TSB67 - Field Testing of Generic Cabling

Introduction

For sometime, users have been testing what is now known as a Basic Link using the values given in ANSI/TIA/EIA 568-A Annex E. Unfortunately, these values are for a Channel, not a Basic Link. The purpose of this document is to give an insight into ANIS/TIA/EIA TSB-67, which is the American National Standards Institute (ANSI) Technical Services Bulletin on cable system performance verification in the field. This document covers both the test requirements and stringent requirements on field test equipment.

The introduction to TSB67 specifically recognises that connectivity testing and visual inspection are not enough to verify an installation. Installation practices can often decide whether a system is compliant or not, no matter how good the cable and connectors. It specifically recognises that *'users need more comprehensive verification testing to validate that the link and channel will support telecommunications applications that are designed to operate on the generic cabling system'.*

Applicability

TSB67 is written for unshielded systems. However, it specifically says that it may also be used for shielded links which meet the requirements of TIA/EIA 568-A, but excludes any testing of shielding. ANSI/TIA/EIA TSB-67 is the only document to address field testing in great detail and is expected to be the basis for future standards.

Test Configurations

TSB67 defines two test configurations - 'Channel' and 'Basic Link'.

Basic Link

The Basic Link (see Fig.1) is defined for the purpose of testing permanently installed cabling. This can be used as the basis of contractual requirements for fixed cabling. Final details of test requirements for installed cabling must be agreed between the customer and supplier. The basic link includes qualified adapter cords (test cords) to attach to test instruments.

Fig. 1 The Basic Link

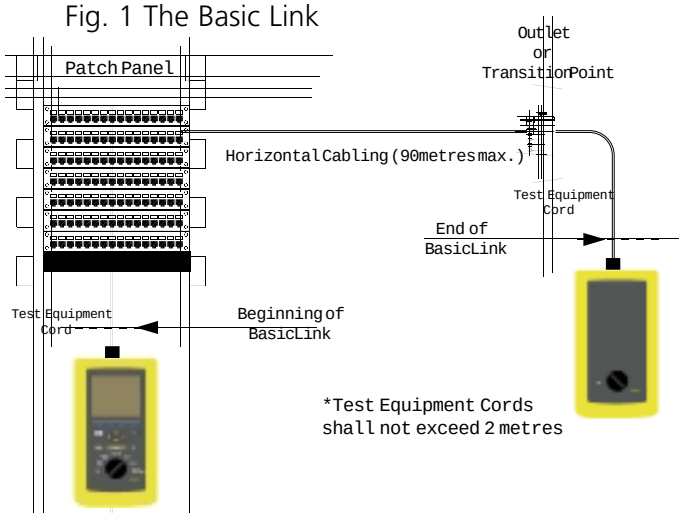
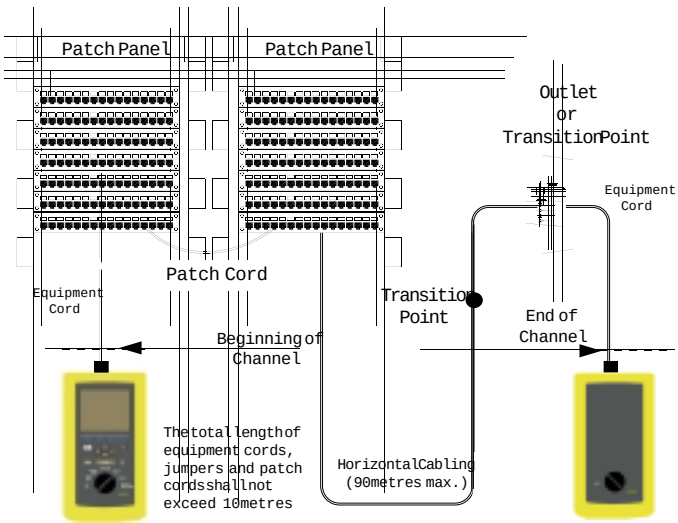


Fig. 2 The Channel



Channel

The channel (see Fig.2) is intended for system designers, end-users and installers of complete LAN systems, to verify the performance of the overall transmission path, including user cords. If the channel conforms, the user patch cords may be approved for use in that channel only.
In order to conform to the requirements of TSB67, the test equipment manufacturer must ensure that the effect of connections to the test equipment are excluded from test results as these connections can have a major effect on the accuracy of the transmission performance measurements. Users should refer to manufacturers' guidelines.

Tests

TSB67 defines primary field test parameters:

à Wire Map
à Length
à Attenuation
à NEXT (both ends of the link/channel)

It specifically requires that all these items are measured in the field. It defines pass/fail criteria for these based on the components and cable length in the link.

Important points are:

- maximum step size for attenuation is 1MHz from 1MHz to 100mhz
- maximum step size for NEXT measurements is 150kHz from 1MHz to 31.25MHz and 250kHz from 31.26MHz to 100MHz

This ensures that when a swept frequency measurement is made, a suitable number of points are used to accurately determine worst case conditions.

In addition to detailing that every pair and pair combination be tested for attenuation and cross-talk, TSB67 specifically requires that field tests of NEXT shall be tested at both ends of the link/channel. This is specified since the longer the basic link/channel, the less effect the connector at the far-end has on the result of the measurement.

Data Reporting & Accuracy, Measurement Procedures

Specific guidelines are given on measurement procedures and how to present results.

Accuracy levels

Two levels of performance, as well as the techniques for measuring performance factors are laid down in (Annex A). The measurement accuracy is computed, based on an error model, using the individual performance factors of random noise floor, residual NEXT, output signal balance, common mode rejection, return loss and dynamic accuracy. The TSB requires that the measurement accuracy is in harmony when comparing network analyser and field tester results. Detailed procedures to be followed for making the comparison are specified (Annex B).

Accuracy level I is the lowest level, with a measurement uncertainty of ±3.8dB for NEXT of a Basic Link and ±3.4dB of a Channel, and ±1.3dB for Attenuation measurements.

Accuracy level II is the highest in the field with up to ±1.5dB of overall uncertainty for NEXT of a Basic Link and ±1.6dB of a Channel, and ±1.0dB for Attenuation measurements.

Accuracy Levels and confidence

Accuracy is the difference between the measured value reported by the field test instrument and the real value. Due to the uncertainty of all measurements there is a probability that a Pass/Fail determination can be in error.

In order to avoid incorrect diagnosis of borderline links, TSB67 requires that measured values which fall within the accuracy limits of the instruments be marked with an asterisk and that documentation from the test equipment supplier be provided to guide the user in the interpretation of such measurements.

Note: Secondary test parameters: To aid clarity, 'informative' secondary test parameters like return loss and longitudinal conversion loss, have been removed from TSB67. These will be subject to further study.

KRONE (UK) TECHNIQUE LIMITED
Runnings Road
Kingsditch Trading Estate
Cheltenham
Gloucestershire
GL51 9NQ
Tel: 01242 264400
Fax: 01242 264488/264466 (Sales)
A subsidiary of KRONE AG, Berlin, Germany.
For further information please contact our Sales office on 01242 264444.