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SERIES L: CONSTRUCTION, INSTALLATION AND PROTECTION OF CABLES AND OTHER ELEMENTS OF OUTSIDE PLANT

Installation of optical fibre cables in the access network

ITU-T Recommendation L.35

ITU-T L-SERIES RECOMMENDATIONS

CONSTRUCTION, INSTALLATION AND PROTECTION OF CABLES AND OTHER ELEMENTS OF OUTSIDE PLANT

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION L.35

INSTALLATION OF OPTICAL FIBRE CABLES IN THE ACCESS NETWORK

Summary

The Recommendation gives information about the methodologies recommended to install fibre optic cables in the access network. In particular, it gives guidance for installation in ducts, aerial installation and directly buried cables. Appendix I provides the experiences of nine countries on this matter.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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Recommendation L.35

INSTALLATION OF OPTICAL FIBRE CABLES IN THE ACCESS NETWORK

(Geneva, 1998)

Introduction

Optical fibres have been used for some time as transmission media in the access network. The different network architectures used are described in Annex A/L.15.

The procedure for connecting customers to the public switched telephone network via optical fibre is described in Recommendation L.17.

In addition, Chapter II (Cable installation) of the Manual on Optical Fibre Cables "Construction, installation, jointing and protection of optical fibre cables" provides general indications for the installation of any type of fibre; more detailed indications may, however, be necessary for the installation of optical fibre cables in the access network.

Considering

–   that the optical fibre access network is expanding rapidly;

–   that the characteristics of the network are, in many cases, different from those of other types of network;

–   that this type of network can be installed in different environments: rural, suburban and urban;

–   that although installation in ducts is common, directly buried or aerial installations are also possible;

–   that there are certain options in each type of installation that may prove advantageous,

it is recommended

1)   In general:

–   that a study of economic factors, environmental impact and rules or regulations in each region should be conducted to decide on the type of installation: in ducts, directly buried or aerial;

–   that existing infrastructure should be used wherever possible (ducts, poles, etc.);

–   that installation should be undertaken by qualified staff who are skilled in the type of installation chosen.

2)   If the installation is in ducts:

–   that manholes or boxes should be used as network splice and flexibility points;

–   that when the diameter of the duct permits and PE or PVC sub-ducts are used, then they should be installed within the duct typically by pulling;

–   that cables should be installed in the duct by any of the methods described in Chapter II (Cable installation) of the Manual on Optical Fibre Cables;

–   that when required, the cable should be installed from an intermediate point, laying part of the cable as a figure eight;

–   that consideration be given to the storage of excess cable in boxes or manholes.

3)   If the cable is directly buried:

–   that the splice cases should be directly buried or protected by a prefabricated box;

–   that any of the traditional methods described in Chapter II (Cable installation) of the Manual on Optical Fibre Cables should be used.

4)   If the installation is aerial:

–   that poles should be made of wood, cement, steel, fibre or plastic depending on the results of the economic and environmental impact study;

–   that either the cable should be lashed to or twisted around a support cable/wire or a self-supporting cable should be used;

–   that the cable should be suspended on all poles, however at special positions, for example:

    •   splice poles;

    •   end of the route;

    •   river or road crossing;

    •   every given number of poles,

the cable should be anchored (fixed to the pole), in order to transfer the main load from the cable on to the pole;

–   a length of cable for cable splicing purposes should be stored at splicing positions.

APPENDIX I

International experience on access network installation procedures

The information in this appendix has been summarized from the replies from nine countries to a questionnaire sent to ITU-T Study Group 6 participants.

The range of data shown incorporates the minimum and maximum values provided within the replies.

I.1   General aspects

I.1.1   Mean distance from exchange to customer: 300-5000 m

I.1.2   Maximum distance from exchange to customer: 2-30 km

I.1.3   Type of installation: Mainly in ducts

I.2   Duct installation

I.2.1   Number of manholes and boxes per km along the route: 1-30

I.2.2   Duct material: PVC, HDPE, PE, earthenware and steel

I.2.3   Internal diameter of the duct bore: 27-125 mm

I.2.4   Sub-duct material: PVC and PE

I.2.5   Internal diameter of sub-ducts: 14-44 mm

I.2.6   Maximum cable length between splices: 400-6000 m

I.2.7   Excess length of cable stored in boxes (when applicable): 2-22 m

I.3 Directly buried cables

I.3.1 Maximum length between splices: 2000-6000 m

I.4 Aerial installation

I.4.1 Mean length between poles: 25-80 m

I.4.2 Maximum length between poles: 50-200 m

I.4.3 Profile of self-supporting cable (when applicable): Figure 8 and circular shape

I.4.4 Excess cable length in splicing points: 0.8-10 m

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