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Reliability requirements for telecommunication systems affected by particle radiation

Recommendation ITU-T K.139

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Reliability requirements for telecommunication systems affected by particle radiation

Summary

Recommendation ITU-T K.139 describes the reliability requirements for telecommunication equipment in relation to the soft errors that are caused by particle radiation. The principles for determination of reliability requirements are described and three types of reliability requirements (alert function reliability, service reliability and maintenance reliability) are defined. Three reliability classes for each type of requirement are defined based on the acceptable soft error failure rate. Specific values are determined for each type and class of reliability requirement.

History

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Introduction

Highly integrated and miniaturized semiconductor devices are indispensable for the telecommunication equipment that makes up carrier telecommunications networks which have large capacity, high functionality, and high reliability. However, preventing the occurrence of soft errors in these semiconductor devices is not possible at an acceptable cost. Accordingly, it is necessary to implement soft error measures to ensure reliability by reducing the influence of soft errors at the time when devices and equipment are designed. This Recommendation describes the reliability requirements needed to provide the level of soft error measures to be applied to telecommunication equipment constituting carrier networks.

As soft error failures occur due to factors different from conventional physical fault failures, the number of failures caused by soft errors is added to those caused by physical faults when estimating equipment reliability. A soft error failure can be rectified by applying the automatic recovery measures described in [ITU-T K.131] and the operation can be restarted after the recovery. Reliability requirements to limit the influence of soft errors on services and the maintenance of networks are specified based on the reliability requirements for physical fault failures.

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