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SERIES I: INTEGRATED SERVICES DIGITAL
NETWORK (ISDN)

General structure – Telecommunication network and
service attributes

ATTRIBUTE TECHNIQUE FOR THE CHARACTERIZATION OF TELECOMMUNICATION SERVICES SUPPORTED BY AN ISDN AND NETWORK CAPABILITIES OF AN ISDN

Reedition of CCITT Recommendation I.140 published in
the Blue Book, Fascicle III.7 (1988)

NOTES

1   CCITT Recommendation I.140 was published in Fascicle III.7 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

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

Recommendation I.140

ATTRIBUTE TECHNIQUE FOR THE CHARACTERIZATION OF TELECOMMUNICATION SERVICES SUPPORTED BY AN ISDN AND NETWORK CAPABILITIES OF AN ISDN

(former Recommendation I.130 of the Red Book;
amended at Melbourne, 1988)

1 General considerations

The purpose of this Recommendation is to introduce the attribute technique and to describe attributes and list attribute values. Attributes are used in the characterization of services and network capabilities provided by an ISDN. The attribute technique can also be used to describe the salient features of other objects of study in telecommunications, e.g. charging.

This Recommendation (in the general I.100-Series) will act as a library of all attributes and attribute values used in other I-Series Recommendations. The inclusion of a particular attribute value in this Recommendation does not mean that this particular object is being recommended by CCITT, but that it is a potential attribute (or attribute value) which may be used in a particular Recommendation in the I-Series (e.g. to describe a CCITT-recommended service).

Annex A includes all attributes and their values so far identified and defined.

2 Attribute technique

2.1 *Outline of the technique*

This technique is used to describe objects in a structured, simple manner and to highlight the important aspects of the object. In order to be able to identify comparable objects, e.g. bearer services, the general concept of the object is broken down in a number of salient features. The salient features are termed *attributes*. Each attribute is independent of the others so that a change in the value of one will not affect the others. To describe a particular object the attributes are assigned values which identify that object.

It is not always necessary or useful to describe an object in great detail and so attributes have been graded into three levels:

– dominant attributes: these define a sub-set containing similar objects, this sub-set is termed a class or category;

– secondary attributes: these define a particular object; and

– qualifying attributes: these define variants of an object.

Characterization of attributes should be used in the I-Series of Recommendations when appropriate.

2.2 *Basic rules*

– Each attribute is assigned a name and definition.

– Some attributes may apply to only one object, others may be applicable to several objects. In this case the same attribute name is used.

– A given value should have the same name and definition in all Recommendations.

– Depending on the nature of the object described, a particular attribute may need to be used more than once.

– Each attribute should be described by three perspectives; generic, service and network.

2.3   *Attribute lists*

2.3.1   *Generic attributes*

Information transfer mode

Information transfer rate

Information transfer capability

Establishment

Symmetry

Configuration

Structure

Channel (rate)

Control protocol

Information transfer protocol

Performance

Interworking

Operations

Type of user information

High layer protocol

Note – This list will be completed according to further results on studies of connectionless, multi-media, broadband and mobile services.

2.3.2   *Service attributes*

2.3.2.1 *Bearer services*

1   Information transfer mode

2   Information transfer rate[1]

3   Information transfer capability

4   Structure

5   Establishment of communication

6   Symmetry

7   Communication configuration

8   Access channel and rate

9-1 Signalling access protocol layer 1

9-2 Signalling access protocol layer 2

9-3 Signalling access protocol layer 3

9-4 Information access protocol layer 1[2]

9-5 Information access protocol layer 2[2]

9-6 Information access protocol layer 3[2]

10 Supplementary services provided

11 Quality of service

12 Interworking possibilities

_____

[1] Service information transfer rate considered at the access point.

[2] Information access protocol (layer 1-3) at the access point.

13   Operational and commercial

2.3.2.2   *Teleservices*

1, 2, 3, 4, 5, 6, 7, 8, 9-1, 9-2, 9-3, 9-4, 9-5, 9-6: refer to § 2.3.2.1.

10   Type of user information

11   Layer 4 protocol

12   Layer 5 protocol

13   Layer 6 protocol

14   Layer 7 protocol

15   Supplementary services provided

16   Quality of service

17   Interworking possibilities

18   Operational and commercial

2.3.2.3   *Supplementary services*

For further study.

2.3.2.4   *Charging*

For further study.

2.3.3   *Network attributes*

2.3.3.1   *Connection types*

1   Information transfer mode

2   Information transfer rate[3]

3   Information transfer susceptance

4   Establishment of communication

5   Symmetry

6   Connection configuration

7   Structure

8   Channel (rate)

9   Connection control protocol

10   Information transfer coding/protocol[4]

11   Network performance

12   Network interworking

13   Operations and management

2.3.3.2   *Connection elements*

1   Information transfer mode

2   Information transfer rate

3   Information transfer susceptance

4   Establishment of communication

5   Symmetry

6   Connection configuration

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[3] Information transfer rate is considered between access points.

[4] Information transfer protocol is considered between access points.

7   Structure

8   Channel (rate)

9   Connection control protocol

10   Information transfer coding/protocol

11   Network performance

12   Network interworking

13   Operations and management

2.3.3.3   *Other network entities*

The definition of attributes for basic connection components, and network capabilities to support supplementary services needs further study.

2.4   *Attribute definition*

A list of definitions of attributes and attribute values is contained in Annex A to this Recommendation.

3   Application to the I-Series Recommendations

This technique has been applied in I.200-Series Recommendations for the specification of the telecommunications services supported by and ISDN and in Recommendation I.340 for the characterization of ISDN connection types and connection elements.

The application of the attribute technique for the characterization of multi-media services is for further study.

ANNEX A

(to Recommendation I.140)

**List of definitions of attributes
and attribute values**

A.1   *Definitions of the attributes*

A.1.1   *Telecomunication service attribute definitions*

Information transfer mode

This attribute describes the operational mode for transferring (transporting and switching) user information through the ISDN.

Possible values: – circuit

– packet

Information transfer rate

This attribute describes either the bit rate (circuit mode) or the throughput (packet mode). It refers to the transfer of digital information at the access points.

Possible values: – appropriate bit or throughput rate

Information transfer capability

This attribute describes the capability associated with the transfer of different types of information through the ISDN.

Possible values: – unrestricted digital information

– speech

– 3.1 kHz audio

– 7 kHz– 15 kHz audio

– video

– other values

Structure

This attribute refers to the capability of the ISDN to deliver information to the destination access point or reference point in a structure (e.g. time interval for circuit mode, service data unit for packet mode), that was presented in a corresponding signal structured at the origin (access point or reference point).

Possible values: – 8 kHz integrity

– service data unit integrity

– time slot sequence integrity

– restricted differential time delay

– unstructured

Establishment of communication

This attribute describes the mode of establishment associated to the telecommunication service used to establish and release a given communication.

Possible values: – demand

– reserved

– permanent

Symmetry

This attribute describes the relationship of information flow between two (or more) access points or reference points involved in a communication.

Possible values: – unidirectional

– bidirectional symmetric

– bidirectional asymmetric

Communication configuration

This attribute describes the spatial arrangement for transferring information between two or more access points. It completes the structure associated with a telecommunication service as it associates the relationship between the access points involved and the flow of information between these access points.

Possible values: – point-to-point

– multipoint

– broadcast

Access channel and rate

This attribute describes the channels and their bit rate used to transfer the user information and/or signalling information at a given access point.

Possible values: – name of the channel (letter) and the corresponding bit rate

Note – This attribute can be used several times for communication characterization.

Signalling access protocol layer 1-3, information access protocol layer 1-3

These attributes characterize the protocol on the signalling or user information transfer channel at a given access point or reference point.

Possible values: – appropriate protocol

Type of user information

Possible values: – speech

– sound

– text

– facsimile

– text-facsimile

– videotex

– video

– text-interactive

Layer 4 - 7 protocol

These attributes characterize the protocol on the user information transfer channel at a given access point or reference point.

Possible values: – appropriate protocol

Supplementary services provided

This attribute refers to the supplementary services associated with a given telecommunication service.

Quality of service

This attribute is described by a group of specific sub-attributes, for example: service reliability, service availability.

The values are under study.

Interworking possibilities

To be defined.

Operational and commercial

To be defined.

A.1.2   *Connection type attribute definitions*

Information transfer mode

This attribute describes the operational mode for transferring (transporting and switching) user information through the ISDN.

Possible values: – circuit

                        – packet

Information transfer rate

This attribute describes either the bit rate (circuit mode) or the throughput (packet mode). It refers to the transfer of digital information between access points or reference points.

Possible values: – appropriate bit or throughput rate

Information transfer susceptance

This attribute describes the capability associated with the transfer of different types of information through the ISDN.

Possible values: – unrestricted digital information

                        – speech

                        – 3.1 kHz audio

                        – 7 kHz audio

                        – 15 kHz audio

                        – video

                        – other values

Establishment of connection

This attribute describes the mode of establishment used to establish and release a given connection in an ISDN.

Possible values: – demand

                        – semi-permanent

– permanent

Symmetry

This attribute describes the relationship of information flow between two (or more) access points or reference points of a connection.

Possible values: – unidirectional

– bidirectional symmetric

– bidirectional asymmetric

Connection configuration

This attribute describes the spatial arrangement for transferring information on a given connection. It consists of two sub–attributes, topology and dynamics.

Structure

This attribute refers to the capability of the ISDN to deliver information to the destination access point or reference point in a structure (e.g. time interval for circuit mode, service data unit for packet mode), that was presented in a corresponding signal structured at the origin (access point or reference point).

Possible values: – 8 kHz integrity

– service data unit integrity

– time slot sequence integrity

– restricted differential time delay

– unstructured

Channel (rate)

This attribute describes the channels and their bit rate used to transfer the user information and/or signalling information at a given access point.

Possible values: – name of the channel (letter) and the corresponding bit rate

Note – This attribute can be used several times.

Connection control protocol, information transfer coding/protocol

These attributes characterize the protocol/coding on the signalling or user information transfer channel at a given access point or reference point.

Possible values: – appropriate protocol or coding

Network performance

This attribute describes the network performance that relates to an ISDN connection.

This performance attribute consists of sub-attributes, for example:

Error performance: the values are given in the appropriate Recommendations.

Slip performance: the values are given in the appropriate Recommendations.

The definition of further sub-attributes is for further study.

Network interworking

To be defined.

Operation and management

To be defined.

A.1.3   *Connection element attribute defintions*

Information transfer mode

This attribute describes the operational mode for transferring (transporting and switching) user information through the ISDN.

Possible values:　　– circuit

　　　　　　　　　– packet

Information transfer rate

This attribute describes either the bit rate (circuit mode) or the throughput (packet mode). It refers to the transfer of digital information between access points or reference points.

Possible values:　　– appropriate bit or throughput rate

Information transfer susceptance

This attribute identifies equipment which may restrict the types of information which may pass through the ISDN.

Possible values:　　– speech processing equipment

　　　　　　　　　– echo suppression equipment

　　　　　　　　　– multi-satellite hope

　　　　　　　　　– null

Establishment of connection

This attribute describes the mode of establishment used to establish and release a given connection element in an ISDN.

Possible values:　　– demand

　　　　　　　　　– semi-permanent

　　　　　　　　　– permanent

Symmetry

This attribute describes the relationship of information flow between two (or more) access points or reference points of a connection element.

Possible values:　　– undirectional

　　　　　　　　　– bidirectional symmetric

　　　　　　　　　– bidirectional asymmetric

Connection configuration

This attribute describes the spatial arrangement for transferring information across a given connection element. It consists of two sub–attributes, topology and uniformity.

Structure

This attribute refers to the capability of the ISDN to deliver information to the destination access point or reference point in a structure (e.g. time interval for circuit mode, service data unit for packet mode), that was presented in a corresponding signal structured at the origin (access point or reference point).

Possible values:　　– 8 kHz integrity

　　　　　　　　　– service data unit integrity

　　　　　　　　　– time slot sequence integrity

　　　　　　　　　– 8 kHz integrity with restricted differential time delay

　　　　　　　　　– unstructured

Channel (rate)

This attribute describes the channels and their bit rate used to transfer the user information and/or signalling information at a given access point.

Possible values:　　– name of the channel (letter) and the corresponding bit rate

　　Note – This attribute can be used several times.

Connection control protocol, information transfer coding/protocol

These attributes characterize the protocol/coding on the signalling or user information transfer channel at a given access point or reference point.

Possible values: – appropriate protocol or coding

Network performance

This attribute describes the network performance that relate to an ISDN connection element.

This performance attribute consists of sub-attributes, for example:

Error performance: The values are given in the appropriate Recommendations.

Slip performance: The values are given in the appropriate Recommendations.

The definition of further sub-attributes is for further study.

Network interworking

To be defined.

Operation and management

To be defined.

A.2   *Definition of the attribute values*

unrestricted digital information

Transfer of information sequence of bits at its specified bit rate without alteration.

This implies: – bit sequence independence

           – digit sequence integrity

           – bit integrity.

speech

Digital representation of speech coded according to a specified encoding rule (e.g. A-law, μ-law).

3.1 kHz audio

Digital representation of audio information such as voice-band data and speech with a bandwidth of 3.1 kHz, the encoding rule being specified (e.g. A-law, μ-law).

7 kHz audio

Digital representation of audio information with a bandwidth of 7 kHz, the encoding rule being specified.

15 kHz audio

Digital representation of audio information with a bandwidth of 15 kHz, the encoding rule being specified.

video

Digital representation of video image information, the encoding rule being specified.

8 kHz integrity

This value applies when:

i)   at each user-network interface, intervals of 125 μs are implicitly or explicitly demarcated, and

ii)   all bits submitted within a single demarcated 125 μs interval are delivered within a corresponding single demarcated 125 μs interval.

service data unit integrity

This value applies when:

i)   at each user-network interface, protocols provide a mechanism for identifying the boundaries of service data units (e.g. X.25 complete packet sequence), and

ii)   all bits submitted within a single service data unit are delivered in a corresponding service data unit.

unstructured

This value is applicable when the telecommunication service or connection neither provides structural boundaries nor preserves structural integrity.

demand (communication)

The communication can be started as soon as possible after the request is made (e.g. t_1 - t_0 is as short as possible).

Communication and connection release occurs in response to the request of any of the users (calling or called users), t_3 - t_2 is as short as possible (see Figure A-1/I.140).
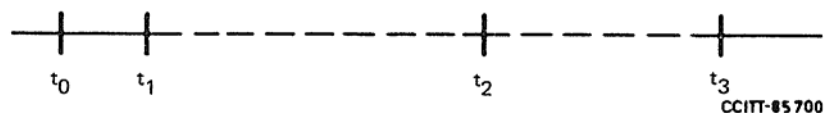
t_0 : time instant at which the request for communication and connection is made,
t_1 : time instant at which the connection and communication is established,
t_2 : time instant at which request for communication and connection release is made,
t_3 : time instant at which communication and connection is cleared.

Note – Recommendation I.112 provides also definitions for these three values (No. 205, 206, 207). However, the definitions proposed are more general (no reference to a time diagram) and are circuit-mode oriented.

FIGURE A-1/I.140

Establishment of communication and connection time diagram

reserved (communication)

The communication can be started at time instant t_1 explicitly specified at the time instant of communication and connection request, t_0. Communication and connection release occurs at time instant t_3 explicitly specified also at t_0. Communication and connection duration is predetermined: the communication and connection is set up for a specified period of time. As an option, connection release occurs at time instant t_3 following a release request made at time instant t_2 during the communication and *a priori* undetermined (t_3 - t_2 is as short as possible). This option corresponds to an unspecified duration of the communication and connection, or to a possibility of unanticipated release (see Figure A.1/I.140).

permanent (communication)

The communication can be started after the connection is set up at time instant t_1 in response to a subscription request for the service at time instant t_0. the duration may be unspecified. The communication and connection is released at time instant t_3 corresponding to the end of the subscription.

switched (connection)

ISDN circuit switched connections/connection elements are set up at any time on demand via e.g. a bit channel in response to signalling information received from subscribers, other exchanges or other networks, i.e. on a per-call-basis. Message/packet switched connections/connection elements provided by an ISDN may be set up on demand via circuit-mode channels (e.g. B-channels) and special packet switching units or via the D-channel subject to any D-channel priority/flow control restrictions that may be applicable.

Note – A more general definition of this value is also given in Recommendation I.112 (No.311).

semi-permanent (connection)

Semi-permanent connections/connection elements pass through a switching network.

Semi-permanent connections/connection elements between agreed points may be provided for an indefinite period of time after subscription, for a fixed period or for agreed periods during a day, week or other interval.

permanent (connection)

Permanent connections/connection elements are described by the following characteristics:

Permanent connections/connection elements are available to the connected subscriber at any time during the period of subscription between fixed network destination points requested by the subscribers.

unidirectional

This value applies when the information flow of messages is provided only in one direction.

bidirectional symmetric

This value applies when the information flow characteristics provided by the service are the same between two (or more) access points or reference points in the forward and backward directions.

bidirectional asymmetric

This value applies when the information flow characteristics provided by the service are different in the two directions.

point-to-point communication

This value applies when there are only two access points.

multipoint communication

This value applies when more than two access points (see Note) are provided by the service. The exact characteristics of the information flows must be specified separately based on functions provided by the ISDN.

Note – The number of access points can be undefined.

broadcast communication

This value applies when more than two access points (see Note) are provided by the service. The information flows from a unique point (source) to the others (destination) in only one direction.

Note – The number of destination access points is undefined.

point-to-point connection

This value applies when only two end points are provided by the connection.

multipoint connection

This value applies when more than two end points are provided by the connection, and thus many different information flows are possible.

broadcast connection

To be defined.

simple connection

A connection consisting of only one connection element.

tandem connection

Two or more connection elements in series form a connection.

parallel connection

Two or more connection elements in parallel form a connection.

star

To be defined.

mesh

To be defined.

uniform

This value applies when all connection elements have the same attribute values.

non uniform

This value applies in all other cases.

concurrent

The configuration of a connection is described as concurrent when all of the connection elements involved are established simultaneously and released simultaneously.

sequential

A connection has a sequential configuration when its connection elements are established and released sequentially i.e. only one of several connection elements or chains of connection elements exists at any given time.

add/remove

When connection elements can be established and released while other connection elements of the same connections still exist, the configuration of this connection is described as add/remove.

Symmetry and/or topology change

When the symmetry attribute value of the connection element can be changed during a call.

Time slot sequence integrity

This value applies when

i) at each user-network interface, time slots are implicitly or explicitly demarcated for each access channel of an aggregate of access channels, and

ii) the information parts delivered from the time slots at the receiving end are in the same order as submitted at the transmitting end.

Note – Preserving the order of bits within an individual time slot from the transmitting to the receiving end is not part of this definition.

8 kHz integrity with restricted differential time delay (RDTD)

This value applies when the following conditions are met:

– that at each point in a connection or connection element, time slots are explicitly or implicitly demarcated for each information channel or an aggregate of information channels; and

– that the information parts submitted to the time slots at the transmitting end are delivered to the receiving end with a differential time delay of not more than 50 ms (provisional).

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