



**106 वीं पीसीसी बैठक
हेतु
कार्यसूची**

**Agenda
for
106th PCC Meeting**

दिनांक: 16.09.2021

Date: 16.09.2021

पूर्वी क्षेत्रीय विद्युत समिति

Eastern Regional Power Committee

14, गोल्फ क्लब रोड, टॉलीगंज, कोलकाता: 700 033

14, Golf Club Road, Tollygunge, Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

AGENDA FOR 106TH PROTECTION COORDINATION SUB-COMMITTEE MEETING TO BE HELD ON 16.09.2021 AT 10:30 HOURS

PART – A

ITEM NO. A.1: Confirmation of minutes of 105th Protection Coordination sub-Committee Meeting held on 23rd Aug 2021 through MS Teams.

The minutes of 105th Protection Coordination sub-Committee meeting held on 23.08.2021 was circulated vide letter dated 07.09.2021.

Members may confirm.

PART – B

ITEM NO. B.1: Total Power Failure at 220 kV TTPS S/s on 11.08.2021 at 13:34 Hrs

220 kV Bus II & 220 kV TTPS-Meeramundali II was under shutdown prior to the disturbance.

At 13:34 Hrs, 220 kV Bus-I at TTPS tripped resulting in total power failure at 220 kV TTPS S/S. Around 150 MW load loss occurred at Chainpal, Duburi and Angul.

Relay Indications:

Time	Name	End 1	End 2	PMU Observation
13:34	220 kV Bus-1 at TTPS	Bus bar protection operated at TTPS	-	Around 17 kV dip in B-ph at TSTPP
	220 kV TTPS-Rengali PH I		-	
	220 kV TTPS-TSTPP I		Didn't trip	
	220 kV TTPS-Joda I		-	
	220 kV TTPS-Joda II		-	
	220 kV TTPS-Meeramundali I		Didn't trip (hand-tripped at 14:45 Hrs)	
	2*160 MVA 220/132 kV ICTs at TTPS		-	

Load Loss: 150 MW

Outage Duration: 00:15 Hrs

NTPC and OPTCL may explain.

ITEM NO. B.2: Total Power Failure at 220 kV Sonenagar S/s on 06.08.2021 at 15:18 Hrs

At 15:18 hrs, 220 KV Bus-I at Sonenagar got tripped on operation of bus bar protection. As a result, 220 KV Chandauti-Sonenagar D/C tripped leading to total power failure at 220/132 KV Sonenagar (BSPTCL) and radially connected 132 KV Substations.

Detailed report from ERLDC is attached at **Annexure B.2.**

Relay Indications:

Time	Name	End 1	End 2	PMU Observation
15:18	220KV Bus-1 at Sonenagar	Bus Bar Protection operated at Sonenagar	-	1 kV dip observed in Y_ph and B_ph voltage at Chandauti
	220 KV Chandauti-Sonenagar-1			
	220 KV Chandauti-Sonenagar-2			

Load Loss: 150 MW

Outage Duration: 00:19 Hrs

BSPTCL may explain.

ITEM NO. B.3: Major grid events other than GD/GI**ITEM NO. B.3.1: CESC Islanding event on 01/08/2021 at 18:18 and 19:50 Hrs.**

CESC system got islanded twice on 01st August due to Bus fault at 132 kV KASBA (WB) system and delayed fault clearance. Detailed Disturbance report is attached at **Annexure B.3.1.**

Following things needs to be discussed

- Delayed clearance from WB end.
- Large variation of Frequency within Islanded until it synchronized with Grid.

CESC and WBSETCL may explain.

ITEM NO. B.3.2: Tripping of Bus-1 at 220 kV Ramchandrapur on 20/08/2021 at 20:24 Hrs.

220 kV Bus-I at Ramchandrapur got tripped on operation of bus bar differential protection due to snapping of B-phase jumper of bus coupler bay. Detailed report is attached at **Annexure B.3.2.**

Further following issues need to be explained:

- Delayed clearance of the fault.
- Tripping of 220/132 kV ICT- IV at Chandil on REF for a fault at remote bus.

JUSNL may explain.

ITEM NO. B.4: Repeated Tripping of Transmission Lines and associated issues**ITEM NO. B.4.1: Repeated Tripping of 400 kV FSTPP-KHSTPP circuit-3.**

400 kV Farakka-Kahalgaon -3 had been tripped four times in the month of August-21 due to DT receipt at Kahalgaon end.

Details are attached below.

	Element Name	Tripping Date	Tripping Time	Reason	Remarks	Revival Date	Revival Time
>	400KV-FSTPP-KHSTPP-3	27/08/2021	05:52	TRIPPED FROM KAHALGAON END AGAIN		27/08/2021	16:15
>	400KV-FSTPP-KHSTPP-3	27/08/2021	03:59	KHSTPP: DT RECEIVED; TRIPPED FROM KAHALGAON END ONLY		27/08/2021	04:25
>	400KV-FSTPP-KHSTPP-3	27/08/2021	00:39	KHSTPP: DT RECEIVED; TRIPPED FROM KAHALGAON END ONLY		27/08/2021	01:54
>	400KV-FSTPP-KHSTPP-3	26/08/2021	09:58	FSTPP- No initiating relay operated, Only Main bay opened, KHSTPP-Only DT received		26/08/2021	10:35

NTPC & Powergrid may explain.

ITEM NO. B.4.2: Repeated Tripping of 220 kV Jorethnag – New Melli Line along with Unit -1 of Jorethang HEP

220 kV Jorethang -New Melli line has been tripped 3 times along with Unit-1 of Jorethang HEP with same fault location and nature.

Details are mentioned below:

	Element Name	Tripping Date	Tripping Time	Reason	Remarks	Revival Date	Revival Time
>	220KV-JORETHANG-NEW MELLI-2	31/08/2021	10:50	MELLI: B_N, FD-9.12 KM, FC-2.08KA, Z-1 JORHANG - B_N , FD - 6.5 KM , FC - 1.299 KA		31/08/2021	11:37
>	220KV-NEW MELLI-JORETHANG-1	30/08/2021	11:43	New-Melli- B-N, 1.894 kA, 10.07km, Z-II Jorethang-Awaited		30/08/2021	12:01
>	220KV-NEW MELLI-JORETHANG-1	10/08/2021	10:17	New Melli- B-N FD-10.07 km FC-1.98kA; Jorethang: O/C operated, Fd= 15,4 km		10/08/2021	10:58

Following discrepancy has been observed :

1. Same Fault Location and with High resistive nature:

In all the events it was observed that all the faults were at 10 Km from New Melli end in B phase and were of high resistive

2. Tripping of Unit -1 for Loss of field protection:

It was also observed that whenever there is any fault in any line, Unit -1 is tripping with loss of field protection. However Unit-2 remains stable. It is advised to check the AVR & Excitation system associated with Unit -1 to avoid such mal-tripping of units on loss of field protection.

Jorethnag HEP & Powergrid may explain.

ITEM NO.B.4.3: Repeated Tripping of 220 kV Joda-Ramchandrapur line.

In the month of August and September' 21, 220 kV Joda-Ramchandrapur line has been tripped on multiple occasions. Details of these tripping are provided below.

Element Name	Tripping Date	Tripping Time	Reason	Remarks	Revival Date	Revival Time
> 220KV-JODA-RAMCHANDRAPU R-1	20/08/2021	20:24	Joda: Z-2, B-N, Ib= 1.26 kA, Fd= 157.01 km		20/08/2021	22:43
> 220KV-JODA-RAMCHANDRAPU R-1	15/08/2021	11:53	Joda: R_N, 58.82 km, 1.67 kA Ramchandrapur: R_N, 1.65 kA		15/08/2021	12:20
Element Name	Tripping Date	Tripping Time	Reason	Remarks	Revival Date	Revival Time
> 220KV-JODA-RAMCHANDRAPU R-1	03/09/2021	21:52	JODA - DT RECEIVED - FAULT R_N , FD -161.35 KM Z2 , FC - 1.1 KA		04/09/2021	02:48
> 220KV-JODA-RAMCHANDRAPU R-1	03/09/2021	10:24	Joda-Z1 R-N FC- 1.377 kA FD- 42.37KMkm, Z-1, R-N, IR=1.89KA, , Dist.=98.4Km		03/09/2021	11:10
> 220KV-JODA-RAMCHANDRAPU R-1	02/09/2021	10:20	JODA: Z-1, E/F, FD-41 KM, FC- 0.5 KA; RAMCHPUR: Z-1, FD- 97.4 KM, FC-1.9 KA		02/09/2021	11:16
> 220KV-JODA-RAMCHANDRAPU R-1	01/09/2021	11:20	RAMCHANDRAPU R: Y-N, Fc= 0.75 kA, Z-1, Fd= 4.4 km; Joda: Y-N, Fc= 1.55 kA		01/09/2021	12:20

JUSNL and OPTCL may explain.

ITEM NO. B.4.4: Repeated Tripping of 132 kV Banka -Sultanganj D/C

132 kV Banka -Sultanganj D/C had been tripped repeatedly with fault in one circuit and due to overload for other circuit. These lines had tripped 17 times in last 2 months causing load loss at Sultanganj, Tarapur, Jagdishpur, Chitra, Deoghar. This issue was also observed earlier.

It is observed that in the month of August these lines got tripped due to Single phase fault at a distance of 18-20 km from Banka end where all tripping seems to be caused due to vegetation issue. Faults could be transient in nature as every time lines are getting charged within 30 Minutes.

Element Name	Tripping Date	Tripping Time	Reason	Revival Date	Revival Time
132 kV-BANKA (PG)-SULTANGANJ-2	31-08-2021	13:47	On overload	31-08-2021	14:10
132 kV-BANKA (PG)-SULTANGANJ-1	31-08-2021	13:47	Sultanganj -fault - R_N , FD - 3.8 km	31-08-2021	14:10
132 kV-BANKA (PG)-SULTANGANJ-2	28-08-2021	01:00	BANKA - FAULT - R_N , FD - 18.3 KM , FC - 4.7 KA	28-08-2021	01:27
132 kV-BANKA (PG)-SULTANGANJ-1	28-08-2021	01:00	TRIPPED DUE TO OVERLOADING ,	28-08-2021	01:23

			AFTER 132 KV BANKA - SULTANGUNJ -2 TRIPPED ON R_N FAULT		
132 kV-BANKA (PG)-SULTANGANJ-2	26-08-2021	22:30	TRIPPED DUE TO OVERLOADING , AFTER 132 KV BANKA - SULTANGUNJ -1 TRIPPED	26-08-2021	23:02
132 kV-BANKA (PG)-SULTANGANJ-1	26-08-2021	22:30	BANKA - R_N FAULT , FD - 18.1 KM , FC - 4.6 KA , SULTANGUNJ - R_N FAULT , FD - 21.7 KM , FC - 1.2 KA ,	26-08-2021	23:01
132 kV-BANKA (PG)-SULTANGANJ-1	26-08-2021	20:34	Sultanganj: Z1, R-N, 1.21kA, 21.6Km Banka: R-N, 4.4kA, 18.09Km	26-08-2021	20:58
132 kV-BANKA (PG)-SULTANGANJ-2	20-08-2021	14:10	Overload on ckt 2 due to tripping of ckt1, Tripped from PG end only	20-08-2021	14:44
132 kV-BANKA (PG)-SULTANGANJ-1	20-08-2021	13:55	Banka:-29.08 km ,2.872kA, Y-N, Z-I. Sultanganj:-Z-I, Y-N, 2.03kA, 9.8kM.	20-08-2021	14:44

BSPTCL may explain.

ITEM NO. B.4.5: Repeated Tripping of 132 kV Sultanganj- Deogarh D/C

132 kV Sultanganj-Deogarh had tripped 8(eight) times in the month of August-21. Details of these tripping are given below –

Sr. No	Element Name	Tripping Date	Tripping Time	Reason	Revival Date	Revival Time
1	132 kV-SULTANGANJ-DEOGHAR-1	29-08-2021	05:00	Sultanganj- z- 1 Y-N FC-Iy-1.841KA FD - 32.05km	29-08-2021	05:35
2	132 kV-SULTANGANJ-DEOGHAR-1	25-08-2021	17:37	DEOGHAR: B_N, FC-0.843 KA, SULTANGANJ:Ir=819.8A, Iy=76.91A, Ib=277.3A, Z-2,FD-107.3 KM	25-08-2021	18:05
3	132 kV-SULTANGANJ-DEOGHAR-1	18-08-2021	00:05	Sultan:1.79kA,R-ph.Deoghar:Didn't trip	18-08-2021	00:30

4	132 kV-SULTANGANJ-DEOGHAR-1	17-08-2021	20:20	Sultanganj:- O/C, E/F, Master trip relay operated Deoghar:- Not Tripped.	17-08-2021	20:55
5	132 kV-SULTANGANJ-DEOGHAR-1	13-08-2021	01:50	SULTANGUNJ: O/C, E/F	13-08-2021	02:15
6	132 kV-SULTANGANJ-DEOGHAR-1	08-08-2021	02:22	Sultanganj: Y-N ,114.7km,0.796 kA,Z-2	08-08-2021	03:10
7	132 kV-SULTANGANJ-DEOGHAR-1	06-08-2021	21:25	Sultanganj: DP, Z-2, B-Ph, 98.57 km, 0.862 kA	06-08-2021	21:45
8	132 kV-SULTANGANJ-DEOGHAR-1	04-08-2021	15:50	O/C E/F,29.90KM,Ir=65.49A,Iy=152A,Ib=1.865KA,Z-1	04-08-2021	16:25

In the past months also, line had been tripped many times for which discussions were held in the earlier PCC meetings.

In 105th PCC Meeting,

BSPTCL confirmed that line length of 132 kV Sultanganj-Deoghar S/C is 92 km, out of which 84 km from Sultanganj end comes under BSPTCL jurisdiction and rest 8 km from Deoghar end comes under JUSNL jurisdiction.

Regarding clearance issues, they informed that line shutdown has been planned on 26th Aug 2021 in order to resolve pending clearance issues.

Regarding protection settings of relays at Deoghar end, JUSNL informed that 132 kV Jamtara - Deoghar was LILoed at Chitra in Aug-2020. As a result line length of shortest and longest line at Deoghar S/S and Jamtara S/S had got changed and the protection settings at respective ends need to be reviewed. They further submitted that the settings at Deoghar and Jamtara end are being reviewed and revised settings would be implemented shortly.

PCC advised JUSNL to share the details regarding change in configuration in 132 kV Deoghar-Jamtara line to BSPTCL & DVC and advised BSPTCL & DVC to review the protection settings at 132 kV Sultanganj & Maithon S/s respectively.

BSPTCL & JUSNL may update.

ITEM NO. B.5: Status of Islanding Schemes in Eastern Region

1. KBUNL Islanding Scheme

In special meeting held on 08.06.2021, following deliberations were made –

1. KBUNL Islanding scheme would be designed considering both units of KBUNL stage-II (2x195 MW) as participating generator and connected radial loads at Gopalganj along with in-house load of KBUNL.
2. The islanding frequency will be at 48.6 Hz and this is subject to revision based on the suggestion received from KBUNL/OEM on underfrequency settings of the generator units.
3. Based on the revised simulation study result, ERLDC would communicate the desired frequency band to KBUNL for their units for stable operation of the islanding scheme. KBUNL would review the proposed range for frequency settings in consultation with their engineering wing & OEM and

communicate their observation to ERLDC in this regard. They would also take up for dynamic simulation study with regard to islanding mode of operation of the units.

4. KBUNL would confirm the provision of Islanding mode of operation in the governors of their Stage-II units.

5. Based on the response received from KBUNL to the above queries, a separate meeting would be convened to discuss further course of action.

6. KBUNL would expedite the construction work related to implementation of Islanding scheme in switchyard. They would also take up with concerned OEM for testing and commissioning of islanding relay panel at their end.

7. BSPTCL to submit the present status of the availability of communication channels (i.e. availability and status of OPGW, PLCC, DTPC coupler) in the transmission lines/substations considered under KBUNL islanding scheme.

In 105th PCC Meeting following deliberations were took place -

Regarding bay construction work at KBUNL switchyard, NTPC informed that construction work of three nos. bays had been completed and work related to 4th bay is in progress.

ERPC secretariat informed that time line for implementation of KBUNL islanding scheme had been decided as December-21 and advised NTPC to complete the pending bay construction work by target date i.e Sep 2021.

PCC also advised NTPC to share the e-mail confirmation regarding proposed range in frequency settings of the KBUNL Stage-II units to ERPC/ERLDC.

KBUNL may update.

2. CTPS Islanding Scheme

In special meeting held on 08.06.2021, following deliberations were made :

1. ERLDC would share the simulation study report with all concerned in DVC i.e. SLDC DVC, SPE wing of DVC & CTPS-B.

2. The CTPS-B islanding scheme is to be designed with two units of CTPS-B (2x250 MW) generating station as participating generator and connected loads at CTPS, Putki, Biada, Nimiaghata&Patherdih.

3. The islanding frequency for CTPS-B islanding system was decided as 48.4 Hz.

4. CTPS-B would take up with their OEM for confirmation of the following

- Provision of Islanded mode of operation in the governor of CTPS-B units.
- Provision for increasing the turbine over frequency settings to a higher value or enhancement of the time delay in existing settings.
- Detail study of islanding response of CTPS units based on the necessary simulation at islanding frequency of 48.4 Hz.
- Detailed study on dynamics of governor and turbine during formation of island at islanding frequency of 48.4 Hz.

5. DVC would take up with concerned OEM for necessary installation & testing of islanding panel at CTPS-B end.

In special meeting held on 06.08.2021, following deliberations took place –

Regarding increasing the turbine over frequency settings to a higher value or enhancement of the time delay in existing settings, they informed that their C & I wing as well as OEM had expressed their reservation in raising the over-frequency setting or increasing the time delay.

Representative of SPE wing of DVC updated that necessary discussion for implementation of the scheme at CTPS-B is going on with M/s GE for finalization of the scope of work & other modalities. He submitted that the tender process for implementation of islanding scheme would be initiated within two weeks.

DVC was advised to prepare the detail action plan for implementation of the scheme along with time line for each milestone and submit it to ERPC secretariat within fortnight. They were also advised to take all measures in expediting the implementation work.

In 105th PCC Meeting,

PCC advised DVC to submit present status of the implementation work as well as a detail action plan with time line for each milestone for implementation of CTPS islanding scheme.

DVC may update.

3. IB-TPS Islanding Scheme

In special meeting held on 09.04.2021, OPGC representative informed the followings:

- a) PLCC work has already been completed and the signal is available at their end.
- b) The annual overhauling of IBTPS is scheduled on 17th April 2021 for 25 days.
- c) OEM (BHEL) is developing a new scheme and the same would be implemented during the overhauling period after getting confirmation from OEM.

OPGC was advised to share the requisite details to ERPC secretariat at the earliest.

In special meeting held on 06.08.2021, following deliberations took place –

OPGC representative informed that work order had been placed on OEM M/s BHEL for implementation of the Islanding scheme at IB TPS units. However, they are facing great difficulty in getting the response from OEM.

MS, ERPC advised OPGC to submit all the relevant documents with regard to their communication with OEM to ERPC secretariat so that the issue may be taken up with appropriate authority.

OPGC was also advised to take up the issue with their highest authority as well as with the OEM for expediting the implementation of islanding scheme.

In 105th PCC Meeting,

OPGC representative intimated that after special meeting dated 06/08/21, they tried to communicate OEM (M/s BHEL) several times however no response was received from the OEM till date.

PCC advised OPGC to submit all the relevant documents with regard to their communication with OEM to ERPC secretariat so that the issue may be taken up with appropriate authority.

OPGC may update.

4. Patna Islanding Scheme

In special meeting held on 06.08.2021 following deliberations took place –

1. SLDC Bihar was advised to submit the following:

I. Revised base case considering the following:

- Peak load scenario of 2021-22(March-22)of the Patna Islanding area.
- Off-peak load scenario of 2021-22(March-22) in Patna Islanding area.
- Critical/essential loads of Patna (Load to be considered during islanding operation with one unit of NPGC).

II. The disconnection points may be reviewed by SLDC, Bihar considering their operation philosophy in practice.

III. The present status of the availability of communication channels(i.e. availability & status of OPGW/PLCC, DTPC coupler)in transmission lines/substations considered under the Patna Islanding scheme.

IV. SLDC Bihar was also advised to make a provision of dedicated page in SCADA display in their control room for Patna Islanding Scheme. Through the display, vital parameters like actual generation & load within the electric boundary of the island, voltage, frequency, power flow in peripheral lines can be monitored.

2. NPGC was advised to submit the inhouse load quantum of Nabinagar units to ERPC and ERLDC.

3. BGCL was advised to submit the present status of the work for 440/220/132 kV Jakhanpur S/s and its associated 220kV and 132 kV lines along with the target date of completion to ERPC and ERLDC.

4. It was decided that tentative frequency for triggering of the islanding operation would be considered at 48.4 Hz. This frequency would be reviewed after completion of the islanding simulation study by ERLDC.

On receipt of the revised base case and confirmation of disconnection points and by Bihar, ERLDC would carry out further study & submit their observation within two weeks.

In 105th PCC Meeting,

SLDC Bihar representative informed that the revised base cases would be submitted within two days.

PCC advised SLDC Bihar to coordinate with BGCL for submitting the present status of the work for 440/220/132 kV JakhanpurS/s and its associated 220kV and 132 kV lines along with the target date of completion.

PCC advised NTPC to submit the in-house load quantum of Nabinagar STPP units to ERPC and ERLDC.

SLDC Bihar & NTPC may update.

5. Ranchi Islanding Scheme

In special meeting held on 06.08.2021 following deliberations took place –

- 1) The Ranchi islanding scheme would be designed considering the present network configuration excluding the new/upcoming substations.
- 2) The island would be formed with one unit of TenughatTPS(150-160 MW average generation) & Inland IPP(50-55 MW average generation) as participating generator & essential/critical loads of Ranchi to the tune of 180 MW.
- 3) JUSNL would submit the revised base case considering only critical/essential loads of Ranchi which is to be considered under islanding scheme along with the disconnection points.
- 4) Considering the age of Tenughat units and to enhance the success rate of island, it was decided that triggering frequency for of the islanding operation would be kept at 48.5 Hz. This frequency would be reviewed after completion of the islanding simulation study by ERLDC.
- 5) On receipt of the revised base case & disconnection details, ERLDC would carry out further study & submit their observation within two weeks.

In 105th PCC Meeting,

JUSNL informed that revised base case along with the disconnection points for Ranchi Islanding Scheme had been sent to ERLDC.

ERLDC stated that the details had been received from JUSNL and they would carry out the study & submit their report within two weeks.

SLDC Jharkhand may update.

ITEM NO. B.6: Tripping Incidence in month of August 2021

Tripping incidents in the month of August 2021 which needs explanation from constituents of either of the end is attached at **Annexure B.6**.

Concerned utilities may explain.

PART- C::OTHER ITEMS

ITEM NO. C.1: Schedule of Training Program on PSCT and PDMS by PRDC

As part of 4th year support period, PRDC has conducted online training program on PDMS & PSCT at Bihar & West Bengal. In continuation to same PRDC is going to conduct online training program for Jharkhand, Odisha and Sikkim as per the following schedule.

SI No.	Date	State
1	27.09.2021-28.09.2021	Jharkhand
3	04.10.2021-05.10.2021	Odisha
5	25.10.2021-26.10.2021	Sikkim

Members may note.

ITEM NO. C.2: Backup Overcurrent Relay coordination for Sikkim Complex.

In 97th PCC following deliberations were made,

It was informed that IDMT characteristics were implemented at Jorethang and Tashiding.

In 103rd PCC following deliberations took place –

Powergrid informed that the protection philosophy for backup protection of lines & ICTs being followed by them in Sikkim Complex is as follows:

- Philosophy of T-op for Lines = (Z3 + 0.1) Sec,
- Philosophy of T-op for Transformer = (Z3+0.1) for O/C & (Z3+0.2) for E/F

However, the proposed settings for ICTs based on PRDC study is:

- T-op for HV & LV side=0.8 Sec for O/C and T-op for HV & LV= 1.4 sec for E/F

They suggested to review the proposed settings in line with their existing settings for lines & ICTs in Sikkim Complex.

They further informed that zone 3 settings of 400 kV Kishangunj-Rangpolineis1.5 second whereas proposed settings for backup overcurrent relay of line is 1.2 second which would result in tripping of DEF before zone 3 of distance protection.

PCC advised PRDC to carry out revised study considering the existing zone-3 settings by Powergrid and share report among concerned utilities for implementation of revised settings at their end.

In 104th PCC, PRDC informed that the revised study considering the zone-3 settings of the transmission lines in Sikkim Complex would be completed within a week.

PCC advised PRDC to share the report among concerned utilities for implementation of revised settings at their end.

Further, the revised study had been carried out by PRDC considering the Powergrid philosophy in practice & existing zone-3 settings of the line.

In 105th PCC Meeting, PCC advised all concerned utilities to implement the proposed settings in the line at their respective ends as given in the report attached at **Annexure C.2**.

Members may update.

ITEM NO. C.3: Review of guideline for over voltage setting for anti-theft charging of 765 kV, 400 kV and 220 kV Lines --ERLDC

In 67th PCC meeting, Relay settings were finalized for anti -theft charging of lines where over voltage setting was finalized as mentioned below:

- Over voltage Stage-I - Overvoltage pick up should be minimum of all the lines connected from the charging substation with minimum grading and minimum time delay corresponding to other lines which are in service.
- Further, it was informed to utilities to keep it above 105 % but it should also be lower than any of the other lines over voltage setting.

However, many utilities keep it at 105 % itself which is leading to tripping of line during charging itself. These can be due to operational regime voltage of substation being around 416-420 kV and during charging the over voltage criteria of 105 % is already reached.

Therefore, it is suggested to insert a guideline that,

- Based on charging end substation voltage profile, utilities should keep overvoltage pickup of anti-theft charge line as 1 or 2 % below the minimum over voltage setting of all lines from that substation.

It is suggested that for anti-theft charge line, if utilities desired to keep O/V enabled for remote end (open end) substation then:

- It should be greater than the rated voltage of equipment e.g.: for 400 and 765 kV lines it should not be less than 110% and for 220 kV it should be at least 112%.
- If utility finds that at remote end is observing high voltage, then they may request respective SLDC or ERLDC to open the circuit to avoid any equipment issue.

These will reduce unwanted tripping of anti-theft charged line.

Further, in line with the discussions held during 102nd PCC Meeting, requirement O/V protection for Anti-theft charging of 220 kV lines also need to be discussed.

Members may discuss.

ITEM NO. C.4: Protection coordination of the New Transmission elements to be charged in Eastern Region

ITEM NO. C.4.1: FTC for LILO of 400 kV Patna-Kishanganj D/C at Saharsa

As per information received at ERLDC, 400 kV Patna -Kishanganj is being LILOed at Saharsa along with FTC of following element. Details of the line (as received at ERLDC)

- LILO of 400 kV Patna-Kishanganj D/C at Saharsa along with associated bays.
- 400 kV 125 MVar Bus Reactor 1 & 2 along with associated bays at Saharsa.
- 400/220 kV ICT 1 & 2 along with associated bays at Saharsa.
- 220/132 kV ICT 1 & 2 along with associated bays at Saharsa.

Name	Conductor type	Length
400 kV Patna -Saharsa-I&II	ACSR Quad Moose	238.16 km
400 kV Saharsa-Kishanganj-I&II	ACSR Quad Moose	183.235 km

Protection coordination may be required as per the following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
400 kV Patna - Kishanganj D/C lilo at Saharsa	Patna & Kishanganj	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	POWERGRID ER-1	Yet to be received
	Saharsa	Protection coordination to be done for all newly connected elements as per ERPC's guidelines. Time grading to be done for Saharsa as Zone-2&z-3 will overlap with adjacent shortest line.	PMJTL	Yet to be received
	S/S connected to Patna & Kishanganj: Barh ,Balia , Npgc ,Binaguri , New Purnea , Rangpo , Teesta-III,DMTCL	For all adjacent substations connected to Patna & Kishanganj, adjacent longest line length will reduce significantly, so Zone-3 settings will be affected. Previously Patna-Kishanganj(420km) was longest which will now be Patna-Saharsa(238km) for all adjacent s/s connected to Patna ,eg: Barh,Balia,NPGC. For all adjacent S/S to Kishanganj such as:,DMCTL,Binaguri,Purnea,Teesta-3,Rangpo adjacent longest line length will also reduce. In case of Zone 2 &Zone 3 overlap of adjacent sections Time grading to be ensured. Kindly check and confirm any setting revision if required.	POWERGRID ER-1&2. NPGC/NTPC BARH/DMTCL/ TVPTL	Yet to be received

Following details are to be shared by various utilities:

- POWERGRID ER-1, ER-2, PMJTL, NPGC, NTPC BARH, DMTCL, TVPTL may share whether revision of any existing protection setting at above mentioned S/S is required or not. In case of any revision, the revised setting may be shared with ERPC and ERLDC.
- The protection setting at Patna & Kishanganj, Saharsa may be shared with ERPC and ERLDC.
- Status of carrier protection and PLCC channel in the all above mentioned section may be shared.

Concerned utilities may update.

ITEM NO. C.4.2: FTC of 765 kV Medinipur-New Jeerat- D/C

As per information received at ERLDC, following elements have been first time charged at 765/400 kV New Jeerat S/S.

1. 765/400 kV, 1500 MVA ICT-I at New Jeerat SS along with associated bays.
2. 765/400 kV, 1500 MVA ICT-II at New Jeerat SS along with associated bays.

3. 765 kV Medinipur-New Jeerat-I Line along with associated bays at both the end(169 km Hex Zebra).
4. 765 kV Medinipur-New Jeerat-II Line along with associated bays at both the end (169 km Hex Zebra).
5. 765 kV Main Bus-I NewJeerat SS.
6. 765 kV Main Bus-II New Jeerat SS.
7. 400 kV Main Bus-I NewJeerat SS.
8. 400 kV, 125 MVar Bus Reactor I at New Jeerat SS along with associated bays.
9. 400 kV, 125 MVar Bus Reactor II at New Jeerat SS along with associated bays.
10. 765 kV, 330 MVar Bus Reactor I at New Jeerat SS along with associated bays.
11. 765 kV, 330 MVar Bus Reactor II at New Jeerat SS along with associated bays.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
FTC of 765 kV Mednipur-New Jeerat (PMJTL SS) Ckt-I&II	Mednipur	Protection coordination to be done for all newly connected elements as per ERPC's guidelines. Busbar protection to be ensured.	PMJTL	Response received/Relay setting to be received
	New Jeerat	Protection coordination to be done for all newly connected elements as per ERPC's guidelines. Busbar protection to be ensured.	PMJTL	Response received/Relay setting to be received
	S/S connected to Mednipur: New Ranchi	Adjacent Shortest line will be now New Jeerat-Mednipur(169 km). Hence Zone-2 of adjacent lines may overlap with this section so ,Z-2 time grading for co-ordination required.Kindly check and confirm any setting revision if any change in adjacent short and long line.	POWER GRID ER-1	Response received/Relay setting to be received

Following details to be shared/confirmed:

- PMJTL/POWERGRID ER-1 may share whether revision of any existing protection setting at above mentioned S/S is required or not. In case of any revision, the revised setting may be shared with ERPC and ERLDC.
- Protection setting of all the elements as mentioned above may be submitted.
- Status of carrier protection and PLCC channel in the all above mentioned section may be shared.

Concerned utilities may update.

ITEM NO. C.4.3: FTC of 220 kV Ranchi-Ramgarh S/c

As per information received at ERLDC, following element has been charged or the first time at 400/220 kV Ranchi (PG) S/S.

220 kV RANCHI(PG)-RAMGARH,

- Total Length-94.47 KM, AAAC Single Zebra

As per information available, protection coordination may be required as per the following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
FTC OF 220 kV RANCHI(PG)-RAMGARH,	RANCHI	Protection coordination to be done for all newly connected elements as per ERPC's guidelines. Busbar protection to be ensured.	PG-ER-1	Received
	RAMGARH	Protection coordination to be done for all newly connected elements as per ERPC's guidelines.	DVC	Received
	S/S connected to RANCHI(PG): Chandil ,Hatia	Adjacent longest line will be now 220 kV RANCHI(PG)-RAMGARH, (94.47km). Hence Zone-3 settings at Chandil and Hatia end may be changed keeping in view it should not encroach next voltage level. Kindly check and confirm any setting revision if any change in adjacent short and long line.	JUSNL	Received/Relay setting to be received

Following Details to be shared:

- POWERGRID ER-1/DVC/JUSNL may share whether revision of any existing protection setting at above mentioned S/S is required or not. In case of any revision, the revised setting may be shared with ERPC and ERLDC.
- Status of carrier protection and PLCC channel in the all above mentioned section may be shared.

Concerned utilities may update.

ITEM NO. C.4.4: FTC for LILO of 220 kV Purnea-Begusarai-I at Khagaria

As per information received, 220 kV New Purnea (PG)-Begusarai-I is being LILOed at Khagaria. After LILO, lines will be as below (as received at ERLDC):

Name	Conductor type	Length
220 kV New Purnea (PG)-Khagaria-I	ACSR Triple Zebra	102 km
220 kV Begusarai-Khagaria-I	ACSR Triple Zebra	98 km

Reason	S/S may be affected	Remarks	Utility to respond
FTC OF 220 kV New Purnea (PG)-Khagaria I & 220 kV Khagaria-Begusarai I (LILO of 220 kV New Purnea (PG)-Begusarai I at Khagaria)	Khagaria	Protection coordination to be done for all newly connected elements as per ERPC's guidelines. Busbar protection to be ensured. Adjacent longest line for existing lines at Khagaria was previously 220 kV New Purnea (PG)-Begusarai. Now it will change. Hence, Zone-3 settings for existing lines at Khagaria may be reviewed keeping in view it should not encroach next voltage level.	BSPTCL
	New Purnea (PG)	Protection coordination to be done for all newly connected elements as per ERPC's guidelines.	PG ER-I
	Begusarai	Protection coordination to be done for all newly connected elements as per ERPC's guidelines.	BSPTCL
	S/S connected to New Purnea(PG): Purnea(PG), Madhepura	Adjacent longest line will be now 220 kV New Purnea(PG)-Khagaria,(102 km). Hence Zone-3 settings at Purnea(PG) and Madhepura end may be reviewed keeping in view it should not encroach next voltage level. Kindly check and confirm any setting revision if any change in adjacent short and long line.	BSPTCL, PG ER-I
	S/s connected to Begusarai: Samastipur, Barauni (BTPS)	Adjacent longest line for Samastipur, Barauni (BTPS) will be now 220 kV Begusarai-Khagaria (98 km). Hence Zone-3 settings at Samastipur, Barauni (BTPS) end may be reviewed keeping in view it should not encroach next voltage	BSPTCL

	level. Kindly check and confirm any setting revision if any change in adjacent short and long line.	
--	---	--

Following details to be shared:

- Respective Utilities may share whether revision of any existing protection setting at above mentioned S/S is required or not. In case of any revision, the revised setting may be shared with ERPC and ERLDC.
- Status of carrier protection and PLCC channel in the all above mentioned section may be shared.

Concerned utilities may update.

PART- D:: FOLLOW-UP OF PREVIOUS PCCM

ITEM NO. D.1: Total Power Failure at 220 kV Rengali HEP on 27/07/2021 at 08:57 Hrs

At 08:57 hrs, all feeders connected to Rengali PH S/s tripped along with Unit # 1, 2, 4 and 5. As per the information received, there was a fault in the downstream i.e. 33kV system at Rengali PH which get cleared at 220 kV Rengali PH end.

In 105th PCC Meeting following deliberations took place –

OHPC representative clarified that there was no fault in downstream i.e.33 kV system on the day of disturbance. However, all 220 kV feeders at Rengali PH tripped from Rengali PH end on overvoltage protection. Simultaneously generating units#1,2, & 4 got tripped on reverse power flow protection which resulted in total power failure at Rengali PH S/s.

- Regarding overvoltage settings protection at Rengali PH end, they informed that the settings are uniform for all the 220 kV lines & the values are as follows.
 - Main-1 relay(old): 136 % with instantaneous tripping
 - Main-2 relay (new relay): 125 % with 5 second delay.
- They added that during the disturbance the overvoltage protection of main-2 relay got operated and tripped all the feeders.

It was informed that no tripping was observed from remote end of the lines.

During analysis, it was observed that the overvoltage condition was being observed at Rangali PH only whereas no such condition was reported at nearby OPTCL substations.Also, it was informed that similar incident of tripping of the lines at Rengali PH in overvoltage protection was reported in the month of October-2020.

PCC opined that the earth resistance of substation is an important factor for localized overvoltage condition and suggested OHPC to do root cause analysis of the event in order to find out the reason for overvoltage.

After detailed deliberations, PCC further advised the followings to OHPC:

- to check the earth resistance of the individual earth pits as well as structures in the

substation.

- to verify DAVR settings and operation of limiters in DAVR for the generating units for any discrepancies.
- to set overvoltage settings in all the relays in range of 135 % to 140 % at their end for all feeders with proper time and voltage grading. PCC also advised OHPC to develop a uniform philosophy for overvoltage settings in consultation with SLDC Odisha, OPTCL & ERLDC.
- to find out the reason for tripping of the generating units in reverse power flow protection.

OHPC was advised to submit a detailed report on root cause analysis of the above event.

OHPC may update.

ITEM NO. D.2: Repeated Tripping of 220 kV Budhipadar-Korba & 220 kV Budhipadar-Raigarh line and associated Issues

It has been observed that 220 kV Budhipadar-Korba & 220 kV Budhipadar-Raigarh circuits had tripped multiple occasions in last few months. Based on available DR analysis, it was observed that faults are occurring due to ROW vegetation issues. In addition to that, protection and Auto reclosure issues are also observed for these circuits.

The details of line tripping are given below:

In 105th PCC Meeting,

Regarding tripping of the lines, OPTCL replied that after repeated tripping events in month of May and June 2021, they had carried out line patrolling and cleared all vegetation issues at identified fault locations. However repeated tripping was being observed again in August -2021 and they informed that they would carry out thorough patrolling of the line in order to resolve any ROW/clearance issues.

PCC advised OPTCL to resolve RoW /clearance issues in the line by Sept' 21.

Regarding implementation of auto-recloser scheme, they replied that as an interim measure, auto-recloser at Budhipadar end would be implemented without PLCC similar to as done for 220 kV Katapalli -Bolangir (PG) line.

PCC advised OPTCL to resolve auto-reclose issue at Budhipadar end by 15th Sep'21.

OPTCL may update.

ITEM NO. D.3: N-1 reliability issue of 2 X 315 MVA 400/220 kV Ranchi ICTs—ERLDC

2 X 315 MVA 400/220 kV Ranchi ICTs are the primary source of power to the capital city of Ranchi. The downstream network from 400/220 kV Ranchi substation of PGCIL is presently having four lines (Three 220 kV lines to 220/132 kV Hatia (JUSNL) and one 220 kV line to Chandil substation. With increasing load and inadequate Tenughat generation, the load on these ICTs has reached more than 220 MW each since the last few quarters during peak hours. Thus, the ICTs were not satisfying the N-1 criteria.

In Aug 2021, 220 kV Ranchi-Ramgarh circuit was commissioned by DVC. With This line, the 400/220 kV ICTs loading increased each by 40-60 MW (total drawal by DVC through the line being 80-120 MW). This additional loading had aggravated the N-1 reliability issue of Ranchi ICTs.

In addition, any tripping of Bokaro ICTs would cause severe loading of Ranchi ICTs due to this newly commissioned line (one ICT tripping would lead to tripping of other ICT on overload).

In 105th PCC Meeting following deliberations took place -

ERLDC representative informed that with commissioning of 220 kV Ranchi-Ramgarh D/C line of DVC, the loading of the 400/220 kV ICTs at Ranchi had been further increased and this has aggravated the n-1 reliability concern of ICTs at Ranchi. They stated that immediate measures are required to address this issue.

PCC decided that a special meeting may be convened among DVC, JUSNL, Powergrid, ERLDC & ERPC secretariat to discuss and finalize remedial measures to address the reliability issue of ICTs at Ranchi.

Members may update.

ITEM NO. D.4: Disturbance at 220 kV Biharsharif Substation on 01.06.2021 at 17:10 Hrs

On 01.06.2021 at 17:10 hrs, all 220 kV lines, emanating from 220 kV Biharsharif (BSPTCL) tripped. As per the information received, R phase CT at LV side of 400/220 kV ICT- 2 got busted resulting in tripping of all emanating lines. Total load loss was around 180 MW at Ekangasarai / Rajgir / Baripahari / Hatida / Harnaut / Barh / Nalanda in Bihar system.

In 105th PCC Meeting,

BSPTCL representative updated the status as follows:

- The time setting of zone-4 protection in distance relay for all lines connected to 220 kV Biharsharif S/s had been reduced to 250 msec.
- Regarding implementation of busbar protection, they had taken up with their higher authority for early commissioning of the busbar protection at Biharsharif.
- Regarding checking of cables/wiring for ICTs, they informed that ICT-1 & ICT-3 are connected through common cable for which simultaneous s/d of both ICTs are required to carry out the activity. The checking would be done after getting the shutdown approval.

Powergrid intimated that they had received proposal from site for disabling the feature of extending inter-trip command from LV side to HV side of the ICT. They informed that they are considering to extend inter trip command through numerical relay instead of 86 relays and final recommendation in this regard would be sent to site for implementation at the earliest.

BSPTCL & Powergrid may update.

ITEM NO. D.5: Total power failure at 220 kV BTPS(BSPTCL)S/s on 01.06.2021 at 17:03 Hrs

On 01.06.2021 at 17:12 hrs, the following elements got tripped resulting in total power failure at 220 kV BTPS.

- I. 220 kV Hazipur-BTPS circuit- 1
- II. 220 kV Mokama-BTPS-2
- III. 220 kV BTPS-Begusarai D/C
- IV. 220 kV Begusarai-Purnea(PG) circuit-I
- V. 220 kV Begusarai-Khagaria circuit-2
- VI. 220 kV Begusarai- New Samastipur (Ujiyarpur) D/C
- VII. 220 kV Mokama(BGCL)-Biharsharif D/C

In 104th PCC Meeting following deliberations took place –

BTPS further informed that high voltage is generally observed at BTPS end & the average voltage remain in the range of 230-235 kV.

PCC advised BTPS to share the voltage data along with the reactive power absorption data of their generating units to SLDC Bihar as well as to ERLDC for review.

In 105th PCC Meeting following deliberations took place -

It was informed that a proposed overvoltage settings for lines connected at 220 kV BTPS S/s was submitted by BTPS to SLDC, Bihar for their comments.

PCC advised SLDC Bihar to review the proposed settings and submit their observations at the earliest.

SLDC Bihar may update.

ITEM NO. D.6: Disturbance at Bodhgaya S/S on 17/05/2021 at 23:06 Hrs

At 23:06 hrs, 220 kV Gaya-Bodhgaya-1 & 2 tripped from Gaya end only. At the same instance, all 220/132 KV ICTs at Bodhgaya also tripped causing load loss of 150 MW at Chandauti, Sherghati, Imamganj, Bodhgaya&Rafiganj Traction. 220 KV Bodhgaya-Khijasarai D/C was hand-tripped from Bodhgaya end.

In 105th PCC Meeting,

BSPTCL informed that they had shared ICT backup protection settings of Bodhgaya S/s with Powergrid.

PCC advised Powergrid to revise zone 3 settings at Gaya end for 220 kV Gaya-Bodhgaya lines in coordination with ICT backup protection settings at Bodhgaya S/s.

Powergrid may update.

ITEM NO. D.7: Total Power Failure at Dumka S/s on 15/05/2021 at 12:01 Hrs

Due to tower collapse of 220 kV Farakka-Lalmatia S/C in April 2021, local load at 220 kV Dumka and Godda S/S were being radially fed from 400/220 kV Maithon S/S through 220 kV Maithon-Dumka D/C and 220 kV Dumka-Godda D/C. 220 kV Maithon-Dumka-1 was under shutdown for attending the hotspot at connector of R-phase pole circuit breaker of the line.

At 12:02 hrs 220 kV Maithon Dumka – 2 tripped on R phase to earth fault resulting in total power failure at Goda, Dumka S/S and nearby areas.

In 105th PCC Meeting,

JUSNL informed that as per the information received from site, the make of PDH unit at Dumka is different from Maithon end. They further informed that for establishing communication between both end and for successful A/R operation, PDH of PLCC must be of same make on either end.

PCC advised JUSNL to re-verify the make of PDH at Maithon end in coordination with Powergrid. In case the PDH make is same on either end, they shall resolve carrier issue in consultation with OEM.

In case the PDH make on either end is different, then the PDH may be replaced or new PDH may

be purchased to restore the PLCC communication.

PCC opined that as the onus of restoration of PLCC in 220 kV Maithon-Dumka line lies with JUSNL, JUSNL shall take appropriate action to restore the PLCC at the earliest.

JUSNL may update.

ITEM NO. D.8: Disturbance at Jasidih(JUSNL) S/S on 27/05/2021 at 10:13 Hrs

On 27-05-2021, demand in Jharkhand system was low because of thunderstorm and heavy rainfall caused by CycloneYaas. This had resulted in high voltage at various parts of JUSNL network.

At 03:22 hrs, 220 kV Dumka-Jasidih D/C were hand tripped at Dumka end because of overvoltage. Charging of 220 KV Dumka-Jasidih – 1 was attempted at 03:51 Hrs and 07:01 Hrs and finally it was charged at 09:50 Hrs.

At 10:13 hrs, 220 kV Dumka Jasidih – 1 tripped from Dumka end due to operation of overvoltage stage 1. With this 132 kV Dumka – Dumka D/C and 132 kV Dumka – Deoghar D/C also got tripped. This has led to loss of supply at 220/132 kV Jasidih and 132 kV Dumka substation.

In 105th PCC Meeting,

JUSNL informed that a draft philosophy for overvoltage settings had been prepared by them and the same was circulated among their field offices for comments.

They added that after incorporating the observations received from field units, the final report would be shared with ERPC/ERLDC for review.

JUSNL may update.

ITEM NO. D.9: Grid event at 132 kV Motihari (DMTCL) S/S on 21-04-2021 at 20:19 hrs

On 21st April 2021 at 19:00 hrs, 132 kV side of 400/132 kV 315MVA ICT-3 (Ownership is with Powergrid Mithilanchal Transmission Ltd) at Motihari was being charged through 132 kV GIS Bus 1. Just after charging of new ICT, 132kV Main bus-1 at Motihari tripped due to Bus extension module SF6 gas pressure low trip at 19:01 Hrs. Following feeders which were connected with 132kV Main bus – 1 at Motihari tripped:

- 132 kV side of 400/132 kV ICT – 1 at Motihari
- 132 kV Betiya – 1
- 132 kV Motihari – 1
- 132 kV Raxaul – 1

In 105th PCC Meeting,

PMTL representative informed that the investigation report for failure of bus extension module was submitted to PSETD division of CEA. PCC advised PMTL to share the disturbance report to ERPC also.

Regarding restoration of the damaged GIS section, PMTL intimated that they had received two offers from OEM i.e. M/s TBEA.

- First one is for bus extension module, for which offer had already been accepted and in process for approval.
- Other offer is for adjacent damaged bay (132 kV DMTCL-Raxaul-2) for which cost negotiation are going on with OEM.

Regarding timeline to complete the work, PMTL informed that since all materials required for restoration work are to be imported from China, it would take some time for restoration.

PCC advise PMTL to process both offer simultaneously so that restoration work of damaged GIS module may be completed at the earliest.

PMTL & DMTCL may update.

ITEM NO. D.10: Repeated delayed clearance of faults at 220 kV Chandil STPS S/C

In March 2021, 220 kV Chandil STPS S/C tripped repeatedly due to various short circuit faults at 6-12 km from STPS.

In 105th PCC Meeting,

JUSNL informed that OEM had visited the site on 17th July 2021 and had identified some issues with PLCC panel.

They further informed that work order for rectification work of PLCC panel would be placed after receiving the cost estimate from OEM and submitted that PLCC issue at Chandil would be resolved by October'21.

JUSNL may update.

पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड

(भारत सरकार का उद्यम)

POWER SYSTEM OPERATION CORPORATION LIMITED

(A Government of India Enterprise)



Eastern Regional Load Despatch Centre: 14, Golf Club Road, Tollygunge, Kolkata-700 033.

CIN: U40105DL2009GOI188682

फ़ोन: 033- 24235755, 24174049 फ़ैक्स : 033-24235809/5029 Website: www.erldc.org, Email ID- erldc@posoco.in

घटना संख्या: 06-08-2021/1

दिनांक: 06-09-2021

Report on the grid event in Eastern Region (पूर्वी क्षेत्र में ग्रिड घटना पर रिपोर्ट)

Summary of the event (घटना का सारांश):

At 15:18 hrs, 220 KV Bus I at Sonenagar tripped on operation of bus bar protection. Consequently, 220 KV Chandauti-Sonenagar D/c tripped, leading to total power failure at 220/132 KV Sonenagar (BSPTCL) and radially connected 132 KV Substations. Power supply restored at 15:37 Hrs by extending power from 400/220 KV Chandauti through 200 KV Chandauti-Sonenagar-1.

- **Date / Time of disturbance:** 06-08-2021 at 15:18 hrs.
- **Event type:** GD - 1
- **Systems/ Subsystems affected:** 220/132 KV Sonenagar S/s
- **Load and Generation loss.**
 - No generation loss was reported during the event.
 - Around 150 MW load loss reported during the event at Sonenagar, Aurangabad and Rafiganj

Important Transmission Line/element if out (महत्वपूर्ण संचरण लाइने जो बंद है):

- 220 kV Bus II at Sonenagar
- 132 KV Sonenagar-Japla
- 132 KV Sonenagar-NagarUntari

Major elements tripped (प्रमुख ट्रिपिंग):

- 220 KV Bus I at Sonenagar
- 220 kV Chandauti-Sonenagar D/c

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

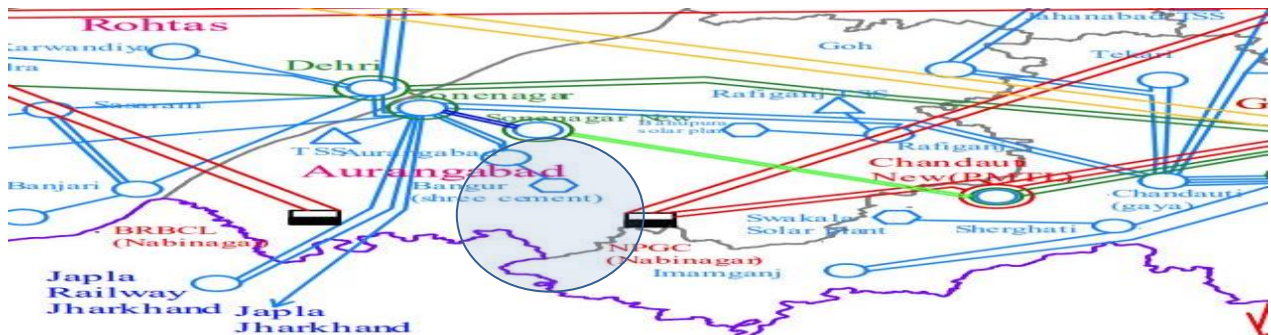


Figure 1: Network across the affected area

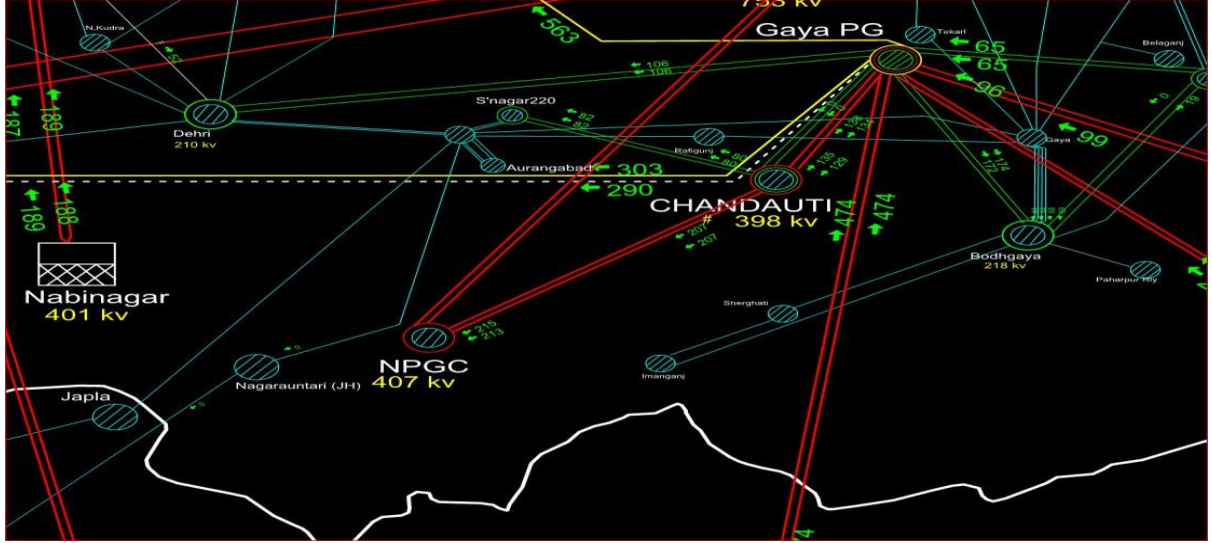


Figure 2: SCADA snapshot for of the system

Relay indication and PMU observation (रिले संकेत और पीएमयू पर्यवेक्षण):

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
15:18	220KV Bus-1 at Sonenagar	Bus Bar Protection operated at Sonenagar	-	1 kv dip observed in Y_ph and B_ph voltage at Chandauti
	220 KV Chandauti-Sonenagar-1		-	
	220 KV Chandauti-Sonenagar-2		-	

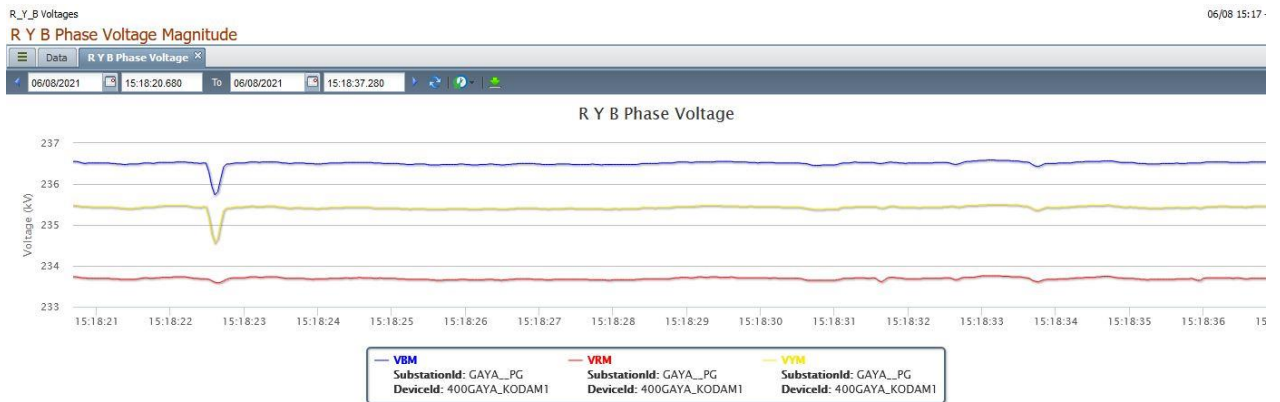


Figure 3: As per Gaya PMU snapshot 0.5 kV dip observed in Y_ph and B_ph

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 KV Bus 1 at Sonenagar	15:37
220kV Chandauti-Sonenagar 1	15:37
220 KV Chandauti-Sonenagar 2	15:55

Analysis of the event (घटना का विश्लेषण):

- Bus bar protection of 220 KV Bus 1 at Sonenagar operated. Complete power failure occurred due to loss of supply as 220 KV Bus-2 was not available at that time.

Protection issue (सुरक्षा समस्या):

- Repeated operation of bus bar protection at Sonenagar is leading to total power failure to radially connected downstream loads, thus affecting reliability.
- Since June'21, total 9 GD occurred at Sonenagar, out of which 3 were either due to operation of bus bar protection or LBB operation at Sonenagar:
 - 16-07-2021 at 19:04 Hrs-LBB operated at Sonenagar
 - 31-07-2021 at 12:13 Hrs-Bus bar protection operated at Sonenagar
 - 06-08-2021 at 15:18 Hrs-Bus bar protection operated at Sonenagar
- Reason for repeated tripping of LBB/Bus bar protection Sonenagar & action taken to avoid the same in future may be shared. **BSPTCL to explain.**

Non-compliance observed (विनियमन का गैर-अनुपालन):

Issues	Regulation Non-Compliance	Utility
DR/EL not provided within 24 Hours	1. IEGC 5.2 (r) 2. CEA grid Standard 15.3	BSPTCL, PG-ER1

Status of Reporting (रिपोर्टिंग की स्थिति):

- DR/EL for 220 kV Bus differential received from BSPTCL
- DR/EL yet to be received from PMTL.

Annexure 1: Sequence of events recorded at ERLDC SCADA data at the time of the event.

Sequence of event not recorded at time of event.

Annexure 2: DR recorded

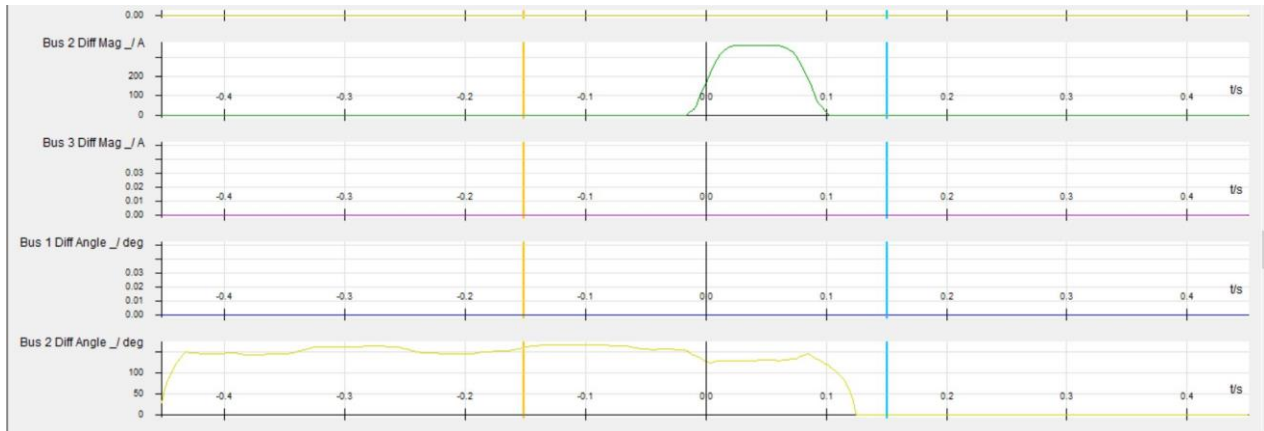
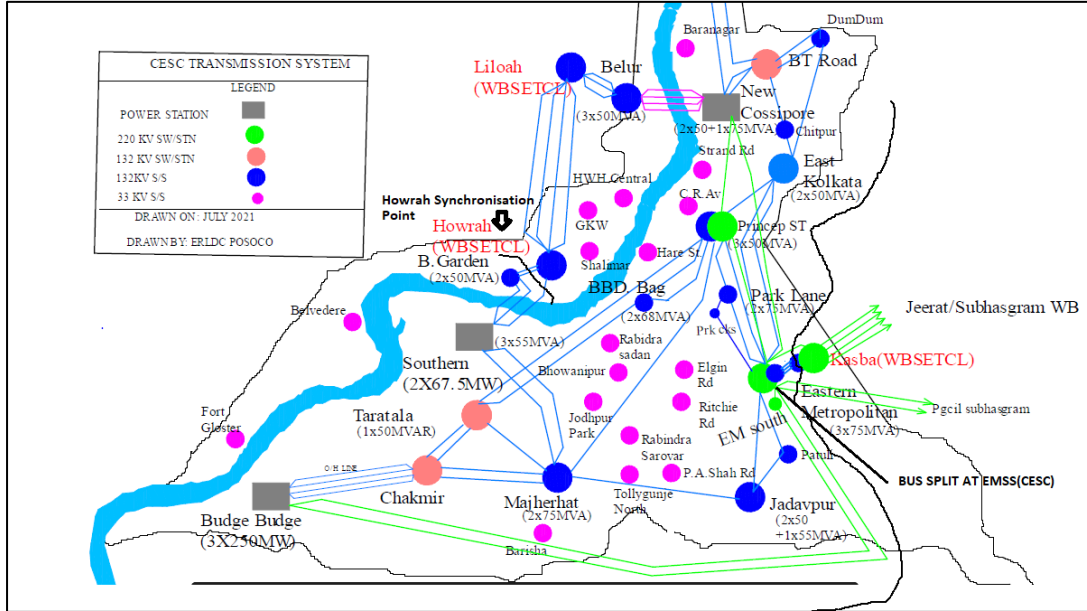


Figure 4: Bus differential operated

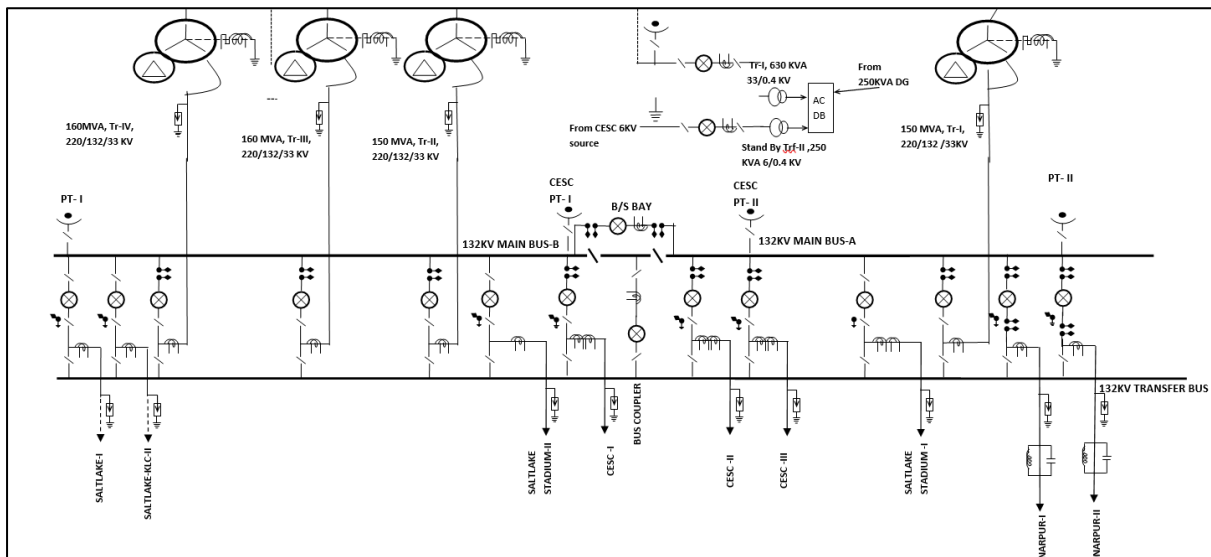
BUS FAULT AT 132 KV KASBA(WBSETCL) & CESC ISLANDING EVENT ON 01 AUGUST 2021

Configuration prior to Event:

220 kV EMSS (CESC) is having Bus -Split, where at one bus ,Radial load is being fed via 220 kv Subhasgram(PG) D/C ,While another bus is synchronized with grid via 3*132kv EMSS(CESC)-KASBA (WBSETCL) circuits and further CESC system connected with the same bus. Hence at this point CESC is synchronized with the grid via 3*132 kV KASBA (WBSETCL) circuits.



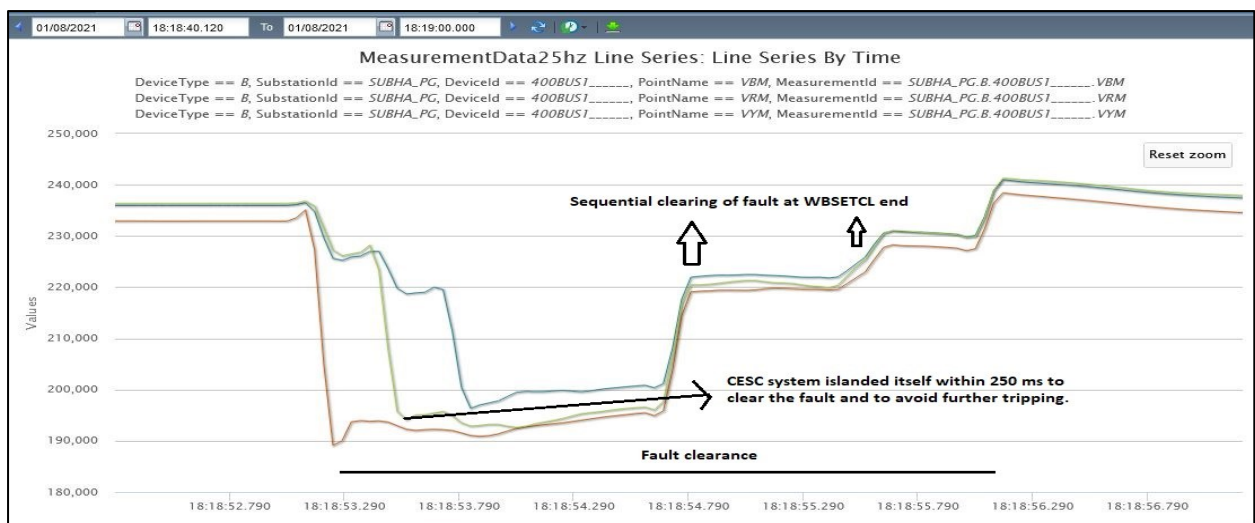
Bus Configuration at 132 kv KASBA(WBSETCL) S/S



132kv kasba-Sonarpur-1 & 2 ckt, 132 kasba-cesc-2 & 3 ckt, Kasba-Saltlake stadium-1 & 150MVA TR-1 at 132 KV Bus Section-A & 132kv kasba-Saltlake-1 & 2 ckt, 132 kasba-cesc-1 ckt, Kasba-Saltlake stadium-2 & 150MVA TR-2, TR-3 & TR-4 on bus section B.

Analysis of First Event at 18:18 Hrs on 01/08/2021

- At 132 kV KASBA (WB) about 18:18 hrs one bus fault occurred at Bus A due to falling of kite string between Main Bus side Isolator and Breaker of 132 KV Kasba-Saltlake Stadium Ckt-1.
- Bus bar of Bus A operated and gave tripping command to all the elements associated with the Bus A and all elements tripped except Bus section breaker as shown in SLD which was coupling both the buses.
- During checking it was found that one wire (which is connected to output contact of 96 relay of 132KV Bus Section bay for trip positive to trip coil of CB) was broken due to which it did not tripped.(This has been rectified).
- LBB of Bus section breaker was not available so it also didn't tripped through LBB.(Status of LBB incorporation) **(WBSETCL to update)**.
- From the PMU plot of Bus voltage of Subhasgram (PG) attached below, it is clear that fault isolated after 3 seconds. As fault was getting fed via Transformers, It should have cleared the fault from HV side by Backup O/C operation, why it did not operated. Whether Backup O/c or any other protection picked up or not?**(WBSETCL to update)**.
- As Bus section Breaker did not tripped fault was getting fed via Bus B, through 220/132kV Transformers due to this fault feeding, R phase 132 KV CT of 220/132 KV TR#2, which was connected to Bus Section-B, burst out and created a Bus B Fault and Bus Bar Relay (87 B & 87 CH), operated and all 96 relay associated to Main Bus Section-B & Differential relay, 86 of TR#2 operated and cleared the fault.



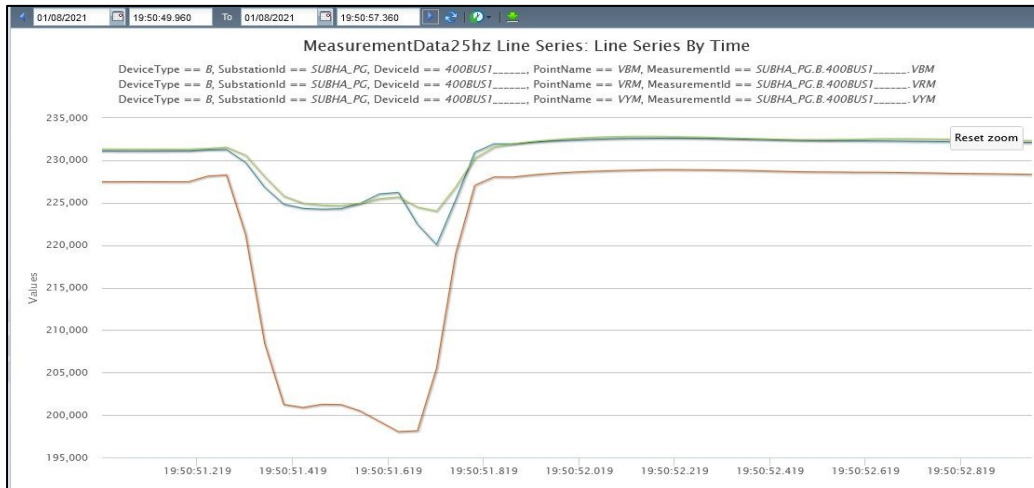
2nd Event Occurred at 19:50 Hrs:

- After restoration of 132kV Bus at Kasba Substation, 132 Kv SaltLake Stadium-Kasba -1 was charged upto 132KV Transfer bus of kasba substation, from SaltLake Stadium end for engaging the mentioned Ckt-1 through Transfer Bus Coupler of Kasba end.
- 132 kV SaltLake Stadium-Kasba 1&2 are fully connected through 132KV cable with Line differential protection.
- 132 Kv Salt Lake Stadium-Kasba Ckt-1 tripped on zone-2(350ms) from Saltlake stadium end due to falling of kite thread at Transfer bus end.
- From Kasba end which protection operated to isolate the fault by Transfer Bus coupler breaker tripping. Why Distance protection at Kasba end did not cleared the fault from Kasba

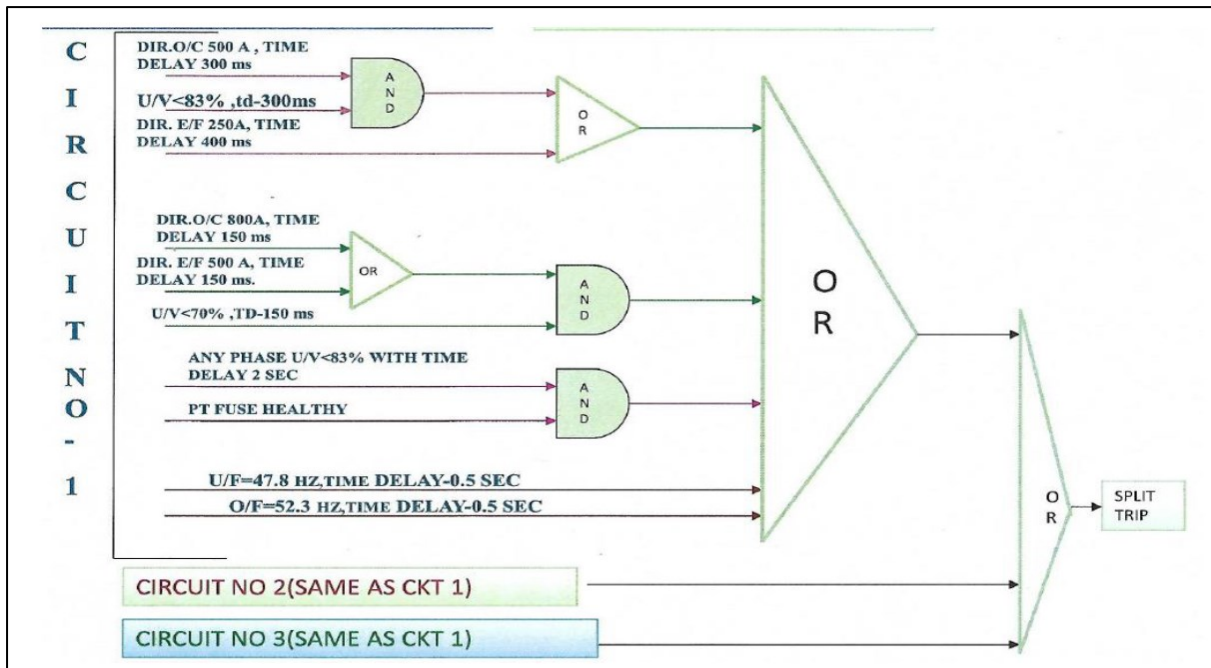
end which would have avoided delayed clearance second time and Cesc Islanding.(WBSETCL to update).

- But prior to that Islanding condition -2 got satisfied as it considers delay of only 150 ms and CESC islanded again.(Logic shown below)
- Rest 132 kV KASBA WBSETCL system was healthy and intact this time.

PMU plot of Subhasgram Bus-Voltage showing Fault clearance 350 ms zone-2 time from WB end.



CESC Islanding during event:



Logic diagram for Islanding of CESC is mentioned in above Figure .

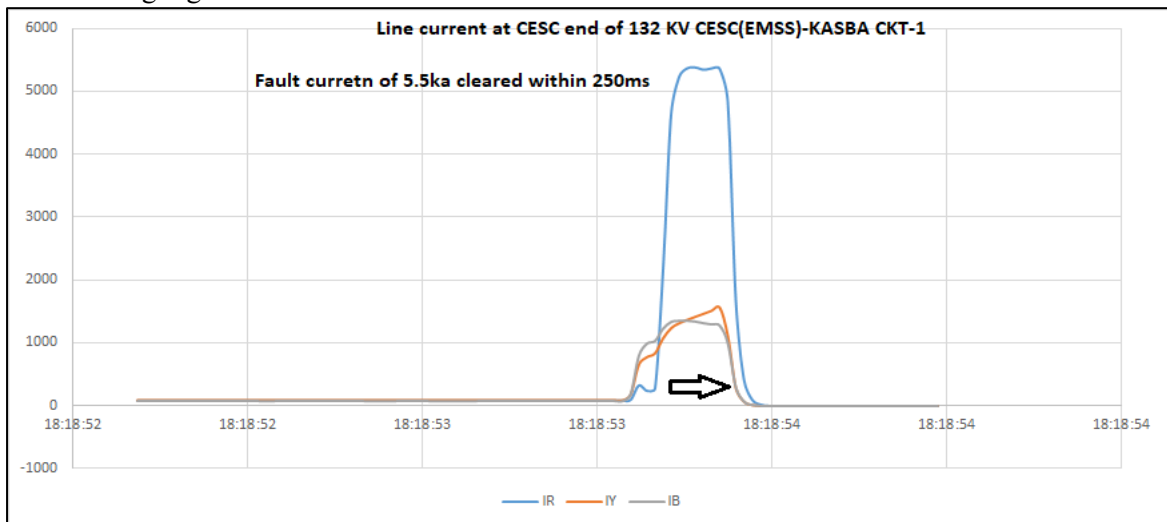
- Due to the BUS fault at 132 kV KASBA WBSETCL end and delayed clearance as per the above logic diagram condition 2 got satisfied: Dir O/C 800 Amps ,Delay 150 Msec and U/V < 70% ,Delay-150ms.Hence CESC islanded itself by tripping all 3 circuits of Kasba WBSETCL.

EVENT 1:

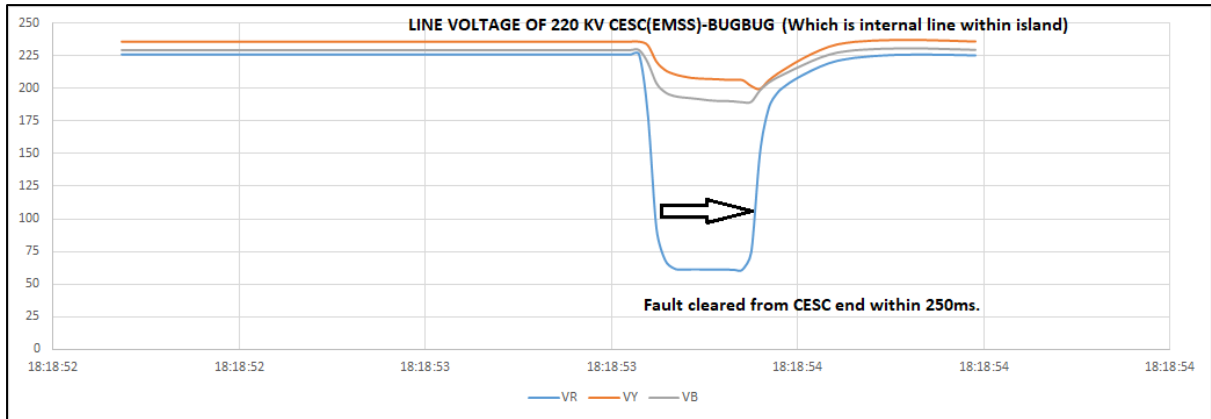
CESC islanded itself as total fault current seen by CESC end was 5.2 Ka and cleared fault by tripping all 3 circuits within 250 ms.

- Line current of 132 kV CESC(EMSS)-KASBA(WBSETCL) shown below:

Line current became zero within 250 ms of fault validating tripping of circuits from CESC end as per the Islanding logic.



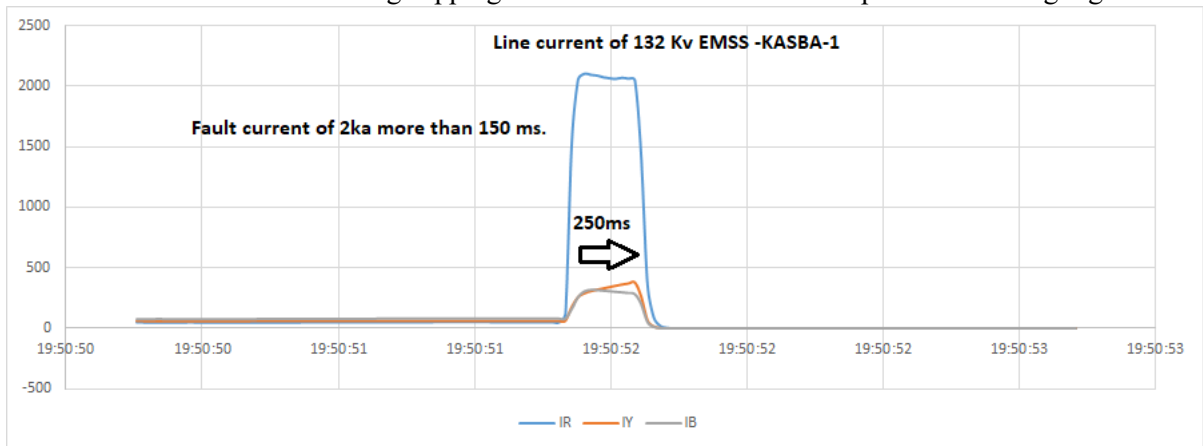
- **LINE Voltage of 220 kV EMSS –(BUGBUG) :** This also indicating fault clearance within 250ms from CESC end while Subhasgram Pmu Bus voltage connected with WBSETCL system indicates delayed clearance from WBSETCL end.



At 18:27 Hrs CESC was synchronized with Howrah Point. Then Synchronization point again changed to 18:35 Hrs at KASBA .

EVENT 2:

Line current of 132 Kv CESC(EMSS)-KASBA(WBSETCL) shown below: Line current became zero within 250 ms of fault validating tripping of circuits from CESC end as per the Islanding logic.



At 19:57 Hrs. CESC was synchronized to Howrah point.

For maintaining Frequency in the island following action are taken:

Low frequency in Islanded system: Loads will be shed through the operation of UFR relays (Stage 1,2 , 3 &4); bulk loadshedding may also be carried out from CESC Control Room to boost up frequency .

High Frequency condition: BBGS will back down generation by operation of FGMO/RGMO and HP-LP Bypass system and will control frequency with guidance from Control Room at CESC House.

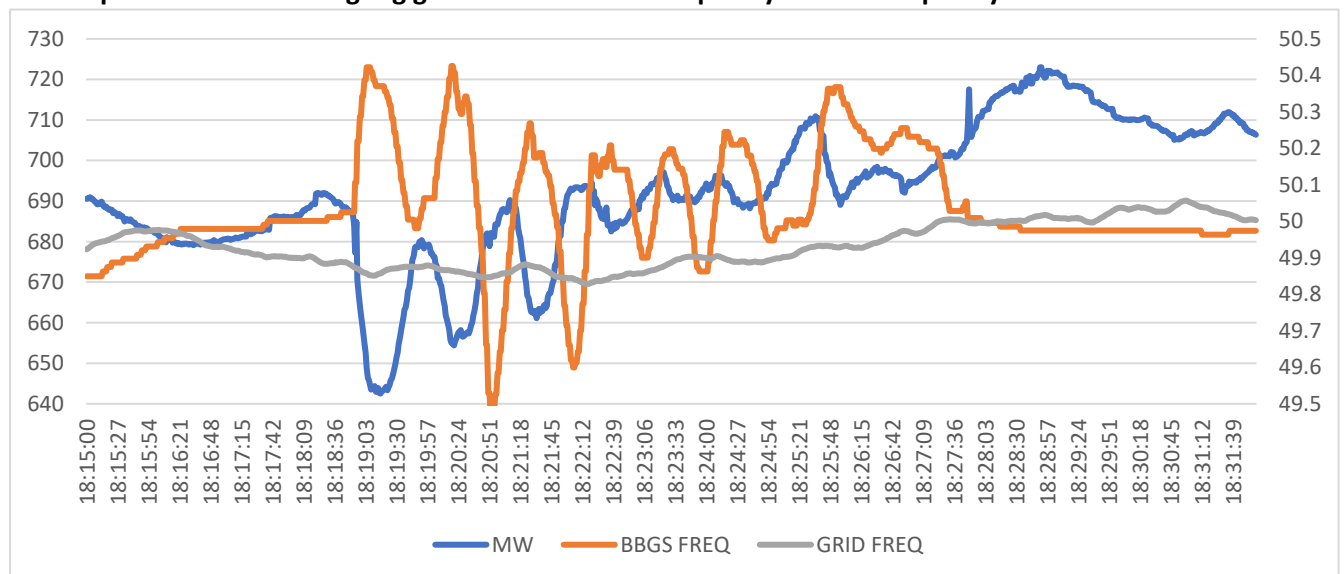
Observations During Islanding of CESC:

CESC to reply following

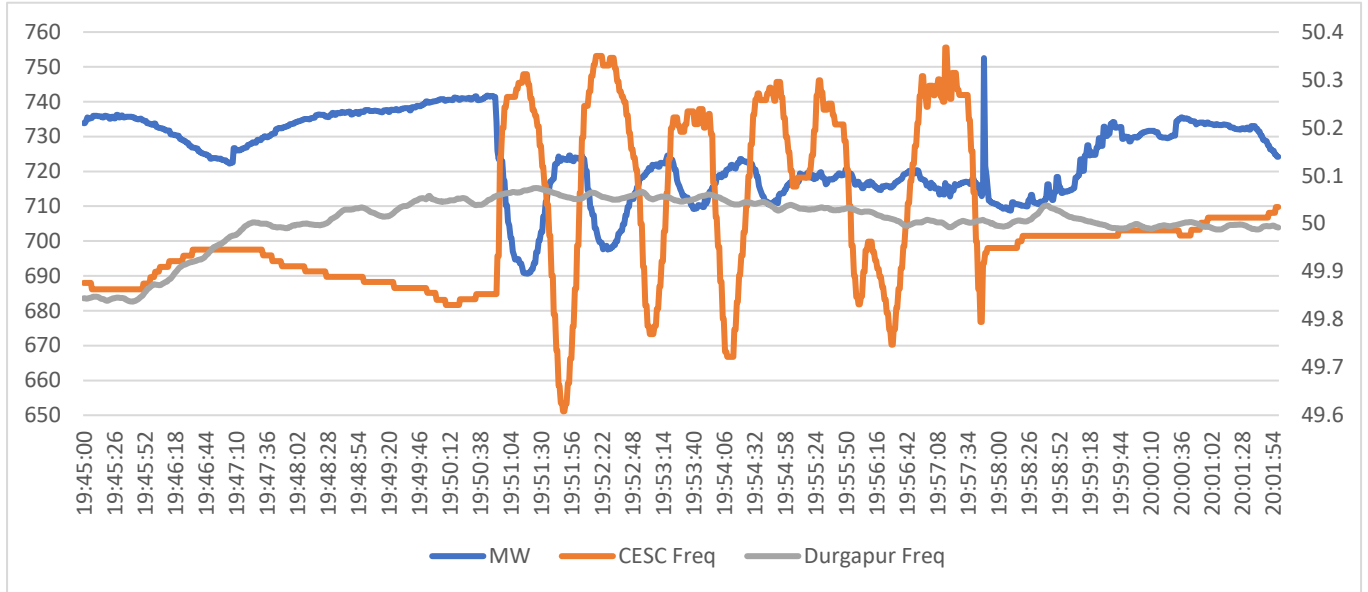
- **Criteria for Islanding condition by CESC** may once be reviewed as ,in condition 2 delay of only 150ms is provided **where the allowable fault clearance as per CEA grid standards for 220 & 132 kV level is 160 ms** ,so even in case of clearance in Zone 1 chances of islanding is possible.
- With the help of proper study if possible, it can be increased further to avoid Islanding for Z-1 fault clearance.
- There is large difference between Pre islanding and post synchronisation of Grid frequency and Bugbug frequency data as submitted, Which is not possible for synchronised grid. **(As observed from Scada)**. This may be looked into and corrected.
- With PMU frequency data Pre-&Post synchronisation frequency of CESC and Grid was found same as attached below .
- Variation of frequency after island formation in Bug-bug frequency is observed upto 1Hz and was varying continuously till it got synchronised with grid at Howrah point, this may also be checked.
- In Event 2 also it can be observed that, although bug-bug generation was more are less constant still frequency variation of 0.5 Hz observed in Bug -bug frequency. Same thing was observed in event 1 also but was prominent in Event-2 .
- Such pro longed variation of frequency during whole islanded mode may be checked as generation variation was minimal.
- Any cyclic load changes or other behaviour may also be analysed for the same.
- **Governor parameter tuning during islanded mode may also be checked along with PSS for stability during islanded mode.**

Reason for such continuous high oscillating variation in frequency may be analysed and possible consequences may also be looked into as it may cause operation of UFR relay in some cases inside the island.

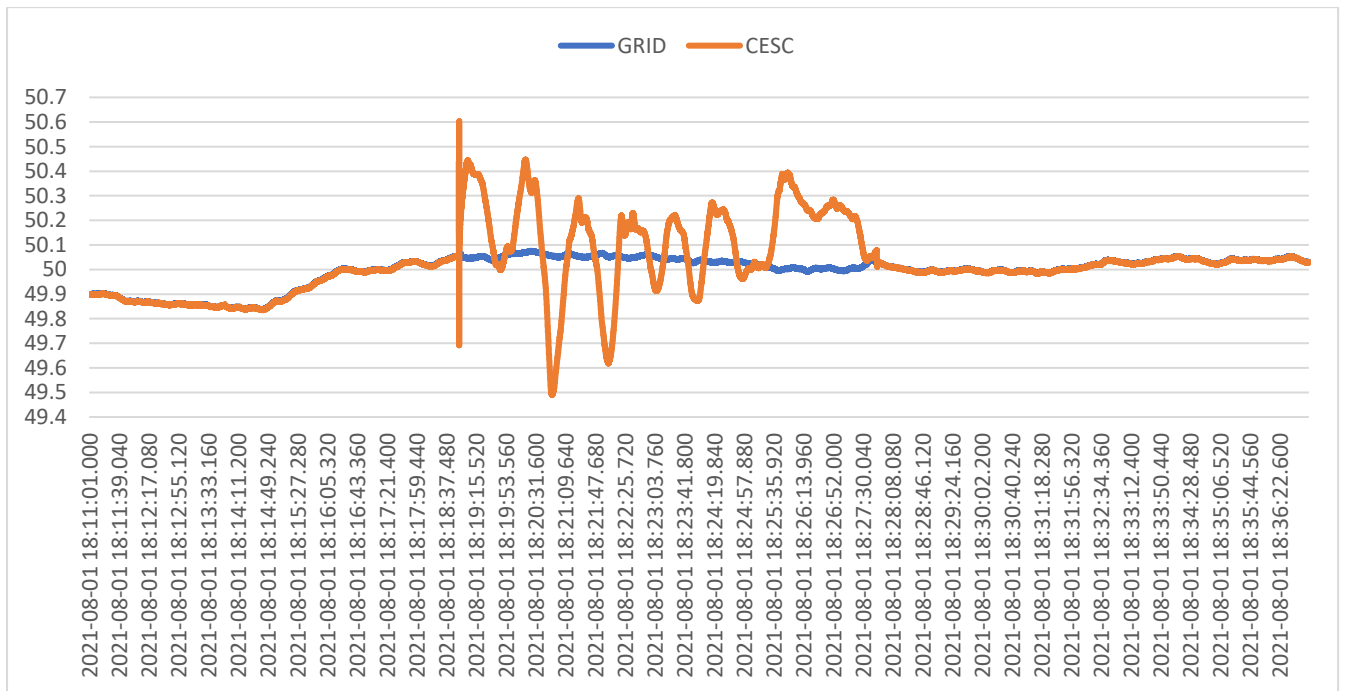
SCADA plot for EVENT 1: BugBug generation Vs CESC frequency vs Grid Frequency



SCADA plot for EVENT 2: BugBug generation Vs CESC frequency vs Grid Frequency



EVENT 1: Frequency comparison by PMU Plot:



EVENT 2: Frequency comparison by PMU Plot:



पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड

(भारत सरकार का उद्यम)

POWER SYSTEM OPERATION CORPORATION LIMITED

(A Government of India Enterprise)



Eastern Regional Load Despatch Centre: 14, Golf Club Road, Tollygunge, Kolkata-700 033.

CIN: U40105DL2009GOI188682

फ़ोन: 033- 24235755, 24174049 फ़ैक्स : 033-24235809/5029 Website: www.erldc.org, Email ID- erldc@posoco.in

घटना संख्या: 20-08-2021/1

दिनांक: 27-08-2021

Report on the grid event in Eastern Region (पूर्वी क्षेत्र में ग्रिड घटना पर रिपोर्ट)**Summary of the event (घटना का सारांश):**

At 20:24 hrs, 220 kV Bus I at Ramchandrapur tripped on operation of bus bar differential. As reported, B_ph jumper of bus coupler snapped. Total 250 MW load loss reported, power supply to Adityapur, Chandil, Jadugoda interrupted. 220 kV Bus II remained charged and power supply to Chaibasa was intact.

Date / Time of disturbance: 20-08-2021 at 20:24 hrs

- **Event type:** Grid Event (Multiple Tripping)
- **Systems/ Subsystems affected:** 220/132 kV Ramchandrapur
- **Load and Generation loss.**
 - No generation loss was reported during the event.
 - Around 250 MW load loss reported during the event at Adityapur, Chandil, Jadugoda

Important Transmission Line/element if out (महत्वपूर्ण संचरण लाइने जो बंद है):

- 150 MVA 220/132 kV ICT I at Ramchandrapur
- 100 MVA 220/132 kV ICT III at Chandil

Major elements tripped (प्रमुख ट्रिपिंग):

- 220 kV Main Bus I at Ramchandrapur
- 220 KV Jamshedpur-Ramchandrapur I & II (400/220 kV CT & ICT II at Jamshedpur)
- 220 kV Ramchadrapur-Joda
- 220 kV Ramchandrapur-Chandil
- 2*150 MVA 220/132 kV ICT II, ICT III at Ramchandrapur
- 3*100 MVA 220/132 kV ICT I, ICT II & ICT IV at Chandil

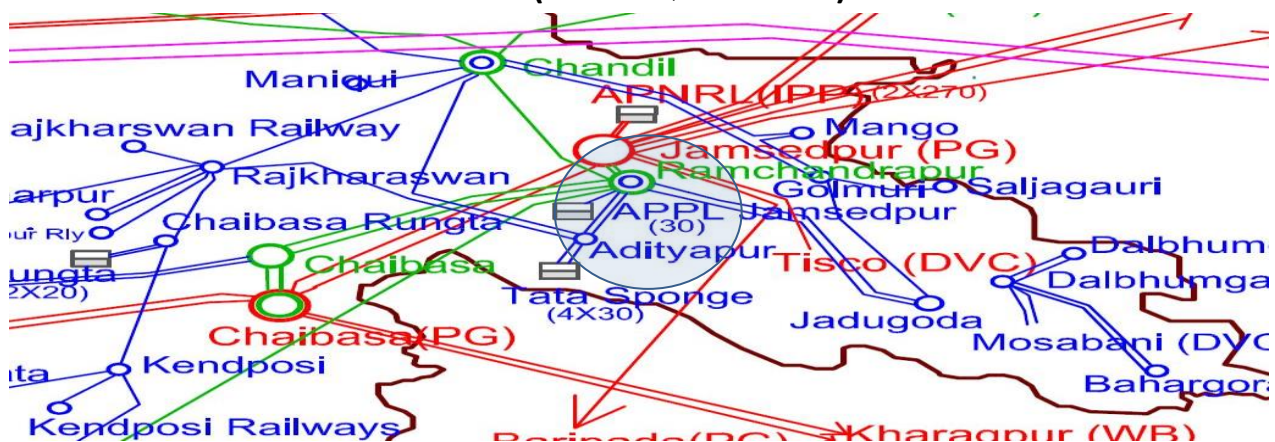
Network across the affected area (प्रभावित क्षेत्र का नक्शा)

Figure 1: Network across the affected area

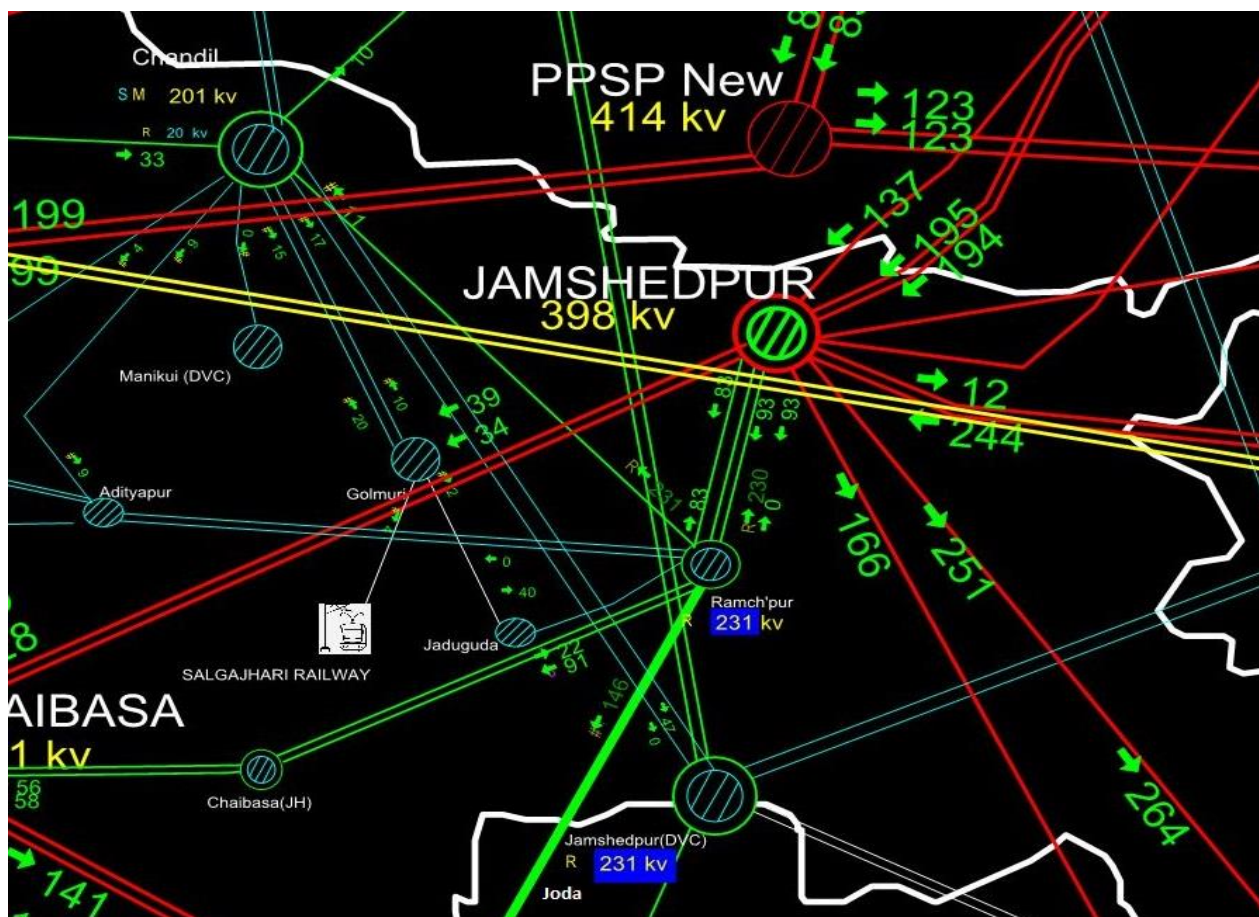


Figure 2: SCADA snapshot of the system

Relay indication and PMU observation (रिले संकेत और पीएमयू पर्यवेक्षण):

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
20:24	220 kV Bus-I at Ramchandrapur	Bus bar differential operated at Ramchandrapur	-	Around 40 kV dip in B_ph, 20 kV dip in R_ph at Jamshedpur
	220 kV Ramchandrapur-Jamshedpur I		Didn't trip	
	220 kV Ramchandrapur-Jamshedpur II		Didn't trip	
	220 kV Ramchandrapur-Chandil		B_N, Z II, 31.9 km, 2.91 kA	
	220 kV Ramchandrapur-Joda		B_N, Z II, 157.01 km, 1.26 kA	
	2*150 MVA 220/132 kV ICTs at Ramchandrapur		-	
	100 MVA 220/132 kV ICT IV at Chandil	REF		
20:29	2*100 MVA 220/132 kV ICT I, ICT II at Chandil	O/C		

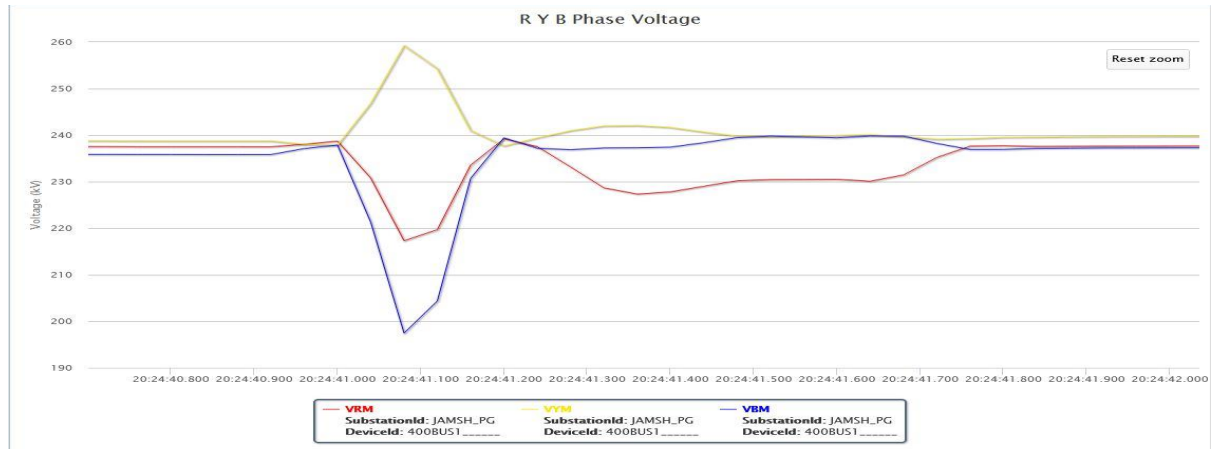


Figure 3: PMU snapshot of 400/220 kV Jamshedpur S/s

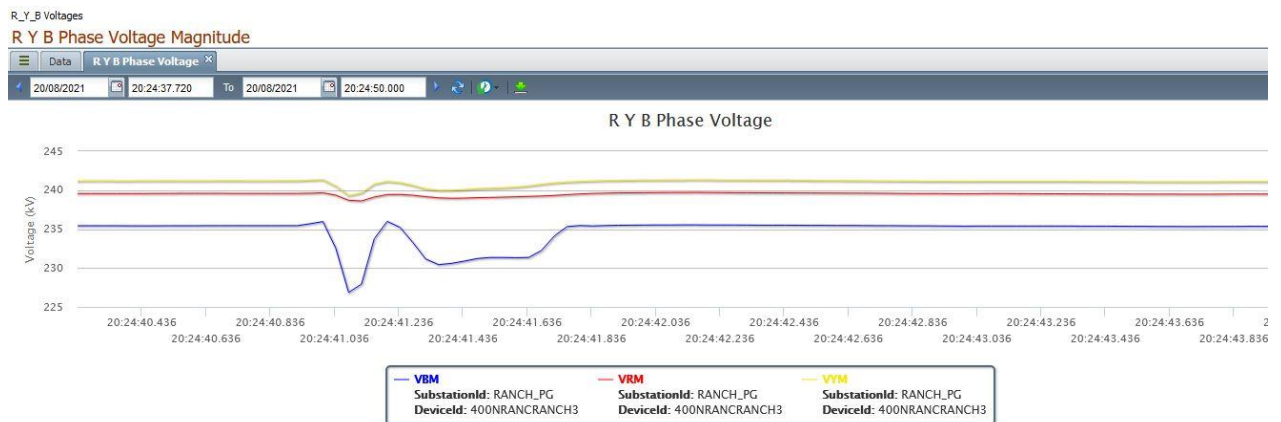


Figure 4: PMU snapshot of 400/220 kV Ranchi S/s

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Bus 1 at Ramchandrapur	21:46
220 kV Jamshedpur-Ramchandrapur I	22:04
220 kV Jamshedpur-Ramchandrapur II	22:32
220 kV Ramchandrapur-Chandil	22:16
220 kV Joda-Ramchandrapur	22:43
150 MVA 220/132 kV ICT II at Ramchandrapur	21:46
150 MVA 220/132 kV ICT III at Ramchandrapur	22:05
220/132 kV ICT I at Chandil	20:35
220/132 kV ICT II at Chandil	20:37
220/132 kV ICT IV at Chandil	20:34

Analysis of the event (घटना का विश्लेषण):

- Bus bar differential of 220 kV Bus 1 at Ramchandrapur operated.
- Delayed fault clearance.
- At the same time, 220/132 kV ICT IV at Chandil also tripped. Subsequently at 20:29 Hrs, 220/132 kV ICT I, II at Chandil tripped on O/c.
- Bus Configuration at Ramchandrapur was as below:
 - 220 kV Bus I:
 - 220 kV Jamshedpur-Ramchandrapur I (400/220 kV ICT I)
 - 220 kV Jamshedpur-Ramchandrapur II (400/220 kV ICT II)
 - 220 kV Ramchandrapur-Chandil
 - 220 kV Ramchandrapur-Joda
 - 220/132 kV ICT II, ICT III
 - 220 kV Bus II:
 - 220 kV Jamshedpur-Ramchandrapur III (400/220 kV ICT III)
 - 220 kV Ramchandrapur-Chaibasa D/c

Elements were not equally distributed on both buses. Power interruption could have been avoided with equal arrangement.

Protection issue (सुरक्षा समस्या):

- Whether bus bar operated successfully as delayed clearance was observed in Ramchandrapur-Chandil and Ramchandrapur-Joda.
- 400/220 kV ICT I, II tripped from Ramchandrapur side (LV) only.
- 220/132 kV ICT IV at Chandil tripped on REF protection for a fault at remote bus. JUSNL may explain.
- JUSNL is requested to do root cause analysis.

Non-compliance observed (विनियमन का गैर-अनुपालन):

Issues	Regulation Non-Compliance	Utility
DR/EL not provided within 24 Hours	1. IEGC 5.2 (r) 2. CEA grid Standard 15.3	JUSNL, PG ER-I

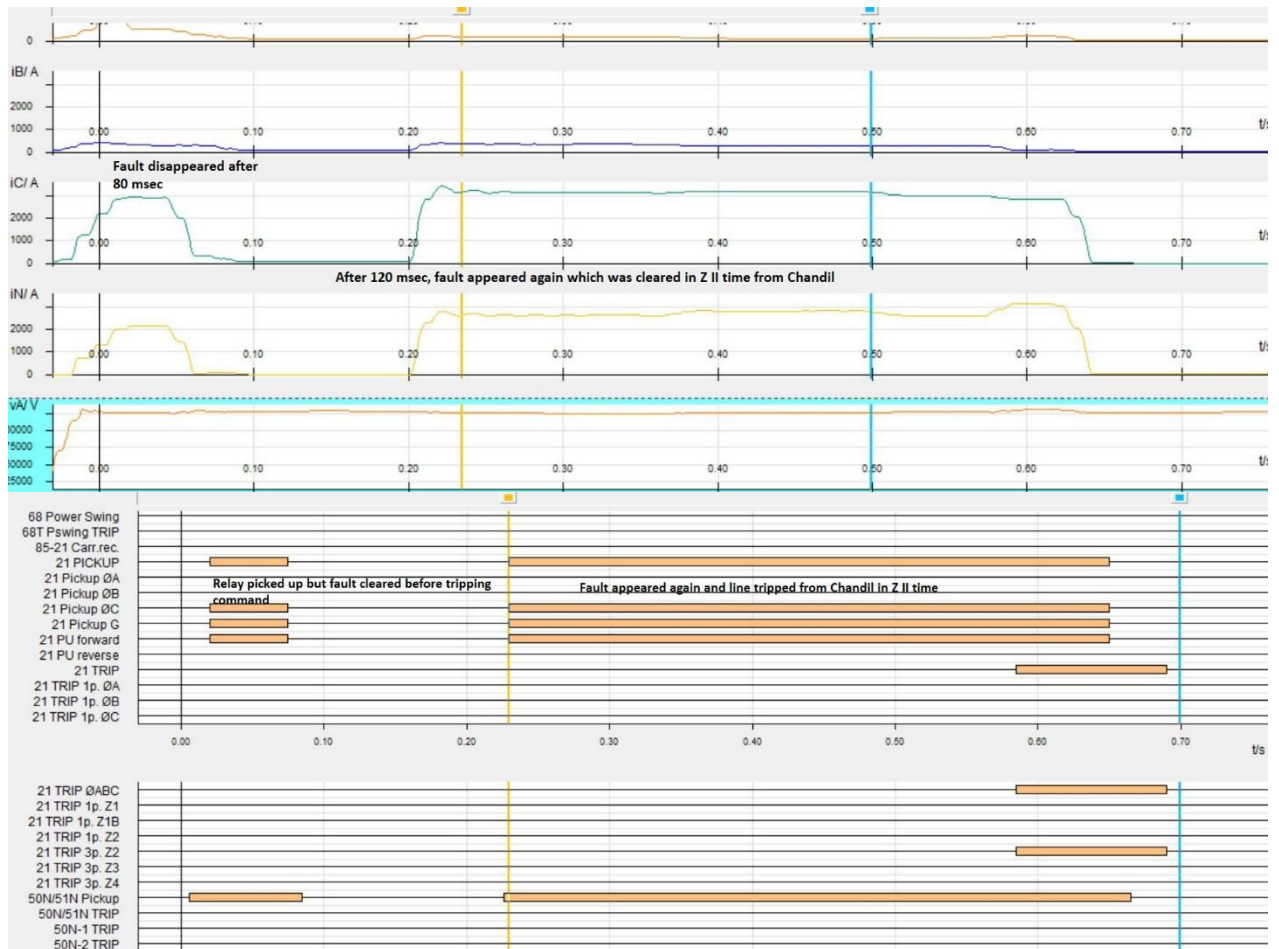
Status of Reporting (रिपोर्टिंग की स्थिति):

- Complete DR/EL yet to be received from JUSNL
- Complete DR/EL yet to be received from OPTCL

Annexure 1: Sequence of events recorded at ERLDC SCADA data at the time of the event.

Sequence of event not recorded at time of event.

Annexure 2: DR recorded



DR of 220 kV Ramchandarapur-Chandil at Chandil

List of important transmission lines in ER which tripped in AUGUST-2021

S.NO	LINE NAME	TRIP DATE	TRIP TIME	Relay Indication LOCAL END	Relay Indication REMOTE END	Reason	Fault Clearance time in msec	Remarks	LOCAL END UTILITY	REMOTE END UTILITY	Utility to update	Utility Response
1	220KV-TSTPP-MEERAMUNDALI-2	02-08-2021	12:18	TSTPP: R-Earth, 4.7 kA, 35.9 KM		R-Earth	350	Tripped in Z II time from Meeramundali, Carrier signal not received	NTPC TSTPP	OPTCL	NTPC TSTPP	
2	400KV-SUBHASHGRAM-HALDIA-2	03-08-2021	03:54	Subhashgram: R_Y, Ir: 3.336 kA, Iy: 3.354 kA, 84.71 KM	Ir: 6.409 kA, Iy: 6.083 kA, 1.93 KM	R-Y-Earth	<100		CESC	PG ER-II		
3	400KV-ALIPURDUAR-BINAGURI-1	04-08-2021	05:14	-	N, 81.19Km, 2.6kA	Y-Earth	<100	AR attempt failed	PG ER-II	PG ER-II		
4	220KV-DARBHANGA (DMTCL)-MOTIPUR-2	04-08-2021	05:56	-	Motipur: B-Earth, 2.934 kA, 33 km	B-Earth	<100	Single phase tripping during AR failure	DMTCL	BSPTCL	Both utilities	
5	220KV-SITAMARHI-MOTIPUR-1	04-08-2021	11:52	Sitamarhi: B-Earth, 29 KM, 3.55 kA	CB got stuck, LBB operated	B-Earth	500	Z II started and carrier received but breaker didn't opened hence LBB operated at Motipur	PMTL	BSPTCL		
6	220KV-SITAMARHI-MOTIPUR-2	04-08-2021	11:52	Sitamarhi: B-Earth, Z III, 88 KM, 2.19 kA	Motipur: B-Earth, Z I, 2.21 kA	B-Earth	500	Tripped in Z II time.	PMTL	BSPTCL		
7	220KV-RANCHI-CHANDIL-1	05-08-2021	09:11	Ranchi: B-Earth, 64.39 km, 2.55 kA	Earth, 18.5 KM, 3.4 kA, A/R successful	B-Earth	400	Carrier signal not sent from Chandil	PG ER-I	JUSNL	Chandil	

8	400KV-ALIPURDUAR-BINAGURI-3	05-08-2021	10:02	Alipurduar: B-Earth, 38.4 km, 2.8 kA, A/r successful. Tripped in reclaim time	Binaguri: B-Earth, 101.3 km, 1.507 kA, A/r	B-Earth	<100	Tripped in reclaim time	PG ER-II	PG ER-II		
9	400KV-MALDA-NEW PURNEA-1	06-08-2021	05:52	Malda: B-Earth, 49.39 km, 7.28 kA	New Purnea: B-Earth, 80.6 km, 3.9 kA	B-Earth	<100	Tie Cb A/r attempted after failure of main CB A/r	PG ER-II	PG ER-I		
10	220KV-TENUGHAT-BIHARSHARIF-1	06-08-2021	11:51	Tenughat: R-Earth, 129.6 km, 1.23 kA	Biharsharif: R-Earth, Z I, 2.54 kA, 54.88 KM	R-Earth	<100	Three phase tripping for single phase fault	JUSNL	BSPTCL	Both utilities	
11	220KV-PATNA-SIPARA-2	06-08-2021	14:50	Patna: Y_ph differential operated		Y-Earth	<100		PG ER-I	BSPTCL		
12	400KV-BAHARAMPUR-BHERAMARA-3	07-08-2021	09:25	DT received at Baharampur		No Fault	NA	Tripped while availing shutdown of main bay of the line at Bheramara	PG ER-II	Bangladesh		
13	220KV-TSTPP-MEERAMUNDALI-1	07-08-2021	09:36	Y_B-Earth		Y_B-Earth	500	Fault was in 220 KV Meeramundali-BSL. Both lines tripped in Z II from TSTPP sensing same fault as fault was not cleared from Meeramundali	NTPC TSTPP	OPTCL	Line voltage appearing at both ends	
14	220KV-TSTPP-MEERAMUNDALI-2	07-08-2021	09:36	Tripped from TSTPP end only		Y-B-Earth	500		NTPC TSTPP	OPTCL		
15	220KV-BIRPARA-CHUKHA-1	07-08-2021	19:39	Chukha: B-Earth, 70.2 km	Birpara: B-Earth, 59 km, 4.52 kA	B-Earth	<100	Single phase fault, within 500 msec fault occurred in another phase	PG ER-II	Bhutan		

16	400KV-GMR-ANGUL-2	09-08-2021	10:28		Angul: B-Earth, 6.4 km, 14.7 kA	B-Earth	<100	Tripped in reclaim time;	GMRKEL	PG ER-III		
17	220KV-NEW MELLI-JORETHANG-1	10-08-2021	10:17	New Melli: B-Earth, 10.07 km, 1.98 kA	Jorethang: B-Earth, 15.4 km	B-Earth	600	High resistive phase to phase fault	PG ER-II	DANS		
18	400KV-RAJARHAT-JEERAT-1	10-08-2021	18:26	Jeerat: B_ph broken conductor		Broken Conductor	NA	No fault observed in PMU	PG ER-II	WBSETCL		
19	220KV-CHANDIL-RANCHI-1	10-08-2021	20:02	Chandil: R_B, 82.6 km, Ir: 2.43 kA, Ib: 2.55 kA	Ranchi: R_B, 18.02 km, Ir: 8.5 kA, Ib: 8.57 kA	R_B-Earth	500	Carrier signal not sent from Ranchi	PG ER-I	JUSNL		
20	220KV-MAITHON-DUMKA-1	10-08-2021	22:21	Maithon: R-Earth, Z I, 40 KM, 3.927 kA	Dumka: R-Earth, 28.08 KM, 1.89 kA	R-Earth	<100	A/r not in service. Three phase tripping due to unhealthy PLCC	PG ER-II	JUSNL		
21	400KV-ALIPURDUAR-BINAGURI-2	11-08-2021	00:57	Alipurduar: R_B, 21.2 KM, Ir: 25.69 kA, Ib: 21.2 kA, 21.2 km	Binaguri: R_B, Ir: 2.98 kA, Ib: 2.916 kA	R_B-Earth	<100		PG ER-II	PG ER-II		
22	400KV-DSTPS(ANDAL)-RAGHUNATHPUR-1	11-08-2021	11:24	DSTPS: B-Earth, Z I, 18.79 kA, 0.99 KM		B-Earth	<100	Y_B fault observed in PMU	DVC	DVC		
23	400KV-NEW PURNEA-MUZAFFARPUR-1	11-08-2021	22:49	New Purnea: Y-Earth, 135.2 km, 3.3 kA	Muzaffarpur: Y-Earth, 139.6 km, 3.3 kA	Y-Earth	<100	Three phase tripping for single phase fault	PG ER-I	PG ER-I		
24	400KV-NEW PURNEA-MALDA-2	12-08-2021	01:06	New Purnea: R-Earth, 106 km, 3.03 kA	Earth, 4.166 km, 14.06 kA	R-Earth	<100	A/r attempt failed	PG ER-I	PG ER-II		
25	220KV-DARBHANGA (DMTCL)-MOTIPUR-2	12-08-2021	13:56	Darbhanga: R-Earth, 31.44 km, 3.933 kA	Didn't trip	R-Earth	<100		DMTCL	BSPTCL		
26	220KV-DARBHANGA (DMTCL)-SAMASTIPUR-1	12-08-2021	22:14	Darbhanga: R-Earth, 7.6 km, 10 kA	Samastipur: R-Earth, 30 km, 3.3 kA	R-Earth	<100		DMTCL	BSPTCL		

27	400KV-BARIPADA-KHARAGPUR-1	13-08-2021	11:56	Baripada: R-Earth, 75.05 km, 3.3 kA	Kharagpur: R-Earth, 22.42 km, 7.39 kA	R-Earth	<100	Tripped in reclaim time	PG ER-III	WBSETCL		
28	220KV-DARBHANGA (DMTCL)-MOTIPUR-2	14-08-2021	12:23	Darbhanga: Y_B, Iy: 3.29 kA, Ib: 3.21 kA, 62.1 km	Motipur: Y_B, Iy=Ib: 4.24 kA, 44.38 km	Y_B-Earth	<100		DMTCL	BSPTCL		
29	220KV-BUDHIPADAR-KORBA-1	14-08-2021	13:12	Budhipadar: B-Earth, 108.1 km, 1.44 kA	Korba: B-Earth, Z II, 60 KN, 2.039 kA	B-Earth	200	Three phase tripping for single phase fault	OPTCL	WR		
30	220-KV-NEW PURNEA-MADHEPURA-1	14-08-2021	14:38	New Purnea: B-Earth, Z I, 12.8 km, 3.75 kA	Madhepura; B-Earth, Z I, 71.8 km, 1.78 kA	B-Earth	<100	A/r not operated at New Purnea	PG ER-I	BSPTCL		
31	220KV-BUDHIPADAR-RAIGARH-1	14-08-2021	21:02	Budhipadar: R-Earth, Z I, 65 km, 2.55 kA		R-Earth	<100		OPTCL	WR		
32	220KV BARIPADA-BALASORE-1	15-08-2021	05:41	Baripada: B-Earth, 28.39 km, 2.71 kA		Y-B-Earth	<100	Initially Y_ph fault in the line, later B_ph fault also appeared.	PG ER-III	OPTCL		
33	220KV KHAGARIA-NEW PURNEA-2	15-08-2021	09:35		New Purnea: B-Earth, 7.2 km, 9.36 kA	B-Earth	<100		BSPTCL	PG ER-I		
34	220KV-MAITHON-DUMKA-2	15-08-2021	10:12	Maithon - B-Earth , FD - 54.909 KM , FC - 2.471 KA	DUMKA - B-Earth , FD - 4 KM , FC - 1.27 KA	B-Earth	350	Three phase tripping for single phase fault	PG ER-II	JUSNL		

35	220KV-JODA-RAMCHANDRAPUR-1	15-08-2021	11:53	Joda: R-Earth, 58.82 km, 1.67 kA	Ramchandra pur: R-Earth, 1.65 kA	R-Earth	100	A/r not in service. Other two phase tripped in 500 msec from Ramchandrapur end	OPTCL	JUSNL		
36	400KV ARAMBAGH-BAKRESWAR-1	15-08-2021	12:14	ARAMBAGH: R-Earth, Z-1, FD-81 KM, FC-4.42 KA	BAKRESWAR: R-Earth, FD-18 KM	R-Earth	<100	Tripped in reclaim time	WBSETCL	WBSETCL		
37	220KV TENUGHAT-BIHARSHARIF	15-08-2021	13:12	TENUGHAT: R-Earth, Z-1, FD-100.2 KM, FC 1.07 KA	BIHARSARI FF: R-Earth, 84.3 KM, 1.628 kA	R-Earth	200	Three phase tripping. A/r not in service	TVNL	BSPTCL		
38	400KV ARAMBAGH-BAKRESWAR-1	15-08-2021	13:23	Arambag: R-Earth, 81.8 KM, 4.285 kA	Bakreshwar: R-Earth, 53 KM, 3.95 kA	R-Earth	<100	A/r attempt failed	WBSETCL	WBSETCL		
39	220KV KATAPALLI-BOLANGIR-1	16-08-2021	02:02		Bolangir: B-Earth, 72.3 km, 1.76 kA	B-Earth	<100	Three phase tripping from both ends for single phase fault, three phase A/r from Katapalli; No AR at Bolangir	OPTCL	PG ER-III		
40	220KV-BUDHIPADAR-KORBA-1	16-08-2021	13:02	Budhipadar-R-N, Z I, FD-52.6km FC-2.93kA		R-Earth	<100	Three phase tripping for single phase fault at Budhipadar	OPTCL	WR		
41	400KV-MEDINIPUR-KHARAGPUR-1	18-08-2021	14:01	Medinipur-B-Earth, Z I, 61.1 km, 3.893 kA	Kharagpur: B-Earth, 46.5 km, 5.5 kA, A/r failed	B-Earth	<100	A/r attempt failed	PMJTL	WBSETCL		
42	220KV-MAITHON-KALYANESHWARI-1	20-08-2021	13:13	Didn't trip	Tripped during panel shifting at Kalyaneshwa	No Fault	NA	No fault observed in PMU	PG ER-II	DVC		

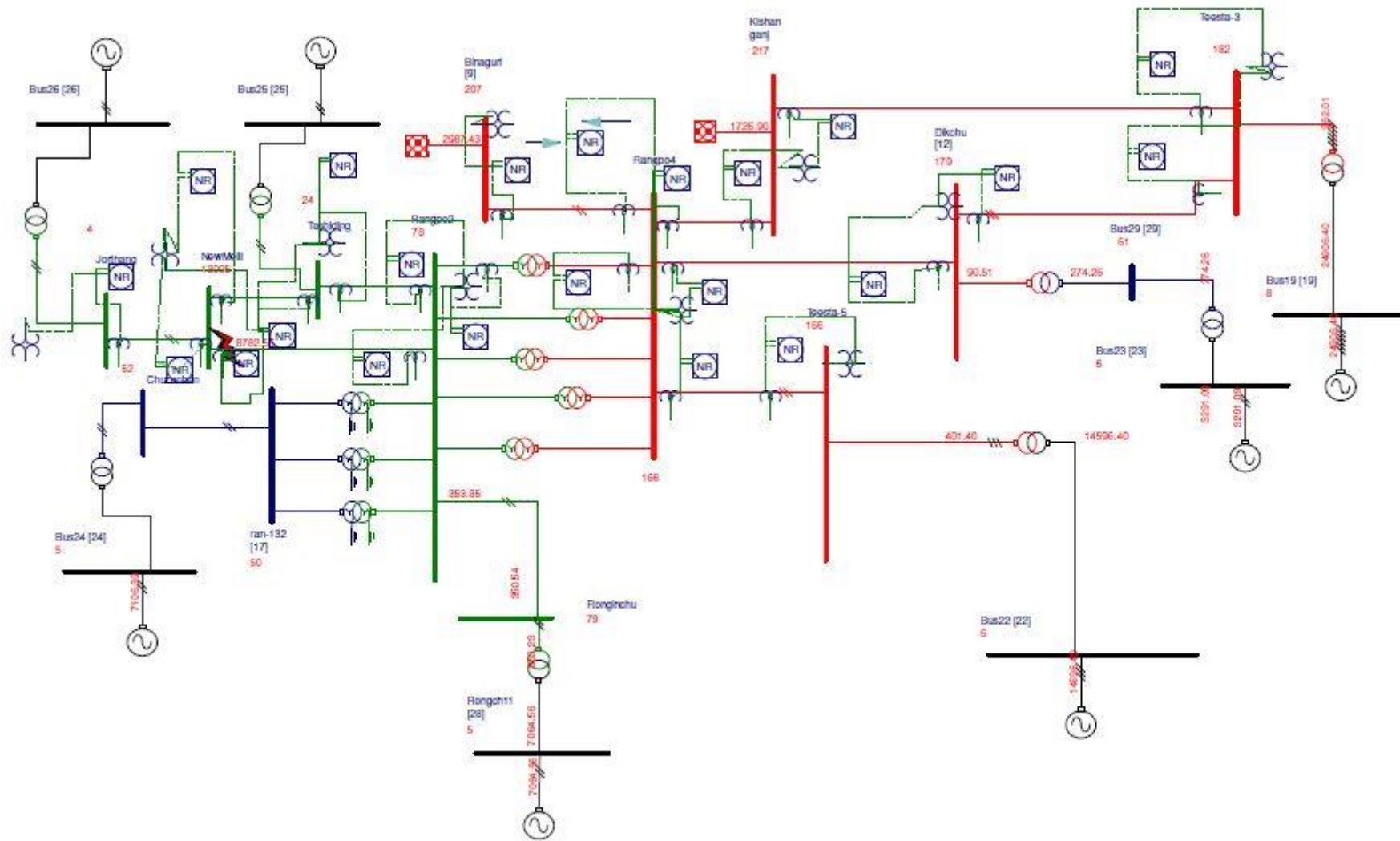
43	220KV-NEW PURNEA-MADHEPURA-1	22-08-2021	11:59	New Purnea: B-Earth, 1.795 KM, 20.504 kA		B-Earth	<100	Three phase tripping for single phase fault from New Purnea	PG ER-I	BSPTCL		
44	220KV-BUDHIPADAR-KORBA-2	23-08-2021	02:54	Budhipadar: B-Earth, 191.3 km, 1.79 kA		B-Earth	<100		OPTCL	WR		
45	400KV-KHSTPP-BARH-2	23-08-2021	03:07	Tripped on O/V at KHSTPP		O/V	NA	Successful A/r observed in 400 KV KHSTPP-Banka II at the same time	NTPC KHSTPP	NTPC Barh		
46	400KV-BARIPADA-KHARAGPUR-1	24-08-2021	11:17	Baripada: Y-Earth, Z II, 77.2 km, 3.07 kA	Kharagpur: Y-Earth, 16.27 km, 8.47 kA	Y-Earth	<100	A/r failed at Baripada but other two phase CB didn't open, later two phase opened on PD	PG ER-III	WBSETCL		
47	400KV-MERAMUNDALI-LAPANGA-2	24-08-2021	13:18	Meramundali: B-Earth, 136.1 km, 2.85 kA, A/r failed	Lapanga: B-Earth, 70.8 km, 3.06 kA	B-Earth	<100	A/r failed at Meramundali. Tie CB at Lapanga took AR attempt after failed attempt of main CB	OPTCL	OPTCL		
48	220KV-DARBHANGA(DMTCL)-LAUKAHI-2	24-08-2021	15:57	Darbhangha: B-Earth, 53.11 km, 1.281 kA	Laukahi: B-Earth, 42.18 km, 0.909 kA	B-Earth	160	initially DEF started then fault sensed in z-1 by Distance Protection but A/r lockout triggered for single phase fault and all three phase opened at Laukahi	DMTCL	BSPTCL		

49	400 KV DSTPS (ANDAL)-RAGHUNATHPUR-1	24-08-2021	12:21	DSTPS: B-Earth, Z I, 55.71 km, 6.04 kA	Raghunathpur: B-Earth, 6.74 km, 15.601 kA	B-Earth	<100	Line tripped in reclaim time	DVC	DVC		
50	220KV-BEGUSARAI-NEW PURNEA-1	24-08-2021	17:26	Begusarai: B-Earth, 218 km, 0.4 kA	New Purnea: B-Earth, 15.6 km, 7.06 kA	B-Earth	<100	Faulty phase tripped immediately and Rest 2 unfaulted phase also tripped after 400 ms ,at Purnea end reason may be checked ,seems PD time delay 400ms only.	BSPTCL	PG ER-I		
51	220KV DARBHANGA (DMTCL)-LAUKAHI-2	25-08-2021	04:28	Darbhangha: Y-Earth, Z I, 34 km	Laukahi: Y-Earth, 44.34 km, 2.097 kA	Y-Earth		DR of another event uploaded by Laukahi	DMTCL	BSPTCL		
52	400KV JHARSUGUDA-RAIGARH-1	25-08-2021	12:19	Jharsuguda: Y-Earth, Z I, 80 km, 3.8 kA		Y-Earth	<100	A/r failed, discrepancy in A/r dead time of two ends	PG ER-III	WR		
53	220KV PATNA-FATUHA-1	25-08-2021	13:36	Patna: R_Y_B, 23.6 km ,Ir: 7.6 kA, Iy: 8.2 kA, Ib: 7.3 kA	Patna: Y_ph CT of 220 KV Biharsharif-Fatuha bus	R_Y_B	500	Y_ph fault eveloved to three phase fault	PG ER-I	BSPTCL		
54	220KV SUBHASHGRAM-EMSS (CESC)-2	25-08-2021	17:14	Subhashgram: R_Y, 24.8 km, Ir: 6 kA, Iy: 4.8 kA		R_Y	350		PG ER-II	WBSETCL		
55	220KV PATNA-FATUHA-1	25-08-2021	16:42		Auxiliary Contact short circuit at Fatuha	No Fault	NA		PG ER-I	BSPTCL		
56	400KV FSTPP-KHSTPP-3	26-08-2021	09:58	Only Main bay tripped	DT received	No Fault	NA		NTPC FSTPP	NTPC KHSTPP		
57	400KV PPSP-BIDHANNAGAR-2	26-08-2021	14:49	R-Earth, 28.8 km	R-Earth, 168.8 km, 2.14 kA	R-Earth	<100		WBSETCL	WBSETCL		
58	400KV FSTPP-KHSTPP-3	27-08-2021	00:39	Didn't trip	DT received	No Fault	NA		NTPC FSTPP	NTPC KHSTPP		
59	400KV FSTPP-KHSTPP-3	27-08-2021	03:59	Didn't trip	DT received	No Fault	NA		NTPC FSTPP	NTPC KHSTPP		

60	220KV NEW PURNEA-MADHEPURA-1	27-08-2021	05:37	New Purnea: B-Earth, 3.81 kA, 54.9 km	Madhepura: B-Earth, 3.23 kA, 32.5 km	Y-Earth	<100	A/r failed from New Purnea while A/r was successful from Madhepura. Jumper snapping reported	PG ER-I	BSPTCL		
61	400KV FSTPP-KHSTPP-3	27-08-2021	05:52	Didn't trip	DT received	No Fault	NA		NTPC FSTPP	NTPC KHSTPP		
62	220KV TTPS-TSTPP-1	27-08-2021	12:11	TTPS: R-Earth, 3.6 km, 12 kA	TSTPP: R-Earth, Z II, 25 km, 5.46 kA	R-Earth	<100		OPTCL	NTPC TSTPP		
63	400KV JEERAT-BAKRESWAR-1	27-08-2021	13:12	Jeerat: B-Earth, 90.6 km, 3.5 kA	Bakreshwar: B-Earth	B-Earth	<100	Fault in reclaim time.	WBSETCL	WBSETCL		
64	400KV NEW PPSP-ARAMBAGH-1	27-08-2021	13:37	New PPSP: R-Earth, 160 km, 2.3 kA	Arambagh: R-Earth, 15 kA, 1.6 km	R-Earth	<100		WBSETCL	WBSETCL		
65	220KV JORETHANG-NEW MELLI-1	30-08-2021	11:43	New Melli: B-Earth, 10.07 km, 1.894 kA		B-Earth	<100	Fault in zone-2 from Jorethang ,Carrier received but No A/r and 3 phase tripping occurred , evolving fault.Same time unit I also tripped on Loss of field ,AVR may be checked	DANS	PG ER-II		
66	220 KV DARBHANGA (DMTCL)-MOTIPUR-1	30-08-2021	13:01	Darbhangha: B-Earth, Z II, 1.293 kA, 90.79 km	Didn't trip	B-Earth	<100	A/R successful from Motipur end ,why tripped from Darbhanga end.	DMTCL	BSPTCL		
67	220 KV DARBHANGA (DMTCL)-LAUKAHI-2	31-08-2021	08:20	DT received	Didn't trip	No Fault	NA		DMTCL	BSPTCL		

68	220KV JORETHANG-NEW MELLI-2	31-08-2021	10:50	Jorethang: B-Earth, 6.5 km, 1.29 kA	New Melli: B-Earth, 9.12 km, 2.08 kA	B-Earth	500	Fault in zone-2 from Jorethang ,Carrier received but No A/r and 3 phase tripping occurred , eveolving fault.Same time unit 1 also tripped on Loss of field ,AVR may be checked	DANS	PG ER-II		
69	220KV CHUKHA-BIRPARA-2	31-08-2021	12:40		Birpara. B-Earth, 39.23 km, 2.722 kA	B-Earth	<100		Bhutan	PG ER-II		

Network:



This is the maximum conditions by taking all generators are on at individual generating stations.

Line	Relay Connected at	CT Ratio in A	Fault Location	Fault Current seen by the Relay	Existing				Proposed			
					Ie> in A (Primary)	Characteristics	TMS/Time Delay	Top (sec)	Ie> in A (Primary)	Characteristics	TMS	Top in sec
Binaguri-Rangpo	Rangpo end	2000/1	Binaguri	2257	200	IEC NI	0.568	1.6	400	IEC NI	0.402	1.6
Binaguri-Rangpo	Binaguri end	2000/1	Rangpo	3021	200	IEC NI	0.638	1.6	400	IEC NI	0.472	1.6
Kishangunj-Rangpo	Rangpo end	3000/1	Kishangunj	1804	200	IEC NI	0.514	1.6	600	IEC NI	0.254	1.6
Kishangunj-Rangpo	Kishangunj end	3000/1	Rangpo	1690	400	IEC NI	0.28	1.3	600	IEC NI	0.239	1.6
Rangpo- Dikchu	Rangpo end	3000/1	Dikchu	6830	200	IEC NI	0.61	1.1	600	IEC NI	0.392	1.1
Rangpo- Dikchu	Dikchu end	3000/1	Rangpo	6620	600	DT	1.5	1.5	600	IEC NI	0.422	1.2
Rangpo- TeesthaV	Rangpo end	2000/1	Teestha V	7814	200	IEC NI	0.6	1.1	400	IEC NI	0.481	1.1
Rangpo- TeesthaV	TeesthaV end	2000/1	Rangpo	3853	-	-	-	-	400	IEC NI	0.397	1.2
Kishangunj-Teestha III	Kishangunj end	3000/1	Teestha III	925	400	IEC NI	0.28	2.3	600	IEC NI	0.068	1.1
Kishangunj-Teestha III	Teestha III end	2000/1	Kishangunj	1555	-	-	-	-	400	IEC NI	0.236	1.2
Dikchu-Teestha III	Dickchu end	3000/1	Teestha III	3453	400	DT	1.5	1.5	600	IEC NI	0.305	1.2
Dikchu-Teestha III	Teestha III end	3000/1	Dikchu	5867	-	-	-	-	600	IEC NI	0.4	1.2
Rangpo 220Kv Bus												
Rangpo-Tasheding	Rangpo end	1600/1	Tasheding	1966	320	IEC NI	0.38	1.4	320	IEC NI	0.24	0.9
Rangpo-Tasheding	Tasheding end	800/1	Rangpo	1446	160	DT	1.2	-	160	IEC NI	0.39	1.2
Rangpo- Newmelli	Rangpo end	1600/1	Newmelli	3173	320	IEC NI	0.399	1.1	320	IEC NI	0.30	0.9
Rangpo- Newmelli	Newmelli end	1600/1	Rangpo	3075	320	IEC NI	0.33	0.9	320	IEC NI	0.30	0.9
Tasheding-Newmelli	Tasheding end	800/1	Newmelli	1956	160	IEC NI	0.24	0.65	160	IEC NI	0.37	1
Tasheding-Newmelli	Newmelli end	1600/1	Tasheding	2164	320	IEC NI	0.314	1.1	320	IEC NI	0.25	0.9
Newmelli-Jorethang	Newmelli end	400/1	Jorethang	6986	-	-	0.473	-	80	IEC NI	0.60	0.9
Newmelli-Jorethang	Jorethang end	400/1	Newmelli	3715	100	DT	0.6	0.6	80	IEC NI	0.57	1

Rangpo - Ronginchu	Rangpo end	1600/1	Ronginchu	6078	208	IEC NI	0.52	1	208	IEC NI	0.45	0.9
Rangpo - Ronginchu	Ronginchu end	400/1	Rangpo	6091	60	DT	0.5	0.5	80	IEC NI	0.65	1
Line	Relay Connected at	CT Ratio in A	Fault Location	Fault Current seen by the Relay	Existing				Proposed			
					I> in A (Primary)	Characteristics	TMS/Time Delay	Top (sec)	I> in A (Primary)	Characteristics	TMS	Top (sec)
Newmelli-Jorethang	Jorethang end	400/1	Newmelli	1009	300	IDMT	0.09	0.42	400	IEC NI	0.11	0.8

Relay Connected	CT Ratio in A	Fault Current seen by the Relay	Existing					Proposed						
			I> in A (Primary)	Characteristics	TMS	Top (sec)	I>	Time delay	I> in A (Primary)	Characteristics	TMS	Top (sec)	I>>(Primary)	Time delay
315 MVA Transformer 400 kV Side	2000/1	3526.33	682	IEC NI	0.21	0.9			682	IEC NI	0.21	0.9	4086	0.05
315 MVA Transformer 220 kV Side	1600/1	770	1240	IEC NI	0.11	1.6			1240	IEC NI	0.11	1.6		

Relay Connected	CT Ratio in A	Fault Current seen by the Relay	Existing					Proposed						
			IN> in A (Primary)	Characteristics	TMS	Top (sec)	IN>>	Time delay	IN> in A (Primary)	Characteristics	TMS	Top (sec)	IN>>	Time delay
315 MVA Transformer 400 kV Side	2000/1	423	91	IEC NI	0.51	2.28			91	IEC NI	0.22	1		
315 MVA Transformer 220 kV	1600/1	719.8	165	IEC NI	0.51	2.38			165	IEC NI	0.36	1.7		

The grid fault levels of connected stations were considered is as tabulated in table below

SL NO.	STATION NAME	3-phase FAULT MVA	3-phase FAULT CURRENT (Amps)	1-phase FAULT MVA	1-phase FAULT CURRENT (Amps)
1	BINAGURI 400kV	24461	35307.1	19496.993	28141
2	KISHANGANJ 400kV	23602	34067	16428.708	23713
3	TEESTA-3 400kV	14836	21414	15239.5	21996.4
4	DIKCHU 400kV	13253.6	19129.9	11835.275	17083
5	TEESTA-5 400kV	14899	21504	13829.3	19960.9
6	RANGPO 400kV	17283	23237	16572.1	23919.8
7	RANGPO 220kV	13699	32419	12635	33160
8	TASHIDING 220kV	6331	11099	2690.914	7062
9	NEW MELLI 220kV	5344	13444	4893.6	12842.9
10	JORTHANG 220kV	6947	9958	2891.617	7589
11	RONGINCHU 220kV	9032.627	23.704	4694.68	12320

Note: For all the lines and transformer relay settings are Directional FWD.