ISO/IEC 14543-5-22

Edition 1.0   2010-02

INTERNATIONAL STANDARD

Information technology – Home electronic system (HES) architecture – Part 5-22: Intelligent grouping and resource sharing for HES Class 2 and Class 3 – Application profile – File profile

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

ISO/IEC 14543-5-22

Edition 1.0 2010-02

INTERNATIONAL STANDARD

Information technology – Home electronic system (HES) architecture – Part 5-22: Intelligent grouping and resource sharing for HES Class 2 and Class 3 – Application profile – File profile

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE

V

CONTENTS

INFORMATION TECHNOLOGY –
HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 5-22: Intelligent grouping and resource sharing for HES Class 2 and Class 3 – Application profile – File profile

FOREWORD

1) ISO (International Organization for Standardization) and IEC (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. Their preparation is entrusted to technical committees; any ISO and IEC member body interested in the subject dealt with may participate in this preparatory work. International governmental and non-governmental organizations liaising with ISO and IEC also participate in this preparation.

2) 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.

3) The formal decisions or agreements of IEC and ISO on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC and ISO member bodies.

4) IEC, ISO and ISO/IEC publications have the form of recommendations for international use and are accepted by IEC and ISO member bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC, ISO and ISO/IEC publications is accurate, IEC or ISO cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

5) In order to promote international uniformity, IEC and ISO member bodies undertake to apply IEC, ISO and ISO/IEC publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any ISO/IEC publication and the corresponding national or regional publication should be clearly indicated in the latter.

6) ISO and IEC provide no marking procedure to indicate their approval and cannot be rendered responsible for any equipment declared to be in conformity with an ISO/IEC publication.

7) All users should ensure that they have the latest edition of this publication.

8) No liability shall attach to IEC or ISO or its directors, employees, servants or agents including individual experts and members of their technical committees and IEC or ISO member bodies for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication of, use of, or reliance upon, this ISO/IEC publication or any other IEC, ISO or ISO/IEC publications.

9) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

10) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 14543-5-22 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

The list of all currently available parts of ISO/IEC 14543 series, under the general title *Information technology – Home electronic system (HES) architecture*, can be found on the IEC web site.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

INTRODUCTION

ISO/IEC 14543-5, *Intelligent Grouping and Resource Sharing for HES (IGRS),* is divided into seven parts:

➢ **Part 5-1: Core protocol**

- Specifies the TCP/IP protocol stack as the basis and the HTTP protocol as the message-exchanging framework among devices.

- Defines a series of device and service interaction/invocation standards, including device and service discovery protocol, device and service description, service invocation, security mechanisms, etc.

- Specifies core protocols for a type of home network that supports streaming media and other high-speed data transport within a home.

➢ **Part 5-21: Application profile – AV profile**

- Based on the IGRS Core Protocol.

- Defines a device and service interaction mechanism, as well as application interfaces used in IGRS Basic Applications.

➢ **Part 5-22: Application profile – File profile**

- Based on the IGRS Core Protocol.

- Defines a device and service interaction mechanism, as well as application interfaces used in IGRS Basic Applications.

➢ **Part 5-3: Basic application**

- Includes an IGRS basic application list.

- Defines a basic application framework.

- Addresses operation specifics (device grouping, service description template, etc.), function definitions, and service invocation interfaces.

➢ **Part 5-4: Device validation**

- Defines a standard method to validate an IGRS-compliant device.

➢ **Part 5-5: Device types**

- Defines IGRS Device types used in IGRS applications.

➢ **Part 5-6: Service types**

- Defines basic service types used in IGRS applications.

INFORMATION TECHNOLOGY –
HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 5-22: Intelligent grouping and resource sharing for HES
Class 2 and Class 3 – Application profile – File profile

1   Scope

This part of ISO/IEC 14543 specifies the file data streaming application profile, device interaction flow model, the request and response messages in the device interaction process, and the service description format of the devices based on Intelligent Grouping and Resource Sharing (IGRS), ISO/IEC 14543-5-1.

This standard is applicable to resource sharing and service collaboration of file data stream among computers, consumer electronics, and communication devices in a Local Area Network (LAN) or Personal Area Network (PAN) environment, especially in a wireless dynamic network.

2   Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

The provisions of the referenced specifications other than ISO/IEC, IEC, ISO and ITU documents, as identified in this clause, are valid within the context of this International Standard. The reference to such a specification within this International Standard does not give it any further status within ISO or IEC. In particular, it does not give the referenced specification the status of an International Standard.

ISO/IEC 14543-5-1, *Information technology – Home electronic system (HES) architecture – Part 5-1: Intelligent grouping and resource sharing for Class 2 and Class 3 – Core protocol*

W3C SOAP 1.2: *Simple Object Access Protocol Version 1.2*
http://www.w3.org/2002/12/soap-envelope

3   Abbreviations

For the purposes of this document the following acronyms and abbreviations apply.

FAMS	FileAccessManagement Service
FC	FileClient
FCMS	FileConnectionManagement Service
FS	FileServer
IGRS	Intelligent grouping and resource sharing

4   Conformance

In order to conform to this International Standard the following applies.

- The IGRS File profile interaction model shall conform to the system specification described in Clause 5.

- File service interaction flow models shall conform to the specifications described in Clause 6.

- The relevant File device (File Server, File Client) and service (FAMS, FCMS) shall conform to the specification defined in Clause 7 and Clause 8 respectively.

- The file invocation session setup procedure and message formats shall conform to specifications defined in Clause 9 and Clause 10.

5   System

5.1   Application scenario

In small office and home environment, there are many kinds of digital devices used, such as PC, Notebook, PDA, DC, DV, MP3, MP4, mobile phone, Set-Top-Box, etc. Typically, the user may need to browse, copy, delete, read and write data files stored in these devices over the network.

File profile is designed specifically for this objective. It sets up a middleware layer between the users and different devices. This layer hides the underlying networking protocols, devices, operating systems and file operation modes while providing a set of commonly shared file access APIs for the application program developers. The user can access the files in devices transparently in a network environment, without having to consider the devices and operating systems.

The file profile enables the client to access shared files on servers from different locations, and it includes the following functions:

a) retrieve client file access identity verification;

b) browse shared file/directory on server;

c) manage uploading/downloading of file/directory;

d) support simple management of file/directory in the shared directory of FileServer;

e) support file/directory update event subscription on FileServer;

f) support service update event subscription;

g) out-of-band transport negotiation when uploading/downloading file.

5.2   Design criteria

5.2.1   Relationship between file profile and IGRS

File profile includes two parts: one specifies the functional interfaces of IGRS FileAccessManagement service and FileConnectionManagement service; and the other specifies the interaction logical flows of these service functional interfaces.

5.2.2   Relationship between file profile and transport protocols

File profile is a higher layer application profile in the IGRS framework and does not rely on specific transport protocols. Therefore it shall support any transport protocols such as FTP, HTTP, etc.

5.2.3   Relationship between file profile and existing file sharing system

File profile defines a set of standardized file sharing access interface based on IGRS network. It does not put any restrictions on the backend implementation. File profile shall support either private systems developed by users, or existing file sharing systems such as ActiveDirectory, SMB, NFS, etc.

5.2.4   Relationship between file profile and file format

File profile is independent of any specific file format, which means it shall support interactions with files of any arbitrary format.

5.2.5   Device supported by file profile

Theoretically, file profile can run on any IGRS devices, such as PC, Notebook, PDA, DC, DV, MP3, MP4, mobile phone, Set-Top-Box, etc.

5.3   Interaction model

IGRS file profile is composed of two logical devices, FileServer and FileClient. FileServer is a device that provides content, and it includes two services: FileAccessManagement Service (FAMS) and FileConnectionManagement Service (FCMS). FileClient is a device that accesses content, and it includes FileClient Engine. The user can access and manage the contents published by FileServer from FileClient. All interaction functions shall be completed though the services and engine running on these devices.

The interaction model covers two services, FileAccessManagement Service and FileConnectionManagement Service, both of which run on FileServer. FileAccessManagement Service is responsible for a majority of functions in the file interaction framework, including file browsing management, file uploading/downloading management, client access rights authentication, etc. FileConnectionManagement Service is used in out-of-band transport protocol negotiation between FileServer and FileClient. FileClient Engine is a client application program responsible for interactions with FileServer. An IGRS file profile interaction model is shown in Figure 1.

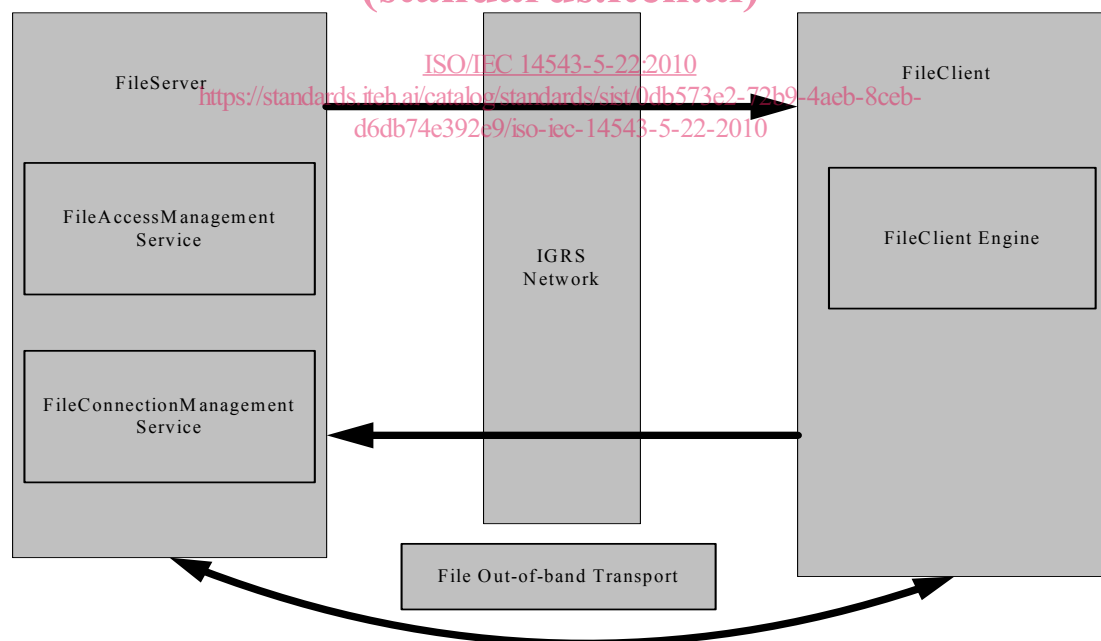**Figure 1 – IGRS file profile interaction model**

6   Interaction flow of IGRS file profile

6.1   Overview

Based on the basic rights setting of the shared files on FileServer, the interaction flow of IGRS file profile can be classified into two categories: simple interaction flow (see 6.2) and complete interaction flow (see 5.3). In simple interaction flow, only the required interfaces of

FileAccessManagement Service and FileConnectionManagement Service on FileServer are applicable in this process. FileClient can browse, download shared file and directory, or retrieve attributes of shared file and directory. In complete interaction flow, the applicable interfaces include all required interfaces of FileAccessManagement Service and FileConnectionManagement Service on FileServer and any optional interfaces except for those that relate to subscription. FileClient can perform management operations on shared files and directories, such as copy, move, delete, modify attributes, etc., or upload file to FileServer, in addition to browse, search, download shared file and directory, or retrieve attributes of shared file and directory. The detailed descriptions about services and interfaces in interaction flow can be found in Annex B.

6.2   Simple Interaction Flow

In simple interaction flow (see Figure 2), only the required interfaces of FileAccessManagement Service and FileConnectionManagement Service on FileServer are applicable. The FileClient shall access a shared file and directory in read-only mode, and is allowed to browse, download a shared file/directory or retrieve attributes of a shared file/directory. However, it shall not be allowed to modify a shared file/directory.

In a simple interaction flow, the invocation process of IGRS service interfaces between FileClient and FileServer is described as follows.

a) IGRS service discovery: through IGRS service discovery mechanism, FileClient discovers FileAccessManagement Service and FileConnectionManagement Service on FileServer.

b) Retrieve access right: a FileClient retrieves an authentication key to get an access right to a shared file on FileServer through invoking FAMS::GetAuthenticationKey() interface of FileAccessManagement Service on FileServer. FileClient can use any combination information of DeviceID/DeviceName, UserName/Password, and Third-party authentication mode of the local device, to retrieve authentication key from FileServer.

c) Browse a shared file/directory:

1) Retrieve sorting capability of a FileServer: a FileClient can retrieve a shared file/directory sorting capability of a FileServer by invoking FAMS::GetSortCapability() interface of FileAccessManagement Service on the FileServer. For example, it can sort according to file names or the time of modification.

2) Browse a shared file/directory on a FileServer: a FileClient can browse all the files and sub-directory information in any specified shared directory by invoking FAMS::Browse() interface of FileAccessManagement Service on FileServer.

3) Retrieve attributes of a shared file/directory: a FileClient can retrieve attributes of any specified shared file/directory by invoking FAMS::GetAttribute() interface of FileAccessManagement Service on a FileServer.

d) Setup a connection with a FileServer:

1) Retrieve transport protocols supported by a FileServer: a FileClient retrieves transport protocols supported by a FileServer, by invoking FCMS::GetProtocolInfo() interface of FileconnectionManagement Service on a FileServer.

2) Select matching transport protocols: the use of retrieved transport protocols supported by a FileServer according to 1) in step d), a FileClient selects matching transport protocols supported by the device.

3) Connection preparation: a FileClient notifies a FileServer to prepare for a connection setup, and retrieve the connection identifier for connection management to be used in a subsequent interaction process, by invoking FCMS::PrepareforConnection() interface of a FileConnectionManagement Service on a FileServer.

e) Download a shared file/directory from a FileServer: a FileClient can set up the downloading of a shared file/directory, and retrieve the URI list of a downloaded shared

file/directory from a FileServer, by invoking FAMS::PrepareforDownload() interface of a FileAccessManagement Service on a FileServer.

f)   File/directory transport: a FileClient and FileServer use out-of-band transport protocols and the URI retrieved in step e) to transport data. When the specified file/directory has been transported, it goes to back to step e) to transport another file/directory if required.

g)   Close connection and release resource: when the file transport has been completed, the FileClient notifies the FileServer to close the connection between them and release the resource, by invoking FCMS::ReleaseConnection() interface of FileConnection-Management Service on FileServer.
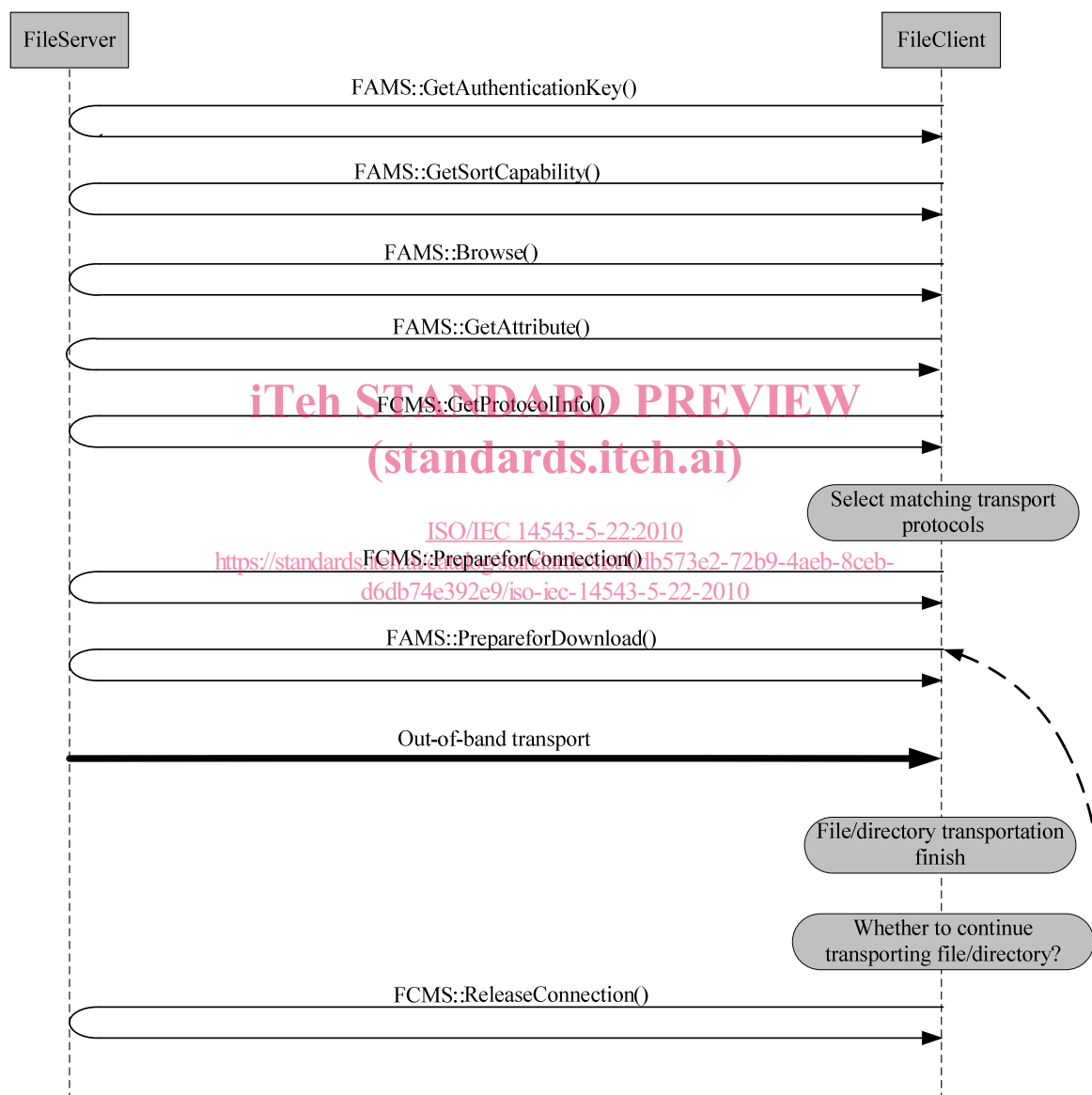
Figure 2 – Simple interaction flow model

6.3   Complete interaction flow

In a complete interaction flow (see Figure 3), the applicable interfaces include all required interfaces of the FileAccessManagement Service and FileConnectionManagement Service on a FileServer and any optional interfaces except for those that relate to subscription. A FileClient can perform management operations on shared files and directories, such as copy, move, delete, modify attributes, etc., or upload a file to a FileServer, in addition to browse,

search and download a shared file and directory, or retrieve attributes of a shared file and directory.

In a complete interaction flow, the invocation process of IGRS service interfaces between a FileClient and a FileServer is described as follows.

a) IGRS service discovery: through the IGRS service discovery mechanism, a FileClient discovers the FileAccessManagement Service and FileConnectionManagement Service on the FileServer.

b) Retrieve access right: a FileClient retrieves an authentication key to get an access right to a shared file on a FileServer by invoking FAMS::GetAuthenticationKey() interface of the FileAccessManagement Service on the FileServer. The FileClient can use any combination information of the DeviceID/DeviceName, UserName/Password, and the Third-party authentication mode of the local device, to retrieve the authentication key from the FileServer.

c) Browse and search a shared file/directory on a FileServer:

   1) Retrieve the sorting and searching capability of a FileServer: the FileClient can retrieve a shared file/directory sorting capability of a FileServer by invoking FAMS::GetSortCapability() interface of a FileAccessManagement Service on a FileServer. For example, it can sort according to file names or times of modification. It can also retrieve a shared file/directory searching capability of a FileServer through invoking FAMS::GetSearchCapability () interface of a FileAccessManagement Service on a FileServer. For example, it can search according to file names or the time of modification.

   2) Retrieve or set a browsing filter of a shared file/directory: the FileClient can retrieve or set a browsing file of a shared file/directory through invoking FAMS::GetBrowseFilter() or FAMS::SetBrowseFilter() interface of FileAccess-Management Service on FileServer.

   3) Browse or search a shared file/directory on a FileServer: the FileClient can browse all files and sub-directory information in any specified shared directory by invoking FAMS::Browse() interface of FileAccessManagement Service on FileServer. It can also search a shared file/directory according to designated criteria through invoking FAMS::Search() interface of a FileAccessManagement Service on a FileServer.

   4) Retrieve or set attributes of a shared file/directory: the FileClient can retrieve attributes of a specified shared file/directory by invoking FAMS::GetAttribute() interface of a FileAccessManagement Service on a FileServer. It can also set attributes of a specified shared file/directory through invoking FAMS::SetAttribute() interface of FileAccessManagement Service on FileServer.

d) Manage a shared file/directory: the FileClient can create a new shared file/directory in a specified shared directory on a FileServer by invoking FAMS::New() interface of a FileAccessManagement Service on a FileServer; or delete a shared file/directory on the FileServer, by invoking FAMS::Delete() interface of FileAccessManagement Service; or copy a shared file/directory on a FileServer to a specified shared directory through invoking FAMS::Copy() interface of a FileAccessManagement Service; or move a shared file/directory to a specified shared directory through invoking FAMS::Move() interface of a FileAccessManagement Service.

e) Set up a connection with a FileServer:

   1) Retrieve the transport protocols supported by a FileServer: the FileClient retrieves transport protocols supported by a FileServer, through invoking FCMS::GetProtocolInfo() interface of a FileConnectionManagement Service on a FileServer.

   2) Select matching transport protocols: the use of retrieved transport protocols supported by a FileServer according to 1) in step e), the FileClient selects matching transport protocols supported by the device.

   3) Connection preparation: the FileClient notifies a FileServer to prepare for connection setup, and retrieve connection identifier for the connection management to use in a subsequent interaction process by invoking

FCMS::PrepareforConnection() interface of a FileConnectionManagement Service in a FileServer.

f) Download a shared file/directory from a FileServer or upload a shared file/directory to a FileServer: the FileClient can set up the downloading of a shared file/directory, and retrieve the URI list of a shared file/directory to be downloaded through invoking FAMS::PrepareforDownload() interface of FileAccessManagement Service on FileServer; or set up a file/directory uploading of a shared directory, and retrieve the URI of the shared directory through invoking FAMS::PrepareforUpload() interface of FileAccess-Management Service.

g) File transport: a FileClient and FileServer use out-of-band transport protocols and the URI retrieved in step f) to download shared files from a FileServer or upload a client file to the designated shared directory on a FileServer. After the transport of a specified file has been completed, it returns to step f), if required.

h) Close connection and release resource: When the file transport has been completed, the FileClient notifies a FileServer to close the connection between them and release the resource through invoking FCMS::ReleaseConnection() interface of FileConnection-Management Service on FileServer.
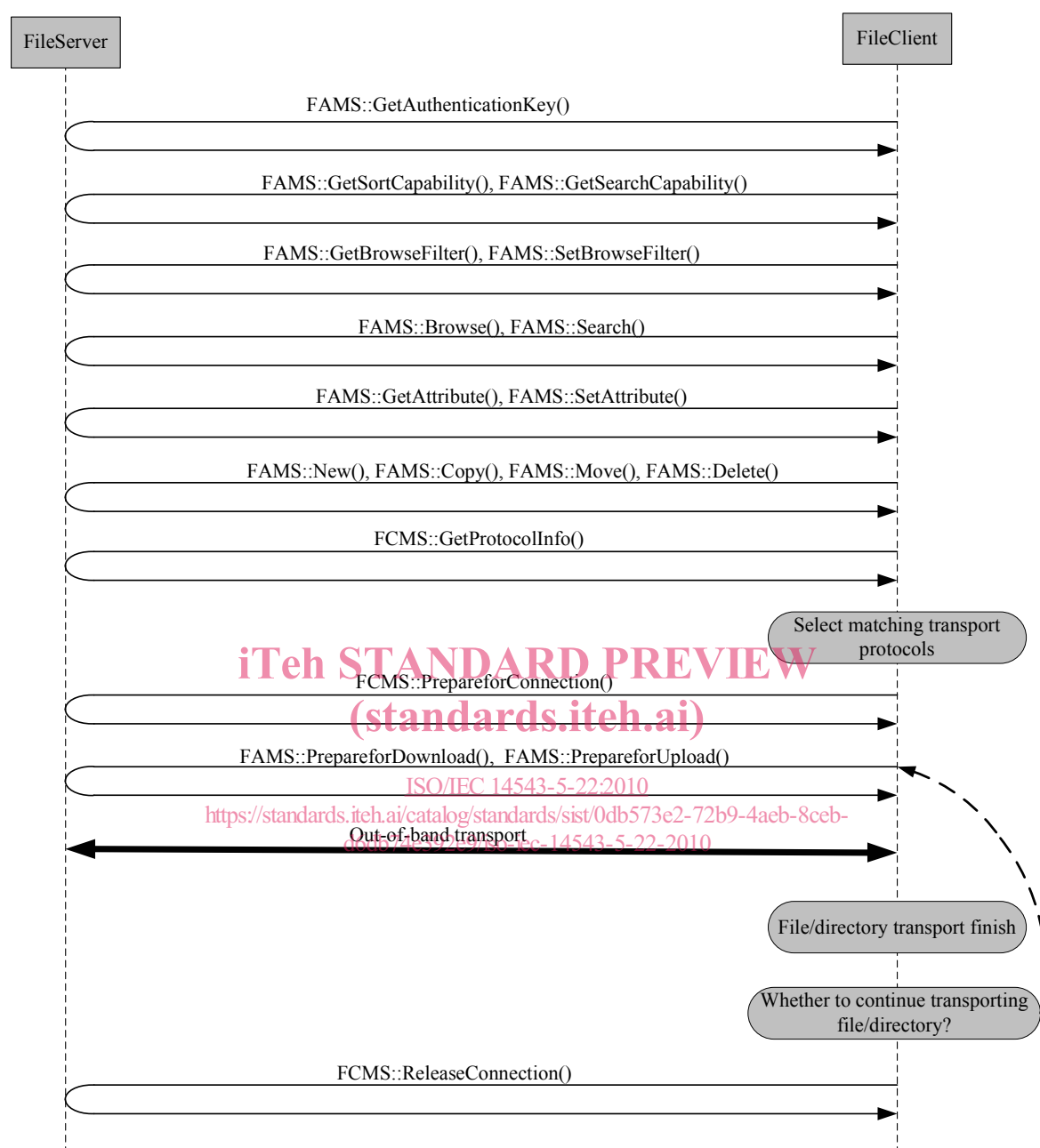
Figure 3 – Complete Interaction Flow of Shared File

7   FileServer

7.1   General

FileServer is the device that provides the file content, and it includes the FileAccess-Management Service (FAMS) and FileConnectionManagement Service (FCMS).

The functions of a FileServer include the following.

a) Based on the authentication information provided by FileClient, a FileServer assigns a corresponding authentication key to a FileClient (recommended validity only during the