BharatNet is one of the key government projects in the telecommunications space. It aims to provide broadband access to rural India through an optic fibre cable (OFC) network. The project has faced multiple delays owing to several operational, commercial and regulatory challenges. Aerial OFC can play an instrumental role in accelerating the roll-out of fibre under the project. While aerial fibre has a number of drawbacks, these can be overcome by implementing simple design techniques.

Underground versus aerial fibre

Underground fibre is generally considered more reliable than aerial fibre as it is not exposed to external conditions. Moreover, it is typically provided with a standard double sheath cable that protects it from rodents. While aerial fibre has an ultraviolet-protected cable jacket, it is prone to damages caused by factor such as windstorms, vehicles and temperature variations. Further, aerial fibre needs frequent monitoring, while underground fibre needs minimum monitoring.

Several factors affect the reliability of aerial cable network. These include attack by rodents, extreme weather conditions (heavy winds, rains, storms and mudslides). Besides, speeding vehicles may damage the poles on which these cables are mounted or heavy vehicles may underestimate the height of the cable and break it.

While putting electrical and telephone cables on the same pole can be convenient, it sometimes causes major power outages. Multiple cables can lead to sparks and initiate fire in the OFC, thus damaging the network.

Another key factor that affects the reliability of aerial fibre is the strength of the pole to which it is connected. Existing poles need to be checked for strength and new poles must be set up at places where the existing poles are not strong enough to handle the operating loads. However, this adds to the time and cost of deploying aerial fibre. Besides, aerial cable causes aesthetic pollution and poses safety hazards as there are no standard practices for cable deployment on electricity poles.

However, the biggest advantage of aerial fibre is that it can be rolled out much faster as compared to underground fibre. By adopting best practices, the reliability of aerial networks can be enhanced.

Best practices for aerial networks

A well-designed and well-implemented aerial cable network can not only increase the lifetime of the network but also improve its reliability as compared to traditional aerial cable network. The key factors that need to be taken into account to ensure the smooth functioning of an aerial cable network are discussed below…

Robust cable designs: In order to avoid unintentional cuts in cables, colour coding of cable jackets should be carried out. Further, to prevent biotic damage, cables can be made more robust by double sheathing it with aramid layers between the sheaths. In addition, fire retardant outer jackets can be provided to avoid the burning of cable.

Best suitable installation method: To ensure that there is no aesthetic pollution, standards need to be developed for tidy cable deployment and storage. It is also important to provide the right kind of accessories with the cables for quick and firm holding on the cable jacket with no slippage. Further, pole strength should be checked in advance.

Operations and maintenance: Well-trained staff should be deployed for monitoring and routine checks of the network to prevent damage. To fast-track OFC deployment under BharatNet, enhanced aerial network using power infrastructure can be a suitable alternative.

Use of OFC for last mile connectivity

Even as multiple fibre technologies are being tested to take broadband connectivity to the gram panchayat level, the use of fibre in providing last mile connectivity has not been fully explored. OFC in the last mile is primarily associated with fibre to the home (FTTH). The key driver for FTTH uptake is the growth in traffic and the type of traffic. In India, networks are currently carrying about 1,350 petabytes of traffic per month and this is dominated by personal computers. However, with the proliferation of smartphones, the mix is likely to change. The spectrum that is currently available to service providers as well as the quantum that has been earmarked is not adequate. Therefore, FTTH will emerge as a key technology for delivering broadband to the last mile in the near term. However, it will coexist with other technologies such as HSPA (high speed packet access), LTE (long term evolution) and cable because the costs associated with the deployment of FTTH continue to be high.