INTERNATIONAL STANDARD

ISO/IEC 9072-3

First edition
1996-09-15

Information technology — Open Systems Interconnection — Remote Operations: Protocol Implementation Conformance Statement (PICS) proforma

Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Opérations distantes: Formulaire de déclaration de conformité de mise en œuvre du protocole (PICS)



Reference number
ISO/IEC 9072-3:1996(E)

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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.

International Standard ISO/IEC 9072-3 was prepared by ITU-T (as CCITT Rec. X.249) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC. The identical text is published as ITU-T Recommendation X.249.

ISO/IEC 9072 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — Remote Operations*:

— *Part 1: Model, notation and service definition*

— *Part 2: Protocol specification*

— *Part 3: Protocol Implementation Conformance Statement (PICS) proforma*

Annex A forms an integral part of this part of ISO/IEC 9072.

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Introduction

This Recommendation | International Standard is one of a set of Recommendations | International Standards produced to facilitate the interconnection of information processing systems. It is related to other Recommendations and International Standards in the set as defined by the Reference Model for Open Systems Interconnection (see ITU-T Rec. X.200 | ISO/IEC 7498-1). The Reference Model subdivides the area of standardization for interconnection into a series of layers of specification, each of manageable size.

The goal of Open Systems Interconnection is to allow, with a minimum of technical agreement outside the interconnection standards, the interconnection of information processing systems:

- from different manufacturers;
- under different managements;
- of different levels of complexity; and
- of different technologies.

The Remote Operations Service Element (ROSE) is an application-service-element commonly used by a number of applications. ROSE supports interactive applications in a distributed open systems environment. A Remote Operation is requested by one entity; the other entity attempts to perform the Remote Operation and then reports the outcome of the attempt.

To evaluate the conformance of a particular implementation, it is necessary to have a description of the capabilities and options which have been implemented. Such a description is called a Protocol Implementation Conformance Statement (PICS).

This Recommendation | International Standard includes the PICS proforma for the remote operations protocol as defined in CCITT Rec. X.229 (1988) | ISO/IEC 9072-2:1989.

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INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – REMOTE OPERATIONS: PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS) PROFORMA

1 Scope

This Recommendation | International Standard provides the Protocol Implementation Conformance Statement (PICS) proforma for the Remote Operations protocol specified in the CCITT Rec. X.229 (1988) | ISO/IEC 9072-2:1989. This PICS proforma is in compliance with the relevant requirements, and in accordance with the relevant guidance given in ITU-T Rec. X.296 | ISO/IEC 9646-7. Detail of the use of this proforma is provided in this Recommendation | International Standard.

The supplier of an implementation which is claimed to conform to CCITT Rec. X.229 | ISO/IEC 9072-2 is required to complete a copy of the PICS proforma provided in Annex A, and is required to provide the information necessary to identify both the supplier and the implementation.

2 Normative references

The following Recommendations | International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and the parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of valid ITU-T Recommendations.

2.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model.*
- ITU-T Recommendation X.581 (1995) | ISO/IEC 14608-1:1996, *Information technology – Open Systems Interconnection – The Directory: Directory access protocol – Protocol Implementation Conformance Statement (PICS) proforma.*

2.2 Paired Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.219 (1988), *Remote operations: Model, notation and service definition.*

  ISO/IEC 9072-1:1989, *Information processing systems – Text communication – Remote Operations – Part 1: Model, notation and service definition.*

- CCITT Recommendation X.229 (1988), *Remote operations: Protocol specification.*

  ISO/IEC 9072-2:1989, *Information processing systems – Text communication – Remote Operations – Part 2: Protocol specification.*

- ITU-T Recommendation X.290 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – General concepts.*

  ISO/IEC 9646-1:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 1: General concepts.*

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- ITU-T Recommendation X.296 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Implementation conformance statements.*

  ISO/IEC 9646-7:1995, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 7: Implementation Conformance Statements.*

2.3 Additional references

- CCITT Recommendation X.483 (1996), *Messaging handling systems – P3 Protocol PICS proforma.*
- CCITT Recommendation X.484 (1996), *Messaging handling systems – P7 Protocol PICS proforma.*

3 Definitions

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.290 | ISO/IEC 9646-1:

a) Implementation Conformance Statement;

b) Implementation Conformance Statement proforma;

c) Protocol Implementation Conformation Statement (PICS); and

d) PICS proforma.

4 Abbreviations

For the purposes of this Recommendation | International Standard, the following abbreviations apply:

ICS Implementation Conformance Statement

PICS Protocol Implementation Conformance Statement

5 Conformance

A conforming PICS proforma shall be technically equivalent to the ITU-T | ISO/IEC published PICS proforma and shall preserve the numbering and ordering of the items in the ITU-T | ISO/IEC PICS proforma.

A PICS which conforms to this Recommendation | International Standard shall:

a) describe an implementation which conforms to CCITT Rec. X.229 | ISO/IEC 9072-2;

b) be a confirming PICS proforma, which has been completed in accordance with the instruction for completion given in A.2;

c) include the information necessary to uniquely identify both the supplier and the implementation.

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Annex A

PICS proforma for the remote operations protocol[1)]

(This annex forms an integral part of this Recommendation | International Standard)

A.1 Identification of PICS proforma corrigenda

The supplier of the PICS proforma shall identify any corrigenda (i.e. Technical Corrigenda or equivalent) to the published proforma that have been applied. Suppliers of the proforma should modify the proforma, or attach relevant additional pages in order to apply the corrigenda, and then record the application of the corrigenda in the table below.

Item	ITU-T Rec. X.249 (1995) | ISO/IEC 9072-3:1996
1	Corr:
2	Corr:
3	Corr:
4	Implementors' Guide version:

A.2 Instructions

A.2.1 Purpose and structure of the proforma

The purpose of this PICS proforma is to provide suppliers of implementations of CCITT Rec. X.229 | ISO/IEC 9072-2 with a consistent means of stating which capabilities have been implemented.

The proforma is in the form of a questionnaire and consists of a set of items. An item is provided for each capability for which an implementation choice is allowed. Items are also provided for major mandatory capabilities for which no implementation choice is allowed. Each item includes an item number, an item description, a status value specifying the support requirement, and room for a support answer to be provided by the supplier.

This subclause provides general information and instructions for completion of the proforma.

Subclause A.3 is for identification of the implementation.

Subclause A.4 contains the means of specifying, at a high level, the protocol and corrigenda that have been implemented.

Subclause A.5 contains the global statement of conformance.

Subclauses A.6 onwards contain tables in which the supplier specifies details of the implementation options chosen.

A.2.2 Symbols, terms and abbreviations

A.2.2.1 Introduction

Notations have been introduced in order to reduce the size of tables in the PICS proforma. These have allowed the use of multi-column layout where the columns are headed 'Status', and 'Support'. The definition of each are given below.

Additionally, the following definitions apply:

A.2.2.1.1 (PICS) item: A row in a PICS proforma table.

A.2.2.1.2 (PICS) question: The question to be answered in the intersection of a PICS item and either a support column (i.e. "Is this item supported in the context applying to this table and column") or supported values column (i.e. "What values are supported for this item in the context applying to this table and column") in a PICS proforma table.

A.2.2.1.3 status (value): An allowed entry in the status column for an item in a PICS proforma table.

---

1) Copyright release for PICS proforma: Users of this Recommendation | International Standard may freely reproduce the PICS proforma in this annex so that it can be used for its intended purpose and may further publish the completed PICS.

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A.2.2.1.4 (support) answer: An allowed entry in the support or supported values columns for an item in a PICS, in answer to a PICS question.

A.2.2.2 Prerequisite notation

If a predicate applies to a whole PICS proforma table, a prerequisite line may be specified in front of the table to which it applies. A prerequisite line takes the form:

Prerequisite: <predicate>

The meaning of such a line is that if <predicate> is True, then the table applies, else it is not-applicable.

A.2.2.3 Item numbering

Each line within the PICS proforma which requires implementation detail to be entered is given an item number in the first column. The item number column provides a means of uniquely referencing each possible answer within the PICS proforma. Such referencing is necessary for specifying predicates, conditional expressions, test suite parameters, and test suite selection expressions.

The means of referencing individual answers is to specify the following sequence:

a) If, and only if, the reference is being made from another Specification, then start with an unambiguous identifier for the relevant ICS proforma specification, enclosed in parentheses – this identifier is stated in the PICS proforma specification and is updated whenever the PICS proforma is updated – it is recommended that this identifier should be the relevant Specification number and year of publication, as is used in a Normative References clause, and this is the default for such identifiers.

b) The number of the relevant table or, if the tables are not numbered, of the smallest subclause enclosing the relevant table.

c) A solidus character, "/".

d) The item number of mnemonic reference to the item, to identify the row in which the answer appears.

e) If, and only if, more than one question occurs in the row identified by the item number or mnemonic reference, then each possible answer is implicitly labelled a, b, c, etc. from left to right, and this letter is appended to the sequence, prefixed by a solidus character ("/") if a mnemonic reference is used.

If mnemonic references are specified and each uniquely identify an item in the PICS proforma, then entries b) and c) in the above sequence may be omitted.

A.2.2.4 Status column

The 'Status' column indicates the level of support required for conformance to CCITT Rec. X.229 | ISO/IEC 9072-2. The values are as follows:

'm' The item is mandatory. The capability is required to be implemented.

'o' The item is optional. The capability may be implemented.

'o.n' The item is a mutually exclusive or selectable option among a set (where n is the number which identifies the group of optional items). The requirement for each numbered group is specified as part of the relevant tables.

'c' The item is conditional. The requirement on the capability depends on the selections of other optional or conditional items. The status (mandatory, optional, prohibited, or non-applicable) depends on the evaluation of a predicate or a conditional expression which is specified as part of the relevant tables or as a predicate.

'cn' The item is conditional (where n is the number which identifies the condition which is applicable). The definitions for conditional statements are given as part of the relevant tables.

'x' The item is prohibited or excluded. There is a requirement not to use this capability in the given context.

'n/a' The item is not applicable. The capability is not applicable in the given context.

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A.2.2.5 Support column

The 'Support' column shall be completed by the supplier or implementor to indicate the level of implementation of each capability. The proforma has been designed such that the only entries required in the 'Support' column are:

'Y' Yes, the capability is implemented in conformance to CCITT Rec. X.229 | ISO/IEC 9072-2.

'N' No, the capability is not implemented.

'–' No answer required – it is unnecessary to answer this question with a yes or a no because the question has a status value of non-applicable.

A.2.2.6 Definition of support

An operation class is said to be supported if the implementation is able to operate in the mode defined for that operation class.

A protocol element is said to be supported for origination if the implementation is able to generate it under some circumstances (either automatically or because the end user explicitly requires a related service).

A protocol element is said to be supported for reception if it is correctly interpreted, handled and, when required, made available to the end user.

A.2.2.7 Predicate definitions

A predicate is an explicit reference to a PICS proforma YES/NO entry, using the format defined in A.2.2.4. If the entry is 'Y', it predicates the condition to be mandatory, otherwise optional.

The following table lists the predicate definitions:

p01 A.6.1/6

p02 A.6.1/7 and (A.6.1/1 or A.6.1/2 or A.6.1/4)

p03 A.6.1/7 and (A.6.1/1 or A.6.1/2 or A.6.1/3)

p04 A.6.1/7

p05 A.6.1/6 and (A.6.1/1 or A.6.1/2 or A.6.1/4)

p06 A.6.1/6 and (A.6.1/1 or A.6.1/2 or A.6.1/3)

p07 A.6.1/8

p08 A.6.1/9

p09 A.6.1/3 or A.6.1/5

p10 A.6.1/1 or A.6.1/2 or A.6.1/4

p11 A.6.1/4 or A.6.1/5

p12 A.6.1/1 or A.6.1/2 or A.6.1/3

p13 A.6.1/8 or A.6.1/9

A.2.2.8 Range of values columns

The 'Permitted' column indicates conditions applied to the support of a feature. In this PICS proforma the constraint definitions consist of the valid integer values for a protocol feature or the keyword 'Context'. The 'Context' keyword is used to indicate those protocol features whose constraints are defined by the application context in which the ROSE is being used.

The 'Implemented' column shall be completed by the supplier or implementor for cases where the constraints supported by the implementation differ from those in the 'Permitted' column.

A.2.2.9 Abbreviations

A.2.2.9.1 Types of application-protocol-data-units

ROER RO-ERROR application-protocol-data-unit

ROIV RO-INVOKE application-protocol-data-unit

RORJ RO-REJECT application-protocol-data-unit

RORS RO-RESULT application-protocol-data-unit

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A.2.2.9.2 Other abbreviations

APDU	Application-protocol-data-unit
ID	Identifier
Int	Integer
ROSE	Remote Operations Service Element
X.229	CCITT Recommendation X.229 and ISO/IEC 9072-2

A.2.3 Instructions for completion

The supplier shall complete all entries in the column marked 'Support'. In certain clauses of the PICS proforma further guidance for completion may be necessary. Such guidance shall supplement the guidance given in this clause and shall have a scope restricted to the clause in which it appears. In addition, other specifically identified information shall be provided by the implementor where requested. No changes shall be made to the proforma except the completion as required. Recognizing that the level of detail required may, in some instances, exceed the space available for responses, a number of responses specifically allow for the addition of appendices to the PICS.

A.3 Identification of the implementation

A.3.1 Date of statement

1	Date of statement? (yy-mm-dd)

A.3.2 Identification of the implementation and/or system

Item	Question	Response
1	Implementation Name	
2	Version Number	
3	Machine Name	
4	Machine Version Number	
5	Operating System Name	
6	Operating System Version	
7	Special Configuration	
8	Other Information	

A.3.3 Identification of the system supplier and/or test laboratory client

Item	Question	Response
1	Organization Name	
2	Contact Name(s)	
3	Address	
4	Telephone Number	
5	Fax Number	
6	Telex Number	
7	E-Mail Address	
8	Other Information	

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A.4 Protocol identification

A.4.1 CCITT Rec. X.229 | ISO/IEC 9072-2 protocol specification and amendments implemented

Item	Identification of Protocol Specification and Amendments	Support
–	CCITT Rec. X.229 (1988) | ISO/IEC 9072-2:1989	
1	Amd:	
2	Amd:	
3	Amd:	
4	Amd:	
5	Amd:	

A.4.2 CCITT Rec. X.229 | ISO/IEC 9072-2 technical corrigenda implemented

Item	CCITT Rec. X.229 (1988) | ISO/IEC 9072-2:1989	Support
1	Corr:	
2	Corr:	
3	Corr:	
4	Corr:	
5	Corr:	
6	Implementors' Guide Version:	

A.5 Global statement of conformance

1	Are all mandatory features implemented? (yes or no)

NOTE – If a positive response is not given to this box, then the implementation does not conform to CCITT Rec. X.229 | ISO/IEC 9072-2.

A.6 Capabilities and options

A.6.1 Application entity requirements

Reference: X.219 – Clause 6

Item	ROSE feature	Status	Support	Predicate
1	Is Operation Class 1 supported?	o.1		
2	Is Operation Class 2 supported?	o.1		
3	Is Operation Class 3 supported?	o.1		
4	Is Operation Class 4 supported?	o.1		
5	Is Operation Class 5 supported?	o.1		
6	Is the ROSE a component of an application entity that invokes operations?	o.2		
7	Is the ROSE a component of an application entity that performs operations?	o.2		
8	Is the ROSE a component of an application entity that supports the origination of linked operations?	o		
9	Is the ROSE a component of an application entity that supports the reception of linked operations?	o		

o.1 Support for at least one of these options is required.
o.2 Support for at least one of these options is required.

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A.6.2 Supported ROSE APDUs on origination

Reference: X.229

Item	ROSE feature	Status	Support	Predicate
1	ROIV	c		p01
2	RORS	c		p02
3	ROER	c		p03
4	RORJ	m		

A.6.3 Supported ROSE APDUs on reception

Reference: X.229

Item	ROSE feature	Status	Support	Predicate
1	ROIV	c		p04
2	RORS	c		p05
3	ROER	c		p06
4	RORJ	m		

A.6.4 ROIV (origination)

Reference: X.229 – Subclause 7.1.4

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	invoke-ID	m				
2	linked-ID	c				p07
3	operation-value	m		Context		
4	argument	o		Context		

A.6.5 ROIV (reception)

Reference: X.229 – Subclause 7.1.4

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	invoke-ID	m				
2	linked-ID	c				p08
3	operation-value	m		Context		
4	argument	o		Context		

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A.6.6 RORS (origination)

Reference: X.229 – Subclause 7.2.4

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	invoke-ID	m				
2	operation-value	o		Context		
3	result	o		Context		

A.6.7 RORS (reception)

Reference: X.229 – Subclause 7.2.4

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	invoke-ID	m				
2	operation-value	o		Context		
3	result	o		Context		

A.6.8 ROER (origination)

Reference: X.229 – Subclause 7.3.4

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	invoke-ID	m				
2	error-value	m		Context		
3	result	o		Context		

A.6.9 ROER (reception)

Reference: X.229 – Subclause 7.3.4

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	invoke-ID	m				
2	error-value	m		Context		
3	result	o		Context		

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A.6.10 RORJ (origination)

Reference: X.229 – Subclause 7.4.3.4

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	invoke-ID	m				
2	InvokeIDType	o				
3	NULL	m				
4	problem (Choice of)	m				
5	GeneralProblem	m				
6	InvokeProblem	m		Int Range 0-7		
7	ReturnResultProblem	o		Int Range 0-2		
8	ReturnErrorProblem	o		Int Range 0-4		

A.6.11 RORJ (reception)

Reference: X.229 – Subclause 7.4.3.2

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	invoke-ID	m				
2	InvokeIDType	m				
3	NULL	m				
4	problem (Choice of)	m				
5	GeneralProblem	m		Int Range 0-2		
6	InvokeProblem	m		Int Range 0-7		
7	ReturnResultProblem	m		Int Range 0-2		
8	ReturnErrorProblem	m		Int Range 0-4		

A.6.12 General problem

Reference: X.229 – Subclause 7.5.2

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	unrecognizedAPDU	m				
2	mistypedAPDU	m				
3	badlyStructuredAPDU	m				

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A.6.13 Invoke problem

Reference: X.229 – Subclause 7.4.4

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	duplicateInvocation	m				
2	unrecognizedOperation	m				
3	mistypedArgument	m				
4	resourceLimitation	m				
5	initiatorReleasing	m				
6	unrecognizedLinkedID	c				p13
7	linkedResponseUnexpected	c				p13
8	unexpectedChildOperation	c				p13

A.6.14 ReturnResult problem

Reference: X.229 – Subclause 7.4.4

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	unrecognizedInvocation	c				p10
2	resultResponseUnexpected	c				p09
3	mistypedResult	c				p10

A.6.15 ReturnError problem

Reference: X.229 – Subclause 7.4.4

Item	Protocol feature	Status	Support	Range of values		Predicate
				Permitted	Implemented	
1	unrecognizedInvocation	c				p12
2	resultResponseUnexpected	c				p11
3	unrecognizedError	c				p12
4	unexpectedError	c				p12
5	mistypedParameter	c				p12

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A.6.16 Other information

Table below can be used to provide any other relevant information.

Item	Other information

A.7 Multi-layer dependencies

A.7.1 Upper layers

The application context in which the ROSE implementation is used imposes some additional requirements to some of the elements on this PICS proforma. The following table gives the reference to the appropriate PICS proforma, which imposes some additional requirements for each application context, where ROSE is used.

This table should indicate which application contexts the implementation operates in.

Item	Application context	PICS reference	Support
1	mts-access (UA)	X.483	
2	mts-access (MTA)	X.483	
3	mts-forced-access (UA)	X.483	
4	mts-forced-access (MTA)	X.483	
5	ms-access (UA)	X.484	
6	ms-access (MS)	X.484	
7	mts-reliable-access (UA)	X.483	
8	mts-reliable-access (MTA)	X.483	
9	mts-forced-reliable-access (UA)	X.483	
10	mts-forced-reliable-access (MTA)	X.483	
11	ms-reliable-access (UA)	X.484	
12	ms-reliable-access (MS)	X.484	
13	DAP (DUA)	X.581	
14	DAP (DSA)	X.581	

A.7.2 Lower layers

The ROSE imposes the following modifications on the lower layers:

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ICS 35.240.20

Descriptors: data processing, information interchange, telecommunications, network interconnection, open systems interconnection, application layer, application-service elements, protocols, implementation.

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