INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

I.377

(10/2000)

SERIES I: INTEGRATED SERVICES DIGITAL NETWORK

Overall network aspects and functions – General network requirements and functions

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Network requirements to support charging and accounting in B-ISDN

ITU-T Recommendation I.377

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION I.377

NETWORK REQUIREMENTS TO SUPPORT CHARGING AND ACCOUNTING IN B-ISDN

Summary

This Recommendation specifies the network capabilities to support the registration and communication of information required for charging and accounting of ATM connections in order to support the charging and accounting principles as defined in Recommendation D.224. It specifies the events to be registered, for each event the parameters to be registered and the requirements related to the communication of this information to an external system.

Source

ITU-T Recommendation I.377 was prepared by ITU-T Study Group 13 (1997-2000) and was approved by the WTSA (Montreal, 27 September-6 October 2000).

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 Assembly (WTSA), 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 WTSA 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.

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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 I.377

NETWORK REQUIREMENTS TO SUPPORT CHARGING AND ACCOUNTING IN B-ISDN

(Montreal, 2000)

1 Scope

This Recommendation specifies the network capabilities to support the registration and communication of information required for charging of ATM connections in order to support all the charging and accounting principles as defined in Recommendation D.224. In a practical situation, in a given network and at a given moment in time, a network operator may choose not to use all defined charging and accounting principles in that network. If the operator chooses not to use specific D.224 options, some related requirements in this Recommendation may be not applicable. Specific requirements to support charging for point-to-multipoint ATM connections are not currently addressed in this Recommendation. They are left for further study.

2 References

The following ITU-T Recommendations and other references contan 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.

[D.224] ITU-T Recommendation D.224 (1999), *Charging and accounting principles for ATM/B-ISDN.*

[E.191] ITU-T Recommendation E.191 (2000), *B-ISDN addressing.*

[F.811] ITU-T Recommendation F.811 (1996), *Broadband connection-oriented bearer service.*

[F.813] ITU-T Recommendation F.813 (1995), *Virtual path service for reserved and permanent communications.*

[I.150] ITU-T Recommendation I.150 (1999), *B-ISDN asynchronous transfer mode functional characteristics.*

[I.311] ITU-T Recommendation I.311 (1996), *B-ISDN general network aspects.*

[I.356] ITU-T Recommendation I.356 (2000), *B-ISDN ATM layer cell transfer performance*.

[I.361] ITU-T Recommendation I.361 (1999), *B-ISDN ATM layer specification.*

[I.371] ITU-T Recommendation I.371 (2000), *Traffic control and congestion control in B-ISDN.*

[I.371.1] ITU-T Recommendation I.371.1 (1997), *Traffic control and congestion control in B-ISDN: Conformance definitions for ABT and ABR.*

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

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

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

[Q.2726.4] ITU-T Recommendation Q.2726.4 (2000), *Extensions to the B-ISDN user part application generated identifiers.*

[Q.2931] ITU-T Recommendation Q.2931 (1995), *Digital Subscriber Signalling System No. 2 (DSS2) – User-Network Interface (UNI) Layer 3 specification for basic call/connection control.*

3 Terms and definitions

3.1 Definitions

This Recommendation defines the following terms:

3.1.1 recording interface: A recording interface indicates a (standardized) interface at which the registration takes place of connection-related information to support the charging and accounting of ATM connections.

3.1.2 connection detail record: A Connection Detail Record (in this Recommendation abbreviated as CDR) contains the registered measurements and information for a connection for a specific time interval.

3.1.3 connection establishment: This term is defined in Recommendation D.224 as follows: *Connection establishment* indicates the moment the connection has been set up and has become available to the user to transport ATM cells. For connections using signalling, this corresponds to the entry into the "active" state.

3.1.4 connection release: This term is defined in Recommendation D.224 as follows: *Connection release* indicates the moment the connection has become unavailable to the user to transport ATM cells. For connections using signalling this corresponds to the departure from the " active" state.

3.1.5 connection's active phase: This term is defined in Recommendation D.224 as follows: The *connection's active phase* indicates the entire period between connection establishment and connection release.

3.1.6 recording interval: A recording interval is the time interval that the registration pertains to. Information related to a given connection may be registered for one or several successive recording intervals. Examples for the use of multiple recording intervals are the following:

– in case of connection modification;

– to support multiple charging periods (where the end of a charging period coincides with the end of a recording interval);

– to allow a network external system to be provided with registered information before the connection is released;

– to limit the consequences of data loss.

The first recording interval for a connection is likely to start at connection establishment. The final recording interval for a connection is likely to end at connection release. Intermediate recording intervals may be started and stopped at regular intervals, or by special events, such as listed above.

3.1.7 charging period: An Administration may choose to apply different charges to different periods, e.g. charges for peak and off-peak hours. Such periods are referred to as charging periods (see 5.3/D.224).

3.1.8 direction- and location-related terms

For the relation between originating and terminating UNI, the forward and backward direction and the ingress and egress sides, see Figure 1.

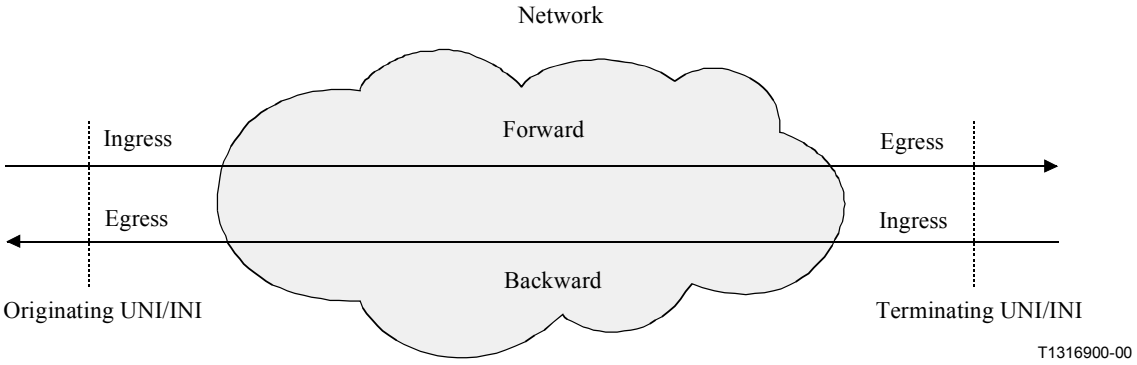


Figure 1/I.377 – Illustration of the terminology originating/terminating UNI, forward/backward direction and ingress/egress sides of one network

– *Originating UNI/INI*: The UNI or INI with the party that initiated the connection (for SVCs: calling party).
– *Terminating UNI/INI*: The UNI or INI with the party to which the connection was established (for SVCs: called party).
– *Forward direction*: The direction from the originating UNI/INI to the terminating UNI/INI.
– *Backward direction*: The direction from the terminating UNI/INI to the originating UNI/INI.
– *Ingress:* Going into the network.
– *Ingress cell count*: The number of cells admitted into the network.
– *Egress*: Coming out of the network.
– *Egress cell count*: The number of cells delivered by the network.

3.2 Abbreviations and acronyms

This Recommendation uses the following abbreviations:

ATC ATM Transfer Capability [I.371]
ATM Asynchronous Transfer Mode
B-ISDN Broadband Integrated Services Digital Network
CDR Connection Detail Record (see 3.1.2)
CLP Cell Loss Priority [I.361, I.356, I.371]
INI Inter-Network Interface [I.371]
NPC Network Parameter Control [I.371]
UPC Usage Parameter Control [I.371]
VCC Virtual Channel Connection [I.311, I.150]
VPC Virtual Path Connection [I.311, I.150]

4 Network capabilities for the registration of parameters related to charging

For each established connection, and at each interface designated as a recording interface, the network shall be able to record the connection-related information for the events specified in 4.1 with the parameters as specified in 4.2.

Each interface used as UNI or as INI shall provide the capability to be designated as a recording interface. Whether or not an interface is assigned as a recording interface is administration-specific.

4.1 Registration triggers

The network shall be able to register information at the occurrence of the following events:

1) at connection establishment (see 4.2.1);
2) at an unsuccessful connection set-up attempt (failed) (see 4.2.2);
3) when any of the traffic contract parameters is modified (see 4.2.3);
4) at an unsuccessful attempt to change any of the traffic parameters (connection modification attempt (failed)) (see 4.2.4);
5) at the end of a charging period (see 4.2.5);
6) at the end of a recording interval (see 4.2.5);
7) at connection release (see 4.2.6).

In Figure 2 the registration moments have been indicated graphically.

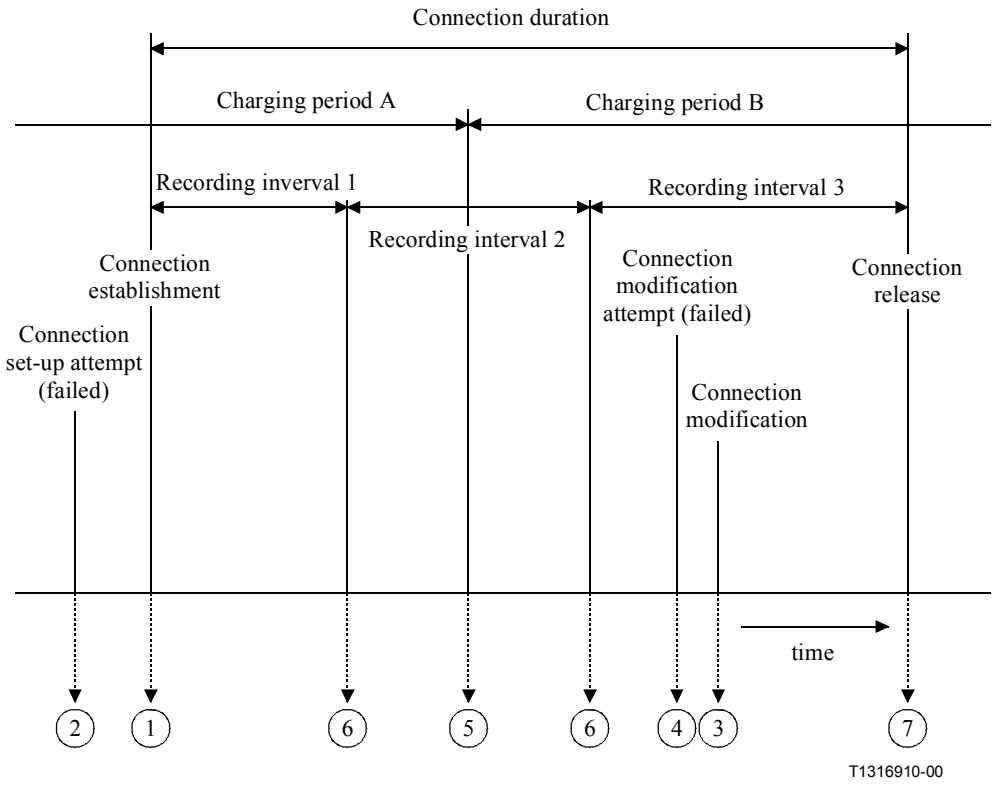


Figure 2/I.377 – Moments in time at which registration shall be performed – the numbers correspond with the bullet numbers in the text

4.2 Parameters to be registered

The following subclauses describe the information to be registered at a recording interface, separately for each of the events listed in 4.1. The requirements relate to each interface which is designated to be a recording interface and to each connection crossing that interface.

4.2.1 Capabilities for registration at connection establishment

At connection establishment, the network shall register the information as listed in the following subclauses.

4.2.1.1 Interface identification

The network shall supply and register an identification of the interface which recorded the connection-related information. The network shall ensure that the interface identification is unique within the network. Its value is administration-specific.

4.2.1.2 Identification of connection end-points

The network shall register an indication of the connection end-points,

– to allow determination of the interfaces that delineate the connection portion to which the charge applies; and

– to allow the charge to be itemized to a more detailed level than to the level of the interface.

For a PVC, the B-ISDN number [E.191] of the two end-points may be used. For an SVC, all information from the Calling/Called party number information elements (and, if applicable, the Calling/Called party sub-address) shall be recorded.

4.2.1.3 Transit network selection

If network selection is applicable, the network shall register an identification of the selection made.

4.2.1.4 Connection identifier and connection type

The network shall register the connection type: VPC or VCC. In addition, it registers the value of the VPI or VPI/VCI respectively used to identify the connection at the relevant interface.

4.2.1.5 Connection correlation identifier

A connection correlation identifier is an identifier which allows the information recorded for a given connection and at a given interface to be unambiguously correlated with information recorded at any other recording interface relevant to the connection [Q.2726.3].

The network shall be able to receive a connection correlation identifier from an originating network and to convey it to a receiving network. The network shall be able to register the connection correlation identifier.

If the originating network provides the identifier, this identifier shall be registered. If the originating network does not provide an identifier, the network shall generate the identifier. The network shall ensure that the generated identifier is unique in the network and shall strive for a globally unique value.

4.2.1.6 Connection mode

The network shall register the connection mode: permanent non-periodic (PVC), permanent periodic (PVC), reserved (PVC), on-demand (SVC) [F.811, F.813].

4.2.1.7 QoS class, ATC and traffic parameters

The network shall register: the QoS class [I.356], the ATC [I.371], the values of the source traffic descriptor [I.371], the value of each associated tolerance [I.371] and, if applicable to the ATC, the value of each additional traffic parameter [I.371].

There may be a need for information conversion, for example to convert the information from Q.2931 signalling messages into the QoS class and ATC applied to the connection.

4.2.1.8 Connection establishment date, time

The network shall register the date and time of connection establishment. The registration of date and time shall be unambiguous in case the network spans different time zones and be robust in case local time is updated, for example because of daylight saving time.

4.2.1.9 Generic information

The network shall allow for registration of additional information, including information carried by the Generic Identifier Transport [Q.2726.4].

4.2.1.10 Call priority

If call priority is indicated, the network shall register the priority level and domain [Q.2726.2].

4.2.1.11 Charged party

If the network supports an option where the charged party differs from the default, the network shall register the selected option if it differs from the default.

4.2.1.12 Start of number of cells registration

The network shall register the number of cells as specified in 4.2.5, from the moment the connection is actually established and has become effectively available to convey ATM cells.

4.2.2 Capabilities for registration at unsuccessful connection set-up attempt

At a failed connection set-up attempt, the network shall register the same information as listed in 4.2.1.1 to 4.2.1.7 and in 4.2.1.9 to 4.2.1.11 for a successful connection set-up, with the understanding that the registration relates to the parameters of the connection set-up attempt rather than to the parameters of an established connection.

If the attempt fails because a service or option is not implemented or because of an invalid message or protocol error, it may occur that this information is not available or is only partly available. Consequently, the information cannot be registered or can be registered only in part.

4.2.2.1 Date and time of the completion of the connection set-up attempt

The network shall register the date and time of the end of the connection set-up attempt. The registration of date and time shall be unambiguous in case the network spans different time zones and be robust in case local time is updated, for example because of daylight saving time. For an SVC, the attempt is regarded to be completed at the arrival of the RELEASE/RELEASE COMPLETE message.

4.2.2.2 Failure cause

The network shall register the cause for the failure of the connection set-up attempt [Q.2610].

4.2.3 Capabilities for registration of in-call modifications to the connection parameters

During the active phase of the connection, some aspects of the traffic contract may be modified. The possible modifications are described in ITU-T Recommendation I.371. The network shall register each modification to the traffic contract. The registration capabilities related to these in-call modifications are listed in the following subclauses.

4.2.3.1 Interface identification

The network shall register the interface identification as specified in 4.2.1.1.

4.2.3.2 Connection identifier and connection type

The network shall register the connection identifier and the connection type as specified in 4.2.1.4.

4.2.3.3 Traffic parameters

The network shall register the modified values of the traffic parameters as specified in 4.2.1.7.

4.2.3.4 Connection modification date, time

The network shall register the date and time of each connection modification. The registration of date and time shall be unambiguous in case the network spans different time zones and be robust in case local time is updated, for example because of daylight saving time (see 4.2.1.8).

4.2.3.5 Number of cells

The network may register the number of cells as specified in 4.2.5 pertaining to the moment of the connection modification.

4.2.4 Capabilities for registration at unsuccessful connection modification attempt

At a failed connection modification attempt, the network shall register the same information as listed in 4.2.3.1 to 4.2.3.3 for a successful connection modification, with the understanding that the registration relates to the parameters of the attempted modification (requested parameter values) rather than to the parameters of a successful modification (realized parameter values).

If the attempt fails because a service or option is not implemented or because of an invalid message or protocol error, it may occur that this information is not available or is only partly available. Consequently, the information cannot be registered or can be registered only in part.

4.2.4.1 Date and time of the completion of the connection modification attempt

The network shall register the date and time of the end of the connection modification attempt. The registration of date and time shall be unambiguous in case the network spans different time zones and be robust in case local time is updated, for example because of daylight saving time. For an SVC, the attempt is regarded to be completed at the arrival of the MODIFY REJECT message.

4.2.4.2 Failure cause

The network shall register the cause for the failure of the connection modification attempt [Q.2610].

4.2.5 Capabilities for registration during the connection until its release

During the entire active phase of the connection, user cells may cross the relevant interfaces. The capabilities related to registering usage information are listed in the following subclauses.

4.2.5.1 Interface identification

The network shall register the interface identification as specified in 4.2.1.1.

4.2.5.2 Connection identifier and connection type

The network shall register the connection identifier and the connection type as specified in 4.2.1.4.

4.2.5.3 Registration date, time

The network shall register the date and time which pertains to the registration of the number of cells specified in this clause. The registration of date and time shall be unambiguous in case the network spans different time zones and be robust in case local time is updated, for example because of daylight saving time (see 4.2.1.8).

4.2.5.4 Number of cells admitted into the network

For each connection, the network shall register the number of user generated cells [I.371] admitted into the network. Requirements on the registration of the number of cells admitted into the network differ, for example depending on the QoS class used by the connection.

– For any connection, the network shall register the total number of cells admitted into the network, irrespective of the CLP bit, $N_{\text{admitted},0+1}$. Alternatively, the network may register $N_{\text{admitted},0}$ and $N_{\text{admitted},1}$ separately.

– For a connection which uses a bilevel QoS class [I.356] (for example SBR2, SBR3, ABR, GFR1) the network shall register the number of cells admitted into the network separately for the CLP = 0 cell flow ($N_{\text{admitted},0}$) and for the CLP = 1 cell flow ($N_{\text{admitted},1}$). Alternatively, the network may register the total number $N_{\text{admitted},0+1}$ (as required for any connection) and register in addition either $N_{\text{admitted},0}$ or $N_{\text{admitted},1}$.

NOTE – For connections to which a specified Cell Loss Ratio (CLR) applies, the network operator may choose to accept to approximate the number of cells admitted into the network by registering the number of cells delivered by the network, accepting a margin of difference not exceeding the committed CLR, as an alternative.

The registration shall have a granularity of one cell. The number of cells shall include all user generated cells, i.e. it shall include, for example, user OAM cells and user RM cells. The registration may also include network generated OAM and RM cells. OAM cells may be registered separately from data cells and RM cells.

Cells discarded by the UPC/NPC (see 4.2.5.6) at a given interface do not contribute to the number of cells admitted into the network at the interface. Cells tagged by the UPC/NPC function (see 4.2.5.7) do contribute to the number of CLP = 1 cells admitted into the network at the interface.

4.2.5.5 Number of cells delivered by the network

For connections using a QoS class for which no QoS commitments apply to all cells or to part of the cell flow, the network shall register the number of user cells that are delivered by the network for which no QoS commitments apply. Requirements on the registration of the number of cells delivered by the network differ, for example depending on the QoS class used by the connection.

– For a connection which uses a bilevel QoS class [I.356], the network shall register the number of CLP = 1 cells delivered by the network $N_{\text{delivered},1}$.

– For a connection which uses GFR1 [I.371], the network shall register the number of cells delivered by the network separately for the CLP = 0 cell flow ($N_{\text{delivered},0}$) and for the CLP = 1 cell flow ($N_{\text{delivered},1}$). Alternatively, the network may register the total number $N_{\text{delivered},0+1}$ and register in addition either $N_{\text{delivered},0}$ or $N_{\text{delivered},1}$.

– For a connection which uses an unspecified QoS class [I.356], the network shall register the number of cells delivered by the network, irrespective of the CLP bit, $N_{\text{delivered},0+1}$. Alternatively, the network may register $N_{\text{delivered},0}$ and $N_{\text{delivered},1}$ separately.

The registration shall have a granularity of one cell. The number of cells shall include all user generated cells, i.e. it shall include e.g. user generated OAM cells and RM cells. The registration may also include network generated cells.

In addition to the requirements above, the network may register the number of cells delivered by the network for which QoS commitments apply.

– For a connection which uses a bilevel QoS class, the network may also register the number of CLP = 0 delivered by the network $N_{\text{delivered},0}$. Alternatively, the network may register $N_{\text{delivered},0+1}$.
– For a connection which uses a QoS class with QoS commitments to all cells, the network may register the number of cells delivered by the network, irrespective of the CLP bit, $N_{\text{delivered},0+1}$. Alternatively, the network may register $N_{\text{delivered},0}$ and $N_{\text{delivered},1}$ separately.

NOTE – For connections using a QoS class for which no QoS commitments apply to all cells or to part of the cell flow, a network operator may choose to accept that either the number of delivered cells is registered or the number of admitted cells, depending on the adopted charging principle, as described in [D.224].

4.2.5.6 Number of cells discarded by the UPC/NPC

The network may register the number of cells discarded by a UPC or NPC function. The network shall register the number of cells discarded by the NPC function at an INI. The number pertains to all cells of a given connection crossing a given interface that are subsequently discarded by a UPC/NPC function.

Discarded cells are not counted as admitted into the network (see 4.2.5.4) on the same interface. The registration may be performed aggregately $N_{\text{discarded},0+1}$ or separately for CLP = 0 ($N_{\text{discarded},0}$) and for CLP = 1 cells ($N_{\text{discarded},1}$).

4.2.5.7 Number of cells tagged by the UPC/NPC

For connections where tagging applies (e.g. SBR3, GFR2), the network may register the number of cells tagged by the UPC/NPC at that interface. The number N_{tagged} pertains to all cells modified from CLP = 0 into CLP = 1 by the UPC/NPC. Cells tagged at a given interface are included in the number of CLP = 1 cells $N_{\text{admitted},1}$ and in the number of CLP = 0+1 cells $N_{\text{admitted},0+1}$ admitted into the network at that interface (see 4.2.5.4).

4.2.6 Capabilities for registration at connection release

At connection release, the network shall register the information as listed in the following subclauses.

4.2.6.1 Interface identification

The network shall register the interface identification as specified in 4.2.1.1.

4.2.6.2 Connection identifier and connection type

The network shall register the connection identifier and connection type as specified in 4.2.1.4.

4.2.6.3 Connection release date, time

The network shall register the date and time the connection was released. The registration of date and time shall be unambiguous in case the network spans different time zones and be robust in case local time is updated, for example because of daylight saving time (see 4.2.1.8).

4.2.6.4 Connection release cause

The network shall register the cause for the release of the connection [Q.2610].

4.2.6.5 Termination of number of cells registration

The network shall register the number of cells as specified in 4.2.5, until the moment the connection is actually released and has become effectively unavailable to convey ATM cells.

4.3 Acceptable registration delay

The registration delay is defined as the difference between the moment at which an event takes place and the moment at which the registration of the relevant parameters (for example: a number of cells) related to that event takes place. The network shall register the information related to the events as specified in 4.2 with a registration delay smaller than the values specified below.

– Connection establishment: 1 s.

– Connection set-up attempt (failed): 5 s.

– Connection modification: 1 s.

– Connection modification attempt (failed): 5 s.

– End of charging period: 30 s.

– End of recording interval: 300 s. If the network supports different charging periods by implementing different recording intervals synchronized with the end of the charging periods, the precision applies as specified for the end of charging period.

– Connection release: 1 s.

An administration may specify precision requirements which are more strict than the values in this Recommendation.

5 Network capabilities for the communication of information related to charging

5.1 Reference configuration for communication of information

To support charging and accounting for ATM services, information regarding the ATM connections needs to be registered by the network. This information has to be transported for further processing. Figure 3 shows a reference configuration of the systems involved in that process.

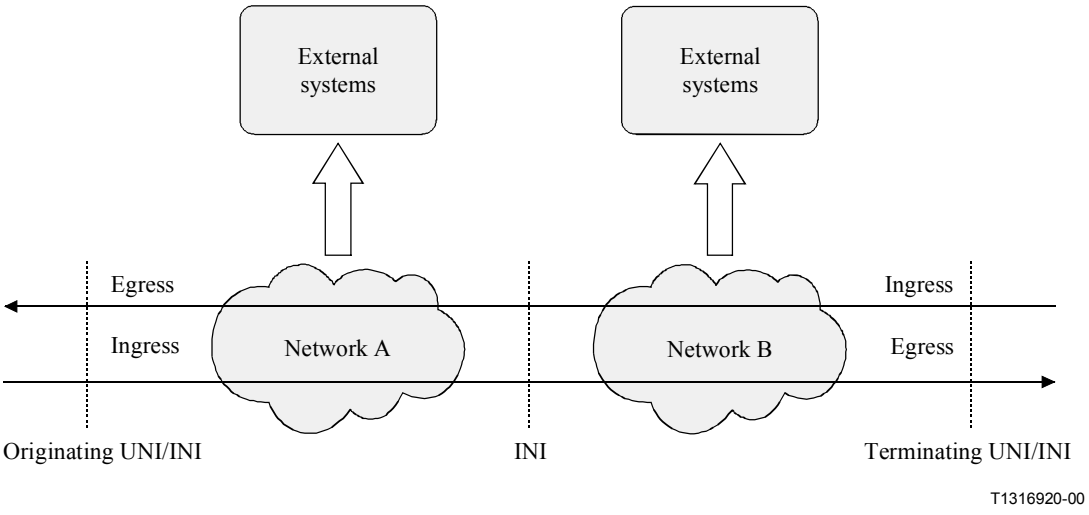


Figure 3/I.377 – Reference configuration for the communication of information between the network and external systems

Figure 3 illustrates a single bidirectional communication between two end-points across one or more networks. The network registers a number of parameters (see 4.2) at the interfaces designated as recording interfaces in the network. The charge is expected to be determined by one or more systems external to the network (e.g. a billing system). The method to determine the charge (see Recommendation D.224) and the systems used for that process are administration-specific.

The registered parameters are transported from the network to the external system(s), in Figure 3 indicated by the arrow from the network to the external system(s).

The following subclauses describe the general network requirements for the communication between the network and an external system processing the information related to charging.

5.2 Connection Detail Records for communicating information to support charging and accounting

To make the registered parameters (see 4.2) available to external systems for further processing, the network shall be able to produce Connection Detail Records (CDRs). The information in a CDR shall pertain to no more connections than a single communication, i.e. either to a single connection of a unidirectional communication or to both connections in a bidirectional communication. For a bidirectional communication, the registered information may be more efficiently accommodated in a CDR containing the information pertaining to both connections of the communication. For each connection or bidirectional communication at least one CDR shall be produced. More than one CDR may be produced, for example, depending on the events relevant to the connection (see 4.1).

A CDR shall contain all parameters specified in 4.2. The data format of the CDR is implementation-specific. An administration may set requirements to the data format.

An administration may, for each of the events listed in 4.1, set requirements on the maximum acceptable delay between the occurrence of the event and the availability of the information to an external system, the maximum of $t_3 – t_1$ in Figure 4. In this figure four different moments (t_1-t_4) have been indicated: the occurrence of an event, the related registration, the moment that the CDR is "available" to an external system and the moment that the CDR is actually received by the external system. The difference between the moments is t_{12}, t_{23} and t_{34} respectively.

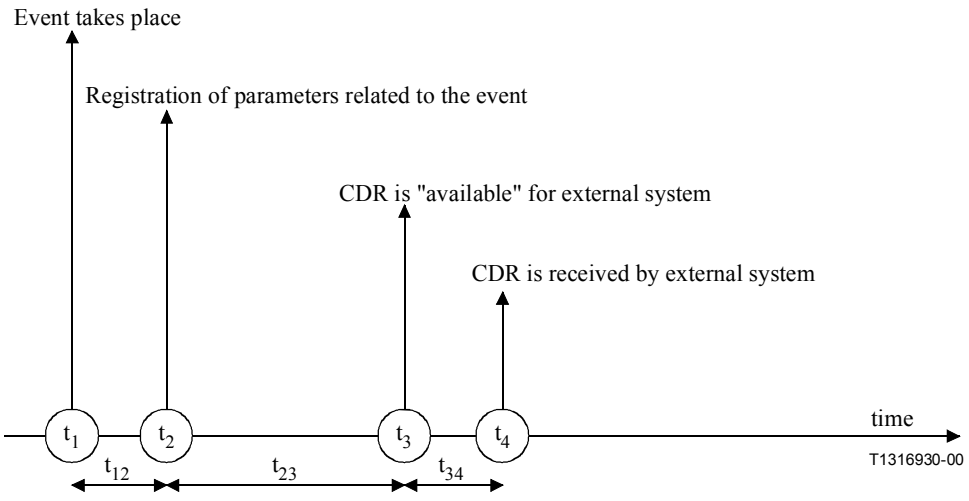


Figure 4/I.377 – Four different moments (t_1-t_4) related to registration and CDR availability

5.3 Communication between the network and an external system

The network shall be able to communicate the CDRs containing the registered information to an external system via an open interface so that the information is accessible. The data format, the protocol and the interface used for this communication is implementation-specific. An administration may set requirements to the data format, the protocol and the interface.

Two types (modes) of communication shall be possible.

1) The external system polls the network to retrieve the CDRs. This is referred to as the polling mode.

2) The network initiates the transport of CDRs to the external system. This is referred to as the autonomous mode. The network shall be able to initiate the transport at several moments:

   – when a CDR is ready;

   – periodically after specified time intervals;

   – when a given amount of data has been registered.

The mode of communication (polled, autonomous) shall be configurable by the administration. An administration may set further requirements regarding the two modes.

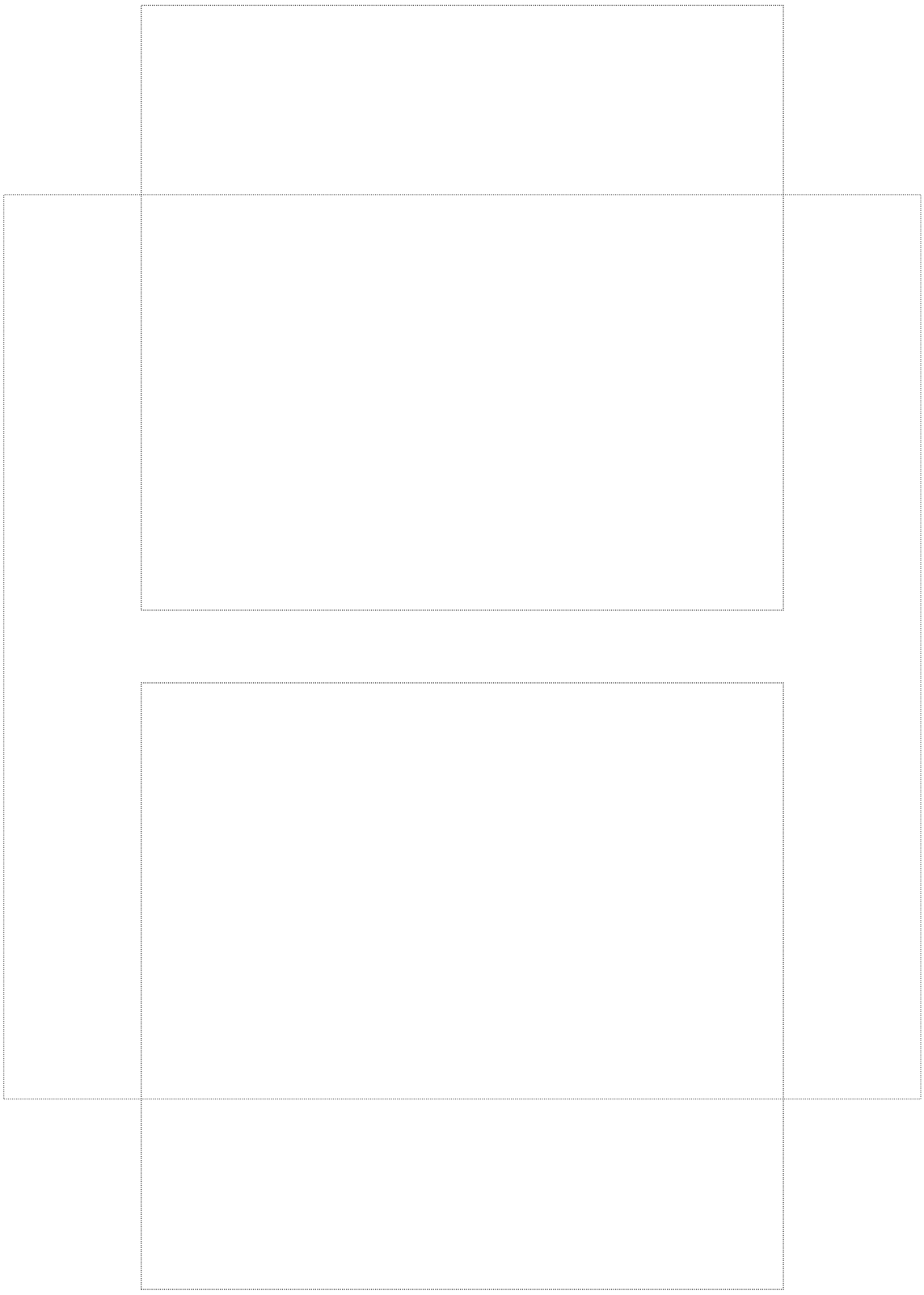
The network and the external system are typically installed at different locations. Therefore, the CDRs need to be transported over a transport network. The network shall be able to use the following possibilities for transporting CDRs.

1) Transport via a non-ATM network.

2) Transport via dedicated ATM connections in the ATM network.

In case of transport via ATM connections, it shall be possible to transport CDRs via semi-permanent ATM connections (PVCs) between the network and the external system. The administration may set requirements to the ATM Transfer Capability used for the ATM connection carrying CDRs, as well as to the traffic parameters.

An administration may require the possibility of transport of CDRs via SVCs.



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Geneva, 2001