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DATA COMMUNICATION NETWORKS

REMOTE OPERATIONS SERVICE ELEMENT – PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS) PROFORMA

Recommendation X.249

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation X.249 was prepared by Study Group VII and was approved under the Resolution No. 2 procedure on the 10th of September 1992.

CCITT NOTES

1) In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized private operating agency.

2) A list of abbreviations used in this Recommendation can be found in Annex B.

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REMOTE OPERATIONS SERVICE ELEMENT – PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS) PROFORMA

(1992)

0 Introduction

This Recommendation specifies the protocol for the services provided by an application-service element – the Remote Operations Service Element (ROSE) – to support interactive applications in a distributed open systems environment. This Recommendation is one of a set of Recommendations defining sets of application-service-element commonly used by a number of applications.

Interactions between entities of a distributed application are modelled as Remote Operations and defined using a Remote Operations Notation. 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. Remote Operations are supported by the ROSE.

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options that have been implemented for a given OSI protocol. Such a statement is called a Protocol Implementation Conformance Statement (PICS).

This Recommendation includes the PICS proforma for the ROSE protocol as defined in the Recommendation X.229.

1 Scope

This Recommendation provides the PICS proforma for the ROSE protocol as specified in Recommendation X.229. This PICS proforma is in compliance with the relevant requirements and in accordance with the relevant guidance for PICS proforma, given in ISO/IEC 9646-2. Detail of the use of this proforma is provided in Annex A.

2 Normative references

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

– CCITT Rec. X.229 (1988), *Remote operations: Protocol specification.*

ISO/IEC 9646-1:1991, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 1: General concepts* [see also CCITT Recommendation X.290 (1992)]

ISO/IEC 9646-2:1991, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 2: Abstract test suite specification* [see also CCITT Recommendation X.291 (1992)]

3 Definitions

This Recommendation uses terms defined in Recommendations X.219 and X.229. This Recommendation uses the following terms defined in ISO/IEC 9646-1:

a) PICS proforma:

b) protocol implementation conformance statement (PICS).

4 Abbreviations

Abbreviations defined in Recommendations X.219 and X.229 are used in this Recommendation.

5 Conventions

The PICS proforma is designed in Annex A.

6 Conformance

The supplier of a protocol implementation that is claimed to conform to Recommendation X.229 is required to complete a copy of the PICS proforma provided in Annex A and is required to provide information necessary to identify both the supplier and the implementation.

ANNEX A

(To Recommendation X.249)
(This annex forms an integral part of this Recommendation.)

Remote Operations Service Element
Protocol Implementation Conformance Statement (PICS) Proforma

Copyright release for PICS Proforma:

Users of this document 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.

A.1 *Identification of the implementation*

A.1.0 *General*

This section is used to record the date of completion of the PICS, and to describe the supplier of the implementation, the implementation itself and the Recommendations to which the implementation is claimed to conform.

A.1.1 *Identification of the PICS*

Ref. No.	Question	Response
1	Date of Statement (DD/MM/YY)	
2	PICS Serial Number	
3	System Conformance Statement Cross Reference	

A.1.2 *Identification of the implementation and/or system*

Ref. No.	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.1.3 *Identification of the system supplier and/or test laboratory client*

Ref. No.	Question	Response
1	Organization Name	
2	Contact Name(s)	
3	Address	
4	Telephone Number	
5	Telex Number	
6	Facsimile Number	
7	E-Mail Address	
8	Other Information	

A.2 *Identification of the protocol*

Ref No.	Question	Response
1	Title, Reference Number and date of publication of the protocol standard	
2	Protocol Version Numbers	
3	Addenda Implemented	
4	Implemented Defect Reports (Ref. No.)	

A.3 *Global statement of conformance*

Ref. No.	Question	Response
1	Are all mandatory capabilities implemented?	

Answering "No" to this question indicates non-conformance to the protocol specification. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conformant. Such information shall be provided in § A.6.16, Other Information.

A.4 *Instructions for completing the PICS proforma*

A.4.1 *Definition of support*

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

A protocol element is said to be supported for origination if the IUT 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.4.2 *Support definition column (D)*

This column indicates the level of support required for conformance to the Recommendation X.229. The values are as follows:

M Mandatory support is required,

O Optional support is permitted for conformance to the Recommendation X.229. If implemented it must conform to the specifications and restrictions contained in the Recommendation;

O.<*integer*> As for optional support, but for mutually exclusive or selectable options among a set;

C: M Conditional mandatory support of this item is subject to a predicate;

C: O Conditional optional support, of this item is subject to a predicate.

A.4.3 *Support implementation column (I)*

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

Y Yes, the feature has been implemented;

N No, the feature has not been implemented.

In the PICS proforma tables, every leading feature marked 'M' should be supported by the IUT. Sub-features marked 'M' should be supported if the corresponding leading feature is supported by the IUT.

All entries within the PICS proforma shall be made in ink. Alterations to such entries shall be made by crossing out, not erasing nor making the original entry illegible, and writing the new entry alongside. All such alterations to records shall be initialled by the staff making them.

A.4.4 *Permitted range of values column*

This 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.

A.4.5 *Implemented range of values column*

This column shall be completed by the supplier or implementor for cases where the constraints supported by the IUT differ from those in the 'Constraints Definition Column'.

A.4.6 *Predicate column*

The "Predicate" column is to be read as follows:

p<*integer*> refers to the predicate referenced by *integer*.

A.4.7 *Predicate definitions*

A predicate is an explicit reference to a PICS proforma YES/NO entry, using the format defined in § A.5.4. If the entry is 'Y', then the predicate is true, otherwise false.

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.5 *Abbreviations*

A.5.1 *Data units*

APDU Application-protocol-data-unit

A.5.2 *Types of application-protocol-data-units*

The following abbreviations have been given to the application-protocol-data-units defined in this PICS proforma annex.

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

A.5.3 *Other abbreviations*

The following abbreviations are used in this PICS proforma annex.

IUT Implementation Under Test (ISO/IEC 9646)

RO Remote Operations

ID Identifier

Max Maximum

Int Integer

U User (of a service)

P Provider (of a service)

A.5.4 *Item reference numbers (Ref. No.)*

Each line within the PICS proforma which requires implementation details to be entered is numbered at the left hand edge of the line. This numbering is included as a means of uniquely identifying all possible implementation details within the PICS proforma. This referencing is used both inside the PICS proforma and for references from other Test Specification documents.

The means of referencing individual responses is done by the following sequence:

a) a reference to the smallest subclause enclosing the relevant item;

b) a solidus character '/';

c) the reference number of the row in which the response appears;

d) if, and only if, more than one response occurs in the row identified by the reference number, then each possible entry is implicitly labelled a, b, c, etc. from left to right, and this letter is appended to the sequence.

A.6 *Capabilities and options*

A.6.1 *Application entity requirements*

Reference: X.219 – § 6

Ref. No.	ROSE feature	D	I	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

A.6.2 *Supported ROSE APDUs on origination*

Reference: X.229

Ref. No.	ROSE APDU	D	I	Predicate
1	ROIV	C: M		p01
2	RORS	C: M		p02
3	ROER	C: M		p03
4	RORJ	M		

A.6.3 *Supported ROSE APDUs on reception*

Reference: X.229

Ref. No.	ROSE APDU	D	I	Predicate
1	ROIV	C: M		p04
2	RORS	C: M		p05
3	ROER	C: M		p06
4	RORJ	M		

A.6.4 *ROIV (origination)*

Reference: X.229 – § 7.1.4

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	Permitted	Implemented	
1	invoke-ID	M				
2	linked-ID	C: M				p07
3	operation-value	M		Context		
4	argument	O		Context		

A.6.5 *ROIV (reception)*

Reference: X.229 – § 7.1.4

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	Permitted	Implemented	
1	invoke-ID	M				
2	linked-ID	C: M				p08
3	operation-value	M		Context		
4	argument	O		Context		

A.6.6 *RORS (origination)*

Reference: X.229 – § 7.2.4

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	Permitted	Implemented	
1	invoke-ID	M				
2	operation-value	O		Context		
3	result	O		Context		

A.6.7 *RORS (reception)*

Reference: X.229 – § 7.2.4

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	Permitted	Implemented	
1	invoke-ID	M				
2	operation-value	O		Context		
3	result	O		Context		

A.6.8 *ROER (origination)*

Reference: X.229 – § 7.3.4

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	Permitted	Implemented	
1	invoke-ID	M				
2	error-value	M		Context		
3	result	O		Context		

A.6.9 *ROER (reception)*

Reference: X.229 – § 7.3.4

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	Permitted	Implemented	
1	invoke-ID	M				
2	error-value	M		Context		
3	result	O		Context		

A.6.10 *RORJ (origination)*

Reference: X.229 – § 7.4.3.2

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	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 – § 7.4.3.2

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	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 – § 7.5.4

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	Permitted	Implemented	
1	unrecognizedAPDU	M				
2	mistypedAPDU	M				
3	badlyStructuredAPDU	M				

A.6.13 *Invoke problem*

Reference: X.229 – § 7.4.4

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	Permitted	Implemented	
1	duplicateInvocation	M				
2	unrecognizedOperation	M				
3	mistypedArgument	M				
4	resourceLimitation	M				
5	initiatorReleasing	M				
6	unrecognizedLinkedID	C: M				p13
7	linkedResponseUnexpected	C: M				p13
8	unexpectedChildOperation	C: M				p13

A.6.14 *ReturnResult problem*

Reference: X.229 – § 7.4.4

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	Permitted	Implemented	
1	unrecognizedInvocation	C: M				p10
2	resultResponseUnexpected	C: M				p09
3	mistypedResult	C: M				p10

A.6.15 *ReturnError problem*

Reference: X.229 – § 7.4.4

Ref. No.	Protocol feature	Support		Range of values		Predicate
		D	I	Permitted	Implemented	
1	unrecognizedInvocation	C: M				p12
2	resultResponseUnexpected	C: M				p11
3	unrecognizedError	C: M				p12
4	unexpectedError	C: M				p12
5	mistypedParameter	C: M				p12

A.6.16 *Other information*

This table can be used to provide any other relevant information.

Ref. No.	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 references to the appropriate PICS proforma, which impose some additional requirements for each application context where ROSE is used.

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

Application context	PICS reference	Section (mts and ms only)	I
mts-access (UA)	Rec. X.483	A.7.2.1	
mts-access (MTA)	Rec. X.483	A.7.2.1	
mts-forced-access(UA)	Rec. X.483	A.7.2.1	
mts-forced-access(MTA)	Rec. X.483	A.7.2.1	
ms-access(UA)	Rec. X.484	A.7.2.1	
ms-access(MS)	Rec. X.484	A.7.2.1	
mts-reliable-access(UA)	Rec. X.483	A.7.2.1	
mts-reliable-access(MTA)	Rec. X.483	A.7.2.1	
mts-forced-reliable-access(UA)	Rec. X.483	A.7.2.1	
mts-forced-reliable-access(MTA)	Rec. X.483	A.7.2.1	
ms-reliable-access(UA)	Rec. X.484	A-7.2.1	
ms-reliable-access(MS)	Rec. X.484	A.7.2.1	
DAP(DUA)	Rec. X.581		
DAP(DSA)	Rec. X.581		

A.7.2 *Lower layers*

The ROSE imposes the following modifications on the lower layers:

NO MODIFICATIONS ARE IMPOSED.

ANNEX B

(to Recommendation X.249)

Alphabetical list of abbreviations used in this Recommendation

APDU Application-protocol-data-unit

IUT Implementation under test

PICS Protocol implementation conformance statement

ROSE Remote operations service element