to be recovered by the RLDC or SLDCs from the generators. Selection of independent third party agencies separately by each RLDC would be duplication of effort. In order to have ease and uniformity in procurement, it was decided that NLDC on behalf of RLDCs would identify the parties for conducting the Primary frequency Response tests. SLDCs would either adopt the same set of parties identified by NLDC or have a separate process.

2. As per IEGC regulations, Primary frequency Response Test is required to be carried out on all generators once in two years. There are total 342 units which come under purview of RLDCs for primary frequency response and are to be tested in time period of two years. Considering that 2-3 days are required for testing on each unit, approx. 14 units are required to be tested in a month. There are few specialized agencies who can carry out Primary Response Tests. In view of the same it was decided that more than one agency is engaged to carry out the tests.

3. Shortlisted agencies who are eligible and qualified will be invited to submit price proposals. A meeting will be convened with shortlisted agencies for inputs for technical and commercial clauses for preparation of Price Proposal documents. After opening of price bids, other bidders would be offered to match the price of L1 bidder. All the bidders who match the price will also be considered along with L1 bidder for award of the contract. The price per unit will be valid for a period of 2 years after award and shall be fixed for the entire duration of contract.

4. It is to inform that at each plant, based on rating, vintage and type of generating unit would be tested. Further, based on the undertaking furnished by agency regarding time bound capability to test the generating units, the quantity of generators will be allocated by POSOCO for carrying out the tests. The testing will be conducted at site in presence of representative(s) of POSOCO.

5. As per IEGC code, costs for carrying out the tests are to be recovered by the RLDC or SLDCs from the generators. Pursuant to implementation of GST, modalities for placement of award were internally discussed. After discussion, it emerged that in GST regime, raising of invoice for testing by POSOCO and testing agencies have working implications. Further, POSOCO has no earmarked funds for making payments to testing agency (ies).In view of the same, it is proposed that Generators would pay the testing agency(ies) based on the rates and testing agency(ies) finalized by POSOCO.

6. After completion of this task the payment to the *agency* will be made by owner of generator, which will be done after approval of report on testing by POSOCO is done.

7. All miscellaneous expenses such as cost incurred on publishing EOI in the newspaper, printing, postal charges and filing etc. will be borne by POSOCO.

8. Copy of EOI documents is enclosed.

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)
केन्द्रीय कार्यालय : 61, आई एफ सी आई टावर, 7,8 एवं 9वीं मंजिल, नेहरु प्लेस, नई दिल्ली -110019
Corporate Office : 61, IFCI Tower, 7,8 & 9th Floor, Nehru Place, New Delhi- 110019
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococc@posoco.in, Tel.: 011- 40234672

Ref: POSOCO/NLDC/Primary Response/ **Date:** 22nd Apr 2020

To,

As per distribution list.

Sub: Regarding: ***Testing of primary frequency response of generators as per IEGC clause 5.2(g) and informing modus-operandi to generating unit owners where testing is planned***

Reference:

1. Indian Electricity Grid Code (Fifth Amendment) Regulations, 2017 dated 12th April 2017 .
2. POSOCO Communication dated 12th Oct 2018, dated 23rd May 2019, dated 26th Jun 2019 and dated 4th Oct 2019 on the subject.

Dear Sir/Ma'am,

The Hon'ble Central Electricity Regulatory Commission (CERC), vide notification dated 12th April 2017, had notified Indian Electricity Grid Code (Fifth Amendment) Regulations, 2017. As per this notification has added following proviso at the end of Regulation 5.2 (g) of Part 5 of the Principal Indian Electricity Grid Code (IEGC) Regulations:

"***Provided that periodic checkups by third party should be conducted at regular interval once in two years through independent agencies selected by RLDCs or SLDCs as the case may be. The cost of such tests shall be recovered by the RLDCs or SLDCs from the Generators. If deemed necessary by RLDCs/SLDCs, the test may be conducted more than once in two years.***"

In compliance of the regulation mentioned above, POSOCO has carried out necessary actions which were shared with all the generators from time to time. The developments in this regard are summarized below:

1. NLDC on behalf of RLDCs formulated a procedure in this regard and shared the details with generators vide letter dated 12th Oct 2018 from ED (NLDC)-POSOCO. In the letter, it was specifically mentioned that generators will directly place the

पंजीकृत कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली - 110016
Registered Office : First Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016

Letter of Award(LoA) on the identified/allocated agency as per rate finalized by POSOCO. The copy of letter is enclosed at *Annexe-1*.

2. The modus-operandi in this regard was also intimated to Hon'ble CERC vide ED (NLDC)-POSOCO letter dated 12th Oct 2018. The copy of the letter is enclosed at *Annexe-2*.
3. A meeting with all generators was organized at POSOCO-NRLDC on 6th Jun 2019 to discuss the important clauses of Request for Proposal (RfP) document for primary frequency testing. The meeting invitation was given to all generators by POSOCO and is enclosed as *Annexe-3*.
4. The meeting on 6th Jun 2019 was attended by representatives of generators. In the meeting various clauses of RfP draft were discussed. The Minutes of Meeting (MoM) was shared with all participants vide CGM (NLDC)-POSOCO letter dated 26th Jun 2019. The copy of communication is enclosed as *Annexe-4*.
5. The RfP was reviewed and shared with all the five agencies selected during EOI stage. The copy of RfP and EOI documents were also shared with all the generators. The generators were requested for cooperation while carrying out testing. The copy of communication dated 4th Oct 2019 from POSOCO is enclosed as *Annexe-5*.
6. Based on above, POSOCO has identified M/s Siemens Ltd as per bidding procedure and has accepted the offer of Siemens to test 40 number of generating units at a cost of *Rupees Three Lakh Thirty One Thousand* | excluding GST) per generating unit. The POSOCO letter to M/s Siemens Ltd in this regard and their acknowledgement is enclosed as *Annexe-6 & 7*. The other details of testing and facilities to be provided by the generating stations, would be as per RfP document. The generating units at the stations owned by your company have been selected for testing by M/s Siemens..
7. The Request for Proposal (RfP) document, Clause 26.2 of the document, Finalisation of Award mentions *"The Agency (ies) will coordinate with generating unit owners and award will be placed directly by generating unit on Agency(ies). The Agency's representative(s) who must have written power of attorney to sign a Contract on behalf of the Agency would be invited by the Generating Companies for signing the contract based on the price and the generators allotted. The Agency is expected to commence the assignment on the date and at the location agreed."*
8. M/s Siemens Ltd. has already been informed about the generating units allotted to them via meeting with POSOCO dated 18th Mar 2020. The copy of signed Minutes of Meeting (MoM) in this regard is enclosed as *Annexe-8*.

The general terms and condition of contract have been mentioned in Request for Proposal (RfP) document which shall be referred while finalization of award. The contact details of representatives of M/s Siemens Ltd. are given below:

S.No.	Name	Designation & Department	Email-id
1.	Sh. Puneet Goyal	GP-SD S CD-GTM	puneet.goyal@siemens.com
2.	Sh.Karthik Shivaprasad	Head- GP-SD S CD-GTM	shivaprasad.karthik@siemens.com

It is kindly requested to coordinate with testing agency as above to carry out the envisaged testing in time. After the contract, the final schedule of testing shall be coordinated with respective RLDC/RPC and NLDC. POSOCO assures all necessary help and support in this regard.

Thanking You

Yours faithfully,

(Debasis De)
Executive Director-NLDC

Encl.: As above

Copy to:

1. Member Secretary, NRPC/WRPC/SRPC/ERPC/NERPC
2. Executive Director, NRLDC/WRLDC/SRLDC/ERLDC/NERLDC
3. Sh. Puneet Goyal, GP-SD S CD-GTM, M/s Siemens Ltd.

7 Annexe-2(Letter togenerators alongwith list of units allocated)

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Siemens)

S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Others(specify)	Governor has provisions for accepting the frequency simulation signals(Y/N)
1	NR	NTPC Ltd	Rihand	1	500	Coal	BHEL	01.03.1988	EHG	YES
2	NR	NTPC Ltd	Rihand	3	500	Coal	BHEL	01.01.2005	EHG	YES
3	NR	NTPC Ltd	Rihand	4	500	Coal	BHEL	01.09.2005	EHG	YES
4	NR	NTPC Ltd	Rihand	6	500	Coal	BHEL	01.10.2013	EHG	YES
5	NR	NTPC Ltd	Koldam	1	200	Hydro	ALSTOM (France)	31.03.2015 (COD)	EHG	YES
6	NR	NTPC Ltd	Koldam	3	200	Hydro	M/s ALSTOM (France)	10.04.2015 (COD)	EHG	YES
7	NR	NTPC Ltd	Koldam	4	200	Hydro	M/s ALSTOM (France)	12.06.2015 (COD)	EHG	YES
8	NR	ADHP	AD Hydro	1	96	Hydro	BHEL	16-Sep-10	G-40, EHGC Max Dna software	YES
9	NR	ADHP	AD Hydro	2	96	Hydro	BHEL	18-Sep-10	G-40, EHGC Max Dna software	YES
10	NR	NHPC	Dhauliganga	1	70	Hydro	M/s GE Power India Limited (Formerly known as M/s Alstom Power India	Commissioned in 2006, recommissioned in 2014.	EHG	YES
11	NR	NHPC	Dhauliganga	3	70	Hydro			EHG	YES
12	NR	NHPC	Dhauliganga	4	70	Hydro			EHG	YES

Goyal Puneet

Digitally signed by Goyal Puneet
DN: cn=Goyal Puneet, o=Siemens, email=puneet.goyal@siemens.com
Date: 2020.04.16 09:45:39 +05'30'

Karthik Shivaprasad

Digitally signed by Karthik Shivaprasad
DN: cn=Karthik Shivaprasad, o=Siemens, email=shivaprasad.karthik@siemens.com
Date: 2020.04.16 09:35:17 +05'30'

Rahul Shukla

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Siemens)

S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Others(specify)	Governor has provisions for accepting the frequency simulation signals(Y/N)
13	NR	NHPC	Sewa-2	1	40	Hydro	BHEL	2010	EHG	YES
14	NR	NHPC	Sewa-2	2	40	Hydro	BHEL	2010	EHG	YES
15	WR	NTPC Ltd	Sipat-I	2	660	Coal	Electrosila		EHG	YES
16	WR	NTPC Ltd	Sipat-II	4	500	Coal	Electrosila		EHG	YES
17	WR	NTPC Ltd	Solapur	1	660	Coal	ALSTOM	2018	EHG	YES
18	WR	NSPCL	NSPCL	1	250	Coal	BHEL	2009	EHG	YES
19	WR	NSPCL	NSPCL	2	250	Coal	BHEL	2009	EHG	YES
20	WR	Jaypee	JP-Nigrie	1	660	Coal	MITSUBISHI ELECTRIC	2011	DEH	YES
21	WR	Jaypee	JP-Nigrie	2	660	Coal	MITSUBISHI ELECTRIC	2011	DEH	YES
22	WR	Reliance Energy	Sasan_UMPP	1	660	Coal	Shanghai Electric Company	2013	EHG	YES
23	WR	Reliance Energy	Sasan_UMPP	2	660	Coal	Shanghai Electric Company	2013	EHG	YES
24	WR	Reliance Energy	Sasan_UMPP	6	660	Coal	Shanghai Electric Company	2013	EHG	YES

Goyal Puneet
Digitally signed by Goyal Puneet
DN: cn=Goyal Puneet, o=Siemens, email=puneet.goyal@siemens.com
Date: 2020.04.16 09:45:54 +05'30'

Karthik Shivaprasad
Digitally signed by Karthik Shivaprasad
DN: cn=Karthik Shivaprasad, o=Siemens, email=shivaprasad.karthik@siemens.com
Date: 2020.04.16 09:35:44 +05'30'

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Siemens)

S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Others(specify)	Governor has provisions for accepting the frequency simulation signals(Y/N)
25	SR	NTPC Ltd	SIMHADRI TPS STAGE 1	1	500	Coal	BHEL	2002	EHG	YES
26	SR	NTPC Ltd	SIMHADRI TPS STAGE 1	2	500	Coal	BHEL	2003	EHG	YES
27	SR	NTPC Ltd	SIMHADRI TPS STAGE 2	1	500	Coal	BHEL	2011	EHG	YES
28	SR	NTPC Ltd	SIMHADRI TPS STAGE 2	2	500	Coal	BHEL	2012	EHG	YES
29	SR	Coastal Energen Pvt. Ltd, Tuticorin.	COASTAL	1	600	Coal	HARBIN ELECTRIC MACHINERY COMPANY LTD	23.12.2014	EHG	YES
30	SR	Coastal Energen Pvt. Ltd, Tuticorin.	COASTAL	2	600	Coal	HARBIN ELECTRIC MACHINERY COMPANY LTD	15.01.2016	EHG	YES

Goyal Puneet
Digitally signed by Goyal Puneet
DN: cn=Goyal Puneet, o=Siemens, email=puneet.goyal@siemens.com
Date: 2020.04.16 09:46:06 +05'30'

Karthik Shivaprasad
Digitally signed by Karthik Shivaprasad
DN: cn=Karthik Shivaprasad, o=Siemens, email=shivaprasad.karthik@siemens.com
Date: 2020.04.16 09:36:03 +05'30'

Rahul Shukla

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Siemens)

S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Others(specify)	Governor has provisions for accepting the frequency simulation signals(Y/N)
31	ER	Maithon Power Limited	Maithon RB	1	525	Coal	BHEL	2011	EHG	YES
32	ER	Maithon Power Limited	Maithon RB	2	525	Coal	BHEL	2012	EHG	YES
33	ER	GMR Kamalanga Energy Ltd.	GMR	1	350	Coal	DONGFANG	2013	EHG	YES
34	ER	GMR Kamalanga Energy Ltd.	GMR	2	350	Coal	DONGFANG	2013	EHG	YES
35	ER	Jindal India Thermal Power Limited	JITPL	1	600	Coal	BHEL	2015	EHG	YES
36	ER	Jindal India Thermal Power Limited	JITPL	2	600	Coal	BHEL	2015	EHG	YES
37	NER	NEEPCO	Doyang	1	25	HYDEL	BHEL	8-Jul-00	EHG	YES
38	NER	NEEPCO	Doyang	2	25	HYDEL	BHEL	5-Jul-00	EHG	YES
39	NER	OTPCL	Palatana	GT-I	232.39	GAS	BHEL	2010	EHG	YES
40	NER	OTPCL	Palatana	ST-I	130.91	GAS	BHEL	2010	EHG	YES

Goyal Puneet
Digitally signed by Goyal Puneet
DN: cn=Goyal Puneet, o=Siemens, email=puneet.goyal@siemens.com
Date: 2020.04.16 09:46:19 +05'30'

Karthik Shivaprasad
Digitally signed by Karthik Shivaprasad
DN: cn=Karthik Shivaprasad, o=Siemens, email=shivaprasad.karthik@siemens.com
Date: 2020.04.16 09:36:35 +05'30'

Rahul Shukla

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)
पंजीकृत एवं केन्द्रीय कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110016
Registered & Corporate Office : Ist Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococc@posoco.in,Tel.: 011- 41035696, Fax : 011- 26536901

Ref: POSOCO/NLDC/Primary Response/ **Date:** 13th May 2020

To,

As per distribution list.

Sub: Regarding: ***Testing of primary frequency response of generators as per IEGC clause 5.2(g) and informing modus-operandi to generating unit owners where testing is planned***

Reference:

1. Indian Electricity Grid Code (Fifth Amendment) Regulations, 2017 dated 12th April 2017 .
2. POSOCO Communication dated 12th Oct 2018, dated 23rd May 2019, dated 26th Jun 2019 and dated 4th Oct 2019 on the subject.

Dear Sir/Ma'am,

The Hon'ble Central Electricity Regulatory Commission (CERC), vide notification dated 12th April 2017, had notified Indian Electricity Grid Code (Fifth Amendment) Regulations, 2017. As per this notification, following proviso has been added at the end of Regulation 5.2 (g) of Part 5 of the Principal Indian Electricity Grid Code (IEGC) Regulations:
"***Provided that periodic checkups by third party should be conducted at regular interval once in two years through independent agencies selected by RLDCs or SLDCs as the case may be. The cost of such tests shall be recovered by the RLDCs or SLDCs from the Generators. If deemed necessary by RLDCs/SLDCs, the test may be conducted more than once in two years.***"

In compliance of the regulation mentioned above, POSOCO has carried out necessary actions which were shared with all the generators from time to time. The developments in this regard are summarized below:

1. NLDC on behalf of RLDCs formulated a procedure in this regard and shared the details with generators vide letter dated 12th Oct 2018 from ED (NLDC)-POSOCO. In the letter, it was specifically mentioned that generators will directly place the Letter of Award(LoA) on the identified/allocated agency as per rate finalized by POSOCO. The copy of letter is enclosed at *Annexe-1*.
2. The modus-operandi in this regard was also intimated to Hon'ble CERC vide ED (NLDC)-POSOCO letter dated 12th Oct 2018. The copy of the letter is enclosed at *Annexe-2*.
3. A meeting with all generators was organized at POSOCO-NRLDC on 6th Jun 2019 to discuss the important clauses of Request for Proposal (RfP) document for primary frequency testing. The meeting invitation was given to all generators by POSOCO and is enclosed as *Annexe-3*. The meeting was attended by representatives of generators. In the meeting various clauses of RfP draft were discussed. The Minutes of Meeting (MoM) was shared with all participants vide CGM (NLDC)-POSOCO letter dated 26th Jun 2019. The copy of communication is enclosed as *Annexe-4*.
4. The RfP was reviewed and shared with all the five agencies selected during EOI stage. The copy of RfP and EOI documents were also shared with all the generators. The generators were requested for cooperation while carrying out testing. The copy of communication dated 4th Oct 2019 from POSOCO is enclosed as *Annexe-5*.

5. Based on above, POSOCO has identified M/s Solvina India Pvt. Ltd.(Solvina) as per bidding procedure and has accepted the offer of Solvina to test 200 number of generating units at a cost of *Rupees Three Lakh Thirty One Thousand* (excluding GST) per generating unit. The POSOCO letter to M/s Solvina India Pvt. Ltd. in this regard and their acknowledgement is enclosed as *Annexe-6 & Annexe-7* respectively. The other details of testing and facilities to be provided by the generating stations, would be as per RfP document. The generating units at the stations owned by your company have been selected for testing by M/s Solvina India Pvt. Ltd.
6. The Request for Proposal (RfP) document, Clause 26.2 of the document, it is mentioned that *"The Agency (ies) will coordinate with generating unit owners and award will be placed directly by generating unit on Agency(ies). The Agency's representative(s) who must have written power of attorney to sign a Contract on behalf of the Agency would be invited by the Generating Companies for signing the contract based on the price and the generators allotted. The Agency is expected to commence the assignment on the date and at the location agreed."* Accordingly, Generating Agencies are to place award for the testing activity.
7. M/s Solvina India Pvt. Ltd. has already been informed about the generating units allotted to them via meeting with POSOCO dated 27th Apr 2020. The copy of signed Minutes of Meeting (MoM) in this regard is enclosed as *Annexe-8*.

   The general terms and condition of contract have been mentioned in Request for Proposal (RfP) document which shall be referred while finalization of award.

The contact details of representatives of M/s Solvina India Pvt. Ltd. are given below:

S.No.	Name	Contact No.(Mobile)	Email-id
1.	Mr. Mohammad Shahzad Alam	9910611184	shahzad.alam@solvina.com
2.	Mr. Deepesh Yadav	9873302435	Deepesh.Yadav@solvina.com
3.	Mr. Saurabh Bhargava	8010180398	saurabh.bhargava@solvina.com
4.	Mr. Jaidev Oza	9925846756	jaidev.oza@solvina.com

It is kindly requested to coordinate with testing agency as above to carry out the envisaged testing in time. After the contract, the final schedule of testing shall be coordinated with respective RLDC/RPC and NLDC. POSOCO assures all necessary help and support in this regard.

Thanking You,

Yours faithfully,

(Debasis De)
Executive Director-NLDC

Encl.: As above
Copy to:

1. Member Secretary, NRPC/WRPC/SRPC/ERPC/NERPC
2. Executive Director, NRLDC/WRLDC/SRLDC/ERLDC/NERLDC
3. Mr. Shahzad Alam, M/s Solvina India Pvt. Ltd.

List of generating units allocated to M/s Solvina India to test primary response

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Solvina)										
S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(FHG/Mechanical/Others(specify))	Governor has provisions for accepting the frequency simulation signals(Yes, No, Others-OEM required, NA-Data not available)
1	NR	NTPC Ltd	Singrauli	5	200	Coal	USZ (erstwhile)	01.02.1984	Mechanical (HYDRAULIC GOVERNOR)	NO
2	NR	NTPC Ltd	Singrauli	6	500	Coal	BHEL	01.12.1986	EHG	YES
3	NR	NTPC Ltd	Singrauli	7	500	Coal	BHEL	01.11.1987	EHG	YES
4	NR	NTPC Ltd	Dadri stg-I	1	210	Coal	BHEL	01.01.83	EHG	YES
5	NR	NTPC Ltd	Dadri stg-I	2	210	Coal	BHEL	01.02.84	EHG	YES
6	NR	NTPC Ltd	Dadri stg-I	3	210	Coal	BHEL	01.04.84	EHG	YES
7	NR	NTPC Ltd	Dadri stg-I	4	210	Coal	BHEL	01.12.95	EHG	YES
8	NR	NTPC Ltd	Dadri stg-2	1	490	Coal	BHEL	31.01.2010	EHG	YES
9	NR	NTPC Ltd	Unchahar	1	210	Coal	BHEL	01.11.1988	EHG	YES
10	NR	NTPC Ltd	Unchahar	3	210	Coal	BHEL	01.01.1999	EHG	YES
11	NR	NTPC Ltd	Unchahar	4	210	Coal	BHEL	01.10.1999	EHG	YES
12	NR	NTPC Ltd	Unchahar	5	210	Coal	BHEL	01.09.2006	EHG	YES
13	NR	NTPC Ltd	Unchahar stg-4	1	500	Coal	BHEL	01.02.2017	EHG	YES
14	NR	NTPC Ltd	Dadri GPS	1	130.19	Gas	SIEMENS	01.05.92	EHG	YES
15	NR	NTPC Ltd	Dadri GPS	2	130.19	Gas	SIEMENS	01.06.92	EHG	YES
16	NR	NTPC Ltd	Dadri GPS	4	130.19	Gas	SIEMENS	01.11.95	EHG	YES
17	NR	NTPC Ltd	Anta	1	88.71	Gas	ABB	1989	EHG	YES
18	NR	NTPC Ltd	Anta	2	88.71	Gas	ABB	1989	EHG	YES
19	NR	NTPC Ltd	Anta	4	153.2	Gas	ABB	1990	EHG	YES
20	NR	NTPC Ltd	Auraiya	1	111.19	Gas	MHI (Japan)	1989	EHG	YES
21	NR	NTPC Ltd	Auraiya	2	111.19	Gas	MHI (Japan)	1989	EHG	YES
22	NR	NTPC Ltd	Auraiya	4	111.19	Gas	MHI (Japan)	1989	EHG	YES
23	NR	APCPL	Jhajjar	1	500	Coal	BHEL	05-03-2011	EHG & HG	YES
24	NR	APCPL	Jhajjar	2	500	Coal	BHEL	21-06-2012	EHG & HG	Yes

FOR SOLVINA : Deepesh

DEEPESH YADAV

Rahul Shukla

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Solvina)

S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Others(specify))	Governor has provisions for accepting the frequency simulation signals(Yes, No, Others-OEM required, NA-Data not available)
25	NR	APCPL	Jhajjar	3	500	Coal	BHEL	26-04-2013	EHG & HG	YES
26	NR	NHPC	Chamera-I	1	180	Hydro	M/s GE Power India Limited (formerly known as M/s Alstom Power India Limited)	2004	EHG	YES
27	NR	NHPC	Chamera-I	3	180	Hydro	M/s GE Power India Limited (formerly known as M/s Alstom Power India Limited)	2005	EHG	YES
28	NR	NHPC	Chamera-3	1	77	Hydro	M/s GE Power India Limited (Formerly known as M/s Alstom Power India Limited)	2012	T-ALG (Turbine Speed Load)	OTHERS
29	NR	NHPC	Nimmugarh	2	110	Hydro	BHEL	24.08.18(COD)	EHG	YES
30	NR	SJVNL	Nathpa-Jhakri	1	250	Hydro	Andritz hydro Pvt. Ltd.	18.05.2004	EHG	YES
31	NR	SJVNL	Nathpa-Jhakri	2	250	Hydro	Andritz hydro Pvt. Ltd.	06.05.2004	EHG	YES
32	NR	SJVNL	Nathpa-Jhakri	4	250	Hydro	Andritz hydro Pvt. Ltd.	30.03.2004	EHG	YES
33	NR	SJVNL	Nathpa-Jhakri	5	250	Hydro	Andritz hydro Pvt. Ltd.	06.10.2003	EHG	YES
34	NR	SJVNL	Nathpa-Jhakri	6	250	Hydro	Andritz hydro Pvt. Ltd.	02.01.2004	EHG	YES
35	NR	SJVNL	Rampur	4	68.67	Hydro	BHEL	'18.06.2014	EHG	NA
36	NR	SJVNL	Rampur	5	68.67	Hydro	BHEL	13.09.2014	EHG	NA
37	NR	SJVNL	Rampur	6	68.67	Hydro	BHEL	16.12.2014	EHG	NA
38	NR	JSW	Karcham	1	250	Hydro	ANDRITZ HYDRO PRIVATE LIMITED	2011	EHG	YES
39	NR	JSW	Karcham	3	250	Hydro	ANDRITZ HYDRO PRIVATE LIMITED	2011	EHG	YES
40	NR	JSW	Karcham	4	250	Hydro	ANDRITZ HYDRO PRIVATE LIMITED	2011	EHG	YES
41	NR	THDC	Tehri	1	250	Hydro	LENINGRADSKY METALLICHESKY ZAVOD (LMZ) ST. PETERSBERG,	2001	EHG	YES
42	NR	THDC	Tehri	2	250	Hydro	LENINGRADSKY METALLICHESKY ZAVOD (LMZ) ST. PETERSBERG,	2001	EHG	YES
43	NR	THDC	Tehri	3	250	Hydro	LENINGRADSKY METALLICHESKY ZAVOD (LMZ) ST. PETERSBERG, RUSSIA	2001	EHG	YES
44	NR	THDC	Tehri	4	250	Hydro	LENINGRADSKY METALLICHESKY ZAVOD (LMZ) ST. PETERSBERG,	2001	EHG	YES
45	NR	THDC	Koteshwar	1	100	Hydro	BHEL	01.04.2011	EHGC	YES
46	NR	THDC	Koteshwar	3	100	Hydro	BHEL	13.02.2012	EHGC	YES
47	NR	THDC	Koteshwar	4	100	Hydro	BHEL	01.04.2012	EHGC	YES
48	NR	Everest Power	Malana-2	1	50	Hydro	TIANJIN DESIGN & RESEARCH INSTITUTE OF ELECTRIC DRIVE	COD :12-Jul-2012	Step motor with PLC as controller	YES

FOR SOLVINA : Deepesh

Rahul Shukla

DEEPESH YADAV

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Solvina)										
S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Others(specify)	Governor has provisions for accepting the frequency simulation signals(Yes, No, Others-OEM required, NA-Data not available)
49	NR	Everest Power	Malana-2	2	50	Hydro	TIANJIN DESIGN & RESEARCH INSTITUTE OF ELECTRIC DRIVE TIANJIN, CHINA	COD :12-Jul-2012	Step motor with PLC as controller	YES
50	NR	BBMB	Bhakra (L)	2	126	Hydro	BHEL	1961	G-40 (EHG)	Yes
51	NR	BBMB	Bhakra (L)	4	126	Hydro	BHEL	1961	G-40 (EHG)	YES
52	NR	BBMB	Bhakra (L)	5	126	Hydro	BHEL	1961	G-40 (EHG)	Yes
53	NR	BBMB	Bhakra (H)	1	157	Hydro	Lening Rudsky Metallichesky Zavod Russia	1966	GPF-LN3-108-M	YES
54	NR	BBMB	Bhakra (H)	2	157	Hydro	Lening Rudsky Metallichesky Zavod Russia	1966	GPF-LN3-108-M	YES
55	NR	BBMB	Bhakra (H)	3	157	Hydro	Lening Rudsky Metallichesky Zavod Russia	1967	GPF-LN3-108-M	Yes
56	NR	BBMB	Bhakra (H)	4	157	Hydro	Lening Rudsky Metallichesky Zavod Russia	1967	GPF-LN3-108-M	Yes
57	NR	BBMB	Dehar	1	165	Hydro	M/s Andritz Hydro (Model no. AK 1703)	01.11.1977	Digital Microgovernor based Governor	YES
58	NR	BBMB	Dehar	5	165	Hydro	M/s Andritz Hydro (Model no. AK 1703)	01.03.1980	Digital Microgovernor based Governor	YES
59	NR	BBMB	Dehar	6	165	Hydro	M/s Andritz Hydro (Model no. AK 1703)	01.11.1983	Digital Microgovernor based Governor	YES
60	NR	BBMB	Pong	1	66	Hydro	M/s Andritz Hydro Pvt. Ltd.	2018	Digital Governor	YES
61	NR	BBMB	Pong	5	66	Hydro	M/s Andritz Hydro Pvt. Ltd.	2019	Digital Governor	YES
62	NR	BBMB	Pong	6	66	Hydro	M/s Andritz Hydro Pvt. Ltd.	2018	Digital Governor	YES
63	WR	NTPC Ltd	Korba STPS	1	200	Coal	BHEL	1984	EHG	YES
64	WR	NTPC Ltd	Korba STPS	2	200	Coal	BHEL	1984	EHG	Yes
65	WR	NTPC Ltd	Korba STPS	3	500	Coal	BHEL	1984	EHG	Yes
66	WR	NTPC Ltd	Korba STPS	4	500	Coal	BHEL	1988	EHG	YES
67	WR	NTPC Ltd	Korba STPS	5	500	Coal	BHEL	1989	EHG	Yes
68	WR	NTPC Ltd	Korba STPS	6	500	Coal	BHEL	1990	EHG	YES
69	WR	NTPC Ltd	Korba STPS	7	500	Coal	BHEL	2011	EHG	YES
70	WR	NTPC Ltd	Mouda	1	500	Coal	BHEL	2013	EHG	YES
71	WR	NTPC Ltd	Mouda	2	500	Coal	BHEL	2014	EHG	Yes
72	WR	NTPC Ltd	Mouda	3	660	Coal	SIEMENS	2017	EHG	YES

FOR SOLVINA: Deepesh

Rahul Shukla

DEEPESH YADAV

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Solvina)										
S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Others(specify))	Governor has provision for accepting the frequency simulation signals(Yes, No, Others-OEM required, NA-Data not available)
73	WR	NTPC Ltd	Mouda	4	660	Coal	BHEL	2017	EHG	YES
74	WR	NTPC Ltd	Vindhyachal-I	5	210	Coal	LMZ turbine		Mechanical (HYDRAULIC GOVERNOR)	NO
75	WR	NTPC Ltd	Vindhyachal-II	7	500	Coal	BHEL		EHG	YES
76	WR	NTPC Ltd	Vindhyachal-II	8	500	Coal	BHEL		EHG	YES
77	WR	NTPC Ltd	Vindhyachal-III	9	500	Coal	BHEL		EHG	YES
78	WR	NTPC Ltd	Vindhyachal-III	10	500	Coal	BHEL		EHG	YES
79	WR	NTPC Ltd	Vindhyachal-IV	11	500	Coal	BHEL		EHG	YES
80	WR	NTPC Ltd	Vindhyachal-IV	12	500	Coal	BHEL		EHG	YES
81	WR	NTPC Ltd	Vindhyachal-V	13	500	Coal	BHEL		EHG	YES
82	WR	NTPC Ltd	Gadarwara	1	800	Coal	BHEL	2016	EHG	YES
83	WR	NTPC Ltd	Lara	1	800	Coal				NA
84	WR	Balco	Balco	1	300	Coal	Dongfang Electrical Machinery			NA
85	WR	Balco	Balco	4	300	Coal	Dongfang Electrical Machinery			NA
86	WR	Tata Power	CGPL	10	830	Coal	Toshiba		DEHC TOSMAP-DS S8Tx	NO
87	WR	Tata Power	CGPL	40	830	Coal	Toshiba		DEHC TOSMAP-DS S8Tx	NO
88	WR	Tata Power	CGPL	50	830	Coal	Toshiba		DEHC TOSMAP-DS S8Tx	NO
89	WR	DB Power	DB Power Ltd.	1	600	Coal	BHEL	Nov-14	EHG/ Mechanical	YES
90	WR	DB Power	DB Power Ltd.	2	600	Coal	BHEL	Mar-16	EHG/ Mechanical	YES
91	WR	Dhariwal-Infra	Dhariwal	2	300	Coal	Shanghai Electric			NA
92	WR	GMR Warora (GWEL)	GMR Warora (GWEL)	1	300	Coal	Shanghai Electric		EHG	YES
93	WR	GMR Warora (GWEL)	GMR Warora (GWEL)	2	300	Coal	Shanghai Electric		EHG	YES
94	WR	Essar Power(Mahan)	Essar Power(Mahan)	1	600	Coal	Harbin Electric Co.	2006	EHG	NO
95	WR	Essar Power(Mahan)	Essar Power(Mahan)	2	600	Coal	Harbin Electric Co.	2017	EHG	NO
96	WR	GMR	GMR-CG	1	685	Coal	Doosan	2011	EHG	YES

FOR SOLVINA: [signature]
DEEPESH YADAV

Rahul Shukla

Annexure-3(Letter to generators alongwith list of units allocated to Solvina)

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Solvina)										
S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Others(specify)	Governor has provisions for accepting the frequency simulation signals(Yes, No, Others-OEM required, NA-Data not available)
97	WR	GMR	GMR-CG	2	685	Coal	Dweem	2013	EHG	YES
98	WR	Jhabua Power Ltd.	Jhabua	1	600	Coal	BHEL	2016	EHG (Electro Hydraulic fitted up with Hydro-Mechanical)	YES
99	WR	Jindal Power	Jindal Stage-I	1	250	Coal	BHEL	2008	EHC	YES
100	WR	Jindal Power	Jindal Stage-I	3	250	Coal	BHEL	2009	EHC	YES
101	WR	Jindal Power	Jindal Stage-I	4	250	Coal	BHEL	2009	EHC	YES
102	WR	Jindal Power	Jindal Stage-II	1	600	Coal	BHEL	2014	EHC	YES
103	WR	Jindal Power	Jindal Stage-II	4	600	Coal	BHEL	2016	EHC	YES
104	WR	KSK Mahanadi	KSK Mahanadi	1	600	Coal	Dongfang Electrical Machinery	2013	EHG	YES
105	WR	KSK Mahanadi	KSK Mahanadi	2	600	Coal	DongFang Electrical Machinery	2014	EHG	YES
106	WR	KSK Mahanadi	KSK Mahanadi	3	600	Coal	Dongfang Electrical Machinery	2017	EHG	YES
107	WR	KWPCL	KWPCL	1	600	Coal	BHEL			NA
108	WR	Lanco Amarkantak	Lanco	1	300	Coal	DEC CHINA	2010	EHG	YES
109	WR	Lanco Amarkantak	Lanco	2	300	Coal	DEC CHINA	2009	EHG	YES
110	WR	Hindustan Power Ltd	MB-Power	1	600	Coal	Harbin Electric			NA
111	WR	Hindustan Power Ltd	MB-Power	2	600	Coal	Harbin Electric			NA
112	WR	ACBIL	MCCPL	1	300	Coal	Beijing Beizhong Steam Turbine Generator Co. Ltd	2013	EHG	YES
113	WR	BKM	BKM	1	300	Coal	Berhin Electrical		EHG	YES
114	WR	BKM	BKM	3	300	Coal	Berhin Electrical		EHG	YES
115	WR	BKM	BKM	4	300	Coal	Berhin Electrical		EHG	YES
116	WR	SKS	SKS	1	300	Coal	HTC (HARBIN TURBINE COMPANY LTD)	2013	DEH	YES
117	WR	SKS	SKS	2	300	Coal	HTC (HARBIN TURBINE COMPANY LTD)	2013	DEH	YES
118	WR	TRN	TRN	1	300	Coal	Beijing Beizen		DEH (Digital Electro hydraulic)Governor	YES
119	WR	TRN	TRN	2	300	Coal	Beijing Beizen		DEH (Digital Electro hydraulic)Governor	YES
120	WR	DGEN	Torrent Power	1	400	Gas	Siemens	2015	EHG	NA

Rahul Shukla

FOR SOLVINA : Deepesh

DEEPESH YADAV

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Solvina)										
S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Others(specify))	Governor has provision for accepting the frequency simulation signals(Yes, No, Others-OEM required, NA-Data not available)
121	WR	RGPPL	Ratnagiri Phase III*	1	213	Gas	GE	1999	EHG	YES
122	WR	NCA	SSP CHPH (Hy)	1	80	Hydro	BHEL	04-10-2004	EHG	YES
123	WR	NCA	SSP CHPH (Hy)	4	50	Hydro	BHEL	03-09-2004	EHG	YES
124	WR	NCA	SSP CHPH (Hy)	5	50	Hydro	BHEL	15-12-2004	EHG	YES
125	WR	NCA	SSP RBPH (Hy)	1	200	Hydro	TOSHIBA	01-02-2005	EHG	YES
126	WR	NCA	SSP RBPH (Hy)	3	200	Hydro	TOSHIBA	07-03-2006	EHG	YES
127	WR	NCA	SSP RBPH (Hy)	6	200	Hydro	TOSHIBA	28-06-2006	EHG	YES
128	SR	NTPC	RAMAGUNDAM TPS	1	200	Coal	ANSALDO	1984	EHG	NO
129	SR	NTPC	RAMAGUNDAM TPS	4	500	Coal	BHEL	1988	EHG	YES
130	SR	NTPC	RAMAGUNDAM TPS	5	500	Coal	BHEL	1989	EHG	YES
131	SR	NTPC	RAMAGUNDAM TPS	6	500	Coal	BHEL	1991	EHG	YES
132	SR	NTPC	RAMAGUNDAM TPS	7	500	Coal	BHEL	2003	EHG	YES
133	SR	NTPC	TALCHER STAGE 2	1	500	Coal	BHEL	01-05-2003	EHG	YES
134	SR	NTPC	TALCHER STAGE 2	2	500	Coal	BHEL	01-03-2004	EHG	YES
135	SR	NTPC	TALCHER STAGE 2	3	500	Coal	BHEL	01-08-2005	EHG	YES
136	SR	NTPC	TALCHER STAGE 2	4	500	Coal	BHEL	01-08-2005	EHG	YES
137	SR	NTPC	NTPC KUDGI	1	800	Coal	TOSHIBA	31-07-2017	EHG	NO
138	SR	NTPC	NTPC KUDGI	3	800	Coal	TOSHIBA	15-09-2018	EHG	NO
139	SR	Simhcorp Energy India Limited (formerly Thermal Powertech Corporation India Limited, SPSR	Simhcorp Energy India Limited P1 (formerly Thermal Powertech Corporation India Limited,	1	660	Coal	Dong Fang,China	2016	Digital Electro Hydraulic	NA
140	SR	Simhcorp Energy India Limited (formerly Thermal Powertech Corporation India Limited, SPSR	Simhcorp Energy India Limited P1 (formerly Thermal Powertech Corporation India Limited,	2	660	Coal	Dong Fang,China	2015	Digital Electro Hydraulic	NA
141	SR	IL & FS Tamilnadu Power Company Ltd., Cuddalore.	ILAPS	1	600	Coal	DONGFANG ELECTRIC MACHINERY CO.LTD	2013	EHG	NO
142	SR	IL & FS Tamilnadu Power Company Ltd., Cuddalore.	ILATS	2	600	Coal	DONGFANG ELECTRIC MACHINERY CO.LTD	2014	EHG	NO
143	SR	Simhcorp Energy India Limited (Formerly Simhcorp Gayatri Power Ltd).	Simhcorp Energy India Limited P2 (Formerly Simhcorp Gayatri Power Ltd).	1	660	Coal	Harbin,China	2016	Digital Electro Hydraulic	NA

FOR SOLVINA : Neelesh

DEEPESH YADAV

Rahul Shukla

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Solvina)										
S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Other(specify))	Governor has provisions for accepting the frequency droop/dead band signals(Yes, No, Others-OEM required, NA-Data not available)
144	SR	Simhapuri Energy India Limited (Formerly Simhapuri Gayatri Power Ltd).	Simhapuri Energy India Limited #2 (Formerly Simhapuri Gayatri Power Ltd).	2	600	Coal	Harbin,China	2017	Digital Electro Hydraulic	NA
145	SR	NTPC Tamilnadu Energy Company Ltd, Chennai	VALLUR TPS	1	500	Coal	BHEL	2012	EHG	YES
146	SR	NTPC Tamilnadu Energy Company Ltd, Chennai	VALLUR TPS	3	500	Coal	BHEL	2015	EHG	YES
147	SR	NLC Tamilnadu Power Limited, Tuticorin	NTPL	1	500	Coal	BHEL	2015	EHG/ Mechanical	YES
148	SR	NLC Tamilnadu Power Limited, Tuticorin	NTPL	2	500	Coal	BHEL	2015	EHG/ Mechanical	YES
149	SR	NLC	NLC TPS II Stage II	4	210	Coal	BHEL	30-03-1991	EHG	NO
150	SR	NLC	NLC TPS I Expansion	1	210	Coal/Lignite	ANSALDO	2002	Digital EHG	YES
151	SR	NLC	NLC TPS I Expansion	2	210	Coal/Lignite	ANSALDO	2003	Digital EHG	YES
152	SR	NLC	NLC TPS II Expansion	1	250	Coal	BHEL	2015	EHG	NA
153	SR	NLC	NLC TPS II Expansion	2	250	Coal	BHEL	2015	EHG	NA
154	SR	NLC	New Neyveli Thermal Power Station	1	500	Coal	BHEL		EHG/ Mechanical	YES
155	ER	NTPC	Farakka	1	200	Coal	BHEL	1986	EHG	YES
156	ER	NTPC	Farakka	2	200	Coal	BHEL	1988	EHG	YES
157	ER	NTPC	Farakka	4	500	Coal	BHEL	1996	EHG	YES
158	ER	NTPC	Farakka	5	500	Coal	BHEL	1995	EHG	YES
159	ER	NTPC	Farakka	6	500	Coal	BHEL	2012	EHG	YES
160	ER	NTPC	Kahalgaon	1	210	Coal	LHZ turbine, control system R&M by M/s SIEMENS	1995	Mechanical/ HYDRAULIC GOVERNOR WITH A DROOP OF 4.5%	NO
161	ER	NTPC	Kahalgaon	3	500	Coal	BHEL	2008	EHG	YES
162	ER	NTPC	Kahalgaon	4	500	Coal	BHEL	2009	EHG	YES
163	ER	NTPC	Kahalgaon	7	500	Coal	BHEL	2010	EHG	YES
164	ER	NTPC	Darlipalli	1	800	Coal	TOSHIBA JSW POWER SYSTEMS PRIVATE LIMITED	2019	D-EHC (Digital Electro-Hydraulic Control	YES
165	ER	NTPC	TSTPP	1	500	Coal	ABB,Germany	1997	EHG	NO
166	ER	NTPC	TSTPP	2	500	Coal	ABB,Germany	1997	EHG	NO

FOR SOLVINA: Neelkanth
DEEPESH YADAV

Rahul Shukla

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Solvina)										
S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Other/specify)	Governor has provisions for accepting the frequency simulation signals(Yes, No, Others-OEM required, NA-Data not available)
167	ER	NTPC	Barh	4	660	Coal	M/s Siemens Germany	2014	EHG	NO
168	ER	NTPC	Barh	5	660	Coal	M/s BHEL/Siemens	2006	EHG	NO
169	ER	APNRL	Adhunik	1	270	Coal	BHEL	2013	Digital Governing System	NO
170	ER	APNRL	Adhunik	2	270	Coal	BHEL	2013	Digital Governing System	NO
171	ER	BRBCL	BRBCL	1	250	Coal	BHEL	2019	EHG	NO
171	ER	BRBCL	BRBCL	2	250	Coal	BHEL	2017	EHG	NO
173	ER	NPGC	NPGC	1	660	Coal	GE Power India	2019	EHG	NO
174	ER	NHPC	Teesta V	1	170	Hydro	TOSHIBA, JAPAN	2000	EHG (with Microprocessor based regulator having P,I,D functions)	NO
175	ER	TUL	Teesta III	1	200	Hydro	Andritz Hydro	2017	Digital Governor with PID controller	YES
176	ER	TUL	Teesta III	2	200	Hydro	Andritz Hydro	2017	Digital Governor with PID controller	YES
177	ER	TUL	Teesta III	4	200	Hydro	Andritz Hydro	2017	Digital Governor with PID controller	YES
178	ER	TUL	Teesta III	5	200	Hydro	Andritz Hydro	2017	Digital Governor with PID controller	YES
179	ER	TUL	Teesta III	6	200	Hydro	Andritz Hydro	2017	Digital Governor with PID controller	YES
180	ER	Sikkim Kinetic	Dikchu	1	48	Hydro	ALSTOM -NEYRPIC T.SE.G	2017	EHG	NO
181	ER	Sikkim Kinetic	Dikchu	2	48	Hydro	ALSTOM -NEYRPIC T.SE.G	2017	EHG	NO
182	NER	NTPC	Bongaigaon TPP	1	250	Coal	BHEL	2018-11	EHG (DCS system for governor : MaxDNA (version 4.6.2)(	YES
183	NER	NTPC	Bongaigaon TPP	2	250	Coal	BHEL	2018-11	EHG (DCS system for governor : MaxDNA (version 4.6.2)(	YES
184	NER	NTPC	Bongaigaon TPP	3	250	Coal	BHEL	2018-13	EHG (DCS system for governor : MaxDNA (version 4.6.2)(	YES
185	NER	NEEPCO	Monarchak	GT	65.61	GAS	BHEL	Mar-15	SERVO CONTROL (ADVANCED FORM OF ELECTRO HYRAULIC)	YES
186	NER	NEEPCO	Monarchak	ST	35.58	GAS	BHEL	Jun-16	EHTC(ELECTRO HYRAULIC TURBINE CONTROL)	YES
187	NER	NEEPCO	Kopili St II	1	25	Hydro	BHEL	2004	EHC(Pro-Control-23 based EHGC	YES
188	NER	NEEPCO	Khandong	2	50	Hydro	BHEL	2014 (EHGC)	G-60 (EHC) & RG200/FG200 EHGC	YES
189	NER	NEEPCO	Ranganadi	1	135	Hydro	BHEL	2002	EHC G-60MAX DNA Based EHGC	YES
190	NER	NEEPCO	Ranganadi	2	135	Hydro	BHEL	2002	EHC-G-60/Max DNA Based EHGC	YES

Rahul Shukla

FOR SOLVINA : Deepesh

DEEPESH YADAV

Generating Machines under RLDC for testing Primary Frequency Response (Proposed allocation to Solvina)										
S.No.	Region	Name of Utility	Station	Generating Unit	Capacity (MW)	Fuel Type	OEM	Vintage	Governor Type(EHG/Mechanical/Others(specify))	Governor has provisions for accepting the frequency simulation signals(Yes, No, Others-OEM required, NA-Data not available)
191	NER	NEEPCO	Ranganadi	3	135	HYDEL	BHEL	2002	HMC C-48/MAX DNA Based EHGC	YES
192	NER	NEEPCO	Tuirial	1	30	Hydro	BHEL	2007	HMC, C-48/Max DNA Based EHGC	YES
193	NER	NEEPCO	Tuirial	2	30	Hydro	BHEL	2007	HMC C-48/MAX DNA Based EHGC	YES
194	NER	NEEPCO	Pare	1	55	Hydro	Andritz Hydro	2010	Andritz Hydro Make Digital Governor	YES
195	NER	NEEPCO	Pare	2	55	Hydro	Andritz Hydro	2010	Andritz Hydro Make Digital Governor	YES
196	NER	NHPC	Loktak	1	35	Hydro	LHZ	2010	EHG	YES
197	NER	NHPC	Loktak	2	35	Hydro	LHZ	30.06.2009	EHG	YES
198	NER	NHPC	Loktak	3	35	Hydro	LHZ	16.09.2009	EHG	YES
199	NER	OTPCL	Palatana	GT-01	233.29	GAS	BHEL	2010	EHG	YES
200	NER	OTPCL	Palatana	ST-01	130.91	GAS	BHEL	2010	EHG	YES

FOR SOLVINA : Nagesh
DEEPESH YADAV

Rahul Shukla

Summary of Status of Primary Response Testing of Units allocated to Solvina as on date 12th Nov 2021

Units where Onsite Testing completed	Units where Onsite Testing is scheduled	Units where work order is not received by Testing Agency
NHPC Chamera-1 (2-unit)	NTPC Anta (3-unit)	BBMB Bhakra (7-unit)
NHPC Chamera-3 (2-unit)	NTPC Unchahar (3/5-unit)	BBMB Dehar (3-unit)
THDC-Koteshwar (4-unit)	THDC-Tehri (4-unit)	BBMB Pong (3-unit)
JSW Karcham (4-unit)	Lanco Amarkantak (2-unit)	Hindustan Power (2-unit)
SJVNL Nathpa Jhakri (5-unit:)	GMR Warora (2-unit)	Essar Power (2-unit)
SJVNL Rampur (3-unit)	Balco (2+2E units)	RKM (3-unit)
Dadri Stg-1 & Stg-2 (5-unit)	NTPC-Mouda (4-unit)	SKS (2-unit)
NTPC Dadri GPS (3-unit)	Tata Power CGPL (3-unit)	TRN (2-unit)
NTPC Singrauli (3-unit)	NTPC Gadarwara (1-unit)	GMR CG, ADANI (2-unit)
APCPL Jhajjar (3-unit)	NTPC Lara (1-unit)	KWPCL, ADANI (1-unit)
NTPC Auraiya (3-unit)	Dhariwal-Infra (1-unit)	
NTPC Vindhyachal (8-unit)	DGEN Torrent Power (1-unit)	
RGPPL (1-unit)	Jindal Power (5-unit)	
Jhabua (1-unit)	NCA (6-unit)	
NTPC-Korba (7-unit)	DB Power (2-unit)	
NTPC- TECL VallurTPS (2-unit)	KSK Mahanadi (3-unit)	
NLC New Neyvelli TPS (1-unit)	ACBIL (1-unit)	
NLC TPS-I Expansion (2-unit:)	NLC TPS-II Expansion (2-unit)	
NLC TPS II Stage II (1-unit)	IL&FS ITPCL (2-unit)	

Summary of Status of Primary Response Testing of Units allocated to Solvina as on date 12th Nov 2021

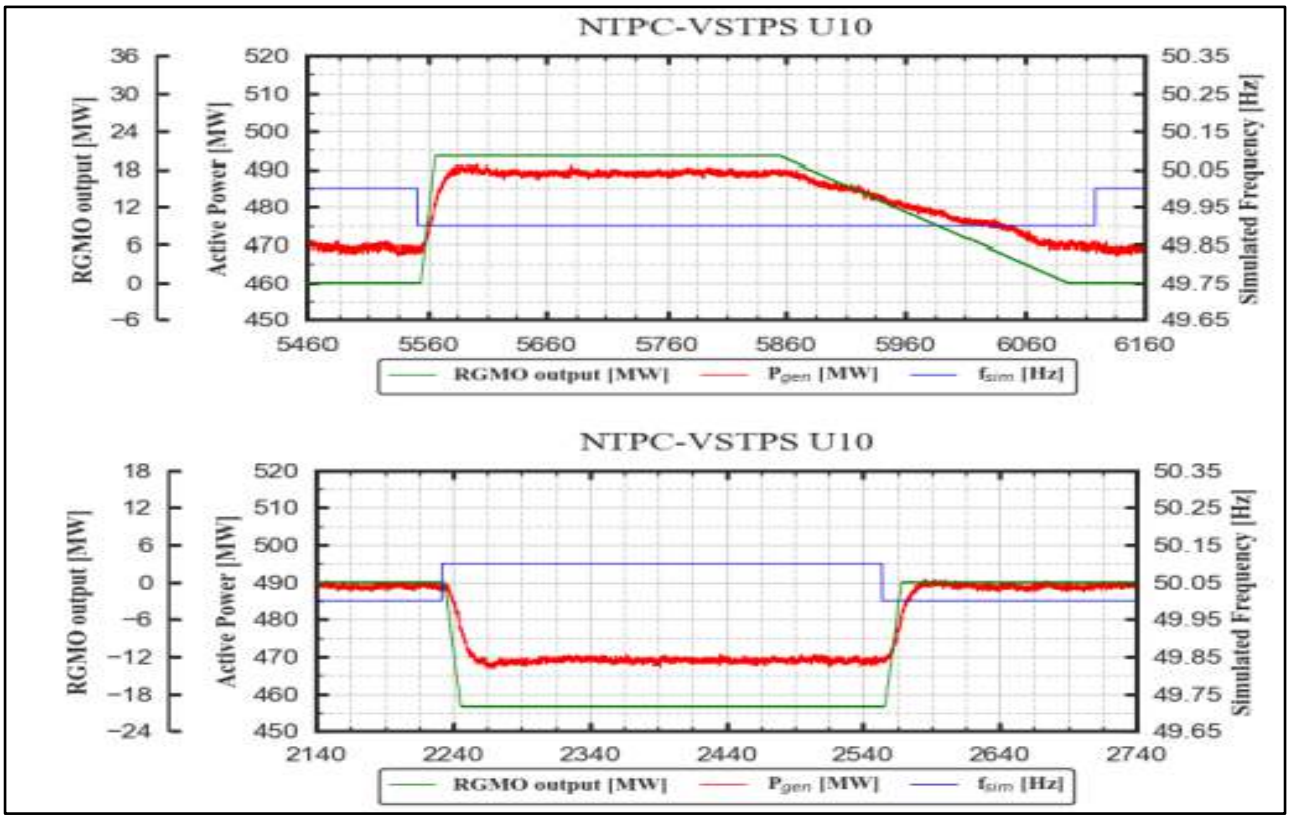
	Units where Onsite Testing completed	Units where Onsite Testing is scheduled	Units where work order is not received by Testing Agency
	NLC NTPL (2-unit)	NTPC- Kudgi (2-unit)	
	Sembcorp Energy (4-unit)	Sneha Kinetic (2-unit)	
	NHPC Teesta-V (1-unit)	NTPC-Barh (2-unit)	
	NTPC-Farakka (5-unit)	NTPC-Daripalli (1-unit)	
	TUL Teesta III (5+1E-unit)	[*PO with SR] NTPC Talchar (2-unit)	
	NTPC-Kahalgaon (4-unit)	NEEPCO-Monarchak (2-unit)	
	Adhunik (2-unit)	OTPCL Palatana (2-unit)	
	BRBCL (2-unit)	NEEPCO- Kopili (1 unit)	
	NPGCL (1-unit)		
	NEEPCO Pare (2-unit)		
	NEEPCO Ranganadi (3-unit)		
	NEEPCO-Khandong - (2 unit)		
	NHPC Loktak (3-unit)		
	NTPC Bongaigaon (3-unit)		
	NEEPCO Turial (2-unit)		
Total	**107**	**66**	**27**

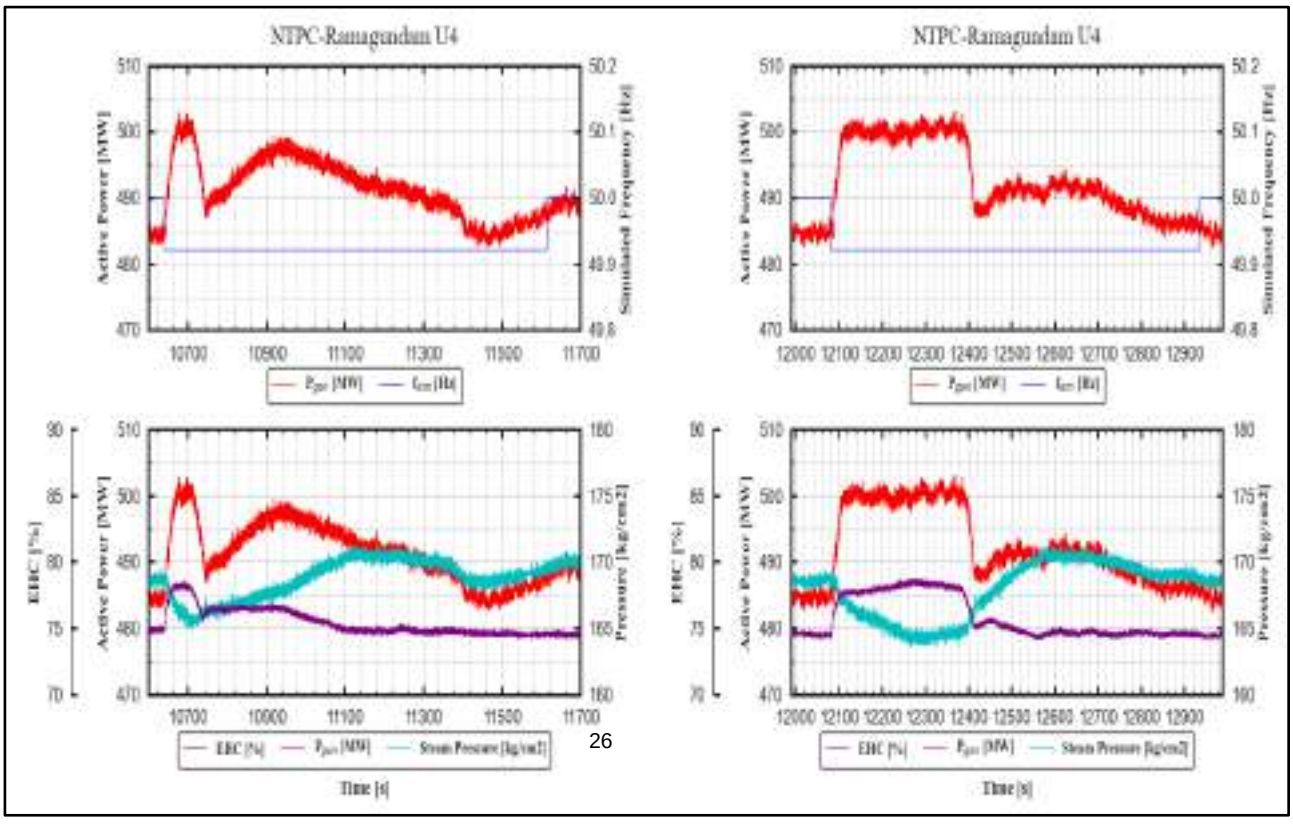
Summary of Status of Primary Response Testing of Units allocated to Siemens (All Work Orders placed) as on date 12th Nov 2021

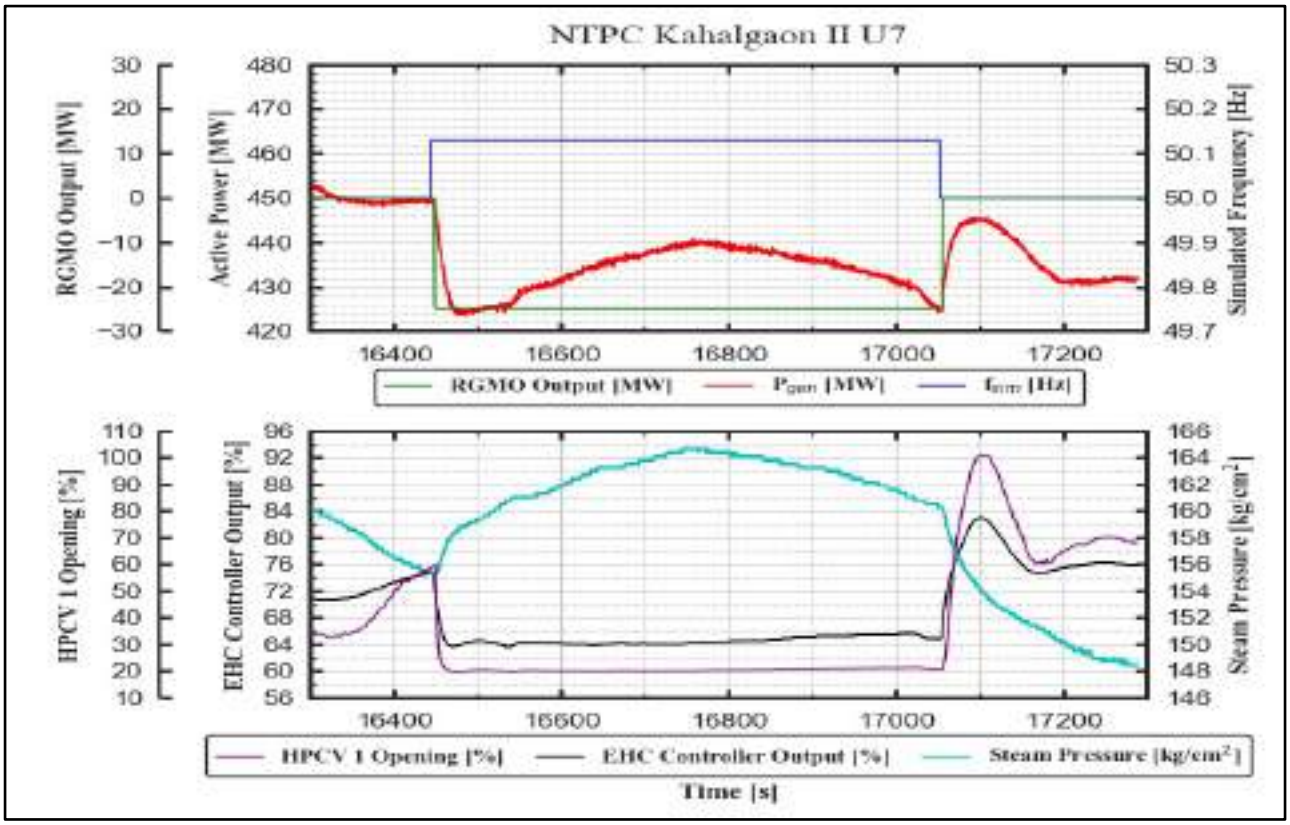
S.no.	Location	Unit Assigned	Unit Test Conducted
1	OPTCL Palatana 232.39+130.91 MW CCPP	UNIT-1	
2	NTPC Sipat 1X660 MW, 1X500 MW (Coal)	Unit-2,4	Unit-2,4
3	NSPCL 2X250 MW (Coal)	Unit-1,2	
4	Maithon Power Ltd. 2X525 MW (Coal)	UNIT-1,2	
5	GMR Kamalganga Energy Ltd. 2X350 MW (Coal)	UNIT-1,2	UNIT-1,2
6	JITPL 2X600 MW (Coal)	UNIT-1,2	
7	NEEPCO 2X25 MW (Hydro)	UNIT-1,2	
8	Costal Energen Pvt. Ltd., Tuticorin 2X500 MW (Coal)	UNIT-1,2	
9	NTPC Simhadri 4X500 MW (Coal)	Unit-1,2,3,4	Unit-3,4
10	Dhauliganga (NHPC) 3X70 MW (Hydro)	Unit-1,3,4	
11	SEWA – II (NHPC) 2X40 MW (Hydro)	Unit-1,2	
12	NTPC Rihand 4X500 MW (Coal)	UNIT-1,3,4,6	
13	NTPC Koldam 3X200 MW (Hydro)	UNIT-1,3,4	
14	ADHP 2X96 MW (Hydro)	Unit-1,2	Unit-1,2
15	NTPC Solapur 1X660 MW (Coal)	Unit-1	
16	JP-Nigrie 2X660 MW (Coal)	Unit-1,2	Unit-1,2
17	Reliance Energy Sasan_UMPP 3X660 MW (Coal)	Unit-1,2,6	
	Total	**40**	**10**

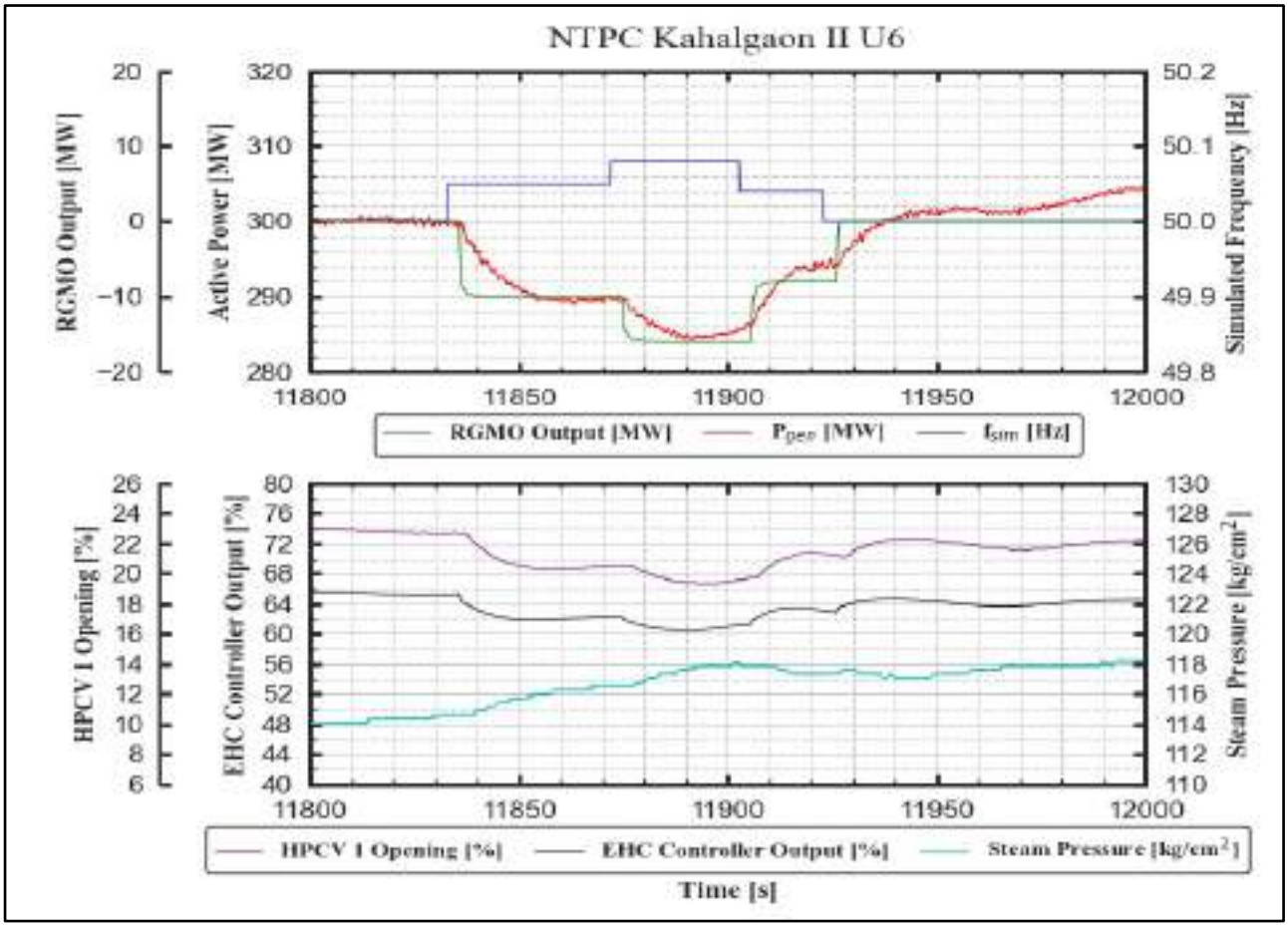
Annexe-3: 12th Nov 21

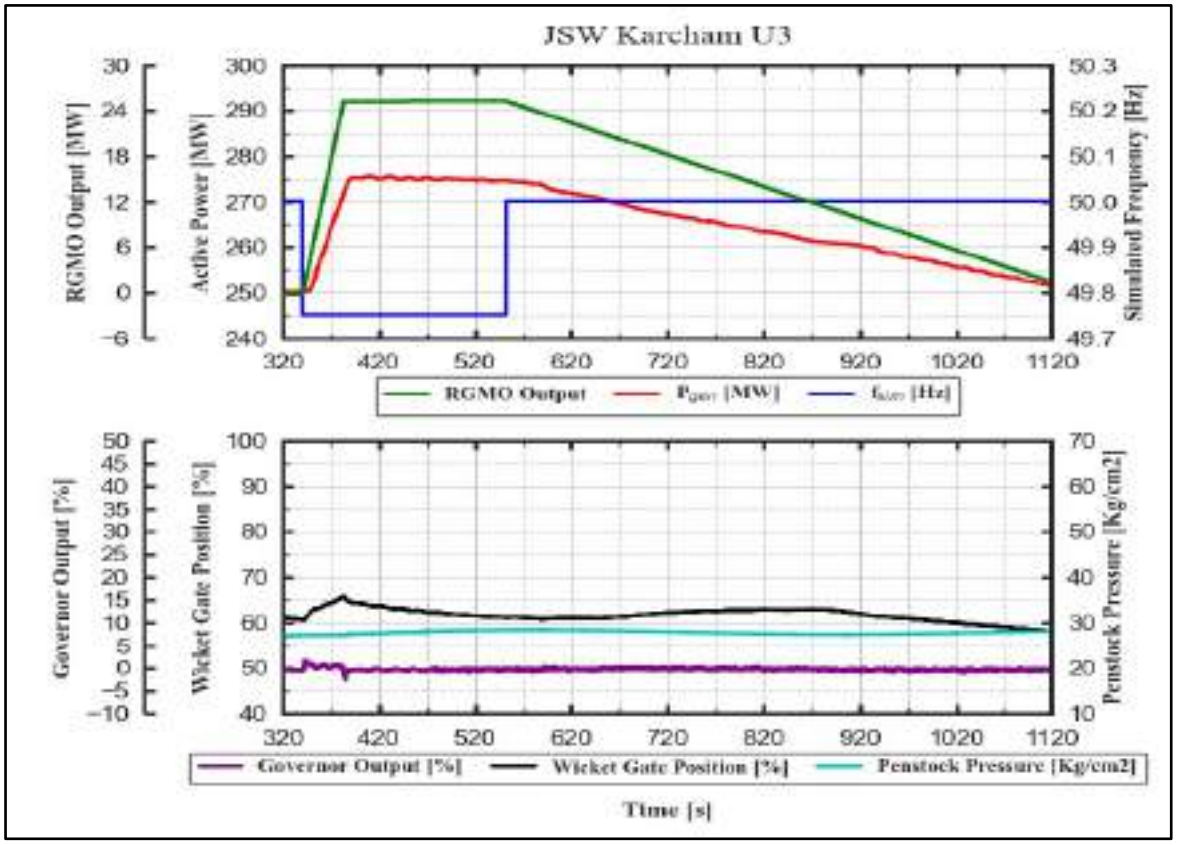
Sample Plots during onsite primary response testing of generating units

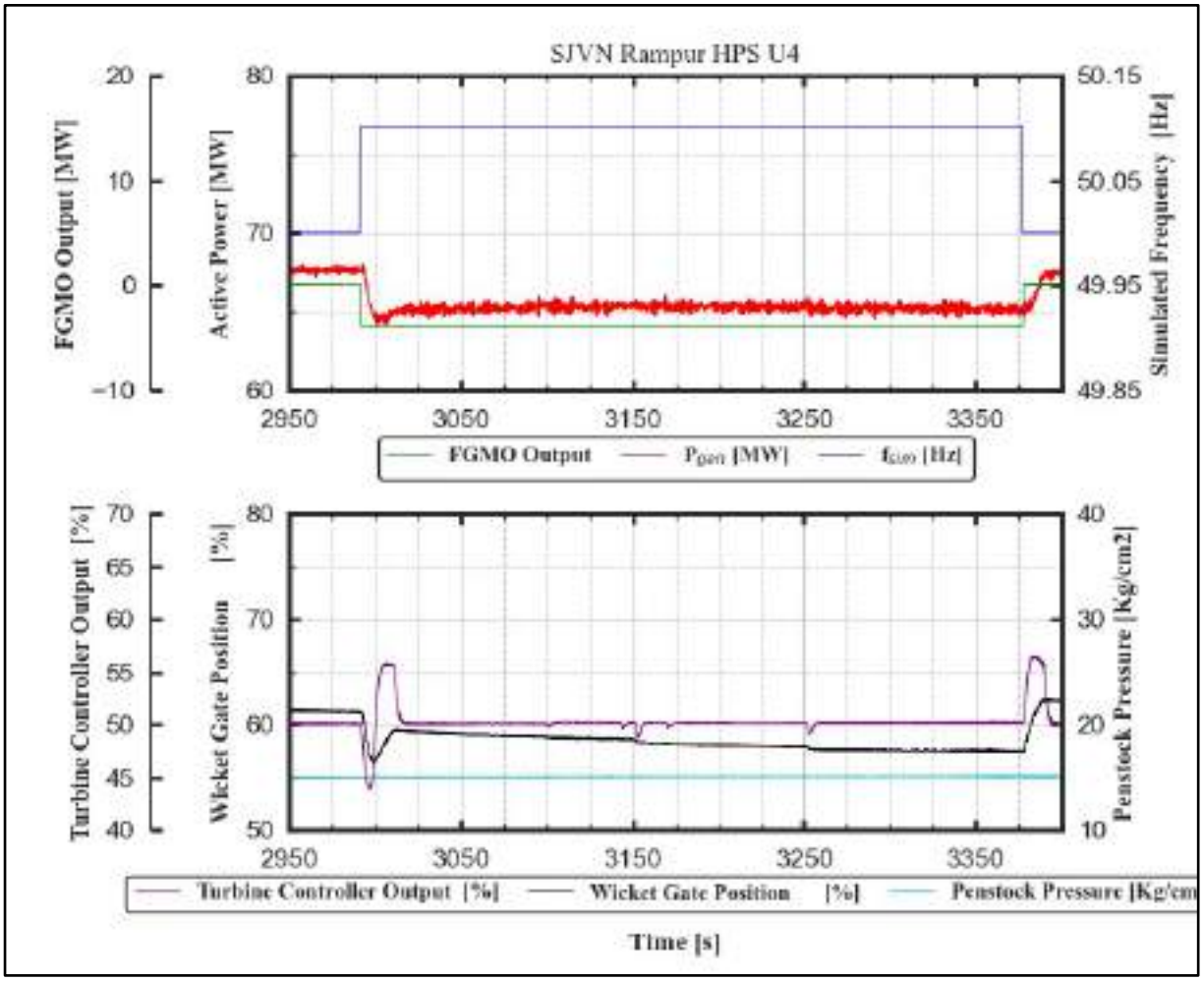





NTPC Kahalgaon II U7
RGMO Output [MW]
Active Power [MW]
Simulated Frequency [Hz]
RGMO Output [MW]
P_{gen} [MW]
f_{sim} [Hz]
HPCV 1 Opening [%]
EHC Controller Output [%]
Steam Pressure [kg/cm^2]
HPCV 1 Opening [%]
EHC Controller Output [%]
Steam Pressure [kg/cm^2]
Time [s]


NTPC Kahalgaon II U6
RGMO Output [MW]
Active Power [MW]
Simulated Frequency [Hz]
RGMO Output [MW]
P_{gen} [MW]
f_{sim} [Hz]
HPCV 1 Opening [%]
EHC Controller Output [%]
Steam Pressure [kg/cm^2]
HPCV 1 Opening [%]
EHC Controller Output [%]
Steam Pressure [kg/cm^2]
Time [s]


JSW Karcham U3
RGMO Output [MW]
Active Power [MW]
Simulated Frequency [Hz]
RGMO Output
Governor Output [%]
Wicket Gate Position [%]
Penstock Pressure [Kg/cm2]
Governor Output [%]
Wicket Gate Position [%]
Penstock Pressure [Kg/cm2]
Time [s]


SJVN Rampur HPS U4
FGMO Output [MW]
Active Power [MW]
Simulated Frequency [Hz]
FGMO Output
Turbine Controller Output [%]
Wicket Gate Position [%]
Penstock Pressure [Kg/cm2]
Turbine Controller Output [%]
Wicket Gate Position [%]
Time [s]

STATUS FOR CCMP, CII, CSK ALERT & COMPLIANCE OF CYBER SECURITY ADVIDORY

AS ON 11-NOVEMBER-2021

SN	Points of Action	Status of Action taken				Remarks
1	Status of CCMP Submission :	**CERT-IN Approval received by:**	**Approval by CERT-IN pending for:**	**Final CCMP submitted to CERT-GO by:**	**Final revised CCMP Submission pending for:**	Manipur SLDC shall submit soon. Arunachal Predesh & Tripura has not confirmed anything.
		Meghalaya & Nagaland SLDCs	Assam SLDC	Mizoram SLDC	Arunachal Pradesh, Manipur & Tripura SLDC	
2	Status of CII Notification of SLDCs:	**Final Submission to NCIIPC done by:**	**Part-II documents (after 1st Review) submission pending for:**	**Report Sent to NCIIPC but no communication received:**	**Submission pending for:**	Mizoram SLDC - documents are ready and shall be submitted shortly. Arunachal Pradesh no information regarding action taken.
		Assam, Meghalaya & Nagaland SLDCs	Manipur SLDC	Tripura SLDC	Mizoram & Arunachal Pradesh SLDCs	
3	CSK alerts and resolution:	**Being Resolved and No new alerts received for:**	**Alerts are being Received for:**			(i) Tripura SLDC has been informed about the increasing alerts and their status as reported in the Situation Awareness Report by CERT-IN. **Awareness Training to Arunachal Pradesh & Mizoram has been conducted online and again Awareness Training to Arunachal Pradeshis being planned physically at NERLDC.**
		Assam, Meghalaya, Nagaland, Mizoram & Manipur SLDCs	Tripura-SLDC			

STATUS FOR CCMP, CII, CSK ALERT & COMPLIANCE OF CYBER SECURITY ADVIDORY

AS ON 11-NOVEMBER-2021

4	**Compliance of cyber security advisories/alerts and providing its information on CERT-GO portal:**	Being provided in the Portal by all SLDCs except Arunachal Pradesh SLDC.				Arunachal Pradesh SLDC has approached NERLDC for providing them hands-on training regarding usage of the Portal and resolution of advisories for their IT & OT systems.
5 (i)	**VAPT of OT Systems:**	**Carried out once for FY-21-22:**	**Will do it again under SCADA AMC for 1st VAPT:**	**LOAs placed for 2nd VAPT:**	**Tender floated/ under approval for 2nd VAPT:**	For Nagaland SLDC Contract is approved but awarding is kept on hold due to funding issues. Arunachal Pradesh SLDC is yet to initiate proposal.
		Mizoram & Tripura SLDCs	All NER SLDCs	Manipur & Meghalaya SLDCs	Assam, Tripura, Mizoram SLDCs	
5 (ii)	**VAPT of IT Systems:**	**LOAs placed for 1st VAPT:**	**Tender floated/ under approval for 1st VAPT:**	**Contract approved but award on hold due to funding issueLOAs placed for 1st VAPT & 2nd VAPT for SCADA:**	**Not yet initiatated**	
		Manipur & Meghalaya SLDCs	Assam, Tripura, Mizoram SLDCs	Nagaland SLDC	Arunachal Pradesh SLDC	
6	**ISMS Implementation:**	**LOAs placed:**	**Tender Floated/ Evaluation:**	**Proposal under approval:**	**Proposal under process:**	
		Manipur & Meghalaya SLDCs	Assam SLDC	Tripura SLDC	Mizoram SLDC	

B.6 GPRS connectivity for Substations and Leased line for SLDC:

NERLDC request all the SLDCs using GPRS or other cellular communication technologies to submit the compliance report of GPRS technology as per the Communication Standards before 20th NETeST meeting.

Deliberation in the meeting

TSECL submitted to the forum that NERTS was implementing agency of the GPRS projects through M/s PMAS and hence the compliance report may be provided by NERTS itself.

NERTS informed that it will investigate and update the status to the forum in next NETeST meeting.

Requirement of Technical Standard for GPRS/Cellular communication system as per CEA

(1) Cellular communication may be used for data acquisition system, where feasibility of access to wideband network is not possible.
Reply: Cellular communication is being used for data acquisition system only.

(2) Cellular communication shall be adopted after ensuring the available signal level up to the required strength and dual or more Subscriber Identification Module (SIM) with different service provider with automatic changeover to ensure 99.5 per cent. link availability for interrupption free operation of the communication system.
Reply:The system support dual SIM cards of different service providers. (as mentioned in Annex-III TS cl. 15.0-P-6 of 12)

(3) Design shall be for satisfactory and continuous operation in open environment with operating temperature range of -10 deg. C to 55 deg. C and humidity up to 95 percent non condensing.
Reply: As per Annex-III (TS cl. 15(j & k)--P-7&8/12), Operating Temp of GPRS Modem: is -30 to 70degree C and humidity is 5 to 85%RH and for M2M gateway, OT is 0 to 50 degree C and humidity is 0 to 90%RH.

(4) Field interface shall be optical port / RS232 / RS485 / RJ45 IP or any other suitable port.
Reply: It has RS232/RS485/RJ45 IP port for interfacing as mentioned in Annex-III(TS cl. 15(j)-P7/12)

(5) Receiving device shall support International Electro-Technical Commission (IEC) - 60870 -5-101 and International Electro-Technical Commission (IEC) — 60870 -5- 104 protocol and Device Language Message Specification (DLMS) (IS15959/IEC 62056), Modbus for

interfacing.

Reply: Yes, the system support IEC60870-5-104, IEC60870-5-101, MODBUS for interfacing. It does support UDP, DNS, FTP, HTTP & IPsec, Security Standards.(As per Annex-III(TS cl. 15(j)-P-7/12),

(6) Receiving end shall have Multi Wide Area Network Virtual Private Network (WAN VPN) concentrator with built-in facility to manage at least 250 remote nodes for a fixed IP provided for control center.

Reply: The communication front end server provides secure VPN channel (Which support upto 250 locations in parallel) (As per Annex-III-TS cl. 15(k)-P-8/12)

(7) Receiving end shall have redundant Multi Wide Area Network Virtual Private Network (WAN VPN) Concentrator with a fail over — fall back feature for uninterrupted data communication.

Reply: The communication front end server has dual Power Supply and hard drives for redundant operation. (As per Annex-III-TS cl. 15(k)-P-8/12)

(8) Router shall be capable of handling Virtual Private Network (VPN) based security by assuming a fixed IP issued by the Multi Wide Area Network Virtual Private Network (WAN VPN) concentrator at the supervisory control and data acquisition (SCADA) end.

Reply: Yes, router is capable of handling VPN based security.(as mentioned in cyber security guideline of GPRS modem/Artic gateway/Router--Point no-5.3.2-P-20/21)

(9) Device shall have the capability of data encryption with Triple Data Encryption Standard (3-DES) or Advanced Encryption Standard (AES) 128 or latest to ensure secured communication network over broadband, 2G or 2.5G or 3G or 4G or 5G or latest.

Reply: Device has RAS security based on Certificates-2048 Bit and SHA-2 security algorithm (as mentioned in cyber security guideline of GPRS modem/Arctic gateway/Router-point no. 5.3.3-P-21)

(10) Device shall have capability to decide and act according to the best available link in redundant mode configuration with automatic switch over.

Reply: The device supports dual SIM of different service providers. Both the SIM network can be used as main and redundant path. It also supports automatic switch over.

(11) Quality of service (QoS) and bandwidth management shall be planned to get optimal bandwidth usage.

Reply: SIM card compatible with GPRS/EDGE/3G/LTE network is used to enhance quality of service and Internet lease line having static IP is being used in M2M gateway to Ethernet over wireless networks and integrate with remote locations wireless modem and Mobile operator independent static IP addressing for connected wireless modems enabling two-way communication.

(12) Centralised monitoring at control centre shall be available.

Reply: Centralized monitoring of all devices through Control center is available.

(13) Receiving device shall have Internet Protocol Security (lPsec), Point-to-Point Tunneling Protocol (PPTP), and Layer 2 Tunneling Protocol Virtual Private Network (L2TP VPN) support

up to eight concurrent tunnels with max 70 Mbps throughput.

Reply: The system support TCP/UDP tunneling protocol(Open VPN), L2TP VPN tunneling, IPsec, L2TP Security Standards.(As per Annex-III(TS cl. 15(j)P-7/12 and as mentioned in M2M gateway manual Point no. 5.3/5.4-, P-22-24/69),

(14) Communication equipment or modem shall comply with Ingress Protection (IP) rating suitable for the installation condition as agreed between the user and provider.

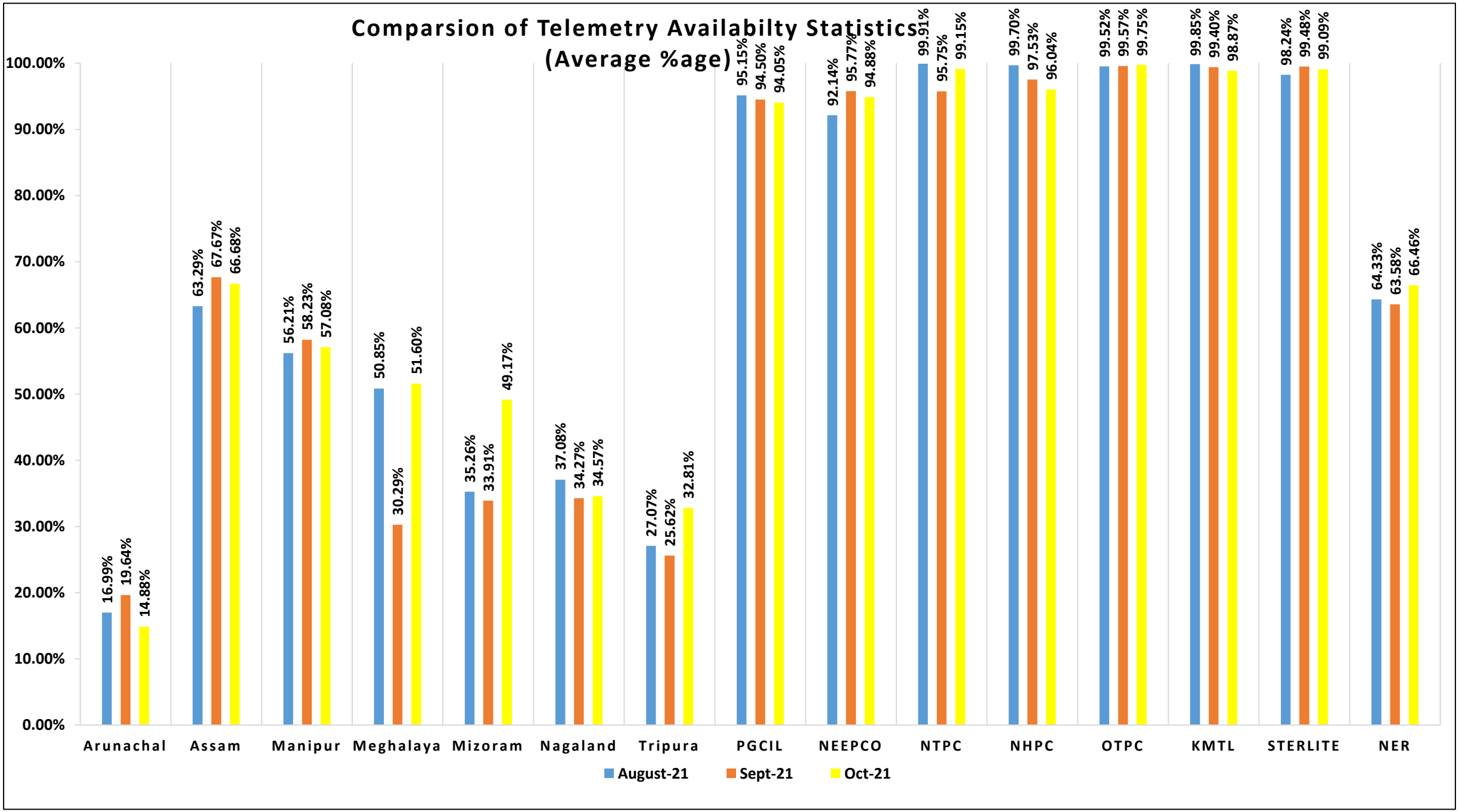
Reply: The system has IP rating of IP30 (as mentioned in GPRS modem/Arctic gateway manual, under table no. 4 of Technical Data-Page-12 of 20)

(15) The relevant standards and code of practice of cellular communication as specified in the Bureau of Indian Standards (BIS), the International Electro-Technical Commission (IEC), the European Standards (EN), the European Telecommunications Standards Institute (ETSI) and the International Special Committee on Radio Interference (CISPER) shall be followed.

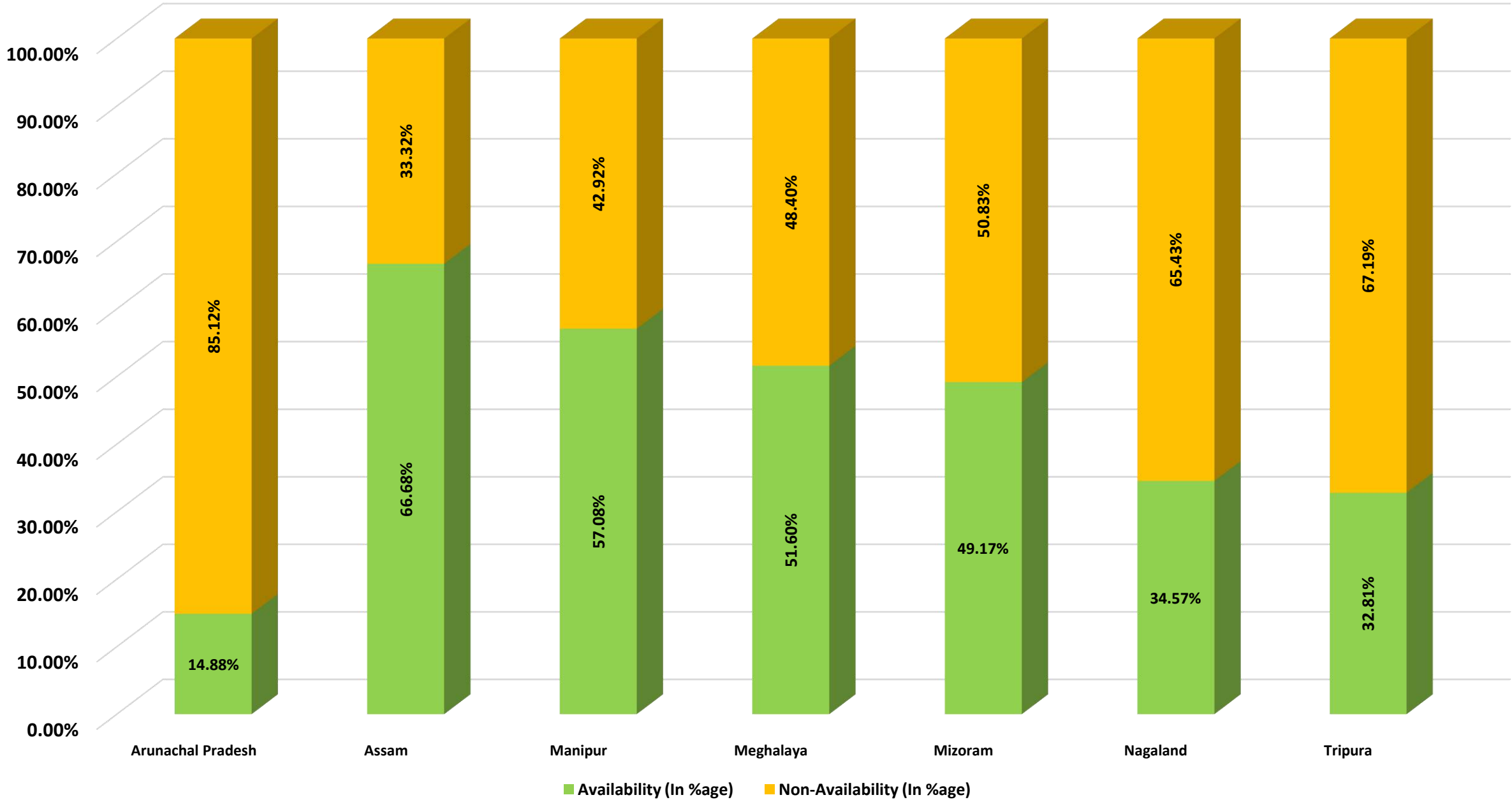
Reply: EN and CISPER standards followed (as mentioned in Arctic gateway manual, under table no. 11 of Technical data P-15 of 20)

Telemetry Statistics for the Month of October 2021

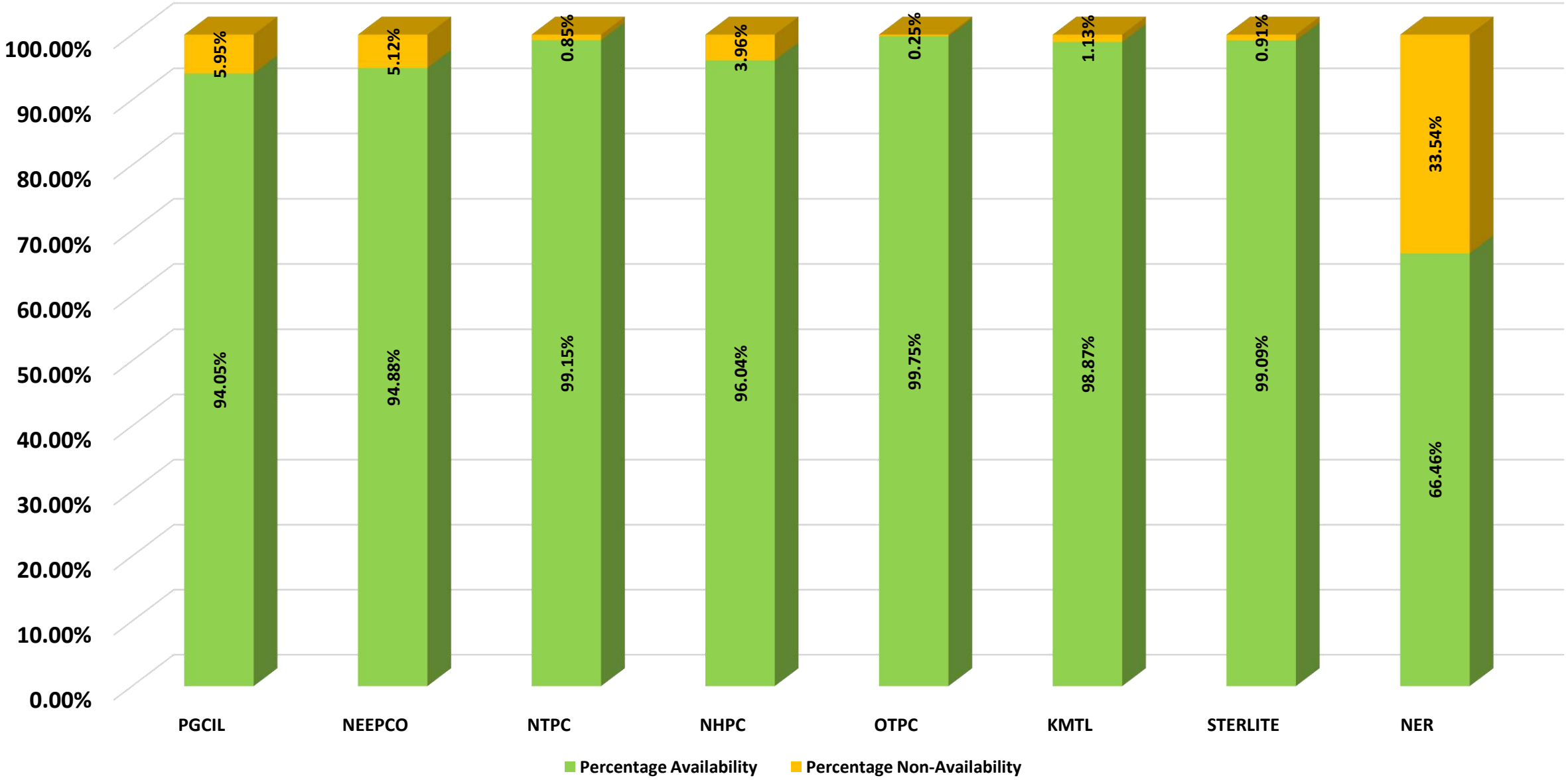
Sl. No.	Utility	Average Analog Percentage	Average Digital Percentage	Average Total Percentage	Average availability of RTUs (%age)	Instantaneous Maximum of Total percentage
1	PGCIL	93.64	94.25	94.05	94	98.5
2	NEEPCO	89.16	98.56	94.88	93	96.09
3	NTPC	99.16	99.15	99.15	99	100
4	NHPC	95.98	96.08	96.04	96	100
5	OTPC	99.71	99.76	99.75	100	100
6	KMTL	98.90	98.85	98.87	99	100
7	IndiGrid	98.11	99.51	99.09	100	100
8	Arunachal Pradesh	20.53	11.31	14.88	27	21.81
9	Assam	70.85	64.00	66.68	81	72.16
10	Manipur	60.70	55.03	57.08	73	63.93
11	Meghalaya	71.00	36.94	51.60	73	59.39
12	Mizoram	51.97	46.86	49.17	76	52.17
13	Nagaland	27.63	39.96	34.57	24	36.88
14	Tripura	39.26	28.16	32.81	45	41.65
	NER	68.54	65.19	66.46	70	69.75

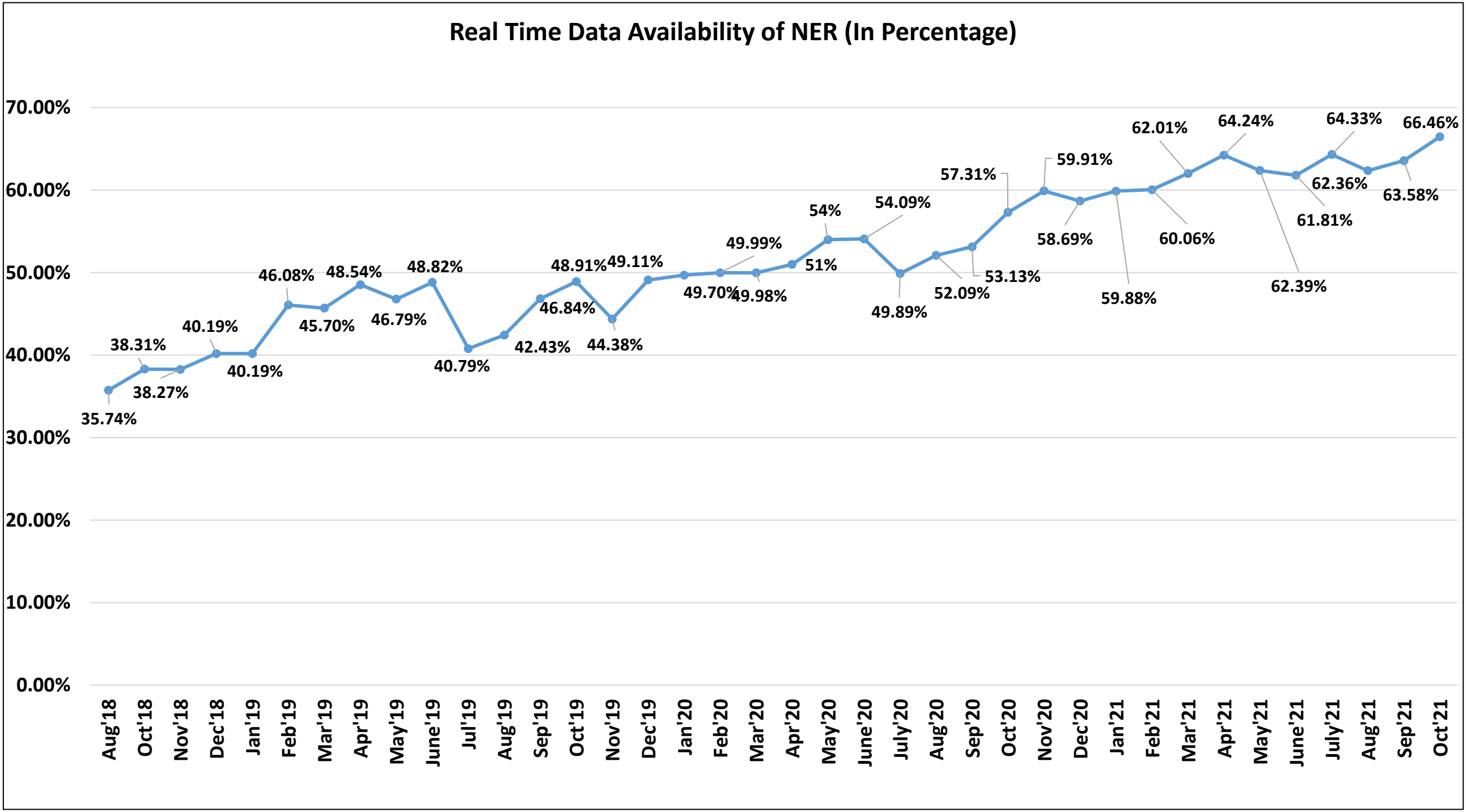

Comparsion of Telemetry Availabilty Statistics
(Average %age)
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
16.99%
19.64%
14.88%
63.29%
67.67%
66.68%
56.21%
58.23%
57.08%
50.85%
30.29%
51.60%
35.26%
33.91%
49.17%
37.08%
34.27%
34.57%
27.07%
25.62%
32.81%
95.15%
94.50%
94.05%
92.14%
95.77%
94.88%
99.91%
95.75%
99.15%
99.70%
97.53%
96.04%
99.52%
99.57%
99.75%
99.85%
99.40%
98.87%
98.24%
99.48%
99.09%
64.33%
63.58%
66.46%
Arunachal
Assam
Manipur
Meghalaya
Mizoram
Nagaland
Tripura
PGCIL
NEEPCO
NTPC
NHPC
OTPC
KMTL
STERLITE
NER
August-21
Sept-21
Oct-21

Telemetry Statistics for NER States (Average availability of data for the Month of October'21)

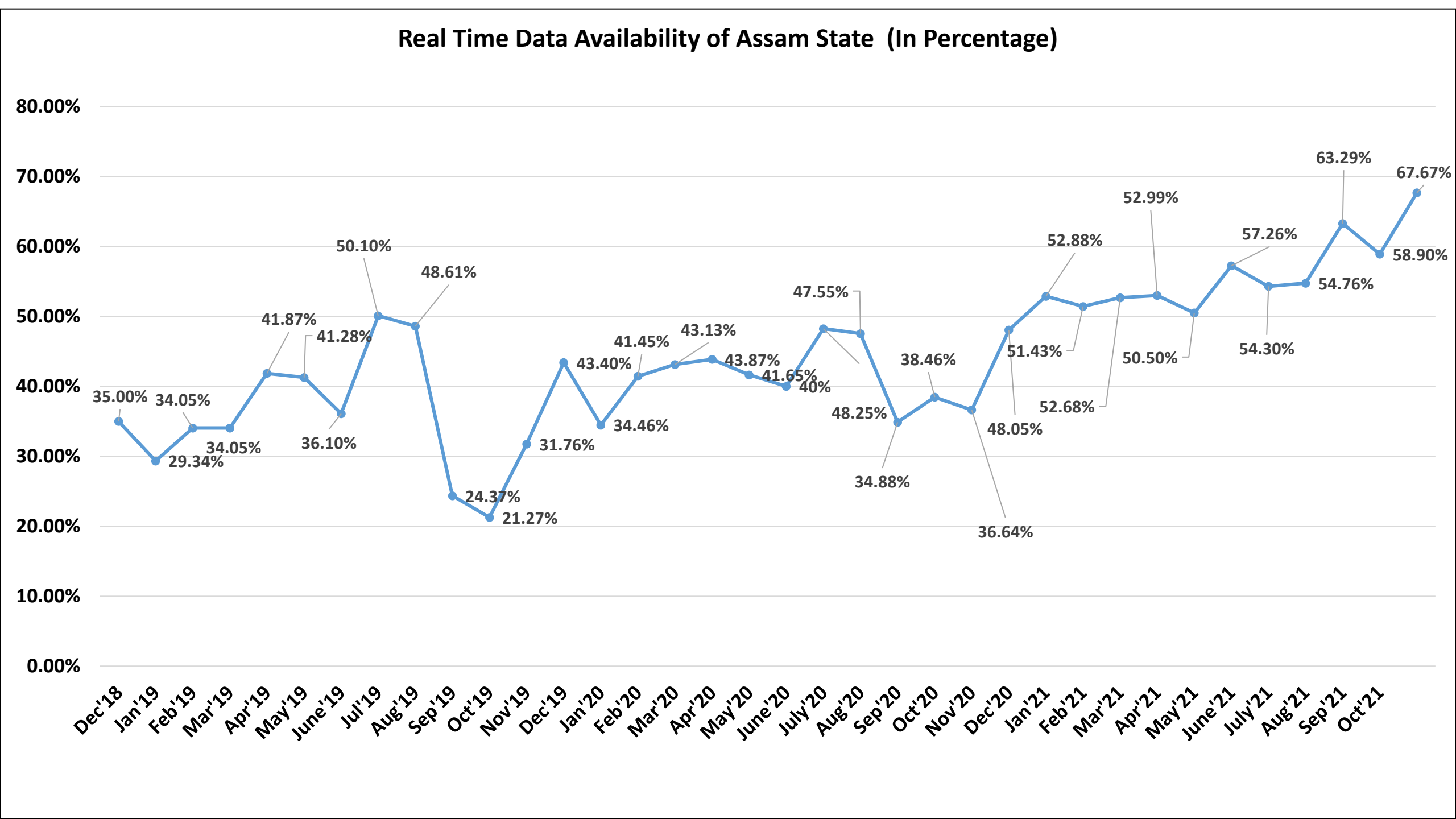


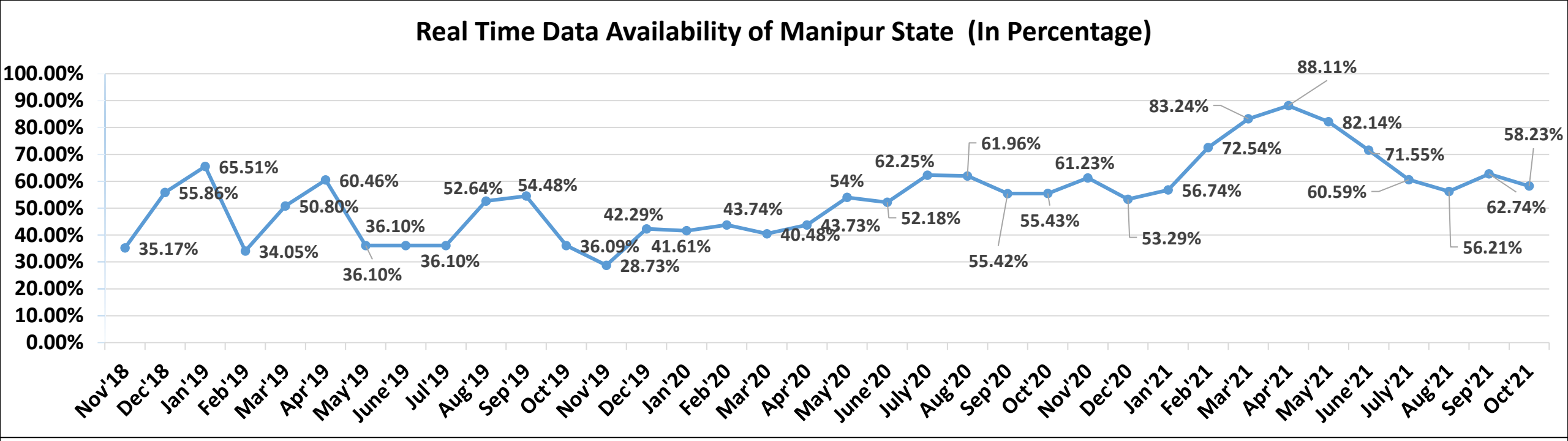
Telemetry Statistics for Central Sector of NER (Average availability of data for the Month of October'21)

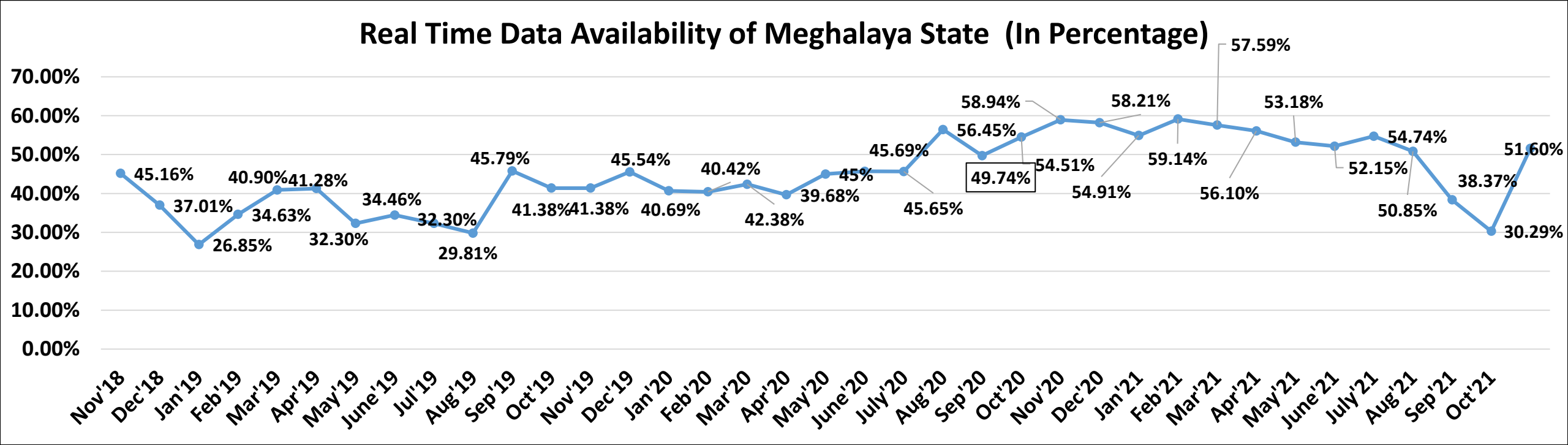


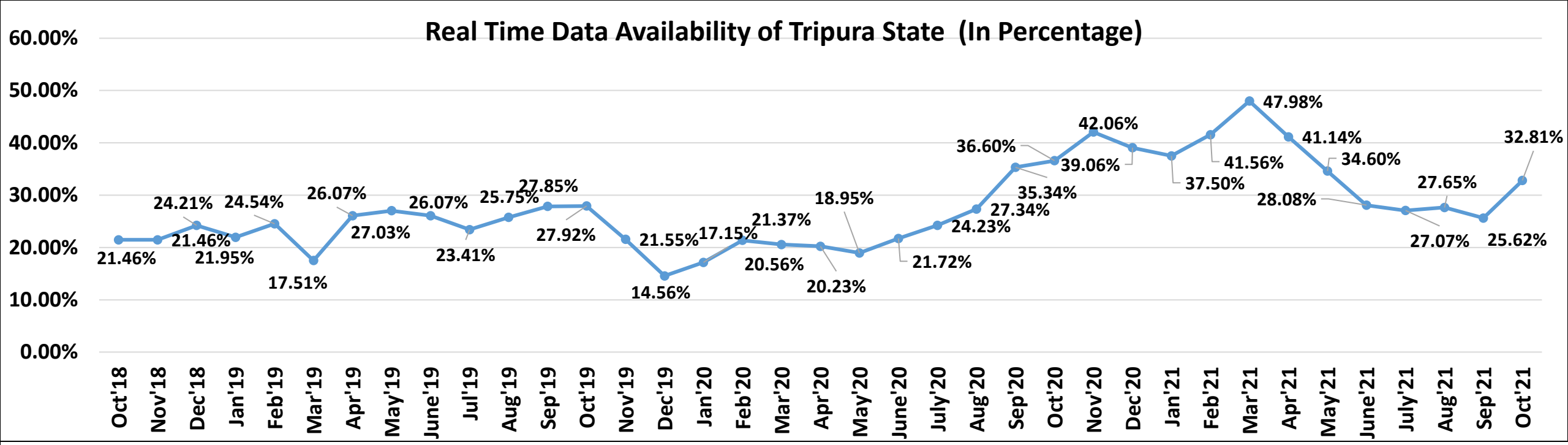

Real Time Data Availability of NER (In Percentage)
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
35.74%
38.31%
38.27%
40.19%
40.19%
46.08%
45.70%
48.54%
46.79%
48.82%
40.79%
42.43%
46.84%
48.91%
44.38%
49.11%
49.70%
49.99%
49.98%
51%
54%
49.89%
54.09%
52.09%
53.13%
57.31%
58.69%
59.91%
59.88%
62.01%
60.06%
64.24%
62.39%
62.36%
61.81%
64.33%
63.58%
66.46%
Aug'18
Oct'18
Nov'18
Dec'18
Jan'19
Feb'19
Mar'19
Apr'19
May'19
June'19
Jul'19
Aug'19
Sep'19
Oct'19
Nov'19
Dec'19
Jan'20
Feb'20
Mar'20
Apr'20
May'20
June'20
July'20
Aug'20
Sep'20
Oct'20
Nov'20
Dec'20
Jan'21
Feb'21
Mar'21
Apr'21
May'21
June'21
July'21
Aug'21
Sep'21
Oct'21

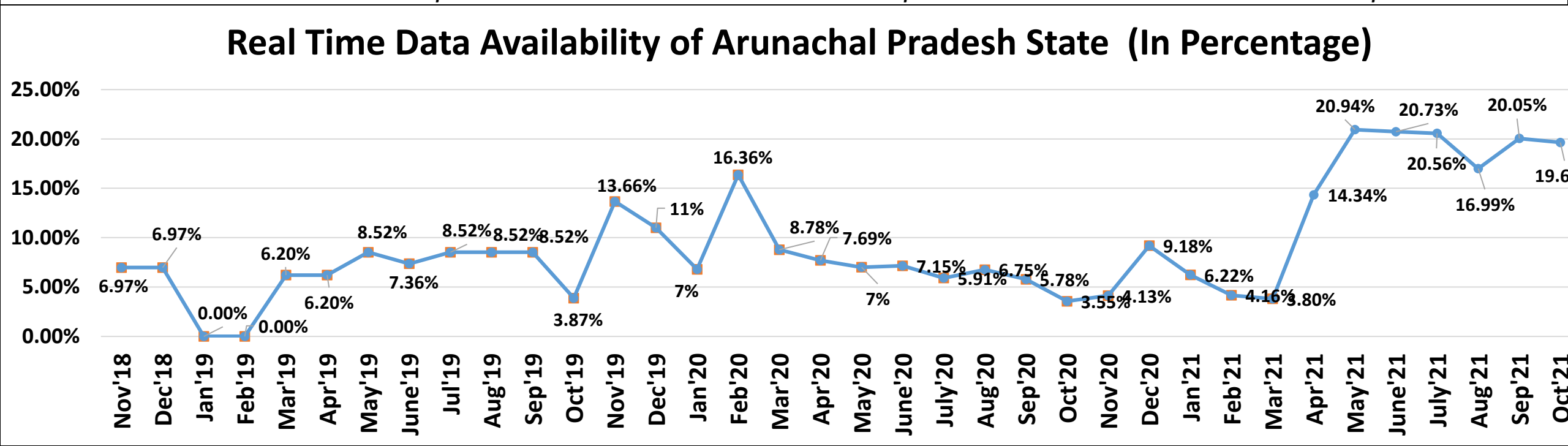
Real Time Data Availability of Assam State (In Percentage)



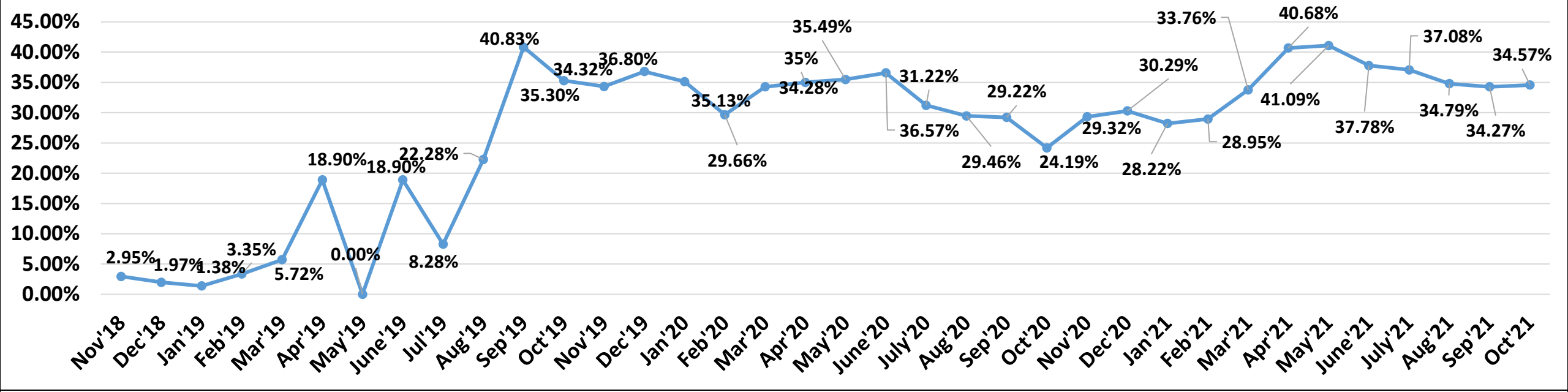

Real Time Data Availability of Manipur State (In Percentage)
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
35.17%
55.86%
65.51%
34.05%
50.80%
60.46%
36.10%
36.10%
36.10%
52.64%
54.48%
42.29%
36.09%
28.73%
41.61%
43.74%
40.48%
43.73%
54%
52.18%
62.25%
61.96%
55.42%
55.43%
61.23%
53.29%
56.74%
72.54%
83.24%
88.11%
82.14%
60.59%
71.55%
56.21%
62.74%
58.23%
Nov'18
Dec'18
Jan'19
Feb'19
Mar'19
Apr'19
May'19
June'19
Jul'19
Aug'19
Sep'19
Oct'19
Nov'19
Dec'19
Jan'20
Feb'20
Mar'20
Apr'20
May'20
June'20
July'20
Aug'20
Sep'20
Oct'20
Nov'20
Dec'20
Jan'21
Feb'21
Mar'21
Apr'21
May'21
June'21
July'21
Aug'21
Sep'21
Oct'21


Real Time Data Availability of Meghalaya State (In Percentage)
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
45.16%
37.01%
26.85%
40.90%
34.63%
41.28%
32.30%
34.46%
32.30%
29.81%
45.79%
41.38%
41.38%
45.54%
40.69%
40.42%
42.38%
39.68%
45%
45.69%
45.65%
58.94%
56.45%
49.74%
54.51%
58.21%
54.91%
59.14%
57.59%
56.10%
53.18%
52.15%
54.74%
50.85%
38.37%
30.29%
51.60%
Nov'18
Dec'18
Jan'19
Feb'19
Mar'19
Apr'19
May'19
June'19
Jul'19
Aug'19
Sep'19
Oct'19
Nov'19
Dec'19
Jan'20
Feb'20
Mar'20
Apr'20
May'20
June'20
July'20
Aug'20
Sep'20
Oct'20
Nov'20
Dec'20
Jan'21
Feb'21
Mar'21
Apr'21
May'21
June'21
July'21
Aug'21
Sep'21
Oct'21

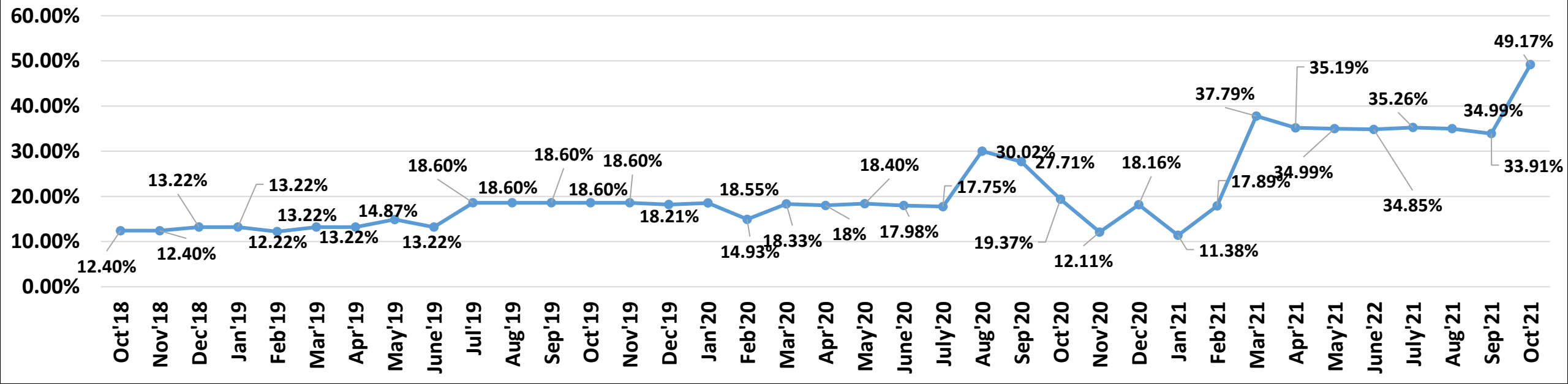

Real Time Data Availability of Tripura State (In Percentage)
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
21.46%
24.21%
21.46%
24.54%
21.95%
17.51%
26.07%
27.03%
26.07%
23.41%
25.75%
27.85%
27.92%
21.55%
14.56%
17.15%
21.37%
20.56%
18.95%
20.23%
21.72%
24.23%
36.60%
27.34%
35.34%
39.06%
42.06%
37.50%
41.56%
47.98%
28.08%
41.14%
34.60%
27.07%
27.65%
25.62%
32.81%
Oct'18
Nov'18
Dec'18
Jan'19
Feb'19
Mar'19
Apr'19
May'19
June'19
Jul'19
Aug'19
Sep'19
Oct'19
Nov'19
Dec'19
Jan'20
Feb'20
Mar'20
Apr'20
May'20
June'20
July'20
Aug'20
Sep'20
Oct'20
Nov'20
Dec'20
Jan'21
Feb'21
Mar'21
Apr'21
May'21
June'21
July'21
Aug'21
Sep'21
Oct'21

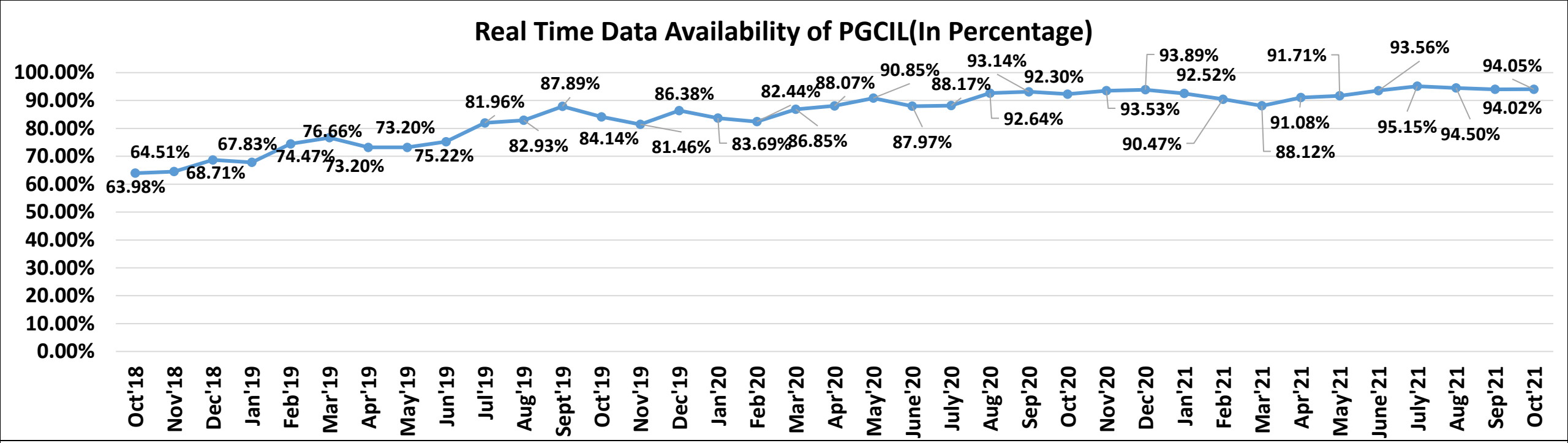

Real Time Data Availability of Arunachal Pradesh State (In Percentage)
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
6.97%
6.97%
0.00%
0.00%
6.20%
6.20%
8.52%
7.36%
8.52%
8.52%
8.52%
3.87%
13.66%
11%
7%
16.36%
8.78%
7.69%
7%
7.15%
5.91%
6.75%
5.78%
3.55%
4.13%
9.18%
6.22%
4.16%
3.80%
14.34%
20.94%
20.56%
20.73%
16.99%
20.05%
19.6
Nov'18
Dec'18
Jan'19
Feb'19
Mar'19
Apr'19
May'19
June'19
Jul'19
Aug'19
Sep'19
Oct'19
Nov'19
Dec'19
Jan'20
Feb'20
Mar'20
Apr'20
May'20
June'20
July'20
Aug'20
Sep'20
Oct'20
Nov'20
Dec'20
Jan'21
Feb'21
Mar'21
Apr'21
May'21
June'21
July'21
Aug'21
Sep'21
Oct'21

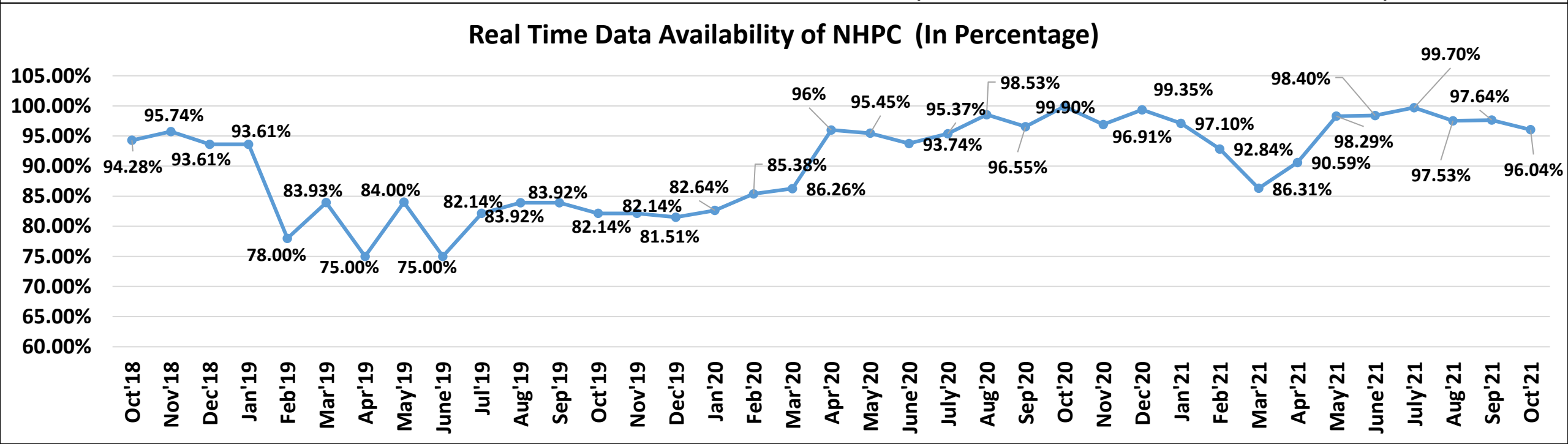
Real Time Data Availability of Nagaland State (In Percentage)

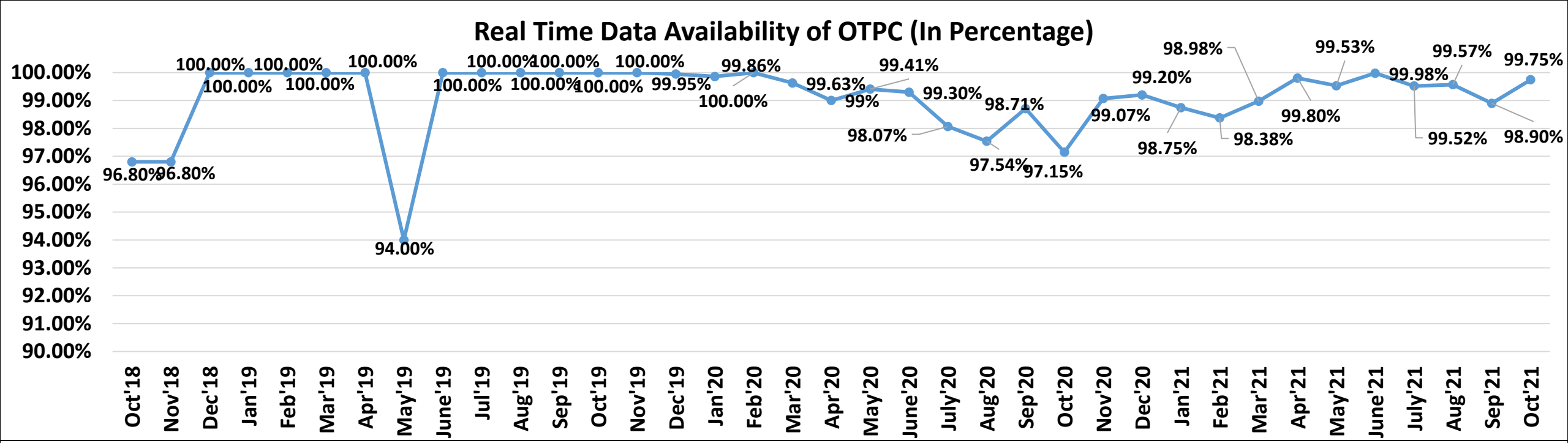


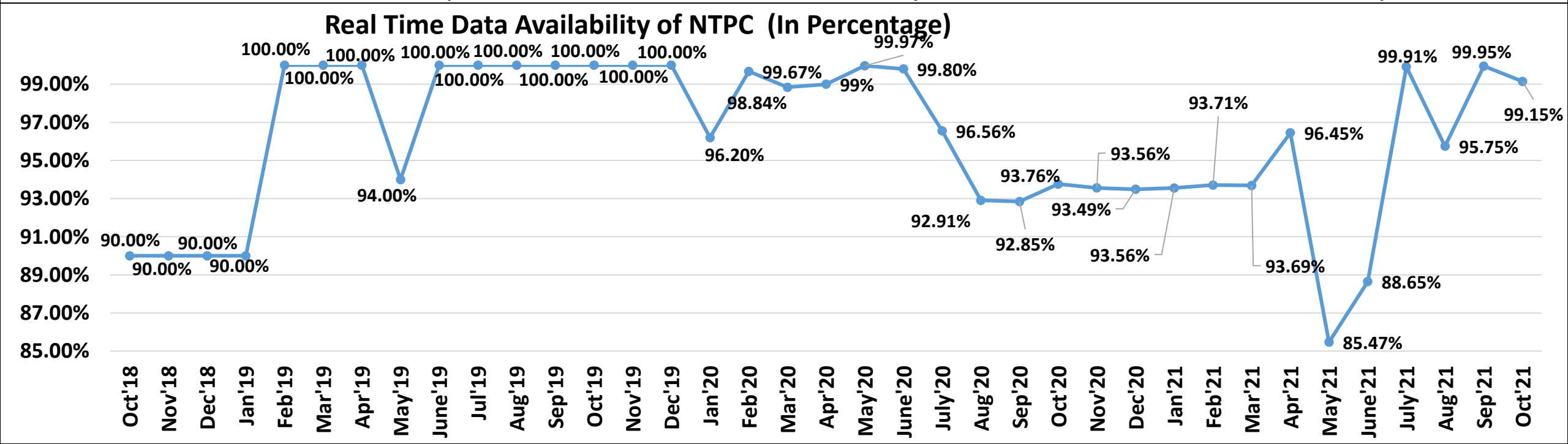
Real Time Data Availability of Mizoram State (In Percentage)

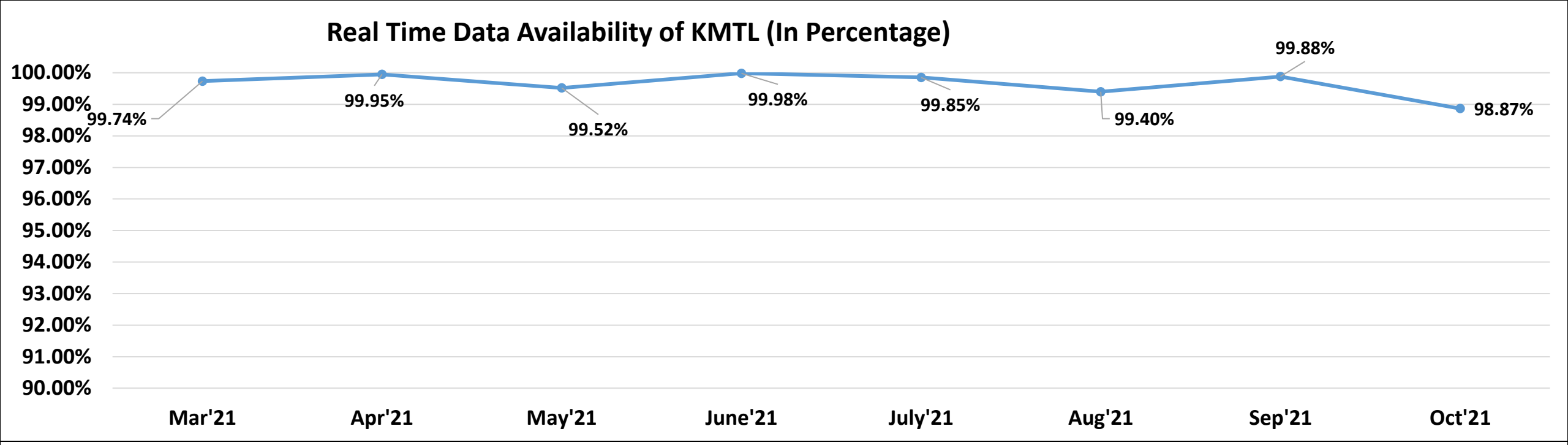


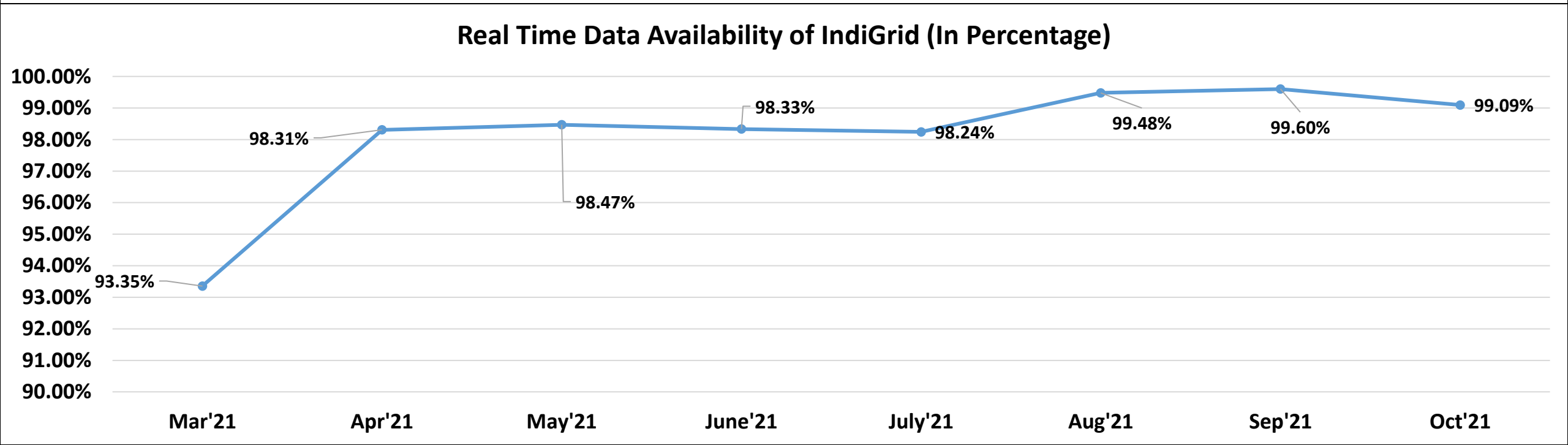

Real Time Data Availability of PGCIL(In Percentage)
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
63.98%
64.51%
68.71%
67.83%
74.47%
76.66%
73.20%
73.20%
75.22%
81.96%
82.93%
87.89%
84.14%
86.38%
81.46%
83.69%
82.44%
86.85%
88.07%
87.97%
90.85%
88.17%
93.14%
92.64%
92.30%
93.53%
93.89%
90.47%
92.52%
91.08%
88.12%
91.71%
95.15%
93.56%
94.50%
94.02%
94.05%
Oct'18
Nov'18
Dec'18
Jan'19
Feb'19
Mar'19
Apr'19
May'19
Jun'19
Jul'19
Aug'19
Sept'19
Oct'19
Nov'19
Dec'19
Jan'20
Feb'20
Mar'20
Apr'20
May'20
June'20
July'20
Aug'20
Sep'20
Oct'20
Nov'20
Dec'20
Jan'21
Feb'21
Mar'21
Apr'21
May'21
June'21
July'21
Aug'21
Sep'21
Oct'21

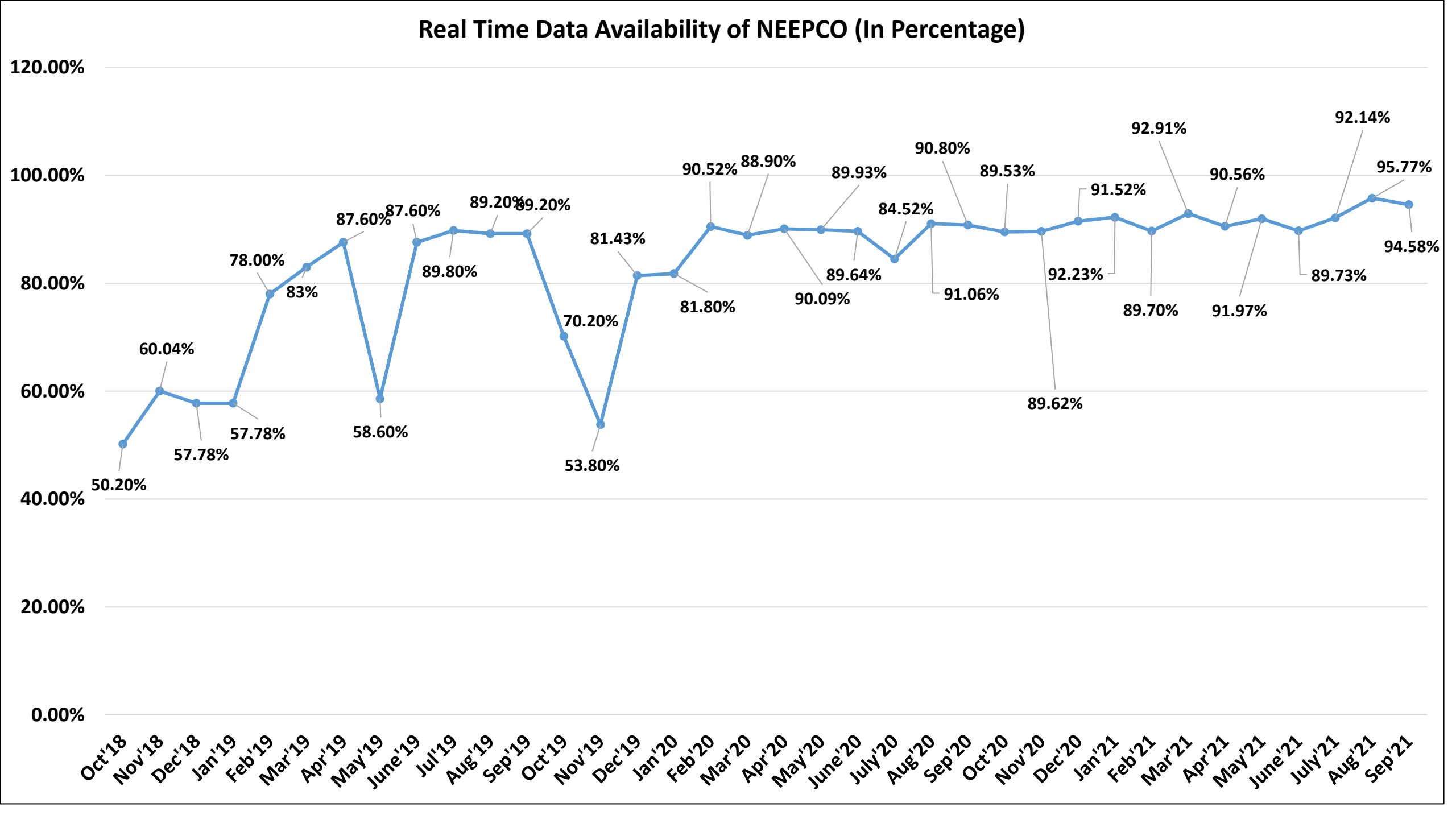

Real Time Data Availability of NHPC (In Percentage)
105.00%
100.00%
95.00%
90.00%
85.00%
80.00%
75.00%
70.00%
65.00%
60.00%
94.28%
95.74%
93.61%
93.61%
78.00%
83.93%
75.00%
84.00%
75.00%
82.14%
83.92%
83.92%
82.14%
82.14%
81.51%
82.64%
85.38%
86.26%
96%
95.45%
93.74%
95.37%
98.53%
96.55%
99.90%
96.91%
99.35%
97.10%
92.84%
86.31%
90.59%
98.40%
98.29%
99.70%
97.53%
97.64%
96.04%
Oct'18
Nov'18
Dec'18
Jan'19
Feb'19
Mar'19
Apr'19
May'19
June'19
Jul'19
Aug'19
Sep'19
Oct'19
Nov'19
Dec'19
Jan'20
Feb'20
Mar'20
Apr'20
May'20
June'20
July'20
Aug'20
Sep'20
Oct'20
Nov'20
Dec'20
Jan'21
Feb'21
Mar'21
Apr'21
May'21
June'21
July'21
Aug'21
Sep'21
Oct'21


Real Time Data Availability of OTPC (In Percentage)
100.00%
99.00%
98.00%
97.00%
96.00%
95.00%
94.00%
93.00%
92.00%
91.00%
90.00%
96.80% 96.80% 100.00% 100.00% 100.00% 100.00% 100.00% 94.00% 100.00% 100.00% 100.00% 100.00% 100.00% 100.00% 100.00% 99.95% 99.86% 100.00% 99.63% 99% 99.41% 98.07% 99.30% 97.54% 98.71% 97.15% 99.07% 99.20% 98.75% 98.98% 98.38% 99.80% 99.53% 99.98% 99.52% 99.57% 98.90% 99.75%
Oct'18 Nov'18 Dec'18 Jan'19 Feb'19 Mar'19 Apr'19 May'19 June'19 Jul'19 Aug'19 Sep'19 Oct'19 Nov'19 Dec'19 Jan'20 Feb'20 Mar'20 Apr'20 May'20 June'20 July'20 Aug'20 Sep'20 Oct'20 Nov'20 Dec'20 Jan'21 Feb'21 Mar'21 Apr'21 May'21 June'21 July'21 Aug'21 Sep'21 Oct'21


Real Time Data Availability of NTPC (In Percentage)
99.00%
97.00%
95.00%
93.00%
91.00%
89.00%
87.00%
85.00%
90.00% 90.00% 90.00% 90.00% 100.00% 100.00% 100.00% 94.00% 100.00% 100.00% 100.00% 100.00% 100.00% 100.00% 100.00% 96.20% 98.84% 99.67% 99% 99.97% 99.80% 96.56% 92.91% 92.85% 93.76% 93.49% 93.56% 93.56% 93.71% 93.69% 96.45% 85.47% 88.65% 99.91% 95.75% 99.95% 99.15%
Oct'18 Nov'18 Dec'18 Jan'19 Feb'19 Mar'19 Apr'19 May'19 June'19 Jul'19 Aug'19 Sep'19 Oct'19 Nov'19 Dec'19 Jan'20 Feb'20 Mar'20 Apr'20 May'20 June'20 July'20 Aug'20 Sep'20 Oct'20 Nov'20 Dec'20 Jan'21 Feb'21 Mar'21 Apr'21 May'21 June'21 July'21 Aug'21 Sep'21 Oct'21


Real Time Data Availability of KMTL (In Percentage)
100.00%
99.00%
98.00%
97.00%
96.00%
95.00%
94.00%
93.00%
92.00%
91.00%
90.00%
99.74%
99.95%
99.52%
99.98%
99.85%
99.40%
99.88%
98.87%
Mar'21
Apr'21
May'21
June'21
July'21
Aug'21
Sep'21
Oct'21


Real Time Data Availability of IndiGrid (In Percentage)
100.00%
99.00%
98.00%
97.00%
96.00%
95.00%
94.00%
93.00%
92.00%
91.00%
90.00%
93.35%
98.31%
98.47%
98.33%
98.24%
99.48%
99.60%
99.09%
Mar'21
Apr'21
May'21
June'21
July'21
Aug'21
Sep'21
Oct'21


Real Time Data Availability of NEEPCO (In Percentage)
120.00%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
50.20%
60.04%
57.78%
57.78%
78.00%
83%
87.60%
58.60%
87.60%
89.80%
89.20%
89.20%
70.20%
53.80%
81.43%
81.80%
90.52%
88.90%
89.93%
90.09%
89.64%
84.52%
90.80%
91.06%
89.53%
89.62%
91.52%
92.23%
92.91%
89.70%
90.56%
91.97%
89.73%
92.14%
95.77%
94.58%
Oct'18
Nov'18
Dec'18
Jan'19
Feb'19
Mar'19
Apr'19
May'19
June'19
Jul'19
Aug'19
Sep'19
Oct'19
Nov'19
Dec'19
Jan'20
Feb'20
Mar'20
Apr'20
May'20
June'20
July'20
Aug'20
Sep'20
Oct'20
Nov'20
Dec'20
Jan'21
Feb'21
Mar'21
Apr'21
May'21
June'21
July'21
Aug'21
Sep'21

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Government of India Enterprise)

उत्तर पूर्वी क्षेत्रीय भार प्रेषण केंद्र : लोअर नँगरा, लापालांग, शिलांग-793006, (मेघालय)
North Eastern Regional Load Despatch Centre: Lower Nongrah, Lapalang, Shillong - 793006, (Meghalaya)
Ph : 0364-2537470, 2537427, Fax - 2537486 Website : www.nerldc.org, Email - nerldc@posoco.in, CIN : U40105DL2009GOI188682

संदर्भ संख्या/Ref. No.: NERLDC/SL/SCADA/Assam/Jul'21/1746 दिनांक: 06th July 2021

सेवा में/ To,

Managing Director
Assam Power Generation Corp. Ltd.
Bijulee Bhawan, Guwahati-781001
E-mail: md@apgcl.com

पूर्व संदर्भ/Earlier References:

1. Letter from NERLDC ref. NERLDC/SL/SCADA/Assam/691 dated 04-07-2019
2. Minutes of Meeting between NERLDC, AEGCL and APGCL dated 06-09-2019
3. Letter from NERLDC ref. NERLDC/SL/SCADA/Assam/Jan'20/1827 dated 30-01-2020
4. Email conversation with subject *Lakwa - Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC* dated 12-01-2021

विषय: Status of action points in accordance to provide operational data and voice of Assam owned generating stations – reg.

महोदया/Madam,

This is in reference to the various Minutes of Meetings, exchange of letters and e-mails between NERLDC, AEGCL and APGCL for providing real-time operational data of generating units of Lakwa TPS, LRPP, NRPP and Namrup TPS attached as ***Annexure-1*** to ***Annexure-4***.

The real-time operational data of the switchyard of Lakwa TPS and Namrup TPS stations is partially available at SLDC-Assam and NERLDC; but the real-time operational data and voice communication for Lakwa TPS, LRPP, NRPP and Namrup TPS generation portion are not available at Assam-SLDC and NERLDC yet. The data of Lakwa TPS, Namrup TPS, LRPP and NRPP is critical for grid operation in North-Eastern Region and its present status is mentioned in *table* below.

S. No.	Station Name	Ownership	Remarks on real-time operational data availability
1	Lakwa TPS	APGCL	▪ Data from switchyard side is partially available which is under AEGCL. ▪ Data of all equipment under APGCL scope is not available at Assam-SLDC and NERLDC.
2	LRPP	APGCL	Entire Analog and Digital Status data not available at Assam-SLDC and NERLDC.
3	Namrup TPS	APGCL	▪ Data from switchyard side is partially available which is under AEGCL. ▪ Data of all equipment under APGCL scope is not available at Assam-SLDC and NERLDC.
4	NRPP	APGCL	Entire Analog and Digital Status data not available at Assam-SLDC and NERLDC.

Various actionable points were discussed in the meetings and correspondences (as attached) but the real-time data has not been made available for the Load Despatch functions yet. Personal intervention of your good office is solicited to expedite early completion of the associated works. It is also requested that APGCL may update the progress on the matter in the NETeST forum of NERPC (next meeting tentatively planned in Aug'21) in which all

the SCADA and Communication related matters of NER are discussed on quarterly-basis which will help in timely resolving the issues pertaining to APGCL.

We look forward to your support and cooperation on the matter.
सादर धन्यवाद/Thanking you.

भवदीय/Yours faithfully,

06/7/2021

(नबरुन रॉय/Nabarun Roy)
मुख्य महाप्रबंधक (प्रभारी)/Chief General Manager (I/c)
उ.पू.क्षे.भा.प्रे.के./ NERLDC

Encl.: As above.

प्रति/Copy to (by e-mail):

1. Member Secretary, NERPC, Shillong
2. Chief General Manager, SLDC Assam, Kahelipara

पावर सिस्टम ऑपरेशन कारपोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Government of India Enterprise)

उत्तर पूर्वी क्षेत्रीय भार प्रेषण केंद्र : लोअर नोंगरा, लापालांग, शिलांग-793006, (मेघालय)
North Eastern Regional Load Despatch Centre: Lower Nongrah, Lapalang, Shillong - 793006, (Meghalaya)
Ph : 0364-2537470, 2537427, Fax - 2537468 Website : www.nerldc.org, Email - nerldc@posoco.in, CIN : U40105DL2009GOI188682

Ref: NERLDC/SL/SCADA/Assam/ 691 |

Date: 04/07/2019

To,
General Manager, NTPS
APGCL, Namrup,
Dist.-Dibrugarh, Assam
Your Ref Letter No: GM/NTPS/APGCL/2019/ Dated 03/06/2019

Subject: Necessary arrangement at Namrup Thermal Power Station, APGCL for real-time data sharing.

Sir,
With reference to your letter dated 03/06/2019 regarding real-time telemetry data at Namrup Thermal Power Station at APGCL, the matter may be taken up with AEGCL for providing communication from your generating station to SLDC, AEGCL.
As per **IEGC Clause 4.6.2**, user has to provide reliable data and voice communication to the respective Load Despatch Centre. In this case, NTPS, APGCL is the user and the respective Load Despatch Centre is SLDC, AEGCL. The communication has to be provided from NTPS, APGCL to SLDC, AEGCL and subsequently to NERLDC through ICCP links. Technical support regarding this matter may be extended from NERLDC. The responsibility of providing the real-time data lies with APGCL.

This is for your kind information please.

Thanking you.

Yours faithfully,

M. K. Ramesh 04/07/2019
General Manager, System Logistics

Copy to:
1. Chief General Manager, APGCL
2. Chief General Manager, NERLDC, POSOCO
3. Chief General Manager, AEGCL
4. Deputy General Manager, NTPS
5. Deputy General Manager, RTCC, AEGCL

ASSAM POWER GENERATION CORPORATION LIMITED

NAMRUP THERMAL POWER STATION

Namrup- 786622, Dist.- Dibrugarh (Assam),Tele-Fax :0374-2503080

e-mail : apgcl_ntps@yahoo.co.in

Sonit Kr.Neog.
GM NTPS

No: GM/NTPS/APGCL/2019/ Date: 03/06/2019

To,

Shri M.K.Ramesh
General Manager, Logistic
NERLDC,Shillong,Meghalaya.

Sub: Necessary arrangement at Namrup Thermal power station, APGCL, for real time data sharing.

Sir,

This is to inform you that, Namrup Thermal Power Station , a gas based generating station under Assam Power Generation Corporation Limited is operating with 99.5 MW installed capacity and also going to commsioned a replacement gas based project of 98.4 MW installed capacity very soon. But till now no communication system is installed here to faciletate the Real Time data sharing to NERLDC.

Therefore request you kindly to take necessary steps to provide the required communication system at NTPS for the aformentioned purpose.

Thanking you,

Yours Sincerely,

General Manager
NTPS, APGCL, NAMRUP

Memo No: GM/NTPS/APGCL/2019/ DATE: 03-06-2019

Copy to:-

1. The Chief General Manager (G), APGCL for favour of kind information.
2. The Deputy General Manager, NTPS, for information.
3. R/F

General Manager
NTPS, APGCL, NAMRUP

ANNEXURE-I

MOM held between APGCL and AEGCL at O/o GM LTPS Maibella, Assam-785689 on 6th September 2019

Members Present :

For APGCL	For AEGCL	For NERLDC
Sri A. K Kalita GM LTPS	Sri. P. Saha AGM	Sri M. K Ramesh GM
Sri T Basumatary DGM	Sri D. Saikia DM	
Sri A Saikia DGM	Sri A. Sarmah M)	
Sri H Hazarika AGM		

Reference:

1. APGCL/CGM(G)/AERC/2018/115/PT-XI/39, dated 28-08-2019
2. MD/AEGCL/DPRO/2017/Part-I/64 dated 29.08.2019

Following points were discussed for early integration of Switchyard data, LRPP data , LTPS Phase –II HV side data and Steam Turbine HV Data :

1. Joint visit of AEGCL and NERLDC representatives made on 6th September in LTPS and LRPP Generating station with the objective of improving the telemetry status.

2. A joint meeting was organized by GM LTPS ,DGM LTPS and other senior and field officials along with AEGCL and NERLDC representative to decide how to proceed with improving the telemetry status and also Nodal officers for telemetry work was identified from APGCL and AEGCL for proposed actions and rectifications. Nodal officers from APGCL and AEGCL are as follows:

   a. Sri Harinarayan Hazarika, AGM (Electrical) APGCL
   b. Sri Bikash Sarma , DM APGCL
   c. Sri Migom Mili ,DM APGCL
   d. Sri Sanjay Mallick, AM APGCL
   e. Sri Debojit Saikia DM AEGCL

6/9/19
GM NERLDC
(in protest)

3. It has been observed under joint visit of representatives that LV side 3 nos. Generators of LTPS Phase-II and 1 no. Steam Turbine Generator is reporting SLDC via AREVA C264 RTU installed at Switchyard Control Room. However the digital data i.e CB and isolator status is not reporting

4. In the LTPS switchyard all the analog data except Namrup Feeder I MW ,MVAR ,Bus Coupler CB and Isolator status are reporting to SLDC .

5. No real time data from LRPP reporting to SLDC.

6. Based on the above observation the team of APGCL nodal officers and AEGCL, NERLDC representatives a detailed field study was made and following are the suggestions for implementation

   i. **For LRPP**
   The nodal officers of APGCL have to study with the vendor Warstila for integration of electrical parameter data over IEC 60870-5-101/104 to the communication equipment located at switchyard control room. The nodal officers have to initiate an email to get the confirmation regarding the above said configuration on or before 16th September 2019.
   Also the nodal officers have to collect detailed information on as built control system automation layout (Document No. CBG01247801A1000).Copy enclosed.
   AEGCL will ensure physical communication interface for IEC 60870-5-101/104 is available at LTPS switchyard Communication equipment. The nodal officer of AEGCL has to ensure the link upto SLDC Kahilipara.

   ii. **For LTPS Phase –II and Steam Turbine**
   Nodal officer of APGCL has to ensure the commissioning of 4 nos. MFTs at HV side of the Generator to C264 RTU and for the CB status data of both LV side and HV side of generator also to be provided.
   During the above discussion APGCL submitted that 4nos. MFTs may be provided by AEGCL. In this nodal officer of APGCL may send official request through proper channel.

   iii. **For switchyard**
   Namrup Fdr-1 analog data and CB data of Namrup Fdr-1 to be rectified by AEGCL by September 2019.

   Integration of 11/132KV Trafo-1 and Trafo-2 Analog MW and MVAR data at HV side along with CB status of the bay need to be done by AEGCL.

   Integration of 132/33KV Trafo-1 and Trafo-2 Analog MW and MVAR data at HV side along with CB status of the bay need to be done by AEGCL.

   AEGCL to ensure the integration of above switchyard data latest by September 2019.

   iv. **Voice communication from LRPP and LTPS to SLDC Kahilipara**
   AEGCL will ensure the voice communication from LRPP and LTPS unit control room to Kahilipara for which APGCL has to provide necessary cabling from unit control room to switchyard Communication room with necessary handset at unit control room.
   The work targeted to complete by September 2019.

06/9/19

GM NERLDC (In Presence of)

As Built

MOM held between APGCL and AEGCL at O/o GM NTPS, Namrup, Assam-786622 on 7th September 2019

Members Present :

For APGCL	For AEGCL	For NERLDC
Sri A Rahman DGM (O&M)	Sri. P. Saha AGM	Sri M. K Ramesh GM
Sri N R Kakati DGM NRPP	Sri D. Saikia DM	
Sri Biswajyoti Gohain AGM	Sri A. Sarmah DM	

Reference:

A. **Letter No: APGCL/CGM(G)/AERC/2018/115/PT-XI/39, dated 28-08-2019**
B. **Letter No: MD/AEGCL/DPRO/2017/Part-I/64 dated 29.08.2019**

Following points were discussed for early integration of Namrup Switchyard data, NRPP data, NTPS data:

1. Joint visit of AEGCL and NERLDC representatives was made on 7th September in NTPS and NRPP Generating station with the objective of improving the telemetry status.

2. A joint meeting was organized by DGM NTPS , DGM NRPP and other senior and field officials along with AEGCL and NERLDC representative. In opening meeting GM NERLDC emphasis the requirement of real time telemetry for efficient grid operation for SLDC and RLDC operators. He also explained the current status of Namrup station telemetry status.In order to stream line the work progress it is sugeested to identify Nodal officers for telemetry work from APGCL and AEGCL. Nodal officers from APGCL and AEGCL are as follows:

   a. Sri Biswajyoti Gohain AGM OP&D APGCL
   (Contact No: 9954431528 email-id: biswajyoti_gohain@yahoo.co.in)
   b. Sri Deepjyoti Gogoi AGM NRPP Electrical APGCL
   (Contact No: 8486017915/7002080576 email-id: djgogoi_jec@yahoo.co.in)
   c. Sri Debojit Saikia DM Communication AEGCL
   (Contact No: 8724904083 email-id: talk2devajeet@gmail.com)

3. It has been observed under joint visit that no telemetry data is reporting to SLDC for quite long duration .Hence team made the field visit to AEGCL switch yard to see the condition of RTU and Communication status. The RTU was healthy and after fault finding it was observed that communication channel was faulty and as such data port shifted to spare channel and Namrup data started reporting to SLDC.

7/9/19 DGM (O&M) 07/9/19 DGM, NRPP AGM, TEC(C)Ph 07/09/19 7/9/19 (A. Sarmah DM) 07/09/19

220 KV Mariani Feeder not integrated to existing RTU.

4. The Namrup database available at SLDC out of 6 units.Only 5 are in service Unit 1 was decommissioned. The representative visited NTPS and found that in 5 units MFMs installed in LV side CR panels of the Generating units and only one unit is getting power supply. Remaining DC supply was switched off and APGCL agreed to extend the dc auxiliary supply by 20-Sep-19.
5. The digital data i.e CB and isolator status is not reporting. AEGCL and APGCL explore the possibility of extending status data to RTU located at switchyard or providing RTU at Unit Control Room.

6. In the NTPS switchyard the digital status of isolator and CB are suspect and also 220/66KV Transformer 2 data is not reporting.

7. No real time data from NRPP reporting to SLDC at present. NRPP will initiate the matter with BHEL so that necessary configuration can be made by 25th September 2019 and AEGCL nodal officer will look for the configuration communication channel up to SLDC.

8. Based on the above observation the team of APGCL nodal officers and AEGCL, NERLDC representatives a detailed field study was made and following are the suggestions for implementation

   i. **For NRPP**
   NRPP of switchyard real time data at switchyard control room is available in local SCADA and NRPP has to coordinate with BHEL to configure the gateway for transmission of real time switchyard data to SLDC Kahilipara. All relevant address list for SLDC SCADA System may be collected by NRPP.
   AEGCL will ensure physical communication interface for IEC 60870-5-101/104 available at NTPS switchyard Communication equipment. The nodal officer of AEGCL has to ensure the link up to SLDC Kahilipara.
   This action will help the SLDC to get NRPP Switchyard data before COD.

   ii. **For switchyard**
   Suspected analog and digital data to be rectified by AEGCL by December 2019.AEGCL representative submitted that under PSDF the switchyard CRP panels are going to be replaced and work to be started by September 2019. However AEGCL nodal officer will ask to configure the gateway first as per the IOA list to be provided by SLDC so that phase by phase data integration can be reported to SLDC and till then 2 separate data channels will be maintained for switchyard data.

   AEGCL to ensure the integration of above switchyard data latest by December 2019.APGCL requested AEGCL to take up the matter of renovation of wideband communication room where Communication equipment are placed as the room is prone to moisture and heavy rain water seepage.

   iii. **Voice communication from NRPP and NTPS to SLDC Kahilipara**
   AEGCL will ensure the voice communication from NRPP and NTPS unit control room, NRPP switchyard to SLDC Kahilipara for which APGCL have to provide necessary cabling from units control room to switchyard along with handsets.

   iv. SLDC will do the necessary modeling of SLD of NRPP in SCADA and provide IOA address list and IPs for IEC 60870-5-104. All the data configuration requirement over 101 and 104 to be provided by SLDC Kahilipara

07/9/19

2/9/19
DGM (O&M)

DGM/NRPP

4/9/19

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Government of India Enterprise)

उत्तर पुर्वी क्षेत्रीय भार प्रेषण केंन्द्र : लोअर नँगरा, लापालांग, शिलांग-793006, (मेघालय)
North Eastern Regional Load Despatch Centre: Lower Nongrah, Lapalang, Shillong - 793006, (Meghalaya)
Ph : 0364-2537470, 2537427, Fax - 2537486 Website : www.nerldc.org, Email - nerldc@posoco.in, CIN : U40105DL2009GOI188682

सदंर्भ संख्या/Ref. No.: NERLDC/SL/SCADA/Assam/Jan'20/ 1825. **दिनांक**: 30-January-2020

सेवा में/ To,

Managing Director
Assam Power Generation Corp. Ltd.
Bijulee Bhawan, Guwahati-1
E-mail: md@apgcl.com

पूर्व संदर्भ/Earlier References: Minutes of Meeting between NERLDC, AEGCL and APGCL dated 06-09-2019.

विषय: Status of action points in accordance with MoM dated 06.09.2019 and 07.09.2019 - reg.

महोदय/Sir,

This is in reference to the Meeting between NERLDC, AEGCL and APGCL held at Lakwa and Namrup stations on 6th September 2019 and 7th September 2019 and corresponding signed Minutes of Meeting (MoM) attached as ***Annexure-1***.

The real-time data and Voice Communication of the Lakwa TPS and Namrup TPS stations is partially available; but the real-time data and voice communication for LRPP and NRPP portion has not been made available to NERLDC and Assam-SLDC yet. The data of Lakwa TPS, Namrup TPS, LRPP and NRPP is critical for grid operation in North-Eastern Region.

Your personal intervention is requested to expedite early completion of the works and meanwhile present status of all the action-points agreed during the meeting on 06-09-2019 and 07-09-2019 may please be communicated to NERLDC. This is for information and necessary action at your end.

सादर धन्यवाद/Thanking you.

भवदीय/Yours faithfully,
30/01/2020
(V. Suresh)
Executive Director, NERLDC

Encl.: As above.

प्रति/Copy to(by E-mail):

1. Member Secretary, NERPC, Shillong
2. Director (System Operation), POSOCO, Nehru Place, New Delhi
3. Director, NERPC, Shillong
4. Executive Director, NLDC, POSOCO
5. Chief General Manager, SLDC Assam, Kahelipara

ANNEXURE-I

MOM held between APGCL and AEGCL at O/o GM LTPS Maibella, Assam-785689 on 6th September 2019

Members Present :

For APGCL	For AEGCL	For NERLDC
Sri A. K Kalita GM LTPS	Sri. P. Saha AGM	Sri M. K Ramesh GM
Sri T Basumatary DGM	Sri D. Saikia DM	
Sri A Saikia DGM	Sri A. Sarmah MJ	
Sri H Hazarika AGM		

Reference:

1. **APGCL/CGM(G)/AERC/2018/115/PT-XI/39, dated 28-08-2019**
2. **MD/AEGCL/DPRO/2017/Part-I/64 dated 29.08.2019**

Following points were discussed for early integration of Switchyard data, LRPP data , LTPS Phase –II HV side data and Steam Turbine HV Data :

1. Joint visit of AEGCL and NERLDC representatives made on 6th September in LTPS and LRPP Generating station with the objective of improving the telemetry status.

2. A joint meeting was organized by GM LTPS ,DGM LTPS and other senior and field officials along with AEGCL and NERLDC representative to decide how to proceed with improving the telemetry status and also Nodal officers for telemetry work was identified from APGCL and AEGCL for proposed actions and rectifications. Nodal officers from APGCL and AEGCL are as follows:

   a. Sri Harinarayan Hazarika, AGM (Electrical) APGCL
   b. Sri Bikash Sarma , DM APGCL
   c. Sri Migom Mili ,DM APGCL
   d. Sri Sanjay Mallick, AM APGCL
   e. Sri Debojit Saikia DM AEGCL

6/9/19
GM NERLDC (in presence of)

3. It has been observed under joint visit of representatives that LV side 3 nos. Generators of LTPS Phase-II and 1 no. Steam Turbine Generator is reporting SLDC via AREVA C264 RTU installed at Switchyard Control Room. However the digital data i.e CB and isolator status is not reporting

4. In the LTPS switchyard all the analog data except Namrup Feeder I MW ,MVAR ,Bus Coupler CB and isolator status are reporting to SLDC .

5. No real time data from LRPP reporting to SLDC.

6. Based on the above observation the team of APGCL nodal officers and AEGCL, NERLDC representatives a detailed field study was made and following are the suggestions for implementation

i. **For LRPP**

The nodal officers of APGCL have to study with the vendor Warstila for integration of electrical parameter data over IEC 60870-5-101/104 to the communication equipment located at switchyard control room. The nodal officers have to initiate an email to get the confirmation regarding the above said configuration on or before 16th September 2019.
Also the nodal officers have to collect detailed information on as built control system automation layout (Document No. CBG012478O1A1000).Copy enclosed.
AEGCL will ensure physical communication interface for IEC 60870-5-101/104 is available at LTPS switchyard Communication equipment. The nodal officer of AEGCL has to ensure the link upto SLDC Kahilipara.

ii. **For LTPS Phase –II and Steam Turbine**

Nodal officer of APGCL has to ensure the commissioning of 4 nos. MFTs at HV side of the Generator to C264 RTU and for the CB status data of both LV side and HV side of generator also to be provided.
During the above discussion APGCL submitted that 4nos. MFTs may be provided by AEGCL. In this nodal officer of APGCL may send official request through proper channel.

iii. **For switchyard**

Namrup Fdr-1 analog data and CB data of Namrup Fdr-1 to be rectified by AEGCL by September 2019.

Integration of 11/132KV Trafo-1 and Trafo-2 Analog MW and MVAR data at HV side along with CB status of the bay need to be done by AEGCL.

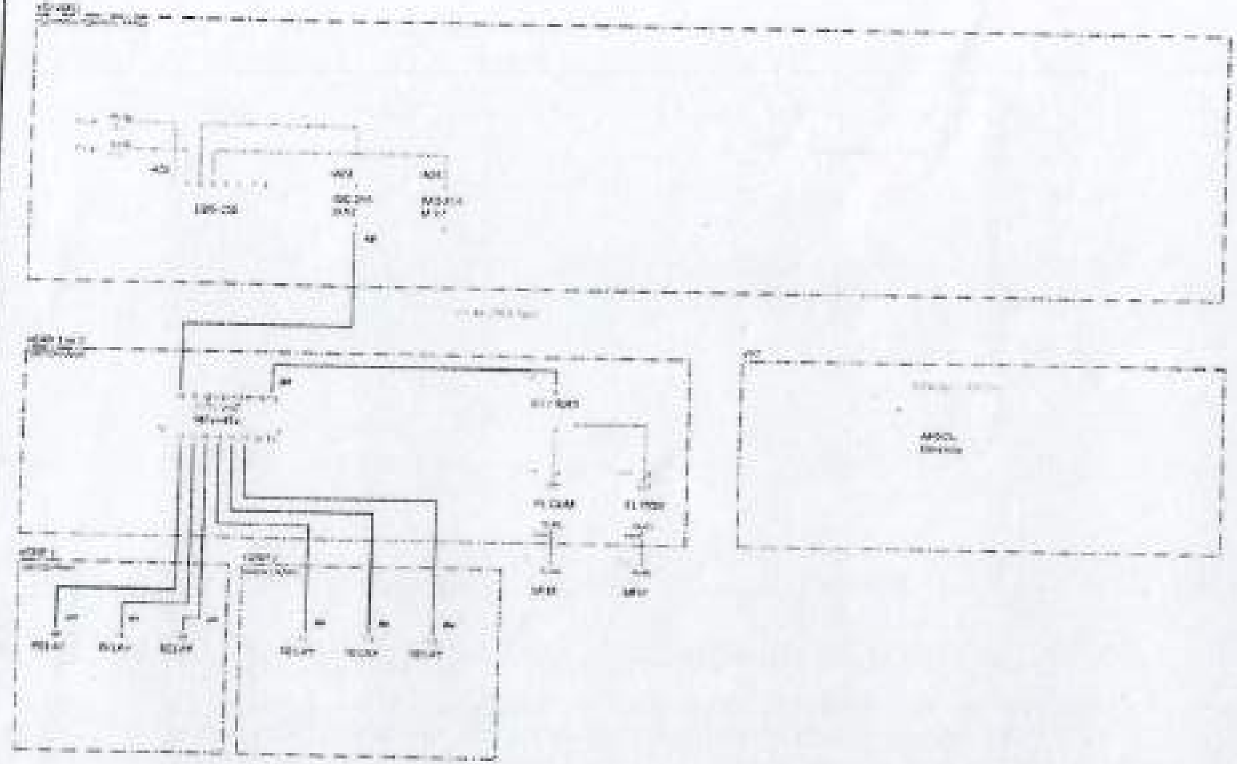
Integration of 132/33KV Trafo-1 and Trafo-2 Analog MW and MVAR data at HV side along with CB status of the bay need to be done by AEGCL.

AEGCL to ensure the integration of above switchyard data latest by September 2019.

iv. **Voice communication from LRPP and LTPS to SLDC Kahilipara**

AEGCL will ensure the voice communication from LRPP and LTPS unit control room to Kahilipara for which APGCL has to provide necessary cabling from unit control room to switchyard Communication room with necessary handset at unit control room.
The work targeted to complete by September 2019.

GM NERLDC (in presence)



WÄRTSILÄ

Control System Automation Layout

ABB Oy

CBG012478 01 A1000

MOM held between APGCL and AEGCL at O/o GM NTPS, Namrup, Assam-786622 on 7th September 2019

Members Present :

For APGCL	For AEGCL	For NERLDC
Sri A Rahman DGM (O&M)	Sri. P. Saha AGM	Sri M. K Ramesh GM
Sri N R Kakati DGM NRPP	Sri D. Saikia DM	
Sri Biswajyoti Gohain AGM	Sri A. Sarmah DM	

Reference:

A. **Letter No: APGCL/CGM(G)/AERC/2018/115/PT-XI/39, dated 28-08-2019**
B. **Letter No: MD/AEGCL/DPRO/2017/Part-I/64 dated 29.08.2019**

Following points were discussed for early integration of Namrup Switchyard data, NRPP data, NTPS data:

1. Joint visit of AEGCL and NERLDC representatives was made on 7th September in NTPS and NRPP Generating station with the objective of improving the telemetry status.

2. A joint meeting was organized by DGM NTPS , DGM NRPP and other senior and field officials along with AEGCL and NERLDC representative. in opening meeting GM NERLDC emphasis the requirement of real time telemetry for efficient grid operation for SLDC and RLDC operators. He also explained the current status of Namrup station telemetry status.In order to stream line the work progress it is sugeested to identify Nodal officers for telemetry work from APGCL and AEGCL. Nodal officers from APGCL and AEGCL are as follows:

   a. Sri Biswajyoti Gohain AGM OP&D APGCL
      (Contact No: 9954431528 email-id: biswajyoti_gohain@yahoo.co.in)
   b. Sri Deepjyoti Gogoi AGM NRPP Electrical APGCL
      (Contact No: 8486017915/7002080576 email-id: djgogoi_jec@yahoo.co.in)
   c. Sri Debojit Saikia DM Communication AEGCL
      (Contact No: 8724904083 email-id: talk2devajeet@gmail.com)

3. It has been observed under joint visit that no telemetry data is reporting to SLDC for quite long duration .Hence team made the field visit to AEGCL switch yard to see the condition of RTU and Communication status. The RTU was healthy and after fault finding it was observed that communication channel was faulty and as such data port shifted to spare channel and Namrup data started reporting to SLDC.

7/9/19
DGM (O&M)

07/09/19
DGM, NRPP

07/09/19

7/9/19

03/09/19

220 KV Mariani Feeder not integrated to existing RTU.

4. The Namrup database available at SLDC out of 6 units.Only 5 are in service Unit 1 was decommissioned. The representative visited NTPS and found that in 5 units MFMs installed in LV side CR panels of the Generating units and only one unit is getting power supply. Remaining DC supply was switched off and APGCL agreed to extend the dc auxiliary supply by 20-Sep-19.
5. The digital data i.e CB and isolator status is not reporting. AEGCL and APGCL explore the possibility of extending status data to RTU located at switchyard or providing RTU at Unit Control Room.
6. In the NTPS switchyard the digital status of isolator and CB are suspect and also 220/66KV Transformer 2 data is not reporting.
7. No real time data from NRPP reporting to SLDC at present. NRPP will initiate the matter with BHEL so that necessary configuration can be made by 25th September 2019 and AEGCL nodal officer will look for the configuration communication channel up to SLDC.
8. Based on the above observation the team of APGCL nodal officers and AEGCL, NERLDC representatives a detailed field study was made and following are the suggestions for implementation

i. **For NRPP**

NRPP of switchyard real time data at switchyard control room is available in local SCADA and NRPP has to coordinate with BHEL to configure the gateway for transmission of real time switchyard data to SLDC Kahilipara. All relevant address list for SLDC SCADA System may be collected by NRPP.

AEGCL will ensure physical communication interface for IEC 60870-5-101/104 available at NTPS switchyard Communication equipment. The nodal officer of AEGCL has to ensure the link up to SLDC Kahilipara.

This action will help the SLDC to get NRPP Switchyard data before COD.

ii. **For switchyard**

Suspected analog and digital data to be rectified by AEGCL by December 2019.AEGCL representative submitted that under PSDF the switchyard CRP panels are going to be replaced and work to be started by September 2019. However AEGCL nodal officer will ask to configure the gateway first as per the IOA list to be provided by SLDC so that phase by phase data integration can be reported to SLDC and till than 2 separate data channels will be maintained for switchyard data.

AEGCL to ensure the integration of above switchyard data latest by December 2019.APGCL requested AEGCL to take up the matter of renovation of wideband communication room where Communication equipment are placed as the room is prone to moisture and heavy rain water seepage.

iii. **Voice communication from NRPP and NTPS to SLDC Kahilipara**

AEGCL will ensure the voice communication from NRPP and NTPS unit control room, NRPP switchyard to SLDC Kahilipara for which APGCL have to provide necessary cabling from unit control room to switchyard along with handsets.

iv. SLDC will do the necessary modeling of SLD of NRPP in SCADA and provide IOA address list and IPs for IEC 60870-5-104. All the data configuration requirement over 101 and 104 to be provided by SLDC Kahilipara

07/9/19 GM/NERLDC

2/9/19 DGM (O&M)

07/09/19 DGM NRPP

07/09/19

7/9/19

07/09/19

Sakal Deep (सकल दीप)

From: Sakal Deep (सकल दीप) <skldeep@posoco.in>
Sent: 12 January 2021 08:30
To: asldcscada@gmail.com
Cc: M K Ramesh (एम के रमेश); Akhil Singhal (अखिल सिंघल); Paominlal Doungel (पाओमिंलाल डौंगेल)
Subject: Re: Lakwa - Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC

Dear sir,

The following points may be clarified with concerned authorities:
1. Whether 132 kV SUT-1 signifies HV side of Transformer or LV side of Transformer?
2. HV Side and LV side data of both 132/11kV Transformers must be telemetered.
3. Position of tap changer of both 132/11kV must be telemetered.
4. Description of data points with physical address 8468 to 8502 is not clear. Which data is for which generating unit must be mentioned as same is required for database modelling.

This is for your kind information.

Regards,
Sakal Deep (सकल दीप)
System Logistics
North Eastern Regional Load Despatch Centre, Shillong
Power System Operation Corporation Ltd./पावर सिस्टम आपरेशन कारपरेशन लि.
(A Government of India Enterprise)

> On 11-Jan-2021, at 20:11, M K Ramesh (एम के रमेश) <mkramesh@posoco.in> wrote:
>
> Dear Sakal deep
> Check and revert back
> Coordinate with scada AEGCL also.
> Regards
> MK Ramesh
>
> Get Outlook for Android
>
> ---
>
> **From:** Assistant General Manager <comm.div.jht@gmail.com>
> **Sent:** Monday, January 11, 2021 12:53:31 PM
> **To:** SLDC SCADA <asldcscada@gmail.com>
> **Cc:** General Manager (LTPS) APGCL <gm-ltps@apgcl.com>; Lule, Manish <manish.lule@wartsila.com>; Birje, Mandar <mandar.birje@wartsila.com>; Dwivedi, Bhawani Sharan <bhawani.dwivedi@wartsila.com>; K.V, Joseph <joseph.k.v@wartsila.com>; dgmmrtc@gmail.com <dgmmrtc@gmail.com>; DGM MRT UA <dgmuatnc@gmail.com>; M K Ramesh (एम के रमेश) <mkramesh@posoco.in>; Manikumar, K <k.manikumar@wartsila.com>; Chief General Manager- Gen (APGCL) <cgm-gen@apgcl.com>; CGM APGCL <cgm-g@apgcl.com>; LRPP APGCL <lrpp@apgcl.com>; Mathews, Dennis Joseph <dennis.mathews@wartsila.com>

Subject: Fwd: FW: Lakwa - Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC

Dear sir,

Please find the list of signals available at LRPP end for necessary verification and remarks.

Regards,

Assistant General Manager
Communication Division, AEGCL
LMTC, Garmur, Jorhat 785 007

---------- Forwarded message ---------
From: **DGM (Project, LTPS) APGCL** <dgmp-ltps@apgcl.com>
Date: Fri, Jan 8, 2021 at 4:37 PM
Subject: Re: FW: Lakwa - Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC
To: plccghy@gmail.com <plccghy@gmail.com>, Assistant General Manager <comm.div.jht@gmail.com>
Cc: General Manager (LTPS) APGCL <gm-ltps@apgcl.com>, Lule, Manish <manish.lule@wartsila.com>, Birje, Mandar <mandar.birje@wartsila.com>, Dwivedi, Bhawani Sharan <bhawani.dwivedi@wartsila.com>, K.V, Joseph <joseph.k.v@wartsila.com>, dgmmrtc@gmail.com <dgmmrtc@gmail.com>, M K Ramesh (एम के रमेश) <mkramesh@posoco.in>, Manikumar, K <k.manikumar@wartsila.com>, Chief General Manager- Gen (APGCL) <cgm-gen@apgcl.com>, CGM APGCL <cgm-g@apgcl.com>, LRPP APGCL <lrpp@apgcl.com>, Mathews, Dennis Joseph <dennis.mathews@wartsila.com>

Dear Sir,

Please find the signals list available in COM 600 having IEC 60870-5-101 address as provided by Wartsila. Request your views on the same.

Thanks And Regards,

DGM(Projects)
LTPS, Maibella
94353-25535

On Fri, Dec 4, 2020 at 10:48 PM Mathews, Dennis Joseph <dennis.mathews@wartsila.com> wrote:

> Dear Sir,
>
> We are trying to get a solution for this. The engineers are not in a position to travel yet from Finland due to their respective companies travel restriction.
>
> We shall get back to you shortly on the way forward. Please give us a week to revert on this.
>
> Thanks and Regards,
>
> Dennis Mathews
>
> **From:** DGM (Project, LTPS) APGCL <dgmp-ltps@apgcl.com>
> **Sent:** 3 December 2020 12:53
> **To:** Acharya, Brajesh <brajesh.acharya@wartsila.com>; Mathews, Dennis Joseph <dennis.mathews@wartsila.com>
> **Cc:** General Manager (LTPS) APGCL <gm-ltps@apgcl.com>; Lule, Manish <manish.lule@wartsila.com>; Birje, Mandar <mandar.birje@wartsila.com>; Dwivedi, Bhawani Sharan <bhawani.dwivedi@wartsila.com>; K.V, Joseph <joseph.k.v@wartsila.com>; dgmmrtc@gmail.com; M K Ramesh (एम के रमेश) <mkramesh@posoco.in>; plccghy@gmail.com; Assistant General Manager <comm.div.jht@gmail.com>; Manikumar, K <k.manikumar@wartsila.com>; Chief General Manager- Gen (APGCL) <cgm-gen@apgcl.com>; CGM APGCL <cgm-g@apgcl.com>; LRPP APGCL <lrpp@apgcl.com>
> **Subject:** Re: FW: Lakwa - Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC
>
> Dear Sir,
>
> As mentioned in your trailing mail, there was a lockdown in the country and ABB engineers from Finland were not travelling due to COVID 19 situation, we request you to pursue this matter as we are getting reminders from AEGCL to complete the telemetry work at the earliest.
>
> Also we would like to clarify that shipping of COM-600 will not be feasible as there will be uncertainty about the work being completed successfully.

Looking forward to your reply.

Thanks And Regards,

DGM(Projects)

LTPS, Maibella

94353-25535

On Fri, Feb 28, 2020 at 2:26 PM Acharya, Brajesh <Brajesh.Acharya@wartsila.com> wrote:

> Dear Sir,
>
> We are extremely sorry for the delay in revert!!,
>
> In this case, ABB engineer in india are not capable/available to carry out this job and engineers from ABB finland are not available for travelling due to restrictions on travelling due to ongoing virus alert. Without ABB's support it is not possible to complete this work.
>
> Other option which is being explored is to send the COM-600 for necessary programming and get it programmed.
>
> In this option, we understand that there will many export formalities would be required to done from your (APGCL's) end as an owner of the engines and component.
>
> We request to please discuss it internally with your logistics people and seek the possibility of the same. We shall also talk to our logistics deptt and revert back with the list of requirements to export it to ABB finland
>
> Looking forward to conclude the issue soon,

With best regards,

Brajesh

From: DGM (Project, LTPS) APGCL <dgmp-ltps@apgcl.com>
Sent: 17 February 2020 17:58
To: Acharya, Brajesh <Brajesh.Acharya@wartsila.com>; Manikumar, K <k.manikumar@wartsila.com>
Cc: General Manager (LTPS) APGCL <gm-ltps@apgcl.com>; Lule, Manish <manish.lule@wartsila.com>; Birje, Mandar <mandar.birje@wartsila.com>; Dwivedi, Bhawani Sharan <bhawani.dwivedi@wartsila.com>; K.V, Joseph <joseph.k.v@wartsila.com>; dgmmrtc@gmail.com; M K Ramesh (एम के रमेश) <mkramesh@posoco.in>; plccghy@gmail.com; Assistant General Manager <comm.div.jht@gmail.com>; Mathews, Dennis Joseph <dennis.mathews@wartsila.com>
Subject: Re: FW: Lakwa - Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC

Dear Sir,

Please update on the status of the telemetry work as we are in the middle of February without any update from your end.

Thanks And Regards,

DGM(Projects)

LTPS, Maibella

94353-25535

On Fri, Jan 24, 2020 at 4:58 PM DGM (Project, LTPS) APGCL <dgmp-ltps@apgcl.com> wrote:

> Dear Sir,
>
> We hope for a positive outcome by 31st January, 2020 as communicated during your visit at LTPS, Maibella. Please update on the same.

Thanks And Regards,

DGM(Projects)

LTPS, Maibella

94353-25535

On Tue, Dec 24, 2019 at 1:50 PM Acharya, Brajesh <Brajesh.Acharya@wartsila.com> wrote:

> Dear Sir,
>
> In order to provide this solution, we require support from ABB finland.
>
> For making it easier we have requested to workout a solution where the project specific execution support can come from ABB india.
>
> ABB is working out the same and therefore some delay is expected. However, on our consistent push, ABB assured us to work out it as soon as possible(expected to revert by second week of Jan-2020 with offer)
>
> Request to bear with us till then,
>
> Hope to have an understanding on the above,
>
> With best regards,
>
> Brajesh
>
> +919930173324

From: DGM (Project, LTPS) APGCL <dgmp-ltps@apgcl.com>
Sent: 24 December 2019 13:24
To: Acharya, Brajesh <Brajesh.Acharya@wartsila.com>; Manikumar, K <k.manikumar@wartsila.com>
Cc: General Manager (LTPS) APGCL <gm-ltps@apgcl.com>; Lule, Manish <manish.lule@wartsila.com>; Birje, Mandar <mandar.birje@wartsila.com>; Dwivedi, Bhawani Sharan <bhawani.dwivedi@wartsila.com>; K.V, Joseph <joseph.k.v@wartsila.com>; dgmmrtc@gmail.com; M K Ramesh (एम के रमेश) <mkramesh@posoco.in>; plccghy@gmail.com; Assistant General Manager <comm.div.jht@gmail.com>
Subject: Re: Lakwa - Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC

Dear Sir,

Please update on the status of the telemetry work as was finalized in the MOM held on 22nd of November, 2019. The MOM is attached herewith for your reference.

Thanks And Regards,

DGM(Projects)

LTPS, Maibella

94353-25535

On Tue, Nov 19, 2019 at 1:43 PM DGM (Project, LTPS) APGCL <dgmp-ltps@apgcl.com> wrote:

> Dear Sir,
>
> M/S. Wartsila has intimated as given in the trailing mail that the resource person for telemetry work will be coming on 22nd of November, 2019. Please depute your concerned person for the job.
>
> Thanks And Regards,

DGM(Projects)

LTPS, Maibella

94353-25535

On Tue, Nov 19, 2019 at 11:26 AM K.V, Joseph <joseph.k.v@wartsila.com> wrote:

> Dear Sir,
>
> Good morning!
>
> Mr. Mandar Birje from Wartsila Automation will be at APGCL site on 22nd of this month.
>
> Please confirm the availability of your team on 22nd for discussion on the subject work.
>
> With Regards,
>
> Joseph K V
>
> Wartsila India Pvt. LTD
>
> Site- APGCL

From: Manikumar, K <k.manikumar@wartsila.com>
Sent: 7 November 2019 8:22
To: dgmp-ltps@apgcl.com
Cc: General Manager (LTPS) APGCL <gm-ltps@apgcl.com>; Dy. General Manager (O&M, LTPS) APGCL <dgmom-ltps@apgcl.com>; LRPP APGCL <lrpp@apgcl.com>; Assistant General Manager <comm.div.jht@gmail.com>; K.V, Joseph <joseph.k.v@wartsila.com>; Deenadayalan, R <R.Deenadayalan@wartsila.com>; M K Ramesh (एम के रमेश) <mkramesh@posoco.in>; Nandy, Ayan <ayan.nandy@wartsila.com>
Subject: RE: Lakwa - Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC

Dear Sir,

Apologies for the delay. The concerned people are on Diwali vacation, hence is the delay.

Our service department team is looking into the request and we will revert to you.

Regards,

K. Manikumar

From: DGM (Project, LTPS) APGCL <dgmp-ltps@apgcl.com>
Sent: Wednesday, November 6, 2019 12:50 PM
To: Nandy, Ayan <ayan.nandy@wartsila.com>; Manikumar, K <k.manikumar@wartsila.com>
Cc: General Manager (LTPS) APGCL <gm-ltps@apgcl.com>; Dy. General Manager (O&M, LTPS) APGCL <dgmom-ltps@apgcl.com>; LRPP APGCL <lrpp@apgcl.com>; Assistant General Manager <comm.div.jht@gmail.com>; K.V, Joseph <joseph.k.v@wartsila.com>; Deenadayalan, R <R.Deenadayalan@wartsila.com>; M K Ramesh (एम के रमेश) <mkramesh@posoco.in>
Subject: Re: Lakwa - Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC

Dear Sir,

We request you to depute your service engineer at the earliest so that the Generation data of LRPP is reflected at SLDC.

Thanks And Regards,

DGM(Projects)

LTPS, Maibella

94353-25535

On Mon, Oct 28, 2019 at 11:24 AM DGM (Project, LTPS) APGCL <dgmp-ltps@apgcl.com> wrote:

> Dear Sir,

Please update on the status for the configuration of the address provided by SLDC.

On Mon, 30 Sep 2019, 14:48 Nandy, Ayan, <ayan.nandy@wartsila.com> wrote:

> Dear Manikumar
>
> Noted your email –
>
> I will take this forward.
>
> With best regards
>
> Ayan Nandy
>
> +91 9831046772
>
> +91 8928955227

From: Manikumar, K <k.manikumar@wartsila.com>
Sent: 26 September 2019 14:06
To: GM (LTPS) APGCL <gm-ltps@apgcl.com>
Cc: dgmp-ltps@apgcl.com; DGM (O&M, LTPS) APGCL <dgmom-ltps@apgcl.com>; LRPP APGCL <lrpp@apgcl.com>; comm.div.jht@gmail.com; K.V, Joseph <joseph.k.v@wartsila.com>; Deenadayalan, R <R.Deenadayalan@wartsila.com>; Nandy, Ayan <ayan.nandy@wartsila.com>
Subject: RE: Lakwa - Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC

Dear Sir,

As mentioned in my trailing mail dtd 20.09.2019, I have forwarded your request to our Mr. Ayan Nandy (copied in Cc of this mail)who will discuss with you about the modalities to take it forward.

Note to Mr. Ayan: You may contact Mr. Basumatri on mobile number 9435325535 to take forward their request.

Regards,

K. Manikumar

From: GM (LTPS) APGCL <gm-ltps@apgcl.com>
Sent: Thursday, September 26, 2019 1:09 PM
To: Manikumar, K <k.manikumar@wartsila.com>
Cc: dgmp-ltps@apgcl.com; DGM (O&M, LTPS) APGCL <dgmom-ltps@apgcl.com>; LRPP APGCL <lrpp@apgcl.com>; comm.div.jht@gmail.com; K.V, Joseph <joseph.k.v@wartsila.com>; Deenadayalan, R <R.Deenadayalan@wartsila.com>
Subject: Re: Lakwa - Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC

Dear Sir,

As requested in the trailing mail, we are sending you the address list of signal required by SLDC for configuring in the ABB gateway

attached herewith the e-mail.Please arrange for the configuration at the earliest.

This is for your kind information and necessary action.

On Fri, Sep 20, 2019 at 5:16 PM Manikumar, K <k.manikumar@wartsila.com> wrote:

Dear Sir,

As the trailing mail from APGCL was not clear to Wartsila, we had a teleconference with the concerned people from APGCL, AEGCL on 12.09.2019. From the discussions we understood the following.

1. APGCL installed Telemetry communication with SLDC in Switchyard for transmitting the signals from New 70MW Lakwa Powerplant.
2. Wartsila is requested to configure the COM 600 Gateway for transmitting the Signals and confirmed necessary FO cable and convertors are available in CFA901 and switchyard side.
3. The communication protocol required by APGCL is IEC 60870 -5-101/104
4. Wartsila confirmed that the IEC 60870-5-101/104 protocol is possible and ABB gateway need to be Configured for the same.
5. Wartsila advised APGCL to have the Address List of signal required by SLDC/APGCL
6. APGCL confirmed that the Signal list with Addresses can be prepared and will be shared whenever it is required.

We would like to appraise APGCL that the above requirement was not informed to Wartsila during the commissioning of LRPP.

In deed as the modifications works which were to be carried out in the switchyard control room by AEGCL & APGCL was not started till the plant commissioning time, APGCL advised Wartsila to ignore the integration work of switchyard panels with APGCL and AEGCL panels and go ahead with the commissioning activities of the power plant. Pl. see the point no.5 of the enclosed MoM dtd 19.01.2018 in this regard. However we will forward your above mentioned requirement to our service department who will submit their offer to APGCL to provide the necessary solution.

We assure you our best services.

Regards,

K. Manikumar

From: GM (LTPS) APGCL <gm-ltps@apgcl.com>
Sent: Saturday, September 7, 2019 11:54 AM
To: Manikumar, K <k.manikumar@wartsila.com>
Cc: dgmp-ltps@apgcl.com; DGM (O&M, LTPS) APGCL <dgmom-ltps@apgcl.com>; LRPP APGCL <lrpp@apgcl.com>; comm.div.jht@gmail.com; K.V, Joseph <joseph.k.v@wartsila.com>
Subject: Transfer of Telemetry data over IEC 60870-5-101/104 for reflecting at SLDC

Dear Sir,

A joint meeting was held among APGCL, AEGCL and NERLDC in which the non-reflection of electrical data at SLDC such as MW, MVAR, Circuit Breaker Staus and Isolator Status of 7 GEG were discussed. The generating station has to provide the electrical parameter data over IEC 60870-5-101/104 to the communication equipment located at switchyard control room. AEGCL has also requested for detail information on as built control system automation layout (Document NO. CBG0124801A1000).

So, we request you to configure the IEC 60870-5-101/104 protocol with our equipment at the earliest. We are enclosing the MOM and control system automation layout for your kind reference.

--

Yours faithfully,

General Manager,
LTPS, APGCL, Maibella

--

Yours faithfully,

General Manager,
LTPS, APGCL, Maibella

<LRPP COM600 address list rev -.xls>