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OF ITU

G.821

Corrigendum 1
(07/2001)

SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS

Digital networks – Quality and availability targets

Error performance of an international digital
connection operating at a bit rate below the primary
rate and forming part of an integrated services
digital network

Corrigendum 1

ITU-T Recommendation G.821 – Corrigendum 1

(Formerly CCITT Recommendation)

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ITU-T Recommendation G.821

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CORRIGENDUM 1

Summary

The corrigendum corrects defects identified in ITU-T G.821 (1996). The definition of SES is modified to include LOS and AIS. Annex A is modified to be consistent with the 1996 SES definition (with the above modification). The new text is in line with that of ITU-T G.826. In addition, Annex B is deleted.

Source

Corrigendum 1 to ITU-T Recommendation G.821 was prepared by ITU-T Study Group 13 (2001-2004) and approved under the WTSA Resolution 1 procedure on 13 July 2001.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. 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 Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 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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ITU-T Recommendation G.821

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CORRIGENDUM 1

1 Introduction

1.1 Impact of SES definition on Annexes A and B

ITU-T G.821 was revised in 1996 in order to bring its structure in line with the more modern ITU-T G.826. One of the revisions resulted in a slightly different definition of the SES event. The former text:

- **Severely Errored Second:** A one-second interval having a ratio worse than $1 \cdot 10^{-3}$.

was replaced by:

- **Severely Errored Second (SES):** It is a one-second period which has a bit error ratio $\geq 1 \cdot 10^{-3}$.

It was not recognized, however, that this change had a bearing on Annex A, which reads:

A period of unavailable time begins when the bit error ratio (BER) in each second is worse than $1 \cdot 10^{-3}$ for a period of ten consecutive seconds. These ten seconds are considered to be unavailable time. A new period of available time begins with the first second of a period of ten consecutive seconds each of which has a BER better than 10^{-3} .

Considering the new SES definition, there is an uncertainty for one-second periods exhibiting a BER of **exactly** 10^{-3} . To solve the problem, the following modification of ITU-T G.821 applies:

Annex A is modified to be consistent with the 1996 SES definition. The new text is in line with that of ITU-T G.826. In addition, Annex B is deleted because it is now superfluous.

1.2 Impact of loss of signal (LOS) and alarm indication signal (AIS) on SES definition

ITU-T G.821 deals with error performance of $N \times 64$ kbit/s channels and looks at bit errors. Because there is no overhead at these rates, bit errors are the only criterion to be evaluated. Parameters are defined accordingly, i.e., an SES is declared if the bit error ratio is $\geq 1 \cdot 10^{-3}$. Because bit errors can only be measured using a known test pattern, ITU-T G.821 calls for out-of-service measurements. According to the present text of ITU-T G.821, it is unclear what happens if there is a loss of signal or AIS at the receive side interface. It is quite clear that the connection under test is unavailable if these two "defects" persist for at least 10 s. To solve the problem, the SES definition in ITU-T G.821 is amended as follows (new text in italics):

- **severely errored second (SES):** It is a one-second period which has a bit error ratio $\geq 1 \cdot 10^{-3}$ *or during which Loss of Signal (LOS) or Alarm Indication Signal (AIS) is detected.*

2 Resolved defects

2.1 SES definition

Replace clause 4.2.1.2 with the following:

4.2.1.2 Severely Errored Second (SES): It is a one-second period which has a bit error ratio $\geq 1 \cdot 10^{-3}$ or during which Loss of Signal (LOS) or Alarm Indication Signal (AIS) is detected.

2.2 Annex A

Replace Annex A in its entirety, with the following:

ANNEX A

Criteria for entry and exit for the unavailable state

A.1 Criteria for a single direction

A period of unavailable time begins at the onset of ten consecutive SES events. These ten seconds are considered to be part of unavailable time. A new period of available time begins at the onset of ten consecutive non-SES events. These ten seconds are considered to be part of available time. Figure A.1 illustrates this definition.

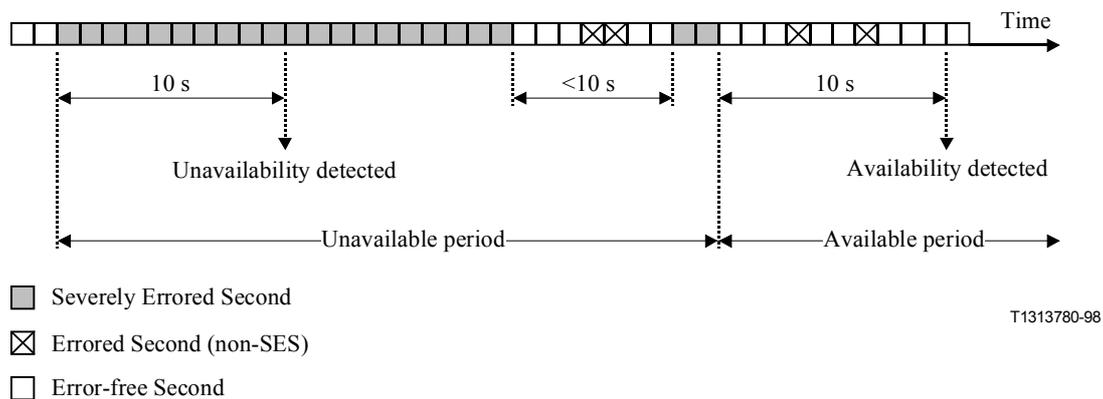


Figure A.1/G.821 – Example of unavailability determination

A.2 Criterion for a bidirectional connection

A bidirectional connection is in the unavailable state if either one or both directions are in the unavailable state. This is shown in Figure A.2.

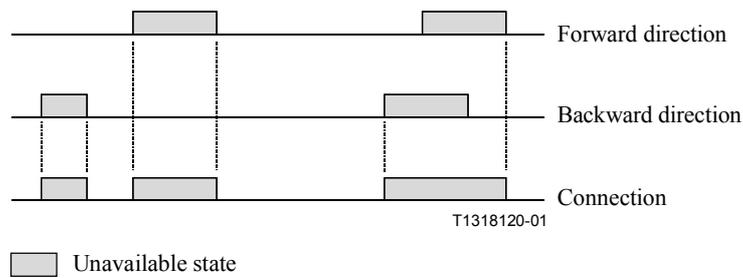


Figure A.2/G.821 – Example of the unavailable state of a connection

A.3 Criterion for a unidirectional connection

The criterion for a unidirectional connection is defined in clause A.1 above.

A.4 Consequences on error performance measurements

When a bidirectional connection is in the unavailable state, ES and SES counts may be collected in both directions and may be helpful in the analysis of the trouble. However, it is recommended that these ES and SES counts are not included in estimates of performance.

Some existing systems cannot support this requirement to exclude ES and SES counts. For these systems, the performance of a bidirectional connection can be approximated by evaluating the parameters in each direction, independently of the state of availability of the other direction. It should be noted that this approximation method may result in a worse estimate of performance in the event that only one direction of a bidirectional connection becomes unavailable.

NOTE – This is not an issue for unidirectional connections.

2.3 Annex B

Delete Annex B.

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