INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.2963.3
(05/98)

SERIES Q: SWITCHING AND SIGNALLING

Broadband ISDN – B-ISDN application protocols for access signalling

Digital Subscriber Signalling System No. 2 – Connection modification: ATM traffic descriptor modification with negotiation by the connection owner

ITU-T Recommendation Q.2963.3

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION Q.2963.3

DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 2 – CONNECTION MODIFICATION: ATM TRAFFIC DESCRIPTOR MODIFICATION WITH NEGOTIATION BY THE CONNECTION OWNER

Summary

The Q.2963 series of Recommendations belongs to the DSS 2 family of ITU-T Recommendations and specifies the procedure of the modification of traffic parameters of a call/connection in the active state.

Recommendation Q.2963.3 defines the procedure of the ATM Traffic Descriptor modification with negotiation which is equivalent to that specified in Recommendation Q.2962.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 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.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the 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.

CONTENTS

Recommendation Q.2963.3

DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 2 – CONNECTION MODIFICATION: ATM TRAFFIC DESCRIPTOR MODIFICATION WITH NEGOTIATION BY THE CONNECTION OWNER

(Geneva, 1998)

1 Scope

This Recommendation specifies the signalling protocol for ATM Traffic Descriptor modification with negotiation for the Broadband Integrated Services Digital Network (B-ISDN) at the T_B reference point or coincident S_B and T_B reference point (as defined in Recommendation I.413 [1]) by means of the Digital Subscriber Signalling System No. 2 (DSS 2). This Recommendation extends the ATM Traffic Descriptor modification capability specified in Q.2963.2 to support the traffic parameter negotiation which is equivalent to that specified in Q.2962.

In addition, this Recommendation specifies the protocol requirements at the T_B reference point where the service is provided to the user via a private B-ISDN.

The capability described in this Recommendation enables the connection owner to modify the ATM Traffic Descriptor with negotiation for call/connections that have already been established. This Recommendation specifies the procedure of the modification with negotiation of PCR, SCR and MBS using either an Alternative ATM traffic descriptor information element or a Minimum acceptable ATM traffic descriptor information element.

ATM Traffic Descriptor modification with negotiation is applicable to all connection oriented telecommunication services that are based on single point-to-point calls/connections. The ATM Traffic Descriptor modification with negotiation for point-to-multipoint calls/connections is outside the scope of this Recommendation.

This Recommendation is applicable to equipment, supporting ATM Traffic Descriptor modification with negotiation, to be attached at either side of a T_B reference point or coincident S_B and T_B reference point when used as an access to the public B-ISDN.

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.

[1]   ITU-T Recommendation I.413 (1993), *B-ISDN user-network interface.*

[2]   ITU-T Recommendation Q.2931 (1995), *Digital Subscriber Signalling System No. 2 – User-Network interface (UNI) Layer 3 specification for basic call/connection control.*

[3]   ITU-T Recommendation Q.2961.1 (1995), *Digital Subscriber Signalling System No. 2 – Additional traffic parameters: Additional signalling capabilities to support traffic parameters for the tagging option and the sustainable cell rate parameter set.*

[4]   ITU-T Recommendation Q.2962 (1998), *Digital Subscriber Signalling System No. 2 – Connection characteristics negotiation during call/connection establishment phase.*

[5]   ITU-T Recommendation Q.2963.1 (1996), *Digital Subscriber Signalling System No. 2 – Connection modification: Peak cell rate modification by the connection owner.*

[6]   ITU-T Recommendation Q.2963.2 (1997), *Digital Subscriber Signalling System No. 2 – Connection modification: Modification procedures for sustainable cell rate parameters.*

3   Definitions

For the purpose of this Recommendation, the definitions in clause 3/Q.2963.1 apply.

4   Abbreviations

This Recommendation uses the following abbreviations:

ATM   Asynchronous Transfer mode

B-ISDN   Broadband Integrated Services Digital Network

CLP   Cell Loss Priority

MBS   Maximum Burst Size

PCR   Peak Cell Rate

SCR   Sustainable Cell Rate

UNI   User-Network Interface

VC   Virtual Channel

5   Description

The description given in clause 5/Q.2963.2 shall apply with the following addition:

4)   The following negotiation capabilities are applicable in the modification procedure:

–   negotiation of sets of traffic parameters in the ATM traffic descriptor using an Alternative ATM traffic descriptor; and

–   negotiation of individual traffic parameters in the ATM traffic descriptor using a Minimum acceptable ATM traffic descriptor.

5.1   Modifiable connections

Subclause 5.1/Q.2963.2 shall apply with the replacement of its fourth paragraph with the following sentences.

During the modification with negotiation of the ATM traffic descriptor, the following rule applies:

•   *Traffic parameters in the backward direction*

When the entity sends a MODIFY REQUEST message that includes a Minimum acceptable ATM traffic descriptor information element, the traffic descriptor for the connection that applies to this entity's reception until completion of the modification procedure is a traffic descriptor for which the parameter values are determined by taking the maximum of the existing value, the value (if any) specified in the ATM traffic descriptor information element, and the value (if any) specified in the Minimum acceptable ATM traffic descriptor information element. When the entity sends a MODIFY REQUEST message that includes

an Alternative ATM traffic descriptor information element, the traffic descriptor for the connection that applies to this entity's reception until completion of the modification procedure is a traffic descriptor for which the parameter values are determined by taking the maximum of the existing value, the value (if any) specified in the ATM traffic descriptor information element, and the value (if any) specified in the Alternative ATM traffic descriptor information element.

- *Traffic parameters in the forward direction*

    When the entity sends a MODIFY REQUEST message that includes a Minimum acceptable ATM traffic descriptor information element, the traffic descriptor for the connection that applies to this entity's transmission until completion of the modification procedure is a traffic descriptor for which the parameter values are determined by taking the minimum of the existing value, the value (if any) specified in the ATM traffic descriptor information element, and the value (if any) specified in the Minimum Acceptable ATM traffic descriptor information element.

    When the entity sends a MODIFY REQUEST message that includes an Alternative ATM traffic descriptor information element, the traffic descriptor for the connection that applies to this entity's transmission until completion of the modification procedure is a traffic descriptor for which the parameter values are determined by taking the minimum of the existing value, the value (if any) specified in the ATM traffic descriptor information element, and the value (if any) specified in the Alternative ATM traffic descriptor information element.

5.2 Modification of a point-to-point connection

Subclause 5.2/Q.2963.2 shall apply.

5.3 Negotiation during modification

This Recommendation supports the traffic parameter negotiation in their modification procedure by using an Alternative ATM traffic descriptor or a minimum acceptable ATM traffic descriptor.

When an Alternative ATM traffic descriptor is used, the parameters of this information element are handled as a single set, whereas a Minimum acceptable ATM traffic descriptor information element allows the specification of a range of values for parameters which are then handled independently for the selection of their respective value. Both the use of Alternative ATM traffic descriptor information element and of the Minimum acceptable ATM traffic descriptor information element allows negotiation of any relevant ATM-related traffic parameters (i.e. peak cell rate, sustainable cell rate and maximum burst size traffic parameters, depending on the ATM transfer capability actually used for the connections).

6 Operational requirements

The provision of the connection modification capability is a service provider option.

6.1 Provision and withdrawal

It is a user and a network option to provide the procedures described in this Recommendation. If implemented, the procedures of this Recommendation may be provided as a subscription option to the served user on the origination side.

6.2   Requirements on the originating network side

See 6.1 above.

6.3   Requirements on the destination network side

See 6.1 above.

7   Primitive and state definitions

7.1   Primitive definitions

Clause 8/Q.2931 shall apply. No additional primitives between DSS 2 layer 3 and the Signalling ATM Adaptation Layer are defined for the purpose of this Recommendation.

7.2   State definitions

Subclause 7.2/Q.2963.1 shall apply.

8   Coding requirements

8.1   Messages

For the establishment of call/connections, the messages described in Recommendations Q.2931 and Q.2961 remain valid, and do not have to be enhanced. In order to support the modification with negotiation, the following messages are used.

–   MODIFY REQUEST;

–   MODIFY ACKNOWLEDGEMENT;

–   MODIFY REJECT;

–   CONNECTION AVAILABLE.

8.1.1   MODIFY REQUEST

This message is sent from the modification requesting entity to the modify responding entity to request modification of a single connection. See Table 8-1 for additions to the structure of this message shown in 8.1.1/Q.2963.1 and in 8.1/Q.2963.2.

Table 8-1/Q.2963.3 – MODIFY REQUEST message additional content

Message type: MODIFY REQUEST Significance: Global Direction: Both				
Information element	**Reference**	**Direction**	**Type**	**Length**
Alternative ATM traffic descriptor	8.2.1/Q.2962	Both	O (Note)	4-28
Minimum acceptable ATM traffic descriptor	8.2.2/Q.2962	Both	O (Note)	4-28
NOTE – Either the Alternative ATM traffic descriptor information element or the Minimum acceptable ATM traffic descriptor information element, but not both, shall be included in the MODIFY REQUEST message when traffic parameters are negotiable.				

8.1.2   MODIFY ACKNOWLEDGEMENT

This message is sent by the modification responding entity to indicate that the modify request is accepted. See Table 8-2 for additions to the structure of this message shown in 8.1.2/Q.2963.1.

Table 8-2/Q.2963.3 – MODIFY ACKNOWLEDGMENT message additional content

Message type: MODIFY ACKNOWLEDGMENT Significance: Global Direction: Both				
Information element	**Reference**	**Direction**	**Type**	**Length**
ATM traffic descriptor	4.5.6/Q.2931 8.2.1/Q.2961.1	Both	O (Note)	8-30
NOTE – Included to specify the traffic parameter values allocated for the modification if one or more traffic parameters were negotiable in the MODIFY REQUEST message.				

8.1.3   MODIFY REJECT

Subclause 8.1.3/Q.2963.1 shall apply.

8.1.4   CONNECTION AVAILABLE

Subclause 8.1.4/Q.2963.1 shall apply.

8.2   Coding of specific message types and specific information element

8.2.1   Coding of specific message type

Subclause 8.2.1/Q.2963.1 shall apply.

8.2.2   Coding of specific information elements

For the establishment of call/connections, the information elements described in Recommendations Q.2931 and Q.2961 remain valid, and do not have to be enhanced. In order to support the modification with negotiation, the following information elements have to be supported.

8.2.2.1   Broadband report type

Subclause 8.2.2/Q.2963.1 shall apply.

8.2.2.2   Alternative ATM traffic descriptor

Subclause 8.2.1/Q.2962 shall apply with the replacement of the last paragraph with the following paragraph:

The Alternative ATM traffic descriptor information element can have any combination of traffic parameters that is allowed for the ATM traffic descriptor information element for the specified broadband bearer capability. Within a single MODIFY REQUEST message, the combination of traffic parameters may be different for these two information elements. However, a traffic parameter can be set in the Alternative ATM traffic descriptor information element only if the traffic parameter was assigned to the connection during connection establishment. The alternative bandwidth requirements must be lesser than the parameter values included in the ATM traffic descriptor.

8.2.2.3   Minimum acceptable ATM traffic descriptor

Subclause 8.2.2/Q.2962 shall apply with the replacement of "SETUP" in the last paragraph with "MODIFY REQUEST".

9   Signalling procedures at the coincident S_B and T_B reference point

NOTE – When the OAM traffic descriptor information element is present, the allocation of bandwidth for OAM flow is based on the ATM traffic descriptor agreed (e.g. as received in the MODIFY ACKNOWLEDGE message.) Since the OAM flow allocation is bidirectional (see Note 2 of Table 4-22/Q.2931) the available user cell rate in one direction can be affected by negotiation of bandwidth in the other direction.

9.1   Modification procedure at the requesting entity

9.1.1   Modification request

Subclause 9.1.1/Q.2963.1 and clause 9/Q.2963.2 shall apply with the following addition:

The requesting entity initiates the modification with negotiation of the connection characteristics by including, in addition to the ATM traffic descriptor information element, either the Minimum acceptable ATM traffic descriptor information element or the Alternative ATM traffic descriptor information element, but not both, in the MODIFY REQUEST message. In the case of the use of the Alternative ATM traffic descriptor information element, the parameters of the information element are handled as a single entity whereas the Minimum acceptable ATM traffic descriptor information element allows the specification of a range of values for parameters which are handled independently. The alternative bandwidth requirements must be less than the parameter values included in the ATM traffic descriptor. If the Minimum acceptable ATM traffic descriptor information element is used, the traffic parameter values indicated shall be less than the corresponding traffic parameter values specified in the ATM traffic descriptor information element. The traffic parameter values specified in the Minimum acceptable ATM traffic descriptor information can be either greater or less than the existing values.

9.1.2   Modification acknowledgment

Subclause 9.1.2/Q.2963.1 shall apply with the following addition:

In case of modification with negotiation, a transit entity and a terminating entity shall allocate the resources which correspond to the ATM traffic descriptor included in the MODIFY ACKNOWLEDGE message. If an ATM traffic descriptor is not included in the MODIFY ACKNOWLEDGMENT message, the ATM traffic descriptor in the MODIFY REQUEST message shall be used for resource allocation.

9.1.3   Indication of modification rejection

Subclause 9.1.3/Q.2963.1 shall apply.

9.1.4   Response to STATUS messages while in the modify request state

Subclause 9.1.4/Q.2963.1 shall apply.

9.1.5   No response to modification request

Subclause 9.1.5/Q.2963.1 shall apply.

9.2 Modification procedures at the responding entity

9.2.1 Modification indication

Subclause 9.2.1/Q.2963.1 and clause 9/Q.2963.2 shall apply with the following addition:

In case of modification with negotiation, the MODIFY REQUEST message may include the Alternative ATM traffic descriptor or the Minimum acceptable ATM traffic descriptor in addition to the ATM traffic descriptor.

9.2.2 Modification acceptance

Subclause 9.2.2/Q.2963.1 and clause 9/Q.2963.2 shall apply with the following addition:

In case of modification with negotiation, the MODIFY REQUEST message may include the Alternative ATM traffic descriptor or the Minimum acceptable ATM traffic descriptor in addition to the ATM traffic descriptor.

When the Minimum acceptable ATM traffic descriptor information element is included in the MODIFY REQUEST message and the responding entity is able to provide the traffic parameter values specified in the ATM traffic descriptor information element, the entity shall:

– if a transit entity:

  • progress the modification request with both the ATM traffic descriptor information element and the Minimum acceptable ATM traffic descriptor information element;

– if a terminating entity:

  • progress the modification request with the ATM traffic descriptor information element.

When the Alternative ATM traffic descriptor information element is included in the MODIFY REQUEST message and the responding entity is able to provide the traffic parameter values specified in the ATM traffic descriptor information element and the entity is able to provide the traffic parameter values specified in the Alternative ATM traffic descriptor information element, the entity shall:

– if a transit entity:

  • progress the modification request with both the ATM traffic descriptor information element and the Alternative ATM traffic descriptor information element;

– if a terminating entity:

  • progress the modification request with the ATM traffic descriptor information element.

When the Alternative ATM traffic descriptor information element is included in the MODIFY REQUEST message and the responding entity is able to provide the traffic parameter values specified in the ATM traffic descriptor information element and the entity is not able to provide the traffic parameter values specified in the Alternative ATM traffic descriptor information element, the entity shall progress the modification request with the ATM traffic descriptor information element and without the Alternative ATM traffic descriptor information element.

9.2.2.1 Minimum acceptable ATM traffic parameter negotiation

If the responding entity is not able to provide some of the traffic parameter values indicated in the ATM traffic descriptor information element and the Minimum acceptable ATM traffic descriptor information element is included, the following procedures shall apply:

If the responding entity is not able to provide some of the traffic parameter values indicated in the ATM traffic descriptor information element but is able to provide at least their corresponding traffic parameter values in the Minimum acceptable ATM traffic descriptor information element, the

responding entity shall progress the modification request after adjusting the traffic parameter values in the ATM traffic descriptor information element to the values which can be supported. The adjusted parameter values will support at least the corresponding minimum acceptable values. The responding entity shall act as follows:

– if a transit entity:

  • if some of the parameters in the Minimum acceptable ATM traffic descriptor information element are still less than the corresponding parameters in the modified ATM traffic descriptor information element, then the modification shall be progressed with the Minimum acceptable ATM traffic descriptor information element containing all such parameters, in addition to the adjusted ATM traffic descriptor information element. Otherwise, the modification shall progress with the adjusted ATM traffic descriptor information element and without the Minimum acceptable ATM traffic descriptor information element;

– if a terminating entity:

  • the modification shall be progressed with the adjusted ATM traffic descriptor information element.

If the responding entity is not able to provide at least the traffic parameter values indicated in the Minimum acceptable ATM traffic descriptor information element, the responding entity shall reject the modification request.

9.2.2.2   Alternative traffic parameter negotiation

If the responding entity is not able to provide some of the traffic parameter values indicated in the ATM traffic descriptor information element and the Alternative ATM traffic descriptor information element is included, the following procedures shall apply:

If the responding entity is not able to provide the ATM traffic descriptor indicated in the ATM traffic descriptor information element but is able to provide the ATM traffic descriptor indicated in the Alternative ATM traffic descriptor information element, the responding entity shall progress the modification request by using the contents of the Alternative ATM traffic descriptor information element as the ATM traffic descriptor.

If the responding entity can provide neither the ATM traffic descriptor indicated in the ATM traffic descriptor information element nor the ATM traffic descriptor indicated in the Alternative ATM traffic descriptor information element, the responding entity shall reject the modification request.

The MODIFY ACKNOWLEDGE message returned by the terminating entity shall include the ATM traffic descriptor which indicates the finally accepted parameters. The transit entity shall allocate the resources which correspond to this ATM traffic descriptor. If the ATM traffic descriptor is not included in the MODIFY ACKNOWLEDGMENT message, the transit entity shall use the ATM traffic descriptor in the MODIFY REQUEST message for resource allocation.

9.2.3   Modification confirmation

Subclause 9.2.3/Q.2963.1 shall apply.

9.2.4   Modification rejection

Subclause 9.2.4/Q.2963.1 shall apply with the following addition:

When both the Minimum acceptable ATM traffic descriptor and the Alternative ATM traffic descriptor information elements are present in a MODIFY REQUEST message, the modification request shall be rejected with cause #73, "unsupported combination of traffic parameters".

If the parameters of the Alternative ATM traffic descriptor information element or Minimum acceptable ATM traffic descriptor information element are not according to the allowed combinations as specified in 8.2.2.2 and 8.2.2.3 respectively, the network shall handle these information elements as if they were non-mandatory information elements with content error as specified in 5.6.8/Q.2931.

9.3 Transit entity conveyance of CONNECTION AVAILABLE messages

Subclause 9.3/Q.2963.1 shall apply.

10 Procedures at the T_B reference point for interworking with private B-ISDNs

The procedures specified in clause 9/Q.2963.2 shall apply.

11 Interworking with other networks

No interworking with other networks has been identified.

12 Interworking with supplementary services

Clause 12/Q.2963.2 shall apply.

13 Parameter values

The parameter values specified in clause 13/Q.2963.1 shall apply.

14 Dynamic description SDLs

The SDLs specified in clause 14/Q.2963.1 shall apply.

APPENDIX I

Example configuration of user and network behaviour during modification procedures

These examples show the configuration in which both the initiating and the addressed users are terminating entities.

MODIFY REQUEST

MODIFY REQUEST
MODIFY ACKNOWLEDGE

MODIFY ACKNOWLEDGE
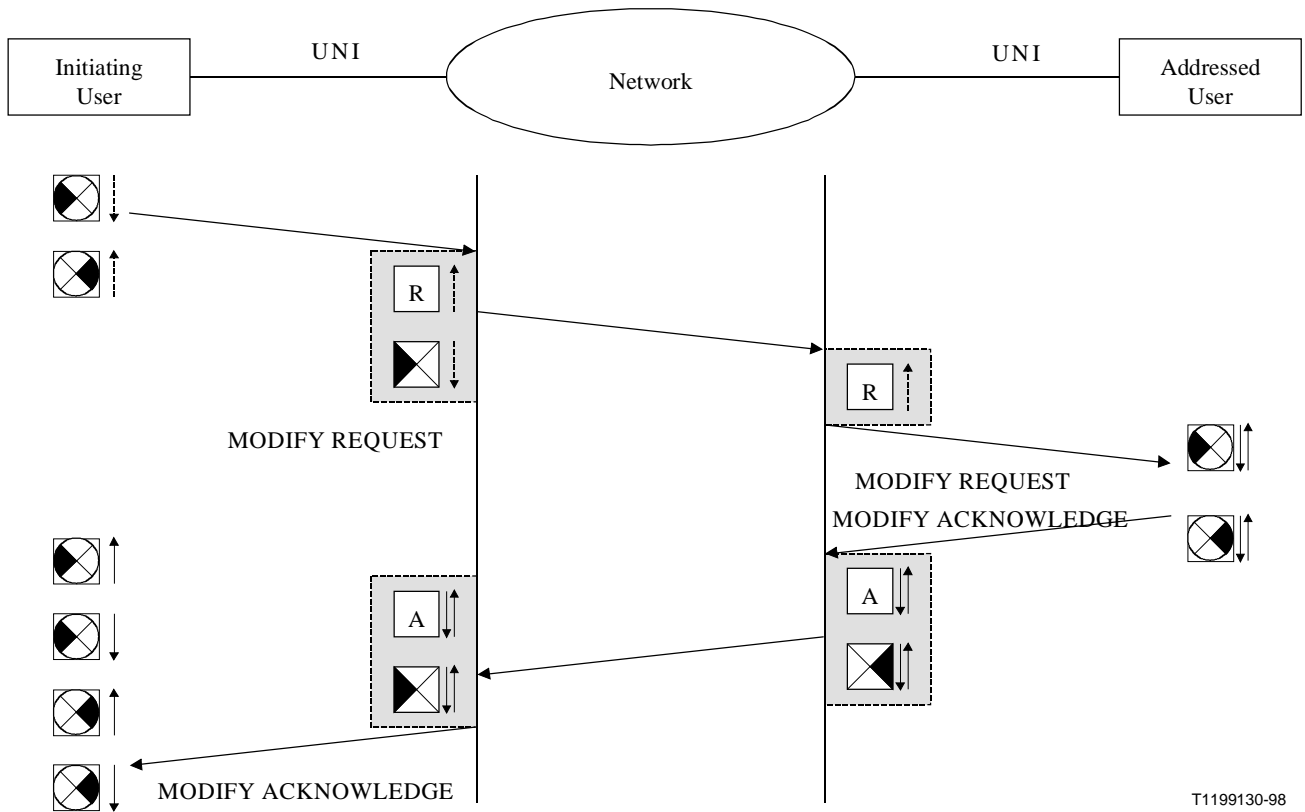
T1199130-98

Forward UPC change

Backward UPC change

Change of applied forward ATM traffic parameters

Change of applied backward ATM traffic parameters

Increase of any parameter based on the value specified in the ATM traffic descriptor IE and the value (if any) specified in the Alternative ATM traffic descriptor IE

Decrease of any parameter based on the value specified in the ATM traffic descriptor IE and the value (if any) specified in the Alternative or Minimum Acceptable ATM traffic descriptor IE

Increase of any parameter up to the finally accepted value

Decrease of any parameter down to the finally accepted value

R/A   CAC change
   R Reservation of resources
   A Allocation of resources

**Figure I.1/Q.2963.3 – Procedure of modification without request
of connection acknowledgement**

Initiating
User

UNI

Network

UNI

Addressed
User

R

MODIFY REQUEST

R

MODIFY REQUEST
MODIFY ACKNOWLEDGE

A

A

MODIFY ACKNOWLEDGE

CONNECTION AVAILABLE

CONNECTION AVAILABLE

T1199140-98

Forward UPC change

Backward UPC change

Change of applied forward ATM traffic parameters

Change of applied backward ATM traffic parameters

Increase of any parameter based on the value specified in the ATM
traffic descriptor IE and the value (if any) specified in the Alternative
ATM traffic descriptor IE

Decrease of any parameter based on the value specified in the ATM
traffic descriptor IE and the value (if any) specified in the Alternative or
Minimum Acceptable ATM traffic descriptor IE

Increase of any parameter up to the finally accepted value

Decrease of any parameter down to the finally accepted value

R/A CAC change
R Reservation of resources
A Allocation of resources

**Figure I.2/Q.2963.3 – Procedure of modification with request
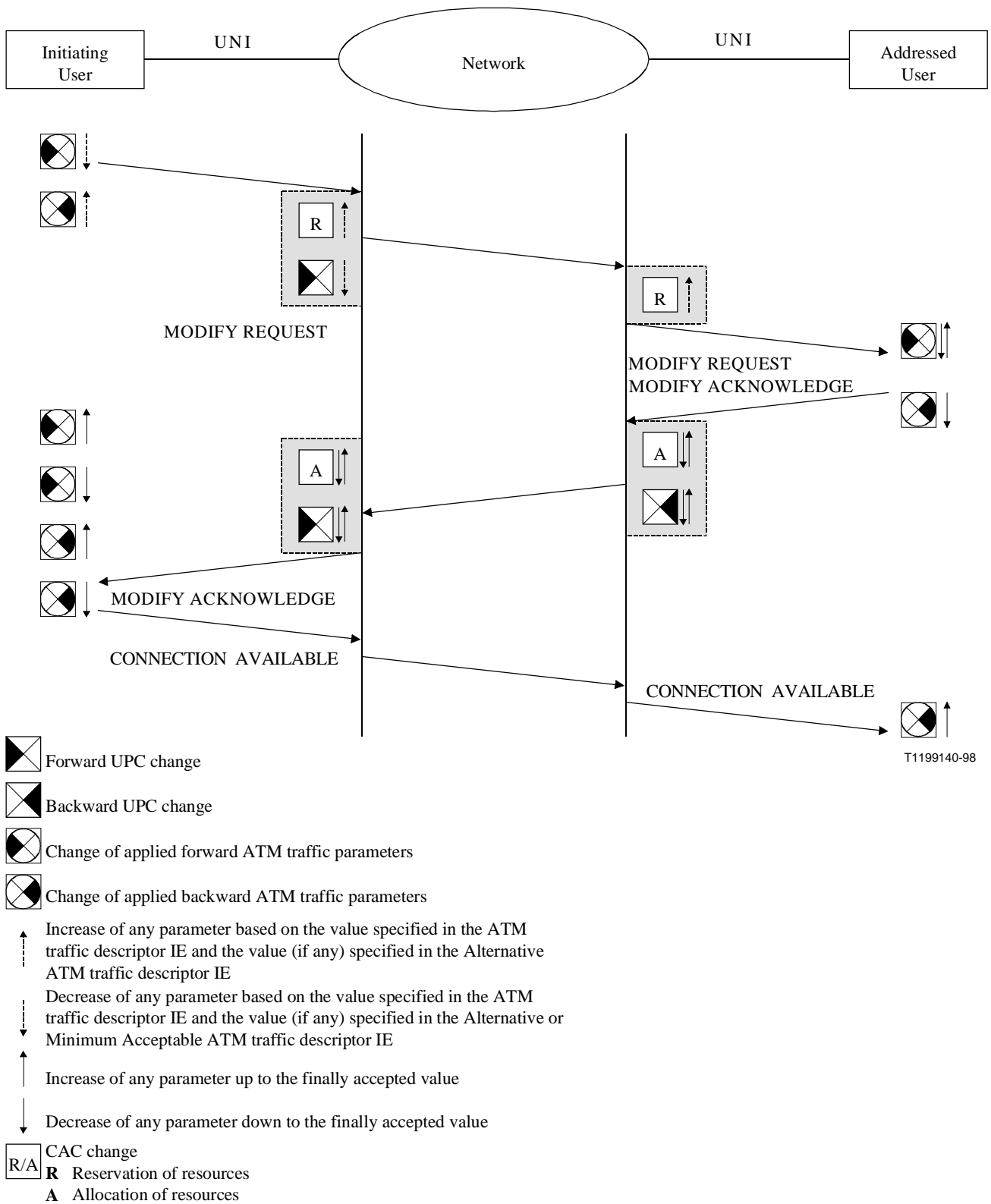of connection acknowledgement**

APPENDIX II

Guidelines for the use of the instruction indicator

It is suggested that the instruction indicator for the alternative ATM traffic indicator and minimum acceptable ATM traffic descriptor information elements be encoded to indicate "discard, proceed and report status".

ITU-T RECOMMENDATIONS SERIES

Series A   Organization of the work of the ITU-T

Series B   Means of expression: definitions, symbols, classification

Series C   General telecommunication statistics

Series D   General tariff principles

Series E   Overall network operation, telephone service, service operation and human factors

Series F   Non-telephone telecommunication services

Series G   Transmission systems and media, digital systems and networks

Series H   Audiovisual and multimedia systems

Series I   Integrated services digital network

Series J   Transmission of television, sound programme and other multimedia signals

Series K   Protection against interference

Series L   Construction, installation and protection of cables and other elements of outside plant

Series M   TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits

Series N   Maintenance: international sound programme and television transmission circuits

Series O   Specifications of measuring equipment

Series P   Telephone transmission quality, telephone installations, local line networks

Series Q   **Switching and signalling**

Series R   Telegraph transmission

Series S   Telegraph services terminal equipment

Series T   Terminals for telematic services

Series U   Telegraph switching

Series V   Data communication over the telephone network

Series X   Data networks and open system communications

Series Y   Global information infrastructure

Series Z   Programming languages