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SERIES Q: SWITCHING AND SIGNALLING

Q3 interface

Upper layer protocol profiles for the Q and X interfaces

ITU-T Recommendation Q.812

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For further details, please refer to the list of ITU-T Recommendations.

ITU-T Recommendation Q.812

Upper layer protocol profiles for the Q and X interfaces

Summary

This Recommendation provides the upper layer (5-7) protocol profiles for the Q and X interfaces as defined in the M.3000 series of ITU-T Recommendations.

Source

ITU-T Recommendation Q.812 was approved on 13 February 2004 by ITU-T Study Group 4 (2001-2004) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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ITU-T Recommendation Q.812

Upper layer protocol profiles for the Q and X interfaces

1 Scope

This Recommendation defines the characteristics of protocol profiles for the Q and X interfaces, as defined in the M.3000 series of ITU-T Recommendations. The interface will support bidirectional data transfer for the management of telecommunication systems.

The need for security functionality is recognized, but is not fully addressed in this Recommendation and is for further study. Users may need to use mechanisms outside this Recommendation in order to address their specific security needs. Security mechanisms chosen may depend on the network configuration being used.

This Recommendation defines:

- the layer services profiles;
- the layer protocols profiles;
- the application service and protocols profiles;
- the conformance requirements to be met by an implementation of this interface.

This Recommendation does not define:

- the structure or meaning of the management information that is transmitted by means of the protocol suite;
- the manner in which management is accomplished as a result of the application protocol exchanges;
- the interactions which result in the use of the application layer protocols.

The profiles in this Recommendation align with equivalent ISPs.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

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3 Definitions

This Recommendation defines the following terms:

3.1 International Standardized Profile (ISP): An internationally agreed-to, harmonized document which identifies a standard or group of standards, together with options and parameters, necessary to accomplish a function or a set of functions [1].

3.2 Interactive Agent (IA) (ITU-T Rec. Q.814): The IA supports the exchange of electronic data interchange (UN/EDIFACT or ASC X12 EDI) transactions between peer entities. The IA functions as an interface between its direct user (normally an EDIFACT/ASC X12 EDI translator or a security module) and the transport layer security. Various implementation approaches may be taken ranging from a simple API (Application Program Interface) through a stand-alone program. The IA is described in ITU-T Rec. Q.814 and the Security Module is described in ITU-T Rec. 815.

3.3 transport layer security (ITU-T Rec. Q.814): The Transport Layer Security (TLS) protocol optionally provides communications privacy. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, and intrusion. The TLS protocol also provides strong peer authentication and data flow integrity.

3.4 Distinguished Encoding Rules (DER) (ITU-T Rec. X.690): DERs for ASN.1 are a subset of Basic Encoding Rules (BER), and give exactly one way to represent any ASN.1 value as an octet string. DERs are intended for applications in which a unique octet string encoding is needed, as is the case when an ASN.1 message is encoded for transport via TLS. DERs are described in ITU-T Rec. X.690. In this profile the definite-length method of constructing IA messages must be employed.

3.5 Interactive Agent Transfer Protocol (IATP) (ITU-T Rec. Q.814): The IATP protocol is utilized between peer Interactive Agents wishing to exchange Electronic Data Interchange transactions/messages via Transmission Control Protocol/Internet Protocol utilizing Transport Layer Security. The IATP is described in ITU-T Rec. Q.814.

3.6 Electronic Data Interchange (EDI) translator (ITU-T Rec. Q.814): A computer software module or program that translates private data formats and representations to/from standard formats and standard data representations such as those specified by ISO 9735 or ANSI ASC X12.

4 Abbreviations

This Recommendation uses the following abbreviations.

ACSE	Association Control Service Element
AE	Application Entity
APDU	Application Protocol Data Unit
ASE	Application Service Element
ASN.1	Abstract Syntax Notation One
ASO	Application Service Object
BER	Basic Encoding Rules
CF	Control Function
CLNS	ConnectionLess-mode Network layer Service
CMIP	Common Management Information Protocol
CMISE	Common Management Information Service Element
CONS	Connection-mode Network layer Service
CORBA	Common Object Request Broker Architecture
COTS	Connection-mode Transport Service
DAP	Directory Access Protocol
DCN	Data Communication Network
DER	Distinguished Encoding Rules
DSA	Directory System Agent
DUA	Directory User Agent
EDI	Electronic Data Interchange
EDIFACT	Electronic Data Interchange For Administration, Commerce and Transport
FTAM	File Transfer, Access and Management
GULS	Generic Upper Layer Security
IA	Interactive Agent
IATP	Interactive Agent Transfer Protocol
IDL	Interface Definition Language
IEC	International Electrotechnical Commission
IETF	Internet Engineering Task Force
IP	Internet Protocol
IPSec	Security Architecture for the IP Protocol
ISO	International Organization for Standardization
ISP	International Standardized Profile
ITU	International Telecommunication Union
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
NBS	National Bureau of Standards

NCMS	Network Connection Management Subprotocol
NE	Network Element
OS	Operations System
OSI	Open Systems Interconnection
PDU	Protocol Data Unit
RFC	Request for Comments
ROS	Remote Operations Service
ROSE	Remote Operations Service Element
SACF	Single Association Control Function
SMASE	Systems Management Application Service Element
SNMP	Simple Network Management Protocol
SPDU	Session Protocol Data Unit
TCP	Transmission Control Protocol
TLS	Transport Layer Security
tML	Telecommunications Markup Language
TMN	Telecommunications Management Network
UDP	User Datagram Protocol
USM	User-based Security Model

5 Upper layer protocol specifications for the OSI paradigm

5.1 Introduction to Upper layer protocol specifications for the OSI paradigm

The communication services and protocols referred to in this Recommendation are in accordance with the Open Systems Interconnection (OSI) Reference Model [2].

The protocols for the different layers are based on ITU-T Recommendations and/or ISO Standards, CORBA Specifications from the OMG and Internet Protocol Specifications from the IETF.

Three types of protocol profiles are defined in this Recommendation:

- upper layer protocol profile for Interactive Class services;
- upper layer protocol profile for File-oriented Class services;
- upper layer protocol specification for Directory services.

The three protocol profiles can be applied to applications using DCN, as defined by ITU-T Rec. M.3010 [3].

Interface Q is defined to intend to connect Mediation Devices to Operations Systems (OSs), Q Adapters to OSs, NEs to OSs, and OSs to OSs via a DCN. The X Interface is defined to connect the TMNs of two Administrations.

Other ASEs will be added in the identified protocol profiles as new requirements develop.

5.2 Upper layer protocol specification for Interactive Class services

Figure 1 illustrates the protocol stack of the upper layer protocol profile for Interactive Class services. The profile for TMN function sets corresponding to the SMASE for Interactive Class of

services may be specified as part of Recommendations defining the information models and services.

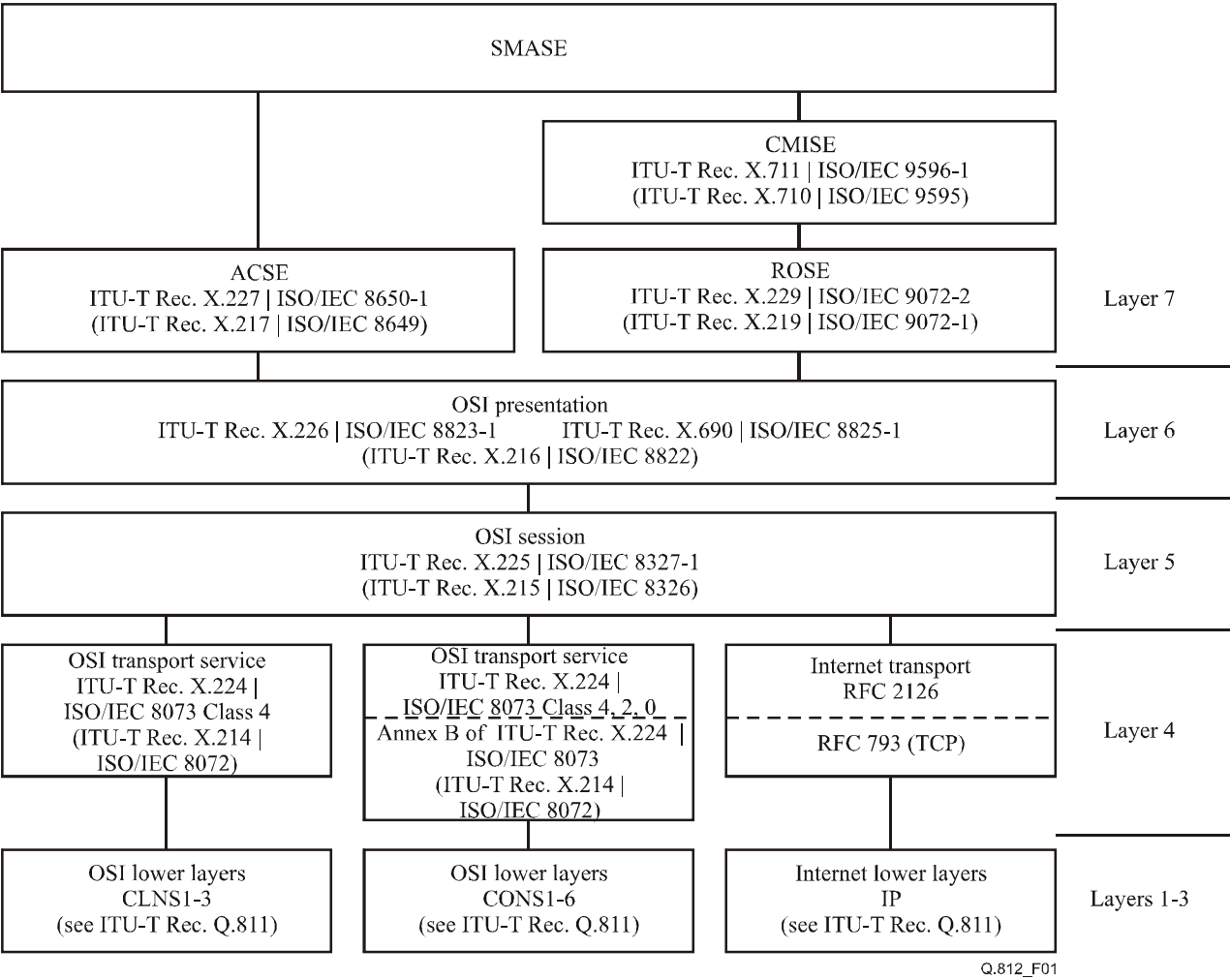


Figure 1/Q.812 – Protocol stack of the upper layer protocol profile for Interactive Class services for the OSI paradigm

5.3 Upper layer protocol specification for File-oriented Class services

Figure 2 illustrates the protocol stack of the upper layer protocol profile for File-oriented Class services.

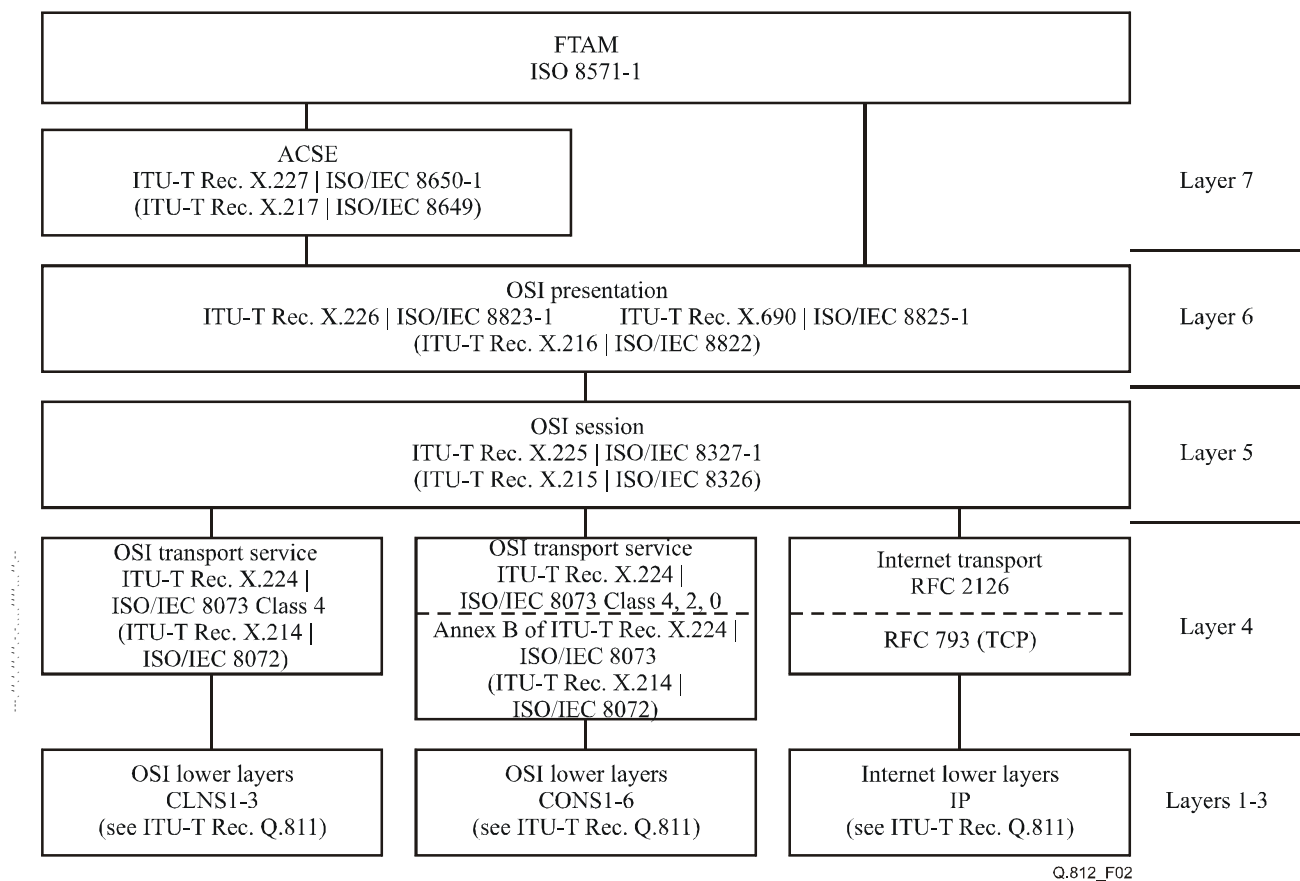


**Figure 2/Q.812 – Protocol stack of the upper layer protocol profile for
File-oriented Class services for the OSI paradigm**

5.4 Upper layer protocol specification for Directory services

Figure 3 illustrates the protocol stack of the upper layer protocol profile for Directory services.

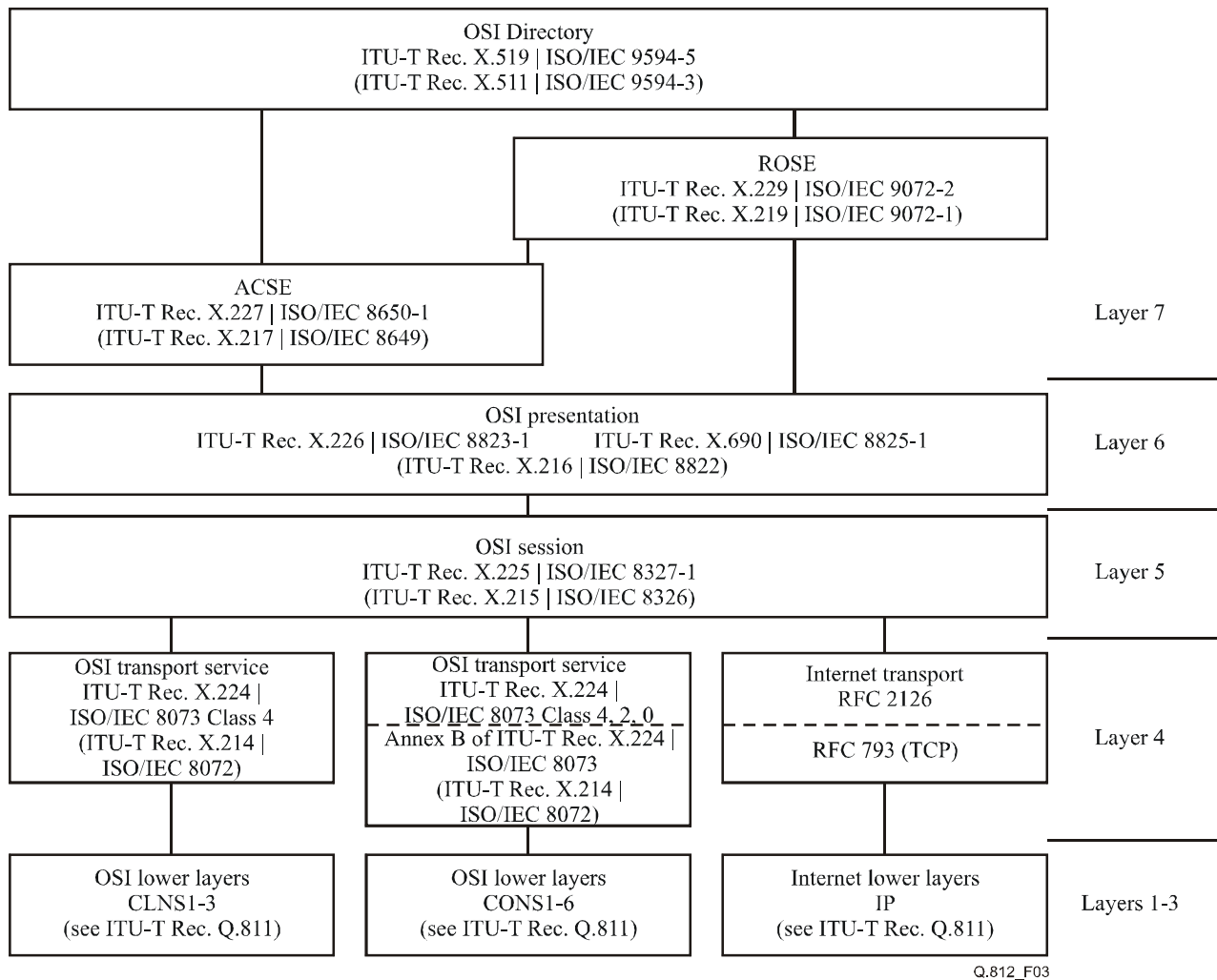


Figure 3/Q.812 – Protocol stack of the upper layer protocol profile for Directory services in the OSI paradigm

5.5 Upper layer protocol specification for store and forward services

The upper layer protocols to be used for store and forward services (e.g., for exchange of EDI formatted information) is for further study.

6 Upper layer protocol specification for Interactive Class services using the OSI paradigm

6.1 Transport layer profiles

6.1.1 Transport layer profile for CLNS1, CLNS2 and CLNS3

This clause defines the transport layer profile for use with CLNS1, CLNS2 and CLNS3 as defined in ITU-T Rec. Q.811 [45].

6.1.1.1 Services profile

It is mandatory that for the connectionless-mode Network service, the Transport service shall conform to ITU-T Rec. X.214 | ISO/IEC 8072 [41].

6.1.1.2 Protocol profile

Operation of the Transport protocol over the connectionless-mode network layer service (CLNS), as described in ITU-T Rec. X.213 | ISO/IEC 8348, shall use the elements of ITU-T Rec. X.224 | ISO/IEC 8073 [4], Class 4 operation over the CLNS. Provisions in 6.1.2.1.2, 6.1.2.1.3, 6.1.2.1.4, 6.1.2.2.4, 6.1.2.2.6, 6.1.2.2.7 and 6.1.2.2.8, of CONS1 profile Transport protocol also apply here.

6.1.1.3 Class of service

Support of Class 4 operation of ITU-T Rec. X.224 | ISO/IEC 8073 [4] is mandatory.

6.1.1.4 Transport layer attributes

Transport layer attributes for Class 4 operation over the Connectionless-mode Network layer Service shall be as shown in Table 1.

**Table 1/Q.812 – Transport layer attributes
[for use with Connectionless-mode Network layer Service (CLNS)]**

	Value/Range/Option	Default
Maximum TPDU (Octets)	128, 256, 512, 1024 (2048, 4096, 8192 optional)	(128)
TSAP-ID (Note 1)	Up to 32 octets	
Class of service	4	—
Preferred class	4	—
Alternative Class	None	—
Expedited Data	Non-use	—
Options:		
Security Parameters	Optional	—
Data TPDU numbering (Note 2)	Normal, extended	(Normal)
Checksum (Note 3)	Use, non-use	(Non-use)
Parameters:		
T1 – Retransmission time	0.25-64 seconds (Note 4)	(8)
N – Retransmissions	2-15	(2)
L – Bound on reference	1-256 seconds	(32)
I – Inactivity time	2-512 seconds	(64)
NOTE 1 – Some systems may require TSAP-IDs. However, all systems shall be capable of generating called TSAP-IDs in CR TPDUs and capable of receiving calling and called TSAP-IDs in received CR and CC TPDUs, respectively.		
NOTE 2 – Extended format option shall be implemented. Non-use of this option shall be negotiable. The responder shall honour the initiator's request whenever possible. Negotiation to other than what has been requested shall only occur under abnormal conditions, for example, severe congestion, as determined by the implementor. Initiators shall be prepared to operate in the mode confirmed by the responder.		
NOTE 3 – Use of checksum is required for the CR TPDU. An additional requirement is that all implementations shall support the negotiated "non-use" of the checksum. Initiators shall request and responders shall agree to "non-use" of the checksum.		
NOTE 4 – The Transport layer T1 timer value should always be greater than the link layer T1 timer value.		