

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

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

Digital networks – General aspects

Generic protection switching – Shared mesh protection

Recommendation ITU-T G.808.3



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Recommendation ITU-T G.808.3

Generic protection switching – Shared mesh protection

Summary

Recommendation ITU-T G.808.3 provides an overview of generic aspects of a shared mesh protection (SMP) mechanism for connection-oriented layer networks that does not depend upon the presence of a control plane. SMP provides a method for sharing resources in the mesh network for protection against one or more failures in the network.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T G.808.3	2012-10-29	15

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). 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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As of the date of approval of this Recommendation, ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

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Recommendation ITU-T G.808.3

Generic protection switching – Shared mesh protection

1 Scope

This Recommendation provides an overview of generic aspects of a shared mesh protection (SMP) mechanism for connection-oriented layer networks that does not depend upon the presence of a control plane. This mechanism is targeted for mesh network architectures, which offer further efficiencies in protection resource utilization. The primary characteristics of this path-based protection approach involve usage of pre-computation and pre-allocation of resources to maximize speed of recovery. The technology-specific shared mesh protection mechanisms will be defined in technology-specific Recommendation(s).

This version of the Recommendation provides an architecture framework for SMP.

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.780] Recommendation ITU-T G.780/Y.1351 (2010), *Terms and definitions for synchronous digital hierarchy (SDH) networks*.
- [ITU-T G.805] Recommendation ITU-T G.805 (2000), *Generic functional architecture of transport networks*.
- [ITU-T G.806] Recommendation ITU-T G.806 (2006), *Characteristics of transport equipment – Description methodology and generic functionality*.
- [ITU-T G.808.1] Recommendation ITU-T G.808.1 (2010), *Generic protection switching – Linear trail and subnetwork protection*.
- [ITU-T G.870] Recommendation ITU-T G.870/Y.1352 (2010), *Terms and definitions for optical transport network*.

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 Terms related to actions

3.1.1.1 switch [ITU-T G.870]

3.1.2 Terms related to components

3.1.2.1 bridge [ITU-T G.870]

3.1.2.2 selector [ITU-T G.870]

3.1.2.3 intermediate node [ITU-T G.870]

3.1.3 Terms related to fault conditions

3.1.3.1 signal degrade (SD) [ITU-T G.805]

- 3.1.3.2 **signal fail (SF)** [ITU-T G.805]
- 3.1.4 **Terms related to architecture**
 - 3.1.4.1 **m:n (protection) architecture** [ITU-T G.870]
- 3.1.5 **Terms related to operation**
 - 3.1.5.1 **revertive (protection) operation** [ITU-T G.870]
- 3.1.6 **Terms related to signals**
 - 3.1.6.1 **traffic signal** [ITU-T G.870]
 - 3.1.6.2 **normal traffic signal** [ITU-T G.870]
 - 3.1.6.3 **extra traffic signal** [ITU-T G.870]
- 3.1.7 **Terms related to switching**
 - 3.1.7.1 **bidirectional (protection) switching** [ITU-T G.780]
 - 3.1.7.2 **unidirectional (protection) switching** [ITU-T G.780]
- 3.1.8 **Terms related to transport entities**
 - 3.1.8.1 **link** [ITU-T G.805]
 - 3.1.8.2 **transport entity** [ITU-T G.870]
 - 3.1.8.3 **protection transport entity** [ITU-T G.870]
 - 3.1.8.4 **working transport entity** [ITU-T G.870]
- 3.1.9 **protection** [ITU-T G.870]
- 3.1.10 **restoration** [ITU-T G.870]
- 3.1.11 **switch event** [ITU-T G.870]

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

- 3.2.1 **protection segment:** A link between two SMP nodes on a protection transport entity.
- 3.2.2 **shared mesh protection:** A shared mesh protection (SMP) architecture involves multiple normal traffic signals, where each signal has one corresponding working transport entity and one or more protection transport entities, in a meshed network. In an SMP, the protection resources are shared among two or more protection transport entities. Only one of these protection transport entities can use the shared protection resources at any point of time.
- 3.2.3 **shared protection segment:** A link between two SMP nodes, where the bandwidth resource on the link is shared by multiple protection transport entities.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

APS	Automatic Protection Switching
NUT	Non-pre-emptible Unprotected Traffic
OTN	Optical Transport Network
P	Protection

SD	Signal Degrade
SDH	Synchronous Digital Hierarchy
SF	Signal Fail
SMP	Shared Mesh Protection
W	Working

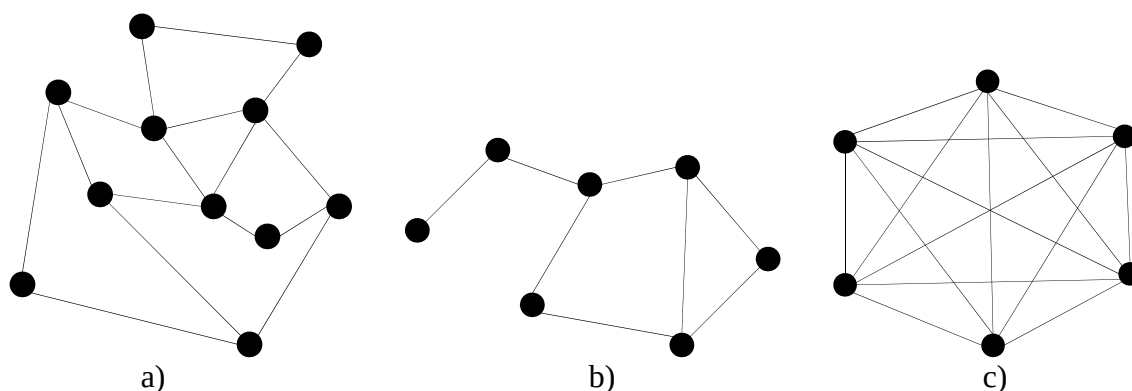
5 Conventions

None.

6 Overview

6.1 Mesh topologies

A meshed transport network is one in which each node in the network is interconnected by at least two links whose remote ends are on different nodes from each other (see example a) of Figure 1). It should be noted that while the overall transport network may contain nodes that do not satisfy the above criteria (see left two nodes in example b) of Figure 1), such nodes would not be considered part of the portion of the transport network defined as being a mesh. A fully meshed topology is one in which each node is directly connected to every other node in a network (see example c) of Figure 1).



1-a: Example of a mesh network

1-b: Example of a network, only a portion of which is meshed

1-c: Example of a fully meshed network

Figure 1 – Examples of mesh network

Most mesh transport networks are only partially meshed (as in example a) of Figure 1), with some nodes fully meshed and others connecting to one or more nodes, but not to all of them (i.e., their maximum number being less than the total number of nodes – 1). While fully meshed network topologies offer the highest degree of survivability in the event of failures, they have the highest degree of transport resource redundancy. Most mesh transport networks are only partially meshed and generally require traversing intermediate nodes to go from each node to every other node.