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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Transmission and Multiplexing (TM).

The present document is part of a library of functional blocks for the functional description of the European Transmission Hierarchy.

The present document is part 9, sub-part 1 of a multi-part deliverable covering the generic requirements of transport functionality of equipment, as identified below:

Part 1: "Generic processes and performance";

Part 2: "Synchronous Digital Hierarchy (SDH) and Plesiochronous Digital Hierarchy (PDH) physical section layer functions";

Part 3: "Synchronous Transport Module-N (STM-N) regenerator and multiplex section layer functions";

Part 4: "Synchronous Digital Hierarchy (SDH) path layer functions";

Part 5: "Plesiochronous Digital Hierarchy (PDH) path layer functions";

Part 6: "Synchronization layer functions";

Part 7: "Equipment management and auxiliary layer functions";

Part 9: "Synchronous Digital Hierarchy (SDH) concatenated path layer functions";

Sub-part 1: "Requirements".

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1 Scope

The present document specifies requirements of transport functionality of equipment, which processes SDH concatenated path layers. The functionality is described by a set of functional building blocks and a set of rules by which they are combined. The generic description method and generic functionality is described in EN 300 417-1-1 [1] and ITU-T Recommendation G.806 [2].

For equipment which is compliant with the present document the processing of SDH concatenated path layers with in the equipment shall be describable as an interconnection of a subset of the functional blocks contained within the present document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] ETSI EN 300 417-1-1: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 1-1: Generic processes and performance".

[2] ITU-T Recommendation G.806 (2000): "Characteristics of Transport Equipment - Description Methodology and Generic Functionality".

[3] ETSI EN 300 417-4-1: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 4-1: Synchronous Digital Hierarchy (SDH) path layer functions".

[4] ITU-T Recommendation G.783 (2000): "Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks".

[5] ETSI EN 300 147: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); Multiplexing structure".

[6] ETSI EN 301 163-2-1: "Transmission and Multiplexing (TM); Generic requirements of Asynchronous Transfer Mode (ATM) transport functionality within equipment; Part 2-1: Functional model for the transfer and layer management plane".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

concatenation: procedure whereby a multiplicity of Virtual Containers is associated one with another with the result that their combined capacity can be used as a single container across which bit sequence integrity is maintained
Two versions exists:

- Contiguous concatenation;
- Virtual concatenation.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

c	contiguous concatenation
v	virtual concatenation

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

_I	Interworking Function
S4-X	Concatenated VC-4 path layer
S4-Xc	Contiguous concatenated VC-4 path layer
S4-Xv	Virtual concatenated VC-4 path layer
S3-X	Concatenated VC-3 path layer
S3-Xv	Virtual concatenated VC-3 path layer
S2-X	Concatenated VC-2 path layer
S2-Xv	Virtual concatenated VC-2 path layer
S12-X	Concatenated VC-12 path layer
S12-Xv	Virtual concatenated VC-12 path layer
S11-X	Concatenated VC-11 path layer
S11-Xv	Virtual concatenated VC-11 path layer

4 Generic Processes

4.1 Layer network interworking function

Refer to ITU-T Recommendation G.806 [2], clause 5.6.4 "Layer network interworking function ".

4.2 Virtual concatenation multiframe alignment

Refer to ITU-T Recommendation G.783 [4], clause 8.2.5 "Virtual concatenation multiframe alignment".

5 Concatenated VC-4 path layer functions

5.1 Atomic functions overview

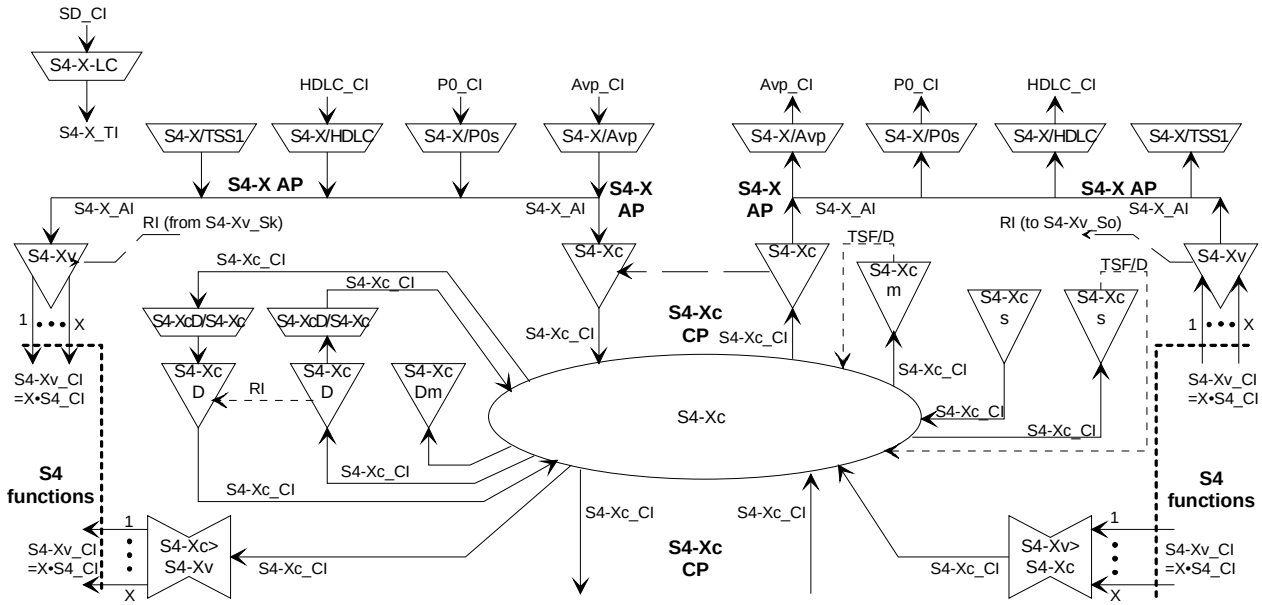

Figure 1: Concatenated VC-4 path layer atomic functions

Figure 1 shows the set of atomic functions for the concatenated VC-4 path layer. Figure 2 shows the additional functions for the concatenated VC-4 layer trail protection. It should be noted that the S4-X/P0s_A function can be absent, or connected before or after the protection functions S4-XP_C. When connected before S4-XP_C the transport of the user channel signal is not protected, otherwise it is protected.

Figures 1 and 2 show that more than one adaptation function exists in the S4-X layer that can be connected to one S4-X access point. For such cases, a subset of these adaptation source functions is allowed to be activated together, but only one adaptation source function may have access to a specific timeslot. Access to the same timeslot by other adaptation source functions shall be denied. In contradiction with the source direction, adaptation sink functions may be activated all together. This may cause faults to be detected and reported. To prevent this an adaptation sink function can be deactivated.

NOTE: If one adaptation function only is connected to the AP, it will be activated. If one or more other functions are connected to the same AP accessing the same timeslot, one out of the set of functions will be active.

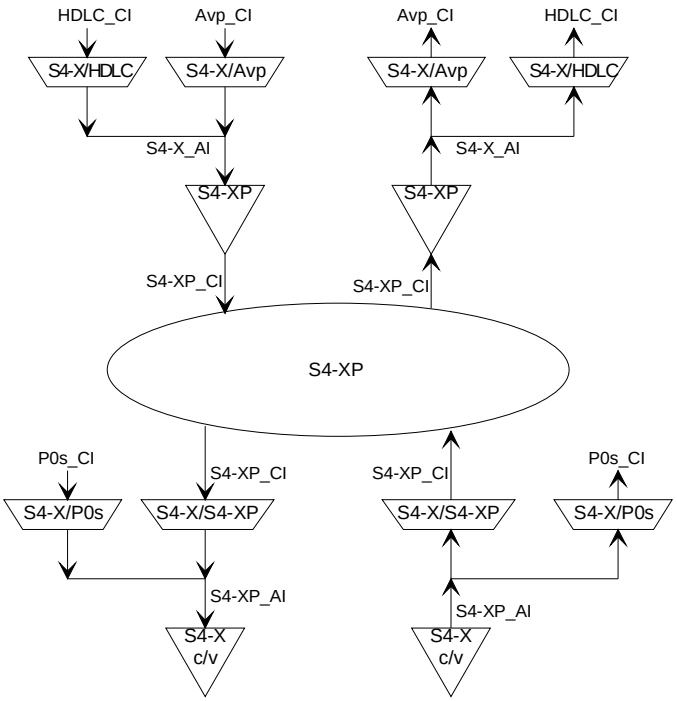

Figure 2: Concatenated VC-4 Layer Trail Protection atomic functions

5.2 Layer information

5.2.1 VC-4-X layer access point

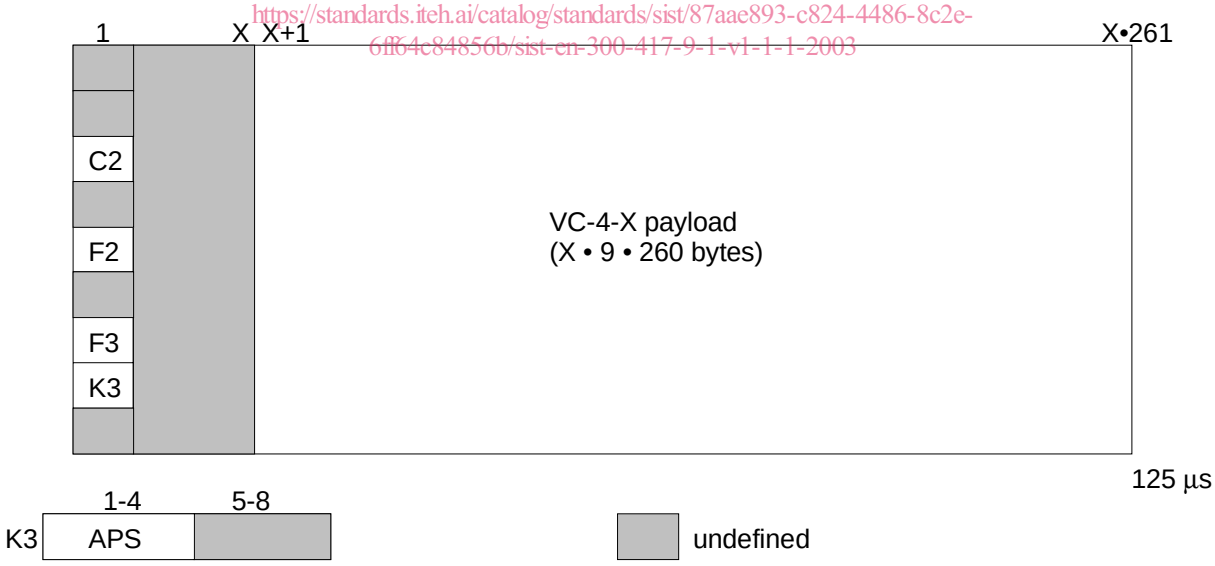

Figure 3: S4-X_AI_D

The VC-4-X AI (S4-x_AI_D) at this point is octet structured with a 125 µs frame. It represents adapted client layer information comprising X • 2 340 bytes of client layer information, the signal label byte C2, and the 2 path user channel bytes F2/3 as defined in EN 300 147 [5]. For the case the signal has passed the trail protection sublayer, S4_AI has defined APS bits (1 to 4) in byte K3.

NOTE 1: The APS signal has not been defined; a multiframed APS signal might be required.

NOTE 2: Bits 1 to 4 of byte K3 will be undefined when the signal S4-X_AI has not been processed in a trail protection connection function S4-XP_C.

NOTE 3: Bytes F2 and F3 will be undefined when the adaptation functions sourcing these bytes are not present in the network element.

A VC-4-X comprises one of the following payloads:

- an ATM X • 149 760 kbit/s cell stream signal;
- a PPP X • 149 760 kbit/s cell stream signal;
- a Test Signal Structure (TSS1).

5.2.2 VC-4-X layer connection point

A VC-4 concatenated trail can be transported via contiguous concatenated VC-4 (VC-4-Xc) or virtual concatenated VC-4 (VC-4-Xv) connections.

If the concatenated VC-4-X trail is supported by a contiguous concatenated VC-4-Xc connection, the only allowed values for X are 4 and 16. If the concatenated VC-4-X trail is supported by a virtual concatenated VC-4-Xv connection all values for X ≥ 1 are allowed.

5.2.3 VC-4-Xc layer connection point

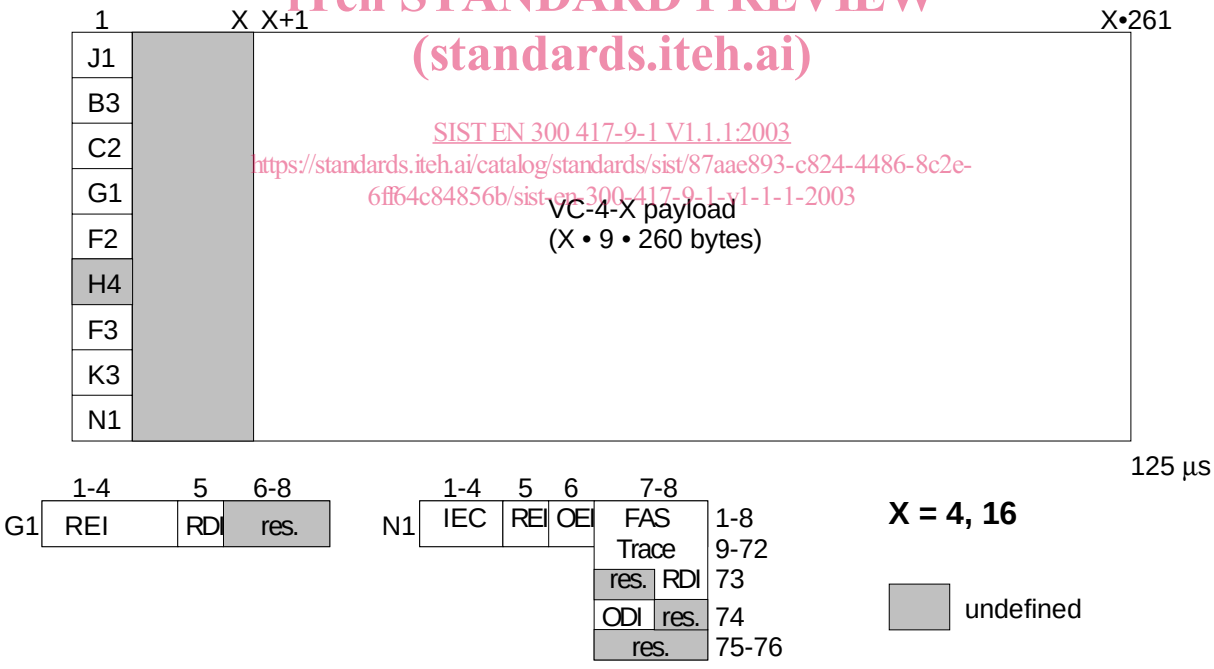

Figure 4: S4-Xc_CI_D

The CI of a VC-4-Xc (S4-Xc_CI_D) signal is octet structured with a 125 µs frame. Its format is characterized as S4-X_AI plus the VC-4 trail termination overhead in the J1, B3, and G1 locations as defined in EN 300 147 [5]

NOTE: H4 is not used in VC-4-Xc

5.2.4 VC-4-Xv layer connection point

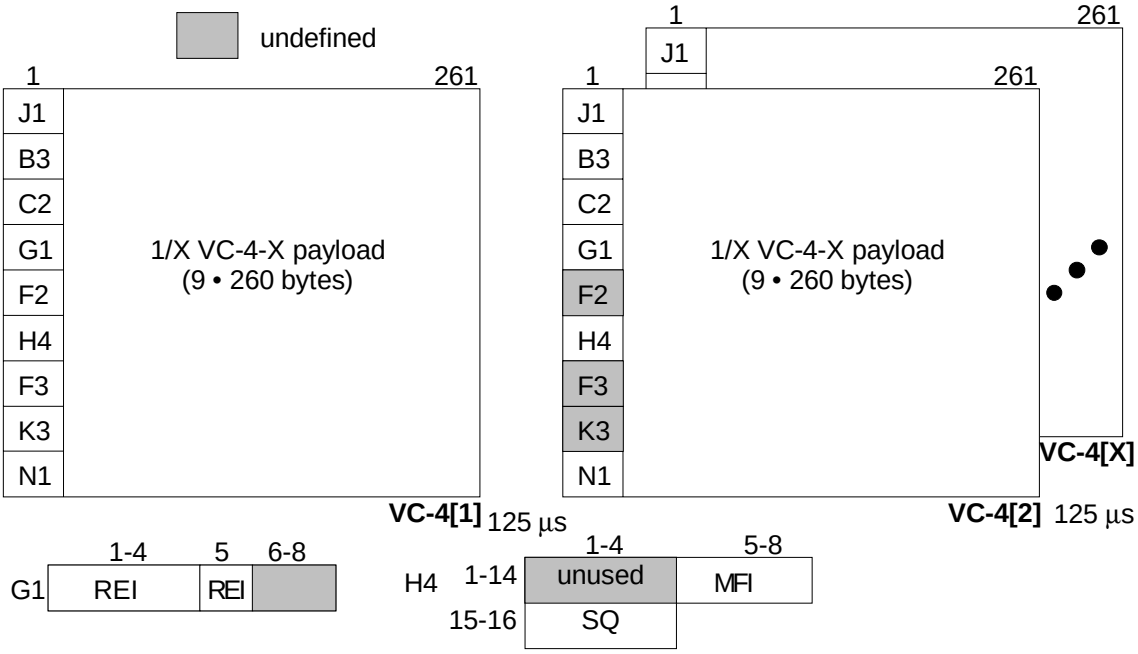

Figure 5: S4-Xv_CI_D

The CI of a VC-4-Xv (S4-Xv_CI_D) consists of X times S4_CI as defined in EN 300 417-1-1 [1]. The H4 byte is generated as defined in EN 300 147 [5].

The mapping of S4-X_AI to S4-Xv_CI is performed as shown in figure 6.

NOTE: F2, F3 and K3 of VC-4[2...X] are undefined.