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Amendment 1

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SERIES Q: SWITCHING AND SIGNALLING

Broadband ISDN – B-ISDN application protocols for the network signalling

Switched virtual path capability

Amendment 1

ITU-T Recommendation Q.2766.1 – Amendment 1

(Formerly CCITT Recommendation)

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ITU-T Recommendation Q.2766.1

Switched virtual path capability

AMENDMENT 1

Summary

Recommendation Q.2766.1 specifies extensions to the Broadband ISDN User Part (B-ISUP) protocol to support Switched Virtual Path (SVP) service in a point-to-point configuration. This Amendment 1 to Recommendation Q.2766.1 has been prepared to enable the use of the modified B-ISUP assignment procedures together with the Switched Virtual Path Capability. This amendment includes the additional procedures required to support the modified B-ISUP assignment procedures.

Source

Amendment 1 to ITU-T Recommendation Q.2766.1 was prepared by ITU-T Study Group 11 (1997-2000) and approved under the WTSC Resolution 1 procedure on 15 June 2000.

FOREWORD

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The approval of ITU-T Recommendations is covered by the procedure laid down in WTSC Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

Introduction

This Amendment 1 to Recommendation Q.2766.1 has been prepared to enable the use of the modified B-ISUP assignment procedures together with the Switched Virtual Path Capability.

This amendment includes the additional procedures required to support the modified B-ISUP assignment procedures.

ITU-T Recommendation Q.2766.1

Switched virtual path capability

AMENDMENT 1

1) Introduction

This Amendment 1 to Recommendation Q.2766.1 has been prepared to enable the use of the modified B-ISUP assignment procedures together with the Switched Virtual Path Capability.

This amendment includes the additional procedures required to support the modified B-ISUP assignment procedures.

2) Replacements

2.1) Replacement of current clause 1.2/Q.2766.1

1.2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

– ITU-T I.610 (1995), *B-ISDN operation and maintenance principles and functions*.

– ITU-T Q.2610 (1999), *Usage of cause and location in B-ISDN user part and DSS2*.

– ITU-T Q.2650 (1999), *Interworking between Signalling System No. 7 Broadband ISDN User Part (B-ISUP) and Digital Subscriber Signalling System No. 2 (DSS2)*.

– ITU-T Q.2723.1 (1996), *B-ISDN user part – Support of additional traffic parameters for sustainable cell rate and quality of service*.

NOTE 1 – The content of this Recommendation was integrated into the "core" set of B-ISDN User Part Recommendations (Q.2761 through Q.2764).

– ITU-T Q.2723.3 (1997), *Extensions to the B-ISDN user part – Signalling capabilities to support traffic parameters for the Available Bit Rate (ABR) ATM transfer capability*.

NOTE 2 – The content of this Recommendation was integrated into the "core" set of B-ISDN User Part Recommendations (Q.2761 through Q.2764).

– ITU-T Q.2723.4 (1997), *Extensions to the B-ISDN user part – Signalling capabilities to support traffic parameters for the ATM Block Transfer (ABT) ATM transfer capability*.

NOTE 3 – The content of this Recommendation was integrated into the "core" set of B-ISDN User Part Recommendations (Q.2761 through Q.2764).

– ITU-T Q.2723.6 (1998), *Extensions to the Signalling System No. 7 B-ISDN user part (B-ISUP) – Signalling capabilities to support the indication of the Statistical Bit Rate Configuration 2 (SBR 2) and 3 (SBR 3) ATM transfer capabilities.*

NOTE 4 – The content of this Recommendation was integrated into the "core" set of B-ISDN User Part Recommendations (Q.2761 through Q.2764).

– ITU-T Q.2724.1 (1996), *B-ISDN user part – Look-ahead without state change for the network node interface*.

– ITU-T Q.2725.1 (1996), *B-ISDN user part – Support of negotiation during connection setup.*

NOTE 5 – The content of this Recommendation was integrated into the "core" set of B-ISDN User Part Recommendations (Q.2761 through Q.2764).

– ITU-T Q.2725.2 (1996), *B-ISDN user part – Modification procedures.*

NOTE 6 – The content of this Recommendation was integrated into the "core" set of B-ISDN User Part Recommendations (Q.2761 through Q.2764).

– ITU-T Q.2725.3 (1997), *Extensions to the B-ISDN user part – Modification procedures for sustainable cell rate parameters.*

NOTE 7 – The content of this Recommendation was integrated into the "core" set of B-ISDN User Part Recommendations (Q.2761 through Q.2764).

– ITU-T Q.2725.4 (1998), *Extensions to the Signalling System No. 7 B-ISDN user part – Modification procedures with negotiation*.

NOTE 8 – The content of this Recommendation was integrated into the "core" set of B-ISDN User Part Recommendations (Q.2761 through Q.2764).

– ITU-T Q.2726.1 (1996), *B-ISDN user part – ATM end system address*.

NOTE 9 – The content of this Recommendation was integrated into the "core" set of B-ISDN User Part Recommendations (Q.2761 through Q.2764).

– ITU-T Q.2726.2 (1996), *B-ISDN user part – Call priority*.

– ITU-T Q.2726.3 (1996), *B-ISDN user part – Network generated session identifier*.

– ITU-T Q.2761 (1999), *Functional description of the B-ISDN User Part (B-ISUP) of Signalling System No. 7*.

– ITU-T Q.2762 (1999), *General functions of messages and signals of the B-ISDN User Part (B-ISUP) of Signalling System No. 7*.

– ITU-T Q.2763 (1999), *Signalling System No. 7 B-ISDN user part (B-ISUP) – Format and codes*.

– ITU-T Q.2764 (1999), *Signalling System No. 7 B-ISDN user part (B-ISUP) – Basic call procedures*.

– ITU-T Q.2934 (1998), *Digital Subscriber Signalling System No. 2 – Switched virtual path capability*.

2.2) Replacement of current clause 3.1.1/Q.2766.1

3.1.1 Assignment procedure of VPCI and bandwidth

Two options are provided for the assignment procedure of VPCI and traffic related resources.

Option 1

The one-side selection of bandwidth and VPCI values, which allows one exchange to be assigning exchange for both outgoing and incoming call/connections, on a VPCI basis, is adopted to prevent dual seizure completely.

Option 2

The one-side selection of VPCI values, which allows one exchange to be assigning exchange for both outgoing and incoming call/connections, on a VPC pool basis, is adopted to prevent dual seizure of VPCIs.

It is possible that the two exchanges will attempt to seize the same VPC pool at approximately the same time. In order to reduce the probability of VPC pool glare cases, the adjacent exchanges shall perform the selection of the VPC pools in opposite order.

NOTE – A VPC pool glare will not automatically lead to the rejection of one or both of the involved connections. A connection has to be rejected only, when in addition to the VPC pool glare a "Lack of Resources" condition is encountered, e.g. bandwidth not available.

3.1.1.1 Management of VPCI value and bandwidth of each VPC pool

Option 1

Before a route between two exchanges can be put into service, the following is necessary:

- the VPCIs to be used must be assigned unambiguously and identically at both exchanges;
- VPC pools must be defined on a physical interface basis identically at both exchanges; each VPC pool consists of a continuous range of VPCIs;
- a bandwidth pool must be allocated to each VPC pool identically at both exchanges;
- for every VPC pool it must be defined which exchange controls this VPC pool, i.e. which is responsible for assigning bandwidth for this VPC pool.

NOTE – In some cases the VPCI values that may be used for SVP may be restricted, e.g. by management action.

The following default mechanism is defined for determining this designation.

If an exchange has to set up a call/connection (also in the case of an automatic repeat attempt), it shall first use a VPCI which it is controlling, i.e. a Set-Up request including the Connection Element Identifier parameter is issued. Only if there is no available bandwidth or VPCI values which the exchange is controlling, the exchange issues a Set-Up request without the Connection Element Identifier parameter.

Bandwidth is allocated from the available bandwidth for SVP connections under allocation control of the assigning exchange.

Option 2

Before a route between two exchanges can be put into service, the following is necessary:

- the VPCIs to be used must be assigned unambiguously and identically at both exchanges;
- VPC pools must be defined on a physical interface basis identically at both exchanges; each VPC pool consists of a continuous range of VPCIs;
- a bandwidth pool must be allocated to each VPC pool identically at both exchanges;
- for every VPC pool it must be defined which exchange controls this VPC pool, i.e. which is responsible for assigning VPCI values from this VPC pool;
- for every exchange the order of VPC pool selection must be defined.

NOTE – In some cases the VPCI values that may be used for SVP may be restricted, e.g. by management action.

If an exchange has to set up a call/connection (also in the case of an automatic repeat attempt), it shall first use a VPCI which it is controlling and shall act as an assigning exchange, i.e. a Set-Up request including the Connection Element Identifier parameter is issued. Only if there is no available bandwidth or VPCI values which the exchange is controlling, the exchange acts as a non-assigning exchange, and it issues a Set-Up request primitive with the Exclusive connection element Identifier parameter.

Bandwidth is allocated from the available bandwidth for SVP connections.

3.1.1.2 Assignment procedure of VPCI and bandwidth

Option 1

The assigning exchange assigns both VPCI and bandwidth for outgoing and incoming call/connections. The non-assigning exchange does not assign but asks the assigning exchange to assign both VPCI and bandwidth.

a) *Outgoing call/connections from the assigning exchange to the non-assigning exchange*

The assigning exchange performs the following actions:

- selection of one VPCI from the set of VPCI values that the assigning exchange controls;
- assigning bandwidth to the call/connection;
- updating the available bandwidth pool that the switch controls.

b) *Outgoing call/connections from the non-assigning exchange to the assigning exchange*

- The non-assigning exchange performs no assignment actions.
- The assigning exchange performs the actions as in a).

c) *Simultaneous call/connection request from the assigning exchange and the non-assigning exchange*

- As the assigning exchange assigns bandwidth at the time of call/connection acceptance at the assigning exchange, a dual seizure of bandwidth cannot occur.

Option 2

a) *Call/connection establishment from the assigning exchange to the non-assigning exchange*

The assigning exchange performs the following actions:

- It shall perform the CAC function and shall select one VPC pool from several available VPC pools which can provide the requested resources, e.g. bandwidth, from its point of view according to the requested traffic parameters.
- The resources shall be reserved on the selected VPC for that connection.
- It shall assign a VPCI value from the set of available VPCI values to the connection and shall indicate the selected VPCI to the succeeding exchange in the Connection element identifier parameter.
- The reserved resources shall be related to the assigned VPCI value.

The non-assigning exchange performs the following actions:

- It shall perform the CAC function and shall check whether it can provide the requested resources, e.g. bandwidth, on the indicated VPC pool from its point of view according to the indicated traffic parameters.
- If it can provide the requested resources on the indicated VPC pool, it shall reserve the resources on the indicated VPC pool for that connection, and shall relate the reserved resources to the VPCI value.
- If it cannot provide the requested resources on the indicated VPC pool, it shall reject the connection with cause #37, "User cell rate not available".

b) *Call/connections establishment from the non-assigning exchange to the assigning exchange*

The non-assigning exchange performs the following actions:

- It shall perform the CAC function and shall select one VPC pool from several available VPC pools which can provide the requested resources, e.g. bandwidth, from its point of view according to the requested traffic parameters.
- The resources shall be reserved on the selected VPC pool for that connection.
- It shall select one VPCI from the selected VPC pool.

- It shall indicate the selected VPC pool to the succeeding exchange in the Exclusive connection element identifier parameter in the Set_Up request primitive by means of the selected VPCI.
- When it receives the Incoming_Resources_Accepted indication primitive, it shall relate the reserved resources to the indicated VPCI value.

The assigning exchange performs the following actions:

- It shall perform the CAC function and shall check, whether it can provide the requested resources, e.g. bandwidth, on the indicated VPC pool from its point of view according to the requested traffic parameters.
- If it can provide the requested resources on the indicated VPC pool, it shall:
  - reserve the resources on the indicated VPC pool for that connection;
  - assign a VPCI value to the connection and shall indicate the selected VPCI to the preceding exchange in the Connection element identifier parameter;
  - relate the reserved resources to the assigned VPCI value.
- If it cannot provide the requested resources on the indicated VPC pool, it shall reject the connection. If no VPCI is available in the indicated VPC pool, the connection shall be rejected with cause #45 "no VPCI/VCI available". In cases of lack of other resources, cause values specified in 3.3.1 shall apply.

c) *Simultaneous call/connection request from the assigning exchange and the non-assigning exchange*

As the assigning exchange assigns the VPCI value at the time of call/connection acceptance at the assigning exchange, a dual seizure of VPCI value cannot occur.

Both exchanges can simultaneously request a call/connection using the same VPC pool. In that case, each exchange performs the normal procedures and checks the availability of the requested resources, independent from the actions at the other exchange.

3.1.1.3 Abnormal procedure

For abnormal conditions of the one-side selection principle, the following procedures shall apply:

- If a Set_Up indication primitive with VPCI is received at the assigning exchange for that virtual path, an Incoming_Resources_Rejected request primitive shall be returned with cause "VPCI/VCI assignment failure". The event shall be reported to management.
- If a Set_Up indication primitive without VPCI is received at an exchange which is non-assigning for all virtual paths between the sending and receiving exchanges, an Incoming_Resources_Rejected request primitive shall be returned with cause "VPCI/VCI assignment failure". The event shall be reported to management.
- If an Incoming_Resources_Accepted indication primitive with VPCI is received at the assigning exchange for that virtual path, the event shall be reported to management. The call/connection shall be released using cause "VPCI/VCI assignment failure".
- If an Incoming_Resources_Accepted indication primitive without VPCI is received at an exchange which sent a Set-Up request without the Connection Element Identifier parameter, the event shall be reported to management, and the call/connection shall be released using cause "VPCI/VCI assignment failure".

For **Option 2** the following additional procedure applies:

- If a Set_Up indication primitive with the Exclusive connection element identifier parameter is received at the non-assigning exchange for that VPC pool, an Incoming_Resources_Rejected request primitive shall be returned with cause "VPCI/VCI assignment failure". The event shall be reported to management.

3.1.1.4 Interworking with nodes supporting only the assignment procedures according to Option 1

Option 1

Not applicable.

Option 2

Interworking with exchanges, which have implemented only the assignment procedures according to Option 1 (those were exclusively used in the first release of Q.2766.1), has to be taken into account. This affects the call/connection establishment from the non-assigning exchange to the assigning exchange. In order to provide a smooth interworking the instruction indicators for the Exclusive connection element identifier parameter shall be set to discard the parameter, and the following procedures shall be followed.

a) *Call/connection establishment from a non-assigning exchange supporting Option 2 to an assigning exchange supporting only Option 1*

The procedures of 3.1.1.2 b) shall be followed with the following exceptions and additions:

- The assigning exchange does not recognize the Exclusive connection element identifier parameter. It will select a VPCI without taking into account the indicated VPC pool.
- If the non-assigning exchange receives an Incoming_Resources_Accepted indication primitive with a VPCI indicating a VPC pool which is different from the one previously selected, it shall:
  - release the resources reserved for the previously selected VPC pool;
  - again perform the CAC function and check whether it can provide the requested resources on the indicated VPC pool from its point of view.

  If it can provide the requested resources on the indicated VPC pool, it shall reserve the resources on the indicated VPC pool for that connection and relate the reserved resources to the indicated VPCI value.

  If it cannot provide the requested resources on the indicated VPC pool, it shall release the connection in forward and backward direction with cause #37 "User cell rate not available".

b) *Call/connection establishment from a non-assigning exchange supporting only Option 1 to an assigning exchange supporting Option 2*

- The non-assigning exchange does not select a VPC pool and therefore the Exclusive connection element identifier parameter is not included in the Set_Up request primitive sent by the exchange.
- If the assigning exchange receives no Connection element identifier parameter nor an Exclusive connection element identifier parameter, it shall:
  - perform the CAC function and shall select one VPC pool from several available VPC pools which can provide the requested resources, e.g. bandwidth, from its point of view according to the requested traffic parameters;
  - reserve the resources on the selected VPC pool for that connection;
  - assign a VPCI value to the connection and shall indicate the selected VPCI to the preceding exchange in the Connection element identifier parameter;
  - relate the reserved resources to the assigned VPCI value.

2.3) Replacement of current clause 3.2.1.2.1/Q.2766.1

3.2.1.2.1 Incoming side of the exchange

a) *Assigning exchange*

After receiving a Set_Up indication primitive, an assigning exchange shall perform the assignment procedure for VPCI and bandwidth as described in 3.1.1.2 b). If this is successful, the Incoming_Resources_Accepted request primitive shall be issued immediately. The Incoming_Resources_Accepted request primitive shall at a minimum include the mandatory parameters listed in Table 2.4/Q.2764, including the Connection Element Identifier parameter.

b) *Non-assigning exchange*

Option 1

Procedures of ITU-T Q.2764 apply.

Option 2

After receiving a Set_Up indication primitive, a non-assigning exchange shall perform the assignment procedure as described in 3.1.1.2 a). If this is successful the Incoming_Resources_Accepted request primitive shall be issued immediately. The Incoming_Resources_Accepted request primitive shall at a minimum include the mandatory parameters listed in Table 2.4/Q.2764, without the Connection Element Identifier parameter.

2.4) Replacement of current clause 3.2.2.2.1/Q.2766.1

3.2.2.2.1 Incoming side of the exchange

a) *Assigning exchange*

After receiving a Set_Up indication primitive, an assigning exchange shall perform the assignment procedure for VPCI and bandwidth as described in 3.2.1.2.1 b). If this is successful the Incoming_Resources_Accepted request primitive shall be issued immediately. The Incoming_Resources_Accepted request primitive shall include the mandatory parameters listed in Table 2.4/Q.2764, and include the Connection Element Identifier parameter.

b) *Non-assigning exchange*

Option 1

Procedures of ITU-T Q.2764 apply.

Option 2

After receiving a Set_Up indication primitive, a non-assigning exchange shall perform the assignment procedure as described in 3.1.1.2 a). If this is successful the Incoming_Resources_Accepted request primitive shall be issued immediately. The Incoming_Resources_Accepted request primitive shall at a minimum include the mandatory parameters listed in Table 2.4/Q.2764, without the Connection Element Identifier parameter.

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