

ERLDC Agenda Items for 65th PCC Meeting

Agenda 1: Low Frequency Oscillation (LFO) observed in Pan India grid on 17th March 2018 from 02:43 Hrs. to 02:48 Hrs.

Low frequency oscillation of 0.37 Hz was observed in the pan-India grid on 17th March 2018 from 02:43 hrs. to 02:48 hrs. Based on the synchrophasor data analysis for the Indian grid, it is noted that oscillation was more prominent in the Eastern region near Farakka STPS. Oscillations of Farakka bus voltage as recorded by the PMU installed there is given in the figure below. Based on analysis of all India SCADA data, it was found that there were large variations in the MW and MVAR generation of the Kahalagaon Unit 6 during the same time period. On inquiry with KhSTPS, it was reported that there was some issue with the Kahalgaon unit 6 turbine Electro-hydraulic governor (EHG) due to which its control valves oscillated causing Unit generation to fluctuate from 40 MW to 470 MW, as can be seen from the MW and MVAR plot received from NTPC. The time of LFO initiation in the grid as recorded by PMUs, and that of Kahalgaon MW/MVAR fluctuations matched with each other. Further, on examining the all India SCADA data of generating units obtained from NLDC it was observed that no other unit has experienced such severe oscillation in its MW/MVAR during the period. So, it can be inferred from the analysis that oscillation was excited in the grid due to the malfunctioning of turbine EHG of Kahalgaon Unit 6.

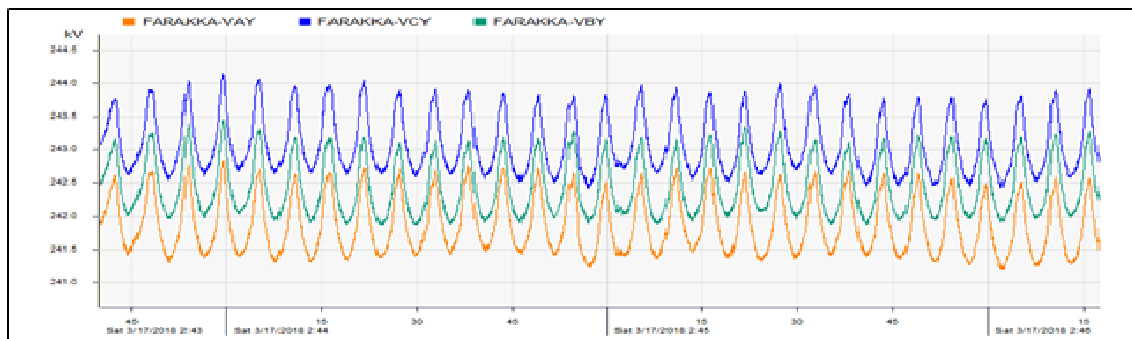


Fig 1: Farakka Bus Voltage from PMU.



Fig 2: MW and MVAR of Kahalgaon Unit 6 received from NTPC.

In view of the above incident, it is desired that:

1. NTPC Kahalgaon may kindly explain the issue with the turbine EHG governor of their U-6 and the remedial action taken so that such event does not reappear in near future as these have an adverse impact on the entire the Indian Grid.
2. Further, it is desirable that all generating units immediately share the details of MW/MVAR of their units in Excel/.CSV format to ERLDC as soon as they receive communication from ERLDC control Room or ERLDC Protection team for analysis of such event. The resolution of such data should be 1 second or better as available from the DCS of the power plant. In case of generators within the state, the respective SLDC should collect the data and submit to ERLDC/ERPC for analysis.
3. PSS tuning of all the units in the Eastern region above 100 MW may kindly be ensured as per the relevant regulation of CERC and CEA and their tuning reports may be shared with ERLDC/ERPC.

PCC may like to discuss.

Agenda 2: Need of Flexibility in the Web Portal Protection Suite of ERPC

During usage of the protection suite of ERPC, following challenges have been encountered which need to be addressed immediately for better utilization of this software and consequent improvement of system reliability and security:

1. Automatic Intimation to the respective utility by Email/SMS alert when an Event is created for submission of details.
2. Flexibility for downloading overvoltage setting, Distance protection setting and any other setting of all 220 kV and above lines from both ends.
3. Database of Event Reporting suite is not integrated with the rest of the system database. This is resulting in taking a large amount of time in filling the details of elements tripped by configuring them one by one.
4. Intimation to all during maintenance activity and its restoration

PCC may like to Discuss.

Agenda 3: 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 with a 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 be a 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 protection 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.

PCC may like to discuss.

Agenda 4: 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 as per **CEA Regulation on “Measures relating to Safety and Electric Supply 2010”**,

Quote

45.2.VII“*High-Speed Bus 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.

PCC may like to discuss.

Agenda 5:Ensuring the availability and healthiness of Auto-reclosure on all 220 kV and above lines in Eastern region.

In the recent past, there were several occasions when the Auto-reclosure of the 765 kV, 400 kV and 220 kV lines did not operate from one end or both ends. The non-operation of A/R is being monitored by ERLDC based on PMU data and DR/EL being provided by utilities and is being provided as an agenda item on regular basis to Eastern region PCC forum for monitoring and discussion. While some improvement has been observed in the auto-reclosure on transmission lines, there are some lines where Auto-reclosure has not operated on more than one occasion like **400 kV Rourkela-Chaibasa 1** (05-02-18, 07-10-17) , **765 kV Fatehpur-Sasaram S/C** (13-02-18, 29-12-17), **400 kV Meramundali-Sterlite 1** (19-03-18,4-10-17,6-10-17,25-10-17,29-10-17), **400 kV Meramundali-Sterlite 2** (01-10-17,09-10-17), **400 kV Patna-Ballia 3** (25-12-17,26-12-17), **400 kV Meramundali-Mendashal S/C** (09-10-17,21-10-17) etc.

The single-phase auto-reclosure on 220 kV and above circuits has to be in service per the regulation 43(4) (c) of CEA Technical standards for construction of electric plants and electric lines 2010. Any line tripping on a single-phase transient fault without

attempting auto-reclosure reduces their availability and further impacts the security and reliability of Indian grid under adverse weather condition.

In view of the above, it is desirable to:

1. Verify the auto-reclosure status for all 765/400 kV Lines in Eastern region. All Constituents(ISGS/IPPs/State ISGS and IPPs /ISTS licensee /State ISTS licensee are requested to provide the A/R status of all the 765 and 400 kV Lines.
2. Immediately Submit the details of the reason of non-functioning of single phase A/R function on any of the 765/400 kV line to ERLDC/ERPC.
3. Take immediate measures by the concerned utility for ensuring auto-reclosure healthiness whenever it did not operate, by analyzing its cause and the same shall be reported to ERLDC/ERPC.

Status of 64thPCC Meeting follow up actions

1. DVC to provide the timeline for installation of Numerical Bus bar Protection

Scheme of following Substations:

Substation	Timeline for Numerical Bus bar Protection Implementation
220 kV Bokaro	Implementation Month and year to be submitted.
220 kV Kalyaneswari	Implementation Month and year to be submitted.
220 kV Chandrapura	Implementation Month and year to be submitted.
220 kV MTPS	Implementation Month and year to be submitted.
220 kV Durgapur	Implementation Month and year to be submitted.

2. Follow Up action on Disturbance at 400kV Koderma and 400kV Bokaro-A on 30-01-18 at 10:46 Hrs

- **DVC to check the neutral earthing of line CVTs:** Status of CVT earthing checking at the substation may be informed by DVC
- **Root cause:** If any root cause for this event has been found then may kindly be shared with ER PCM forum