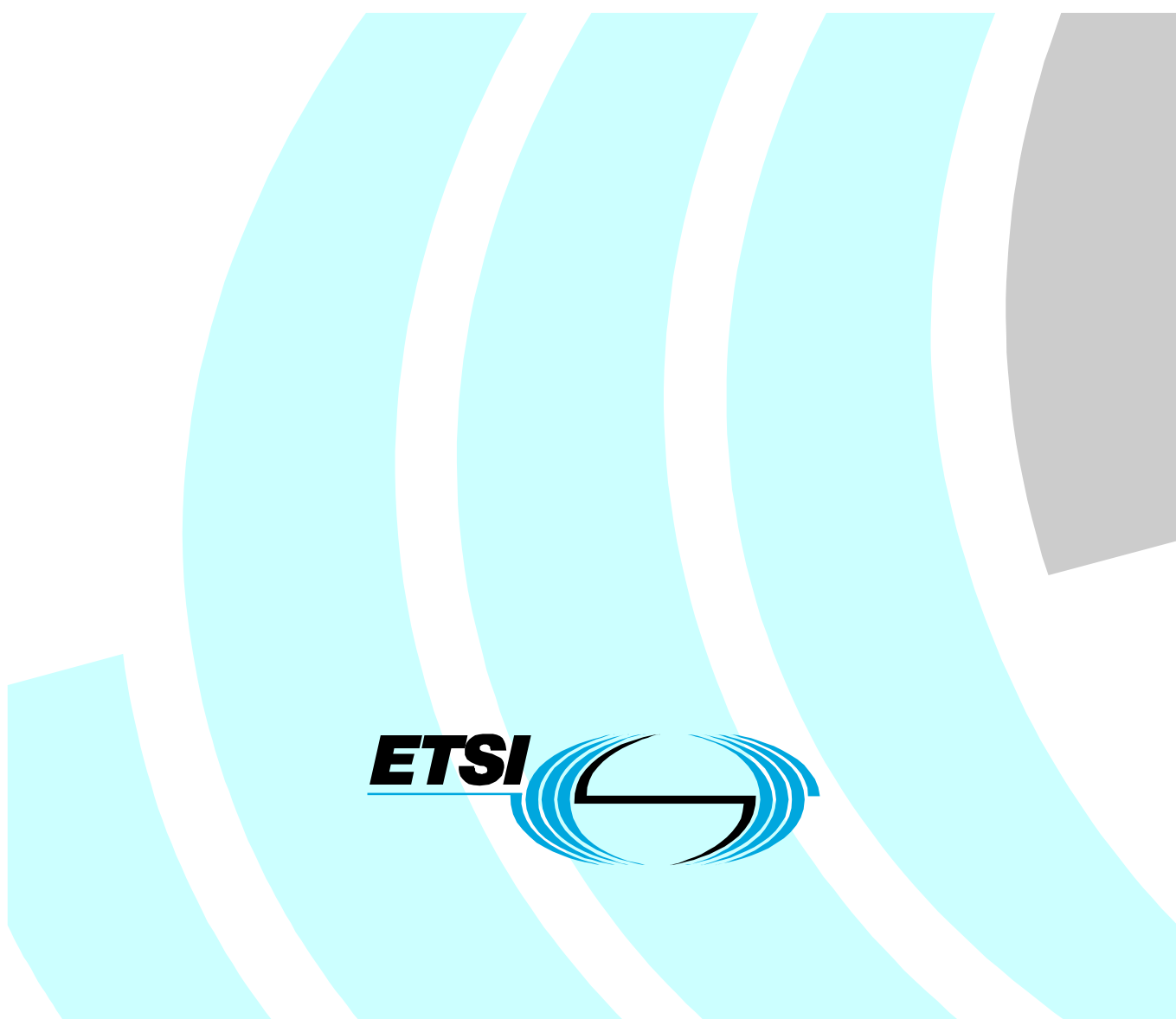


**Dynamic synchronous Transfer Mode (DTM);
Part 9: Mapping of ATM over DTM**



Reference

DES/TISPAN-02002-DTM

Keywords

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Contents

| | |
|---|----|
| Intellectual Property Rights | 4 |
| Foreword..... | 4 |
| Introduction | 5 |
| 1 Scope | 6 |
| 2 References | 6 |
| 3 Abbreviations | 7 |
| 4 Overview | 8 |
| 5 DTM ATM Transport Application Layer (AP0)..... | 8 |
| 5.1 Access point information..... | 8 |
| 5.1.1 Characteristic Information | 8 |
| 5.1.2 Adapted Information | 8 |
| 5.1.3 Management Information | 9 |
| 5.1.4 Timing Information..... | 9 |
| 5.2 Connection function (AP0_C)..... | 9 |
| 5.3 Trail Termination functions (AP0e_TT) | 9 |
| 5.3.1 Application 0 empty Trail Termination (AP0e_TT)..... | 9 |
| 5.3.1.1 Application 0 empty Termination Source function (AP0e_TT_So)..... | 9 |
| 5.3.1.2 Application 0 empty Trail Termination Sink function (AP0e_TT_Sk)..... | 10 |
| 5.4 Adaptation functions | 11 |
| 5.4.1 Application 0 to ATM virtual path Adaptation function (AP0/Avp_A) | 11 |
| 5.4.1.1 Application 0 to ATM virtual path Adaptation Source function (AP0/Avp_A_So) | 11 |
| 5.4.1.2 Application 0 to ATM virtual path Adaptation Sink function (AP0/Avp_A_Sk)..... | 15 |
| 6 Mapping of ATM virtual paths over DTM..... | 18 |
| History | 19 |

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Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN), and is now submitted for the ETSI standards Membership Approval Procedure.

The present document is part 9 of a multi-part deliverable covering the Dynamic synchronous Transfer Mode (DTM), as identified below:

- ES 201 803-1: "System description";
- ES 201 803-2: "System characteristics";
- ES 201 803-3: "Physical protocol";
- ES 201 803-4: "Mapping of DTM frames into SDH containers";
- ES 201 803-5: "Mapping of PDH over DTM";
- ES 201 803-6: "Mapping of Synchronous Digital Hierarchy (SDH) over DTM";
- ES 201 803-7: "Ethernet over DTM Mapping";
- ES 201 803-9: "Mapping of ATM over DTM";**
- TR 101 803-10: "Routeing and switching of IP traffic over DTM";
- ES 201 803-11: "Mapping of video streams over DTM";
- ES 201 803-12: "Mapping of MPLS over DTM";
- ES 201 803-13: "System description of sub-rate DTM".

Introduction

Dynamic synchronous Transfer Mode (DTM) is a time division multiplex and a circuit-switched network technique that combines switching and transport.

Part 1 describes the general properties of DTM and the DTM service over a unidirectional data channel. The overall system architecture is described and fundamental functions are identified.

Part 2 includes system aspects that are mandatory or optional for nodes from different vendors to interoperate. The interworking granularity should be at node level, such that nodes from different vendors can interoperate with regard to well-defined functions.

Part 3 specifies the physical layer for physical links based on 8B10B encoding.

Part 4 describes how DTM frames are mapped onto SDH containers.

The transport of various tributary signals is specified for PDH (part 5), SDH (part 6), Ethernet (part 7), ATM (part 9), IP (part 10), video streaming (part 11) and MPLS (part 12).

Subrate DTM is described in part 13.

1 Scope

The present document:

- specifies a method for mapping ATM virtual path over DTM channels;
- specifies the characteristics of critical parameters for mapping ATM virtual path over DTM channels;
- gives terms and definitions for mapping encoding and decoding.

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.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

- [1] ETSI EN 301 163-1-1: "Transmission and Multiplexing (TM); Generic requirements of Asynchronous Transfer Mode (ATM) transport functionality within equipment; Part 1-1: Functional characteristics and equipment performance".
- [2] 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] ETSI EN 300 301-1: "Broadband Integrated Services Digital Network (B-ISDN); Traffic control and congestion control in B-ISDN; Conformance definitions for Available Bit Rate (ABR) and ATM Blocked Transfer (ABT) [ITU-T Recommendation I.371.1 (1997)]".
- [4] ETSI ES 201 803-1: "Dynamic synchronous Transfer Mode (DTM); Part 1: System description".
- [5] ETSI ES 201 803-2-3: "Dynamic synchronous Transfer Mode (DTM); Part 2: System characteristics; Sub-part 3: Transport network and channel adaptation aspects".
- [6] ETSI ETS 300 298-1: "Broadband Integrated Services Digital Network (B-ISDN); Asynchronous Transfer Mode (ATM); Part 1: B-ISDN ATM functional characteristics [ITU-T Recommendation I.150 (1995)]".
- [7] ETSI ETS 300 298-2: "Broadband Integrated Services Digital Network (B-ISDN); Asynchronous Transfer Mode (ATM); Part 2: B-ISDN ATM layer specification [ITU-T Recommendation I.361 (1995)]".
- [8] ETSI ETS 300 300: "Broadband Integrated Services Digital Network (B-ISDN); Synchronous Digital Hierarchy (SDH) based user network access; Physical layer User Network Interfaces (UNI) for 155 520 kbit/s and 622 080 kbit/s Asynchronous Transfer Mode (ATM) B-ISDN applications".
- [9] ETSI ETS 300 354: "Broadband Integrated Services Digital Network (B-ISDN); B-ISDN Protocol Reference Model (PRM)".
- [10] ETSI ETS 300 404: "Broadband Integrated Services Digital Network (B-ISDN); B-ISDN Operation And Maintenance (OAM) principles and functions".
- [11] ITU-T Recommendation I.150: "B-ISDN asynchronous transfer mode functional characteristics".

- [12] ITU-T Recommendation I.321: "B-ISDN protocol reference model and its application".
- [13] ITU-T Recommendation I.361: "B-ISDN ATM layer specification".
- [14] ITU-T Recommendation I.371: "Traffic control and congestion control in B-ISDN".
- [15] ITU-T Recommendation I.432.1: "B-ISDN user-network interface - Physical layer specification: General characteristics".
- [16] ITU-T Recommendation I.610: "B-ISDN operation and maintenance principles and functions".

3 Abbreviations

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

| | |
|-------|---|
| A | Adapted function |
| aAIS | Alarm Indication Signal action |
| aCNGI | CoNGestion Indication action |
| ACS | ATM Cell Start |
| AI | Adapted Information |
| AIS | Alarm Indication Signal |
| AP | Access Point |
| AP0 | Application layer channel adaptation type 0 |
| ATM | Asynchronous Transfer Mode |
| aSSF | Server Signal Fail action |
| Avp | ATM virtual path |
| C | Connection function |
| CI | Characteristic Information |
| CK | ClocK |
| cLCD | Loss of Cell Delineation failure cause |
| CLP | Cell Loss Priority |
| CNGI | CoNGestion Indication |
| CP | Connection Point |
| D | Data |
| DCAP | DTM Channel Adaptation Protocol |
| DFLOC | Defect Field LOCation |
| dLCD | Loss of Cell Delineation defect |
| DTM | Dynamic synchronous Transfer Mode |
| EFCI | Explicit Forward Congestion Indicator |
| FS | Frame Start signal |
| GFC | Generic Flow Control |
| HEC | Header Error Check |
| II | Idle Insertion |
| LSB | Least Significant Bit |
| MI | Management Information |
| MP | Management Point |
| MSB | Most Significant Bit |
| NE | Network Element |
| NNI | Network Node Identifier |
| OAM | Operation, Administration and Maintenance |
| OCD | Out of Cell Delineation |
| PDH | Plesiochronous Digital Hierachy |
| PRM | Protocol Reference Model |
| PS | Performance Supervision |
| PSI | Performance Supervision Indication |
| PTI | Payload Type Identifier |
| SDH | Synchronous Digital Hierarchy |
| sII | Idle Insertion signal |
| Sk | Sink |
| So | Source |
| SSF | Server Signal Fail |

| | |
|--------|--------------------------------------|
| TI | Timing Information |
| TP | Timing Point |
| TSF | Trail Signal Fail |
| TT | Trail Termination |
| UNI | User Network Interface |
| VCI | Virtual Channel Identifier |
| VP | Virtual Path |
| VP-AIS | Virtual Path Alarm Indication Signal |
| VPI | Virtual Path Identifier |

4 Overview

The ATM virtual path (Avp) over DTM mapping describes the mapping of ATM cells over DTM channels. The functionality is part of the DTM Application layer and provides a transport service to the ATM virtual path layer similar to the transport path definitions in EN 301 163-2-1 [2]. The mapping has been modelled to fit into the formal modelling of EN 301 163-1-1 [1] and EN 301 163-2-1 [2] and providing a service similar to the S4/Avp EN 301 163-2-1 [2] transport path, but with the arbitrary capacity of a DTM channel ES 201 803-1 [4].

The ATM over DTM mapping enables the service where an ATM network connection can be established over a DTM network either as a transported bit-pipe, overlay network or hybrid thereof. Such a connection can be either bi-directional or uni-directional. Uni-directional connections may take advantage of the DTM multicast capability.

5 DTM ATM Transport Application Layer (AP0)

The ATM virtual path (Avp) over DTM transport is specified as the Application 0 (AP0) adaptation functions on top of the DCAP-0 ES 201 803-2-3 [5] adaptation functions, providing the Avp trail over DTM.

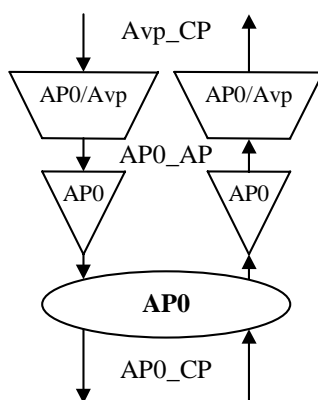


Figure 1: Application 0 atomic functions

5.1 Access point information

5.1.1 Characteristic Information

The Characteristic Information (CI) of the Connection Point (CP) is described in EN 301 163-2-1 [2].

5.1.2 Adapted Information

The Adapted Information (AI) of the Adaption Point (AP) is described in ES 201 803-2-3 [5] as the Application 0 Characteristic Information.

5.1.3 Management Information

The Management Information (MI) of the Management Point (MP) is described in EN 301 163-2-1 [2] as the S3/Avp management information.

5.1.4 Timing Information

The Timing Information (TI) of the Timing Point (TP) is:

- the Application 0 data clock timing indication AP0_TI_CK;
- and the Application 0 frame start timing indication AP0_TI_FS.

5.2 Connection function (AP0_C)

Not applicable. There are no connection functions defined for this layer.

5.3 Trail Termination functions (AP0e_TT)

The trail termination functions are empty mappings between AI and CI.

5.3.1 Application 0 empty Trail Termination (AP0e_TT)

5.3.1.1 Application 0 empty Termination Source function (AP0e_TT_So)

Symbol:



Figure 2: Application 0 empty Trail Termination Source (AP0e_TT_So)

Interfaces:

Table 1: AP0e_TT_So Input and output signals

| Input(s) | Output(s) |
|------------|------------|
| AP0_AI_D | AP0_CI_D |
| AP0_AI_CK | AP0_CI_CK |
| AP0_AI_II | AP0_CI_II |
| AP0_AI_PSI | AP0_CI_PSI |
| AP0_AI_TSF | AP0_CI_SSF |

Processes and anomalies:

None.

Defects:

None.

Consequent actions:

None.

Defect correlation:

None.

Performance monitoring:

None.

Output mapping:

AP0_CI_D ← AP0_AI_D.

AP0_CI_CK ← AP0_AI_CK.

AP0_CI_II ← AP0_AI_II.

AP0_CI_PSI ← AP0_AI_PSI.

AP0_CI_SSF ← AP0_AI_TSF.

Fault management:

None.

Long term performance monitoring:

None.

5.3.1.2 Application 0 empty Trail Termination Sink function (AP0e_TT_Sk)**Symbol:****Figure 3: Application 0 empty Trail Termination Sink (AP0e_TT_Sk)****Interfaces:****Table 2: AP0e_TT_Sk Input and output signals**

| Input(s) | Output(s) |
|------------|------------|
| AP0_CI_D | AP0_AI_D |
| AP0_CI_CK | AP0_AI_CK |
| AP0_CI_II | AP0_AI_II |
| AP0_CI_PSI | AP0_AI_PSI |
| AP0_CI_SSF | AP0_AI_TSF |

Processes and anomalies:

None.

Defects:

None.

Consequent actions:

None.

Defect correlation:

None.

Performance monitoring:

None.

Output mapping:

AP0_AI_D ← AP0_CI_D.

AP0_AI_CK ← AP0_CI_CK.

AP0_AI_II ← AP0_CI_II.

AP0_AI_PSI ← AP0_CI_PSI.

AP0_AI_TSF ← AP0_CI_SSF.

Fault management:

None.

Long term performance monitoring:

None.

5.4 Adaptation functions

5.4.1 Application 0 to ATM virtual path Adaptation function (AP0/Avp_A)

This clause describes the ATM virtual path adaptation using Application 0 empty trail terminators.

5.4.1.1 Application 0 to ATM virtual path Adaptation Source function (AP0/Avp_A_So)

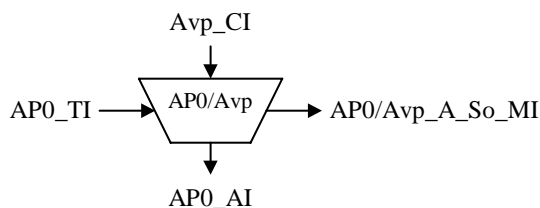
Symbol:

Figure 4: Application 0 to ATM virtual path Adaptation Source (AP0/Avp_A_So)

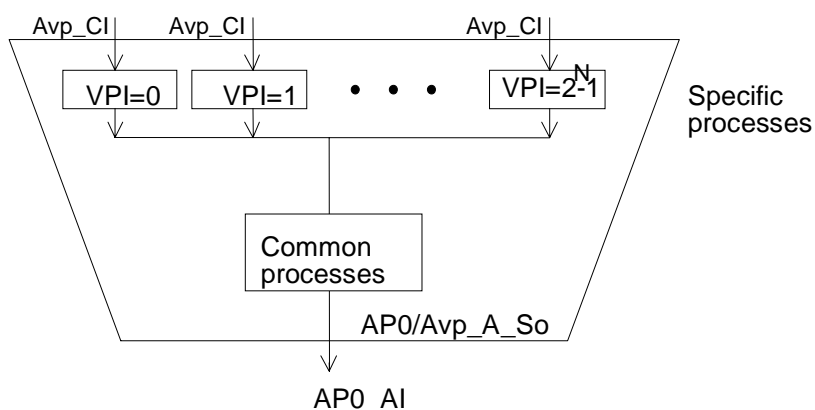
Interfaces:**Table 3: AP0/Avp_A_So Input and output signals**

| Input(s) | Output(s) |
|------------------------------------|------------|
| Per Avp_CI for each VP configured: | AP0_AI_D |
| Avp_CI_D | AP0_AI_CK |
| Avp_CI_ACS | AP0_AI_II |
| Avp_CI_SSF | AP0_AI_PSI |
| AP0_TI_CK | AP0_AI_TSF |
| AP0_TI_FS | |
| AP0/Avp_A_So_MI_Active | |
| AP0/Avp_A_So_MI_CellDiscardActive | |
| AP0/Avp_A_So_MI_TPusgActive | |
| AP0/Avp_A_So_MI_GFCActive | |
| AP0/Avp_A_So_MI_VPI-KActive | |

Processes and anomalies:

The AP0/Avp_A_So function provides adaptation from the ATM Virtual Path layer to the DTM Application 0. This is performed by a grouping of Specific Processes and Common Processes as shown in figure 5.

Activation: The function shall access the access point when it is activated (MI_Active is true). Otherwise, it shall not access the access point.

**Figure 5: AP0/Avp_A_So atomic function decomposed into Specific and Common processes parts**

NOTE 1: The sequential order of the processes within the atomic functions is important. For the correct order, refer to the ordering of the processes given below.

Specific Processes:

These Processes include VPI setting as well as VP asynchronous multiplexing. Each of these Specific Processes is characterized by the Virtual Path Identifier number K , where $0 \leq K \leq 2^N - 1$.

VPI-K Activation: The Specific Processes perform the operation specified below when it is activated (MI_VPI-KActive is true).

The format of the Characteristic Information (Avp_CI) is given in figure 6.

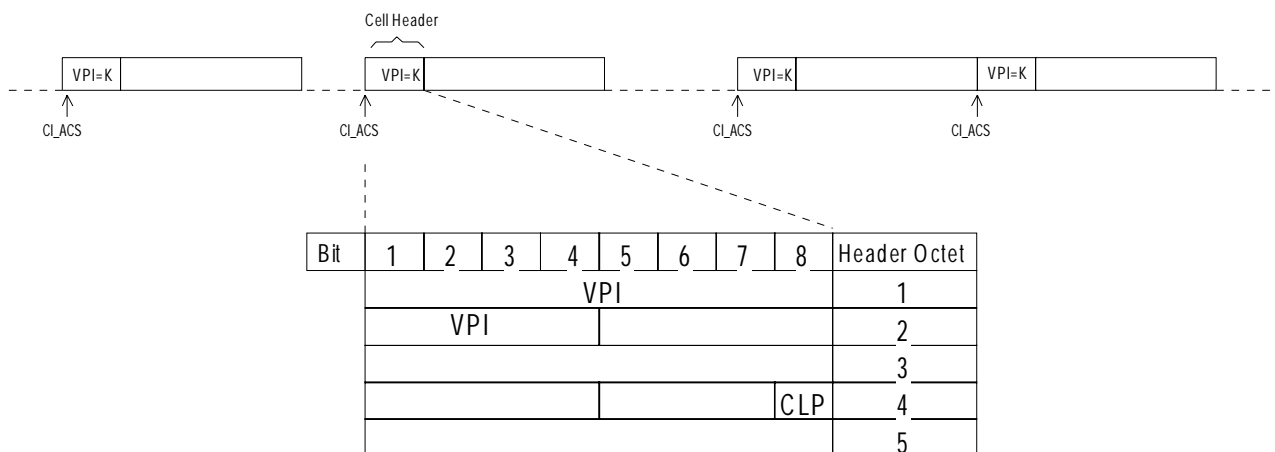


Figure 6: Avp_CI (NNI format)

VPI setting is based on the activation of the Specific function by MI_VPI-KActive and inserts the value of "K" as VPI.

NOTE 2: The value of N represents the number of bits in the VPI field and is an integer number. Its maximum value is equal to 12 for the ATM NNI. Its maximum value is equal to 8 for the ATM UNI.

VP multiplexing: Asynchronous multiplexing is performed for each active Specific function.

Common Processes:

The Common Processes include: Congestion control (selective cell discard (CLP based)), GFC processing, TP usage measurement, cell rate decoupling, HEC processing, cell information field scrambling and cell stream mapping into the Application 0 dataslots. The logical ordering of the processes from input to output shall be maintained.

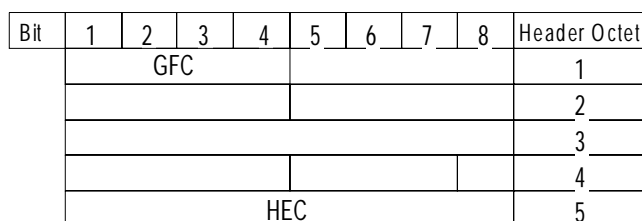


Figure 7: Cell header information processed in AP0/Avp_A_So

Congestion control: If enabled by MI_CellDiscardActive, this function shall perform selective cell discard according to CLP value. In the event of congestion, cells with CLP = 1 are subject to be discarded prior to cells with CLP = 0. See EN 300 301-1 [3] (ITU-T Recommendation I.371 [14]) for further details about the use of the CLP. In the event of congestion, the EFCI marking in the PTI field is set according to ETS 300 298-2 [7] (ITU-T Recommendation I.361 [13]).

GFC processing: The support of the GFC protocol applies to the UNI and in point-to-point configuration only and is an option. The GFC function uses assigned and unassigned cells. Two modes of operation are available: Uncontrolled Transmission (MI_GFCActive = false) and Controlled Transmission (MI_GFCActive = true). If enabled by MI_GFCActive = true, this function shall insert the GFC protocol in the GFC field. The GFC field processing is defined in ETS 300 298-1 [6] (ITU-T Recommendation I.150 [11]) and ETS 300 298-2 [7] (ITU-T Recommendation I.361 [13]). If the GFC function is not supported or the GFC function disabled by MI_GFCActive = false, the binary contents of the GFC field shall be set to "0000". In Uncontrolled Transmission mode, neither the controlling nor the controlled NE performs the GFC procedure.

NOTE 3: The application of the GFC function in the ETSI environment is for further study.

TP usage measurement: The function shall count the transmitted cells for cell measurement purposes. This cell counting shall be activated/deactivated by MI_TPUsActive.

Cell rate decoupling: This process takes the ATM cell stream present at its input and inserts it into the Application 0 data slot adding Idle special markers inbetween cells. The idle cells format is specified in ETS 300 298-2 [7]. The cell rate decoupling process makes use of the AP0 timing clock, frame position (AP0_TI), and idle special marker indication signal (AP0_AI_II). After every 128 cells a Performance Supervision (PS) special marker is inserted directly after the last cell by activating the Application 0 Performance Supervision Indication (AP0_AI_PSI) signal. When an Idle special marker is to be sent, then the Idle Indication signals (sII) is asserted, else it is de-asserted. When a Performance Supervision special marker is to be sent, then the Performance Supervision Indication signal (sPSI) is asserted, else it is de-asserted.

HEC Processing: The HEC value for each cell is calculated and inserted into the HEC field. The method of HEC value calculation shall be according to ETS 300 300 [8] (ITU-T Recommendation I.432.1 [15]).

Cell information field scrambling: The self synchronizing scrambler polynomial $x^{43} + 1$ has been identified for the SDH-based transmission paths and minimizes the error multiplication introduced by the self synchronizing scrambling process. It scrambles the information field bits only. The operation of the scrambler shall be according to ETS 300 300 [8], clause 10.5.3 (ITU-T Recommendation I.432.1 [15], clause 4.3.4).

NOTE 4: Technically the scrambling of ATM cell content has two uses, to protect the short SDH scrambler and for cell delineation algorithm support. For DTM mapping only the cell delineation is the only reason since DTM is datasafe otherwise.

Cell stream mapping: The octet structure of ATM cells shall be aligned with the octet structure of the Application 0 data slots and mapped into the AI_D octet stream as detailed in clause 6.

The Trail Signal Fail (AI_TSF) signal is de-asserted.

Defects:

None.

Consequent actions:

None.

Defect correlation:

None.

Performance monitoring:

The use of the Performance Monitoring parameters is for further study. The parameters for the following functions need to be defined:

- TP usage measurement;
- Count of discarded cells from congestion control.

Output mapping:

AP0_AI_D ← AI_D.

AP0_AI_CK ← TI_CK.

AP0_AI_II ← sII.

AP0_AI_PSI ← sPSI.

AP0_AI_TSF ← AI_TSF.

Fault management:

None.

Long term performance monitoring:

None.

5.4.1.2 Application 0 to ATM virtual path Adaptation Sink function (AP0/Avp_A_Sk)

Symbol:

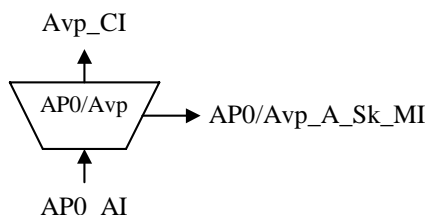


Figure 8: Application 0 to ATM virtual path Adaptation Sink (AP0/Avp_A_Sk)

Interfaces:

Table 4: AP0/Avp_A_Sk Input and output signals

| Input(s) | Output(s) |
|-----------------------------------|-------------------------------------|
| AP0_AI_D | per Avp_CI, for each VP configured: |
| AP0_AI_CK | Avp_CI_D |
| AP0_AI_II | Avp_CI_ACS |
| AP0_AI_PSI | Avp_CI_SSF |
| AP0_AI_TSF | Avp_CI_CNGI |
| AP0/Avp_A_Sk_MI_Active | AP0/Avp_A_Sk_MI_cLCD |
| AP0/Avp_A_Sk_MI_CellDiscardActive | |
| AP0/Avp_A_Sk_MI_TPushActive | |
| AP0/Avp_A_Sk_MI_VPIrange | |
| AP0/Avp_A_Sk_MI_HECActive | |
| AP0/Avp_A_Sk_MI_GFCActive | |
| AP0/Avp_A_Sk_MI_DFLOC | |
| AP0/Avp_A_Sk_MI_VPI-KActive | |

Processes and anomalies:

The AP0/Avp_A_Sk function provides adaptation from the DTM Application 0 to the ATM Virtual Path. This is performed by a grouping of Specific Processes and Common Processes as shown in figure 9.

Activation: The AP0/Avp_A_Sk function shall perform the Common and Specific Processes operation specified below when it is activated (MI_Active is true). Otherwise, it shall activate the SSF signals at its output (CI_SSF) and not report its status via the management point.

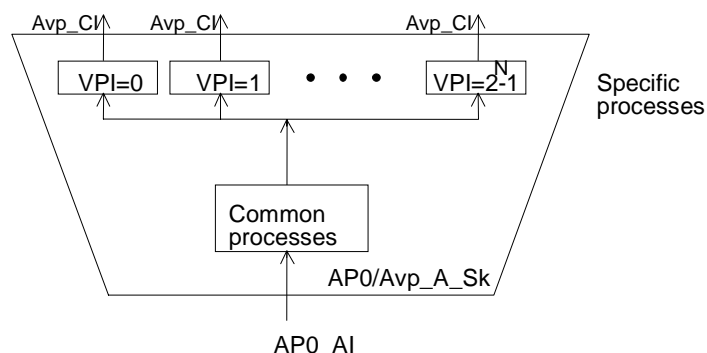


Figure 9: AP0/Avp_A_Sk atomic function decomposed into Specific and Common Processes parts

NOTE 1: The sequential order of the processes within the atomic functions is important. For the correct order, refer to the ordering of the processes given below.

Common Processes:

These Common Processes include: Demapping, cell delineation, cell information field descrambling, HEC processing, cell rate decoupling, TP usage measurement, header verification, GFC processing, VPI verification and congestion control (selective cell discard (CLP based)). The logical ordering of these processes from input to output shall be maintained.

Demapping: The cell stream shall be extracted from the Application 0 data slot stream in the AP0_AI_D in accordance with clause 6.

Cell Delineation: dLCD shall be declared if an incorrect HEC is obtained ALPHA times consecutively. dLCD shall be cleared if the cell delineation algorithm enters SYNC state. (According to clause 10.5.1.1, item 3 of ETS 300 300 [8], (clause 4.3.2.2 of ITU-T Recommendation I.432.1 [15])).

Cell information field descrambling: The self synchronizing descrambler polynomial $x^{43} + 1$ has been identified for the SDH-based transmission paths and minimizes the error multiplication introduced by the self synchronizing scrambling process (factor 2). It descrambles the information field bits only. The operation of the descrambler in relation to the HEC cell delineation state diagram shall be according to ETS 300 300 [8], clause 10.5.3 (ITU-T Recommendation I.432.1 [15], clause 4.3.4).

HEC Processing: HEC verification and correction shall be according to ETS 300 300 [8] (ITU-T Recommendation I.432.1 [15]). Cells determined to have an invalid and incorrigible HEC pattern shall be discarded. A count of invalid HEC events and a count of invalid HEC cell discard events are maintained with threshold crossings checked. HEC correction mode may be activated/deactivated by MI_HECActive. The HEC correction mode should be activated by default.

Cell rate decoupling: The function shall extract the Idle special markers used as fixed stuff in the far-end AP0/Avp adaptation source function.

TP usage measurement: The function shall count the received cells for cell measurement purposes. This cell counting shall be activated/deactivated by MI_TPusgActive.

Header verification: Invalid header patterns from paths based on SDH/PDH transmission systems are as follows (except idle cell)(x = any value):

| | | | | | |
|-----|---------|---------|---------|-----|-----|
| | GFC | VPI | VCI | PTI | CLP |
| UNI | xxxx | all 0's | all 0's | xxx | 1 |
| | VPI | VCI | PTI | CLP | |
| NNI | all 0's | all 0's | xxx | 1 | |

GFC processing: The support of the GFC protocol applies to the UNI and in point-to-point configuration only and is an option. The GFC function uses assigned and unassigned cells. Two modes of operation are available: Uncontrolled Transmission (MI_GFCActive = false) and Controlled Transmission (MI_GFCActive = true). In Uncontrolled Transmission mode, neither the controlling nor the controlled NE performs the GFC procedure. If enabled by MI_GFCActive = true, this function shall extract the GFC protocol from the GFC field. The GFC field processing is defined in ETS 300 298-1 [6] (ITU-T Recommendation I.150 [11]) and ETS 300 298-2 [7] (ITU-T Recommendation I.361 [13]).

NOTE 2: The application of the GFC function in the ETSI environment is for further study.

NOTE 3: According to the PRM (ETS 300 354 [9] (ITU-T Recommendation I.321 [12])), the unassigned cells should be processed in the ATM layer. Some of the ATM layer processes are adaptation processes belonging to the adaptation function between the TP and the Avp layer network. The unassigned cells as well as idle cells are per physical connection (VPI = 0, VCI = 0). For this reason the idle and unassigned cells processing is allocated to the same atomic function.

VPI verification: The function shall verify that the received cell VPI is valid. If the VPI is determined to be invalid (i.e. out-of-range VPI or not assigned), the cell shall be discarded. The range of valid VPI is given by MI_VPIrange.

Congestion control: If enabled by MI_CellDiscardActive, this function shall perform selective cell discard according to CLP value. In the event of congestion, cells with CLP = 1 are subject to be discarded prior to cells with CLP = 0. See EN 300 301-1 [3] (ITU-T Recommendation I.371 [14]) for further details about the use of the CLP. In the event of congestion, the indication Avp_CI_CNIGI is set for the traffic management function AvpT_TT_So to insert EFCI.

Specific Processes:

The function performs VP-AIS insertion and demultiplexing on a per VP basis.

VPI-K Activation: The Specific Processes perform the operation specified below when it is activated (MI_VPI-KActive is true). Otherwise, it shall send no cells and Server Signal Fail (SSF) = false.

VP-AIS insertion: If the Specific Processes are activated, the VP-AIS insertion shall be performed as in the Consequent Actions clause.

VP demultiplexing: The adaptation sink function has access to a specific Avp identified by the number K ($0 \leq K \leq 2 - 1$). When the function is activated only the cells of that specific Avp-K are passed in client direction.

NOTE 4: The value of N represents the number of bits in the VPI field and is an integer number. Its maximum value is equal to 12 for the ATM NNI. Its maximum value is equal to 8 for the ATM UNI.

The demapped data of a particular VPI shall be mapped into the octet stream of CI_D.

The demapped ATM cell frame start of a particular VPI shall be indicated by asserting the ATM Cell Start (CI_ACS), else it is de-asserted.

Defects:

The function shall detect the dLCD defect according to ETS 300 300 [8] (ITU-T Recommendation I.432.1 [15]).

Consequent actions:

aCNGI ← "Event of Congestion" and CellDiscardActive.

aSSF ← dLCD or AI_TSF.

aAIS ← dLCD or AI_TSF.

On declaration of aAIS the function shall output VP-AIS OAM cells on all active VPCs according to ETS 300 404 [10] (ITU-T Recommendation I.610 [16], clause 9.2.1.1.1.1); on clearing of aAIS the generation of VP-AIS cells shall be stopped. If implemented, the defect type and defect location field (provided by MI_DFLOC) of the VP-AIS cell shall be inserted in the information field. The contents of these fields are for further study.

Defect correlation:

cLCD ← dLCD and (not AI_TSF).

Performance monitoring:

The use of the Performance Monitoring parameters is for further study. The parameters for the following functions need to be defined:

- TP usage measurement;
- Count of discarded cells from congestion control;
- Count of invalid HEC events;
- Count of invalid HEC discard events;
- Count of invalid header discard events (one common counter for invalid header/invalid VPI/invalid VCI is maintained);
- OCD event.

Output mapping:

$Avp_CI_D \leftarrow CI_D.$

$Acp_CI_ACS \leftarrow CI_ACS.$

$Avp_CI_SSF \leftarrow aSSF.$

$Avp_CI_CGNI \leftarrow aCGNI.$

$AP0/Avp_A_Sk_MI_cLCD \leftarrow cLCD.$

Fault management:

None.

Long term performance monitoring:

None.

6 Mapping of ATM virtual paths over DTM

The mapping of ATM cells into a DTM Application 0 format requires the mapping into data slots (AP0_AI_D), idle special marker indication (AP0_AI_II) and performance supervision indication (AP0_AI_PSI).

The traditional stuffing with idle cells is replaced with the frequency justification mechanism of idle special markers. Idle special markers are only to be inserted inbetween cells, such that all data slots of a cell are in sequence without intermediate idle special markers. In order to provide for performance supervision a performance supervision special marker will be inserted directly after the last data slot word of every 128th cell.

The cell is mapped into 7 data slot words, where the header is mapped into the first and the cell payload is mapped into the following 6 data slot words. The cell header octets are mapped into the data slot word as given in table 5. Bit 23 to 0 of the data slot is reserved, always set to 0 and is never to be monitored for state.

Table 5: Cell octet to data slot bit mapping

| Octet | MSB | LSB |
|-------|-----|-----|
| 1 | 63 | 56 |
| 2 | 55 | 48 |
| 3 | 47 | 40 |
| 4 | 39 | 32 |
| 5 | 31 | 24 |

The cell payload is mapped into the data slots such that the first octet is mapped into bit 63 to 56 with bit 63 as MSB, and the following octets in the same fashion for bit ranges 55 to 48, 47 to 40, 39 to 32, 31 to 24, 23 to 16, 15 to 8 and 7 to 0. When the first 8 octets of the cell payload have been mapped, the next 8 octets are mapped into the following data slot word according to the same mapping scheme. When all 48 octets of the payload have been mapped according to this scheme, they are to be transmitted in the mapped order after the data slot word containing the header. All 7 data slot words is to be transmitted in one consecutive sequence without inserted idle or performance supervision special markers.

History

| Document history | | |
|-------------------------|--------------|--|
| V1.1.1 | October 2004 | Membership Approval Procedure MV 20041224: 2004-10-26 to 2004-12-24 |
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