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**Broadband Integrated Services Digital Network (B-ISDN);  
Broadband Virtual Path Service (BVPS);  
Part 2: BVPS for Reserved communications (BVPS-R)**

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## Foreword

This European Telecommunication Standard (ETS) has been produced by the Network Aspects (NA) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS defines stage one of the Broadband Virtual Path Service (BVPS) for a Broadband Integrated Services Digital Network (B-ISDN), as provided by European public telecommunication operators.

This ETS consists of 2 parts as follows:

Part 1: "BVPS for Permanent communications (BVPS-P)".

**Part 2: "BVPS for Reserved communications (BVPS-R)".**

Transposition dates	
Date of adoption of this ETS:	31 August 1995
Date of latest announcement of this ETS (doa):	30 November 1995
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## 1 Scope

This European Telecommunication Standard (ETS) defines the stage 1 of the Broadband Virtual Path Service for Reserved communications (BVPS-R) for a Broadband Integrated Services Digital Network (B-ISDN), as provided by European public telecommunication operators.

Part 1 of this ETS (ETS 300 455-1 [13]) defines the stage 1 of the Broadband Virtual Path Service for Permanent communications (BVPS-P) for a B-ISDN, as provided by European public telecommunication operators.

This ETS does not specify the additional requirements where the service is provided to the user via a telecommunication network that is not a B-ISDN, but it does include requirements for interworking of other networks with a B-ISDN.

This ETS is applicable to stage two and stage three standards for the BVPS-R. The terms "stage two" and "stage three" are also defined in CCITT Recommendation I.130 [4]. Where the text indicates the status of a requirement (i.e. as strict command or prohibition, as authorisation leaving freedom, or as a capability or possibility), this shall be reflected in the text of the relevant stage two and stage three standards.

Furthermore, conformance to this ETS is met by conforming to the stage three standards with the field of application appropriate to the equipment being implemented. Therefore, no method of testing is provided for this ETS.

Charging principles and management operations are outside the scope of this ETS.

The BVPS-R provides the transfer of unrestricted digital information between  $T_B$  or  $S_B/T_B$  reference points. It does not preclude the applicability of the BVPS-R to  $S_B$ .

The provision of the BVPS-R is based on the use of Asynchronous Transfer Mode (ATM) Virtual Path (VP) connections in a B-ISDN.

## 2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] CCITT Recommendation E.164 (1991): "Numbering plan for the ISDN era".
- [2] ITU-T Recommendation I.112 (1993): "Vocabulary of terms for ISDNs".
- [3] ITU-T Recommendation I.113 (1993): "Vocabulary of terms for broadband aspects of ISDN".
- [4] CCITT Recommendation I.130 (1988): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [5] ITU-T Recommendation I.140 (1993): "Attribute technique for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [6] ITU-T Recommendation I.150 (1993): "B-ISDN asynchronous transfer mode functional characteristics".
- [7] ITU-T Recommendation I.356 (1993): "B-ISDN ATM layer cell transfer performance".

- [8] ITU-T Recommendation I.361: "B-ISDN ATM layer specification".
- [9] ITU-T Recommendation I.371 (1993): "Traffic control and congestion control in B-ISDN".
- [10] ITU-T Recommendation M.3010 (1993): "Principles for a telecommunications management network".
- [11] ETS 300 299: "Broadband Integrated Services Digital Network (B-ISDN); Cell based user network access; Physical layer interfaces for B-ISDN applications".
- [12] ETS 300 300: "Broadband Integrated Services Digital Network (B-ISDN); Synchronous Digital Hierarchy (SDH) based user network access; Physical layer interfaces for B-ISDN applications".
- [13] ETS 300 455-1: "Broadband Integrated Services Digital Network (B-ISDN); Broadband Virtual Path Service (BVPS); Part 2: BVPS for Permanent communications (BVPS-P)".

### 3 Definitions, symbols and abbreviations

#### 3.1 Definitions

For the purposes of this ETS, the following definitions apply:

**Asynchronous Transfer Mode (ATM):** See ITU-T Recommendation I.113 [3], definition 204.

**broadband:** See ITU-T Recommendation I.113 [3], definition 101.

**Cell Delay Variation (CDV) tolerance:** The CDV tolerance  $\tau$  corresponds to the maximum anticipated time variation with respect to the Theoretical Arrival Time, see ITU-T Recommendation I.371 [9], subclause 2.4.1.1.

**Global Virtual Path Identifier (GVPI):** The GVPI identifies a specific Virtual Path (VP). It is used by the Service Management Entity (SME) for the management of the complete VP.

**initiating manager:** The manager issuing a request to the SME.

**Integrated Services Digital Network (ISDN):** See ITU-T Recommendation I.112 [2], definition 308.

**involved manager:** The manager receiving a request issued by another initiating manager.

**ISDN number:** A number conforming to the numbering plan and structure specified in CCITT Recommendation E.164 [1].

**manager:** The functional entity authorised to send through x reference point (as defined in ITU-T Recommendation M.3010 [10]) the VP registration requests, VP modification requests and interrogation requests, on behalf of the users to which it is related at the subscription time (see figure A.1).

**non-periodic VP:** A non-periodic VP is a VP whose values of PBR and Quality of Service (QoS) are constant for the reservation duration.

**Peak Cell Rate (PCR):** See ITU-T Recommendation I.371 [9], subclause 2.4.1.1. The PCR is expressed as an integer number of cells per second.

**Peak Emission Interval (PEI):** See ITU-T Recommendation I.371 [9], subclause 2.4.1.1.

**periodic VP:** A periodic VP is a VP whose same scheme of the values of PBR and QoS repeats within each period for the reservation duration.

**service, telecommunication service:** See ITU-T Recommendation I.112 [2], definition 201.



**Service Management Entity (SME):** The SME is the functional entity to which manager's VP registration requests, VP modification requests and interrogation requests are addressed (see figure A.1).

**subscriber:** The entity that subscribes to the BVPS-R.

**time slot:** The time interval between the activation and the following deactivation of a VP. The duration of an  $i^{\text{th}}$  time slot  $De_i$  is defined by  $De_i = De_{\text{min}} + M_i \times P$  where  $De_{\text{min}}$  is the minimum duration of the time slot,  $M_i$  is an integer and  $P$  is a fixed duration of time.  $De_{\text{min}}$  and  $P$  are service constants.

**user:** Each of the subscriber's functional entity that sends or receives ATM cells through  $T_B$  or  $S_B/T_B$  reference point (see figure A.1).

**Virtual Channel (VC):** See ITU-T Recommendation I.113 [3], definition 401.

**Virtual Channel Identifier (VCI):** A logical number that locally identifies a specific VC at the User-Network Interface (UNI).

**Virtual Path (VP):** From the user's point of view, a virtual end-to-end connection that ensures unidirectional or bi-directional transport of ATM cells belonging to VCs that are associated by a common VPI at each UNI.

**Virtual Path Identifier (VPI):** A logical number that locally identifies a specific VP at the UNI.

### 3.2 Symbols and abbreviations

For the purposes of this ETS, the following symbols and abbreviations apply:

ATM	Asynchronous Transfer Mode
B-ISDN	Broadband Integrated Services Digital Network
BVPS-P	Broadband Virtual Path Service for Permanent communications
BVPS-R	Broadband Virtual Path Service for Reserved communications
CBR	Constant Bit Rate
CDV	Cell Delay Variation
GVPI	Global Virtual Path Identifier
(N-)ISDN	(Narrowband) Integrated Services Digital Network
PCR	Peak Cell Rate
PEI	Peak Emission Interval
QoS	Quality of Service
SME	Service Management Entity
SP	Service Provider
UNI	User-Network Interface
VBR	Variable Bit Rate
VC	Virtual Channel
VCI	Virtual Channel Identifier
VP	Virtual Path
VPI	Virtual Path Identifier

## 4 Description

The BVPS-R permits communication in both directions between two users in a point-to-point configuration.

The provision of the BVPS-R is based on VP connections in a B-ISDN.

A communication is established in reserved mode (for non-periodic and periodic use).

In accordance with ITU-T Recommendation I.361 [8], there can be up to and including 256 VPs associated with the subscription to the BVPS-R.

The physical bit rate at the  $T_B$  or  $S_B/T_B$  reference points corresponds to the existing UNIs as defined within ETS 300 299 [11] and ETS 300 300 [12].

The parameter "PCR" is associated with each VP. The network shall allocate the appropriate resources using the PCR value. Statistical multiplexing cannot be used for the BVPS-R.

The subscriber can negotiate with the Service Provider (SP) any value of the maximum bandwidth that is available at the  $T_B$  or  $S_B/T_B$  reference points and agreed by the SP. Then, the manager can negotiate with the SME any available value of the PCR in the subscribed maximum bandwidth.

The SP shall enforce user cells according to the PCR reference algorithm specified in ITU-T Recommendation I.371 [9]. The cell conformance is defined with reference to the pair  $(T, \tau)$  where  $T$  is the PEI and  $\tau$  is the CDV tolerance. The SP shall provide the user the values of PEI and CDV tolerance that are part of the traffic contract.

User information transfer is unrestricted. It is structured in ATM Cells. The cell format is of the UNI type defined in ITU-T Recommendation I.361 [8], subclause 2.2. The bit rate of the source can be Constant Bit Rate (CBR) or Variable Bit Rate (VBR). The effective availability of the PCR (greater than zero) for a VP corresponds to a time slot. During a time slot as defined within this ETS, the user provides user information in blocks of 48 octets that shall be transparently transferred.

## 5 Procedures

### 5.1 Provision and withdrawal

The BVPS-R is provided after prior arrangement with the SP.

The BVPS-R shall be withdrawn by the SP upon request of the subscriber or SP reasons.

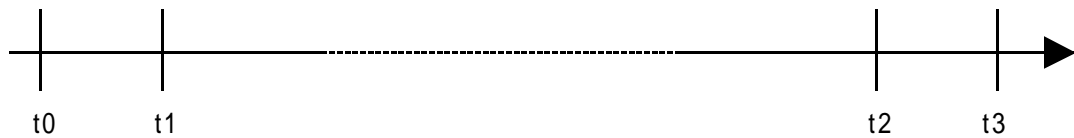
The subscriber shall identify one manager at most and one or more related users. The user has to communicate with the manager for the purpose of being controlled and of being monitored.

The BVPS-R permits the establishment of reserved communications between two UNIs.

It has to be noted that subscriptions of reserved and permanent (see ETS 300 455-1 [13]) establishments of communications can coexist on the same UNI.

The subscription states the maximum number  $Nb_{max}$  of VPs per UNI. According to ITU-T Recommendation I.361 [8], the number of VPs available at the UNI is less than or equal to 256. Hence,  $Nb_{max}$  is evaluated taking these constraints into account.

Provision and withdrawal procedures are based on schedule 1 (see figure 1). Provision of the BVPS-R corresponds to subscription phase and withdrawal of the BVPS-R corresponds to the end of the subscription.



- t0 : time at which the subscription to the BVPS-R is requested.  
t1 : time at which the BVPS-R is available.  
t2 : time at which the subscription to the BVPS-R is requested to be terminated.  
t3 : time at which the subscription to the BVPS-R is effectively terminated.

**Figure 1: Schedule 1**

The notification time  $T_a = t_1 - t_0$  is necessary greater than or equal to a minimum time  $T_{a_{\min}}$ .

The availability of BVPS-R  $D_a = t_3 - t_1$  corresponds to the subscription duration.  $D_a$  varies between the minimum subscription duration  $D_{a_{\min}}$  and the maximum subscription duration  $D_{a_{\max}}$ . If  $t_3$  is not indicated  $D_a$  is assumed equal to  $D_{a_{\max}}$ .

The values of  $T_{a_{\min}}$ ,  $D_{a_{\min}}$  and  $D_{a_{\max}}$  are fixed by the SP.

The manager obtains at time  $t_1$  (see figure 1) the authorisation to use the BVPS-R, i.e. to issue through x reference point (see ITU-T Recommendation M.3010 [10]) a registration request to the SME to reserve VP(s).

Two types of reservation shall be available:

- 1) non-periodic reservation (as described in subclause 5.2.1.1);
- 2) periodic reservation (as described in subclause 5.2.1.2).

The following parameters shall be specified at subscription:

- a) manager identifier;
- b) ISDN numbers of the users controlled by the manager;
- c) subscription beginning time:  $t_1$ ;
- d) subscription end time:  $t_3$ ;
- e) maximum number  $N_{b_{\max}}$  of VPs per UNI;
- f) maximum bandwidth available at each UNI.

An anticipated BVPS-R withdrawal request may be issued by the manager at any time  $t_2$  before foreseen time  $t_3$ .

## 5.2 Procedures

### 5.2.1 Activation and deactivation

The activation procedure leads to the effective availability of the requested PCR (greater than zero) for the VP.

As a SP option for a periodic VP, a deactivation may be simultaneous with an activation ( $TD_i=TA_{i+1}$ ), this shall correspond to a PCR modification (without a jump to PCR zero) ensuring the continuity of the BVPS-R.

The deactivation procedure leads to the PCR value equal to zero for the VP.

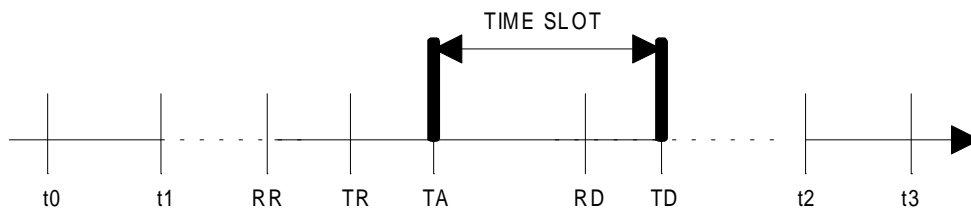
Two types of deactivation shall be available:

- a) after the foreseen duration, the SP deactivates the VP at time TD for an non-periodic reservation or at each time  $TD_i$  for a periodic reservation;
- b) after the manager request for the deactivation at time RD (non-periodic reservation) or at any time  $RD_i$  (periodic reservation).

The activation and deactivation procedures are based on the exchange of appropriate information between the manager and the user.

#### 5.2.1.1 Non-periodic reservation

Figure 2 presents the schedule 2 that applies to this case.



- RR: time at which the request for the reservation of a VP is made.  
TR: time at which the reservation of a VP is made.  
TA: time at which the VP activation is completed.  
RD: time at which the request for the deactivation of the VP is made.  
TD: time at which the VP is deactivated.

**Figure 2: Schedule 2**

The activation (respectively deactivation) procedure occurs only once.

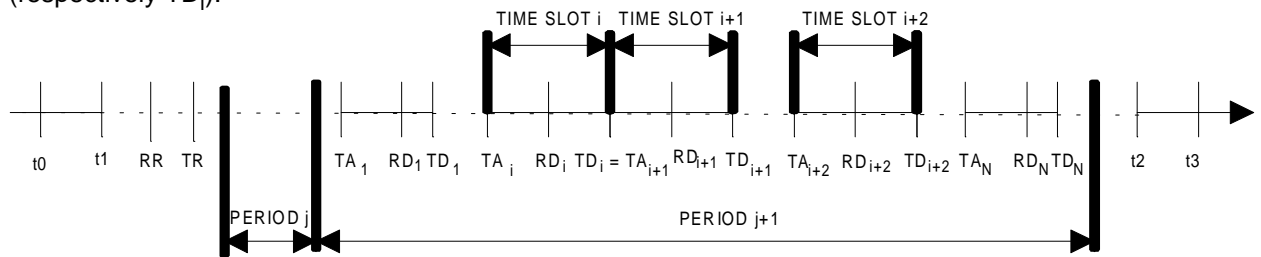
The VP setup shall be completed at time TA.

The VP release shall be initiated either after or at time TD or after or at time t2.

### 5.2.1.2 Periodic reservation

Figure 3 presents the detailed schedule 3 that applies to this case.

The activation (respectively deactivation) procedure shall be repeated for each time slot at  $TA_i$  (respectively  $TD_i$ ).



- RR: time at which the request for reservation of a VP is made.
- TR: time at which the reservation of a VP is made.
- $TA_i$ : time at which the  $i^{\text{th}}$  activation of the VP in the period is completed.
- $RD_i$ : time at which the anticipated request for the deactivation (corresponding to the  $i^{\text{th}}$  activation in the period) of the VP is made.
- $TD_i$ : time at which the VP is deactivated for the  $i^{\text{th}}$  time in the period.

**Figure 3: Schedule 3**

The VP setup shall be completed at time  $TA_1$  of the first period.

The VP release shall be initiated either after or at time  $TD_N$  of the last period or after or at time  $t_2$ .

### 5.2.2 Registration

If a manager requests the registration of a VP spanning between two users both related to that manager, the following procedure shall be performed:

- 1) the manager issues the registration request providing the SME with the parameter values for the VP;
- 2) the SME shall issue either, a positive notification (including the values of GVPI, VPIs, PEI and CDV Tolerance, see clause 4) or a negative notification. In the former case the VP shall be established as requested. If the SME issue a negative notification no VP is established; the SME can propose along with the negative notification new parameter values that would have made the request viable.

If a manager (initiating manager) requests the registration of a VP spanning between two users, one of which relates to a different manager (involved manager), the following procedure shall be performed:

- a) the initiating manager issues the registration request providing the SME with the parameter values for the VP;
- b) the SME shall issue either a negative notification to the initiating manager or a notification to the involved manager reporting the parameter values of the requested VP. In the former case the SME can propose along with the negative notification new parameter values that would have made the request viable. If the SME issues a negative notification the procedure stops;
- c) the involved manager shall issue to the SME either a positive notification or a negative notification. In the latter case the involved manager can provide along with the notification new parameter values that would have made the request viable;
- d) if the involved manager has issued a positive notification the SME shall issue a positive notification (including the values of GVPI, VPI, PEI and CDV Tolerance, see clause 4) to both managers. The SME shall establish the VP as requested. If the involved manager has issued a negative notification the SME shall issue a negative notification to the initiating manager, along with the parameter values proposed by the involved manager with the notification, if provided.

### 5.2.2.1 Non-periodic VP

#### 5.2.2.1.1 Mandatory registration parameters

The initiating manager shall provide the following parameters:

- a) reservation type: non-periodic;
- b) ISDN numbers of the users;
- c) activation time: TA;
- d) deactivation time: TD;
- e) symmetry: unidirectional, bi-directional symmetric or bi-directional asymmetric;
- f) PCR: in each direction for a bi-directional asymmetric VP.

#### 5.2.2.1.2 Optional registration parameters

The initiating manager may provide the following parameters:

- a) Value of VPI per user (as a SP option);
- b) value of QoS, in each direction for a bi-directional asymmetric VP.

### 5.2.2.2 Periodic VP

#### 5.2.2.2.1 Mandatory registration parameters

The initiating manager shall provide the following parameters:

- a) reservation type: periodic;
- b) ISDN numbers of the users;
- c) period; day, week or month;
- d) beginning time of the first period;
- e) beginning time of the last period;
- f) activation time:  $TA_i$  (with  $1 \leq i \leq N$ );
- g) deactivation time:  $TD_i$  (with  $1 \leq i \leq N$  and  $TA_i < TD_i \leq TA_{i+1}$ );
- h) symmetry: unidirectional, bi-directional symmetric or bi-directional asymmetric;
- i) PCR: for each time slot, in each direction for a bi-directional asymmetric VP.

#### 5.2.2.2.2 Optional registration parameters

The initiating manager may provide the following parameters:

- a) value of VPI per user (as a SP option);
- b) values of QoS for each time slot, in each direction for a bi-directional asymmetric VP.

### 5.2.3 Registration modification

The initiating manager has the following capabilities:

- 1) request for modification of one or more parameter values of one registered VP;
- 2) request for global cancellation of a VP or cancellation of a particular time slot for a periodic reservation.

If a manager requests the registration modification of a VP spanning between two users both related to that manager, the following procedure shall be performed:

- a) the manager issues the registration modification request providing the SME with the GVPI and the list of parameters to be modified with the proposed parameter values;
- b) the SME shall issue either a positive notification (including the values of PEI and CDV Tolerance if the PCR is modified, see clause 4) or a negative notification. In the former case the VP shall be modified as requested. If the SME issue a negative notification no VP will be established; the SME can propose along with the negative notification new modified parameter values that would have made the request viable.

If a manager (initiating manager) requests the registration modification of a VP spanning between two users, one of which relates to a different manager (involved manager), the following procedure shall be performed:

- a) the initiating manager issues the registration modification request providing the SME with the GVPI and the list of parameters to be modified with the proposed parameter values;
- b) the SME shall issue either a negative notification to the initiating manager or a notification to the involved manager reporting the list of parameters to be modified and the proposed parameter values of the VP. In the former case the SME can propose along with the negative notification new parameter values that would have made the request viable. If the SME issues a negative notification the procedure stops;
- c) the involved manager shall issue to the SME either, a positive notification or a negative notification. In the latter case the involved manager can provide along with the notification new parameter values that would have made the request viable;
- d) if the involved manager has issued a positive notification the SME shall issue a positive notification (including the values of PEI and CDV Tolerance if the PCR is modified, see clause 4) both managers. The SME shall modify the VP as requested. If the involved manager has issued a negative notification the SME shall issue a negative notification to the initiating manager, along with the parameter values proposed by the involved manager with the notification, if provided.

### 5.2.4 Erasure

The erasure leads to the deletion of all the data related to the VP in the SME.

The erasure occurs at the same time as the release of the VP.

### 5.2.5 Invocation and operation

The BVPS-R is automatically invoked when the user provides user information in blocks of 48 octets during a time slot.

## **6 Interworking**

### **6.1 Interworking with N-ISDNs**

Not applicable.

### **6.2 Interworking with private B-ISDNs**

The BVPS-R can be provided to private B-ISDNs.

## **7 Interaction with supplementary services**

Each supplementary service description identifies the applicability to the BVPS-R.

## **8 Static description of the service using attributes**

The attributes are defined in ITU-T Recommendation I.140 [5].

The values of the attributes are defined in ITU-T Recommendation I.140 [5].

### **8.1 Information transfer mode**

ATM.

#### **8.1.1 Connection mode**

Connection-oriented.

#### **8.1.2 Traffic type of VP**

The traffic of the source can be CBR or VBR. However, the source traffic bit rate shall be less than or equal to the PCR of the VP.

#### **8.1.3 End-to-end timing of VP**

Not required.

#### **8.1.4 VCI transparency**

VCI = 0 to 3 and VCI = 5 to 31 shall not be used by the user. VCI = 4 may be used by the user for end-to-end F4 flow. All other VCIs are transparent.

### **8.2 Information transfer rate**

The rate of a VP is a PCR.

If a user subscribes to several VPs, the PCR of aggregated VPs is defined as the addition of the PCRs of each single VP.

Any PCR value supported by the UNIs to be interconnected is allowed.

### **8.3 Information transfer capability of VP**

Unrestricted digital information.

### **8.4 Structure of VPs**

Cell sequence integrity.



## **8.5 Establishment of communication**

Reserved.

## **8.6 Symmetry of VP**

- a) Unidirectional.
- b) Bi-directional symmetric.
- c) Bi-directional asymmetric.

## **8.7 Communication configuration**

Point-to-point.

## **8.8 Access channels and rates**

Standardized access rates are defined in ETS 300 299 [11] and ETS 300 300 [12].

### **8.8.1 For user information**

#### **8.8.1.1 Number of channels**

Up to and including 256 VPs, but the maximum number available for each user  $N_{b_{max}}$  is fixed at the subscription.

#### **8.8.1.2 Type of channels**

VP.

### **8.8.2 For signalling**

Not applicable.

## **8.9 Access protocols**

### **8.9.1 Information access protocol physical layer**

Standardized physical layers are defined in ETS 300 299 [11] and ETS 300 300 [12].

### **8.9.2 Information access protocol ATM layer**

See ITU-T Recommendation I.361 [8] and ITU-T Recommendation I.150 [6].

### **8.9.3 Information access protocol ATM adaptation layer**

User defined.

## **8.10 QoS of VPs**

The QoS is based on the performance parameters defined in ITU-T Recommendation I.356 [7].

### Annex A (informative): Reference configuration

This reference configuration defines the reference points between the SP and the users on the user plane and on the management plane. It means that this configuration also describes the functional entities which are separated by the reference points. It is noted that the reference configuration does not specify an implementation of functional entities.

In figure A.1 the subscriber A is associated to the manager M(A) and the users U(A)<sub>1</sub>, U(A)<sub>2</sub> and U(A)<sub>n</sub> and the subscriber B is associated to the manager M(B) and the user U(B).

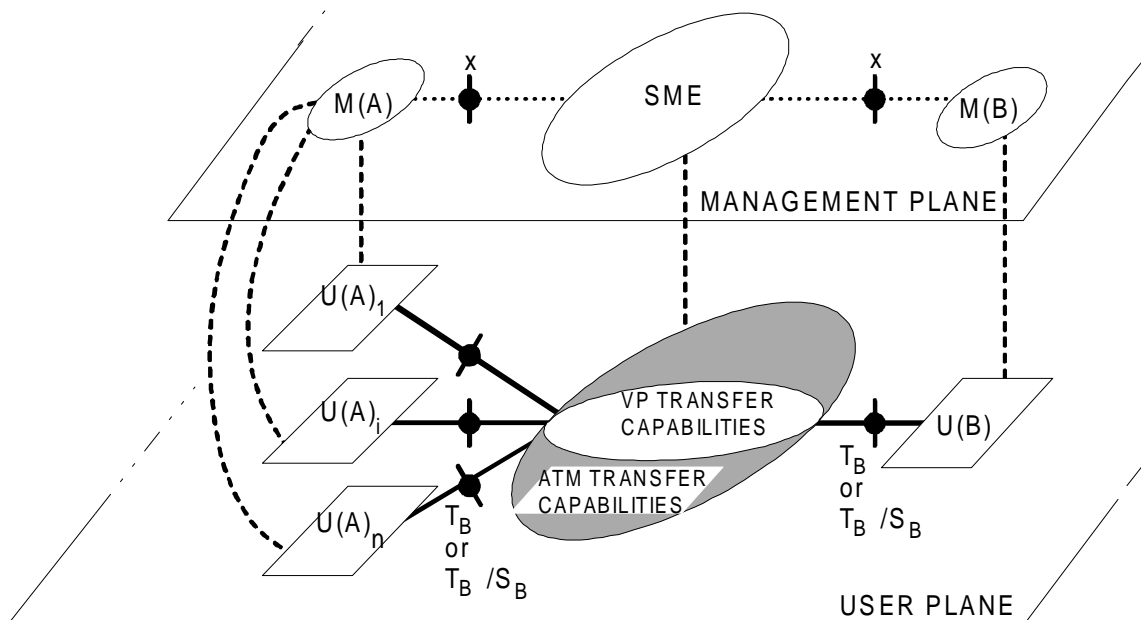


Figure A.1: Reference configuration

## History

Document history			
December 1994	Public Enquiry	PE 75:	1994-12-05 to 1995-03-31
June 1995	Vote	V 81:	1995-06-12 to 1995-08-18
August 1995	First Edition		
February 1996	Converted into Adobe Acrobat Portable Document Format (PDF)		