

Distribution Automation

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ABSTRACT: *Distribution automation (DA) is a Smart Grid technology that can be implemented on the electric grid's distribution system of local power lines and neighborhood substations. It often offers the greatest bang for the buck. It improves reliability with real-time monitoring and intelligent control. Distribution automation (DA) represents the evolution of control technologies that has taken place as computing power becomes embedded in the individual products that make up the distribution system. DA allows individual devices to sense the operating conditions of the grid around them and make adjustments to improve the overall power flow and optimize performance. Without DA, grid operators in centralized control centers have the responsibility to identify and analyze their power system and intervene by either remotely activating devices or dispatching a service technician. This research paper review illustrate the adaptability and implement ability of smart monitoring and fault detection technique by the DISCOMS.*

KEYWORD: *Distribution Automation(DA),Ring Main Unit, Fault Passage Indicator, Feeder Remote Terminal Unit*

1.INTRODUCTION

Distribution Automation is smart monitoring and fault detection method which consist of RMU(Ring main unit),FPI(Fault Passage Indicator),FRTU(Feeder remote terminal unit).It helps to monitor and find fault location from substation to utility side in both overhead and unground system. As per recent scenario of DISCOMS load increment the proper monitoring and controlling system is still missing in practical practices. This system induced the system stability with real time monitoring. It increase computerized control of utility side. It is mostly hardware which is controlled from SCADA system. In future planning of DISCOMS, they are adopting this system along with RMU,FRTU and FPI.

2.RMU

RMU is Remote Terminal Unit. It is a totally sealed, gas-insulated compact switchgear unit which are applicable in medium voltage secondary distribution system for outdoor and indoor applications. The primary switching device consists of switch disconnectors / isolators or circuit breakers. The circuit breaker is equipped with a protective relay.

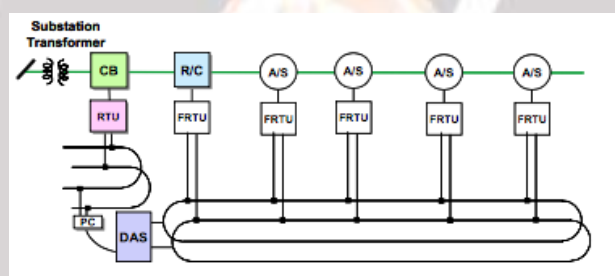
Depending upon the application ring main unit can be installed in extensible and non-extensible modules. The switching modules (switch disconnectors / isolators or circuit breakers) can be added in the extensible ring main unit depending upon the application of the Ring Main Unit.

Advantages of RMU

- ⇒ Completely sealed and gas insulated hence safe to use and operate.
- ⇒ Applicable for both indoor and outdoor environment.
- ⇒ Compact design to install.
- ⇒ Low Maintenance.
- ⇒ Provide protection with built in relay.

3.FRTU

FRTU is Feeder Remote Terminal Unit. It is basically modem based system which find fault between two RMU.



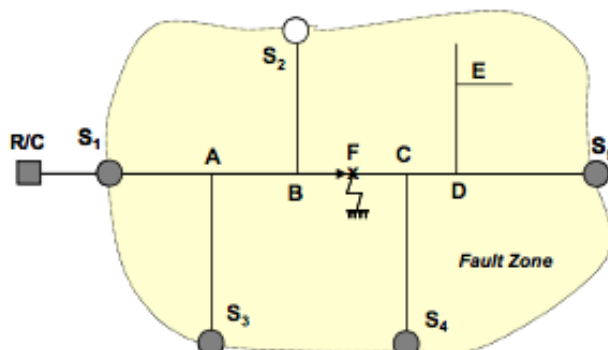
The switch FRTUs are interconnected as an Ethernet dual optic ring network as revealed in Figure. As such, each FRTU can exchange at high speed diverse information such as the current, voltage, current direction, etc. with the other FRTUs. Therefore, it is possible to employ the FRTU- based fault location determination method using the current and voltage information obtained by 1:1 communication between the FRTUs.

With the proposed method, the FRTU is triggered by the fault current, and it determines the fault zone, fault path, and fault distance based on the heuristic rule, which is driven by the current and voltage collected from the neighboring FRTUs. So, the FRTU minimizes the patrol time taken by the crews to find the fault location within the fault zone.

3.1 FAULT ZONE DETERMINATION

Figure shows the case in which a single phase ground fault occurs in the F position. At this time, switch S1 of the source side experiences the fault current, but switches S2 and S3 do not experience the fault current and also satisfy the nil-voltage condition. On the other hand, switches S4 and S5, which are supplied from the F position, satisfy the nil-voltage condition. That is, the FRTU of the source switch S1 of the fault zone experiences the fault current, and, more than one FRTUs, the FRTUs of the switches S4 and S5, of elements of its self-load zone switch set {S2, S3, S4, S5} satisfy the nil-voltage condition. Therefore, if the FRTU experiences the fault current, based on this rule, it can determine whether its self-load zone is

the fault zone or not by checking the nil-voltage condition after collecting voltage data by 1:1 communication with its load zone FRTUs.



4. FAULT PASSAGE INDICATOR

There are two types of FPI: 1) communicable FPI 2) Non-communicable FPI.

The main function of fault passage indicating system is to identify faults occurring in the downstream section from the point of its installation in the medium voltage system. This is achieved by continuous monitoring of voltage presence and current flow in medium voltage line.

Any increase in current along with absence of voltage is signaled by the equipment. Fault condition is indicated by flashing lights in FPI; this information is sent using radio signals to the communication gateway installed nearby for onward transmission to SCADA system at the control center through a suitable communication channel.

5. CONCLUSION

Using this system, the utility acquires information regarding the section of the line having fault. This identification helps to eliminate the patrolling of entire line for finding the fault, which reducing restoration time, reliability of the system. It clearly gives totally stable monitoring. Which ultimately resulting into better customer satisfaction and increase revenue to DISCOM.

*Distribution Automation System by B.A.Ananda and Dr. Y.R.Majunatha

*The FRTU-Based Intelligent Fault Location Determination Strategy in Ubiquitous Based Distribution Systems by Yun-Seok Ko

*ABB blogs & RMU manual.

*Schneider blogs & FPI manual.