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BSI DD*126 85 ■ 1624669 0096586 T ■

DD 126: 1985

UDC 681.324.02.071.8

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Draft for Development

**Open Systems Interconnection: session
symmetric synchronization service
(ISO/DIS 8326 DAD 1)**

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This publication is not to be regarded as a British Standard

It is being issued in the Draft for Development series of publications and is of a provisional nature because the subject matter is in the process of ongoing development within the International Standards Committee (ISO/TC 97/SC 21 Information Retrieval, Transfer and Management for Open Systems Interconnection).

It should be applied on this provisional basis, so that information and experience of its practical application may be obtained.

A review of this Draft for Development will be carried out not later than two years after its publication. Notification of the start of the review period, with a request for the submission of comments from users of this Draft for Development will be made in an announcement in the appropriate issue of *BSI News*. Observations which it is felt should receive attention before the official call for comments will be welcomed.

According to the replies received, the responsible BSI Committee will judge whether the Draft for Development can be converted into a British Standard or what other action should be taken.

National foreword

This Draft for Development has been prepared under the direction of the Office and Information Standards Committee. The primary objective of this Draft for Development is to give advance guidance to product and systems designers concerned with the Session Layer of the Basic Reference Model for Open Systems Interconnection (OSI).

The text of the Draft for Development is identical with the Draft Proposal ISO/DIS 8326 DAD 1 (reference ISO/TC 97/SC 21 N 610) issued May 1985 by the International Organization for Standardization (ISO).

For ease of reproduction the ISO text has been reproduced unchanged but, because the tables contained handwritten entries, these have been retyped and, in table 34 specific actions have been re-listed in numerical order, in table 35 predicates have been re-listed in numerical order, and in tables 37 and 38, rows and columns have been re-ordered to be in state number order.

The UK has actively participated through BSI Technical Committee OIS/121 in the development of the ISO Draft Proposal. The Technical Committee will review any agreed amendment or addenda to the ISO text and will, where appropriate, update the text of this Draft for Development via an amendment or revision. When the ISO draft reaches an appropriate level of agreement and stability, this Draft for Development may then be converted to a British Standard.

This Draft for Development extends the services defined in DD 111 to provide an optional symmetric synchronization service that allows the session service users to set minor synchronization points independently in their sending data flows. This service does not prevent communication between a session service user using the services in DD 111 together with the service in this Draft for Development and another session service user using the services in DD 111 without the service in this Draft for Development.

This Draft for Development is closely related to DD 127 which specifies the protocol providing the service defined in this Draft for Development.

This Draft for Development has been issued for information. There is, at present, no specific reference to it in any of the current draft Application or Presentation layer standards. The UK has recommended, therefore, that it does not progress to the Draft International Standard stage until detailed requirements for it have been identified in higher layer standards.

For information, a list of published British Standards and Drafts for Development (together with those scheduled for publication at the time of publication of this Draft for Development) for OSI, data communications and computer graphics is attached as national appendix A. Press releases for new OSI, data communications and computer graphics British Standards publications will be issued to the computing press, and details of all new publications will be recorded in full in *BSI News*.

Terminology and conventions. The text of the Draft Proposal has been approved as suitable for publication as a Draft for Development without deviation. Some terminology and certain conventions are not identical with those used in Drafts for Development; attention is drawn especially to the following.

Wherever the words 'International Standard' appear, referring to this Draft for Development, they should be read as 'Draft for Development'.

Wherever page numbers are quoted, they are ISO page numbers.

Because of the re-setting of the tables, there is not always a one-to-one correspondence between the BS and ISO pages and, as a consequence, the ISO page numbers for the tables have not been quoted in this Draft for Development.

Cross-references

International standards	Corresponding British Standard
ISO 7498:1984	BS 6568:1984 Description of basic reference model for open systems interconnection (Identical)
ISO/DIS 8326	DD 111:1985 Open Systems Interconnection: basic connection-oriented session service definition (ISO/DIS 8326) (Identical)
ISO/DIS 8327	DD 112:1985 Open Systems Interconnection: basic connection-oriented session protocol specification (ISO/DIS 8327) (Identical)
ISO/DIS 8327 DAD 1	DD 127* Open Systems Interconnection: session symmetric synchronization protocol (ISO/DIS 8327 DAD 1) (Identical)

At the time of publication of this Draft for Development the references in the text to ISO 8326 and ISO 8327 are at the Draft International Standard stage and the reference to ISO 8327 DAD 1 is at the Draft Proposal Stage.

* In preparation.

Textual error. It has been noted that three entries in the state tables do not contain a resultant state. The intersections and the missing resultant states are indicated below.

Table	Intersection			Missing resultant state
	Event	State	Predicate	
36	SCONcnf+	STA 02A	p 78	STA 713
36	SCONrsp+	STA 08	p 78	STA 713
38	SSYNMcnf	STA 04A	p 78	STA 713

0.0 Introduction

0.1 General

ISO 8326 specifies the session service provided by the session protocol as defined in ISO 8327.

This addendum extends the services defined in ISO 8326 to provide an optional symmetric synchronization service. The symmetric synchronize service allows the SS-users to independently identify minor synchronization points on their sending data flows. It also allows the SS-users to resynchronize on one or both directions of flow when the resynchronize functional unit is also selected.

A brief rationale for this service and a summary of the service extensions defined in this addendum comprise the remainder of this Introduction.

0.2 Rationale

The synchronization service currently defined in ISO 8326 is two-way alternate (TWA) in nature. That is, a token is used to control which SS-user is permitted to insert synchronization points into its output flow. This service appears to be adequate for those SS-users who have structured their dialogues as TWA or master/slave.

However, it is also necessary to support those SS-users who develop dialogues which are truly two-way simultaneous (TWS) in nature. For example, an SS-user may choose to send a stream of requests (and minor synchronization points) to its peer SS-user. The peer SS-user may need to set minor synchronization points in its sending flow simultaneously. This could result from a need to send multiple responses per request, to send responses in an order different than the requests, or in some cases to send a request or other control information in the opposite direction. In these cases, correlation of the two flows is an association only perceivable at the level of the SS-users.

The SS-users still need synchronization services; however, each SS-user must have the ability to independently insert minor synchronization points into its output flow. Symmetric synchronization services provide this

[ISO page 2]

capability. The correlation of these minor synchronization points and the semantics associated with the points is an SS-user responsibility.

This extension is of particular interest to TWS or S-TYPED-DATA users, but is also made available in TWA to permit a user to easily operate in any mode.

When symmetric synchronize and resynchronize services are in use, SS-users may choose to resynchronize on only one direction of data flow or on both directions.

0.3 Summary of Service Extensions

This addendum introduces the symmetric synchronization functional unit, which is available for use with all other functional units except minor synchronization. When the symmetric synchronization functional unit is selected, two synchronization point serial number counters are provided to the SS-user: one for sync points on the SS-user's sending flow and the other for sync points on that SS-user's receiving flow. The synchronize-minor token is not available because minor synchronization points can be issued independently by the two SS-users. A minor synchronization point is associated with one direction of data flow on the session and is represented by one synchronization point serial number.

If the major-synchronize and/or activity functional units are selected with symmetric synchronization, two serial numbers (one for each direction of flow) are used to fully define a major synchronization point or an activity end. The major sync confirmation service and the activity end confirmation service supply the second serial number. Likewise, two serial numbers are defined for the connect, accept, and activity resume service primitives when the symmetric synchronization functional unit is used.

If the resynchronize functional unit and the symmetric synchronize functional unit are selected, the SS-user can choose to request resynchronization on only one direction of flow, or on both. If both flows are to be resynchronized, the SS-user must provide two serial numbers. With this mechanism, correlation of the two directions of flow and naming of the resynchronization points are an SS-user responsibility.

[ISO page 3]

Following the Introduction, this addendum has a structure which is similar to that of ISO 8326 and shows the modifications (if any) applicable to each Clause.

It must be noted that the ISO 8326 text often refers to "a serial number" or "a synchronization point serial number". When referring to a major synchronization point, activity end, activity resume or resynchronization, these references must be read as "serial number(s)" instead of "serial number" to include the symmetric synchronize case. For the sake of brevity, such minor editorial changes are not included in this addendum.

[ISO page 4]

This publication is a Draft for Development and is therefore not to be regarded as a British Standard. See page 1.

1.0 SCOPE AND FIELD OF APPLICATION

The services provided in this addendum are an extension of the basic services defined in ISO 8326, and therefore do not prevent communication between SS-users using ISO 8326 services and those in this addendum and SS-users using ISO 8326 services without this addendum.

This addendum describes the service extensions to ISO 8326 which provide the symmetric synchronize services. These services are available on a session connection for which the symmetric synchronize functional unit has been selected.

The symmetric synchronize service allows both SS-users to independently set minor synchronization points in their sending data flows. With the symmetric synchronize service, correlation of the two flows and any semantics associated with synchronization points are SS-user responsibilities.

2.0 REFERENCES

ISO 7498 Information processing systems -
Open systems interconnection -
Basic Reference Model

ISO 8326 Information processing systems -
Open systems interconnection -
Session Service Definition

ISO 8327 Information processing systems
Open systems interconnection -
Session Protocol Specification

ISO 8327/DAD covering Symmetric Synchronization
for the Session Protocol

This addendum has no effect on Clauses 3, 4, 5 and 6 of ISO 8326.

[ISO page 5]

7.0 OVERVIEW OF THE SESSION SERVICE

7.3 Synchronization and dialogue unit concepts

A synchronization point can be identified by a single serial number if the right to send all sync 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. Any semantics which SS-users may give to the synchronization points are transparent to the SS-provider.

7.5 Resynchronization

Resynchronization may be initiated by either SS-user. It sets the session connection to a defined state. Tokens are reassigned. If the symmetric synchronize functional unit is selected, 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.

If both the symmetric synchronize functional unit and the resynchronize functional unit are selected, 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

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 the called SS-user accepts use of any of these functional units, it returns values 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 accepted, the called SS-user proposes values for two serial numbers; otherwise a value for one serial number is proposed. 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 serial number is proposed.

8.0 PHASES AND SERVICE ELEMENTS OF THE SESSION SERVICE

8.2 Data transfer phase

In addition to the Minor Synchronization Point service, Major Synchronization Point service and Resynchronize service, a fourth service is associated with session synchronization and resynchronization:

- the Symmetric Synchronization Point service is used to independently define minor synchronization points on each SS-user's sending flow. The synchronize-minor token is not available.

9.0 FUNCTIONAL UNITS AND SUBSETS

A new functional unit, the symmetric synchronize functional unit, is introduced by this addendum.

9.1 Functional Units

9.1.13 Symmetric synchronize functional unit

The symmetric synchronize functional unit supports the symmetric synchronization point service which allows the SS-users to independently place minor synchronization points in their sending flows. Correlation of these synchronization points is an SS-user responsibility. The synchronize-minor token is not available. It is not possible to select this

functional unit and the minor synchronize functional unit for use on the same session connection.

It is possible to select the symmetric synchronize functional unit with either the duplex functional unit or the half-duplex functional unit. If the half-duplex functional unit is selected, the data token is available; if the duplex functional unit is selected, the data token is not available. The synchronize-minor token is not available when the symmetric synchronize functional unit is selected.

Table 2 indicates the service associated with the symmetric synchronize functional unit. No token services are associated with this functional unit.

Table 2 - Services associated with each functional unit

Functional unit	Service(s)	Reference
Symmetric Synchronize	Symmetric Synchronize	13.8

10.0 QUALITY OF SESSION SERVICE

This addendum has no effect on the QOS definition.

11.0 INTRODUCTION TO THE SESSION SERVICE PRIMITIVES

11.2 Token restrictions on sending primitives

Table 8 defines the token restrictions that apply for the S-SYNC-MINOR request when the symmetric synchronization functional unit has been selected.

TABLE 8 - Token restrictions on service primitives

Service primitives	Data token	Sync-minor token	Major/activity token	Release token
IS-SYNC-MINOR request (symmetric sync)	nr	3	nr	nr

Key:

3 : Token not available

nr: No restriction

11.4 Synchronization point serial number management

A synchronization point may be identified in either of the following two ways, depending on whether the symmetric synchronize functional unit has been selected:

- 1) Single serial number synchronization points: Only one SS-user is allowed to define synchronization points at any given time, as controlled by the synchronize-minor and major/activity tokens. A single serial number is used to identify all synchronization points; it is incremented each time either SS-user issues a synchronization request.
- 2) Symmetric serial number synchronization points: Both SS-users are allowed to define minor synchronization points on their sending directions of data flow. Correlation of two minor synchronization points (one for each direction of flow) is an SS-user responsibility. The synchronize-minor token is not available. Only the serial number associated with the direction of flow on which a minor synchronization point travels is incremented.

With symmetric serial number synchronization points, a minor synchronization point is associated with a single direction of data flow and can be represented by one synchronization point serial number. On the other hand, major synchronization points and the ends of activities are

[ISO page 9]

always defined by two correlated synchronization point serial numbers, one for each direction of data flow.

When the data token is available and the symmetric synchronize functional unit has been selected, ownership of the data token is not required to issue a minor synchronization point. This permits a TWA user to indicate minor synchronization points in its typed-data flow against the turn, when the Typed data functional unit is selected. If an SS-user using half-duplex mode does not wish to synchronize the typed-data flow, the SS-user should restrict the right to issue minor synchronization points to the owner of the data token.

When both the major synchronize and symmetric synchronize function units are selected, the major/activity token is available. Acknowledgement of a major synchronization defines a serial number for the direction of flow on which the confirmation travels. Only the owner of the major/activity token (and the data token, if available) is allowed to make an S-SYNC-MAJOR request.

11.4.1 Variables

The synchronization variables $V(A)$, $V(M)$, and $V(R)$ are each dual number variables (an ordered pair) when the symmetric synchronize functional unit has been selected.

The remainder of Clause 11 in this addendum defines the symmetric synchronize variables and how they are managed. For both minor and major synchronization services, the serial numbers are managed by the SS-provider and given to the SS-user.

11.4.1.1 $V(A) = V(As), V(Ar)$

$V(As)$ is the lowest serial number on the SS-user's sending flow to which a synchronization point confirmation is expected. No confirmation is expected to be received when $V(As) = V(Ms)$.

$V(Ar)$ is the lowest serial number on the SS-user's receiving flow for which a confirmation has not yet been sent. No confirmation can be sent when $V(Ar) = V(Mr)$.

11.4.1.2 $V(M) = V(Ms), V(Mr)$

$V(Ms)$ is the serial number of the next synchronization point to be sent.

V(Mr) is the serial number of the next synchronization point to be received.

11.4.1.3 V(R) = V(Rs), V(Rr)

V(Rs) is the lowest serial number on the SS-user's sending flow to which resynchronization restart is permitted.

V(Rr) is the lowest serial number on the SS-user's receiving flow to which resynchronization restart is permitted.

11.4.1.4 Vsc

Vsc is not used if the symmetric synchronize functional unit has been selected.

11.4.2 Session connection establishment

When any session connection is established in which the symmetric synchronize functional unit has been selected and the activity management functional unit has not been selected, V(Ms) and V(Mr) are set to the initial synchronization point serial numbers of the response/confirm primitives. V(As) and V(Ar) are also set to these numbers. V(Rs) and V(Rr) are set to zero. The dual number definitions of these numbers apply if the symmetric synchronize functional unit has been selected.

11.4.3 Minor synchronization point

When an S-SYNC-MINOR request is issued, the associated synchronization point serial number, which is indicated to the SS-user, is equal to V(Ms). V(Rs) and V(As) remain unchanged. V(Ms) is then incremented by one.

When an S-SYNC-MINOR indication is received, the associated synchronization point serial number, which is indicated to the SS-user, is equal to V(Mr). V(Rr) and V(Ar) remain unchanged. V(Mr) is then incremented by one.

When an S-SYNC-MINOR response is issued, the associated synchronization point serial number, which is supplied by the SS-user, must be less than V(Mr) and equal to or greater than V(Ar). V(Ar) is set to the serial number plus one. V(Mr) and V(Rr) remain unchanged.

When an S-SYNC-MINOR confirm is received, the associated synchronization point serial number, which is indicated to the SS-user, is less than $V(Ms)$ and equal to or greater than $V(As)$. $V(As)$ is set to the serial number plus one. $V(Ms)$ and $V(Rs)$ remain unchanged.

11.4.4 Major synchronization point

Two serial numbers are associated with a major synchronization point, one for each direction of flow. The serial number for the requesting SS-user's sending flow is defined by the SS-provider at the time the S-SYNC-MAJOR request is issued. The second serial number is defined by the SS-provider at the time the S-SYNC-MAJOR response is issued.

When an S-SYNC-MAJOR request is issued, the associated sending flow synchronization point serial number, which is indicated to the SS-user, is equal to $V(Ms)$. $V(Rs)$ remains unchanged. $V(Ms)$ is then incremented by one.

When an S-SYNC-MAJOR indication is received, the associated receiving flow synchronization point serial number, which is indicated to the SS-user, is equal to $V(Mr)$. $V(Rr)$ remains unchanged. $V(Mr)$ is then incremented by one.

When an S-SYNC-MAJOR response is issued, the associated sending flow synchronization point serial number, which is indicated to the SS-user, is equal to $V(Ms)$. $V(Ms)$ is then incremented by one. $V(As)$ and $V(Rs)$ are set to $V(Ms)$. $V(Ar)$ and $V(Rr)$ are set to $V(Mr)$.

When an S-SYNC-MAJOR confirm is received, the associated receiving flow synchronization point serial number, which is indicated to the SS-user, is equal to $V(Mr)$. $V(Mr)$ is then incremented by one. $V(As)$ and $V(Rs)$ are set to $V(Ms)$. $V(Ar)$ and $V(Rr)$ are set to $V(Mr)$. $V(Ms)$ remains unchanged.

After an SS-user has made an S-SYNC-MAJOR request, it may receive minor synchronization points and user data (if the full duplex functional unit is selected). The receiving SS-user is not permitted to respond to these synchronization points or data while waiting on the S-SYNC-MAJOR confirm.