INTERNATIONAL STANDARD

ISO/IEC 8326

Second edition
1996-09-15

Information technology — Open Systems Interconnection — Session service definition

Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Définition du service de session

Reference number
ISO/IEC 8326:1996(E)

Contents

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 8326 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 21, *Open Systems Interconnection, data management and open distributed processing*, in collaboration with ITU-T. The identical text is published as ITU-T Recommendation X.215.

This second edition cancels and replaces the first edition (ISO 8326:1987), which has been technically revised. It also incorporates Amendment 4:1992.

Annex A forms an integral part of this International Standard.

Introduction

This Recommendation | International Standard is one of a set of Recommendations | International Standards produced to facilitate the interconnection of computer systems.

This Recommendation | International Standard is related to other Recommendations | International Standards in the set as defined by the Reference Model for Open Systems Interconnection. The Reference Model subdivides the area of standardization for interconnection into a series of layers of specification, each of manageable size.

The purpose of this Recommendation | International Standard is to define the service provided to the Presentation Layer at the boundary between the Session and Presentation Layers of the Reference Model. The session service is provided by the session protocol making use of the services available from the Transport Layer. This Recommendation | International Standard also defines the session service characteristics which the presentation protocol may exploit. The relationship between the Recommendations | International Standards for the session service, session protocol, transport service, and the presentation protocol is illustrated in Figure Intro.1 below.

It is recognized that, with respect to session Quality of Service (described in clause 10), work is still in progress to provide an integrated treatment of QOS across all of the layers of the OSI Reference Model and to ensure that the individual treatments in each layer service satisfy overall QOS objectives in a consistent manner. As a consequence, an addendum may be added to this Recommendation | International Standard at a later time which reflects further QOS developments and integration.

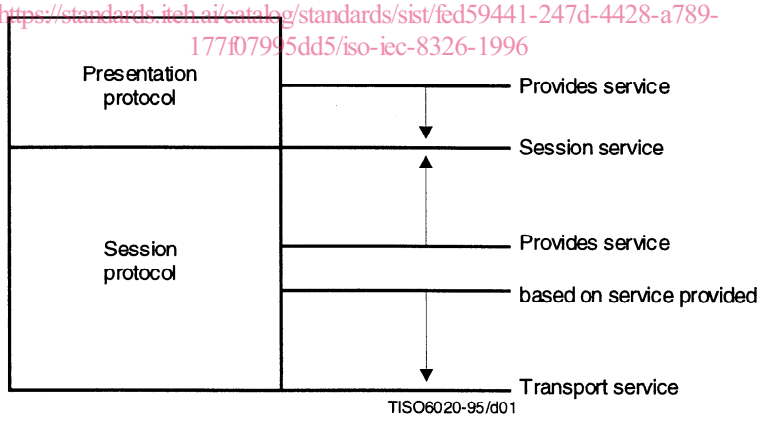

Figure Intro. 1 – Relationship of this Recommendation | International Standard to other OSI Standards

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INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – SESSION SERVICE DEFINITION

SECTION 1 – GENERAL

1 Scope

This Recommendation | International Standard defines in an abstract way the externally visible service provided by the OSI Session Layer in terms of:

a) the primitive actions and events of the service;

b) the parameter data associated with each primitive action and event;

c) the relationship between, and the valid sequence of these actions and events.

The service defined in this Recommendation | International Standard is that which is provided by the OSI session protocol (in conjunction with the transport service) and which may be used by the OSI presentation protocol.

This Recommendation | International Standard does not specify individual implementations or products, nor does it constrain the implementation of entities and interfaces within a computer system. There is, therefore, no conformance to this Recommendation | International Standard.

The text pertaining to the symmetric synchronization functional unit is not applicable to the support of ITU-T applications.

2 Normative references

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and International Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and International Standards listed below. Members of ISO and IEC maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

2.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model.*
- ITU-T Recommendation X.210 (1993) | ISO/IEC 10731:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: Conventions for the definition of OSI services.*
- ITU-T Recommendation X.214 (1993) | ISO/IEC 8072:1994, *Information technology – Open Systems Interconnection – Transport service definition.*
- ITU-T Recommendation X.225 (1995) | ISO/IEC 8327-1:1996, *Information technology – Open Systems Interconnection – Connection-oriented Session protocol: Protocol specification.*

- ITU-T Recommendation X.226 (1994) | ISO/IEC 8823-1:1994, *Information technology – Open Systems Interconnection – Connection-oriented presentation protocol: Protocol specification.*
- ITU-T Recommendation X.235 (1995) | ISO/IEC 9548-1:1995, *Information technology – Open Systems Interconnection – Connectionless Session protocol: Protocol specification.*

2.2 Paired Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.650 (1992), *Open Systems Interconnection (OSI) – Reference Model for naming and addressing.*

  ISO 7498-3:1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 3: Naming and addressing.*

3 Definitions

For the purposes of this Recommendation | International Standard, the following definitions apply.

NOTE – The definitions contained in this clause make use of abbreviations defined in clause 4.

3.1 Reference Model definitions

This Recommendation | International Standard is based on the concepts developed in ITU-T Rec. X.200 | ISO/IEC 7498-1, and makes use of the following terms defined in it:

a) expedited-session-service-data-unit;

b) session connection;

c) Session Layer;

d) session service;

e) session-service-access-point;

f) session-service-data-unit;

g) Transport Layer;

h) duplex;

i) half-duplex.

3.2 Service convention definitions

This Recommendation | International Standard also makes use of the following terms defined in ITU-T Rec. X.210 | ISO/IEC 10731, as they apply to the Session Layer:

a) service-user;

b) service-provider;

c) primitive;

d) request;

e) indication;

f) response;

g) confirm.

3.3 Session service definitions

3.3.1 **calling SS-user**: An SS-user that initiates a session connection establishment request.

3.3.2 **called SS-user**: An SS-user with whom a calling SS-user wishes to establish a session connection.

NOTE – Calling SS-users and called SS-users are defined with respect to a single connection. An SS-user can be both a calling and called SS-user simultaneously.

3.3.3 sending SS-user: An SS-user that acts as either a source of data during the data transfer phase of a session connection or a source of data during a particular instance of session-connectionless-mode transmission.

3.3.4 receiving SS-user: An SS-user that acts as either a sink of data during the data transfer phase of a session connection or a sink of data during a particular instance of session-connectionless-mode transmission.

NOTE – An SS-user can be both sending and a receiving SS-user simultaneously.

3.3.5 requestor; requesting SS-user: An SS-user that initiates a particular action.

3.3.6 acceptor; accepting SS-user: An SS-user that accepts a particular action.

3.3.7 token: An attribute of a session connection which is dynamically assigned to one SS-user at a time to permit certain services to be invoked.

3.3.8 conditional (parameter): A parameter whose presence in a request or response depends on conditions defined in the text of this Recommendation | International Standard; and whose presence in an indication or confirm is mandatory if that parameter was present in the preceding session service primitive, or absent if that parameter was absent in the preceding session service primitive.

3.3.9 proposed parameter: The value for a parameter proposed by an SS-user in an S-CONNECT request or an S CONNECT response that it wishes to use on the session connection.

3.3.10 selected parameter: The value for a parameter that has been chosen for use on the session connection.

3.3.11 session-connectionless-mode transmission; session-connectionless transmission: The transmission of a unit of data in a single self-contained session service without establishing a session connection (as defined in ITU-T Rec. X.200 | ISO/IEC 7498-1).

4 Abbreviations

For the purposes of this Recommendation | International Standard, the following abbreviations apply.

4.1 Data units

SSDU	Session service data unit
NSSDU	Normal data session service data unit
TSSDU	Typed data session service data unit
XSSDU	Expedited session service data unit

4.2 Miscellaneous

SS	Session service
SSAP	Session service access point
QOS	Quality of Service

4.3 Service variables

V(A)	See 11.4.1.1.1
V(M)	See 11.4.1.1.2
V(R)	See 11.4.1.1.3
Vsc	See 11.4.1.1.4

5 Conventions

This Recommendation | International Standard uses the descriptive conventions contained in the OSI Service Conventions (ITU-T Rec. X.210 | ISO/IEC 10731) except that, where indicated in this Recommendation | International Standard, parameter values associated with a service primitive may be passed in a direction opposite to the direction of the service primitive.

6 Model of the session service

6.1 Model of the layer service

This Recommendation | International Standard uses the abstract model for a layer service defined in ITU-T Rec. X.210 | ISO/IEC 10731. The model defines the interactions between the SS-users and the SS-providers which take place at the two SSAPs. Information to passed between an SS-user and the SS-provider by service primitives, which may convey parameters.

There are two types of session service:

a) A connection-mode service, which is defined in clause 2.

b) A connectionless-mode service, which is defined in clause 3. The connectionless-mode service defines the feature given in 7.1 e). This service is invoked by the connectionless presentation P-UNIT-DATA service.

6.2 Model of session connectionless-mode transmission

This Recommendation | International Standard uses the abstract model of connectionless-mode transmission defined in ITU-T Rec. X.200 | ISO/IEC 7498-1. A defining characteristic of session connectionless-mode transmission is the independent nature of each invocation of the connectionless-mode session service.

7 Overview of the session service

7.1 General overview

The session service provides the means for organized and synchronized exchange of data between co-operating SS-users. It provides its users with means to:

a) establish a connection with another SS-user, exchange data with that user in a synchronized manner, and release the connection in an orderly manner;

b) negotiate for the use of tokens to exchange data, synchronize and release the connection, and to arrange for data exchange to be half-duplex or duplex;

c) establish synchronization points within the dialogue and, in the event of errors, resume the dialogue from an agreed synchronization point;

d) interrupt a dialogue and resume it later at a pre-arranged point.

In addition, the following service is described:

e) a means by which a single unit of data is transmitted from one source SSAP to another SSAP in a single session service access, without first establishing or later releasing a session connection.

7.2 Token concept

A token is an attribute of a session connection which is dynamically assigned to one SS-user at a time to permit certain services to be invoked. It is the right to exclusive use of the service.

Four tokens are defined:

a) the data token;

b) the release token;

c) the synchronize-minor token;

d) the major/activity token.

A token is always in one of the following states:

e) available, in which case it is always

1) assigned to one SS-user, who then has the exclusive right to use the associated service (provided that no other restrictions apply); and

2) not assigned to the other SS-user, who does not have the right to use the service but may acquire it later; or

f) not available to either SS-user, in which case neither SS-user has the exclusive use of the associated service. The service then becomes inherently available to both SS-users (data transfer and release), or otherwise unavailable to both SS-users (synchronization and activities).

Restrictions related to the availability and assignment of tokens are defined in 11.2.

7.3 Synchronization and dialogue unit concepts

SS-users may insert synchronization points into the data they are transmitting. There are two methods to identify a synchronization point. A synchronization point can be identified by a single serial number if the right to send all synchronization points is token controlled. Alternatively, synchronization points can be identified by two serial numbers, one for each direction of flow. This dual numbering scheme, called symmetric synchronization, allows the SS-users to independently place synchronization points in their sending flows. Serial numbers are maintained by the SS-provider (see 11.4).

Any semantics which SS-users may give to their synchronization points are transparent to the SS-provider.

There are two types of synchronization points:

a) minor synchronization points;

b) major synchronization points.

Major synchronization points are used to structure the exchange of data into a series of dialogue units. The characteristic of a dialogue unit is that all communication within it is completely separated from all communication before and after it. A major synchronization point indicates the end of one dialogue unit and the beginning of the next. Each major synchronization point is confirmed explicitly.

Minor synchronization points are used to structure the exchange of data within a dialogue unit. Figure 1 illustrates how a dialogue unit is structured through the use of minor synchronization points. Each minor synchronization point may or may not be confirmed explicitly. A minor synchronization point inserted in association with the data separation service protects all data sent before the minor synchronization point from being discarded by a subsequent resynchronize request.

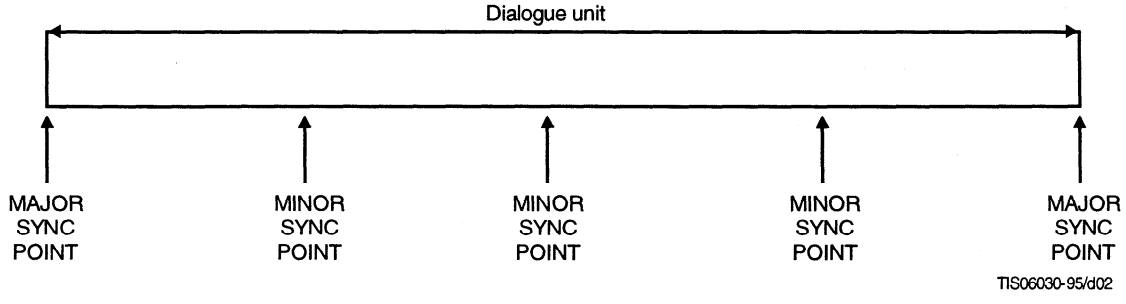

Figure 1 – Example of a structured dialogue unit

7.4 Activity concept

The activity concept allows SS-users to distinguish between different logical pieces of work called activities. Each activity consists of one or more dialogue units. Only one activity is allowed on a session connection at a time, but there may be several consecutive activities during a session connection. An activity may also span more than one session connection. An activity can be interrupted and then resumed on the same or on a subsequent session connection. This can be considered as a form of resynchronization.

Figure 2 shows how an activity may be structured into dialogue units through the use of major synchronization points. In addition, the SS-users may transfer data outside an activity.

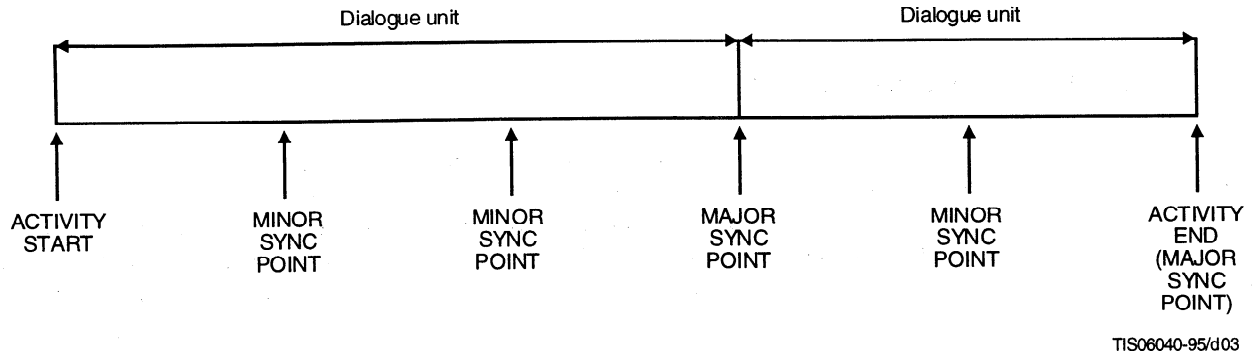

Figure 2 – Example of a structured activity

7.5 Resynchronization

Resynchronization may be initiated by either SS-user. It sets the session connection to a defined state, and therefore includes reassignment of tokens and setting the synchronization point serial number(s) to new value(s).

When symmetric synchronization is used, the SS-user can request to resynchronize one direction of data flow, or both directions. If both directions are requested, then both serial numbers are assigned new values; otherwise only the serial number associated with the requested direction of flow is assigned a new value. Resynchronization purges all undelivered data for the requested direction(s) of flow.

When symmetric synchronization is not used, both directions of flow are always resynchronized. The single synchronization point serial number is assigned a new value. All undelivered data is purged.

Three options are provided:

a) abandon option which is used to set the synchronization point serial number to an unused value;

b) restart option which is used to set the synchronization point serial number to any used value which is greater than the synchronization point serial number which identifies the last acknowledged major synchronization point;

c) set option is used to set the synchronization point serial number to any value chosen by SS-user.

When symmetric synchronization is used, a resynchronize option (restart, set or abandon) is provided by the SS-user for each direction of data flow on which resynchronization is requested.

7.6 Negotiation

Negotiation takes place between both SS-users during the session connection establishment phase according to the following rules.

7.6.1 Negotiation of functional units

The kernel functional unit (see clause 9) is always used. Each SS-user proposes the use or non-use of each of the other functional units. A functional unit is selected only if both SS-users propose use of the functional unit and it is supported by the SS-provider. Specific negotiation rules are given in 12.1.2.

7.6.2 Negotiation of initial token settings

When the calling SS-user proposes use of a functional unit that requires a token, it also proposes the initial token settings:

a) calling SS-user side;

b) called SS-user side;

c) called SS-user choice.

If the use of the functional unit is selected, the token is set to:

d) the side proposed by the called SS-user, if "called SS-user choice" is proposed by the calling SS-user; or

e) in all other cases, the side proposed by the calling SS-user.

7.6.3 Negotiation of initial synchronization point serial number

When a calling SS-user proposes any of the minor synchronize, symmetric synchronize, major synchronize or resynchronize functional units, but does not propose the activity functional unit, it also proposes values for the initial synchronization point serial number(s). Two serial numbers are proposed if the symmetric synchronize functional unit is proposed; otherwise one serial number is proposed. If two serial numbers are proposed, the First Initial Synchronization Point Serial Number is associated with the calling SS-user's sending flow and the Second Initial Synchronization Point Serial Number is associated with the calling SS-user's receiving flow.

The calling SS-user may also propose value(s) for the initial synchronization point serial number(s) even if the activity management functional unit is proposed provided that any of the minor synchronize, symmetric synchronize, major synchronize or resynchronize functional units are also proposed. If the called SS-user selects use of any of the minor synchronize, symmetric synchronize, major synchronize or resynchronize functional units, but does not select use of the activity management functional unit, it returns value(s) for the initial synchronization point serial number(s) which may or may not be the same as the values proposed by the calling SS-user. If the symmetric synchronize functional unit is selected, the called SS-user returns values for two serial numbers; otherwise a value for one serial number is returned. The values returned by the called SS-user are used as the initial synchronization point serial number(s) for the new session connection.

In all other combinations of functional units, no initial synchronization point serial number(s) are proposed.

8 Phases and services of the session service

The connection-mode session service comprises three phases. The purpose of each phase, and a short description of the associated services are given in 8.1 to 8.3. The services and the primitives by which they are invoked are defined in clauses 12, 13 and 14.

The connectionless-mode session service is used to transfer a single SSDU from the sending SS-user to the receiving SS-user. The service primitives associated with it are defined in clause 17.

NOTE – The amount of SS-user data which can be transferred in certain primitives may be limited due to protocol restrictions imposed by the SS-provider.

8.1 Session connection establishment phase

The session connection establishment phase is concerned with establishing a connection between two SS-users. It has one service associated with it:

The session connection service (see 12.1) is used to set up a session connection and to negotiate tokens and parameters to be used for the connection.

8.2 Data transfer phase

The data transfer phase is concerned with the exchange of data between the two SS-users connected in the session connection establishment phase.