

~~ISO/IEC DIS PRF 4396-2:2022(E)~~

~~Date: 2022-09~~

ISO/IEC JTC 1/SC 6/~~AWG 7~~

Secretariat: KATS

~~Date: 2023-10-11~~

Telecommunications and information exchange between  
systems—~~Future network~~— Recursive inter-network  
architecture— ~~—~~

Part 2:  
Common application connection establishment  
~~Protocol procedure~~

iTeh Standards

(<https://standards.itih.ai>)

Document Preview

[ISO/IEC PRF 4396-2](#)

<https://standards.itih.ai/catalog/standards/sist/21664e06-3db6-472c-9380-72ea4647220d/iso-iec-prf-4396-2>

**FDIS stage**

~~Edited DIS — MUST BE USED~~

**ISO/IEC PRF 4396-2:2023(E)**

© ISO/IEC ~~2022~~2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: + 41 22 749 01 11

Fax: +41 22 749 09 47

Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[ISO/IEC PRF 4396-2](#)

<https://standards.iteh.ai/catalog/standards/sist/21664e06-3db6-472c-9380-c2ea4647220d/iso-iec-prf-4396-2>

ISO/IEC PRF 4396-2:2023(E)

**iTeh Standards**  
**(<https://standards.itih.ai>)**  
**Document Preview**

[ISO/IEC PRF 4396-2](https://standards.itih.ai/catalog/standards/sist/21664e06-3db6-472c-9380-c2ea4647220d/iso-iec-prf-4396-2)

<https://standards.itih.ai/catalog/standards/sist/21664e06-3db6-472c-9380-c2ea4647220d/iso-iec-prf-4396-2>

## 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives) or [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs)).

~~Attention is drawn to the possibility that some of the elements of this document may involve the subject of a patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents) and <https://patents.iec.ch>. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)) or the IEC list of patent declarations received (see <https://patents.iec.ch>).~~

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html). In the IEC, see [www.iec.ch/understanding-standards](http://www.iec.ch/understanding-standards).

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6 *Telecommunications and information exchange between systems*.

A list of all parts in the ISO/IEC 4396 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html) and [www.iec.ch/national-committees](http://www.iec.ch/national-committees).

Field Code Changed

## Introduction

The functions of creating an application connection between instances of application processes are to:

- exchange application naming information;
- optionally, authenticate each;
- establish the set of objects that to which remote operations on the flow have access ~~to~~.

This document defines the Common Application Connection Establishment Procedure (CACEP), patterned after the Association Control Service Element (ACSE) protocol. ACSE was chosen for three reasons:

- it already exists;
- it provides all of the necessary functions and no more, ~~and~~;
- it was designed to be used recursively.

ACSE provides the basic requirements for exchanging application naming and context information and provides for an authentication module to be included.

Although the primary use of CACEP is to combine it with common distributed application protocol (CDAP) for the application information data transfer phase, there are situations when it is desirable to use CACEP with a different protocol in the data transfer phase, e.g. HTTP, in effect, wrapping CACEP establishment around a legacy protocol. CACEP exchanges naming information and provides for an authentication policy. CACEP is a protocol exchange over a flow that serves to authenticate flow participants to their mutual satisfaction and to initialize the application naming information and information related to the application protocol that will be used by applications to exchange information, e.g. abstract and encoding rules, object model versions. In the case of recursive inter-network architecture (RINA), the application protocol is CDAP

The International Organization for Standardization (ISO)

[ISO/IEC PRF 4396-2](https://standards.iteh.ai/catalog/standards/sist/21664e06-3db6-472c-9380-c2ea4647220d/iso-iec-prf-4396-2)

<https://standards.iteh.ai/catalog/standards/sist/21664e06-3db6-472c-9380-c2ea4647220d/iso-iec-prf-4396-2>

Telecommunications and/or International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of a patent.

ISO and/or IEC take no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured ISO and/or IEC that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with ISO and/or IEC. Information may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents) or [patents.iec.ch](http://patents.iec.ch).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those in the patent database. ISO and/or IEC shall not be held responsible for identifying any or all such patent rights.

The following patents may apply:

~~10,135,689 Position parameterized recursive network architecture with topological addressing~~

~~9,762,531 Position parameterized recursive network architecture with topological addressing~~

~~9,584,633 Method and system for managing network communications~~

~~9,288,176 Position parameterized recursive network architecture with topological addressing~~

~~8,769,077 Parameterized recursive network architecture with topological addressing~~

~~8,352,587 Parameterized recursive network architecture with topological addressing~~

~~8,103,797 Parameterized recursive network architecture with topological addressing~~

iteh Standards  
(<https://standards.iteh.ai>)  
Document Preview

ISO/IEC PRF 4396-2

<https://standards.iteh.ai/catalog/standards/sist/21664e06-3db6-472c-9380-c2ea4647220d/iso-iec-prf-4396-2>

# ~~Future network information exchange between systems — Recursive inter-network architecture —~~

## **Part 2: Common application connection establishment procedure**

### **1 Scope**

This document provides the common application connection establishment procedure (CACEP) specification. It includes an overview of CACEP, its specification, the syntax of the protocol data units (PDUs), and the policies available.

### **2 Normative references**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any ~~amendments~~amendments) applies.

ISO 4396-1, *Telecommunications and information exchange between systems — Future network Recursive inter-network architecture — Part 1: Reference model*

### **3 Terms and definitions**

For the purposes of this document, the terms and definitions given in ISO 4396-1, and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp><https://www.iso.org/obp/https://standards.itec.ai/catalog/standards/sist/27064e66-5d86-472c-9580-2ea4647220d/iso-iec-prf-4396-2>
- IEC Electropedia: available at <https://www.electropedia.org/><https://www.electropedia.org/>

#### **3.1**

##### **Application Naming Information**

names used to reference an application that includes the required name Application Process Name and can include distributed application facility (DAF) name or distributed IPC (inter-process communication) facility (DIF) name, application process name, application process instance id, application entity id, and application entity instance id

### **4 Overview**

The Initiating Process first allocates an (N-1)-flow with a destination application. When this is complete, it sends an A\_CONNECT Request with the appropriate parameters and initiates the authentication policy. When the Authentication policy completes, a positive or negative A\_CONNECT Response is returned by the destination application process and the connection is established.

## 5 Detailed specification

### 5.1 General

This specification describes both sides of the procedure for establishing communication between the Initiating and Responding Processes.

### 5.2 Definitions of the process states

#### 5.2.1 General

Creating an applications connection will transition among the following states:

#### 5.2.2 Initiating states

- ~~Authenticating~~ – a connection is in the process of being established and the initiator is authenticating within policy the responder and vice versa.
- ~~ConnectPending~~ – a Connect Request has been sent, awaiting a response.
- ~~Established~~ – the connection is established and PDUs can be exchanged.
- ~~FlowPending~~ – determining if the flow is well-formed.
- ~~Null~~ – the state machine is awaiting input.
- ~~Releasing~~ – the state machine is releasing all resources associated with this connection.

#### 5.2.3 Responding states

- ~~Authenticating~~ – a connection is in process of being established and the responder is authenticating within policy the initiator and vice versa.
- ~~ConnectPending~~ – a Connect Request has been sent, awaiting a response.
- ~~Established~~ – the connection is established and PDUs can be exchanged.
- ~~Null~~ – the state machine is awaiting input.
- ~~Releasing~~ – the state machine is releasing all resources associated with this connection.

### 5.3 Allocate\_Request.submit

#### 5.3.1 When invoked

This primitive is invoked when a process has been instructed to create an application connection.

#### 5.3.2 Action upon receipt

The Initiating-Process is provided with the Application-Naming-Information and a supporting DIF that can be used to contact the Destination Application Process. The Initiating-Process is in the NULL state and invokes an Allocate\_Request to the supporting DIF:

- ~~Allocate\_Request(<DIF-Name>.any.DIF or URL, <Initiating-Process-name>, QoS parameters, access control parameters)~~



The Initiating-Process transitions to the FlowPending state.

#### 5.4 Allocate\_Response.deliver

##### 5.4.1 When invoked

When the Initiating Application Process is in the *FlowPending* state and the supporting DIF receives a Create Flow Response.

##### 5.4.2 Action upon receipt

If the Initiating Application Process is not in the FlowPending state, this is an error, the Initiating Process should invoke a Deallocate primitive and report the error appropriately. If the Allocate was successful, then there is an allocated flow with the requested QoS and the Initiating Process can transition from the FlowPending state to the ConnectPending state, sending a A\_CONNECT PDU to the Responding Process. If the Response was negative, an error is returned, and the state returns to NULL.

#### 5.5 Allocate\_Indication

##### 5.5.1 When invoked

When the named Destination Application in the NULL state and receives an Allocate\_Indication from the supporting DIF.

##### 5.5.2 Action upon receipt

The Responding Process is in the NULL state. If the Allocate\_Indication specified an Application Process-Instance and Application-Entity-Instance and the instance was not in the NULL state, then this is an error; otherwise, a new instance is created and it is not an error.

If the Responding Process is not willing to accept the request, it returns a negative Allocate\_Confirm to the supporting DIF. The state remains NULL. If the Responding Process is willing to accept the connection, it notifies the supporting DIF with a positive Allocate\_Confirm primitive. The Responding Process transitions to ConnectPending state.

#### 5.6 A\_CONNECT Request

##### 5.6.1 When invoked

When a supporting flow has been allocated, the Responding Process is in the *ConnectPending* State (waiting for an A\_CONNECT Request).

##### 5.6.2 Action upon receipt

If the Responding Entity-instance is not in the ConnectPending State, the Responding Entity-instance should send an A\_RELEASE and invoke a Deallocate and abruptly terminate the connection.

Otherwise, If the PotentialConnection Timer is set then (this is a retry), the timer is cancelled. Otherwise, The Responding Entity-instance will evaluate the parameters of the A\_CONNECT Request and if they are valid will invoke the Authentication module and transition to the Authenticating state.

If the Authentication module completes successfully, the Responding Entity instance sends a positive A\_CONNECT Response and transitions to the Established state.

If Authentication fails, the Responding Entity-instance sends a negative A\_CONNECT Response. The Responding Entity instance increments the count of number of retries. If the count is less than or equal MaxConnectRetries, then it sets a PotentialConnection Timer greater than 2MPL (Maximum Packet Lifetime) and remains in the ConnectPending State.

If the count is greater than MaxConnectRetries, the Responding Entity-instance sends an A\_RELEASE (with no response required) and invokes a Deallocate primitive.

## 5.7 A\_CONNECT Response

### 5.7.1 When invoked

When the Initiating Process has sent an A\_CONNECT Request and transitioned to the Authenticating state, awaiting a positive or negative A\_CONNECT Response.

### 5.7.2 Action upon receipt

If the Initiating Process is not in the ConnectPending State, this is an error. Send an A\_RELEASE (with no response required) and invoke Deallocate.

If the A\_CONNECT Response PDU indicated a failure, the Initiating Process may remain in the Connect Pending state and attempt to modify the parameters and send a new A\_CONNECT Request.

Otherwise, it sends an A\_RELEASE (with no response required) and invokes a Deallocate(port-id) on the flow and flags an error and transitions to the NULL state. The Initiating Process should also have a count of retries and give up after the maximum. However, this will be enforced by the responding process regardless.

If the A\_CONNECT Response PDU indicated success, the Initiating Process transitions to the Established state.

## 5.8 A\_DATA (Optional)

### 5.8.1 When invoked

When the Initiating or Responding Entity Instance is in the Established state. This PDU may be used with Applications that are not using CDAP but have multiple AEs to which data is being sent. This PDU type is not used with CDAP.

### 5.8.2 Action upon receipt

When an Application Process receives an A\_DATA PDU, it inspects the AE-name or AE-instance-identifier to deliver the PDU to the appropriate instance.

## 5.9 A\_RELEASE Request

### 5.9.1 When invoked

An A\_RELEASE can be sent by either the Initiating or the Responding Process in any state. If the sender indicates a response is requested, it transitions to the Releasing state.

### 5.9.2 Action upon receipt

When the Initiating or the Responding Process, receives an A\_RELEASE, if an A\_RELEASE Response is not requested, it immediately invokes an Deallocate primitive and transitions to the NULL state.

If a A\_RELEASE Response was requested, it sends an A\_RELEASE Response and after 2MPL+A invokes Deallocate. All state associated with this connection is deallocated.

## 5.10 A\_RELEASE Response

### 5.10.1 When invoked

When an Initiating or Responding Process has received an A\_RELEASE indicating a response is desired.