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Ascending Mount Everest with lightweight fibre-optic cable

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Connecting rural citizens to broadband Internet services remains a challenge worldwide.

In the United States, for instance, the prospect of a new USD 1 trillion infrastructure programme has sparked renewed interest in how best to bring rural connectivity up to speed with urban broadband.

The rural-urban digital divide, however, is often more pronounced in developing countries as a result of the massive costs of installing broadband infrastructure and questionable return on investment.

But a new ITU international standard for lightweight optical cable could help change that equation by providing a lower-cost, “do-it-yourself” solution that helps better connect people even in the world’s most remote areas.

Recommendation ITU-T L.110 defines the shape of low-cost, terabit-capable optical cable that can be deployed on the ground’s surface with minimal expense and environmental impact. L.110 today achieved the first-stage approval (‘consent’) required to enter the close of its development cycle and its impending approval is giving developing countries the confidence to consider the rollout of optical networks in some of the world’s most challenging conditions.

That’s why Nepal, for example, highlighted in a contribution to ITU standardization work its intention to use lightweight optical cable to connect places as remote as Mount Everest Base Camp and Annapura Trekking Trail.

Why lightweight optical cable is important

Satellite communications are characterized by high latency, struggling to support the interactive services associated with broadband. Radio communications can provide ‘last-mile’ connectivity. But optical infrastructure is indispensable – rural communities are often many, many miles away from core networks.

The installation of ultra-high speed optical networks, however, comes with a great deal of cost and complexity.

The costs of optical cable installation are typically 70 to 80 per cent of the entire CAPEX of the network, with cable installation currently relying on heavy machinery and highly skilled labour. This challenge is made even greater by the low densities of rural communities, where fibre rollouts demand a disproportionate level of initial capital investment relative to the potential return on such investment.

New ITU standards to reduce cost and complexity

The new ITU international standard, L.110, was developed within the framework of Recommendation [ITU-T L.1700](#), a standard approved in June 2016 to provide “requirements and framework for low-cost sustainable telecommunications infrastructure for rural communications in developing countries”.

[Read more about L.1700 in an ITU blog post.](#)

L.1700 builds on established technologies to identify the founding principles for low-cost, sustainable broadband backhaul infrastructure. L.1700 is largely technology-neutral, providing the framework for technology-specific standards such as L.110, a standard based on the non-normative [ITU-T L Supplement 22](#).

High-tech optical cable with low-tech installation

L.110 puts advanced optical technology in the hands of rural communities, leveraging the ingenuity of local communities to overcome the prohibitive costs of traditional fibre installation techniques.

The design of the optical cable specified in L.110 builds on lightweight submarine-cable technology, technology with its first deployments targeted towards lakes and wetlands and other submarine environments less hostile than our oceans. The technology has proven its worth in Japan, where the last 20 years have seen the deployment of over 20,000 kilometres of this form of optical cable. L.110 has adapted this design to terrestrial deployment, taking an established technology and giving it new life in a new application environment.

The unique feature of L.1700 and technology-specific compatriots such as L.110 is the focus on ease of deployment.

Cost-effective, practical implementation is the standard effort's top priority. Reliability is the second most important attribute. This reverses the common approach to fibre-optic cable design – reliability is usually the first prize, but with L.110, affordable implementation comes first.

Local communities will have the ability to secure these on-surface lines, using everyday tools to partially bury the lines, settle them on ground underwater, suspend them aerially, or relocate the lines as necessary.

In L.110, ITU standards experts have put forward a solution expressly targeted at narrowing the digital divide, providing the groundwork for artisanal optical cable installation, maintenance and repair.

L.110 was developed by ITU-T Study Group 15, the standardization expert group responsible for 'Networks, technologies and infrastructures for transport, access and home'. Learn more about the group's work [here...](#)