

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.8080/Y.1304

Amendment 1
(03/2008)

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

Packet over Transport aspects – Ethernet over Transport
aspects

**SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT-GENERATION NETWORKS**

Internet protocol aspects – Transport

Architecture for the automatically switched optical
network (ASON)

Amendment 1

Recommendation ITU-T G.8080/Y.1304 (2006) –
Amendment 1



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Recommendation ITU-T G.8080/Y.1304

Architecture for the automatically switched optical network (ASON)

Amendment 1

Summary

Amendment 1 to Recommendation ITU-T G.8080/Y.1304 contains:

- G.8080/Y.1304 Corrigendum 1 (09/2007)
- G.8080/Y.1304 Erratum 1 (04/2007)
- Additions to allow ASON to apply to packet transport networks
- Updates to TAP and LRM, including clarification of SNP binding states.

Source

Amendment 1 to Recommendation ITU-T G.8080/Y.1304 (2006) was approved on 29 March 2008 by ITU-T Study Group 15 (2005-2008) under Recommendation ITU-T A.8 procedure.

FOREWORD

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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.

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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.

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Recommendation ITU-T G.8080/Y.1304

Architecture for the automatically switched optical network (ASON)

Amendment 1

Summary

Replace the existing summary with the following:

This Recommendation describes the reference architecture for the control plane of the Automatically Switched Optical Network as applicable to connection-oriented circuit or packet transport networks, as defined in Recommendation ITU-T G.805. This reference architecture is described in terms of the key functional components and the interactions between them.

1 Scope

Replace the first paragraph with the following:

This Recommendation specifies the architecture and requirements for the automatic switched transport network as applicable to connection-oriented circuit or packet transport networks, as defined in [ITU-T G.805].

2 References

Add the following references:

- [ITU-T G.800] Recommendation ITU-T G.800 (2007), *Unified functional architecture of transport networks*.
- [ITU-T G.7718] Recommendation ITU-T G.7718/Y.1709 (2005), *Framework for ASON management*.

3 Definitions

Add the following definition:

FwPt: See [ITU-T G.800].

Add the following definitions after definition 3.53:

3.54 potential (resource) label range: The potential (resource) label range is the range of resource labels in the transport plane name space that an adaptation function supports to distinguish different information flows.

3.55 configured (resource) label: A "configured (resource) label" is a label that has been configured in the transport plane in support of a connection. For each configured label, a forwarding table entry exists on the receiving end of the link such that packets can be forwarded based on the label value of the received packet.

3.56 allocated (resource) label range: The "allocated label range" is the set of labels that can be used by the adaptation function of a particular link to carry user traffic. It is a subset of the potential resource label range. The allocated labels are entities that can be referenced in the transport plane name space. Each allocated label is associated with one or multiple SNP IDs that exist in the control plane name space (1:n relationship). TAP holds this binding information.

3.57 potential SNPs: Potential SNPs are those SNPs that are associated with a (resource) label. In general, multiple SNPs can be associated with a single label. The different SNPs associated with the same (resource) label typically belong to different SNPPs.

3.58 assigned SNPs: Assigned SNPs are those SNPs out of the set of potential SNPs that have been assigned to a particular connection. This means that the associated label corresponds to a configured label.

6.1 Transport entities

Replace the sentence:

A number of transport systems support variable adaptation, whereby a single server layer trail may dynamically support different multiplexing structures.

With the following:

A number of transport systems support variable adaptation, whereby a single server layer trail may dynamically support different clients. For example, different GFP mappings for packet clients or different multiplexing structures for SDH/OTN. The description below illustrates the application to the latter.

Add the following to the end of the clause

In the case of circuit switching, the SNP is bound to a resource label, which provides a resource reservation and allocation. In the case of packet switching, the SNP is not directly bound to a resource label, and the resource label does not carry either any resource allocation. Therefore, in the case of packet switching, when a connection is established, an SNP is selected from a range of SNPs that is bound to a resource label. The connection request should include a resource reservation (CIR and EIR).

6.3 Topology and discovery

Replace this clause as follows:

The routing function understands topology in terms of SNPP links. Before SNPP links can be created, the underlying transport topology, i.e., the trail relationship between the access points, must be established. These relationships may be discovered (or confirmed against a network plan) using a number of different techniques; for example, use of a test signal or derived from a trail trace in the server layer. They may also be provided by a management system based on a network plan. The capability of the transport equipment to support flexible adaptation functions (and thus link connections for multiple client layer networks) may also be discovered or reported.

Link connections that are equivalent for routing purposes are then grouped into links. This grouping is based on parameters, such as link cost, delay, quality or diversity. Some of these parameters may be derived from the server layer but in general they will be provisioned by the management plane.

Separate links may be created (i.e., link connections that are equivalent for routing purposes may be placed in different links) to allow the division of resources between different ASON networks (e.g., different VPNs) or between resources controlled by ASON and the management plane.

The link information (e.g., the constituent link connections or resource label range with the available link bandwidth) is then used to configure the LRM instances (as described in clause 7.3.3) associated with the SNPP link. Additional characteristics of the link, based on parameters of the (potential) link connections, may also be provided. The LRMs at each end of the link must establish a control plane adjacency that corresponds to the SNPP link. The interface SNPP ids may be negotiated during adjacency discovery or may be provided as part of the LRM configuration. The link connections and CP names or resource labels (and link connections) are then mapped to interface SNP ids (and SNP Link Connection names). In the case where both ends of the link are

within the same routing area the local and interface SNPP id and the local and interface SNP ids may be identical. Otherwise, at each end of the link the interface SNPP id is mapped to a local SNPP id and the interface SNP ids are mapped to local SNP ids. This is shown in Figure 11.

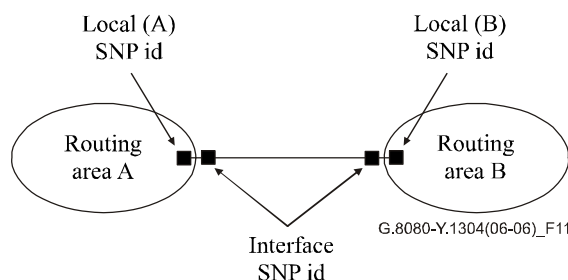


Figure 11 – Relationship between local and interface ids

The resulting SNPP link connections may then be validated by a discovery process. The degree of validation required at this stage is dependent on integrity of the Link Connection relationships initially provided by the transport plane or management plane and the integrity of the process used to map CPs to SNPs.

Validation may be derived from a trail trace in the server layer or by using a test signal and test connections. If test connections are used, the discovery process may set up and release these connections using either the management plane or the control plane. If the control plane is used, the Link must be made temporarily available to routing and connection control, for test connections only.

Once the SNPP link validation is completed, the LRMs inform the RC component (see clause 7.3.2) of the SNPP Link adjacency and the link characteristics, e.g., cost, performance, quality, diversity, and bandwidth.

7 Control plane architecture

Replace the following bullet:

- Support various transport infrastructures, such as the SONET/SDH transport network, as defined in ITU-T Rec. G.803, and the Optical Transport Network (OTN), as defined in ITU-T Rec. G.872.

With the following:

- Support various transport infrastructures, such as those covered by [ITU-T G.805].

7.3.1 Connection controller (CC) component

Replace Table 2 with the following updated table:

Table 2 – Connection controller component interfaces

Input interface	Basic input parameters	Basic return parameters
Connection Request In	A pair of local SNP names and optionally a route	A subnetwork connection
Peer coordination In	1) A pair of SNP names; or 2) SNP and SNPP; or 3) SNPP pair; or 4) route	Confirmation signal

Output interface	Basic output parameters	Basic return parameters
Route Query	Unresolved route fragment	Route
Link Connection Request	–	A Link Connection (an SNP pair)
Connection Request Out	A pair of local SNP names	A subnetwork connection
Peer coordination Out	1) A pair of SNP names; or 2) SNP and SNPP; or 3) SNPP pair; or 4) route	Confirmation signal
Remote topology status Out	Topology information (link and/or subnetwork) including resource availability	–

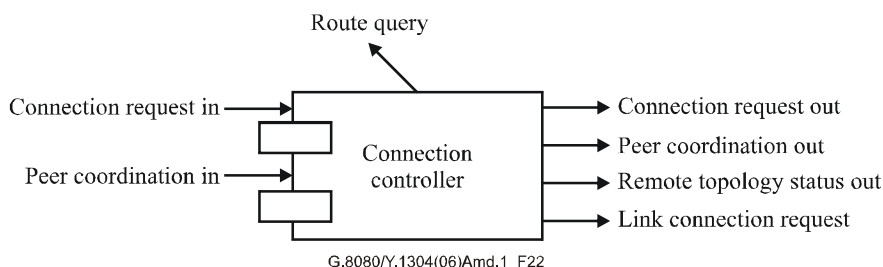


Figure 22 – Connection controller component

7.3.3 Link resource manager (LRMA and LRMZ) component

Replace this clause as follows:

The LRM components are responsible for the management of an SNPP link; including the assignment and unassignment of SNP link connections (to a connection), managing resource reservation, configuration of policing and shaping functions (if required), providing topology and status information. LRM functions for circuit and packet switching are shown in Figure 23.1. Since an SNPP link can be either public or private, an LRM can also be either public or associated to exactly one VPN.

Layer network using circuit switching

The TAP supplies FwPt¹ and the corresponding resource labels to the LRM and associates these resource labels to SNP identifiers. When the TAP allocates a SNP identifier, the transport plane link connection is created; this provides an implicit reservation of the link resource. Tracking the assigned SNP identifiers allows the LRM to track link utilization. Since traffic loading is inherently constrained, policing and shaping functions are not required. In general, the same SNP identifier and resource label are used for both directions of a bidirectional connection.

Layer network using packet switching

The TAP supplies capacity and resources label to the LRM and associates these resource labels to SNP identifiers. The transport plane FwP and link connections are not created until a SNP identifier is assigned by the LRM. When a connection is requested, the LRM must record and track the requested bandwidth (CIR and EIR). The LRM (in cooperation with the TAP) should also configure the appropriate policing and shaping functions. The link information must include the admission control policy (e.g., amount of overbooking allowed for the CIR and EIR). The LRM advises the TAP when a SNP is assigned or unassigned. Different SNP identifiers and resource labels may be used for each direction of a bidirectional connection.

Required LRM functions for packet switching

- Bandwidth management function: the connection request must include bandwidth parameters (CIR and EIR). Due to the fact that the bandwidth is now the important link resource, SNPs and the corresponding labels identifying a flow are of less significance compared to circuit switching. In circuit switching, the SNP of a particular layer network has an implicit bandwidth, and the availability of an SNP also implies that the associated bandwidth is available. The LRMA shall provide a bandwidth management function that keeps track of the allocated bandwidth provided by the TAP and the assigned bandwidth that the currently existing connections have been granted.
- Connection admission control (CAC) function: When the LRMA receives a connection create request or connection modification request, the LRM's connection admission control function determines whether the request can be granted or whether it has to be rejected.
- SNP assignment function: If the CAC function result is positive, the connection create request is further processed and an SNP has to be selected and assigned to the connection. When a connection is deleted, the SNP is unassigned.

¹ FwPt – Forwarding Port from [ITU-T G.800]. This is the end of an unbound link connection. It is converted into a FwP (Forwarding Point) when a subnetwork connection is established. This does not change the associated resource label.

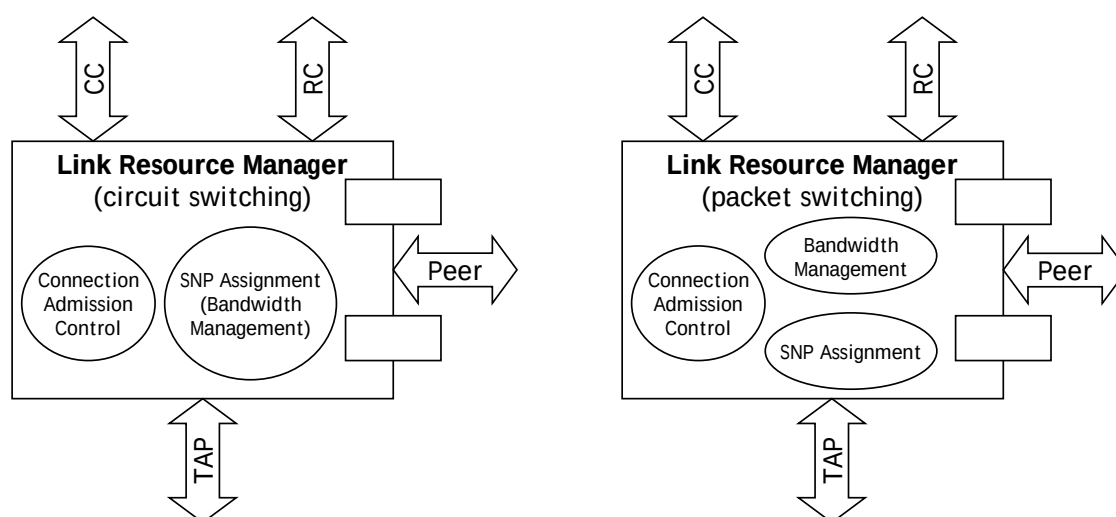


Figure 23.1 – Basic LRM functions for circuit switching and packet switching

Two LRM components are used – the LRMA and LRMZ. An SNPP link is managed by a pair of LRMA and LRMZ components one managing each end of the link. Requests to assign SNP link connections are only directed to the LRMA. If the required link resources are not available, then the LRM must either request additional capacity from the TAP or reject the connection request.

The two cases for SNPP link are illustrated in Figure 24.

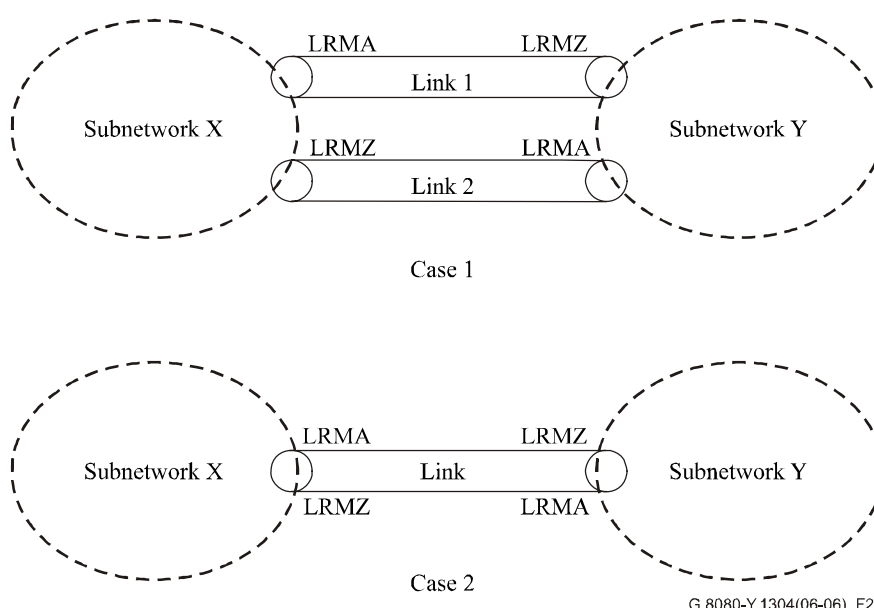


Figure 24 – SNPP link cases

In case 1, link 1 is dedicated to connection set-up requests originating from subnetwork X. Requests for SNP link connections from subnetwork X are directed to the adjacent LRMA for link 1, which can process the request without negotiation with the far end of the link. This LRMA can assign the SNP identifier and capacity (and hence the link connection) without negotiation with the LRMZ for link 1. Similarly, link 2 is dedicated to connection set-up requests originating from subnetwork Y. Requests for SNP link connections from subnetwork Y are directed to the adjacent LRMA for