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**OPERATIONS AND QUALITY OF SERVICE
ISDN SERVICES**

**VIRTUAL PATH SERVICE FOR RESERVED
AND PERMANENT COMMUNICATIONS**

ITU-T Recommendation F.813

(Previously "CCITT Recommendation")

FOREWORD

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The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

ITU-T Recommendation F.813 was prepared by ITU-T Study Group 1 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 21st of February 1995.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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SUMMARY

This Recommendation defines stage one of the broadband virtual path service for reserved and permanent communications (BVPS) for the public broadband integrated services digital network (B-ISDN).

This Recommendation does not specify the additional requirements where the service is provided to the user via a telecommunication network that is not the B-ISDN, but does not preclude requirements for interworking between other networks and the B-ISDN.

The BVPS allows the transfer of unrestricted information between user-to-network reference points (UNRPs).

Recommendation F.813

VIRTUAL PATH SERVICE FOR RESERVED AND PERMANENT COMMUNICATIONS

(Geneva, 1994)

1 Definition

According to Recommendation I.130 [4], this Recommendation defines stage one of the Broadband Virtual Path Service for reserved and permanent communications (BVPS) for the public Broadband Integrated Services Digital Network (B-ISDN).

The BVPS allows the transfer of unrestricted information between User-to-Network Reference Points (UNRPs). In the B-ISDN, the UNRP is T_B . It does not preclude the applicability of the BVPS to S_B .

The establishment of communication is either reserved or permanent.

The provision of the BVPS is based on ATM Virtual Path (VP) connections in the B-ISDN (see Recommendation I.340 [10]).

This Recommendation applies to stage two and stage three ITU-T Recommendations (see Recommendation I.130 [4]) for the BVPS.

Charging Principles are outside the scope of this Recommendation, but could be contained in the appropriate ITU-T Recommendation(s).

2 Description

2.1 General description

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

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

Several VPs can be multiplexed at a specific UNI (up to 256 VP can be allocated at the UNI of the B-ISDN according to Recommendation I.361 [12]).

The physical bit rate at the UNRP is defined by the existing UNIs according to Recommendation I.432 [14].

The parameter Peak Cell Rate (PCR) is associated with each VP.

A communication can be established in two different modes: either permanent or reserved (for non-periodic and periodic use).

In permanent establishment of communication, the subscriber can negotiate with the Service Provider (SP) any value of the PCR that is available at the UNRP and agreed by the SP.

In reserved establishment of communication, the subscriber can negotiate with the SP any value of the maximum bandwidth that is available at the UNI and agreed by the SP. Then, the manager can negotiate with the Service Management Entity (SME) any available value of the PCR within the subscribed maximum bandwidth.

The SP shall enforce user cells according to the Peak Cell Rate (PCR) reference algorithm specified in Recommendation I.371 [13]. According to the PCR reference algorithm in Recommendation I.371 [13], the cell conformance is defined with reference to the pair (T, τ) where T is the Peak Emission Interval (PEI) and τ is the Cell Delay Variation (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 User-to-Network Interface (UNI) type as defined in 2.2/I.361 [12]. The bit rate of the source can be CBR or VBR. The effective availability of the constant value of PCR (greater than zero) for a VP corresponds to a time slot as defined within this Recommendation.

In permanent establishment of communication, periodic or non-periodic VPs are possible. A permanent VP, either periodic or non-periodic, is subscribed providing all the parameters necessary for its establishment. A permanent VP is registered at subscription.

In reserved establishment of communication, periodic or non-periodic VPs are possible. The subscriber subscribes to the BVPS in reserved establishment of communication providing general service parameters (see 3.1.3), e.g. listing only the users involved in the use of the BVPS and the maximum number of VPs that can be established among these users in any configuration at the same time. Every reserved VP, either periodic or non-periodic, is established after a registration procedure. During this phase the parameters of the VP between the two involved users are negotiated.

2.2 Specific terminology

For the purpose of this Recommendation, the following definitions apply:

- 2.2.1 integrated services digital network: See 2.3/I.112 [2], definition 308.
- 2.2.2 broadband: See 2.1/I.113 [3], definition 101.
- 2.2.3 service, telecommunication service: See 2.2/I.112 [2], definition 201.
- 2.2.4 asynchronous transfer mode: See 2.2/I.113 [3], definition 204.
- 2.2.5 virtual channel: See 4/I.113 [3], definition 401.
- 2.2.6 **virtual channel identifier**: A number that identifies locally a specific Virtual Channel (VC) at a UNI.
- 2.2.7 **virtual path**: From the user's point of view, a virtual end-to-end connection that ensures unidirectional or bidirectional transport of ATM cells belonging to VCs that are associated by a common VPI.
- 2.2.8 **virtual path identifier**: A number that identifies locally a specific VP at a UNI.
- 2.2.9 **global virtual path identifier**: The Global Virtual Path Identifier (GVPI) identifies a specific VP. It is used by the Service Management Entity (SME) for the management of the complete VP.
- 2.2.10 **service management entity**: The functional entity (SME) to which manager's VP registration requests, VP modification requests and interrogation requests are addressed (see Figure C.1).
- 2.2.11 **service management reference point**: This reference point (SMRP) is defined between the SME and the manager (see Figure C.1).
- 2.2.12 **subscriber**: The logic entity that subscribes to the BVPS. The subscriber shall declare one manager at most and one or more related users.
- 2.2.13 **manager**: The functional entity authorised to perform through SMRP all the service management functions, including VP registration requests, VP modification requests and interrogation requests, on behalf of the users to which it is related at subscription time (see Figure C.1).
- 2.2.14 **user**: The functional entity authorised to perform through UNRP all the User plane functions, including sending and receiving User Information (see Figure C.1).
- 2.2.15 **user-to-network reference point**: This reference point (UNRP) is defined between the user and the ATM capabilities (see Figure C.1). It is equal to T_B . This does not preclude the applicability of the BVPS to S_B .
- 2.2.16 **initiating manager**: The manager issuing a request to the SME.
- 2.2.17 **involved manager**: The manager receiving a request issued by another initiating manager.
- 2.2.18 **peak cell rate**: See Recommendation I.371 [13]. The PCR is expressed as an integer number of cell(s) per second.

The network shall allocate the appropriate resources using the PCR value. There is no statistical multiplexing.

2.2.19 peak emission interval: According to Recommendation I.371 [13], the PEI is the inverse of the PCR, i.e. PEI corresponds to the minimum time interval T between two successive cells emission times, when these cells are emitted perfectly periodically by the user.

2.2.20 cell delay variation tolerance: The CDV tolerance τ corresponds to the maximum time variation between a perfectly periodic cell stream emitted at period T (see PEI definition) and the conforming user cell stream.

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

2.3 Abbreviations

For the purposes of this Recommendation, the following abbreviations are used:

ATM	Asynchronous Transfer Mode
B-ISDN	Broadband Integrated Services Digital Network
BVPS	Broadband Virtual Path Service for reserved and permanent communications
CBR	Constant Bit Rate
CDV	Cell Delay Variation
GVPI	Global Virtual Path Identifier
NMRP	Network Management Reference Point
PCR	Peak Cell Rate
PEI	Peak Emission Interval
SME	Service Management Entity
SMRP	Service Management Reference Point
SP	Service Provider
UMRP	User Management Reference Point
UNI	User-to-Network Interface
UNRP	User-to-Network Reference Point
VBR	Variable Bit Rate
VC	Virtual Channel
VCI	Virtual Channel Identifier
VP	Virtual Path
VPI	Virtual Path Identifier

3 Procedures

3.1 Provision and withdrawal

3.1.1 General principles

The BVPS is provided after arrangement with the SP.

The BVPS permits either reserved or permanent establishment of communications between two UNIs.

Subscriptions of reserved and permanent establishments of communications can coexist on the same UNI.

The subscription states the maximum number Nb_{\max} of VPs per UNI. According to Recommendation I.361 [12], 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 processes are based on Figure 1.

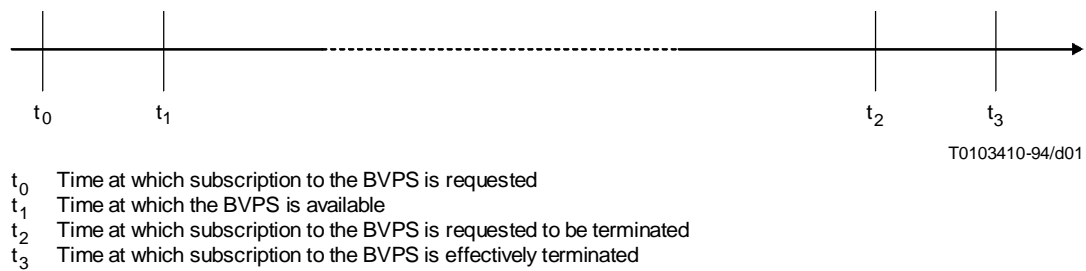


FIGURE 1/F.813

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 service $D_a = t_3 - t_1$ corresponds to the duration of subscription. D_a varies between the minimum duration of subscription $D_{a_{min}}$ and the maximum duration of subscription $D_{a_{max}}$. 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.

3.1.2 Permanent establishment of communication

The permanent establishment of communication is defined in Recommendation I.140 [5].

Each VP is available at the subscribed PCR during a period D_a .

The subscription is renewable per periods of $D_{a_{min}}$.

Either non-periodic or periodic VP can be subscribed.

For a non-periodic VP, values of PCR and QOS are constant for the duration of subscription.

For a periodic VP, the same values of PCR and QOS scheme are repeated within each period for the duration of the subscription.

At the subscription, the SP and the subscriber negotiate the values of service parameters for each VP.

For a non-periodic VP, 3.1.2.1 applies.

For a periodic VP, 3.1.2.2 applies.

The following parameters are defined per VP.

3.1.2.1 Non-periodic VP

3.1.2.1.1 Mandatory subscription parameters

- a) users E.164 [1] numbers;
- b) subscription beginning time: t_1 ;
- c) symmetry: unidirectional, bidirectional symmetric or bidirectional asymmetric;
- d) PCR: in each direction for a bidirectional asymmetric VP.

3.1.2.1.2 Optional subscription parameters

- a) subscription end time: t_3 ;
- b) values of VPIs (as a SP option);
- c) value of QOS: in each direction for a bidirectional asymmetric VP.

3.1.2.2 Periodic VP

This subscription allows the specification of a period and of a number N of time slots within the period (see Figure 2). The number N of time slots shall be within 1 and N_{\max} (fixed by the SP).

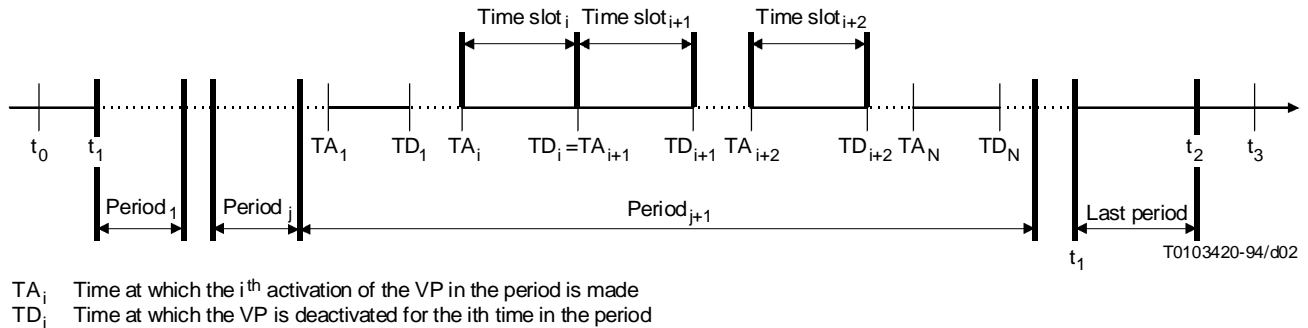


FIGURE 2/F.813

Schedule 2

For each time slot, the values of PCR and QOS can be specified independently by the values they have in other time slots.

If a deactivation is simultaneous to an activation ($TD_i = TA_{i+1}$), this corresponds to a PCR modification (without a jump to a PCR zero) ensuring the continuity of the BVPS.

The VP set-up shall be completed at time t_1 .

The VP release shall be initiated:

- from an including time t_2 if an anticipated deactivation is requested by the subscriber; or
- from an including time TD_N of the last period.

3.1.2.2.1 Mandatory subscription parameters

- users E.164 [1] numbers;
- subscription beginning time: t_1 ;
- period: day, week or month;
- activation time for each time slot: TA_i (with $1 \leq i \leq N$);
- deactivation time for each time slot: TD_i (with $1 \leq i \leq N$);
- symmetry: unidirectional, bidirectional symmetric or bidirectional asymmetric;
- PCR for each time slot: in each direction for a bidirectional asymmetric VP.

3.1.2.2.2 Optional subscription parameters

- subscription end time: t_3 that corresponds to the end time of the last period;
- values of VPIs (as a SP option);
- value of QOS for each time slot: in each direction for a bidirectional asymmetric VP.

3.1.3 Reserved establishment of communication

The definition of the reserved establishment of communication is based on Recommendation I.140 [5].

The manager obtains at time t_1 (see Figure 1) the authorisation to use the BVPS, i.e. to issue registration request to the SME to reserve VP(s).

Two types of reservations are possible (as described in 3.2.1.2.1 and 3.2.1.2.2):

- a) non-periodic reservation;
- b) periodic reservation.

The following parameters shall be specified at subscription time as mandatory subscription parameters:

- a) manager identifier;
- b) users E.164 [1] numbers of the users controlled by the manager;
- c) subscription beginning time: t_1 ;
- d) subscription end time: t_3 ;
- e) maximum number Nb_{\max} of VPs per UNRP;
- f) maximum bandwidth available at each UNRP.

The subscription is renewable.

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

3.2 Normal procedures

3.2.1 Activation and deactivation

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

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

If a deactivation is simultaneous to an activation ($TD_i = TA_{i+1}$), this corresponds to a PCR modification (without a jump to a PCR zero) ensuring the continuity of the BVPS.

The times of the activation and deactivation depend on the establishment of communication fixed at the subscription.

3.2.1.1 Permanent establishment of communication

A non-periodic VP is available at the subscribed PCR for all the duration of subscription. According to Figure 1, activation occurs at time t_1 and deactivation at time t_3 .

For a periodic VP, the activation (respectively deactivation) procedure shall be repeated for each time slot at TA_i (respectively TD_i).

3.2.1.2 Reserved establishment of communication

Two types of deactivation are possible:

- 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 at time RD (non-periodic reservation) or at any time RD_i (periodic reservation).

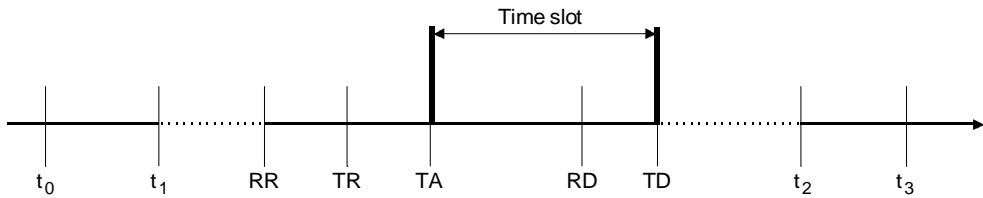
The activation and deactivation procedures are based on the exchange of appropriate information between the manager and the user.

NOTE – Management procedures are outside the scope of this Recommendation.

3.2.1.2.1 Non-periodic reservation

Figure 3 presents the schedule **Error! Bookmark not defined.** that applies to this case.

The activation (respectively deactivation) procedure occurs only once at TA (respectively TD).



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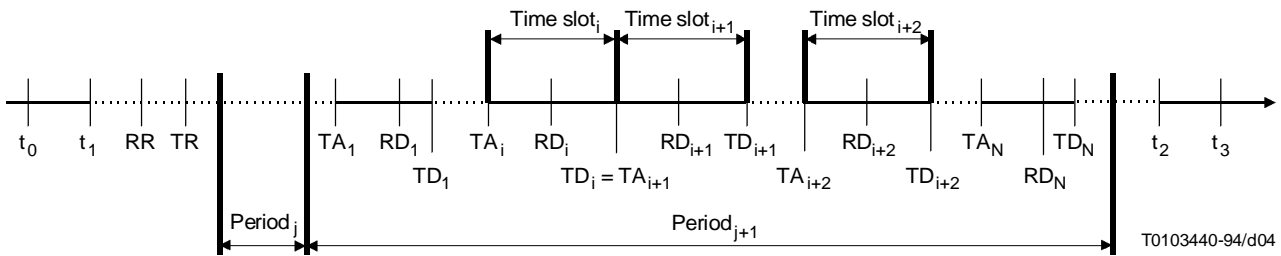
- RR Time at which the request for the reservation of a VP is made
- TR Time at which the reservation of a VP is made
- TA Time at which the VP is activated
- RD Time at which the request for the deactivation of the VP is made
- TD Time at which the VP is deactivated

FIGURE 3/F.813

Schedule 3

3.2.1.2.2 Periodic reservation

Figure 4 presents the detailed schedule **Error! Bookmark not defined.** that applies to this case.



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- 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*th activation of the VP in the period is made
- RD_i Time at which the anticipated request for the deactivation (corresponding to the *i*th activation in the period) of the VP is made
- TD_i Time at which the VP is deactivated for the *i*th time in the period

FIGURE 4/F.813

Schedule 4

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

If a deactivation is simultaneous to an activation (TD_i = TA_{i+1}), this corresponds to a PCR modification (without a jump to a PCR zero) ensuring the continuity of the BVPS.

The VP set-up shall be completed at time TA₁ of the first period.

The VP release shall be initiated:

- a) from an including time t₂ if an anticipated deactivation is requested by the manager; or
- b) from an including time TD_N of the last period.

3.2.2 Registration

For the permanent establishment of communication, the registration applies at subscription and is managed by the SP.

For the reserved establishment of communication, the following procedures apply.

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

- a) The manager issues the registration request providing the SME with the parameter values for the VP.
- b) The SME shall issue either a positive notification (including the values of GVPI, VPIs, PEI and CDV tolerance, see 2.1) or a negative notification. In the former case, the VP shall be established as requested. If the SME issues 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 2.1) 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.

3.2.2.1 Non-periodic VP

3.2.2.1.1 Mandatory registration parameters

The manager shall provide the following parameters:

- a) reservation type: non-periodic;
- b) users E.164 [1] numbers;
- c) activation time: TA;
- d) deactivation time: TD;
- e) symmetry: unidirectional, bidirectional symmetric or bidirectional asymmetric;
- f) PCR: in each direction for a bidirectional asymmetric VP.

3.2.2.1.2 Optional registration parameters

- a) value of VPI per user (as a SP option);
- b) value of QOS, in each direction for a bidirectional asymmetric VP.

3.2.2.2 Periodic VP

3.2.2.2.1 Mandatory registration parameters

The manager shall provide the following parameters:

- a) reservation type: periodic;
- b) users E.164 [**Error! Bookmark not defined.**] numbers;

- c) period; day, week or month;
- d) beginning time of the first period;
- e) end time of the last period;
- f) activation time for each time slot: TA_i (with $1 \leq i \leq N$);
- g) deactivation time for each time slot: TD_i (with $1 \leq i \leq N$);
- h) symmetry: unidirectional, bidirectional symmetric or bidirectional asymmetric;
- i) PCR: for each time slot, in each direction for a bidirectional asymmetric VP.

3.2.2.2 Optional registration parameters

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

3.2.3 Registration modification

In permanent establishment of communication, the registration modification corresponds to a subscription modification and is managed by the SP.

In reserved establishment of communication, the manager has the following capabilities (see Note):

- a) request for modification of one or more parameter values of one registered VP;
- b) request for cancellation of a VP or 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 it, 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 2.1) or a negative notification. In the former case, the VP shall be modified as requested. If the SME issues a negative notification, the VP is not modified. 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 modification of a VP spanning between two users, one of which relates to a different manager (involved manager), the following procedure should be performed:

- a) The initiating manager issues the registration modification request providing the SME with the GVPI and the list of parameter 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 modified 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 2.1) to 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 modified parameter values proposed by the involved manager with the notification, if provided.

NOTE – Management operations are out of the scope of this Recommendation.

3.2.4 Erasure

The erasure procedure leads to the deletion of all the data related to the VP in the SME and is managed by the SP.

For the permanent establishment of communication, the erasure occurs at the same time as the withdrawal.

For the reserved establishment of communication, the erasure occurs at the same time as the release of the VP.

3.2.5 Invocation and operation

The BVPS is automatically invoked when the user provides user information inside conforming ATM cells during a time slot. The conforming ATM cells are defined according to Recommendation I.371 [13].

3.3 Exceptional procedures

The exceptional procedures need further studies.

4 Interworking possibilities

The interworking with other broadband services shall be ensured where applicable.

Annex A

Attributes and values

(This annex forms an integral part of this Recommendation)

The attributes and possible values refer to Recommendation I.140 [5].

A.1 Information transfer mode

ATM.

A.1.1 Connection mode

Connection-oriented.

A.1.2 Traffic type of VP

The traffic of the source can have a CBR or a VBR. However, the cell rate is less than or equal to the PCR of the VP.

A.1.3 End-to-end timing of VP

Not required.

A.1.4 VCI transparency (for VP services)

The VCI is transparent for the BVPS: the BVPS does not modify the VCI field but imposes some constraints on the allocation of this field.

Four of the first sixteen channels are specified in Recommendation I.361 [12]. VCI = 0 ... 3 and VCI = 5 ... 15 shall not be used by the user. VCI = 4 may be used by the user for end-to-end F4 flow (see Recommendation I.610 [15]).

A.2 Information transfer rate

The rate of a VP is a PCR.

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

Any PCR value supported by the UNIs to be interconnected can be allocated.

A.3 Information transfer capability of VP

Unrestricted digital information.

A.4 Structure of VPs

Cell sequence integrity.

A.5 Establishment of communication

- a) permanent;
- b) reserved.

A.6 Symmetry of VP

- a) unidirectional;
- b) bidirectional symmetric;
- c) bidirectional asymmetric.

A.7 Communication configuration

Point-to-point (see Recommendation I.210 [7]).

A.8 Access channels and rates

The types of UNIs available are defined in Recommendation I.432 [14].

A.8.1 For user information

The transfer of user information is ensured via one of the UNIs mentioned in A.8.

A.8.1.1 Number of channels

Up to and including 256, but the maximum number available for each user Nb_{\max} is fixed at the subscription.

A.8.1.2 Type of channels

VP.

A.8.2 For signalling

Not applicable.

A.9 Access protocols

A.9.1 Information access protocol physical layer

See Recommendation I.432 [14].

A.9.2 Information access protocol ATM layer

See Recommendations I.361 [12] and I.150 [6].

A.10 Supplementary services provided

The provision of supplementary services is outside the scope of this Recommendation.

A.11 QOS of VPs

The QOS is based on the performance parameters defined in Recommendation I.356 [11].

A.12 Interworking possibilities

The interworking with other broadband services shall be ensured where applicable.

A.13 Operational and commercial aspects

These aspects are out of the scope of this Recommendation.

Annex B

Normative references

(This annex forms an integral part of this Recommendation)

These Recommendations incorporate, by dated or undated References, provisions from other publications. The normative References are cited at the appropriate places in the text and the publications are listed hereafter. For dated References, subsequent amendments to, or revision of any publications apply to this Recommendation only when incorporated in it by amendment or revision. For undated References the latest edition of the publication referred 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] ITU-T Recommendation I.130 (1988), *Method for the characterization of the telecommunication services supported by an ISDN and network capabilities of an ISDN*.
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- [12] ITU-T Recommendation I.361 (1993), *B-ISDN ATM layer specification*.
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- [14] ITU-T Recommendation I.432 (1993), *B-ISDN user-network interface – Physical layer specification*.
- [15] ITU-T Recommendation I.610 (1993), *B-ISDN operation and maintenance principles and functions*.
- [16] CCITT Recommendation M.3010 (1992), *Principles for a telecommunication management network*.

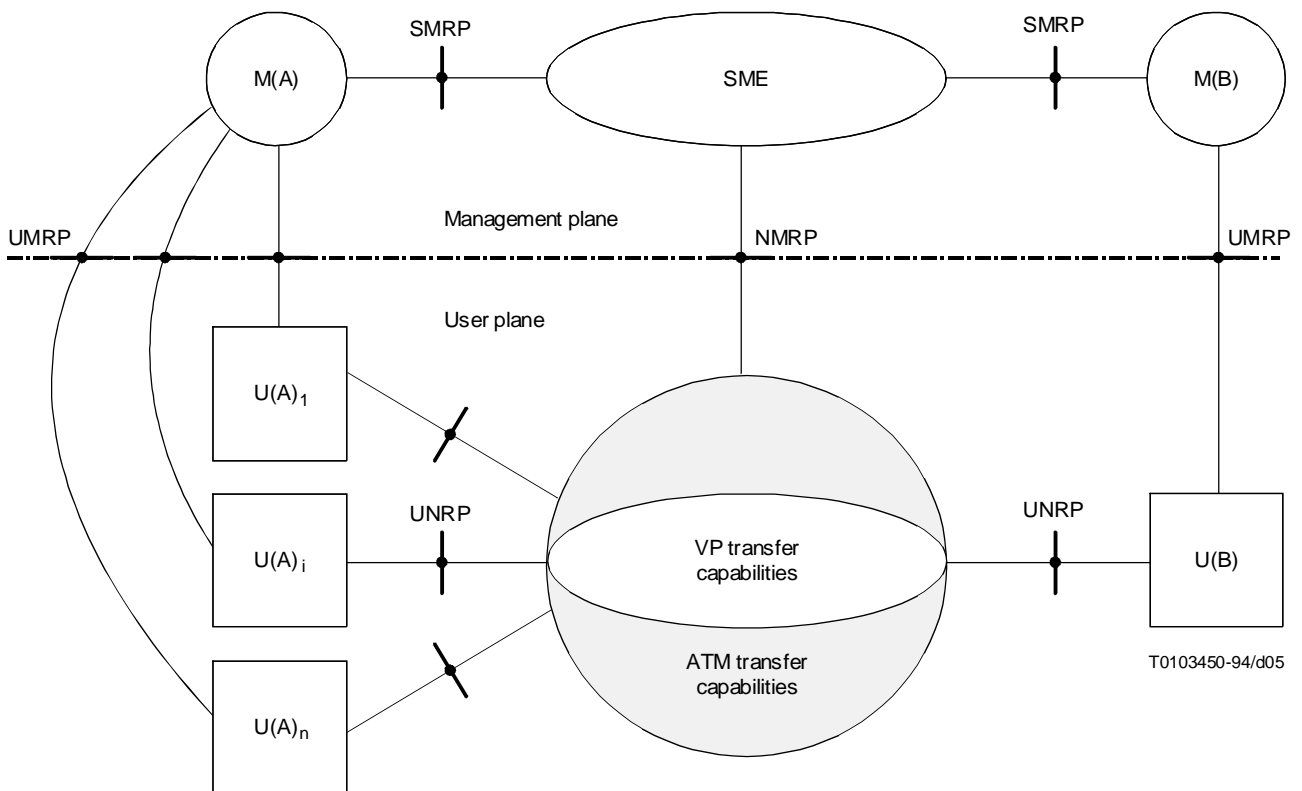
Annex C

Reference configuration

(This annex forms an integral part of this Recommendation)

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 C.1 the subscriber A is associated to the manager M(A) and the users $U(A)_1$, $U(A)_i$ and $U(A)_n$, and the subscriber B is associated to the manager M(B) and the user U(B). SMRP corresponds to the x reference point defined in Recommendation M.3010 [16] and UNRP corresponds to T_B reference point defined in Recommendation I.432 [14].



NOTE – The definitions of UMRP and NMRP are out of the scope of this Recommendation.

FIGURE C.1/F.813

According to Figures 7/I.311 [9] and 8/I.311 [9], SMRP corresponds to the management plane communication type 1 and NMRP corresponds to management plane communication type 2.

SME includes NMC as defined in Recommendation I.311 [9].

Possible communication scenarios are defined in 3.3/I.311 [9] and described in items a) and b) in Figure 8/I.311 [9].