Case Study

Sterlite 's bend insensitive optical fibers

Enabled installation versatility and reduced installation costs, while future-proofing the network in Saudi Arabia.

Sterlite™

Introduction

Worldwide technologies for Broadband Access Networks are advancing rapidly. Among these, the technology applying single mode fiber provides for a high-capacity transmission medium, which can answer the growing demand for broadband services.

Saudi Arabia, poised at the ICT crossroads

The Kingdom of Saudi Arabia is poised to install several new networks to promote ICT. The information and communication technology (ICT) sector is a key element of the Saudi economy, with increasing impact on productivity and the gross domestic product.

Liberalization of the telecommunications sector and the opening of markets to competition have contributed to the revitalization of the national economy, increasing efficiency and productivity, contributing to the higher rates of growth of national income and the development of human resources, and encouraging domestic and foreign investment in the sector.

The Government is working to promote the availability and usage of IT services and applications, and expedite the transition to the information society and the digital economy. Steps are being taken to boost Internet usage and promote IT adoption.

These efforts have led to increased availability of services, improved quality and lower prices. This in turn has contributed to growth of the sector in terms of subscriber numbers.

There is a huge growth potential for broadband services in Saudi Arabia. A large unmet demand exists because of supply side limitations, and demand is expected to grow at a rapid rate, offering attractive opportunities for broadband network and service expansion in the Kingdom.

The cable manufacturer's objectives

The cable manufacturer is one of the largest suppliers of fiber optic cables to key telecom incumbents and ISP's in Saudi Arabia, such as Saudi Telecommunications Company (STC) and Integrated Telecom Company (ITC).

The on-field workforce employed by these incumbents was attuned to installation of copper telecommunication cables. However with the introduction of fiber optic cables in Saudi Arabia, although provided with the necessary training in installation of fiber optic cables, there were still some instances recorded of incorrect handling by the on-field workforce.

Despite the fiber optic cables being manufactured by the cable manufacturer, in excess of the customer's specifications, there were several instances of product failure which was a result of improper installation and handling.

The solution

Differences with respect to the use in the general transport network are mainly due to the high-density network of distribution and drop-cables in the access network.

The limited space and the many manipulations ask for operator-friendly fiber performance and low bending sensitivity. In addition, the cabling in the crowded telecom offices where space is a limiting factor has to be improved accordingly.

In the aim of supporting improved bending performance compared with existing G.652 single mode fibers and cables, ITU introduced two classes of single mode fibers.

One of which is class A, is fully compliant with the G. 652D single mode fibers and can also be used in other parts of the network in the O, E, S, C and L band (1260-1625 nm range).

The other class, class B, is not necessarily compliant with G.652 but is capable of low values of macro-bending losses at very low bend radii and is pre-dominantly intended for in-building use and suitable for transmission at 1310, 1550 and 1625 nm.

In December 2006, the ITU published its recommendations for the G.657 standard. This recommendation describes two categories of single-mode fiber optic cable, which are suitable for use in the access networks, including inside buildings at the end of these networks.

Category A fibers are suitable to be used in the O, E, S, C and L-band (i.e. throughout the 1260 to 1625 nm range). Fibers and requirements in this category are a subset of G.652.D fibers and have the same transmission and interconnection properties. The main improvements are improved bending loss and tighter dimensional specifications, both for improved connectivity.

Macrobending loss (Maximum)	Unit	Category		
		G652D	G657A	G657B
Macrobend test (100 turns on 30 mm radius Mandrel), induced attenuation @1625 nm	dB	0.1	ns	ns
Macrobend test (10 turns on 15 mm radius Mandrel), induced attenuation @1550 nm	dB	ns	0.25	0.03
Macrobend test (10 turns on 15 mm radius Mandrel), induced attenuation @1625 nm	dB	ns	1	0.1
Macrobend test (1 turn on 10 mm radius Mandrel), induced attenuation @1550 nm	dB	ns	0.75	0.1
Macrobend test (1 turn on 10 mm radius Mandrel), induced attenuation @1625 nm	dB	ns	1.5	0.2
Macrobend test (1 turn on 7.5 mm radius Mandrel), induced attenuation @1550 nm	dB	ns	ns	0.5
Macrobend test (1 turn on 7.5 mm radius Mandrel), induced attenuation @1625 nm	dB	ns	ns	1

Category B fibers are suitable for transmission at 1310, 1550, and 1625 nm for restricted distances that are associated with in-building transport of signals. These fibers have different splicing and connection properties than G.652 fibers, but are capable at very low values of bend radius.

The analysis showed that the transmission losses were on account of macro-bending losses, a result of installation in a limited space and or physical distortion of the cable during installation.

Sterlite recommended that the cable manufacturer use 'Bend Insensitive Optical Fiber' in its cables.

Sterlite BOW-LITE is an enhanced low bend sensitive Single Mode Optical Fiber, optimized for use in the 1310 nm, 1550 nm and 1625 nm windows.

It has the industry leading transmission capacity of any non-dispersion shifted single mode product due to its low attenuation, low chromatic dispersion and capability at very low values of bend radius.

The fiber is an ideal choice for access network installations that require very small bending radii. This fiber supports those installations for cable mounting inside premises.

The fiber's enhanced bend radius capabilities enable tighter routing, higher fiber density for component design and deployment of fiber in central offices, and premise wiring.

The cable manufacturer could provide enhanced value to its customers

Future-proofing of networks: Although the installed cable is used in a limited bandwidth range, the optical fiber could in the future, be used in the entire band of O, E, S, C & L (1260-1625 nm). Thus the cables that contain bend insensitive fiber, form part of a future-proof network.

Improved versatility of installation: Cables that are installed indoors for FTTH /FTTD should be robust and resistant to clamping and stapling. Moreover these cables should allow for smaller bend radius (~ 10mm) since these cables need to navigate sharp bends and corners within a user premise. As the critical transmission characteristics of cables containing bend insensitive fibers are not affected by the installation conditions, bend insensitive fibers effectively improved the versatility of installations by the internet service provider.

Faster cable installations : As the cable installation methods were largely simplified, a highly trained workforce was not required. This enabled the ISP to install the cables much faster within the user premise.

Trademarks

References

1. International Telecommunications Union (ITU)
2. Communications & Information Technology Commission (CITC), Saudi Arabia.

About Sterlite Technologies Limited

Sterlite Technologies Limited ("Sterlite") [BSE: 532374, NSE: STRTECH], is a leading global provider of transmission solutions for the telecom and power industries. It is amongst the largest global manufacturers of optical fibers and is the largest manufacturer of power conductors, globally. For more details, please visiit www.sterlitetechnologies.com

Sterlite™

Case Study: CS0001. Release: September 2008.