INTERNATIONAL TELECOMMUNICATION UNION

CCITT

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

F.811

(08/92)

TELEMATIC, DATA TRANSMISSION, ISDN BROADBAND, UNIVERSAL, PERSONAL TELECOMMUNICATIONS AND TELECONFERENCE SERVICES

OPERATIONS AND QUALITY OF SERVICE

BROADBAND CONNECTION-ORIENTED BEARER SERVICE

Recommendation F.811

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT 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 Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation F.811 was prepared by Study Group I and was approved under the Resolution No. 2 procedure on the 4th of August 1992.

CCITT NOTES

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

2) A list of abbreviations used in this Recommendation can be found in Annex B.

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Recommendation F.811

BROADBAND CONNECTION-ORIENTED BEARER SERVICE

1 Definition

The **broadband connection-oriented bearer service** category provides unrestricted digital information transfer between Sb/Tb reference points. This bearer category flexibly supports connection oriented communications at any bit rate over a virtual connection via the 155.52 Mbit/s or 622.08 Mbit/s interface. This bit rate can be approximately constant to support constant bit rate (CBR) traffic or it can be highly variable to support variable bit rate(VBR) traffic. Signalling information transfer will be provided over a separate virtual connection.

2 Connection

2.1.1 *General description*

The asynchronous transfer mode (ATM) capability allows users in a point-to-point, multipoint, broadcast and multicast configuration to communicate via virtual path connections and virtual channel connections in the broadband aspects of integrated services digital network (B-ISDN). The services provide cell based communications in a bidirectional symmetric, bidirectional asymmetric or unidirectional fashion. The user specifies several parameters at call set-up to characterize the communication, e.g. symmetry and bit rate characterization, quality of service (QOS). The bit rate may be characterized by a group of sub-attributes such as peak bit rate, mean bit rate, variable bit rate, etc. Selection of virtual paths and/or virtual channels as described in Recommendation I.150, may be used.

2.1.2 *Configuration variation description*

Various configurations of information flows can be established as defined in Table 1/F.811.

TABLE 1/F.811

Mode / Configuration	Unidirectional	Bidirectional-symmetric	Bidirectional-asymmetric
Point-to-point	E	E	E
Multipoint:			
a) Point-to-multipoint	A		
b) Multipoint-to-point	A		
c) Multipoint-to-multipoint	A		
Broadcast	A		
Multicast	A		

E Essential

A Additional

2.2 *Specific terminology*

Information transfer characteristics: attributes which characterize traffic as defined in Recommendation I.311, § 1.4.1.1.2.

2.2.1 *Point-to-point*

Refer to Recommendation I.210.

2.2.2 *Multipoint*

Communication between the following entities:

a) One source entity to multiple destinations entities (point-to-multipoint);

b) Multiple source entity to a single destination entity (multipoint-to-point), e.g. polling station;

c) Multiple source entities to multiple destination entities (multipoint-to-multipoint).

2.2.3 *Broadcast*

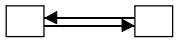
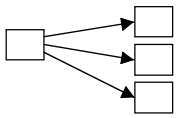
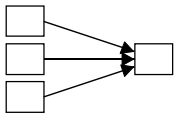
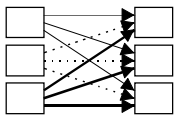
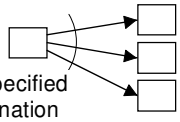
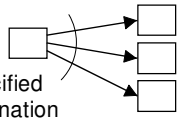
Unidirectional communicatioln from a single source entity to an unlimited number of unspecified destination entities.

2.2.4 *Multicast*

Unidirectional communication from a single source entity to a limited number of specified destination entities.

Note – Examples of communication configurations related to these terms in §§ 2.2.2 to 2.2.4 can be found in Table 2/F.811.

TABLE 2/F.811
Examples of communication configuration

Configuration		Service example
Point-to-point		Videotelephony
Multipoint Point-to-multipoint		Tele-advertising
Multipoint-to-point		Polling service
Multipoint-to-multipoint		Business application
Broadcast	 Unspecified destination	TV program distribution
Multicast	 Specified destination	Video distribution

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2.2.5 *Network determined user busy*

Refers to the situation where the network has determined that the resources required to complete the call on the called user access interface are not currently available.

2.2.6 *User determined user busy*

Refers to the case where the user chooses to indicate the busy condition. Busy conditions are described in Recommendation I.221

2.2.7 *Cell loss probability*

As a quality of service parameter the % cell loss in period is the probability (P) that the cell loss rate is larger than the threshold value (ρ) in the period (T). The actual values of P and T, which may vary for CBR and VBR, are contained in the appropriate I-Series Recommendations.

2.2.8 *Maximum transfer delay user-network interface to user-network interface*

As a quality of service parameter this defines the maximum delay between the source user-network interface and the destination user-network interface, including for example the delays per switch and per transmission system.

2.2.9 *FMBS*

This abbreviation means frame mode bearer service.

2.3 *Service sub-category*

This service is divided into a number of sub-categories. These are listed below along with examples of appropriate user applications.

[A] CBR (constant bit rate)

a) CBR video applications

b) CBR data applications

c) CBR voice applications

d) CBR audio programmes

[B] VBR (variable bit rate) with timing

a) VBR video applications

b) VBR audio applications

Application services

[C] VBR without timing

[C1] emulation of packet mode bearer services

[C2] emulation of frame mode bearer services

a) high speed data transfer

b) medical imaging applications

[C3] others

Applications including and additional to [A], [B] and [C]

[X] [ATM adaptation layer (AAL) defined by user]

Note – These applications are intended to complement user applications identified under [A], [B] and [C] if and when needed by the customer.

3 Procedures

3.1 *Provision/withdrawal*

3.1.1 By arrangement with the Administration.

3.1.2 *Subscription options*

This bearer service category is offered with several subscription options for the interface as summarized in Table 3/F.811.

TABLE 3/F.811

Subscription option	Value
Maximum number of user to user and user to network VPs available on the interface	m, where $m \leq 2^8$ and the condition a)
Maximum number of VCs available on each VP	n, where $n \leq 2^{16}$ and the condition a)

VP Virtual path

VC Virtual channels

a) Condition: $(\log_2 m) + (\log_2 n) \leq q$, where q is the number of active bits negotiated between the user and the network provider, and $q \leq 24$.

Note – In the initial service introductory period, the selectable values may be restricted by the network provider.

3.2 *Normal procedures*

3.2.1 *Activation/deactivation/registration*

By arrangement with service provider.

3.2.2 *Invocation and operation*

User-network signalling is done over a separate signalling channel.

3.2.2.1 *Call set-up originating the service*

The call is originated by the user requesting from the network the required bearer service; the request includes destination address(es) (E.164 address) identifying the called user(s). Other information, as required for the bearer service and for use by the network including symmetry, bit rate and QOS may be included.

3.2.2.1.1 *Indications during call set-up*

After initiating a call, the calling user will receive an acknowledgement that the network is able to process the call. The called user will receive an indication of the arrival of an incoming call of this bearer service.

A calling user attempting to establish a call to a user who is identified by the network to be busy (either network-determined user busy or user-determined user busy) will be given an appropriate indication by the network.

3.2.2.2 *Procedures during the communication phase*

3.2.2.2.1 *Renegotiation of source traffic characteristics during the call communication phase*

Both user and network may request the change of the traffic characteristics of an already established call. Traffic characteristics may be changed after negotiation between user and network. Notification of this change should be sent to all parties.

3.2.2.3 *Call release*

The call may be terminated by either or both users by sending a request to the network. If one user terminates a call, an appropriate indication is sent to the other user.

3.3 *Exceptional procedures*

3.3.1 *Activation/deactivation/registration*

Not applicable.

3.3.2 *Invocation and operation*

3.3.2.1 *Failure situation due to user error*

A user specifying a network-identifiable, improper service request will be given an appropriate failure indication by the network and the call set-up will be ceased.

A user specifying a non-valid destination address will be given an appropriate failure indication by the network and the call set-up will be ceased.

When the users input cell stream violates the negotiated throughput, the network may take action and discard cells.

3.3.2.2 *Failure situation due to resource limitations*

During the call set-up, if the requested service parameters, such as QOS or bandwidth, are not available on the calling or called user-network interface (UNI), or in the network, an appropriate failure indication should be sent to the calling user.

If the network cannot complete the call due to other limitations on network resources, an appropriate failure indication will be given to the requesting user.

3.3.2.3 *Failure situation due to the called user state*

A calling user attempting to establish a call to a user who is identified by the network to be busy (either network-determined user busy or user-determined user busy) will be given an appropriate failure indication by the network.

A user attempting to establish a call to a user whose terminal equipment fails to respond will be given an appropriate failure indication by the network and the call set-up will be ceased.

3.4 *Alternative procedures*

Not applicable.

3.5 *Verification*

Not applicable.

3.6 *Quality of service*

3.6.1 *QOS parameters*

QOS forms an integral part of the call. The following QOS parameters will be supported:

1) Cell Loss Ratio;

2) Maximum Transfer Delay (UNI-to-UNI);

Note – Principles of quality of service and network performance (NP) and their relationship with each other are described in Recommendation I.350

3.6.2 *QOS indication and negotiation*

QOS is indicated during the call set-up phase and can be negotiated during a call.

3.6.2.1 *QOS indication and negotiation at calling end*

The calling party specifies its quality of service request at the time of the call set-up request. This indicates to the network the acceptable ranges of the quality of service requested.

If the calling party does not specify a value for a particular parameter or constraint, then the standard or network default is assumed.

If the network can provide the requested QOS parameters, it accepts the values and transmits the information to the called party.

If the network is unable to provide the requested QOS, then it will take one of the following actions:

– if unable to provide minimum quality of service, the network will clear the call;

– if able to provide at least the minimum quality of service, the network will establish the call.

Note – Minimum QOS is the lowest QOS acceptable by prearrangement between the user and the service provider.

3.6.2.2 *QOS indication and negotiation at called end*

Upon receipt of a call set-up request, the called party will take one of the following actions:

– if able to support the QOS requested, the called party will accept the call;

– if unable to support the minimum quality of service, the called party will reject the call;

– if unable to support the quality of service requested, but able to support the minimum quality of service, the called party will accept the call.

4 Network capabilities for charging

This Recommendation does not cover charging principles. Future Recommendations in the D-Series are expected to contain that information. However, charging for the service may be offered under tariffs containing usage sensitive rate elements, e.g. variable bit rate charging, quality of service.

5 Interworking requirements

Interworking between the B-ISDN and narrow-band ISDN for the bit rates and QOS which the narrow-band ISDN can accommodate is required. A caller should be able to originate a call at the Sb or Tb reference point and terminate at an S or T reference point on the B- or D-channel (and vice versa).

Interworking between the B-ISDN and networks referred to as digital public switched telephone network (PSTNs), pre-ISDNs, pilot ISDNs or extended integrated digital network (IDNs) may be required.

Interworking between B-ISDN and PSTNs, for data calls which have information transfer characteristics within the capability of the PSTNs, require the use of an interworking function (including a modem).

Note – The end-to-end delay limits for B-ISDN interactive services are not yet established. It will be necessary to take into consideration the implication of propagation delay on real-time interactive services (e.g. interactive video/audio) introduced by use of satellites when determining these end-to-end delay limits.

6 Possible supplementary services

Supplementary services applicable to the switched unrestricted 64 kbit/s bearer service may be applicable to B-ISDN services.

ANNEX A

(to Recommendation F.811)

Broadband connection-oriented bearer service category

Sub-categories	A	B	C1	C2	C3	X
Bearer service attributes	Values of attributes					
Information transfer attributes						
1 Information transfer mode	ATM	ATM	ATM			ATM
1.1 Connection mode	CO	CO	CO			CO
1.2 Traffic type	Constant bit rate	Variable bit rate	Variable bit rate			User defined
1.3 Timing end-to-end	Required	Required	Not required			User defined
1.4 Virtual channel identifier (VCI) transparency	Transparent for virtual path services					
2 Information transfer rate (bit/s) (Note 1) (Note 5)	(Note 1)					
2.1 Peak bit rate	Specific bit rate	(Note 4)	(Note 4)			(Note 4)
2.2 Mean bit rate	Same as peak bit rate	(Note 4)	(Note 4)			(Note 4)
3 Information transfer capability	Unrestricted speech, 3,1 kHz audio, 7 kHz audio (Note 3)	Unrestricted	Unrestricted			(Note 4)
4 Structure	Unstructured 8 kHz integrity (Note 3)	AAL-SDU integrity (Note 2)	AAL-SDU integrity (Note 2)			ATM-SDU, i.e. 48-octet integrity
5 Establishment of communication	Demand, reserved, permanent					
6 Symmetry	Bidirectional symmetric, bidirectional asymmetric, unidirectional					
7 Communication configuration	Point-to-point, multipoint, broadcast					

Sub-categories	A	B	C1	C2	C3	X
Bearer service attributes	Values of attributes					
Access attributes 8 Access channel and rate (bit/s) 8.1 User information 8.2 Signalling	Virtual channel connection or virtual path connection via the 155.52 Mbit/s interface. The maximum service bit rate is for further study (see Note 1). Signalling virtual channel for signalling					
9 Access protocols 9.1 Signalling access protocol – Physical layer	Rec. I.432	Rec. I.432	Rec. I.432			Rec. I.432
9.2 Signalling access protocol ATM layer	Recs. I.150, I.361	Recs. I.150, I.361	Recs. I.150, I.361			Recs. I.150, I.361
9.3 Signalling access protocol ATM adaptation layer (AAL)		Rec. I.362	Rec. I.363			Type 3
9.4 Signalling access protocol layer 3 (above AAL) (Here "layer 3" corresponds to signalling terminology not B-ISDN PRM)	Recs. Q.930, Q.931 (to be amended for broadband) or others to be defined (see Note 4)					
9.5 Informaction access protocol – Physical layer	Rec. I.432	Rec. I.432	Rec. I.432			Rec. I.432
9.6 Information access protocol ATM layer	Recs. I.150, I.361	Recs. I.150, I.361	Recs. I.150, I.361			Recs. I.150, I.361
9.7 Information access protocol ATM adaptation layer (AAL)	Recs. I.362, I.363 Type 1	Recs. I.362, I.363 Type 2	Recs. I.362, I.363 Type 3			Not appli-cable (user defined)

9.8 Information access protocol – Layers above AAL up to layer 3	A	B	C1	C2	C3	X
	User defined	User defined	Rec. X.25	FMBS	Others	User defined

Sub-categories	A	B	C1	C2	C3	X
Bearer service attributes	Values of attributes					
General attributes 10 Supplementary services provided	Existing supplementary services when supporting N-ISDN services. Supplementary services for other services are for further study					
11 Quality of service 11.1 Cell loss probability	Quality not less than N-ISDN when supporting N-ISDN services. Other services under study					
11.2 Maximum transfer delay	See Note 4					
12 Interworking possibilities	Interworking with other connection-oriented services in other networks					
13 Operational and commercial aspects						

Note 1 – As described in Recommendations I.432 and I.211, the maximum service bit rate at the 155.52 Mbit/s interface will be less than 135.631 Mbit/s. The maximum bit rate at the 622.08 Mbit/s interface is for further study. The actual value depends on the capacity required by signalling, operations, administration and maintenance (OAM) and ATM adaptation overheads. Also granularity of the actual service bit rates at the 155 Mbit/s and 622 Mbit/s interface, offered by the network is contained in the appropriate I-Series Recommendations.

Constant bit rate means that the peak bit rate as information transfer rate attribute value is equal to the mean bit rate observed at the S/T reference point.

For sub-category A only peak rate is required.

The mapping of the service bit rate (at the AAL service boundary) to cell transfer rate (at the ATM service access boundary) and the location of this function are contained in the appropriate I-Series Recommendations.

Note 2 – Attribute values for message mode, streaming mode, assured operation, non-assured operation in this service class are contained in the appropriate I-Series Recommendations.

Note 3 – This will be used for narrow-band integrated services digital network (N-ISDN) circuit mode bearer service.

Note 4 – Values of these attributes are contained in appropriate I-Series Recommendations.

Note 5 – For bidirectional asymmetric communication, values are specified individually for each direction of transmission.

ANNEX B

(to Recommendation F.811)

Alphabetical list of abbreviations used in this Recommendation

AAL	ATM adaptation layer
ATM	Asynchronous transfer mode
B-ISDN	Broadband integrated services digital network
CBR	Constant bit rate
CO	Connection oriented
FMBS	Frame mode bearer service
IDN	Integrated digital network
N-ISDN	Narrow-band integrated services digital network
NP	Network performance
OAM	Operations, administration and maintenance
PRM	Protocol reference model
PSTN	Public switched telephone network
QOS	Quality of service
SDU	Service data unit
UNI	User-network interface
VBR	Variable bit rate
VCI	Virtual channel identification
VP	Virtual path