INTERNATIONAL STANDARD

ISO/IEC 4396-2

First edition

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

Part 2: Common application connection establishment procedure

PROOF/ÉPREUVE

Reference number
ISO/IEC 4396-2:2023(E)

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Published in Switzerland

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Foreword

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

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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 to which remote operations on the flow have access·

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;

— 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

Telecommunications and 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) applies.

ISO 4396-1, *Telecommunications and information exchange between systems — 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

— IEC Electropedia: avaiable at 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.

