Optimisation of Transmission Line Design in Mountain Regions using Advanced Cartographic Techniques and LiDAR

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Optimisation of transmission design with reference to the available structures and conductors is easy in plain areas, but in rocky mountains, the elevation changes are more and ground condition varies for each tower location to be designed with special towers at many locations. So, application of advanced Cartographic, GIS techniques and 3D visualisation tools over the line route is very much necessary to finalise the optimal route and Tower types required to achieve low cost design possible. This paper analyses many challenges faced by the designers and solutions to address these issues using latest available Cartographic, GIS and 3D visualization techniques, as well as software available, and the inter-related Terrain condition with Electrical and Mechanical calculations of the transmission line such as PLS-Cadd, JOVE, etc.. Building transmission lines through rough terrain can only be done using unconventional methods. Development of high resolution 3D terrain model along the route is the major task to achieve more stable and economic approach to design the transmission line. Recent development in LiDAR (Light Detection and Ranging) technology to collect more accurate and latest data of the existing line and new line gave the designers and maintenance engineers accurate design and future planning of the transmission line. The resulting LiDAR data set produced a digital terrain model (DTM) of the ground surface and a catenary model of the overhead lines. A digital video and digital color orthorectified image of the corridor were produced to provide visual records that could be used for GIS, maintenance and other applications. It is also possible to integrate these images into modeling programs and view the terrain model with an image overlay simulating the true relief of the right of way.