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AND LEASED CIRCUITS

International transport network

**Maintenance thresholds and procedures for
recovery mechanisms (protection and
restoration) of international SDH VC trails
(paths) and multiplex sections**

ITU-T Recommendation M.2102

(Formerly CCITT Recommendation)

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ITU-T Recommendation M.2102**Maintenance thresholds and procedures for recovery mechanisms (protection and restoration) of international SDH VC trails (paths) and multiplex sections****Summary**

This ITU-T Recommendation defines maintenance thresholds and procedures for recovery mechanisms of international SDH VC trails (paths), multiplex sections (MSs) and subnetwork connections (SNCs), in case of failure, degradation, maintenance activities (e.g. planned outages).

This Recommendation deals with protection and restoration including return to original configuration. The internal protection capabilities of network element (NE) hardware are outside the scope of this Recommendation.

Maintenance thresholds and procedures given in this Recommendation are only used for protection and restoration of VCs trails (path), multiplex sections and subnetwork connections (SNCs)¹.

Source

ITU-T Recommendation M.2102 was prepared by ITU-T Study Group 4 (1997-2000) and approved under the WTSC Resolution 1 procedure on 4 February 2000.

Keywords

Acceptable state, alternative trail (path), automatic protection (revertive), automatic protection (non-revertive), automatic restoration (revertive), automatic restoration (non-revertive), manual protection (revertive), manual protection (non-revertive), manual restoration (revertive), manual restoration (non-revertive), multiplex section, normal, normalization, VC trail (path), patch, protection, recovery initiation, recovery mechanism, re-routing trail, restoration, subnetwork connection, SDH, service trail, switch, working trail.

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¹ For a definition of subnetwork connections, see ITU-T Recommendation G.803 [2].

FOREWORD

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NOTE

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ITU-T Recommendation M.2102

Maintenance thresholds and procedures for recovery mechanisms (protection and restoration) of international SDH VC trails (paths) and multiplex sections

1 Scope

This ITU-T Recommendation defines maintenance thresholds and procedures for protection and restoration of international SDH VC trails², multiplex sections and subnetwork connections in case of failure, degradation, maintenance activities (e.g. planned outages).

This ITU-T Recommendation deals with protection and restoration including return to the original configuration. The internal protection capabilities of network element hardware are outside the scope of this Recommendation.

Maintenance thresholds and procedures given in this Recommendation are only used for automatic protection and restoration of VC trails, multiplex sections and subnetwork connections.

ITU-T Recommendations M.2101 [7], M.2110 [8] and M.2120 [9] apply to international SDH VC trails and multiplex sections, prior to, during and following protection or restoration.

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; all 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.

- [1] ITU-T Recommendation G.783 (1997), *Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks*.
- [2] ITU-T Recommendation G.803 (2000), *Architectures of transport networks based on the synchronous digital hierarchy (SDH)*.
- [3] ITU-T Recommendation G.805 (2000), *Generic functional architecture of transport networks*.
- [4] ITU-T Recommendation G.841 (1998), *Types and characteristics of SDH network protection architectures*.
- [5] ITU-T Recommendation G.842 (1997), *Interworking of SDH network protection architectures*.
- [6] CCITT Recommendation M.20 (1992), *Maintenance philosophy for telecommunication networks*.
- [7] ITU-T Recommendation M.2101 (2000), *Performance limits and objectives for bringing-into-service and maintenance of international SDH paths and multiplex sections*.
- [8] ITU-T Recommendation M.2110 (1997), *Bringing-into-service of international PDH paths, sections and transmission systems and SDH paths and multiplex sections*.
- [9] ITU-T Recommendation M.2120 (2000), *PDH path, section and transmission system and SDH path and multiplex section fault detection and localization procedures*.

² Throughout this ITU-T Recommendation the terms "trail" and "trails" should be understood to read "trail (path)" and trails (paths) respectively.

- [10] ITU-T Recommendation M. 2130 (2000), *Operational procedures for the maintenance of the transport network*.

3 Terms and definitions

This ITU-T Recommendation defines the following terms:

- 3.1 normal:** Original configuration of VC trail, SNC or MS: sometimes referred to as "working trail" or "in-service trail."
- 3.2 alternative trail:** Transmission capacity available for recovery purposes.
- 3.3 switching:** The action of transferring transmission capacity between the normal and alternative trail, and vice-versa, using NE switching matrices.
- 3.4 re-routing:** The actions required to divert VC trails or Multiplex Sections onto reserved transport network capacity, in the event of working trail failure or degradation.
- 3.5 acceptable state:** Implies the trail is not degraded. See ITU-T Recommendation M.20 [6].
- 3.6 patching:** The action of transferring transmission capacity manually between the normal and alternative trail, and vice-versa.
- 3.7 recovery mechanism:** A mechanism by which transmission capacity can be recovered after a network failure or degradation. A recovery mechanism is defined by its actions, which are recovery initiation(s) and return(s) to the original configuration.

There are two types of recovery mechanisms: protection and restoration. Descriptions of recovery mechanisms are illustrated in Table 1 and Figure 1.

- 3.8 recovery initiation:** The action which triggers the recovery mechanism. Each recovery mechanism has one or more possible recovery initiations. Examples of NE functions associated with recovery mechanism actions are: manual switching to the alternative trail which can be achieved using the G.783 [1] NE function "Manual Switch" and automatic switching to the alternative trail can be achieved using the G.783 [1] NE function "APS".

- 3.9 return to original configuration:** The action which reverses network changes due to a recovery initiation. Each recovery mechanism has one or more possible returns to original configuration.

- 3.10 automatic protection (revertive):** Recovery is initiated by automatic switching to the alternative trail; return to the original configuration is also automatic. The NE normally autonomously provides this functionality; the definitions from the NE perspective are given in ITU-T Recommendation G.783 [1].

Note that if a manual or forced switching to normal is provided to return to the original configuration, then the particular recovery mechanism is not considered to be automatic protection (revertive) for that particular action.

- 3.11 automatic protection (non-revertive):** Recovery is initiated by automatic switching to the alternative trail; return to original configuration is done by forced or manual switching to normal.

- 3.12 manual protection:** Recovery is initiated by forced or manual switching to the alternative trail; return to original configuration is done by forced or manual switching to normal.

- 3.13 automatic restoration (revertive):** Recovery is initiated by automatic OS controlled switching to the alternative trail; return to original configuration is done by both automatic OS controlled switching to normal or manual switch to normal.