



# SNS COLLEGE OF TECHNOLOGY



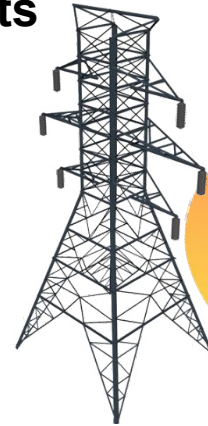
(An Autonomous Institution)

COIMBATORE-35

Accredited by NBA-AICTE and Accredited by NAAC – UGC with A++ Grade  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## UNIT V: MONITORING AND CONTROL

**TOPIC: Case Study of Power System Faults  
and its Detection using PMU**





# TOPIC OUTLINE

- INTRODUCTION
- ABSTRACT
- EVENT DESCRIPTION 1
- EVENT DESCRIPTION 2
- OBSERVATIONS
- CONCLUSIONS
- REFERENCE



# INTRODUCTION



The power grid of India is one of the largest grid of the world with the capacity of 229GW as on October 2013. The Indian power grid is divided into five regions viz Northern grid, Eastern grid, North-Eastern grid, Western grid and Southern grid. By the year 2014, the first four of these were synchronized and measures are being taken to synchronize the southern grid also.



# Abstract



**In this case study, we discuss some special cases of power system faults and their detection in India. The Phasor Measurement Unit has tremendous applications in detection of power system faults and in taking the necessary corrective measures before the failure of the power system. we discuss some special case studies in which the Phasor Measurement Unit was effective in the detection of faults.**

**We discuss three of such case studies, namely Tripping of Omkareshwar HPS, disturbance in Karnataka system due to the resistive nature of the fault and detection of fault cleared by back up protections in Biharsharif.**



# Event Description 1



**Before the failure, all the units of Omkareshwar HPS were running properly. At 13:47 Hrs. R phase fault appeared in the 220 KV Itarsi-Barwaha circuit. As the fault was of resistive nature, so it wouldn't trip immediately. It tripped when the Y phase was also affected after 1 second from Barwaha and Itarsi end. During this fault 220 KV Omkareshwar-Barwaha was sensed and the line got tripped in earth fault protection from OSP end. The Fig. 1. shows the affected area by this fault.**

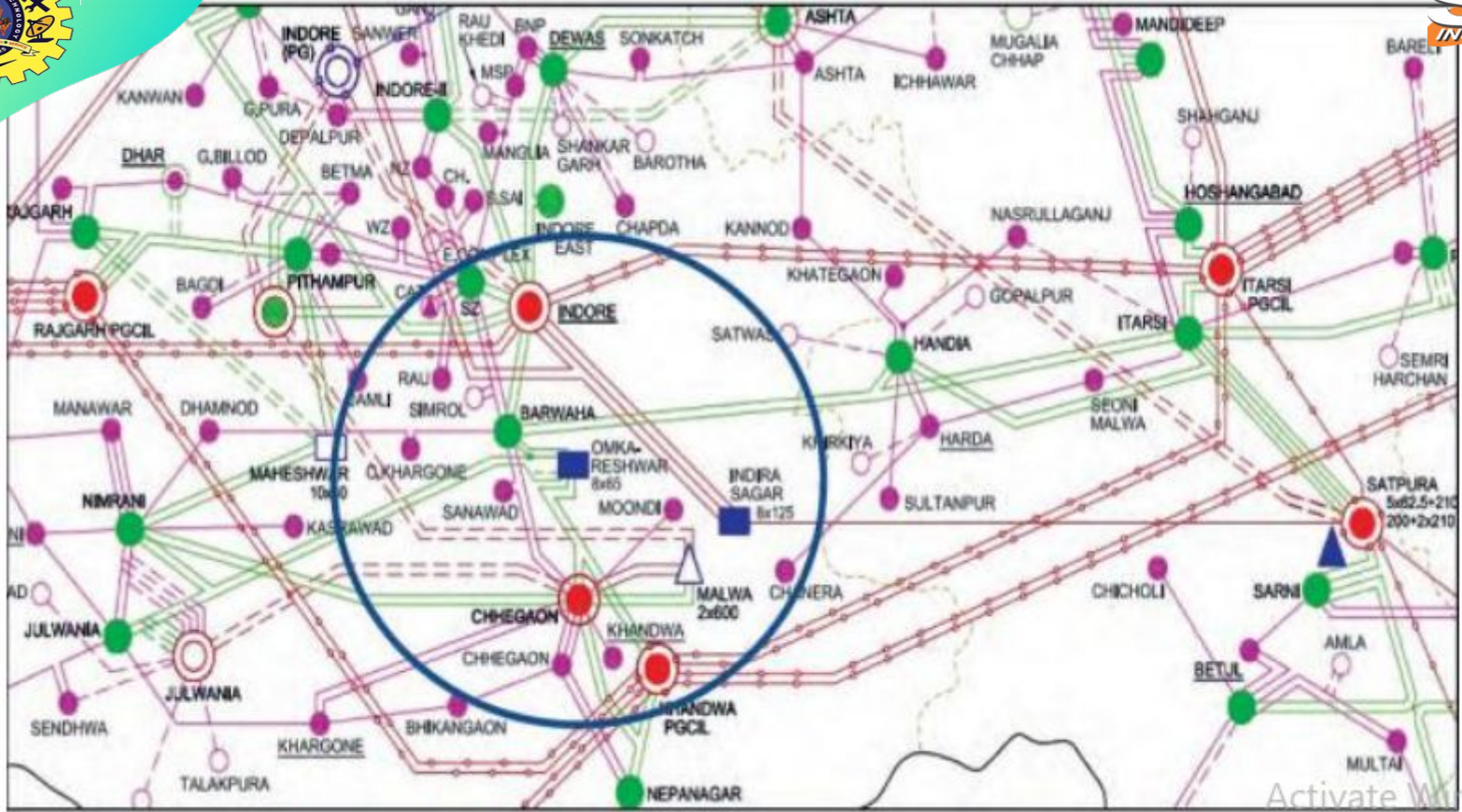


Fig. 1. Schematic Diagram of Omkareshwar and Near By area





Disturbance in Karnataka system due to the resistive nature of the fault which sustained for 5 second before it got cleared. It occurred on 18-09-2013 at 15:59 Hrs. Data which have been used for the event analysis are: Nawandra PMU, KPTCL report

# OVERVIEW

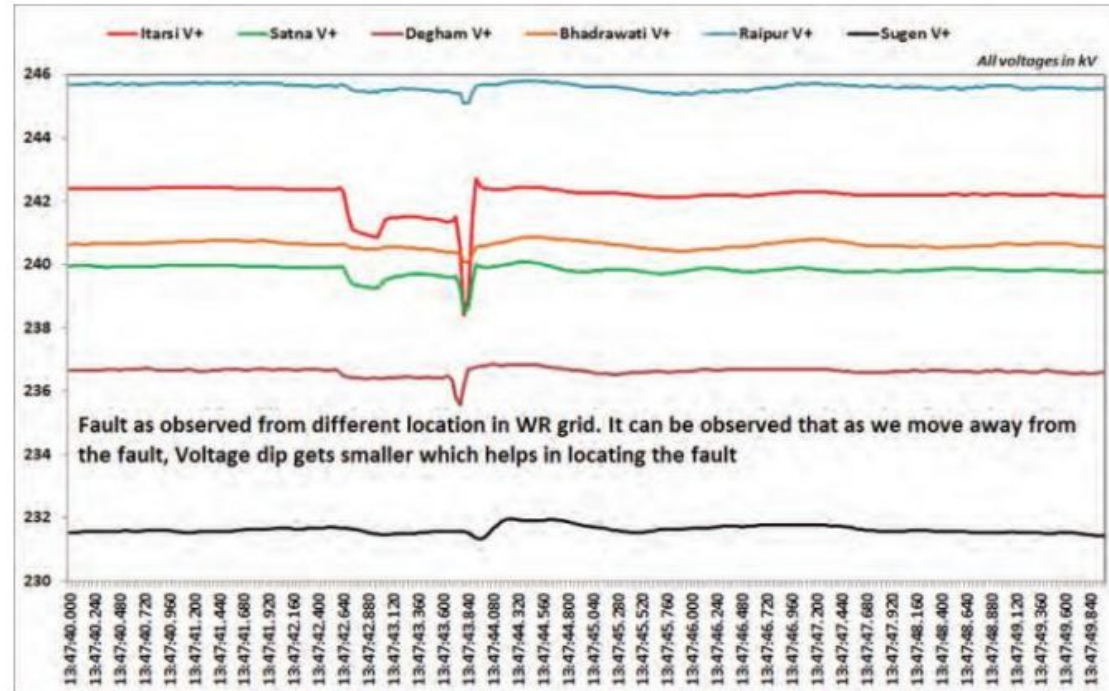


Fig.(3): Phase Voltages from Itarsi PMU during the fault at 13:47 Hrs

# EVENTS DURING THE SPECIFIC PERIOD



After this first trial charging attempt of 220 KV Itarsi-Barwaha line from Barwaha end at 14:06 Hrs was taken and similar fault was observed again.

The 220 KV Omkareshwar-Nimrani line which was tripped from Omkareshwar on the earth fault trip as observed by the Omkareshwar end relay.

After the trip whole 390 MW power was passing the 220 KV Omkareshwar-Chhegaon line.

At 14:07 Hrs 220 KV Omkareshwar-Chhegaon line was tripped from Chhegaon and because of this all outgoing feeder from Omkareshwar caused the tripping of all eight units on over frequency.





## Event Description 2



**A tripping at 220 KV Fatuah-Patna(PG) circuit occurred at 12:13 Hrs on Y-phase to ground fault at a distance of 9.6 km from Patna (PG) end.**

**Due to the operation of back up HV-side overcurrent protection, tripping occurred at all the three 315MVA,400/200 KV ICTs at Biharsharif (PG).**

**Due to outage of all 220 KV & 132 KV lines from Biharsharif substation, a load loss of about 240 MV occurred in area adjoining Biharsharif.**



# CONCLUSION

**We have discussed three case studies, where the faults in the power system were detected using the PMU. Three cases, namely: Tripping of Omkareshwar HPS, disturbance in Karnataka system due to the resistive nature of the fault and detection of fault cleared by back up protections in Bihar Sharif were discussed.**

**PMU plays an important role in the detection of faults and in future we may be able to predict the occurrence of fault and avoid it even before it actually happens.**





# REFERENCE

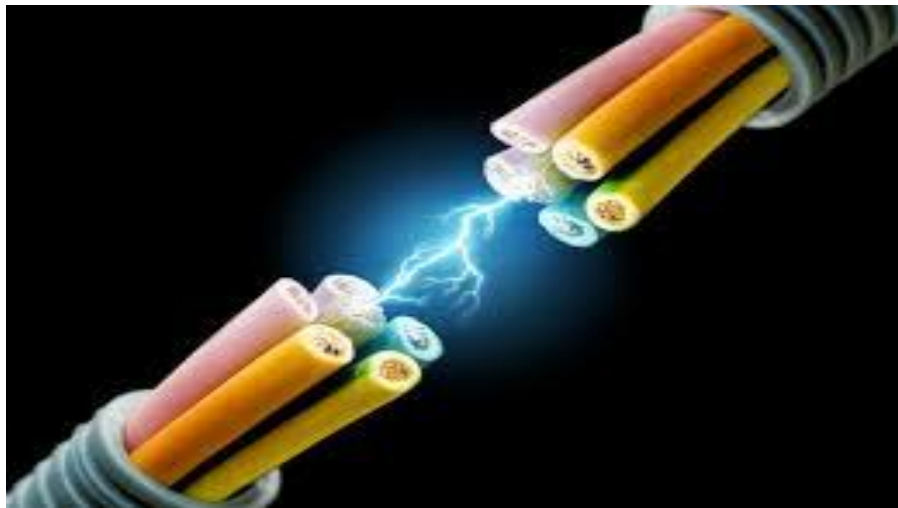
[1] Phadke.A.G., Thorp. J. S. , “Synchronized Phasor Measurement and Their Application,” Springer.

[2] “Synchrophasors initiative in India,” Power System Operation Corporation Limited, December-013





# RECAP....



# ...THANK YOU