INTERNATIONAL STANDARD

ISO 8571-1

First edition
1988-10-01

AMENDMENT 2
1993-08-15

Information processing systems – Open Systems Interconnection – File Transfer, Access and Management –

Part 1 :
General introduction

AMENDMENT 2 : Overlapped access

Systèmes de traitement de l'information – Interconnexion de systèmes ouverts – Transfert, accès et gestion de fichiers –

Partie 1 : Introduction générale

AMENDEMENT 2 : Chevauchement d'accès

Reference number
ISO 8571-1:1988/Amd.2:1993 (E)

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.

Amendment 2 to International Standard ISO 8571-1:1988 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology.*

ISO 8571 consists of the following parts, under the general title *Information processing systems – Open Systems Interconnection – File Transfer, Access and Management*:

- *Part 1 : General introduction*
- *Part 2 : Virtual Filestore Definition*
- *Part 3 : File Service Definition*
- *Part 4 : File Protocol Specification*
- *Part 5 : Protocol Implementation Conformance Statement Proforma*

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Printed in Switzerland

Information processing systems – Open Systems Interconnection – File Transfer, Access and Management –

Part 1 :
General introduction

AMENDMENT 2 : Overlapped access

0 Introduction

Clause 0 provides an introduction to this amendment. The text in this clause is not intended for inclusion in ISO 8571 part 1.

0.1 General

ISO 8571 part 1 defines in an abstract way the externally visible file transfer, access and management service.

This amendment extends this service definition to incorporate the services offered by overlapped access.

0.2 Rationale

The objective in introducing overlapped access is to allow more efficient access to structured files when a single initiator has a need to perform many reading and updating operations; the serial nature of the current FTAM data transfer services introduces a significant control overhead if the FADUs are small. In this context, an FADU is small if its transmission time is comparable with the time to complete a confirmed service on the association (the association's round trip delay).

0.3 Summary

The current design envelope that there should be at most one file selection per association and one file open per file selection is maintained. If access to more than one file is to be overlapped, more than one association is necessary, The overlapped access takes place within a constant set of presentation contexts established as at present when the file is opened, or previously.

Two different degrees of overlap have been identified. Firstly, requests for future accesses may be issued whilst a previously requested BDT action is in progress, allowing the creation of a queue of read and write requests. In general, PCI relating to a given BDT action may be overlapped with other BDT actions, subject to restrictions; this is called consecutive access. Secondly, read and write actions can be performed in parallel, so that both directions of data transfer are exploited at any one time. Requests are then taken from the queue whenever either direction of transfer becomes free. This is called concurrent access.

The transfer of a single FADU, specified in a single F-READ request has the same interpretation as in ISO 8571. The resultant effect on the virtual filestore of a set of overlapped requests using consecutive access shall be the same as that of the equivalent set of requests issued in series; the service provided is serializable. If concurrent access is used then the resultant effect of a set of write actions on the virtual filestore, is also serializable. However, due to the non-determinism introduced by the use of concurrent access, it is also possible that in some uses of the service, the data transferred as a result of a read action is not consistent with the current state of the file.

1 Scope and field of application

This amendment makes no additions to clause 1.

2 References

This amendment makes no additions to clause 2.

3 Reference model definitions

This amendment makes no additions to clause 3.

4 Service conventions definitions

This amendment makes no additions to clause 4.

5 FTAM Definitions

5.2.9 phase:

Replace definition:

The period of time in which protocol exchanges have a particular purpose, such as establishing or releasing an application context; for each phase a set of valid messages is defined in terms of state transitions or LOTOS events. If overlapped access is allowed then (during the open regime) there may be more than one phase valid at any time i.e. there may be a number of protocol exchanges in progress.

Add the following definitions and re-number accordingly:

5.4.2 concurrent access: a restricted overlapped access sequence in which the user data or protocol control information of a read action may be in the process of transmission at the same time as the user data or protocol control information of a write action.

5.4.3 consecutive access: a restricted overlapped access sequence in which the protocol control information of one access action may be in the process of transmission at the same time as the protocol control information or user data of another access action.

Note - consecutive access is a restricted form of concurrent access.

5.4.9 overlapped access: an access procedure in which protocol control information or user data relating to more than one access action can be in the process of transmission at the same time.

6 Abbreviations

This amendment makes no additions to clause 6.

7 OSI architectural background

This amendment makes no additions to clause 7.

Section one: FTAM general concepts

8 Nature of the file service

8.2 Asymmetry of the dialogue

Replace last paragraph:

The second asymmetry is the more basic one in that, when performing bulk data transfer operations then, for any given operation, one particular entity is the sender, and the other is the receiver; at any instant during the data transfer there is a preferred direction of data flow for that bulk data transfer operation.

8.3 External file service and internal file service

Replace second sentence of a):

The transfer of file data is modelled in the external file service as being the result of error-free operations.

Add note:

Note - Pending the specification of presentation symmetric synchronisation services, recovery mechanisms will not be available for use during overlapped access.

8.4 Service classes and functional units

Replace d):

d) the access class, which allows the initiating entity to perform operations on the file access data units, providing for the manipulation of remote data;

9 Functions associated with the file service

9.3 Concurrency control

Replace second sentence of first paragraph:

These mechanisms are designed to provide a way for a user to perform a co-ordinated set of actions without interference from accesses on concurrent associations.

Replace first sentence of third paragraph:

Concurrency control is provided solely to control the correct parallel execution of tasks across multiple associations.

Insert before last paragraph:

Because the concurrency controls provided are with respect to accesses on concurrent associations, the use of the concurrency control mechanisms does not affect the ability of the user to overlap data transfer actions on individual associations. If the use of overlapped access is allowed during an open regime and FADU locking has been enabled, then the responder overrides the present concurrency controls and sets them as required by the FADU lock (as long as they do not conflict with the locks set by other users). Data transfer actions that are requested by the same user over concurrent associations will be subject to concurrency controls.

10 Service providers supporting FTAM

10.3 Session service

Append to third paragraph:

The support for recovery mechanisms during overlapped access requires the use of the Session symmetric synchronisation service.

Note - Pending the specification of presentation symmetric synchronisation services, recovery mechanisms will not be available for use during overlapped access.

Replace last paragraph:

If the symmetric synchronisation services of the Session Layer are not used, then the specification of the Session Layer also requires the FTAM protocol implementation to keep track of a session token controlling which entity is able to issue synchronisation points.

Section two: Virtual Filestore - General Concepts

11 Virtual filestore

This amendment makes no additions to clause 11.

12 File structures

This amendment makes no additions to clause 12.

13 Constraint sets

This amendment makes no additions to clause 13.

14 Document types

This amendment makes no additions to clause 14.

Section three: Overview of the file service and file protocol

15 File service

Replace figure 10.

15.5 File open phase

Replace last sentence:

It establishes the data transfer facilities, including any special presentation contexts required for the transfer, and the use of overlapped access.

15.6 Data access phase

Replace first sentence of second paragraph:

The data access phase consists of a period of time in which a number (for the transfer class only one) of operations are performed; these may be performed sequentially or be overlapped.

Add the following clause and re-number:

15.7 Overlapped access

Mechanisms are provided to allow a relaxation of the protocol rules during the bulk data transfer regime. This is to allow more efficient access to structured files when an initiator has a need to perform many reading and updating operations; the serial nature of the FTAM data transfer services introduces a significant control overhead if the FADUs are small. In this context, an FADU is small if its transmission time is comparable with the time to complete a confirmed service on the association (the association's

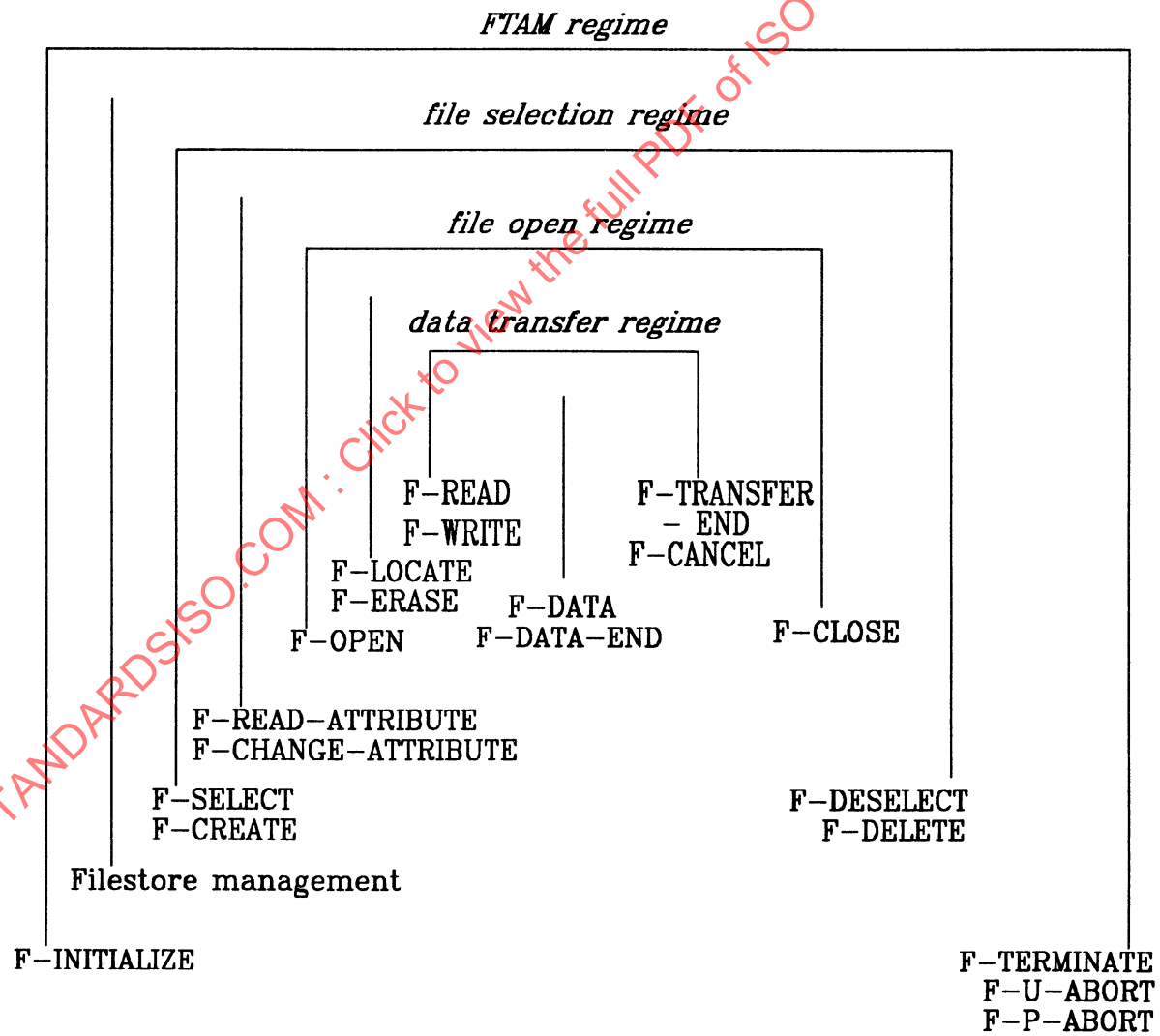

Figure 10 - File service regimes and related primitives

round trip delay).

The overlapped access takes place within a constant set of presentation contexts established when the file is opened, or previously.

Two degrees of overlapped access are defined:

1) consecutive access provides the initiator with the ability to request data transfer operations whilst a previously requested data transfer regime is in progress. Thus, the initiator is able to generate a queue of data transfer requests. Also, subject to the constraints defined in ISO 8571-3, the transfer of data for one data transfer request may be overlapped with the final exchange of PCI for the preceding data transfer operation. The resultant effect on the virtual filestore of a set of overlapped requests using consecutive access is the same as that of the equivalent set of requests issued in series; the service provided is serializable.

2) concurrent access provides an initiator with the ability to overlap read data transfers with write data transfers. A series of read data transfers may be overlapped consecutively as specified in 1); a series of write data transfers may be overlapped consecutively as specified in 1). Thus, the initiator is able to generate separate queues of read and write data transfer requests which are processed independently. That is, the PCI relating to one read data transfer may be overlapped with the exchange of PCI or file data for another read data transfer, similarly for write data transfers. This is subject to the constraints defined in ISO 8571-3. The resultant effect of a set of write actions on the virtual filestore, is serializable. However, due to the non-determinism introduced by the use of concurrent access, it is possible that, in some uses of the service, the data transferred as a result of a read action is not consistent with the current state of the file.

16 Mechanisms in the file protocol

16.4 Checkpoint insertion

Add to end of first paragraph:

If overlapped access is allowed then the checkpointing mechanisms are independent for the two directions of flow, but not for data transfers in the same direction.

Annex A
Examples of the use of FTAM

(This annex does not form part of the standard.)

Replace clause 3:

A.3 Remote database access

A.3.1 Without overlapped access

Suppose a user wishes to make a series of enquiries from a remote database system. The steps taken are as follows (see figure 12):

a) initialise the association as in steps (a) and (b) of A.2, but selecting the access class with the read and grouping functional units.

b) perform the file initialisation steps as in (c) and (d) of A.2. Instead of providing a specification of a user file, the initiating system names a body of information within the database addressed.

c) the initiating system sends a request to read data, using the database query as the identifier of a file access data unit in a notional flat file of possible responses.

d) the responding system returns the result of the query as if it were the contents of the requested file access data unit.

e) the initiating system indicates the end of the transaction and the responding system confirms it.

f) further queries are processed similarly as necessary.

g) the initiating system releases the linkage with the information base as in steps (g) and (h) of A.2.

h) the association and its supporting resources are released as in steps (i) to (k) of A.2.

Note - The above changes represent a defect in the base standard. They have been included here for completeness.

A.3.2 With consecutive access

Suppose a user wishes to make a number of independent enquiries from a remote database system. The use of consecutive access can provide the user with a more efficient service. The steps taken are as follows (see figure 13):

a) initialise the association as in steps (a) and (b) of A.2, but selecting the access class with the read, grouping and consecutive access functional units.

b) perform the file initialisation steps as in (c) and (d) of A.2. Instead of providing a specification of a user file, the initiating system names a body of information within the database addressed.

c) the initiating system sends a series of requests to read data. In each case the database query is used as the identifier of a file access data unit in a notional flat file of possible responses.

d) the responding system returns the result of each query as if it were the contents of the requested file access data unit; the transmission of each result may begin after the end of data transfer marker has been sent for the previous request..

e) upon receipt of the relevant end of data transfer the initiating system indicates the end of the transaction; this is confirmed by the responding system.

f) if a query is dependant on the information received as a result of a previous query, the initiating system need only wait until the receipt of the end of data transfer marker for the previous query, before issuing the next request.

g) further queries are processed similarly as necessary.

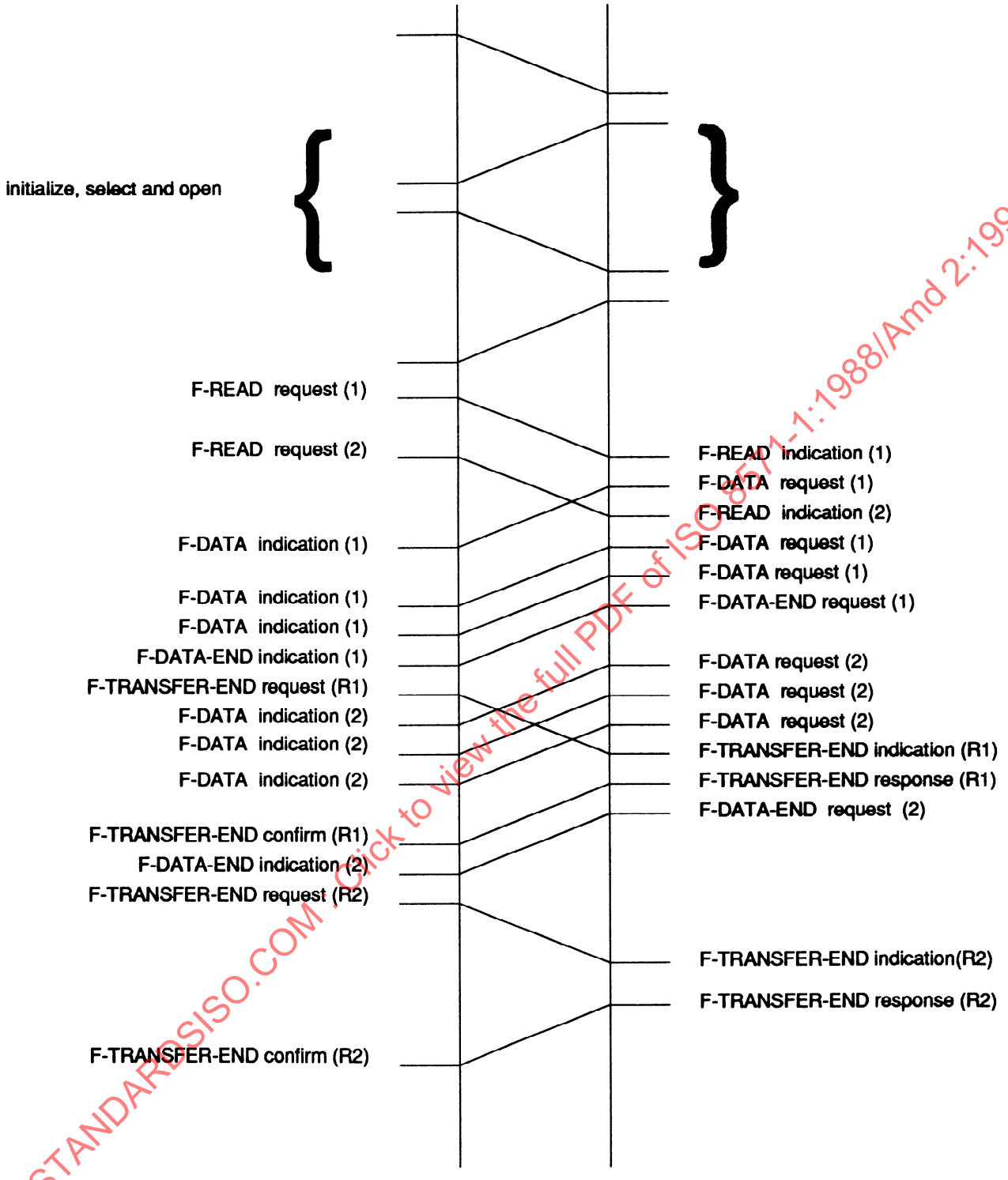

Figure 13 - Remote database access with consecutive access

h) the initiating system releases the linkage with the information base as in steps (g) and (h) of A.2.

i) the association and its supporting resources are released as in steps (i) to (k) of A.2.

Add figure 13 and re-number accordingly:

A.4 A local area network fileserver

Replace first paragraph:

A.4.1 Without overlapped access

Suppose a small disc-less system attached to a local area network as a workstation uses a central fileserver to maintain its working files. These files are organised by the workstation operating system within an area of space viewed by the file server as a single random access file.

The steps taken are as follows (see figure 14):

Add sub-clause:

A.4.2 With consecutive access

Given the scenario as in A.4.1, the interaction between the workstation and the fileserver may be made more efficient with the use of consecutive access (see figure 15).

The workstation follows the same procedures as in steps a) to c) of A.4.1, but this time the consecutive access functional unit is also selected. The operating system makes use of the file service in the same manner as described in step b) of A.4.1. In this case however, the operating system has the additional ability to queue its request to transfer data to and from the filestore. The actual transfer of data is overlapped to increase performance.

Insert figure 15 and re-number accordingly

Add clause:

A.6 Concurrent access

Suppose a user wishes to perform edits on a series of FADUs in a file by reading each FADU in turn, performing edits as necessary. The use of concurrent access enables the user to perform the edits on an FADU, whilst continuing to receive data for the following FADUs. The steps which are taken are as follows (see figure 16):

a) initialise the association as in steps (a) to (b) of A.2, but selecting the file access class with the concurrent access, read and write functional units.

b) the initiating system sends a series of requests to read the FADUs. The responding system begins to transmit data for the requests; transfer of a FADU begins when an end of data transfer has been sent for the previous FADU.

c) the initiating system indicates the end of each transaction and the responding system confirms it.

d) upon receipt of an end of data transfer, if necessary the initiating user may update the FADU by issuing a request to write to that FADU. The initiating system may begin to send the data immediately after issuing the request. The initiator may issue write requests for subsequent FADUs as appropriate; transfer of data may begin after the initiator has indicated the end of the previous transaction.

e) once the responding system has confirmed the end of all outstanding transactions, the initiating system releases the linkage with the file as in steps (g) and (h) of A.2.

f) the association and its supporting services are released as in steps (i) to (k) of A.2.

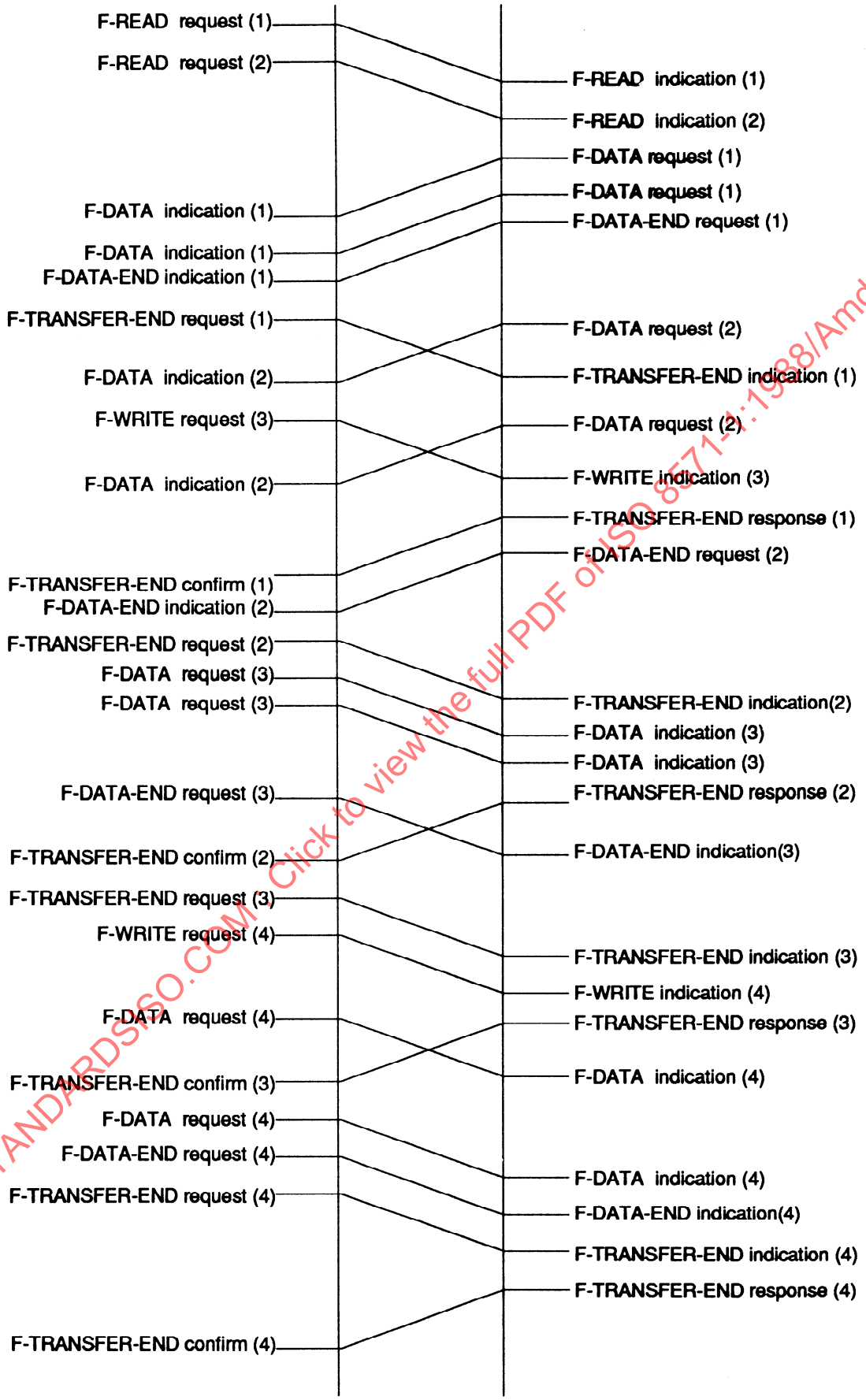

Figure 15 - Use of FTAM in a LAN fileserver with consecutive access