

Large scale deployment planning for fibre and wireless: BharatNet planning and validation

IIT Bombay has joined hands with the Government of India (GoI) to address the issue of Internet connectivity challenges faced by rural India, through Gram Marg, the Rural Broadband project. In order to alleviate these problems, GoI has been working with the BharatNet initiative aims to deploy fibre optic cable connecting Gram Panchayats across all states of India by the year 2019.

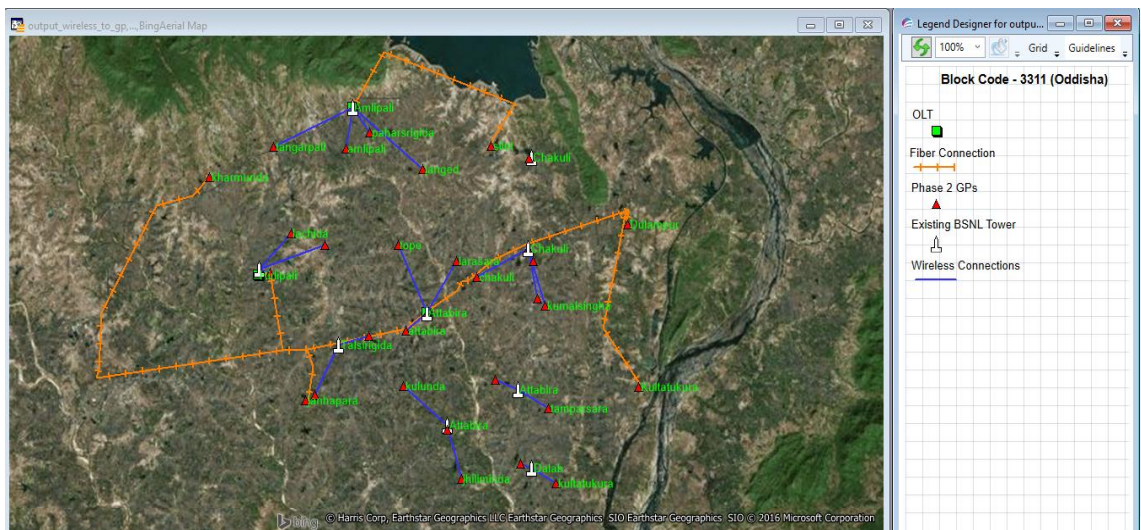
While in Phase 1 of the project, 100,000 Gram Panchayats are being connected with optical fiber, in Phase 2, an optimal mix of technologies such as wireless, satellite, overhead and underground fiber have been decided for expedited implementation of the nationwide network. With no adequate planning tool that can plan large scale fibre and wireless links, there was a felt need to develop such a tool.

IIT Bombay has undertaken the task of developing software based planning tool for pan-India network design. The tool (developed by Gram Marg team at the Electrical Engineering department of IIT Bombay) facilitates online and revised planning at any level of aggregation of geographic and administrative boundaries. The tool has been enhanced for its functionality in order to generate fibre route along with wireless and satellite links. A thorough fibre and wireless

link feasibility has been undertaken to design a feasible and stable network of fibre and wireless links. This type of software planning tool has been the first of its kind in India aiding large scale deployment planning of fibre and wireless. This planning tool has been made open source. As part of the wireless and fiber planning, the outputs generated by the tool are state and district wise wireless links and fiber route length (refer figure). The web-based graphical user interface (GUI) for the tool is currently being designed by the Gram Marg team for online viewing.

The efficacy of the tool has also been proved through experimental validation of 10 wireless links randomly selected in Khandwa (Madhya Pradesh) and Ratnagiri (Maharashtra). The test results of the 10 links validated the IITB BharatNet tool. The experimental results match the output generated by the tool in terms of antenna height and link throughput. The planning tool has been recommended to be used for better and easy deployment procedure.

Based on the results and recommendations of IIT Bombay BharatNet planning tool, GoI has approved the optimal mix of technologies i.e., fibre, radio and satellite for Phase 2 of the BharatNet project.



Sample network topology as generated by IIT Bombay BharatNet planning tool