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Advancement In Extra High Voltage Transmission

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Abstract: Extra high voltage (EHV) and Ultra high voltage transmission (UHV) system is used to transfer bulk amount of power over a long distance. Ultra high voltage transmission Alternative scenarios for long distance bulk power transmission – 800 kV HVDC and 1000 kV HVAC. The higher the voltage, lower the losses. Owing to tremendous growth in requirement of electrical power in the country, technological advancement in transmission systems is essential for transmission of bulk amount of power over long distance. As we increase the transmission line voltage it also reduces cost of transmission .Hence the overall cost of power system will also reduce.

Keywords: UHV AC Transmission, EHV AC Transmission.

I. INTRODUCTION

The need of power consumption is continuously increasing due to rise in population and to fulfill this requirement, we have to increase the power generation capacity. That means we need Effective transmission. Generally power generating stations are at a far distance away from load centers. Which require formation of interconnected transmission and distribution grid to ease delivery of power to the end consumer. In order to ensure effective development of electrical energy, its transmission is carried out at very high voltages. Hence we formed network of high voltage transmission lines. The advantages of high voltage transmission is reduction in line current, reduced size of conductor, better Voltage Regulation, requirement of less number of circuits for same amount of power transfer, reduction in land requirement and lower cost of line per MW per Km. Currently, 765kV lines cover a span of 39,472Ckm across India.

Further India is the first country in the world that has successfully tested fully functioning 1200 UHVAC transmission line. Several advanced transmission technologies exist today that can be used to improve and enhance the transmission system both grid software and grid hardware, Sensor and software solutions, such as dynamic line rating and topology optimization, focus on improvements in the control center, control systems, and decision-making processes. Actuator and hardware solutions, such as power flow controllers and advanced conductors and cables, focus on improvements in the physical assets and infrastructure responsible for carrying, converting, or controlling electricity. These different technologies can be used in isolation or in tandem to improve the overall efficiency and effectiveness of the transmission network. These technologies can also help increase the reliability and resilience of the entire electric power system.

II. LITERATURE SURVEY

C.L.Wadhawa, V.K.Mehata electrical power system We generate electricity at 11 KV or in some cases also at 33 KV .If we transmit this electricity at this lower voltage level then it will cause to increase in line current and then to increase in voltage drop in the line. Finally its result in increased in transmission line losses. To reduce this loss in line we have increase the transmission line voltage .primary transmission voltage is 132 KV after that for secondary transmission we reduce this 132/66/33 KV. Now the next stage is distribution for this we reduce voltage level from 66/33/11 KV which is known as primary distribution. After that this 11 KV is step down to 440/230 V which is known as secondary distribution .In short in all those stages first we increase the voltage level to higher value for transmission purpose and then again reduces this voltage level for utilization purpose.

III. PROBLEM STATEMENT

There are many problems associated with EHV transmission.

A. Insulation Requirement-insulation level is depends upon internal cause I.e. switching surges and external cause i.e lightning surges. Line insulation is designed to take care of switching over voltage's, temporary over voltage's and atmospheric over voltage's. The insulation level of a transmission line is based on the switching surge expectancy on the system.

The maximum switching surge over voltage to the ground is taken as 2.5 pu and the insulation is designed for this voltage. In addition adequate protection against atmospheric over voltage's is provided.

B. Heavy Structure- EHV transmission lines have large mechanical loading on towers because of use of bundled conductors, large air and ground clearances, considerable dynamic forces due to broken conductors etc. Transmission line towers with fabricated steel members are usually employed in EHV transmission.

C. Corona and radio interference problem

IV. DESIGN AND DEVELOPMENT

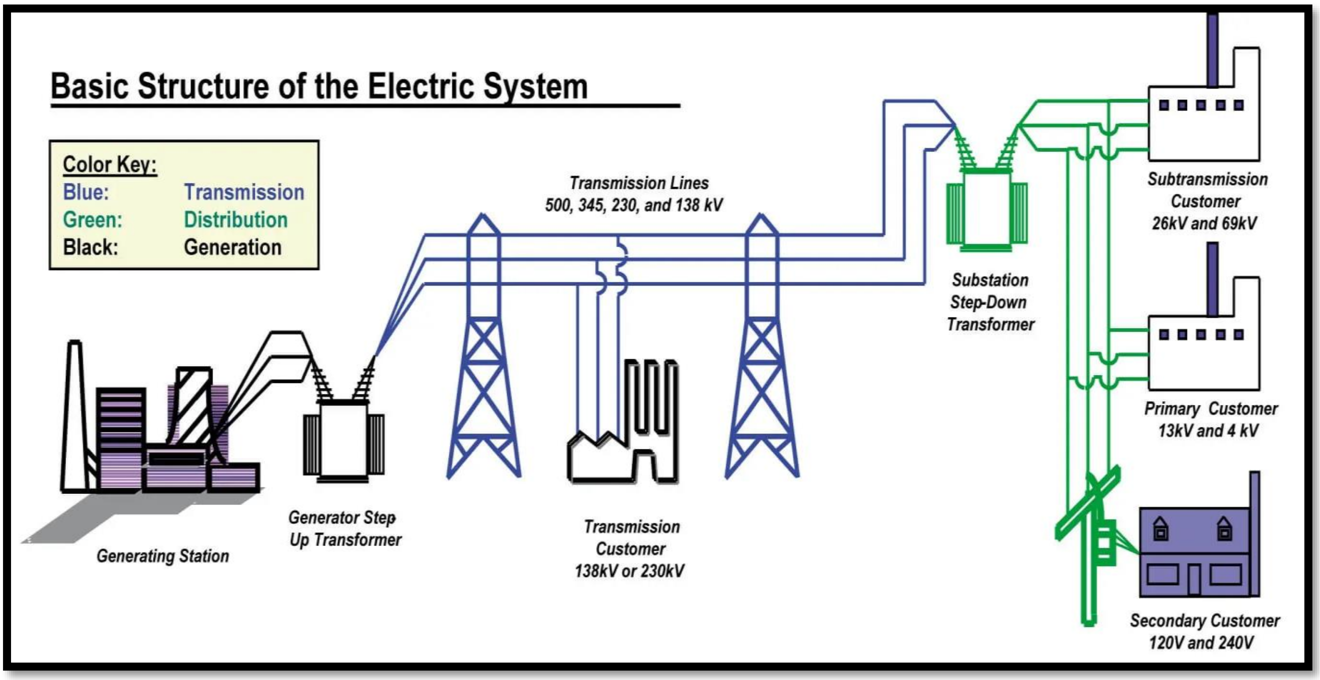

Figure 1: Single line diagram of Transmission and Distribution

As shown in figure1, it includes four stages with totally different level f voltages. The four stages are as below-

1) Primary transmission
2) Secondary transmission
3) Primary distribution
4) Secondary distribution

Generation level is 11kv and utilization level is 440v or 230v in between this the voltage is first increased to reduce losses then again reduces for distribution purpose.

HVDC Transmission

High voltage direct current (HVDC) power systems use D.C. for transmission of bulk power over long distances. For long-distance power transmission, HVDC lines are less expensive, and losses are less as compared to AC transmission. It interconnects the networks that have different frequencies and characteristics.

he transmission capacity of ultra-high voltage lines is more than three times higher compared to conventional transmission lines. This means that under the same transmission conditions, ultra-high-voltage networks can reduce electricity grid costs by 90%.

HVDC lines are commonly used for long-distance power transmission, since they require fewer conductors and incur less power loss than equivalent AC lines. HVDC also allows power transmission between AC transmission systems that are not synchronized. Since the power flow through an HVDC link can be controlled independently of the phase angle between source and load, it can stabilize a network against disturbances due to rapid changes in power.

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HVDC also allows the transfer of power between grid systems running at different frequencies, such as 50 and 60 Hz. This improves the stability and economy of each grid, by allowing the exchange of power between previously incompatible networks.

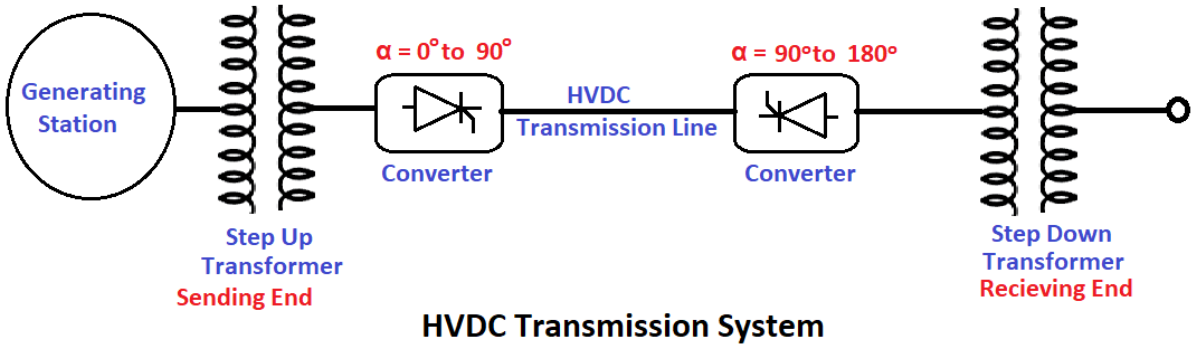

Figure2: Single line diagram of HVDC Transmission System

Problem involved in EHV transmission

Although, there are many problems associated with EHV transmissions but some major problems are Corona loss and radio interference. EHV transmission line requires heavy supporting structures and it is difficult to erect. There is one another major problem is, it require high insulation

V. APPLICATIONS

1) Move large amount of power over a long distance
2) to reduce transmission line losses
2) To reduce project cost

VI. CONCLUSION

To reduce losses in transmission system and to increase the efficiency of power transmission system we use EHV and UHV transmission system.

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