

RECOMMENDATION ITU-R S.1252

**NETWORK MANAGEMENT – PAYLOAD CONFIGURATION OBJECT
CLASS DEFINITIONS FOR SATELLITE SYSTEM NETWORK
ELEMENTS FORMING PART OF SDH TRANSPORT
NETWORKS IN THE FIXED-SATELLITE SERVICE**

(Question ITU-R 201/4)

(1997)

The ITU Radiocommunication Assembly,

considering

- a) that digital satellite systems will remain as constituent elements of public/private networks in a technology independent way;
- b) that ITU-T Recommendation G.707 (1996) specifies the Synchronous Digital Hierarchy (SDH);
- c) that ITU-T Recommendations G.803 and G.805 define the architecture of SDH transport networks which should be reflected in the management functionality definitions;
- d) that ITU-T Recommendation G.783 specifies the general characteristics and functions of synchronous multiplexing equipment which have to be measured and controlled via the management system;
- e) that ITU-T Recommendations G.831 and G.784 define the management principles and capabilities of SDH transport networks with which this Recommendation has to be compatible;
- f) that ITU-T Recommendation G.774 defines the managed objects for terrestrial SDH transport networks which form the precedents for the object definitions in this Recommendation;
- g) that compatibility with the Telecommunications Management Network (TMN) as defined in ITU-T Recommendation M.3000 is desirable;
- h) that ITU-T Recommendation G.861 defines the principles and guidelines for the integration of satellite and radio systems in SDH transport networks including their management capabilities;
- j) that Recommendation ITU-R S.1149 specifies aspects of satellite-based SDH transport networks,

recommends

that digital satellite systems in the FSS comply with the management functionality defined in this Recommendation to facilitate their integration with SDH transport networks.

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1 Scope of this Recommendation

This Recommendation deals with satellite specific payload configuration.

Payload configuration deals with the control of the adaptation functions which sit between the layers of the SDH architecture, see ITU-T Recommendation G.805. It does not cover the control of SDH cross-points which come under the “fabric” managed object class.

2 Introduction to payload configuration

The existing terrestrial Recommendation on this subject is ITU-T Recommendation G.774-02 (1993). This was extensively revised in 1996 with many of the object classes being updated to Revision 1 status, indicated by adding R1 to the end of the object class name. This Recommendation follows the 1996 practice.

Traditional terrestrial SDH payload configuration operations may be applied to the terrestrial SDH adaptation functions which might be found in satellite earth stations.

2.1 Satellite specific payloads

Specialized adaptation equipment functions have been defined in Recommendation ITU-R S.1149 to support asymmetric and point-to-multipoint working in satellite systems and this Recommendation defines the corresponding payload configuration management object classes to control these specialized adaptation functions.

This Recommendation is concerned with the lowest level details of the network management concept. This level is referred to as the “Network Element” level.

One objective is to ensure that these features are compatible with terrestrial SDH transport network management systems.

2.2 Consideration of satellite operational scenarios

The satellite SDH operational scenarios are defined in Recommendation ITU-R S.1149.

2.2.1 Scenario 1

Scenario 1 employs a standard terrestrial payload, STM-1, in a standard terrestrial manner and therefore does not require payload configuration applied to its Higher Order Satellite Section Adaptation (HSSA) function.

2.2.2 Scenario 2

Scenario 2 employs a standard STM-0 (51M) signal format in both directions of transmission but with asymmetric loading of the multiple receive direction signals compared to the transmit direction signal. Multiplexing and demultiplexing of Lower Order Virtual Containers (LOVCs) (VC-2, VC-12) and possibly Higher Order Virtual Container (HOVC) (VC-3) and asymmetry reconciliation are performed in the Higher Order Satellite Path Adaptation (HSPA) function which is a satellite specific function. Therefore, a specialized payload configuration control method had to be defined.

TABLE 1

Scenario 2 – Arrangements

Transport signal	Possible signal components Several receive, STM-0 format, signals may be supported. Total traffic must fit into an STM-0
STM-0 (51M)	One AU-3 = VC-3
	One to seven – TUG-2s
	One to twenty-one – TU-2s
	One to twenty-one – VC-12s
	Other combinations are for further study

U: Administration Unit.

U: Tributary Unit.

UG: Tributary Unit Group.

C: Virtual Container.

To control the various options in scenario 2 a special object class has been created, called `modifiableSatVC3AsymTTP`, as a subclass of the `satVC3AsymTTP` object class defined in Recommendation ITU-R S.1250.

A special AUG payload configure class was not required as only one AU-3 can be carried in a STM-0.

2.2.2.1 Scenario 2 – payload configuration object class definitions in GDMO format

`modifiableSatVC3AsymTTPSource`

`modifiableSatVC3AsymTTPSource`

MANAGED OBJECT CLASS

DERIVED FROM "Recommendation ITU-R S.1250": `satVC3AsymTTPSource`;

CHARACTERIZED BY

"ITU-T Recommendation M.3100": `supportableClientListPackage`,

`modifiableSatVC3AsymTTPSourcePackage` **PACKAGE**

BEHAVIOUR

`modifiableSatVC3AsymTTPSourceBehaviour` **BEHAVIOUR**

DEFINED AS

“This object class models the process of controlling the Adaptation function HSPA located between the lower order path connection LPC-*m*, in scenario 2, and the corresponding Higher Order Satellite Path Termination (HSPT). Scenarios are defined in Recommendation ITU-R S.1149.

The Adaptation functionality may be different between transmit and return directions to support asymmetric and point to multipoint operation.”;

ATTRIBUTES

satVC3AsymTTPSourceStructure **GET,**
clientTypeStructure **GET;**

ACTIONS

defineSatVC3AsymTTPSourceStructure,
defineClientTypeStructure;;;

REGISTERED AS {rRecS.1252MObjectClass 01};

modifiableSatVC3AsymTTPSink

modifiableSatVC3AsymTTPSink **MANAGED OBJECT CLASS**

DERIVED FROM "Recommendation ITU-R S.1250": satVC3AsymTTPSink;

CHARACTERIZED BY

"ITU-T Recommendation M.3100":supportableClientListPackage,

modifiableSatVC3AsymTTPSinkPackage **PACKAGE**

BEHAVIOUR

modifiableSatVC3AsymTTPSinkBehaviour **BEHAVIOUR**

DEFINED AS

“This object class models the process of controlling the Adaptation function HSPA located between the lower order path connection LPC-*m*, in scenario 2, and the corresponding Higher Order Satellite Path Termination (HSPT). Scenarios are defined in Recommendation ITU-R S.1149.

The Adaptation functionality may be different between transmit and return directions to support asymmetric and point to multipoint operation.”;

ATTRIBUTES

satVC3AsymTTPSinkStructure **GET,**
clientTypeStructure **GET;**

ACTIONS

defineSatVC3AsymTTPSinkStructure,
defineClientTypeStructure;;;

REGISTERED AS {rRecS.1252MObjectClass 02};

2.2.3 Scenario 3 – payload configuration

The information model for the payload configuration process is based upon the signal structures.

This part of the Recommendation defines those subclasses which are special to scenario 3 satellite systems as defined in Recommendation ITU-R S.1149.

Extensions to the following definitions will be possible by simply incorporating new items in the ASN.1 Productions listing rather than requiring the development of new subclasses.

Note that terrestrial object classes covering configuration actions, which may be used on the terrestrial side of the Synchronous Baseband Equipment (SBE), are always symmetrical as full two-way working has been assumed. This is not the situation within the satellite specific parts of the system so flexibility in the action and parameter definitions has been provided to support unidirectional, asymmetrical and point-to-multipoint modes of operation.

Scenario 3 introduces two new payload types, called SSTM-2 n and SSTM-1 k . These are created by the Lower order Satellite Section Adaptation function (LSSA).

The scenario 3 payloads are shown in Table 2 taken from Recommendation ITU-R S.1149.

2.2.3.1 Scenario 3 – Multiplex section bit rates

TABLE 2

Sub-STM-1 synchronous signal, payload, SSOH and bit rates

Module designation	Payload		Satellite Section Overhead (SSOH) Rate (kbit/s)	Satellite Intra Office Section (S-IOS) Rate (kbit/s)
	Composition	Rate (kbit/s)		
SSTM-11	1 × TU-12	2 304	128	2 432
SSTM-12	2 × TU-12	4 608	128	4 736
SSTM-21	1 × TUG-2	6 912	128	7 040
SSTM-22	2 × TUG-2	13 824	128	13 952
SSTM-23	3 × TUG-2	20 736	128	20 864
SSTM-24	4 × TUG-2	27 684	128	27 812
SSTM-25	5 × TUG-2	34 560	128	34 688
SSTM-26	6 × TUG-2	41 472	128	41 600

OTE 1 – The need for a higher maximum SSTM-2 n is for further study.

Scenario 3 – Satellite Specific Tributary Unit Groups

Two Satellite Tributary Unit Groups (STUGs) have been defined, STUG-2 n made up of 1 to 6 TUG-2s and STUG-1 k made up of 1 to 2 TU-12s.

In object information terms these are identified as:

stug11Source	stug11Sink
stug12Source	stug12Sink
stug21Source	stug21Sink
stug22Source	stug22Sink
stug23Source	stug23Sink
stug24Source	stug24Sink
stug25Source	stug25Sink
stug26Source	stug26Sink

The bidirectional case has not been included because the method of applying loopbacks (the main reason for the bidirectional object classes) in scenario 3 has not been defined.

Therefore for the purposes of scenario 3 payload control it is necessary to define 16 object classes as shown in Table 3.

TABLE 3
Satellite object classes for scenario 3

New object classes	Related to	Action
modifiableSatTUG11AdaptSource	satTUG11Source	defineClientType
modifiableSatTUG11AdaptSink	satTUG11Sink	defineClientType
modifiableSatTUG12AdaptSource	satTUG12Source	defineClientType
modifiableSatTUG12AdaptSink	satTUG12Sink	defineClientType
modifiableSatTUG21AdaptSource	satTUG21Source	defineSTUG21Structure
modifiableSatTUG21AdaptSink	satTUG21Sink	defineSTUG21Structure
modifiableSatTUG22AdaptSource	satTUG22Source	defineSTUG22Structure
modifiableSatTUG22AdaptSink	satTUG22Sink	defineSTUG22Structure
modifiableSatTUG23AdaptSource	satTUG23Source	defineSTUG23Structure
modifiableSatTUG23AdaptSink	satTUG23Sink	defineSTUG23Structure
modifiableSatTUG24AdaptSource	satTUG24Source	defineSTUG24Structure
modifiableSatTUG24AdaptSink	satTUG24Sink	defineSTUG24Structure
modifiableSatTUG25AdaptSource	satTUG25Source	defineSTUG25Structure
modifiableSatTUG25AdaptSink	satTUG25Sink	defineSTUG25Structure
modifiableSatTUG26AdaptSource	satTUG26Source	defineSTUG26Structure
modifiableSatTUG26AdaptSink	satTUG26Sink	defineSTUG26Structure

2.2.3.2 Definition of actions:

defineClientType

From the definition of scenario 3 in Recommendation ITU-R S.1149, it is clear that the clientTYPE specified in the current version is type (9) c2048ByteSynchronousMappingClientType. However, to allow for future changes to Recommendation ITU-R S.1149 a full list of client types has been included.

defineSTUG21Structure

This is set as 1 × TUG-2 default at creation time.

Each TUG-2 is structured according to a TUG2StructureInfo parameter where the time sequence of the TUG/TU determines which element of the parameter applies, i.e. one TUG-2 = (0), three TU-12s = (1) and 4 TU-11s = (2). All tributaries can be marked as cross-connectable (1) or not (2) or unknown (3) using the connectionInfo parameter. The unknown case permits the network element to make its own decision.

defineSTUG22Structure

This is set as 2 × TUG-2 default at creation time.

Each TUG-2 is structured according to a TUG2StructureInfo parameter where the time sequence of the TUs determines which element of the parameter applies, i.e. one TUG-2 = (0), three TU-12s = (1) and 4 TU-11s = (2). All tributaries can be marked as cross-connectable (1) or not (2) or unknown (3) using the connectionInfo parameter. The unknown case permits the network element to make its own decision.

defineSTUG23Structure

This is set as 3 × TUG-2 default at creation time.

Each TUG-2 is structured according to a TUG2StructureInfo parameter where the time sequence of the TUs determines which element of the parameter applies, i.e. one TUG-2 = (0), three TU-12s = (1) and 4 TU-11s = (2). All tributaries can be marked as cross-connectable (1) or not (2) or unknown (3) using the connectionInfo parameter. The unknown case permits the network element to make its own decision.

defineSTUG24Structure

This is set as 4 × TUG-2 default at creation time.

Each TUG-2 is structured according to a TUG2StructureInfo parameter where the time sequence of the TUs determines which element of the parameter applies, i.e. one TUG-2 = (0), three TU-12s = (1) and 4 TU-11s = (2). All tributaries can be marked as cross-connectable (1) or not (2) or unknown (3) using the connectionInfo parameter. The unknown case permits the network element to make its own decision.

defineSTUG25Structure

This is set as 5 × TUG-2 default at creation time.

Each TUG-2 is structured according to a TUG2StructureInfo parameter where the time sequence of the TUs determines which element of the parameter applies, i.e. one TUG-2 = (0), three TU-12s = (1) and 4 TU-11s = (2). All tributaries can be marked as cross-connectable (1) or not (2) or unknown (3) using the connectionInfo parameter. The unknown case permits the network element to make its own decision.

defineSTUG26Structure

This is set as 6 × TUG-2 default at creation time.

Each TUG-2 is structured according to a TUG2StructureInfo parameter where the time sequence of the TUs determines which element of the parameter applies, i.e. one TUG-2 = (0), three TU-12s = (1) and 4 TU-11s = (2). All tributaries can be marked as cross-connectable (1) or not (2) or unknown (3) using the connectionInfo parameter. The unknown case permits the network element to make its own decision.

The flexibility provided by these object classes is not as great as that supported by the terrestrial object classes because there is only one payload structure defined for each SSTM and this is continuous from 1 to its maximum. However, there is still a need for the modifiable object class type to allow for the identification of SSTMs that contain tributaries that are of the notCrossConnectable type.

2.2.3.3 Scenario 3 – Definition of payload configuration object classes in GDMO format

modifiableSatTUG11AdaptSource

modifiableSatTUG11AdaptSource **MANAGED OBJECT CLASS**

DERIVED FROM "Recommendation ITU-R S.1250": satLSAdaptSource;

CHARACTERIZED BY

"ITU-T Recommendation M.3100":supportableClientListPackage,

modifiableSatTUG11AdaptSourcePackage **PACKAGE**

BEHAVIOUR

modifiableSatTUG11AdaptSourceBehaviour **BEHAVIOUR**

DEFINED AS

“This object class models the process of controlling the Adaptation function located between the lower order path connection LPC-*m*, in scenario 3, and the corresponding Satellite Section Termination (SST). Scenarios are defined in Recommendation ITU-R S.1149.

The Adaptation functionality may be different between transmit and return directions to support asymmetric and point to multipoint operation.”;