Minutes
of
67th PCC meeting

Date: 04.06.2018
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 67TH PROTECTION SUB-COMMITTEE MEETING HELD AT ERPC, KOLKATA ON 22.05.2018 (TUESDAY) AT 10:30 HOURS

List of participants is enclosed at **Annexure-A.**

PART – A

ITEM NO. A.1: Confirmation of minutes of 66th Protection sub-Committee Meeting held on 25th April, 2018 at ERPC, Kolkata.

The minutes of 66th Protection Sub-Committee meeting held on 25.04.18 circulated vide letter dated 09.05.18.

Members may confirm the minutes of 66th PCC meeting.

Deliberation in the meeting

*WBSETCL requested for the amendment of para 3 under "**Item no. B10**" and para 1 under "**Item no. C2**". On deliberation, PCC agreed to record the views of WBSETCL on the issue as follows:*

*Para 3 under "**Item no. B10**":*

"In case of 132 kV Siliguri(PG)-Melli line, maximum portion of this line belongs to Sikim Govt., and most of the faults observed in their jurisdiction".

*Para 1 under "**Item no. C2**":*

"Powergrid informed that CT ratio of 132 kV Birpara(PG) - Birpara D/C line at PG end was 800/1 and the PSM was at 0.5 (corresponding to 400 A) prior to March 2018. PSM has been revised to 0.75 (corresponding to 600A) after discussion in 65th PCC meeting in March, 2018.

Members confirmed the minutes of 66th PCC meeting with above amendments.

PART – B

ANALYSIS & DISCUSSION ON GRID INCIDENCES OCCURRED IN APRIL, 2018

ITEM NO. B.1: Disturbance in DVC system on 11-04-2018 at 20:10 hrs

Antecedent condition:

- DVC demand: 2406 MW; Frequency 49.95 Hz
- Unit 7 & 8 at CTPS – B under outage
- 220 kV Bokaro B – CTPS B D/C was in opened condition to limit the loading of 400/220 kV Bokaro A ICT

Details of the disturbance:

At 19:40 hrs 220 kV Maithon – Dhanbad - I tripped on B-N fault. While restoration of this circuit, 220 kV Maithon – Dhanbad – II also tripped at 20:10 hrs resulting Dhanbad became radial with Kalyaneswari through 220 kV Kalyaneswari – CTPS A – CTPS B – Dhanbad section. At 20:15 hrs 220 kV Kalyaneswari – CTPS – I tripped due to jumper snapping (suspected) and at 20:18 hrs 220

kV Kalyaneswari – CTPS – II tripped on overload. At the same time 220 kV Joda – Jindal S/C tripped from Joda end resulting load loss at radially fed area i.e. Jamshedpur (DVC) through 220 kV Joda – Jindal – Jamshedpur section.

Relay indications are as follows:

Time	Name of the elements	End 1 relay indication	End 2 relay indication	PMU observation	Remarks
19:40	220 kV Maithon – Dhanbad – I	B-N fault; Yet to be received	B-N fault; Yet to be received	Unsuccessful A/R, Fault clearing time <100	Power flow in 220 kV Maithon – Dhanbad II increased from 128 MW to 211 MW towards Dhanbad
20:10	220 kV Maithon – Dhanbad – II	Y-N fault; Yet to be received	Y-N fault; Yet to be received	Unsuccessful A/R, Fault clearing time <100	Power flow in 220 kV Kalyaneswari - CTPS D/C increased from 95 MW/ckt to 150 MW/ckt towards CTPS
20:15	220 kV Kalyaneswari – CTPS - I	Y-B fault; Yet to be received	Y-B fault; Yet to be received	Fault clearing time <100	Power flow in 220 kV Kalyaneswari - CTPS II increased from 150 MW to 280 MW towards CTPS. Power flow in 220 kV Dhanbad - CTPS D/C changed from 100 MW/ckt to (-10) MW/ckt towards CTPS
20:18	220 kV Kalyaneswari – CTPS – II	Yet to be received	Yet to be received	No fault has been observed in PMU data; Line may trip due to O/L	Supply from both Maithon and Kalyaneswari lost; supply from Bokaro was opened prior to disturbance; hence total power failure at nearby area
20:18	220 kV Jindal – Jamshedpur S/C	Yet to be received	Yet to be received	No fault has been observed in PMU data; Line may trip due to O/L	Jamshedpur (DVC) was radially fed through 220 kV Joda - Jindal – Jamshedpur section; hence total power failure at nearby area

Total load Loss: 700 MW (Dhanbad: 30MW; CTPS+BSL: 470MW; Jamshedpur: 180MW)

DVC may explain.

Deliberation in the meeting

DVC informed that CTPS Units # 7 & 8(250MW) were out of bar and the following contingency measures were taken to avoid overloading of 1X315 MVA, 400/220kV ICT at BTPS 'B':

- *At 15:47hrs, 220kV Jamshedpur- BTPS B lines (L # 213, 214) made OFF*
- *At 17:22hrs, 220kV Giridih-Dhanbad Lines (L # 247, 248) made OFF.*
- *At 18:36hrs, 220kV BTPS B CTPS Lines (L # 205, 206) made OFF.*
- *At 19:55hrs, 132kV BTPS B-Konar (L # 79) &132kV BTPS B-Barhi (L # 80) lines made OFF.*

Further to avoid overloading of DTPS 150MVA, 220/132 kV ATRs, 132kVKalyaneswari-Kalipahari Lines (L # 18, 19) made OFF at 17:55hrs.

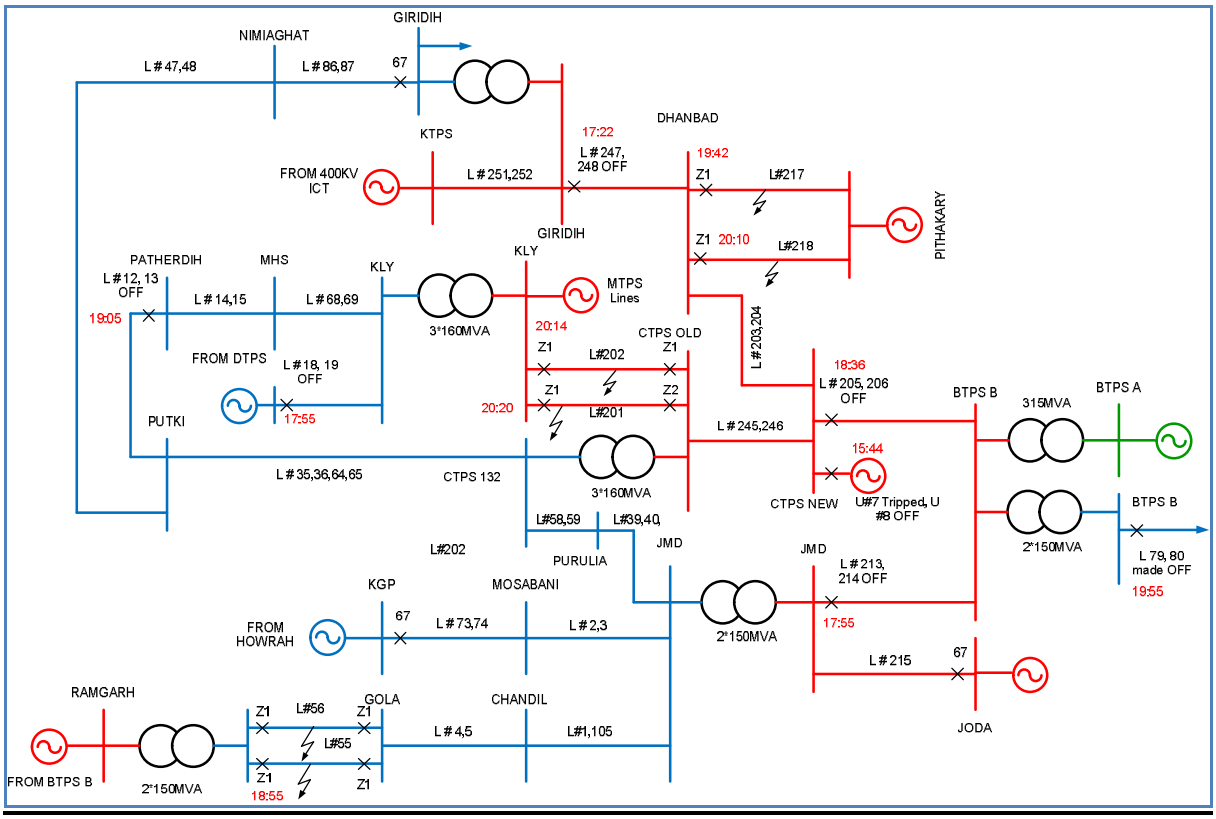
DVC explained that weather was extremely stormy and multiple faults occurred in the network due to lightning. The sequence of events as follows:

- *At 18:55 hrs, 132kV Ramgarh-Gola lines (L # 55 & 56) tripped from both the ends on zone 1 due to simultaneous faults in both the lines during bad weather. L 55 normalised at 18:58 hrs but L 56 had permanent fault as its jumper snapped.*

- *220kV Jamshedpur- BTPS B lines (L # 213, 214) were closed at 17:00hrs to give support to Jamshedpur loads and to avoid over loading on 132kV Ramgarh-Gola lines (line 55) which was being supplied via Ramgarh ATRs.*
- *At about 19:40hrs, weather became extremely stormy with heavy thunder and lightning in CTPS, Dhanbad, Ramgarh region.*
- *220kV Dhanbad-Pithakari line (L # 217) tripped from Dhanbad end at 19:42hrs on zone 1, B-N fault.*
- *220kV CTPS old-Kalyaneswari line (L # 201) tripped at 20:14 from both ends. From Kalyaneswari end on zone 1, from CTPS end on zone 2, YB fault due to Y-Phase jumper snapping near to 220kV Kalyaneswari S/s.*
- *220kV Dhanbad-Pithakari line (L # 218) tripped from Dhanbad end at 20:10hrs on zone 1, Y-N fault. AR attempted but locks out due to permanent fault. Sky wire found snapped.*
- *220kV CTPS old-Kalyaneswari line (L # 202) tripped from both ends on zone 1, B-N fault due to conductor snapping.*

DVC added that the following elements tripped on over load:

- *220kV Jamshedpur- BTPS B lines (L # 213, 214) again switched off to avoid overloading on 400/220kV ICT at BTPS A. As soon as the lines made OFF, 220kV Jamshedpur-Joda line tripped on overcurrent from Joda end due to overload.*
- *132kVGiridih-Nimiaghat lines (L # 86, 87) tripped from Giridih due to over load.*
- *132kV Kharagpur-Mosaboni lines (L 73, 74) tripped from Kharagpur end due to overload.*
- *This caused total power failure at CTPS, Jamshedpur, Dhanbad at 220KV and Gola, Chandil, Putki, Biada, Mosabani, Purulia at 132KV leading to total load loss of approx. 700MW.*



PCC opined that one more 400/220kV ICT at BTPS A is urgently required to overcome the present loading DVC system. DVC should plan automatic load shedding schemes to avoid overloading of existing ICT/ATRs and transmission lines, instead of keeping the important 220kV lines open condition.

In reply, DVC informed that the commissioning of second (2nd) 400/220kV ICT at BTPS 'A', 400kV side bays are ready and work at 220kV side bays is in progress and would take some more times.

ITEM NO. B.2: Total power failure at 400/132 kV Motihari substation on 07-04-2018 at 09:56 hrs

Antecedent condition:

As per DMTCL, weather was stormy with rains at Motihari substation and nearby area prior to the event. All 400 and 132 kV elements were in service at 400/132 kV Motihari substation.

Details of the disturbance:

- 09:48 Hrs, 400 kV Gorakhpur-Motihari circuit 1 and 2 experienced Y phase to earth fault and B phase to earth fault respectively at the same time. Both the lines tripped from Gorakhpur end and main CB tripped at Motihari for both circuits but tie CB faulty phase only has tripped while healthy phase remained in service. This unbalance charging of healthy phases for 400 kV Gorakhpur-Motihari D/C (R-B phases for ckt 1 and R-Y phases for ckt 2) continued for 09:56 Hrs.
- At 09:56 Hrs,total power failed at 400/132 kV Motihari substation due to tripping of 400 kV Barh-Motihari D/C line on R-B phase to phase fault from Barh end on Zone 2 and from Motihari end on Zone 4. The settings for both these zones at respective end were 500 ms hence the lines got tripped from both ends in 500 ms.
- Prior to 400 kV Motihari-Barh D/C tripping after 500 ms , 132 kV Motihari-Motihari (BSPTCL) 1 and 2 have tripped in zone 2 and Zone 1 from Motihari end. While, 132 kV Motihari-Raxaul 1 circuit tripped from Motihari end in Zone 2 while 132 kV Motihari-Betiya 1 got tripped in reverse zone.
- This led to blackout of 132 kV downward radial system which included 132 kV substations of Nepal(Birganj,Surajpura,Parwanipur) and 132 kV substations of Bihar(Ramnagar, Betiah, Raxaul, Motihari, Dhaka).This led to load loss of 90 WM in Nepal and 70 MW in Bihar.

Total Load loss 160 MW

Relay indications are as follows:

Name of the elements	Tripping Time	End 1 relay indication	End 2 relay indication
400 kV Motihari – Gorakhpur 1	09:48.20.160	**At 09:48:** Y-N, No Auto-Reclosure, Main CB tripped, tie CB only Y phase tripped. No PDR operation. **At 09:56 Hrs :**no details.	Y phase to E/F, A/R unsuccessful , Three phase trip issued
400 kV Motihari – Gorakhpur 2	09:48.20.320	**At 09:48:** B-N, No Auto-reclosure, Main CB tripped, tie CB only B phase tripped. No PDR operation. R-Y phase in closed condition. No LBB operation observed from DR. **At 09:56 Hrs :**R-Y phase to Phase fault, Zone 1, Three phase trip, Fault persisted as Tie CB R-Y poles not opening.	B phase to E/F, Fault location : 107 KM ,IB: 2.8 KA A/R unsuccessful , Three phase trip issued
400 kV Motihari – Barh 1	09:56:35.923	R-Y Phase to Phase fault , IR: 3.02 kA, IY: 2.7 kA, Zone 4 (reverse Zone) trip , FD: -1.5 km.	R-Y, Z-II Fault clearing time 500 ms approx
400 kV Motihari – Barh 2	09:56:35.923	R-Y Phase to Phase fault , IR : 2.65 kA, IY: 2.69 kA, Zone 4 (reverse Zone) trip , FD: -1.5 km.	R-Y, Z-II Fault clearing time 500 ms approx
132 kV Motihari – Betia 1	09:56:36.043	R-Y Phase to Phase fault, Reverse zone, IR=261 A, IY-131 A Three phase trip, Tripped after 350 ms. fault location is 2.1 km in forward direction	No Tripping
132 kV Motihari – Betia 2	09:56 Hrs	No details	No Tripping

132 kV Motihari–Motihari (BSPTCL) 1	09:56:36.098	R phase to E/F, 21 Pickup, Forward Direction, IR=158 A, Zone 2 Three-phase trip issued, Three phases tripped after 350 ms delay as per zone 2.	No Tripping
132 kV Motihari–Motihari (BSPTCL) 2	09:56:36.098	R phase to E/F, 21 Pickup, Forward Direction, Zone 1, IR=552 A, Three-phase trip issued immediately after fault, Y-B phase tripped however, R phase tripped after 427 ms of the trip command. Fault location 26.4 km	No Tripping
132 kV Motihari-Raxaul (BSPTCL) 1	09:56:36.008	R phase to E/F, IR=214 A, Zone 2, Distance protection pickup, Forward direction, Tripped after 350 ms. Fault distance 66 km	No Tripping
132 kV Motihari-Raxaul (BSPTCL) 2	09:56	No details	No Tripping

DMTCL and NTPC may explain the following:

- No A/R operation of 400 kV Motihari-Gorakhpur D/C from Motihari end. Same issue has been observed for the 400 kV Darbhanga-Mujaffarpur D/C owned by DMTCL at Darbhanga end.
- Non operation of the healthy phases of respective Tie CB of 400 kV Motihari-Gorakhpur circuits at Motihari end. There is no operation of LBB, PDR with the non-opening of the healthy phases of Tie CB for both the circuits at Motihari end.
- The time setting for Zone 2 for 400 kV Motihari-Barh D/C at Barh end is found to be 500 ms, which is not desirable and should be 350 ms or coordinated accordingly.
- The unbalance charging i.e. for only two phases in service condition has persisted for more than 8 minutes and various alarms like negative sequence, pole discrepancy etc. should have alerted the operator who could have isolated it and averted the event.
- The location of the fault was within Motihari GIS. The actual cause of such fault is still not informed by DMTCL.
- The tripping of 132 kV circuits is also not well understood as none of them was feeding the fault due to radial connection. There is a need of setting coordination for these circuits.
- The 400 kV Gorakhpur-Motihari circuit 2 has been declared faulty due to damage in the GIS yard causing its long outage since 7th April 2018 till today. Such long outage of inter-regional line is not desirable in view of the grid security and reliability.
- The Disturbance recorder files of Motihari end indicate several lapses in configuration, which need to be attended so that all-important signals must be present there. Several queries on disturbance recorder digital and analog signal; configuration has already been sent to DMTCL for correction so that in future correct information can be captured during any event.

Deliberation in the meeting

DMTCL informed that the tie CB of 400kV Gorakhpur-Motihari D/c lines at Motihari end failed to trip the healthy poles for a Y-N fault in the line at 09:48 hrs due to some mechanical problem in all three poles of the CB. At 09:56 hrs, dead fault occurred at 400kV bus of Motihari during isolator operation of 400kV Gorakhpur-Motihari D/c lines. 400kV Barh-Motihari D/c line tripped from Barh end on zone 2 after 500 ms.

PCC advised NTPC and DMTCL to revise the zone 2 time setting of 400kV Barh-Motihari D/c line from 500 ms to 350 ms. However, PCC opined that the line should trip within 100 ms with carrier inter trip scheme.

NTPC reported that in many instances the autorecloser at Motihari end was not initiated for any fault in 400kV Barh-Motihari D/c line.

DMTCL informed that they are planning to hire an agency for rectification of both autoreclose and carrier inter tripping problems being experienced.

DMTCL was not in a position to explain the queries which were mentioned in the agenda.

In view of above, PCC decided to form a Committee with members from NTPC, Powergrid, ERLDC and ERPC. The Committee would visit 400kV Motihari S/s during 11th June 2018 to 13th June 2018 and will do on-site inspection along with Third Party Protection Audit and place the report in next PCC Meeting.

ITEM NO. B.3: Total power failure at 400/132 kV Motihari substation on 07-04-2018 at 18:25 hrs

400 kV Motihari-Gorakhpur 2 and 400/132 kV ICT 2 were out of service prior to the incident.

At 18:25 Hrs on 07-04-2018, 400 kV Main bay breaker of 400 kV Motihari-Gorakhpur circuit 1 tripped. The line was in service through the tie bay along with 400/132 kV ICT 1. Thereafter, 200 MVA 400/132 kV ICT 1 tripped on thermal overload protection. Power flow was 177 MW in ICT I prior to the incident. This led to tripping of its main and tie CB causing tripping of 400 kV Motihari-Gorakhpur circuit 1. Total Load loss is 177 MW.

As this was the only source feeding the 132 kV downstream network, the tripping has led to blackout of 132 kV Radial loads (Betiya, Motihari, Raxaul, Ramnagar, Dhaka, Sibhar, Narkatiyaganj) including 90 MW load loss at Nepal.

Relay indications are as follows:

Name of the elements	Tripping Time	End 1 relay indication	End 2 relay indication
400 kV Motihari – Gorakhpur 1	18:25	Tripped due to ICT 1 tripping as connected through its tie CB	No Details
400/132 kV ICT 1	18:25	Thermal Overload protection operation	-

DMTCL may explain the following:

- Tripping of Main CB of 400 kV Motihari-Gorakhpur 1 at Motihari end
- 400/132 kV ICT 1 tripping on thermal over load. DMTCL may place the settings of thermal overload and over current settings of ICTs.

Deliberation in the meeting

DMTCL informed that Main CB of 400kV Motihari-Gorakhpur line-1 tripped from Motihari end due to some fault in closing coil of CB.

DMTCL failed to explain the reason for tripping of 400/132kV ICT-I on thermal overloading protection instead of overcurrent relay.

PCC advised DMTCL to submit the soft copy of detailed setting files of overcurrent and thermal overload settings of ICTs to ERPC and ERLDC.

ITEM NO. B.4: Disturbance at 220kV Tashiding HEP substation on 15-04-2018 at 06:43 hrs

As per the data received from Tashiding and JLHEP end, it is suspected the fault was at 220 kV JLHEP N Melli – I (Fault was detected by both JLHEP end and New Melli end; A/R was successful at New Melli end, Fault was in Z-I from JLHEP end; Relay indication from New Melli end is yet to be received).

At same time Tashiding end relay of 220 kV Tashiding Rangpo S/C and 220 kV Tashiding New Melli S/C tripped on same fault indication. Fault current detected at Tashiding end (1.5kA & 2.2 kA) are less than JLHEP end (3.4 kA). Fault has been cleared within 100 ms as per PMU data.
After tripping of both lines i.e. 220 kV Tashiding Rangpo S/C and 220 kV Tashiding New Melli, total power failure occurred at Tashiding HEP. As 220 kV JLHEP N Melli – II and 220 kV N Melli – Rangpo S/C were in service, no generation loss occurred at JLHEP end.

Generation loss: 50 MW generation loss at Tashiding

Relay indications are as follows:

Name of the elements	End 1 Time	Relay Indication at end 1	End 2 Time	Relay Indication at end 2
220 kV Tashiding Rangpo S/C	06:43:07.930 hrs	Y-N, F/C 1.5 kA, A/R block	Yet to be received	Yet to be received
220 kV Tashiding New Melli S/C	06:43:07.910 hrs	Y-N, F/C 2.2 kA, A/R block	Yet to be received	Yet to be received
220 kV JLHEP N Melli - I	06:43:07.922 hrs	Y-N, Z-I, F/C 3.4kA, DT received	Yet to be received	Yet to be received

DANSENERGY and Powergrid may explain the following:

- Location of the fault
- Reason for tripping of three circuits as only one fault in Y phase has been observed in PMU data.
- In case of 220 kV JLHEP – New Melli – I, A/R was successful at New Melli end (As per report received from JLHEP end). But line tripped at JLHEP end. Similarly in case of 220 kV Tashiding Rangpo S/C and 220 kV Tashiding New Melli S/C, A/R was blocked at Tashiding end. Reason for DT receipt at JLHEP end of 220 kV JLHEP – New Melli S/C may be explained.

Deliberation in the meeting

Dansenergy representative was not present in the meeting for discussion.

Powergrid informed that there was a Y-N fault in 220kV JLHEP-New Melli-I. The fault was detected by both JLHEP and New Melli ends. Autorecloser was successful at New Melli end but JLHEP end tripped on zone 1.

Powergrid added that 220kV Tasheding-Rangpo tripped from Rangpo end after receiving DT from Tasheding end. Zone 4 pickup was observed at New Melli end of 220kV New Melli-Rangpo line.

PRDC presented their analysis as per the relay settings received from Dansenergy as follows:

- *The time delay of overcurrent settings of outgoing lines at Tashiding was 100 ms.*
- *Zone-1 reach settings of transmission lines at Tashiding and JLHEP wasalmost double than the required setting. Hence zone 1 is overreaching the primary protected line and 220kV*

Tashinding-Rangpo S/c and 220kV Tashinding-New Melli S/c lines were getting tripped immediately from Tashiding end for any fault in the adjacent line.

- *Autorecloser was blocked at both Tashiding and JLHEP ends.*

PCC concluded the disturbance as follows:

- *There was a transient Y-N fault in 220kV JLHEP-New Melli line-I, New Melli end was successfully autoreclosed. As the autorecloser feature was disabled at JLHEP end, no autorecloser attempt was initiated from JLHEP end.*
- *Since zone 1 settings were overreaching the protected line, the same fault was identified in zone 1 by Tashiding end of 220kV Tashinding-Rangpo S/c and 220kV Tashinding-New Melli S/c lines and the lines got tripped immediately from Tashiding end.*

PCC advised Dansenrgy to take the following corrective actions & report:

- *Review the zone 1 reach settings of distance protection at Tashiding and JLHEP as per the protection philosophy of ER.*
- *Review the overcurrent settings of lines at Tashiding and JLHEP and coordinate with the distance protection.*
- *Autoreclose feature should be same at both ends of the line. Hence Dansenergy should decide to keep the Autorecloser in service or not and implement the same at both ends of the line immediately in coordination with Powergrid.*

ITEM NO. B.5: Tripping of 220 kV EMSS – Subhasgram D/C on 17-04-2018 at 10:37 hrs

Antecedent condition:

At 10:37 hrs, total system demand of CESC area was 1550MW out of which CESC generation was 840 MW (BBGS Sent-out) and total import from grid was 710 MW. During this time radial import from PGCIL Subhasgram Sub-station was 468 MW.CESC was synchronized with the Grid at WBSETCL Kasba point through three nos. 132 KV circuits from EMSS.

Details of the disturbance:

Simultaneous faults occurred in B-ph of 220kV EMSS- Subhasgram -1 ckt and R-ph of 220kV EMSS- Subhasgram -2 ckt. A/R started for both the lines from EMSS end. At Subhasgram end, all three phase breakers tripped for 220 kV EMSS – Subhasgram – II and A/R successfully started for Circuit I at Subhasgram end. 220kV EMSS- Subhasgram -1 tripped on Pole-discrepancy form both the ends. In the mean time, 132 kV PCSS-PRS S/C tripped on backup E/F protection due to inflow of earth current through 220/132 kV ICT at EMSS neutral.

Relay indications are as follows:

Name of the elements	Relay Indication at end 1	Relay Indication at end 2
220 KV Subhasgram –EMSS - I	Distance Protection (12.09 km)	B phase Line Differential Protection, Distance: 1.1 km; Tripping time: 10:37:41.957 hrs
220 KV Subhasgram –EMSS - II	Distance Protection (12.26 km)	R phase Line Differential Protection, Distance: 15.7 km Tripping time: 10:37:39.662 hrs
132 kV PCSS – PRS S/C	B/U E/F & I/T received	B/U E/F & I/T received

Load loss: 468 MW

CESC and Powergrid may explain.

Deliberation in the meeting

CESC explained the disturbance with detailed presentation. ERLDC highlighted the issues related to inter tripping and harmonics. Presentation is enclosed at Annexure-B5.

CESC informed that there were multiple faults in 220 KV Subhasgram -EMSS line D/C line, R-N fault in 220 KV Subhasgram -EMSS line-II and B-N fault in 220 KV Subhasgram -EMSS line-I. The sequence of events at both ends was given below:

CIRCUIT ID	***SUBHASGRAM***	***EMSS***
220 KV Subhasgram - EMSS line-II	*1) R PHASE FAULT IN ZONE-1 DETECTED AND TRIPPED.*	*1) R PHASE FAULT IN ZONE-1 DETECTED AND TRIPPED.*
	2) WITHIN R PHASE FAULT DETECTION B PHASE FAULT DETECTED IN ZONE-2 AND AS CARRIER RECEIVED SIGNAL WAS STILL PRESENT SO 3 PHASE TRIPPED	*2)AUTO RECLOSE ATTEMT TAKEN AFTER 1.1 SEC*
220 KV Subhasgram - EMSS line-I	*1) B PHASE FAULT IN ZONE-1 DETECTED AND TRIPPED.*	*1) B PHASE FAULT IN ZONE-1 DETECTED AND TRIPPED.*
	2) AS CKT-2 FROM SUBHASGRAM END TRIPPED AND ONE PHASE OF CKT-T TRIPPED ALREADY ,SO CURRENT OF THE REMAINING R AND Y PHASE INCREASES. FOR Y PHASE IT ENCROCHES ZONE-2 AND AGAIN CARRIER RECEIVED SIGNAL WAS HIGH SO THIS LED TO TRIPPING OF Y PHASE.	*2) NO AUTO RECLOSE ATTEMPT TAKEN AND AFTER 2.57 SEC PD OPERATED*

ERLDC highlighted that 50ms prolongation is set for carrier sendingat EMSS end in Siemens 7SA612 relay. Carrier received at Subhasgram end with delay of 50 ms approximately for both the lines and carrier resetting at Subhasgram is taking around 140 ms.

ERLDC added that significant harmonics observed in DR at Subashgram.

Regarding harmonics, it was informed that the issue was discussed in 145th OCC Meeting.

PCC opined that delay in receiving carrier and delay (160 ms approx.) in resetting of carrier at Subhasgram end may cause mal-tripping of 220 KV Subhasgram -EMSS line during dead time for a fault in the adjacent line of EMSS like 220 KV EMSS-New Casipur.

PCC advised CESC and POWERGRID to ensure minimum time delay for receiving carrier and carrier reset at Subhasgram end.

ITEM NO. B.6: Disturbance at 220/132 kV Madhepura S/S on 30-04-2018 at 05:48 hrs

Antecedent condition:

Inclement weather was reported in Bihar at the time of the incident. 220 kV Purnea Madhepura – II was under shutdown. BSPTCL demand was 575 MW. Frequency was 50 Hz.

Details of the disturbance:

Total power failure occurred at Madhepura, Supaul Lahan (Nepal) and their surrounding area after tripping of 220 kV Purnea Madhepura – I (circuit II was in opened condition due to O/V) on B-N fault. Two voltage dips observed in PMU data within 2.5 seconds suggests existence of multiple faults at the time of the event. Both the faults were cleared within 100 ms.

Load loss: 60 MW

BSPTCL and Powergrid may explain.

Deliberation in the meeting

BSPTCL informed that 220 kV Purnea Madhepura – I tripped from Purnea end on zone 1, B-N fault. Since no other source was available at Madhepura and line II was out of service due to overvoltage, no relay pickup was observed at Madhepura end.

On enquiry, BSPTCL informed that autorecloser was out of service at Madhepura end.

PCC advised BSPTCL to bring the autorecloser at Madhepura into service.

Powergrid informed that the line bays are belongs to BSPTCL and the maintenance & operational issues were yet to be settled.

PCC advised Powergrid and BSPTCL to settle the issues at the earliest.

ITEM NO. B.7: Disturbance at 400/220 kV Maithon S/s on 07-04-2018 at 17:20 hrs

220 kV Maithon - Dhanbad D/C, 220 kV Maithon - Kalyaneswari D/C and 220 kV Maithon - Dumka - II tripped along with 220 kV B/C bay at Maithon tripped due to operation of bus bar protection at Maithon.

In Jamshedpur PMU data fault has been observed in Y & B phases at 17:20:34.620 hrs. Fault has been cleared within 100 ms.

Relay indications are as follows:

Time	Name of the elements	End 1 relay indication	End 2 relay indication
17:20	220 kV Maithon – Dhanbad – I	B/B protection at Maithon	Yet to be received
17:20	220 kV Maithon – Dhanbad – II	B/B protection at Maithon	Yet to be received
17:20	220 kV Maithon - Kalyaneswari -I	B/B protection at Maithon	Yet to be received
17:20	220 kV Maithon - Kalyaneswari - II	B/B protection at Maithon	Yet to be received
17:20	220 kV Maithon - Dumka - II	B/B protection at Maithon	Yet to be received
17:20	220 kV B/C bay at Maithon	B/B protection at Maithon	

Powergrid may explain.

Deliberation in the meeting

Powergrid informed that there was a bus fault in 220 kV Maithan bus I. Busbar protection of Bus –I

has operated and successfully cleared the fault upon tripping all the elements connected to bus-I which was in order. But busbar protection of 220kV Bus II was also reportedly operated and tripped the elements connected to Bus II due to wrong wiring done in the control panel.

The wrong wiring problem was detected and has now been rectified.

ITEM NO. B.8: Tripping of 132 kV KhSTPP - Lalmatia S/C and 132 kV Kahalgaon (BSPTCL) - Lalmatia S/C tripped from Lalmatia on 20-04-2018 at 10:35 hrs

At 10:35 hrs 132 kV KhSTPP - Lalmatia S/C and 132 kV Kahalgaon (BSPTCL) - Lalmatia S/C tripped from Lalmatia resulting load loss at Sahebgunj

Load loss: 30 MW

No fault has been observed in PMU data.

JUSNL, NTPC and BSPTCL may explain.

Deliberation in the meeting

JUSNL informed that there was a B-N fault in 132 kV Kahalgaon (BSPTCL) - Lalmatia S/C line and the fault was successfully cleared from both ends on over current protection. But 132 kV KhSTPP - Lalmatia S/C was also tripped from Lalmatia end on overcurrent protection.

NTPC informed no tripping signal was initiated from their end and the line was manually tripped from their end.

PCC opined that similar incidents were occurred in March 2018 and in 66thPCC JUSNL was advised to check the relay settings and resolve the issue.

PCC once again advised JUSNL to check the reasons for maloperation of the relay of 132 kV KhSTPP (NTPC) - Lalmatia S/C at Lalmatia end within 10 days and submit a report to ERPC and ERLDC.

ITEM NO. B.9: Tripping of 132 KV Motihari-Raxaul D/c tripped from Raxaul end on 21-04-2018 at 21:30 hrs

132 KV Motihari-Raxaul D/c tripped from Raxaul end only on O/C.

Load loss: 120 MW

No fault has been observed in PMU data.

BSPTCL and DMTCL may explain.

Deliberation in the meeting

BSPTCL informed that there was no fault in the network. Nepal was overdrawing from 132kV Raxual-Parwanipur line hence 132 KV Motihari-Raxaul D/c lines got overloaded and tripped from Raxaul end on Overcurrent protection. BSPTCL explained that Raxual end overcurrent protection of 132kV Raxual-Parwanipur line failed to trip because of incorrect CT star point connection. The direction feature of Raxual end overcurrent protection of 132 KV Motihari-Raxaul D/c line was disabled, hence the line got tripped from Raxual end instead of Motihar end.

BSPTCL added that direction feature of Raxual end overcurrent protection of 132 KV Motihari-Raxaul D/c line has been enabled in last week of April 2018. CT star point connection at Raxual end of 132kV Raxual-Parwanipur line would be corrected during next opportunity shutdown.

ITEM NO. B.10: Tripping of 132 KV Motihari-Raxaul D/c tripped from Raxaul end on 26-04-2018 at 09:15 hrs

At 09:15 Hrs, 132 KV Motihari-Raxaul –II tripped on R-N fault and consequently 132 KV Motihari-Raxaul –I also tripped on over current causing load loss of 40 MW at Raxaul and 70 MW load interruption to Nepal.

Load loss: 110 MW

No fault has been observed in PMU data.

BSPTCL and DMTCL may explain.

Deliberation in the meeting

BSPTCL informed that 132 KV Motihari-Raxaulline–II tripped from both ends on R-N fault consequently, 132 KV Motihari-Raxaulline–I was also tripped from Raxual end on over current protection because of overloading.

BSPTCL added that direction feature of Raxual end overcurrent protection of 132 KV Motihari-Raxaul D/c line was disabled. This resulted in tripping of 132 KV Motihari-Raxaul line–I from Raxual end instead of Motihari end. The same has been corrected after the disturbance.

ITEM NO. B.11: Zone 3 settings of ISTS lines

Based on the data available in PDMS, the zone 3 settings of all ISTS lines in Eastern Region were verified and compared with the corresponding resistive reach of the line thermal loading. Zone 3 settings were also checked with the agreed protection philosophy of ER. The discrepancies observed in the settings will be presented in the meeting.

PRDC may present the details.

Deliberation in the meeting

PRDC presented the list of ISTS lines where they observed the discrepancy in zone-3 setting. It was informed that the list of lines will be sent to respective members through mail.

PCC advised all the concern utilities to verify the zone 3 settings and review the settings with an intimation to ERPC Secretariat.

ITEM NO. B.12: Schedule of training program to be conducted by PRDC

As per AMC, PRDC will conduct training on PDMS and PSCT in state utility premises of Eastern Region. Tentative schedule is given below:

Training in Month	State	Date
June'2018	Bihar	11/06/18 To 15/06/18
July'2018	West Bengal	09/07/18 To 13/07/18
August'2018	Odisha	20/08/18 To 24/08/18
September'2028	Jharkhand	17/09/18 To 21/09/18
October'2018	Sikkim	08/10/18 To 12/10/18

Members may finalize the dates and venue.

Deliberation in the meeting

PCC advised the states to confirm the dates and venue shown in the table.

It was informed that PRDC is also planning to arrange a training program at ERPC Conference Hall, Kolkata in first week of July 2018 tentatively.

ITEM NO. B.13: Relay Setting of Idle Charge Line

There is a need of uniform protection setting for lines idle charged for anti-theft purpose in the Eastern Regional grid in order to avoid delayed clearing of faults occurring on the line.

1. **Distance Protection Setting:** Time delays for Zone 1, Zone 2, Zone 3 and Zone 4 should be made instantaneous.
2. **Directional Earth Fault:** Pick Up Current should be set as 120 % of the line charging current of the idle charge length and should be under definite time with instantaneous trip. (Directionality should be retained)
3. **Over Voltage setting :** Stage-I overvoltage pick-up should be minimum of that of all the lines connected from the charging substation with minimum time delay (Say 105 % with 3 Seconds delay)

The adoption of above setting by utilities will help in ensuring instantaneous clearing of any fault on the idle charged section.

Members may discuss.

Deliberation in the meeting

After detailed deliberation PCC agreed to the following settings of idle charged lines for anti-theft measures:

1. ***Distance Protection Setting:*** *Time delays for Zone 1, Zone 2 and Zone 3 should be made instantaneous.*
2. ***Directional Earth Fault:*** *Pick Up Current should be set as 120 % of the line charging current of the idle charge length and should be under definite time with instantaneous trip. (Directional feature should be retained)*
3. ***Over Voltage setting :*** *Stage-I overvoltage pick-up should be minimum of that of all the lines connected from the charging substation with minimum grading and minimum time delay (say 105 % to 110% within 3 sec delay) corresponding to other lines which are in service.*

ITEM NO. B.14: Multiple tripping of 400 kV Ranchi-Rourkela circuit1in the Month of April 2018

400 kV Ranchi-Rourkela 1 circuit tripped on multiple occasions in the month of April 2018. The tripping details are given below:

Element Name	Tripping Date	Tripping Time	Reason 1
400 kV Ranchi-Rourkela-I	13/04/2018	18:53	Ranchi : B-N, FC 4.1 kA, 78 km ; Rourkela : B-N, FC 4.3 kA
400 kV Ranchi-Rourkela-I	05/04/2018	10:34	Rourkela : DT
400 kV Ranchi-Rourkela-I	02/04/2018	12:53	Rourkela: Tripped from Rourkela end only. DT Received

On one occasion it tripped on fault while on other two occasions direct trip signal was received at Rourkela from remote end. ERTS-1 and Orissa Project have not yet sent DR/EL for these tripping and associated reasons to ERLDC which is a non-compliance of IEGC 5.2.r and CEA Grid standard 15.3. In view of this ERTS-1 and Orissa Project may kindly elaborate on the issues during these tripping and remedial actions taken to avoid them along with all supporting information.

Powergrid may explain.

Deliberation in the meeting

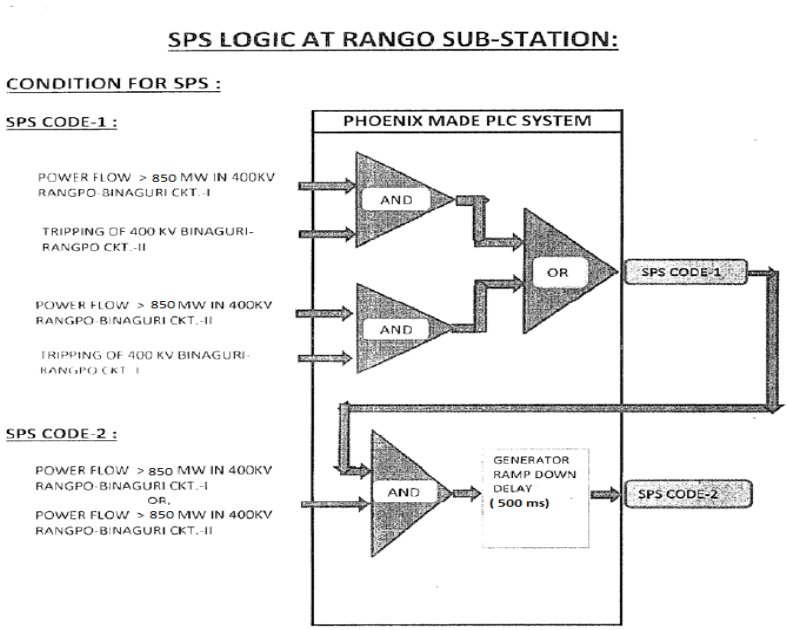
Powergid informed that in first incident the carrier was converted into DT at Rourkela end. In next two occasions the BPL make PLCC system maloperated and sent DT to other end.

Powergrid added that the PLCC issues were rectified and no maloperation was observed afterwards.

ITEM NO. B.15: Non-Operation of 400 kV Binaguri-Rangpo D/C SPS on 9th May 2018

On 9th may 2018 at 05:45 Hrs, 400 kV Binaguri-Rangpo 1 circuit tripped on R phase to earth fault. The circuit tripped from Rangpo end only and it got successfully reclosed from Binaguri end. It was observed that the nature of the fault was highly resistive. Prior to the event, the loading on 400 kV Binaguri-Rangpo D/C was 1040 MW. With tripping of one circuit from Rangpo end, the complete power got shifted to circuit 2. However, the SPS at Rangpo did not operate. After this, ERLDC Control Room took immediate action for reducing the generation in the complex.

The non-operation of SPS at Rangpo end when one circuit tripped and other circuit going above 1040 MW was not desirable as per the SPS logic.



Apart from this, it was observed that the during this resistive fault, Binaguri end first detected it in zone 3 and Rangpo in Zone 2 as the fault feeding from Binaguri end was less compared to Rangpo due to growing fault. Later in next 500 ms the Rangpo end tripped the line causing higher feeding from Binaguri end due to which it detected the fault in zone 1 and initiated faulty phase trip and got successfully reclosed after one second.

In view of this, it is desired to discuss the issues observed with Rangpo SPS scheme non-operation and fault clearance on the line:

1. Why the SPS did not operate even if the logic of one circuit tripping and second circuit carrying more than 850 MW got satisfied?

2. Why was the fault not detected in zone 1 from Binaguri end initially?

3. As the 400 kV Binaguri-Rangpo D/C (110 km length/ckt) is located in hilly terrain and probability of such resistive fault is high, so for faster clearance whether differential protection can be implemented on these lines. This will eliminate the possibility of such delayed clearance of high resistance fault in general.

Deliberation in the meeting

PCC opined that as per the designed logic, SPS should operate in this case. PCC observed that the CB status of Binaguri end of 400kV Rangpo-Binagruri D/C line was not included to the SPS logic.

PCC advised Powergrid to incorporate the status of CBs of Binaguri along with the Rangpo status in SPS logic at the earliest.

PCC advised Powergrid to check the healthiness of the SPS scheme immediately.

PCC advised ERLDC to fix a date for SPS testing and coordinate with all the concern utilities for SPS testing.

Regarding implementation of SPS through SAS, Powergrid informed that the implementation would complete by July 2018.

PCC advised Powergrid to ensure the relevant data availability of SPS operation to ERLDC through SCADA.

ITEM NO. B.16: Multiple Tripping of 400 kV Ranchi-Raghunathpur circuits in the month of March and April 2018.

400 kV Ranchi-Raghunathpur circuits tripped on multiple occasions on fault during the month of March-April 2018. The detailed list is enclosed at **Annexure-B16.** It can be observed that circuit 1 and circuit 3 tripped on 2 occasions each while circuit 2 tripped on six occasions. Such large number of faults on transmission lines connected to a generating station is a matter of serious concern. The circuit 1 is owned by PGCIL however, LILO portion at RTPS is owned by DVC, while circuits 2 & 3 are owned by DVC. ERTS-1 and DVC have not yet sent DR/EL for these tripping and associated reason to ERLDC which is a non-compliance of IEGC 5.2.r and CEA Grid standard 15.3. In view of this, DVC and PGCIL ERTS 1 may kindly elaborate on the issues during these tripping and remedial actions taken to avoid frequent fault on the transmission lines.

DVC and Powergrid may explain.

Deliberation in the meeting

DVC informed that repeated faults were occurred at same location due to touching of Earth wire of 220kV STPS-New Bishnupur line to 400kV Ranchi-Raghunathpur line conductors.

This was due to insufficient clearance between 400kV Ranchi-Raghunathpur and 220kV STPS-New Bishnupur lines.

DVC added that they are planning to resolve the clearance problem during next opportunity shutdown.

Regarding non-operation of Autorecloser at Raghunathpur, DVC informed that they will check the scheme by end of May 2018 and revert back.

ITEM NO. B.17: Multiple tripping of 400 kV transmission lines emanating from Meramundalisubstation and issue of Auto-Reclosure.

For the last two months, several tripping of the 400 kV lines from Meramundalion single phase to earth fault, has been observed. On 1st Apr'18 and 29 Apr'18 two lines tripped from Meramundali and on 28th April 2018 three lines tripped. List is enclosed at **Annexure-B17**. This poses a serious threat to the grid in view of loss of N-1 reliability of Meramundali substation. Further it may also be seen that Auto-reclosure on the lines are not taking place. The issue has been raised in PCC forum on multiple occasions. Apart from this it may kindly be seen that on 28th April Sterlite CPP was connected only via 400 kV Sterlite-Jharsuguda ckts due to tripping of both Meramundali circuits.

In view of above, OPTCL is requested to kindly look into the issues and find out the reason for so many faults at the substation. It may be readily appreciated that any uncoordinated tripping could result in wide-scale impact on the system near Meramundali. Further OPTCL is advised to kindly submit the following:

1. DR/EL for these tripping and the reason for the faults.
2. Action being taken to reduce such fault on these lines.
3. A/R status on these lines at Meramundali as well as remote end.

OPTCL may explain.

Deliberation in the meeting

OPTCL informed that repeated faults were initiated in the lines due to bad weather and severe lightnings. Autorecloser at Meramundali S/s was not operated properly because of non-availability of breaker status binary inputs to the respective relay panel. This was mainly due to damaged connecting cables.

OPTCL added that the connecting cables were replaced in first week of May 2018 and the autorecloser was successfully operated on 17th May 2018.

ITEM NO. B.18: Tripping incidences in the month of April, 2018

Other tripping incidences occurred in the month of April 2018 which needs explanation from constituents of either of the end is given at **Annexure- B18**.

In 58th PCC, ERLDC informed that most of the constituents are not submitting the DR and EL data for single line trippings.

PCC advised all the constituents to upload the details along with DR and EL in PDMS on-line portal and referred the issue to TCC for further guidance.

In 36th TCC, all the constituents were advised to use the PDMS on-line portal for uploading the single line tripping details along with DR (comtrade files), EL and other relevant files for all trippings of August 2017 onwards. Otherwise, it will be considered as violation of compliance of clause 5.2(r) & 5.9 of IEGC.

Members may discuss.

Deliberation in the meeting

Members explained the tripping incidences. Updated status is enclosed at ***Annexure-B18****.*

PART- C:: OTHER ITEMS

FOLLOW-UP OF DECISIONS OF THE PREVIOUS PROTECTION SUB-COMMITTEE MEETING(S)

(The status on the follow up actions is to be furnished by respective constituents)

ITEM NO. C.1: Total power failure at 220/132 kV Waria S/S on 09-03-2018 at 17:15 hrs

In 66th PCC, DVC was advised to ensure the healthiness of CBs at DTPS and review the overcurrent settings of 220/132kV ATRs at DTPS to avoid the fault feeding for longer duration.

DVC may update.

Deliberation in the meeting

DVC informed that the overcurrent settings of 220/132kV ATRs at DTPS are already at lower Margin. Further reduction in pickup value would cause unwanted tripping of the ATRs during normal operation.

On enquiry, DVC informed that separate overcurrent E/F protection is not available for 220/132kV ATRs at DTPS.

PCC opined that it is difficult to isolate the earth faults quickly using simple over current protection especially high resistance and far away faults. PCC advised DVC to install dedicated overcurrent E/F protection for all 220/132kV ATRs in DVC system immediately to improve the reliability.

ITEM NO. C.2: Total power failure at Farakka Power Station on 30th March 2018

In 66th PCC, it was opined that DC earthing could be the reason for operation of Earth Switch Motor and Busbar protection operation of Bus-I.

PCC advised NTPC to ensure healthiness of the DC system at Farakka and also advised to settle the operation & Maintenance modalities with Powergrid at the earliest.

CESC informed that earthing of DC system can be monitored using online monitoring system which also provides the information of fault location. This would help in maintaining the DC system at large substation.

PCC requested CESC to arrange a presentation in PCC Meeting for the benefit of all ER constituents.

NTPC, Powergrid and CESC may update.

Deliberation in the meeting

Powergrid informed that welding of Mechanical interlock for some of the Earthing Switches was not yet completed. The same would be completed during next opportunity shutdown.

NTPC informed that they have isolated the DC earthing and new wiring has been done wherever it is required.

PCC advised CESC to arrange a presentation on "online monitoring of DC system" in next PCC Meeting for the benefit of all ER constituents.

ITEM NO. C.3: Tripping of 220 kV Jorethang - New Melli D/C and 220 kV Tashiding -New Melli S/C lines on 22-03-2018 at 20:38 hrs

In 66th PCC, DansEnergy informed that auto recloser is not in service at Tashiding and Jorethang end.

PCC advised Powergrid and DansEnergy to keep the auto recloser status same in both sides to avoid unwanted autoreclose operation.

PCC advised DansEnergy to check the directional feature, pick up and time settings of distance protection and over current protection of 220kV New Melli-Tashiding line at Tasheding.

DansEnergy may update.

Deliberation in the meeting

Dansenergy representative was not present in the meeting.

ITEM NO. C.4: Disturbance at 400/220 kV Biharshariff S/s on 28-03-2018 at 18:43 hrs and 19-03-2018 at 02:02 hrs.

In 66th PCC, BSPTCL was advised to compute the fault level at Biharshariff (BSPTCL) substation and review the over current settings accordingly.

PCC advised BSPTCL and Powergrid to coordinate back up IDMT the over current settings at 220/132 kV ICTs with 440/220kV ICTs so that 220/132 kV ICTs would trip first for any downstream faults.

BSPTCL and Powergrid may update.

Deliberation in the meeting

BSPTCL informed that they have computed the revised relay settings for Biharshariff S/s as per the fault level of the substation. They would incorporate the new settings by 24th May 2018.

PCC advised BSPTCL and Powergrid to ensure proper relay coordination between 400kV and 220 kV system including ICTs at Biharshariff S/s.

ITEM NO. C.5: Disturbance at 220/132 kV Old Purnea S/S on 16-03-2018 at 11:15 hrs

In 66th PCC, members advised BSPTCL to take the following actions:

The relay settings of VT failure at Purnea(B) of 132 KV Purnea (BSPTCL) -Triveniganj s/c should be reviewed

PCC advised Powergrid to take the following actions:

The relay settings of 132kV Old Purnea - Purnea (B) line III and 220/132 kV ICT – III at Old Purnea should be reviewed

Powergrid informed that the relay settings of 132kV Old Purnea - Purnea (B) line III and 220/132 kV ICT – III at Old Purnea have been corrected in coordination with adjacent relay settings.

On enquiry, Powergrid informed that line differential protection is not yet commissioned for all three lines of 132kV Old Purnea - Purnea (B). Some work is yet to be done at Purnea(B).

BSPTCL agreed to take necessary action by 30th April 2018.

BSPTCL and Powergrid may update.

Deliberation in the meeting

BSPTCL informed that they are ready at their end to implement the differential protection for 132kV Old Purnea-Purnea(BSPTCL) lines.

PCC advised BSPTCL and Powergrid to coordinate each other and commission the differential protection at the earliest.

ITEM NO. C.6: Disturbance at 220/132 kV Patratu S/S on 09-02-2018 at 15:00 hrs

In 65th PCC, JUSNL was advised to take the following measures:

- Check the healthiness of the DC system including end to end cables at 220/132kV Patratu S/s
- Check the healthiness of all Circuit Breakers at 220/132kV Patratu S/s
- Check the healthiness of all the relays installed at 220/132kV Patratu S/s including 220/132kV ATRs
- Check Kanke end relay and CB of 132kV Patratu-Kanke line
- Check the Directional feature of 132 kV Hatia I – Sikidri and 132 kV Namkum - Hatia I line relays at Hatia-I

PCC advised TVNL to verify the zone 1 reach of 220kV Patratu-TVNL line as TVNL end should trip on zone 2 in this case.

In 66th PCC, JUSNL informed that they had visited 220/132kV Patratu S/s on 23rd April 2018 for physical inspection of protection system.

JUSNL added that the primary injection kit was defective hence they could not test the healthiness of the relays. They are planning to engage an agency for checking healthiness of the relays.

JUSNL and TVNL may update.

Deliberation in the meeting

PCC observed that there is no progress in implementation of the PCC recommendations.

PCC decided to pursue the issues with TCC and ERPC Members of JUSNL.

ITEM NO. C.7: Disturbance at 220 kV Budhipadar S/s on 01-10-17 at 09:25 hrs

In 62nd PCC, OPTCL informed that Busbar protection maloperated and tripped all the elements connected 220kV bus 1 at Budhipadar.

OPTCL added that the issue has been referred to OEM (Siemens) for rectification.

In 63rd PCC, OPTCL informed that OEM (SIEMENS) visited the Substation on 29th December'2017 and taken the data (i.e. Trip Log, Even Log & DR) for analysis.

In 64th PCC, OPTCL informed that OEM, Siemens has recommended for updating of 7SS52_MCU device firmware version to V4.73 or higher to resolve the restart automatic problems. Accordingly, Siemens will upgrade the firmware.

OPTCL may update.

Deliberation in the meeting

OPTCL informed that OEM agreed to update the firmware by June 2018.

ITEM NO. C.8: Interim Arrangement for substations that are not having bus bar protection In Eastern region

There may be 400 kV or 220 kV substations where either the bus bar is kept out of service for planned shutdown or bus bar protection is not available due to various reasons. Further, the older substations having static busbar scheme would also undergo replacement activity witha numerical scheme for which the bus bar protection will again be required to be withdrawn for a considerable time. Under such scenario, there is need of a mechanism to reduce the bus fault clearance time as the non-availability of bus bar protection can result in delayed fault clearance.In case of any issue of the protection system at remote substations,there may bea widespread outage.

In view of this, it is proposed to adhere to the following philosophy whenever the bus bar protection is kept out or is not available for a considerable amount of time at any 765/400/220 kV substation:

1. Zone 4 (Reverse Zone) timing of all the Lines to be reduced to 300 ms. The LBB should have a high priority or the reverse zone time should be set at least equal to LBB time setting.
2. Healthiness of the carrier protection of all lines is to be ensured.
3. Zone 4 timer reset should be checked in all the relays, as its function needs to be flawless.
4. DMT high set available in the numerical backup Overcurrent (O/C) relays of all the ICTs be properly set to clear the bus fault immediately. The backup O/C protection is coordinated with the upstream and downstream elements;therefore, it would not be possible to make it sensitive as suggested.
5. Bus Coupler overcurrent protection setting to be made lower. Whenever the Bus Bar protection is out the Buses should be operated in split bus mode, to have isolation of the elements on other Buses from feeding the Bus fault.
6. Re-trip feature if available in LBB should also be enabled to take one more attempt of breaker opening.
7. Healthiness of all Protection i.e. both Main and Backup shall be ensured.
8. All the Other Utilities at the remote ends be informed about the Bus Bar protection outage through ERLDC/respective SLDCs

In the case where two separate bus bar protections schemes are available at the substation as Main 1 and Main 2, then the above will not be applicable in the case of the outage of any one of the bus bar protection scheme.

In 65th PCC, all the constituents were advised to send their comments to ERPC and ERLDC.

PCC may discuss.

Deliberation in the meeting

It was informed that no comments have been received till date.

PCC once again advised all the constituents to send their comments to ERPC and ERLDC for finalization.

ITEM NO. C.9: Sharing of Report on Earthing Audit and Finding/Recommendation for 400/220 kV Bihar Sharif (PGCIL) substation and 400/220 kV Koderma (DVC) substation in Eastern region protection Forum

In the previous PCC meeting of Eastern Region, issue of improper earthing at 400/220 kV Bihar Sharif (PGCIL) substation and 400/220 kV Koderma (DVC) substation was deliberated. Both utilities confirmed the issue with earthing and intimated that they were taking action for resolution of the same. However, there has not been any formal report submission of earthing audit at the substation followed by major finding and recommendation sharing. Therefore, both utilities may kindly share the Report on Earthing Audit and Finding/Recommendation to ERPC/ERLDC immediately. Such report will help other utilities also to enhance their substation security if any such event is observed.

DVC and Powergrid may submit the report.

Deliberation in the meeting

DVC informed that they had already submitted the relevant details of the findings at 400/220kV Koderma S/s.

ERLDC informed that they observed high voltage in healthy phases of Biharshariff S/s during single line to ground fault on 18th April 2018.

Powergrid informed that they have not yet implemented the recommendations of Earthing Audit observations. The recommendations would be implemented by August 2018.Powergrid added that the issue of high voltage in healthy phases during single phase to ground fault would be resolved after implementation of Earthing Audit observations.

PCC advised Powergrid to submit the Earthing Audit report to ERPC and ERLDC.

Powergrid agreed to submit the report within a week.

ITEM NO. C.10: Third Party Protection Audit

1. Status of 1st Third Party Protection Audit:

The compliance status of 1st Third Party Protection Audit observations is as follows:

Name of Constituents	Total Observations	Complied	% of Compliance
Powergrid	54	46	85.19
NTPC	16	14	87.50
NHPC	1	1	100.00
DVC	40	26	65.00
WB	68	49	72.06
Odisha	59	42	71.19
JUSNL	34	25	73.53
BSPTCL	16	5	31.25
IPP (GMR, Sterlite and MPL)	5	5	100.00

** Pending observations of Powergrid are related to PLCC problems at other end.*

The substation wise status of compliance are available at ERPC website (Observations include PLCC rectification/activation which needs a comprehensive plan).

Third Party Protection audit of 220kV MTPS, DTPS, CTPS and BTPS S/s and UFR testing of 132kV Durgapur (DVC) S/s will be carried out during 29th May 2018 to 1st June 2018.

Members may note.

Deliberation in the meeting

Members noted the schedule of Protection Audit in respect of DVC system.

ITEM NO. C.11: Repeated pole blocking at HVDC Sasaram

In 63rd PCC, Powergrid submitted the report which is enclosed at **Annexure-C11**.

In 64th PCC, Powergrid informed that they are implementing the observations. PCC advised Powergrid update the status in monthly PCC Meetings.

Powergrid informed that as per OEM recommendation they have to install air condition system to minimize the temperature of the control panels.

PCC advised Powergrid to submit the details to ERPC and ERLDC.

In 66th PCC, Powergrid informed that as per OEM recommendation they have to install air condition system to minimize the temperature of the control panels which is under procurement.

Powergrid may update.

Deliberation in the meeting

PCC advised Powergrid to submit the latest status on implementation of OEM recommendations.

ITEM NO. C.12: Non-commissioning of PLCC / OPGW and non-implementation of carrier aided tripping in 220kV and above lines.

According to CEA technical standard for construction of electric plants and electric lines -Clause 43(4) (c), transmission line of 220 KV and above should have single-phase auto-reclosing facility for improving the availability of the lines. However, from the tripping details attached June-August, 2016 it is evident that the some of 220kV above Inter & Intra-Regional lines do not having auto-reclose facility either at one end or at both ends. Out of these for some of the lines even PLCC/OPGW is not yet installed and carrier aided protection including Autorecloser facility is not yet implemented. Based on the trippings of June- August, 2016 and PMU analysis a list of such lines has been prepared and as given below:

List of line where auto reclose facility is not available(Information based on PMU data analysis)							
S. No	**Transmission Lines name**	**Date of Tripping**	**Reason of Tripping**	**Owner Detail**		**Present Status**	
				End-1	**End-2**	**OPGW/PLCC Link available**	**AR facility functional**
13	220KV BUDIPADAR-KORBA-II	23.06.16	Y-N FAULT	OPTCL	CSEB	PLCC available	will be activated in consultation with Korba
17	220 KV TSTPP-RENGALI	17.07.16	EARTH FAULT	NTPC	OPTCL		by March 2018
18	220KV BUDIPADAR-RAIGARH	21.07.16	EARTH FAULT	OPTCL	PGCIL	PLCC defective	
19	400 KV KOLAGHAT-KHARAGPUR-II	03.08.16	Y-N FAULT	WBPDCL	WBSETCL		

20	220 KV FARAKKA-LALMATIA	03.08.16	B-N FAULT .	NTPC	JUNSL	Yes	Old Relay and not functional. 7-8 months required for auto re-close relay procurement.
23	220 KV MUZAFFARPUR - HAZIPUR - II	10.08.16	B-N FAULT	PGCIL	BSPTCL		Voice established. For carrier required shutdown
24	220 KV ROURKELA - TARKERA-II	11.08.16	B-N FAULT	PGCIL	OPTCL	OPGW available	Expected to install protection coupler by Jan 17
27	220 KV BIHARSARIF-TENUGHAT	07.09.16	B-N FAULT	BSPTCL	TVNL		
32	220KV Bidhannagar-Waria-II			WBSETCL	DVC		
33	220KV Jamshedpur-Jindal-SC						

34th TCC advised all the respective members to update the above list along with the last tripping status in next PCC meeting.

TCC further advised all the constituents to give the latest status of PLCC of other 220kV and above lines under respective control area.

OPTCL:

1. 220kV Rengali(PG)-Rengali S/Y (Proposal for Commn. in OPGW is pending): *PSDF appraisal committee accepted the proposal*
2. 220kV Indravati(PG)-Indravati(PH) (Proposal for Commn. in OPGW pending): *PSDF appraisal committee accepted the proposal*
3. 132kV Baripada(PG)-Baripada (Tendering in Progress for OPGW): *Contract awarded*
4. 132kV Baripada(PG)-Rairangpur (Tendering in Progress for OPGW): *Contract awarded*

BSPTCL:

1. 220kV Purnea (PG)-Madhepura line
2. 220 kV Biharshariff- Begusarai line
3. 220 kV Biharshariff- Bodhgaya line
4. 220kV MTPS-Motiari line

Work is in progress expected to be commissioned by December 2017.

5. 220KV Madhepura-New Purnea D/C — Auto recloser is out of service at Madhepura
6. 220KV Muzaffarpur-Hajipur D/C line — Auto recloser is out of service at Hazipur
7. 220KV FSTPP-Lalmatia-1 — Auto recloser is out of service at Lalmatia
8. 220KV Patna-Khagaul-SC — Auto recloser is out of service at Khagual

In 65th PCC, Powergrid informed that they will replace the Autorecloser relay of 400 kV Rourkela-Chaibasa 1 and 400 kV Meramundali-Sterlite 1 & 2 by April 2018.

Members may update the status.

Deliberation in the meeting

BSPTCL informed that they are planning to hire an agency for implementing PLCC system in all the lines in their network.

ITEM NO. C.13: Coordination of Auto-Reclsoure on the Transmission lines emanating from generating substation

Many of the Generating stations adopt delayed Auto-reclosure scheme by sensing of the successful Auto-reclosure at the remote end through voltage buildup. In this way if the fault is persisting then it will not be attempting auto-reclosure as line will be in trip condition from the remote end thus there will be no voltage buildup. The intent of this scheme is to avoid generator to feed the fault current on more than one occasion in case of permanent nature of the fault. However, certain issues have been observed in the real-time cases, which are described below:

1. **A/R Time coordination:** In many instances, it has been observed that even in case of unsuccessful A/R from other end, the generating end is attempting Auto-reclosure and thus once again feeding the fault causing double voltage dip. This defies the whole purpose of this scheme. In such cases, either there should be a direct trip sent from the remote end after unsuccessful auto –reclosure or Tripping of the circuit at generating end after the delay introduced for sensing of voltage buildup after A/R timing.
2. **Activation of TOR protection:** Delayed feeding of Fault during A/R has been observed in case of Zone 2 fault from one of the ends. This has happened when the fault is not in the Overlapped Zone 1area from both ends of the transmission line. Under this condition, it has been observed that if the end from where the fault is in zone 2 takes the first attempt for A/R then will see the fault in zone 2 and clear in zone 2 timing (350 ms). This has resulted in delayed fault feeding to the system, which is highly undesirable. Under such condition, if TOR (trip on reclose) protection would have been enabled/activated, then it will trip immediately irrespective of the zone for such scheme.

Example of the above two issues can be seen in the tripping of 400 kV Jeerat-Chanditala at 19:28 Hrs on 17.04.18:

Originally the above-mentionedline was 400 kV Jeerat-Kolaghat and recentlyit has beenLILOed at Chanditala. As one side of the line was Generator (Kolaghat) previously,its A/R scheme was based kept at both ends as per above-described scheme. It is suspected that the A/R timing and scheme has not been revised after the LILO work at Chanditala. On 17th March 2018 at 19:28 Hrs, B phase to earth fault has occurred on the transmission line and its PMU plot is shown in the attached figure. It can be seen that Jeerat end has attempted the A/R in 500 ms and it continuously fed the fault in Zone 2. After clearance of the fault from one end, the other end has also taken A/R attempt, which again resulted in fault feeding in the system.

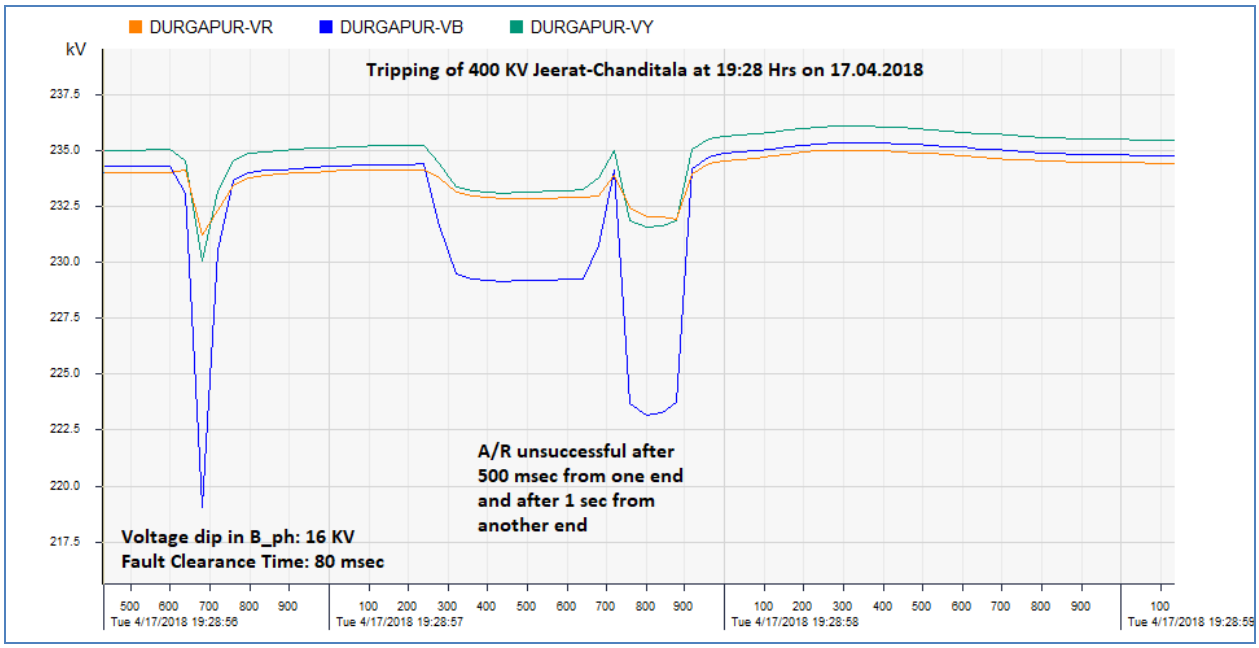


Fig: 400 kV Durgapur Bus Voltage from PMU indicating the fault on 400 Jeerat-Chanditala ckt.

In 66th PCC, Members opined that TOR (trip on reclose) protection should be activated to minimize the fault feeding period.

PCC advised WBSETCL to take appropriate action.

WBSETCL may update.

Deliberation in the meeting

WBSETCL informed that they would review the dead time of the Auto recloser during next opportunity shutdown.

ITEM NO. C.14: Status of Busbar protection Implementation at 132 kV substations in Eastern region.

Presently Eastern region Protection coordination Committee (PC) forum monitors the availability of bus bar protection at 220 kV and above substations on regular basis. In this regard it may be noted that asper **CEA Regulation on "Measures relating to Safety and Electric Supply 2010",**

Quote
45.2.VII*"High-SpeedBus bar differential protection along with local breaker backup shall be commissioned and shall always be available at all 132 kV and above voltage substations and switching substations and generating substations connected with the grid.*
Provided that in the respect for 132 kv substations and switching stations having more than one incoming feeders , the high speedbus bar differential protection along with local breaker backup protection, shall be commissioned and shall always be in service."

Unquote

In view of the above, it is proposed that the PCC forum may also monitor the 132 kV Busbar protection along with LBB protection availability at all 132 kV substations in the Eastern regional grid. For this, the details of the availability of bus bar protection and LBB protection may kindly be submitted by all the utilities to ERLDC/ERPC. In case of non-availability of bus bar protection and LBB, the utility may also kindly submit their action plan with a timeline for ensuring the compliance for enhancing the reliability and security of the grid.

In 65th PCC, constituents informed that as per IEGC, bus bar protection is mandatory for 220kV and above substations. For implementation of bus bar protection the all the CTs have to be replaced which would require huge investment.

After detailed deliberation, it was decided to communicate the issue to CEA.

PCC may discuss.

Deliberation in the meeting

After detailed deliberation, PCC decided to implement the Busbar protection as per the CEA Regulation on "Measures relating to Safety and Electric Supply 2010" for new 132kV Substations which were commissioned after 2010.

ITEM NO. C.15: Checklist for submission of updated data for Protection Database

The network data in Protection Database needs to be updated on regular basis on account of commissioning of new elements in the CTU as well as STU networks. Accordingly a checklist has been prepared which is enclosed in **Annexure-C15**.

All the constituents requested to submit the checklist on monthly bases in every OCC/PCC meetings.

Constituents may note.

Deliberation in the meeting

Members noted.

ITEM NO. C.16: Additional Agenda

1. **Sequence of operation of HVDC Talcher-Kolar D/C line - ERLDC**

ERLDC requested Powergrid and NTPC to submit the details of sequence operation of HVDC Talcher-Kolar D/C for a fault in the line along with the sequence of SPS operation.

Deliberation in the meeting

Powergrid and NTPC agreed to submit the details.

2. **Shutdown of 400kV Farakka-Sagardhigi S/C line**

Deliberation in the meeting

WBSETCL agreed to give one day shutdown (on ODB basis) either on 24th May 2018 or 25th May 2018.

3. **Shutdown of 400kV Farakka-Behrampurline S/C line**

Powergrid informed that they are placing requisition for shutdown of 400kV Farakka-Behrampur S/C line from last three months but they are not getting approval from WBSETCL.

Deliberation in the meeting

WBSETCL informed that in view of huge demand in West Bengal system during this Summer and Monsoon, it is not possible to give the line shutdown till winter.

WBSETCL agreed to allow the shutdown after Durga Puja.

Meeting ended with vote of thanks to the chair

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Participants in 67th PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata   Time: 10:30 hrs   Date: 22.05.2018 (Tuesday)

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"Coming together is a beginning, staying together is progress, and working together is success." –Henry Ford

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Venue: ERPC Conference Room, Kolkata   Time: 10:30 hrs   Date: 22.05.2018 (Tuesday)

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Venue: ERPC Conference Room, Kolkata Time: 10:30 hrs Date: 22.05.2018 (Tuesday)

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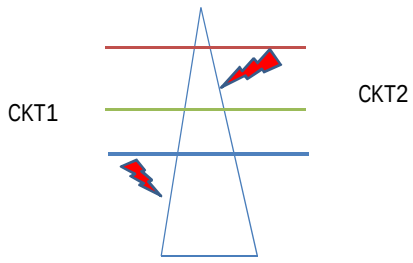
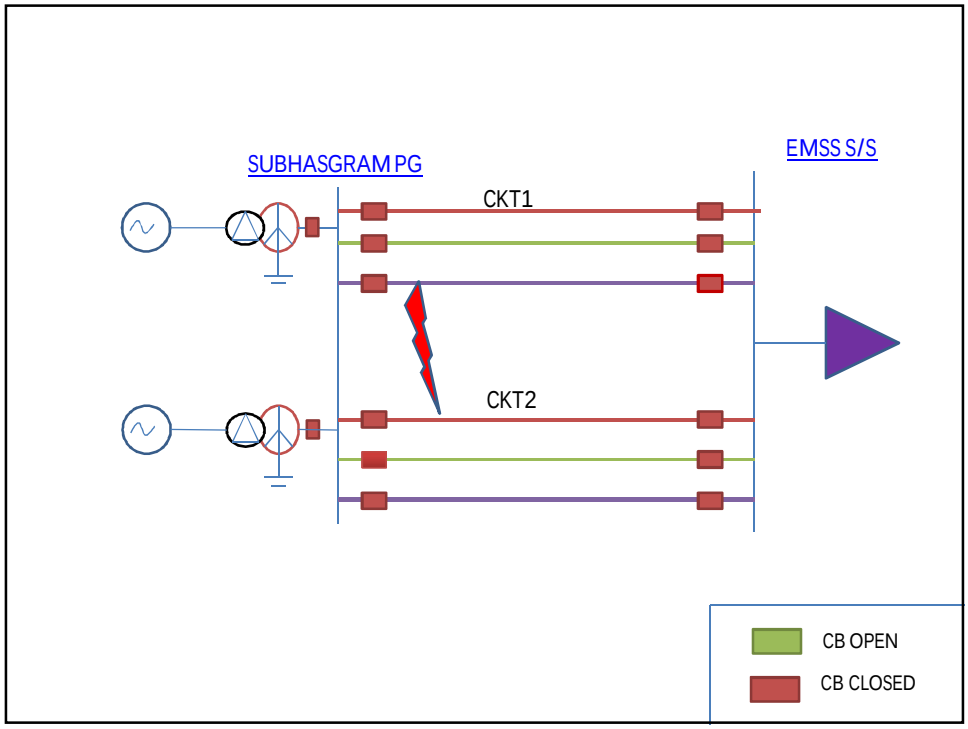
CESC DISTURBANCE ON 17/04/18

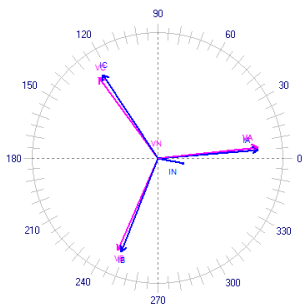
NATURE OF FAULT



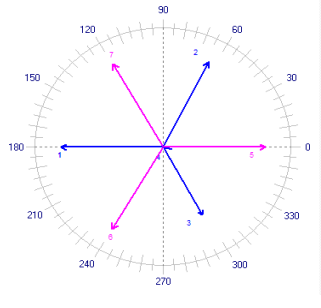


DISCUSSION

- During pre-fault condition angle between V & I at sending end is nearly 0° and at receiving end nearly 180°.



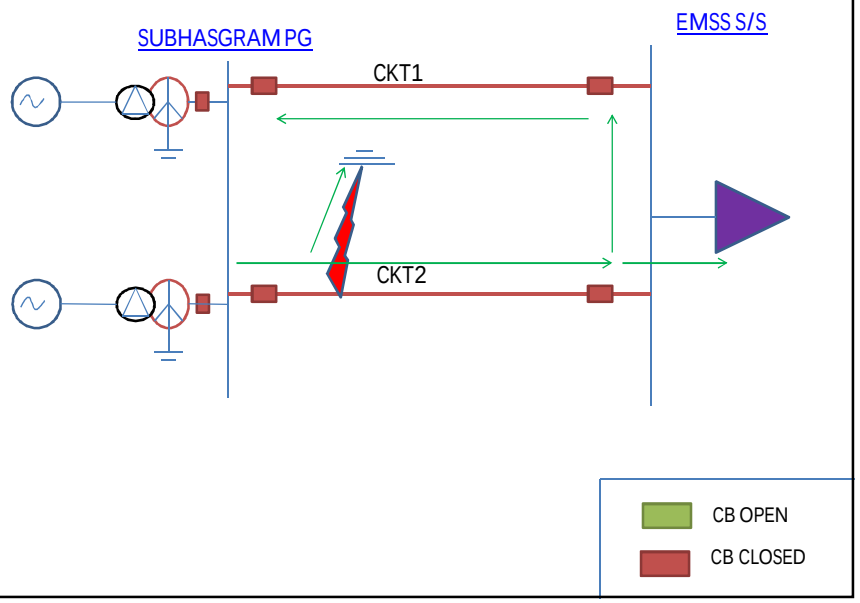
PG END



CESC END

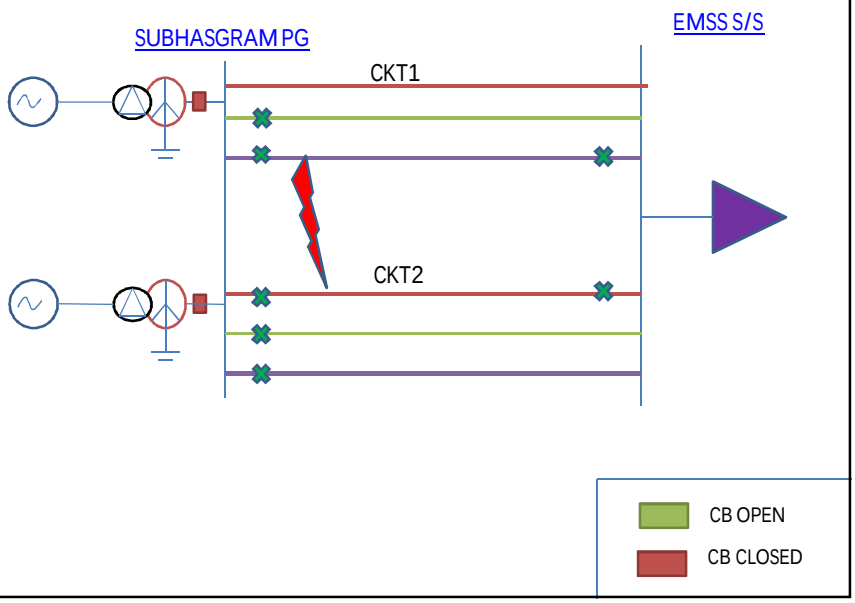
DISCUSSION

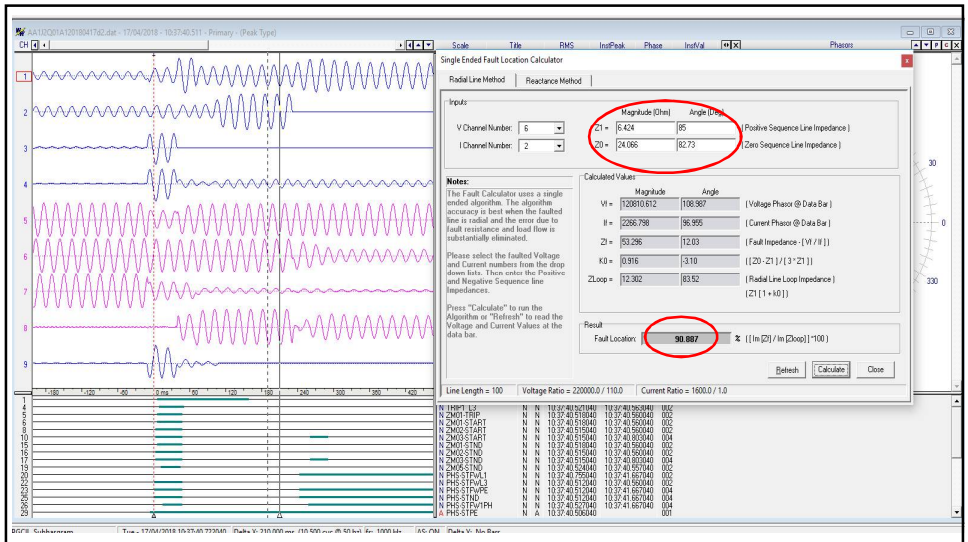
- The angle between voltage and current along with the current magnitude helps in identifying fault location in terms of say within the protected line /outside protected line /reverse/ forward etc.



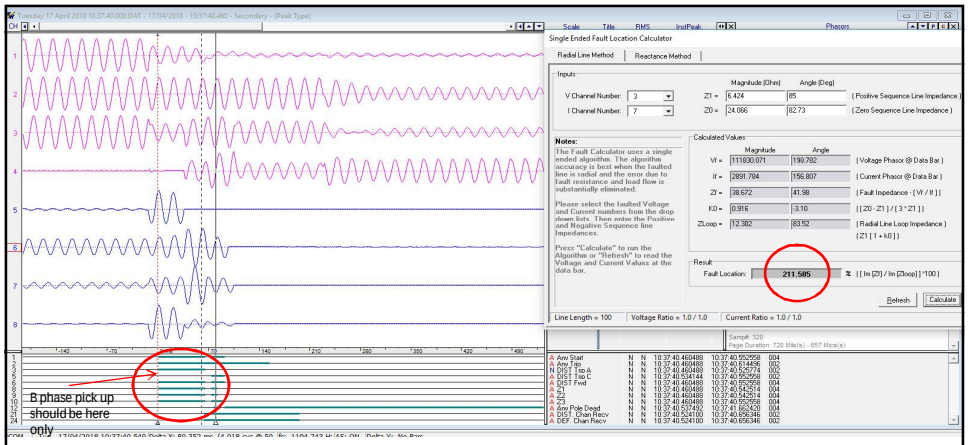
SEQUENCE OF EVENTS

CIRCUIT ID	SUBHASGRAM	EMSS
CIRCUIT-2	1) R PHASE FAULT IN ZONE-1 DETECTED AND TRIPPED.	1) R PHASE FAULT IN ZONE-1 DETECTED AND TRIPPED.
	2) WITHIN R PHASE FAULT DETECTION B PHASE FAULT DETECTED IN ZONE-2 AND AS CARRIER RECEIVED SIGNAL WAS STILL PRESENT SO 3 PHASE TRIPPED	2)AUTO RECLOSE ATTEMT TAKEN AFTER 1.1 SEC
CIRCUIT-1	1) B PHASE FAULT IN ZONE-1 DETECTED AND TRIPPED.	1) B PHASE FAULT IN ZONE-1 DETECTED AND TRIPPED.
	2) AS CKT-2 FROM SUBHASGRAM END TRIPPED AND ONE PHASE OF CKT-T TRIPPED ALREADY ,SO CURRENT OF THE REMAINING R AND Y PHASE INCREASES . AND FOR Y PHASE IT ENCROCHES ZONE-2 AND AGAIN CARRIER RECEIVED SIGNAL WAS HIGH SO THIS LED TO TRIPPING OF Y PHASE.	2) NO AUTO RECLOSE ATTEMPET TAKEN AND AFTERV 2.57 SEC PD OPERATED





LINE DATA COLLECTED FROM PDMS AND USING THE SAME IN THE FAULT LOCATOR IT IS FOUND THAT Y PAHSE OF CKT-1 ENCHROCHED ZONE-2 AFTER TRIPPING OF ALL PAHSES OF CKT-2 AND B PHASE OF CKT-1



When B phase of line-2 at Picked up zone-1 after 70 ms of R phase Pickup , It is seen from DR fault locator that it should not picked up in zone-1. Actually B phase also converging in zone 1 at the same instant as R phase only.

ISSUES

- Why Carrier received signal in not resetting even after the tripping?

  - At CESC end in Siemens 7SA612 relay a 50ms prolongation is set for carrier send(AS PER PDMS DATA) but as resetting at Subhasgram is taking around 140 ms . So POWERGRID and cesc may check the PSL logic for the prolongation of carrier send.

- Delay in carrier received at Subhasgram end.

  - At Subhasgram carrier is received approximately 50 ms delayed in both the line. This issue was highlighted during 56th PCC in regards of 400 KV HEL-Subhasgram line.

- During a evolving fault 3 phase trip should be issued . But for circuit 1 at Subhasgram this did not happened.

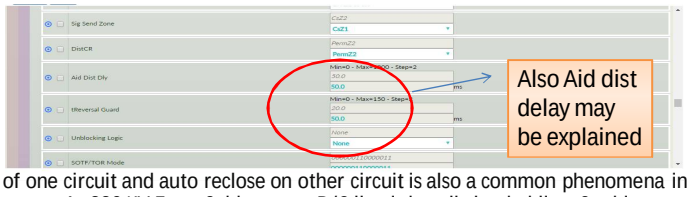
  -In MICOM P444 relay Discrimination timer is used to discriminate between evolving fault and new fault. At Subhasgram, as checked from PDMS, this discrimination timer is set to 5 sec. So 3 phase tripping should have happened. POWERGRID may explain the reason.

- DR of Circuit-2 is showing only 2 pole tripping so it may be configured properly

ISSUES

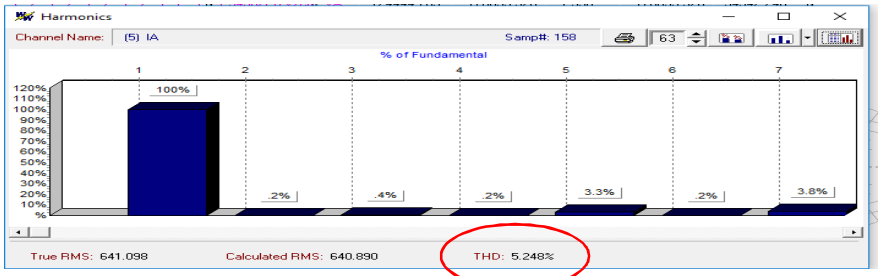
- In permissive under reach scheme there must not be any Reversal guard timer but why at PG end its value is not zero. POWERGRID may explain.

  1) Actually For line -2 in the event logger it is seen that this Timer become on during Y and B phase pick up . And that's why PG end did not send Carrier to EMSS.



- Tripping of one circuit and auto reclose on other circuit is also a common phenomena in power system . As 220 KV Emss-Subhasgram D/C line is heavily loaded line. So this case of load encroachment may happen again. As Micom relay don't have load encroachment facility so it is recommended to change the Zone-2 and 3 resistive reach from 47.8 Ohm to 45 Ohm.
- Why line-1 did not reclosed at CESC end ? CESC may explain.

SPECIAL FINDINGS



As per CEA Grid standard clause 3.2 " *The transmission licensee shall ensure that the voltage wave-form quality is maintained at all points in the Grid by observing the limits given in Table 5 below,- "*

S.No.	System Voltage (kV rms)	Total Harmonic Distortion (%)	Individual Harmonic of any particular Frequency (%)
1	765	1.5	1.0
2	400	2.0	1.5
3	220	2.5	2.0
4	33 to 132	5.0	3.0

Element Name	Tripping Date	Tripping Time	Reason
400 kV Ranchi-Raghunathpur 2	3-Mar-18	12:51	**Ranchi:** R-Y fault, Ir=5 kA, Iy=6 kA, Distance=129.8 km. A/R attempted.1st A/R attempted due to R-N fault, Ir=3.8 kA, Distance 169.8 km and 2nd A/R attempted due to same R-N fault, Distance 64 km, Ir=5 kA.
400 kV Ranchi-Raghunathpur 2	5-Mar-18	12:07	**RANCHI :** R- Phase to E/F, FD: 85 km, FC:4 kA;RTPS : R- Phase to E/F ,FD : 23 km, FC: 8 kA
400 kV Ranchi-Raghunathpur 2	5-Mar-18	13:44	**Ranchi :** R- Phase to E/F , FD: 84.1km, FC: 3.8kA
400 kV Ranchi-Raghunathpur 2	13-Mar-18	14:13	**Ranchi :** Zone 1, R-B Fault, FD-24-93 km, IR-9.992 kA, IY-10.758 kA
400 kV Ranchi-Raghunathpur 3	1-Apr-18	17:09	**Ranchi: :** R Phase to earth due to Inclement Weather
400 kV Ranchi-Raghunathpur 3	5-Apr-18	15:38	**RANCHI:** Y Phase to Earth Fault,, 132 km, F/C 2.94kA A/R Successful; **RTPS:** Y Phase to Earth Fault, F/D :143.8 km
400 kV Ranchi-Raghunathpur 2	10-Apr-18	15:26	**Ranchi :** R- Phase to E/F, 158 km, 3.9 kA; **RTPS :** R phase to Earth Fault , 25.47 km, 9.91 kA
400 kV Ranchi-Raghunathpur 2	10-Apr-18	16:22	**Raghunathpur:** Y Phase to Earth Fault, Zone 1,27.67 km,9.5 kA
400 kV Ranchi-Raghunathpur 1	11-Apr-18	17:45	**Ranchi:** R- Phase to E/F, 112.03 km ,3.2 kA; **RTPS :** Y- Phase to E/F,2.11 km,19.58 kA
400 kV Ranchi-Raghunathpur 1	11-Apr-18	18:32	SOTF, Jumper of Y-PH of RTPS- RANCHI #1 at location no 9 is opened and touches to the cross arm

Element Name	Tripping Date	Tripping Time	Reason
400 kV Meramundali-Sterlite 1	13-Mar-18	19:30	Meramundali: B Phase to Earth Fault , FD: 35.46 kA; Sterlite : FD: 27.4 km
400 kV Meramundali-Sterlite 1	19-Mar-18	11:30	Meramundali: B Phase to Earth Fault, FD: 174.2 km, FC: 2.24 kA
400 kV Meramundali-Mendhasal	28-Mar-18	04:45	At Meramundali :R Phase to Earth Fault, 28.9 km, FC :14.18 kA
400 kV Meramundali-Sterlite 2	1-Apr-18	15:38	Meramundali : B Phase to Earth Fault, Inclement Weather Reported
400 kV Meramundali-Mendhasal	1-Apr-18	17:25	Meramundali : B Phase to Earth Fault, Inclement Weather Reported
400 kV Meramundali-Mendhasal	4-Apr-18	17:25	Meramundali : B Phase to Earth Fault, FD: 30 km , FC: 6 kA
400 kV Meramundali-Mendhasal	7-Apr-18	16:48	Meramundali : Y Phase to Earth Fault, Zone 1, FD: 45.5 km
400 kV Meramundali-Mendhasal	17-Apr-18	17:56	Meramundali: B Phase to Earth Fault, FD: 26.7 km, FC: 7.25 kA
400 kV Meramundali-Sterlite 1	28-Apr-18	17:30	Meramundali: Zone 1,R Phase to Earth Fault ,FC: 5.79kA, FD :57.6km
400 kV Meramundali-Mendhasal	28-Apr-18	21:47	Meramundali: R Phase to Earth Fault, FD: 29.2 km, FC: 25.5 kA
400 kV Meramundali-Sterlite 2	28-Apr-18	19:47	B Phase to Earth Fault
400 kV Meramundali-Angul 1	29-Apr-18	21:14	Meramundali: R Phase to Earth Fault ,FD: 6.6 km
400 kV Meramundali-Sterlite 1	29-Apr-18	21:14	Sterlite : Y Phase to Earth Fault , Z I, FC: 22.6 kA, FD: 4.9 km
400 kV Meramundali-Sterlite 2	30-Apr-18	18:13	Meramundali: B Phase to Earth Fault ,FD: 192.7 km, FC : 2.12 kA

List of important transmission lines in ER which tripped in April 2018

LINE NAME	TRIP DATE	TRIP TIME	RESTORATION DATE	RESTORATION TIME	Relay Indication LOCAL END	Relay Indication REMOTE END	Reason	Fault Clearance time in msec	Remarks
Fault Clearing time violating protection standard									
400KV MALBASE-BINAGURI-I	17-04-2018	20:38	17-04-2018	21:18		R_N, F.D. 129.8 KM, F.C. 2.6 kA	R-N FAULT	500 msec	*Powergrid informed that carrier was recieved after the tripping.*
400KV MOTIHARI-BARH-II	23-04-2018	13:02	23-04-2018	13:32	B-N,F/D-30 KM , F/C-1.6KA	B-n,z-2 , f/c-800 amps	B-N FAULT	500 msec	
220KV JODA-RAMCHANDRAPUR-SC	09-04-2018	11:36	09-04-2018	12:14	Z1,y_n,63.04 km,1.07 KA	z3,Y_N,1.2 KA,100 KM	Y-N FAULT	1000 msec	
Multiple tripping at the same time									
400KV FSTPP-KhSTPP-IV	10-04-2018	19:18	10-04-2018	20:22	A/R SUCCESSFUL	B-N, 10 KM, 28 KA	B-N FAULT		
400KV MAITHON-KhSTPP-II	10-04-2018	19:18	10-04-2018	20:16	DT Reciept		DT Recieped at Maithon		*NTPC informed that over voltage pickup was observed at KhSTPP end and sent DT to Maithon end. PCC advised NTPC and Maithon to send the relevant DRs to ERLDC*
Miscellaneous: Tripping on DT, No Fault observed in PMU									
400KV RANCHI-ROURKELA-I	05-04-2018	10:34	05-04-2018	11:06	Did not trip	DT received	DT RECEIVED AT ROURKELA	--	No fault observed in PMU
400KV PATNA-BALIA-III	08-04-2018	7:29	08-04-2018	8:29		DT received	DT RECEIVED AT BALIA	--	*Powergrid informed that DC mixing was observed at Patna. The same has been rectified.*
220KV MUZAFFARPUR-HAJIPUR-I	19-04-2018	13:20	19-04-2018	13:31	Did not trip	Tripped from Hajipur end only	Tripped from Hajipur end only	--	*PLCC work was in progress at Hazipur. The line tripped on DT due to PLCC maloperation.*
Autoreclose related issues									
400KV MEERAMUNDALI-MENDHASAL-SC	01-04-2018	17:25	01-04-2018	18:25	B-N FAULT		B-N FAULT	< 100 msec	No Auto Reclose operation
400KV GAYA-KODERMA-II	01-04-2018	17:27	01-04-2018	19:07	B-N FAULT		B-N FAULT	< 100 msec	*Fault appeared during reclaim time.*
400KV MEERAMUNDALI-MENDHASAL-SC	04-04-2018	17:25	04-04-2018	17:38	B-N / 30 KM , 6 KA		B-N FAULT	< 100 msec	No Auto Reclose operation
220KV BIDHANNAGAR-WARIA-I	07-04-2018	14:39	07-04-2018	15:35	R-N,Z2,13.8Km,FC-8.47KA from Durgapur end	Z1,R-N Fault, FD 3.457 Km FA -13.936 KA @ Waria end	R-N FAULT	< 100 msec	*PLCC is not in service. It will be available by end of May 2018.*
400KV BINAGURI-RANGPO-I	08-04-2018	13:52	08-04-2018	14:03	R_N	Did not trip	R-N FAULT	< 100 msec	*Permanent fault*
220KV TTPS-TSTPP-SC	09-04-2018	14:33	09-04-2018	15:20		Z1, R-N, 10.77KA	R-N FAULT	< 100 msec	*PLCC is not available.*
400KV MAITHON-KhSTPP-II	09-04-2018	17:15	09-04-2018	17:28	Y-N, 6.53KA, 21.4km	A/R SUCCESSFUL	Y-N FAULT	< 100 msec	*Powergrid informed that A/R was not initiated at Maithon due to some issues in relay settings. The same have been rectifed.*
400KV MAITHON-KhSTPP-I	09-04-2018	17:23	09-04-2018	18:36	B-N,8.1KA	B-N, 2.6KA, 158KM	B-N FAULT	< 100 msec	
400KV MAITHON-MAITHON RB-II	09-04-2018	17:36	09-04-2018	17:47	B_N, 5.91 KM, 14.12 kA	B_N, 24 KM, 4.73 kA	B-N FAULT	< 100 msec	*Auto Reclose is successful at Maithon end.*

LINE NAME	TRIP DATE	TRIP TIME	RESTORATION DATE	RESTORATION TIME	Relay Indication LOCAL END	Relay Indication REMOTE END	Reason	Fault Clearance time in msec	Remarks
400KV DURGAPUR-SAGARDIGHI-II	09-04-2018	19:18	09-04-2018	19:31	Y-N, 92.12KM, 3.673KA, A/R successful		Y-N FAULT	< 100 msec	*It was informed that the fault was reinitiated during reclaim time. PCC advised to review the dead time.*
400KV NEW PPSP-ARAMBAGH-I	09-04-2018	20:25	09-04-2018	20:54	Y_N,F.D. 191 KM, A/R successful	Y_N, F.D. 26 KM, F.C. 7.92 kA	Y-N FAULT	< 100 msec	*WBSETCL informed that there was some problem in Autorecloser at Arambagh end. This will be addressed during next shutdown.*
400KV NEW PPSP-ARAMBAGH-I	09-04-2018	21:16	10-04-2018	13:39		Z-1, Y-N, 8.9KA, 20.09Km	Y-N FAULT	< 100 msec	
400KV TSTPP-ROURKELA-I	10-04-2018	0:47	10-04-2018	1:37	TRIPPED FROM TALCHER END ONLY		B-N FAULT	< 100 msec	*NTPC informed that there was some problem in A/R circuit. The same has been rectified.*
400KV DARBHANGA (DMTCL)-MUZAFFARPUR-II	10-04-2018	13:54	10-04-2018	14:33	BN,47.3KM,5.06KA,Z1	BN,4.7KM,13.09KA,Z1	B-N FAULT	< 100 msec	*Fault appeared during reclaim time.*
400KV RANCHI-RAGHUNATHPUR-II	10-04-2018	16:22	10-04-2018	17:06	YN, 132 KM, A/R Successful	YN,Z1,27.67 KM,9.5 KA	Y-N FAULT	< 100 msec	*DVC agreed to verify A/R at Raghunathpur end.*
400KV KHARAGPUR-CHAIBASA-II	10-04-2018	18:22	10-04-2018	19:08	Y-N, Z2, 163.4 KM, 1.171 KA, A/R successful	YN,Z1, 10.59 KA, 8.7 KM	Y-N FAULT	< 100 msec	*Powergrid informed that there is some problem at Chaibasa end A/R. The same will be verified during next shutdown.*
220KV BARIPADA-BALASORE-II	12-04-2018	14:49	12-04-2018	16:49		B-N,FD 68 KM,FC 1.3 KA	B-N FAULT	< 100 msec	*PLCC is not available*
765KV GAYA-VARANASI-II	13-04-2018	10:12	20-04-2018	0:19	RN,264 KM, 2.9 KM	RN,0.14 KM	R-N FAULT	< 100 msec	*Poiwergrid informed that there was some problem in CB at Varanasi.*
400KV KOLAGHAT-ARAMBAGH-SC	14-04-2018	19:14	14-04-2018	19:38	B-N, ZONE -1 , 34.8KM, 6.075 KA, A/R sucessful	B-N, ZONE 1 , 35.9KM, 5.7KA,	B-N FAULT	< 100 msec	*Tripped on reclose from Arambagh end on zone 2.*
400KV KOLAGHAT-ARAMBAGH-SC	16-04-2018	17:38	16-04-2018	18:04	R-N FAULT		R-N FAULT	< 100 msec	
400KV KHARAGPUR-CHAIBASA-II	17-04-2018	15:22	17-04-2018	15:31	B_N,79 KM, 3.35 kA, A/R successful		B-N FAULT	< 100 msec	*Powergrid informed that there is some problem at Chaibasa end A/R. The same will be verified during next shutdown.*
400KV MEERAMUNDALI-MENDHASAL-SC	17-04-2018	17:56	17-04-2018	18:28	B_N, 26.7 KM, 7.25 kA		B-N FAULT	< 100 msec	No Auto Reclose operation
220KV KATAPALLI-BOLANGIR(PG)-SC	18-04-2018	13:11	18-04-2018	13:41	B_N,53.91 KM, 2.84 kA	B_N, 75.8 KM, 1.36 kA	B-N FAULT	< 100 msec	*PLCC is not available*
220KV BINAGURI-BIRPARA-I	21-04-2018	23:32	22-04-2018	23:54	B_N, 30.73 KM, 3.91 kA ,A/R successful		B-N FAULT	< 100 msec	*There were some setting issues at Birpara. The same have been corrected.*
400KV KHARAGPUR-CHAIBASA-I	23-04-2018	17:39	23-04-2018	17:49	Z-1;Y-N,67.39 KM,2.857 KA,A/R SUCCESSFUL	Y-N,112.4 2.29 KA	Y-N FAULT	< 100 msec	*Powergrid informed that there is some problem at Chaibasa end A/R. The same will be verified during next shutdown.*
400KV ROURKELA-CHAIBASA-I	24-04-2018	15:02	25-04-2018	0:11	Y_N, 83.4 KM, 4.7 kA	Y_N, 40 KM, 6.13 kA	Y-N FAULT	< 100 msec	*Tie bay issues at Chaibasa.*
220KV DALKHOLA-PURNEA-II	26-04-2018	10:07	26-04-2018	10:20		B_N, 25.82 KM, 4.092 kA	B-N FAULT	< 100 msec	*A/R issue at Purnea end.*
400KV ARAMBAGH-BAKRESWAR-SC	26-04-2018	19:01	26-04-2018	19:27	BN,Z1, 26.4 KM,5.04 KA	A/R successful, BN, 107.8 KM, 2.61 KA	B-N FAULT	< 100 msec	No Auto Reclose operation
220KV SUBHASGRAM(PG)-NEW TOWN-SC	26-04-2018	20:46	26-04-2018	21:01	R-N FAULT	A/R SUCCESSFUL	R-N FAULT	< 100 msec	*A/R successful at Sabhashgram end*

LINE NAME	TRIP DATE	TRIP TIME	RESTORATION DATE	RESTORATION TIME	Relay Indication LOCAL END	Relay Indication REMOTE END	Reason	Fault Clearance time in msec	Remarks
400KV KHARAGPUR-CHAIBASA-I	27-04-2018	18:39	27-04-2018	19:01	A/R SUCCESSFUL	3.57 KA, R-N, 78.9 KM @CHAIBASA	R-N FAULT	< 100 msec	*Powergrid informed that there is some problem at Chaibasa end A/R. The same will be verified during next shutdown.*
220KV MAITHON-DUMKA-II	28-04-2018	7:18	28-04-2018	8:48	RN,6.4 KM, Z1		R-N FAULT	< 100 msec	*CB problem at Maithon end*
220KV MADHEPURA-NEW PURNEA-I	29-04-2018	4:50	29-04-2018	4:58		AUTO RECLOSURE SUCCESSFUL	R-N FAULT	< 100 msec	*A/R disabled at Madhepura end.*
220KV CHANDIL-RANCHI-I	29-04-2018	18:48	29-04-2018	19:08	R-N ,4KA,		R-N FAULT	< 100 msec	*Tripped on PD from Ranchi end due to A/R issue. The same has been rectified.*
400KV MEERAMUNDALI-ANGUL-I	29-04-2018	21:14	29-04-2018	22:02	R_N,6.6 KM	A/R SUCCESSFUL	R-N FAULT	< 100 msec	No Auto Reclose operation
400KV MOTIHARI-GORAKHPUR-1	29-04-2018	23:49	30-04-2018	0:10	R_N, 1.687 kA, 147.1 KM	A/R SUCCESSFUL	R-N FAULT	< 100 msec	No Auto Reclose operation
400KV BINAGURI-NEW PURNEA-II	30-04-2018	6:11	30-04-2018	6:46	B_N, 15.7 KM, 9.77 kA, A/R successful		B-N FAULT	< 100 msec	*A/R issue at Purnea end. The same has been rectified.*
400KV RANCHI-RAGHUNATHPUR-III	05-04-2018	15:38	05-04-2018	16:34	B-N Fault F/D 143.8 KM ,F/C 2.94KA		B-N FAULT	< 100 msec	*DVC agreed to verify A/R at Raghunathpur end.*
400KV JEERAT-NEW CHANDITALA-SC	17-04-2018	19:30	17-04-2018	21:03	B_N, Z II, 3.13 kA,69.78 KM	B_N, 4.945 KM, 10.93 kA, Z I	B-N FAULT	< 100 msec	*Different timing of A/R in both end. A/R timer at Jeerat will be changed during next shutdown*
220KV MAITHON-DHANBAD-II	21-04-2018	14:26	21-04-2018	20:42	Y-N.6.6KA , F/D21 KM , A/R UNSUCCESSFUL		Y-N FAULT	< 100 msec	*A/R successful at Maithon. DVC agreed to verify A/R at Dhanbad end.*

MINUTES OF MEETING BETWEEN POWERGRID (HVDC SASARAM) AND GE T&D INDIA LTD.

Date: 14/10/17

Members Present:

GE T&D INDIA LTD.

Mr. Sunil Joshi

POWERGRID

Mr. Sunit Kumar Singh

Mr. D.S. Karthik

Mr. Aman Kumar

M/s GE T&D repersentative reported at Sasaram site on 11.10.2017 to analyse the long pending issues related to HVDC Back to back to Station.

SL NO	ISSUE	Comment
1	**Converter control and Protection: Software issues** a. Control System SYS fail, Independent booting, frequent failure of compact flash cards, Profibus signals updating problems are still persisting. The problem is yet to be resolved. b. Spurious tripping of HVDC pole showing switchyard connectivity lost during opening of any bay connected to HVDC system. c. All AC harmonic filters/ Line reactors become unavailable after resetting of lane inspite of availability of same. d. Only one APEX PC is running, need stand by APEX PC available	a. GE to analyse sysfail logs and revert. b. Switchyard connectivity tripping test done and found that HVDC is blocking upon opening of CWD50Q50 breaker. GE to check the logs and revert. Scheme generally blocks after any breaker open command. c. GE to check the logs and revert. d. New Apex PC has been configured. Issue resolved.
2	**Supply of Spare Control and Protection card as per modified hardware architecture.** The card supplied as spare is for old type of installed cards architecture, which has been modified by GE. So spares cards for C&P panel should be changed as per new modified card architecture. 04 nos. Cards (02 nos. CIBS, 01no. Pentium and 01 no. PMC251) taken by GE in April-2014 for repairing is yet to be returned. Required spare configured compact flash cards as the rate of card corruption is very high (Once in a two month).	GE to check and update the status of cards taken in 2014. Spare cards urgently required at site. Failure rate of compact flash card is very high (15 card fail/year on an average). GE to urgently provide 10 no. pre-configured compact flash cards and procedure to configure new flash card.
3	**HVDC controls and Protection Lane-1 is out of order since long time.** Both the Lane has never worked simultaneously since commissioning and HVDC block is running only through Lane-2	One PMC card found defective on Side B Lane-1 M2 subrack (L1SBM2). Card has been replaced with spare PMC card and Lane is now not having any sys fail and VBE protection also reset.

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	Both the Lane has never worked simultaneously since commissioning and HVDC block is running only through Lane-2 from April-2014 without any redundancy. Also in Lane-2 intermittent problems are observed during running and at the time of re-start corruption of compact flash cards. M/s GE has done many up gradation of software but system is not yet satisfactory.	has been replaced with spare PMC card and Lane is now not having any sys fail and VBE protection also reset. One Pentium card(VMIC 7740) found defective on Side A Lane-1 control subrack(L1SACP1). The P1 of control (Side A Lane-1) is also showing "Interrupt VME bus coupler error" inspite of replacing faulty card with healthy card from M1 subrack. subrackSpare card is not available at site. Lane redundancy test can only be done after replacing Side A Lane-1 control subrack VMIC 7740 card.
4	**Malfunctioning/failure of VBE cards** Problem persisting since commissioning. GE is yet to provide the solution.	S5004 is getting failed very frequently(2 card failure/year). GE to check and revert.
5	**Converter Transformer issue** None of the Hydran transformer gas monitoring system and Drycol breather in operation condition. Matter taken up with GE from 2006 and matter not resolved. Converter transformer WTI/OTI unit is not working properly. GE to provide compatible replacement.	GE to check and revert.
6	**Pending contractual tests:** Auto reclose test on inverter side with both line available, and one line available and system isolation test with one line available at inverter side. It was committed during September 2010 that AREVA shall conduct these tests in 3 months but still pending	GE to check and revert.
7	**Long term spares** AREVA has been requested to give quotation for long term spares but the quotation is yet to be received.	GE to check and revert.
8	**Valve cooling PLC B problem** Reported to M/s AREVA on 18.07.2011. Alarm from PLC B of Valve cooling is continuously being reflected in SCADA. The alarms are "Valve cooling PLC B Fuse failed", "Valve cooling PLC B operation error". GE committed in MOM dtd 13.12.11 to provide the same, not provided. PLC software has not been provided by M/s GE.	GE to provide PLC software application of valve cooling system.

9	**Addition of newly commissioned line in Eastern Side to HVDC system** Earlier HVDC Back to back system is connected through only two 400 KV transmission lines namely Biharshariff-I &II in Eastern Side. Now the connectivity in eastern bus is extended with 1500 MVA, 765/400 KV ICT, 400 Kv S/c Varanasi and one D/C 400Kv Line Nabinagar-I &II. Integrated for last feeder protection to be done.	Details have been provided to GE by PGCIL. GE to check and revert.
10	**Breaking of System Docking Station (RTU) from their base unit due to brittleness of material used** The SDS is breaking from their base plate due to the excessive brittleness of fibre/ plastic installed in Bay Interface Outstations (BIOS) panels.	Defective RTU can not be repaired. RTU upgrade is required.
11	**Failure of DC-DC converters** All 12 nos. 220 V, DC-DC converters and 02 nos. 48 V DC-DC converters have been failed.	Power supply to be replaced with new power supply.

POWERGRID raised their concern to resolve the above long pending issues and requested to take necessary action for rectification of converter control and protection issues immediately.

POWERGRID also requested to assign single contact person to discuss technical issues in the intermittent period till the final resolution of aforesaid problems.

GE to check all above-mentioned issues and revert detailed plan within 3 weeks.

Checklist for Submission of new transmission elements for updation in Protection Database

NAME OF ORGANISATION:
FOR THE MONTH OF:

SUBSTATION DETAIL:

Sl No	DETAILS OF ELEMENTS	DATA TYPE	Status of Submission (Y/N)	Remarks
1	TRANSMISSION LINE	LINE LENGTH, CONDUCTOR TYPE, VOLTAGE GRADE		
2	POWER TRANSFORMER	NAMEPLATE DETAILS		
3	GENERATOR	TECHNICAL PARAMETERS		
4	CURRENT TRANSFORMER	NAMEPLATE DETAILS		
5	VOLTAGE TRANSFORMER	NAMEPLATE DETAILS		
6	RELAY DATA	MAKE, MODEL and FEEDER NAME		
7	RELAY SETTINGS	NUMERICAL RELAYS: CSV or XML file extracted from Relay ELECTROMECHANICAL RELAYS: SNAPSHOT of RELAY		
8	REACTOR	NAMEPLATE DETAILS		
9	CAPACITOR	NAMEPLATE DETAILS		
9	UPDATED SLD			

SIGNATURE:
NAME OF REPRESENTATIVE:
DESIGNATION:
CONTACT:
E-MAIL ID: