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SERIES O: SPECIFICATIONS OF MEASURING EQUIPMENT

Equipment for the measurement of digital and
analogue/digital parameters

Jitter measuring equipment for digital systems which are based on the Optical Transport Network (OTN)

CAUTION !

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Recommendation ITU-T O.173

Jitter measuring equipment for digital systems which are based on the Optical Transport Network (OTN)

Summary

Recommendation ITU-T O.173 specifies instrumentation that is used to generate and measure jitter in digital systems based on the OTN. Measurement requirements for client interfaces, e.g., SDH line interfaces are not addressed in this Recommendation.

The requirements for the characteristics of the jitter measuring equipment that are specified in this Recommendation must be adhered to in order to ensure consistency of results between equipment produced by different manufacturers.

Keywords

Input jitter tolerance, input wander tolerance, jitter generation, jitter measurement, jitter transfer function, output jitter.

Introduction

The timing performance of OTN networks and OTN equipment elements is specified in [ITU-T G.8251], using jitter and wander parameters. This Recommendation specifies the various characteristics of jitter measuring equipment, which are needed in order to support the requirements of [ITU-T G.8251] and to perform other test and measuring tasks.

While functional and characteristic requirements are given for the measuring equipment, the realization of the equipment configuration is not covered and should be given careful consideration by the designer and user. In particular, it is not required that all features described in this Recommendation shall be provided in one piece of equipment. Users may select those functions, which correspond best to their applications.

Recommendation ITU-T O.173

Jitter measuring equipment for digital systems which are based on the Optical Transport Network (OTN)

1 Scope

This Recommendation specifies test instrumentation that is used to generate and measure timing jitter in digital systems based on the Optical Transport Network (OTN).

The test instrumentation consists principally of a jitter measurement function and a jitter generation function. Measurements can be performed at the physical layer of OTN network node interfaces (NNIs). A bit error rate test set may also be required for certain types of measurements; this may be part of the same instrumentation or it may be physically separate.

It is recommended that [ITU-T G.8251] and [ITU-T G.709] are read in conjunction with this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T G.693] Recommendation ITU-T G.693 (2009), *Optical interfaces for intra-office systems*.
- [ITU-T G.703] Recommendation ITU-T G.703 (2001), *Physical/electrical characteristics of hierarchical digital interfaces*.
- [ITU-T G.709] Recommendation ITU-T G.709/Y.1331 (2009), *Interfaces for the Optical Transport Network (OTN)*.
- [ITU-T G.810] Recommendation ITU-T G.810 (1996), *Definitions and terminology for synchronization networks*.
- [ITU-T G.959.1] Recommendation ITU-T G.959.1 (2009), *Optical transport network physical layer interfaces*.
- [ITU-T G.8251] Recommendation ITU-T G.8251 (2011), *The control of jitter and wander within the optical transport network (OTN)*.
- [ITU-T O.3] Recommendation ITU-T O.3 (1992), *Climatic conditions and relevant tests for measuring equipment*.
- [ITU-T O.172] Recommendation ITU-T O.172 (2005), *Jitter and wander measuring equipment for digital systems which are based on the synchronous digital hierarchy (SDH)*.

3 Definitions

For the purpose of this Recommendation, the following definitions apply (refer to [ITU-T G.810]):

3.1 (timing) jitter: The short-term variations of the significant instances of a digital signal from their ideal positions in time (where "short-term" implies that these variations are of frequency greater than or equal to 10 Hz).

3.2 wander: The long-term variations of the significant instances of a digital signal from their ideal position in time (where "long-term" implies that these variations are of frequency less than 10 Hz).

It may be useful to note that [ITU-T G.810] provides additional definitions and abbreviations used in timing and synchronization Recommendations. It also provides background information on the need to limit phase variation and the impairments on digital systems.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

OPUk	Optical channel Payload Unit-k
OTN	Optical Transport Network
OTUk	completely standardized Optical channel Transport Unit-k
OTL	Optical channel Transport Lane
ppm	parts per million
PRBS	Pseudo Random Binary Sequence
SDH	Synchronous Digital Hierarchy
UI	Unit Interval
UIpp	Unit Interval peak-to-peak

5 Functional block diagram

Figure 1 shows the block diagram of the instrumentation in general form, identifying the main functions that are addressed in this Recommendation. The figure does not describe a specific implementation.