INTERNATIONAL STANDARD

ISO/IEC 21990

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Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Inter-exchange signalling protocol — Short message service

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseaux privés avec intégration de services — Protocole de signalisation entre commutateurs — Service de message court

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Contents

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of the joint technical committee is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 21990 was prepared by ECMA (as ECMA-325) 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.

Annexes A and E form a normative part of this International Standard. Annexes B, C and D are for information only.

Introduction

This International Standard is one of a series of Standards defining services and signalling protocols applicable to Private Integrated Services Digital Networks (PISNs). The series uses ISDN concepts as developed by ITU-T and conforms to the framework of International Standards on Open Systems Interconnection as defined by ISO/IEC.

This International Standard specifies the signalling protocol for use at the Q reference point in support of the Short Message Service. The protocol defined in this Standard forms part of the PSS1 protocol (informally known as QSIG).

This International Standard is based upon the practical experience of ECMA member companies and the results of their active and continuous participation in the work of ISO/IEC JTC 1, ITU-T, ETSI and other international and national standardization bodies. It represents a pragmatic and widely based consensus.

Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Inter-exchange signalling protocol — Short message service

1 Scope

This International Standard specifies the signalling protocol for the support of the Short Message Service (SMS) at the Q reference point between Private Integrated services Network eXchanges (PINXs) connected together within a Private Integrated Services Network (PISN).

This service is based on GSM 03.40. The Service Centre functionality described in this International Standard is equal to the functionality of a Service Centre in GSM 03.40. Thus, for interoperability with a GSM network, it is only necessary to implement a QSIG interface.

NOTE 1 - The interworking with other air interfaces is not precluded, but is outside the scope of this International Standard.

NOTE 2 - The Short Message Service is a special type of basic service but is described in the present document as a supplementary service.

The Short Message Service is a service which permits a served user to send a message of limited size to another user in the same PISN or another network.

The Q reference point is defined in ISO/IEC 11579-1.

Service specifications are produced in three stages and according to the method specified in ETS 300 387. This International Standard contains the stage 3 specification for the Q reference point and satisfies the requirements identified by the stage 1 and stage 2 specifications in ISO/IEC 21989.

The signalling protocol for SMS operates on top of the signalling protocol for the connection oriented call independent APDU transport mechanism and uses certain further aspects of the generic procedures for the control of supplementary services specified in ISO/IEC 11582.

This International Standard also specifies additional signalling protocol requirements for the support of interactions at the Q reference point between SMS and supplementary services and ANFs.

This International Standard is applicable to PINXs which can be interconnected to form a PISN.

2 Conformance

In order to conform to this International Standard, a PINX shall satisfy the requirements identified in the Protocol Implementation Conformance Statement (PICS) proforma in annex A.

3 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 8601:2000, *Data elements and interchange formats - Information interchange - Representation of dates and times*

ISO/IEC 10646-1:2000, *Information technology - Universal Multiple-Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multilingual Plane*

ISO/IEC 11572:2000, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Circuit mode bearer services - Inter-exchange signalling procedures and protocol*

ISO/IEC 11579-1:1994, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Part 1: Reference configuration for PISN exchanges (PINX)*

ISO/IEC 11582:1995, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Generic functional protocol for the support of supplementary services - Inter-exchange signalling procedures and protocol*

ISO/IEC 13868:1995, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Name identification supplementary services*

ISO/IEC 15506:2000, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network (PISN) - Inter-Exchange Signalling Protocol - Message Waiting Indication Supplementary Service*

ISO/IEC 21989:2002, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Short message service*

ETSI GTS GSM 03.38, *Digital cellular telecommunications systems (Phase 2+) (GSM); Alphabets and language-specific information*

ETSI TS 100 901, *Digital cellular telecommunications systems (Phase 2+); Technical realization of the Short Message Service (SMS) (GSM 03.40)*

ETSI TS 100 942, *Digital cellular telecommunications systems (Phase 2+) (GSM); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface* (GSM 04.11)

ETSI TS 101 032, *Digital cellular telecommunications systems (Phase 2+) (GSM); Compression algorithm for text messaging services* (GSM 03.42)

ETSI ETS 300 387, *Private Telecommunication Network (PTN); Method for the specification of basic and supplementary services*

ETSI ETS 300 599, *Digital cellular telecommunications systems (Phase 2) (GSM); Mobile Application Part (MAP) specification* (GSM 09.02)

ITU-T Rec. I.112:1993, *Vocabulary of terms for ISDNs*

ITU-T Rec. I.210:1993, *Principles of telecommunication services supported by an ISDN and the means to describe them*

ITU-T Rec. Z.100:1999, *Specification and description language (SDL)*

4 Definitions

For the purposes of this International Standard, the following definitions apply.

4.1 External definitions

This International Standard uses the following terms defined in other documents:

- Application Protocol Data Unit (APDU) (ISO/IEC 11582)
- Call, Basic Call (ISO/IEC 11582)
- Call Independent Signalling Connection (ISO/IEC 11582)
- Command (ISO/IEC 21989)
- End PINX (ISO/IEC 11582)
- Message Centre (ISO/IEC 21989)
- Message Centre Case (ISO/IEC 21989)
- Private Integrated services Network eXchange (PINX) (ISO/IEC 11579-1)
- Private Integrated Services Network (PISN) (ISO/IEC 11579-1)
- Receiving User (ISO/IEC 21989)
- Sending User (ISO/IEC 21989)
- Service Centre (ISO/IEC 21989)
- Short Message (ISO/IEC 21989)
- Short Message Waiting Data (ISO/IEC 21989)
- Status Report (ISO/IEC 21989)

- Signalling (ITU-T Rec. I.112)
- Supplementary Service (ITU-T Rec. I.210)
- Terminal Case (ISO/IEC 21989)

4.2 Other definitions

4.2.1 Receiving User Case

The configuration when the Terminal Case is provided for the Receiving User, i.e. no Receiving User Message Centre is involved in the SMS procedures.

4.2.2 Receiving User PINX

The Receiving User PINX is the PINX serving the Receiving User.

4.2.3 Sending User PINX

The Sending User PINX is the PINX serving the Sending User.

4.2.4 Sending User Message Centre

The Message Centre serving the Sending User.

4.2.5 Short Message Entity

A generic term for an entity that is capable of handling one or more SMS specific procedures. This can be either the Sending Users terminal, the Sending User PINX, the Sending User Message Centre, the Service Centre, the Receiving User Message Centre, the Receiving User PINX or the Receiving Users terminal.

4.2.6 Receiving User Message Centre

The Message Centre serving the Receiving User.

5 Acronyms

APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation One
GSM	Global System for Mobile communication
ISDN	Integrated Services Digital Network
PICS	Protocol Implementation Conformance Statement
PINX	Private Integrated services Network eXchange
PISN	Private Integrated Services Network
SDL	Specification and Description Language
SIM	Subscriber Identity Module
SM	Short Message
SMS	Short Message Service
SMSC	Short Message Service Centre
SMWD	Short Message Waiting Data
SS	Supplementary Service
TE	Terminal Equipment
UDH	User Data Header

6 Signalling Protocol for the support of SMS

6.1 SMS description

Short Message Service is a service which is offered to a user in a PISN and which enables the user to send and receive Short Messages to and from another user in a PISN or in another (e.g. GSM) network.

The PISN transfers the Short Message from the Sending User to an SC and from the SC to the Receiving User.

6.2 SMS operational requirements

6.2.1 Provision/Withdrawal

Provision and withdrawal shall be in accordance with 6.2.1 of ISO/IEC 21989.

6.2.2 Requirements on a Sending User PINX

Generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating-PINX and for a Terminating-PINX, shall apply.

6.2.3 Requirements on a Sending User Message Centre

Generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating-PINX and for a Terminating-PINX, shall apply.

6.2.4 Requirements on a Service Centre

Generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating-PINX and for a Terminating-PINX, shall apply.

6.2.5 Requirements on a Receiving User PINX

Generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating-PINX and for a Terminating-PINX , shall apply.

6.2.6 Requirements on a Receiving User Message Centre

Generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating-PINX and for a Terminating-PINX, shall apply.

6.3 SMS coding requirements

6.3.1 Operations

The following operations defined in Abstract Syntax Notation One (ASN.1) in table 1 shall apply.

Table 1 - Operations in Support of SMS

```
Short-Message-Service-Operations-asn1-97
{iso(1) identified-organization(3) icd-ecma(12) standard(0) qsig-short-message-service(325) short-message-service-
operations-asn1-97(1)}

DEFINITIONS::=
BEGIN
IMPORTS
        OPERATION,
        ERROR
FROM Remote-Operations-Information-Objects
{joint-iso-itu-t (2) remote-operations(4) informationObjects(5) version1(0)}
        EXTENSION, Extension{}
FROM Manufacturer-specific-service-extension-class-asn1-97
{iso(1) standard(0) pss1-generic-procedures(11582) msi-class-asn1-97(11)}
        Name
FROM Name-Operations-asn1-97
{iso(1) standard(0) pss1-name(13868) name-operations-asn1-97(1)}
        supplementaryServiceInteractionNotAllowed
FROM General-Error-List
{ccitt recommendation q 950 general-error-list(1)}
        PartyNumber
FROM Addressing-Data-Elements-asn1-97
{iso(1) standard(0) pss1-generic-procedures(11582) addressing-data-elements-asn1-97(20)};

--TYPE DEFINITIONS FOR SMS OPERATIONS FOLLOW

Sms-Operations OPERATION ::={

                smsSubmit | smsDeliver | smsStatusReport | smsCommand | scAlert}

smsSubmit       OPERATION ::= {
                -- sent from the Sending User PINX/ Sending User Message Centre to the Service Centre
                        ARGUMENT        SmsSubmitArg
                        RESULT          SmsSubmitRes
                        ERRORS          {smsSubmitError |
                                        unspecified}
                        CODE            local:107}

smsDeliver      OPERATION ::= {
                -- sent from the Service Centre to the Receiving User PINX or to the Receiving User Message Centre
                        ARGUMENT        SmsDeliverArg
                        RESULT          SmsDeliverRes
                        ERRORS          {smsDeliverError |
                                        unspecified}
                        CODE            local:108}
```

Table 1 - Operations in Support of SMS (continued)

```
smsStatusReport OPERATION ::= {
        -- sent from the Service Centre to the Sending User PINX or to the Sending User Message Centre
                ARGUMENT        SmsStatusReportArg
                RESULT          SmsStatusReportRes
                ERRORS          {smsStatusReportError |
                                unspecified}
                CODE            local:109}

smsCommandOPERATION ::= {
        -- sent from the Sending User PINX or the Sending User Message Centre to the Service Centre
                ARGUMENT        SmsCommandArg
                RESULT          SmsCommandRes
                ERRORS          {smsCommandError |
                                unspecified}
                CODE            local:110}

scAlert         OPERATION ::= {
        -- sent from the Receiving User PINX or the Receiving User Message Centre to the Service Centre
                ARGUMENT        ScAlertArg
                RESULT          DummyRes
                ERRORS          {unspecified}
                CODE            local:111}

--TYPE DEFINITIONS FOR SMS DATA TYPES FOLLOW

SmsSubmitArg ::=    SEQUENCE    {
        destinationAddress      PartyNumber,
        originatingAddress      PartyNumber,
        messageReference        MessageReference,
        smSubmitParameter       SmSubmitParameter,
        userData                UserData,
        smsExtension            SmsExtension                    OPTIONAL}

SmsSubmitRes ::=    SEQUENCE    {
        serviceCentreTimeStamp  ServiceCentreTimeStamp,
        protocolIdentifier      [3] IMPLICIT ProtocolIdentifier OPTIONAL,
        userData                [4] IMPLICIT UserData           OPTIONAL,
        smsExtension            SmsExtension                    OPTIONAL}

SmsDeliverArg ::=   SEQUENCE    {
        originatingAddress      PartyNumber,
        destinationAddress      PartyNumber,
        originatingName         Name                            OPTIONAL,
        smDeliverParameter      SmDeliverParameter,
        userData                UserData,
        smsExtension            SmsExtension                    OPTIONAL}

SmsDeliverRes ::=   SEQUENCE    {
        smsDeliverResponseChoice    SmsDeliverResChoice,
        smsExtension                SmsExtension                OPTIONAL}
```

Table 1 - Operations in Support of SMS (continued)

```
SmsStatusReportArg ::=          SEQUENCE        {
        messageReference        MessageReference,
        serviceCentreTimeStamp  ServiceCentreTimeStamp,
        dischargeTime           DischargeTime,
        recipientAddress        PartyNumber,
        recipientName           [10] Name                                   OPTIONAL,
        destinationAddress      PartyNumber,
        status                  Status,
        priority                [11] IMPLICIT BOOLEAN DEFAULT FALSE,
        moreMessagesToSend      [12] IMPLICIT BOOLEAN DEFAULT FALSE,
        statusReportQualifier   [13] IMPLICIT BOOLEAN DEFAULT FALSE,
        protocolIdentifier      ProtocolIdentifier                          OPTIONAL,
        userData                UserData                                    OPTIONAL,
        smsExtension            SmsExtension                                OPTIONAL}

SmsStatusReportRes ::= SEQUENCE     {
        smsStatusReportResponseChoice   SmsStatusReportResponseChoice,
        smsExtension                    SmsExtension                        OPTIONAL}

SmsCommandArg ::= SEQUENCE      {
        destinationAddress      PartyNumber,
        messageReference        MessageReference,
        messageNumber           MessageReference,
        protocolIdentifier      ProtocolIdentifier,
        commandType             CommandType,
        commandData             CommandData                                 OPTIONAL,
        statusReportRequest     BOOLEAN                                     OPTIONAL,
        smsExtension            SmsExtension                                OPTIONAL}

SmsCommandRes ::= SEQUENCE      {
        serviceCentreTimeStamp  ServiceCentreTimeStamp,
        protocolIdentifier      ProtocolIdentifier                          OPTIONAL,
        userData                UserData                                    OPTIONAL,
        smsExtension            SmsExtension                                OPTIONAL}

ScAlertArg ::=          SEQUENCE        {
        originatingAddress      PartyNumber,
        smsExtension            SmsExtension                                OPTIONAL}

DummyRes ::=            CHOICE{
        null                    NULL,
        smsExtension            SmsExtension}

SmSubmitParameter ::= SEQUENCE      {
        protocolIdentifier      ProtocolIdentifier,
        validityPeriod          ValidityPeriod                              OPTIONAL,
        statusReportRequest     [11] IMPLICIT BOOLEAN DEFAULT FALSE,
        replyPath               [12] IMPLICIT BOOLEAN DEFAULT FALSE,
        rejectDuplicates        [13] IMPLICIT BOOLEAN DEFAULT FALSE}
```

Table 1 - Operations in Support of SMS (continued)

```
SmDeliverParameter ::= SEQUENCE     {
        protocolIdentifier          ProtocolIdentifier,
        serviceCentreTimeStamp      ServiceCentreTimeStamp,
        priority                    [11] IMPLICIT BOOLEAN DEFAULT FALSE,
        moreMessagesToSend          [12] IMPLICIT BOOLEAN DEFAULT FALSE,
        statusReportIndication      [13] IMPLICIT BOOLEAN DEFAULT FALSE,
        replyPath                   [14] IMPLICIT BOOLEAN DEFAULT FALSE}

SmsDeliverResChoice ::= CHOICE      {
        null                        NULL,
        protocolIdentifier          ProtocolIdentifier,
        userData                    [0] IMPLICIT UserData,
        resChoiceSeq                [1] IMPLICIT ResChoiceSeq}

ResChoiceSeq ::= SEQUENCE {
        protocolIdentifier          ProtocolIdentifier,
        userData                    UserData}

SmsStatusReportResponseChoice ::= CHOICE    {
        null                        NULL,
        protocolIdentifier          ProtocolIdentifier,
        userData                    [0] IMPLICIT UserData,
        resChoiceSeq                [1] IMPLICIT ResChoiceSeq}

MessageReference ::=  INTEGER(0..255)

SmsExtension ::=      CHOICE{
        single                      [1]IMPLICIT Extension{{SmsExtSet}},
        multiple                    [2]IMPLICIT   SEQUENCE OF
                                                  Extension{{SmsExtSet}}
                                    }

SmsExtSet EXTENSION ::= {...}

ProtocolIdentifier ::=  INTEGER (0..127)
                        -- definition of the ProtocolIdentifier values and default value can be found in annex E section
                        -- E.1.2.1

ServiceCentreTimeStamp      ::=     GeneralizedTime(SIZE(12..19))
                                    -- this date and time representation follows ISO 8601

DischargeTime               ::=     GeneralizedTime(SIZE(12..19))
                                    -- this date and time representation follows ISO 8601

ValidityPeriod          ::=     CHOICE{
        validityPeriodRel           [0] IMPLICIT ValidityPeriodRel,
        validityPeriodAbs           [1] IMPLICIT ValidityPeriodAbs,
        validityPeriodEnh           [2] IMPLICIT ValidityPeriodEnh}

ValidityPeriodAbs       ::=     GeneralizedTime(SIZE(12..19))
                                -- this date and time representation follows ISO 8601

ValidityPeriodRel ::=   INTEGER(0..255)
                        -- the rules for the encoding of ValidityPeriodRel are shown in annex E section E.1.2.2
```

Table 1 - Operations in Support of SMS (continued)

```
ValidityPeriodEnh ::=  SEQUENCE{
        singleShotSM            BOOLEAN DEFAULT FALSE,
        enhancedVP              EnhancedVP                          OPTIONAL}

EnhancedVP ::=      CHOICE{
        validityPeriodRel       [0] IMPLICIT ValidityPeriodRel,
        validityPeriodSec       [1] IMPLICIT INTEGER(0..255),
        validityPeriodSemi      [2] IMPLICIT ValidityPeriodSemi}

ValidityPeriodSemi ::=OCTET STRING (SIZE(3))
                -- Validity Period is relative in semi-octet representation, see ETSI TS 100 901, section 9.1.2.3
                -- and section 9.2.3.12.3

UserData ::=  SEQUENCE{
    userDataHeader              [0] IMPLICIT UserDataHeader         OPTIONAL,
    class                       [1] IMPLICIT INTEGER (0..3)         OPTIONAL,
    compressed                  [2] IMPLICIT BOOLEAN DEFAULT FALSE,
    shortMessageText            ShortMessageText}

ShortMessageText ::=        SEQUENCE{
    shortMessageTextType    ShortMessageTextType,
    shortMessageTextData    ShortMessageTextData}

ShortMessageTextType ::=    INTEGER{
                            iA5Coded        (0), -- ShortMessageTextData shall contain data according to
                            octetCoded      (1), -- the type given in ShortMessageTextType, for further
                            uniCoded        (2), -- details see annex E. 1.3.4.
                            compressedCoded (3)} (0..8)

ShortMessageTextData ::= OCTET STRING (SIZE(0..140))

Status ::=              INTEGER (0..255)
                -- definition of status values can be found in section E.7.6 in annex E

CommandType ::=     INTEGER{
        enquiry                                         (0),
        cancelSRR                                       (1),
        deletePreviouslySubmittedSM                     (2),
        enableSRRrelatingToPreviouslySubmittedSM        (3)} (0..255)

CommandData ::= OCTET STRING (SIZE(0..157))

FailureCause ::=        INTEGER (0..255)
        -- definition for failureCause values can be found in section E.3.1 in annex E

UserDataHeader ::=      SEQUENCE OF UserDataHeaderChoice
```

Table 1 - Operations in Support of SMS (continued)

```
UserDataHeaderChoice ::=        CHOICE{
        smscControlParameterHeader              [0] IMPLICIT SmscControlParameterHeader,
        concatenated8BitSMHeader                [1] IMPLICIT Concatenated8BitSMHeader,
        concatenated16BitSMHeader               [2] IMPLICIT Concatenated16BitSMHeader,
        applicationPort8BitHeader               [3] IMPLICIT ApplicationPort8BitHeader,
        applicationPort16BitHeader              [4] IMPLICIT ApplicationPort16BitHeader,
        dataHeaderSourceIndicator               [5] IMPLICIT DataHeaderSourceIndicator,
        wirelessControlHeader                   [6] IMPLICIT WirelessControlHeader,
        genericUserValue                        [99] IMPLICIT GenericUserValue}

SmscControlParameterHeader ::=          BIT STRING {
                sRforTransactionCompleted       (0),
                sRforPermanentError             (1),
                sRforTempErrorSCnotTrying       (2),
                sRforTempErrorSCstillTrying     (3),
                cancelSRRforConcatenatedSM      (6),
                includeOrigUDHintoSR            (7)} (SIZE(8))

Concatenated8BitSMHeader ::=            SEQUENCE{
        concatenated8BitSMReferenceNumber               INTEGER(0..255),
        maximumNumberOf8BitSMInConcatenatedSM           INTEGER(0..255),
        sequenceNumberOf8BitSM                          INTEGER(0..255)}

Concatenated16BitSMHeader ::=           SEQUENCE{
        concatenated16BitSMReferenceNumber              INTEGER(0..65536),
        maximumNumberOf16BitSMInConcatenatedSM          INTEGER(0..255),
        sequenceNumberOf16BitSM                         INTEGER(0..255)}

ApplicationPort8BitHeader ::=           SEQUENCE{
        destination8BitPort                             INTEGER(0..255),
        originator8BitPort                              INTEGER(0..255)}

ApplicationPort16BitHeader ::=          SEQUENCE{
        destination16BitPort                            INTEGER(0..65536),
        originator16BitPort                             INTEGER(0..65536)}

DataHeaderSourceIndicator ::=   INTEGER{
        originalSender                  (1),            -- valid in case of Status Report
        originalReceiver                (2),            -- valid in case of Status Report
        sMSC                            (3)}(0..255)    -- can occur in any message or report

WirelessControlHeader ::=       OCTET STRING

GenericUserValue ::=    SEQUENCE{
        parameterValue          INTEGER(0..255),
        genericUserData         OCTET STRING}

smsDeliverError         ERROR ::= {
                        PARAMETER       SEQUENCE{
                                failureCause            FailureCause,
                                protocolIdentifier      [0] IMPLICIT ProtocolIdentifier         OPTIONAL,
                                userData                [1] IMPLICIT UserData                   OPTIONAL,
                                scAddressSaved          [2] IMPLICIT BOOLEAN DEFAULT FALSE}
                        CODE            local:1026}
```

Table 1 - Operations in Support of SMS (concluded)

```
smsSubmitError          ERROR ::= {
                        PARAMETER    SEQUENCE{
                                failureCause                FailureCause,
                                serviceCentreTimeStamp      ServiceCentreTimeStamp,
                                protocolIdentifier          [0] IMPLICIT ProtocolIdentifier   OPTIONAL,
                                        userData            [1] IMPLICIT UserData             OPTIONAL}
                        CODE    local:1027}

smsStatusReportError    ERROR ::= {
                        PARAMETER SEQUENCE{
                                failureCause                FailureCause,
                                protocolIdentifier          [0] IMPLICIT ProtocolIdentifier   OPTIONAL,
                                userData                    [1] IMPLICIT UserData             OPTIONAL,
                                scAddressSaved              [2] IMPLICIT BOOLEAN DEFAULT FALSE}
                        CODE    local: 1028}

smsCommandError         ERROR ::= {
                        PARAMETER SEQUENCE{
                                failureCause                FailureCause,
                                serviceCentreTimeStamp      ServiceCentreTimeStamp,
                                protocolIdentifier          [0] IMPLICIT ProtocolIdentifier   OPTIONAL,
                                userData                    [1] IMPLICIT UserData             OPTIONAL}
                        CODE    local:1029}

unspecified             ERROR ::= {
                        PARAMETER    SmsExtension
                        CODE         local: 1008}

END -- of Short-Message-Service-Operations-asn1-97
```

6.3.2 Information Elements

6.3.2.1 Facility information element

The operations defined in 6.3.1 for the support of SMS shall be coded in the Facility information element in accordance with ISO/IEC 11582.

When conveying the invoke APDU of the operations defined in 6.3.1 the destinationEntity data element of the NFE shall contain value endPINX. The Interpretation APDU in the Facility information element shall be omitted or have the value "rejectAnyUnrecognizedInvokeAPDU (0)".

6.3.2.2 Other information elements

Any other information elements shall be coded in accordance with ISO/IEC 11572.

6.3.3 Messages

The Facility information element shall be conveyed in messages as specified in clause 10 of ISO/IEC 11582.

6.4 SMS State definitions

6.4.1 States at the Sending User PINX and at the Sending User Message Centre

The procedures at the Sending User PINX/ Sending User Message Centre are written in terms of the following conceptual states existing within the SMS control entity in that Sending User PINX/ Sending User Message Centre in association with a particular request from the Sending User.

6.4.1.1 SMS-Send-Idle

SMS is not operating.

6.4.1.2 SMS-Send-Submit-Wait

An smsSubmit invoke APDU has been sent to the Service Centre. The Sending User PINX/Sending User Message Centre is waiting for a response.

6.4.1.3 SMS-Send-Command-Wait

The Sending User-PINX/Sending User Message Centre has received a command request from the Sending User, has sent an smsCommand invoke APDU to the Service Centre and is waiting for receipt of an smsCommand return result, return error or reject APDU.

6.4.2 States at a Service Centre

The procedures at the Service Centre are written in terms of the following conceptual states existing within the SMS control entity in that Service Centre.

6.4.2.1 States for Short Message Transfer

6.4.2.1.1 SMS-SC-Idle

SMS is not operating.

6.4.2.1.2 SMS-SC-Deliver-Wait

The Service Centre has sent an smsDeliver invoke APDU to the Receiving User PINX and is waiting for receipt of an smsDeliver return result, return error or reject APDU.

6.4.2.1.3 SMS-SC-Await-Alert

The Service Centre has received an smsDeliver return error APDU with failureCause "memoryCapacityExceeded" or "simSmsStorageFull" or with an additional Cause Information Element and is now waiting for receipt of an scAlert invoke APDU from the Receiving User PINX.

6.4.2.2 States for Status Report Transfer

The following states exist in parallel and independently of other states in the Service Centre, if the procedures for Status Report are supported.

6.4.2.2.1 SMS-SC-SR-Wait

The Service Centre has sent an smsStatusReport invoke APDU to the Sending User PINX/Sending User Message Centre and is waiting for receipt of an smsStatusReport return result, return error or reject APDU.

6.4.2.2.2 SMS-SC-SR-Idle

The Service Centre is waiting for an internal request to send a Status Report.

6.4.3 States at a Receiving User PINX

The procedures at the Receiving User PINX are written in terms of the following conceptual states existing within the SMS control entity in that PINX.

6.4.3.1 SMS-Rec-User-case-Idle

SMS is not operating.

6.4.3.2 SMS-Rec-User-case-AlertWait

The Receiving User PINX unsuccessfully attempted to deliver a Short Message to a terminal and is waiting for an internal indication that the Receiving User is available again for further smsDeliver invoke APDUs.

6.4.3.3 SMS-Rec-User-case-AlertResp

The Receiving User PINX has sent an scAlert invoke APDU to the Service Centre and is now waiting for receipt of an scAlert return result, return error or reject APDU from the Service Centre.

6.4.3.4 SMS-Rec-MC-case-Idle

The Receiving User PINX is waiting to forward received APDUs from the Service to the Receiving User Message Centre and vice versa. This state is maintained as long as SMS is provided in the Message Centre Case to the Receiving User.

6.4.4 States at a Receiving User Message Centre

The procedures at the Sending User Message Centre are written in terms of the following conceptual states existing within the SMS control entity in that Message Centre.

6.4.4.1 SMS-Rec-MC-Idle

SMS is not operating.

6.4.4.2 SMS-Rec-MC-AlertWait

The Message Centre has unsuccessfully attempted to save a Short Message, has sent an smsDeliver return error APDU to the Receiving User PINX and is waiting for an internal indication that memory is available again.

6.4.4.3 SMS-Rec-MC-AlertResp

The Message Centre has sent an scAlert invoke APDU to the Receiving User PINX and is waiting for receipt of an scAlert return result, return error or reject APDU from the Receiving User PINX.

6.5 SMS signalling procedures

References in this clause to protocol states refer to protocol states defined in section 7.3 of ISO/IEC 11582.

The APDU elements refered to in the following subclauses are described in annex E.

6.5.1 Actions at a Sending User PINX/ Sending User Message Centre

All invoke, return error, return result and reject APDUs shall be transported using the Call Reference of Call Independent Signalling Connections (CISC). Therefore the Sending User PINX/Sending User Message Centre shall set up a call independent signalling connection in accordance with the procedures described in 7.3 in ISO/IEC 11582. The Sending User PINX/Sending User Message Centre is responsible for the clearing of this call independent signalling connection.

6.5.1.1 Normal procedures

6.5.1.1.1 Short Message

In state SMS-Send-Idle upon request of the Sending User to send a Short Message the Sending User PINX/ Sending User Message Centre shall

1) check if the Sending User is permitted to use the SMS; if so
2) generate an smsSubmit invoke APDU, based on the Short Message elements received from the Sending User, which shall include the following mandatory elements:
   - the PartyNumber of the Receiving User in element destinationAddress,
   - the PartyNumber of the Sending User in element originating Address,
   - a Message Reference in element messageReference which is allocated by the Sending User PINX/Sending User Message Centre for each new Short Message or Command that is sent (see annex E for further details),
   - Short Message specific parameters in element smsSubmitParameters (see annex E for further details),
   - the Short Message Text and related information in element userData (see annex E for further details),
3) send the smsSubmit invoke APDU to the Service Centre;
4) start timer T1 and enter state SMS-Send-Submit-Wait.

On receipt in state SMS-Send-Submit-Wait of an smsSubmit return result APDU the Sending User PINX shall

1) stop timer T1;
2) send an indication to the Sending User that the submission of the Short Message was successful and
3) enter state SMS-Send-Idle.

6.5.1.1.2 Command

On request in state SMS-Send-Idle of the Sending User to send a Command the Sending User PINX/ Sending User Message Centre shall

1) check if the Sending User is permitted to use the SMS, if so
2) generate an smsCommand invoke APDU based on the Command information received from the Sending User, which shall include the following elements:
   - the PartyNumber of the Receiving User of the Short Message to which the Command refers in element destinationAddress,
   - a Message Reference in element messageReference which is allocated by the Sending User PINX/Sending User Message Centre for each new Short Message or Command that is sent (see annex E for further details),
   - the Message Reference of the Short Message to which the Command refers in element messageNumber,
   - the Protocol Identifier identifying the higher layer protocol in element protocolIdentifier (see annex E for further details),
   - the Command Type in element commandType (see annex E for further details),
   - optional elements as described in annex E;

3) send the smsCommand invoke APDU to the Service Centre;

4) start timer T2 and enter state SMS-Send-Command-Wait.

On receipt in state SMS-Send-Command-Wait of an smsCommand return result APDU the Sending User PINX/ Sending User Message Centre shall

1) stop timer T2;

2) send an indication to the Sending User that the submission of the Command was successful and

3) enter state SMS-Send-Idle.

6.5.1.1.3 Status Report

On receipt in state SMS-Send-Idle of an smsStatusReport invoke APDU the Sending User PINX/ Sending User Message Centre shall

1) indicate the content of the received smsStatusReport invoke APDU to the Sending User;

2) send an smsStatusReport return result APDU (see annex E) to the Service Centre and

3) enter state SMS-Send-Idle.

6.5.1.2 Exceptional procedures

In state SMS-Send-Idle upon a request from the Sending User to submit a Short Message or a Command, the Sending User PINX/Sending User Message Centre shall return an error indication to the Sending User if

1) the Sending User is not permitted to use the SMS;

2) the smsSubmit/smsCommand elements are incorrect or if mandatory elements are missing.

6.5.1.2.1 Short Message

On receipt in state SMS-Send-Submit-Wait of an smsSubmit reject or return error APDU the Sending User PINX/ Sending User Message Centre shall

1) stop timer T1;

2) send an indication including the error reason to the Sending User and

3) enter state SMS-Send-Idle.

On expiry of timer T1 in state SMS-Send-Submit-Wait the Sending User PINX/ Sending User Message Centre shall either

- re-send the smsSubmit invoke ADPU, start timer T1 and re-enter state SMS-Send-Submit-Wait or
- send an indication including the error reason to the Sending User and enter state SMS-Send-Idle.

NOTE 3 - The number of times the Sending User PINX may repeat the smsSubmit is an implementation matter.

6.5.1.2.2 Command

On receipt in state SMS-Send-Command-Wait of an smsCommand reject or return error APDU the Sending User PINX/ Sending User Message Centre shall

1) stop timer T2;

2) send an indication including the error reason to the Sending User and

3) enter state SMS-Send-Idle.

On expiry of timer T2 in state SMS-Send-Command-Wait the Sending User PINX/ Sending User Message Centre shall either

- re-send the smsCommand invoke APDU, start timer T2 and re-enter state SMS-Send-Command-Wait or
- send an indication including the error reason to the Sending User and enter state SMS-Send-Idle.

NOTE 4 - The number of times the Sending User PINX may repeat the smsCommand is an implementation matter.

6.5.1.2.3 Status Report

On receipt in state SMS-Send-Idle of an smsStatusReport invoke APDU the Sending User PINX/ Sending User Message Centre shall in case of an error send an smsStatusReport return error APDU with an appropriate error indication in element failureCause, to the Service Centre and enter state SMS-Send-Idle. Elements of the smsStatusReport error APDU and specific error reasons and related failureCause values are described in annex E.

6.5.2 Actions at a Sending User Message Centre

The procedures for the Sending User Message Centre are as described in 6.5.1.

6.5.3 Actions at a Service Centre

All invoke, return error, return result and reject APDUs shall be transported using the Call Reference of Call Independent Signalling Connections (CISC).Therefore the Service Centre shall set up a call independent signalling connection in accordance with the procedures described in 7.3 in ISO/IEC 11582. The Service Centre is responsible for the clearing of this call independent signalling connection.

6.5.3.1 Normal procedures

6.5.3.1.1 Short Message

On receipt in state SMS-SC-Idle of an smsSubmit invoke APDU from the Sending User PINX/Sending User Message Centre the Service Centre shall check if the received smsSubmit invoke APDU contains a Short Message with the same messageReference and destinationAddress as a previously received Short Message from the same originatingAddress. In case such a Short Message exists and the rejectDuplicates APDU element is set to FALSE or in case that the messageReference is different to the messageReference of the previously received Short Message the Service Centre shall

1) check the APDU element protocolIdentifier and
   - if it is set to “replaceShortMessage” check the originatingAddress and replace any existing stored Short Message having the same Protocol Identifier Code and originatingAddress with the new Short Message and other parameter values. If there is no message to be replaced the Service Centre shall store the Short Message in the normal way;
   - if no “replaceShortMessage” code is present the Service Centre shall store the Short Message locally;
2) analyse and store the smsSubmit invoke APDU;
3) set the internal value StatusReportRequest according to the statusReportRequest element and the smscControlParameterHeader as received in the smsSubmit invoke APDU; if the smscControlParameterHeader was not received it shall be assumed that all values of this element are set to TRUE (i.e. a Status Report is requested for all conditions);
4) assign and store a serviceCentreTimeStamp and the priority (see annex E) for the Short Message;
5) send an smsSubmit return result APDU to the Sending User PINX/Sending User Message Centre with the following elements (see annex E for further details):
   - serviceCentreTimeStamp,
   - further optional elements as described in annex E;
6) send an smsDeliver invoke APDU to the Receiving User PINX containing the received elements from the smsSubmit invoke ADPU and the following additional elements (see annex E for further details):
   - optionally, the originatingName of the Sending User if available and not restricted,
   - serviceCentreTimeStamp as designed by the Service Centre,
   - priority as assigned by the Service Centre,
   - moreMessagesToSend: set to TRUE if there are more Short Messages waiting in that Service Centre for that particular destinationAddress,
   - statusReportIndication: set to TRUE if the statusReportRequest information element was set to TRUE in the original smsSubmit invoke APDU,
   - replyPath: set to TRUE if the Service Centre supports the Reply Path functionality;
7) start timer T3 and enter state SMS-SC-Deliver-Wait.

On receipt in state SMS-SC-Deliver-Wait of an smsDeliver return result APDU the Service Centre shall

1) stop timer T3;
2) generate an internal request to send a Status Report with value “smReceivedBySME” if the internal StatusReportRequest field is set for this condition and
3) enter state SMS-SC-Idle.

6.5.3.1.2 Command

On receipt in any state except SMS-SC-Idle of an smsCommand invoke APDU the Service Centre shall

1) identify a specific locally stored Short Message by the received smsCommand invoke APDU elements
   - originatingAddress,
   - messageNumber, containing the messageReference of the stored Short Message;
2) execute the requested commandType on this message, i.e. for commandType
   - "Enquiry" generate an internal request to send a Status Report, regardless of the setting of the internal StatusReportRequest field;
   - "CancelSRR" set the internal field StatusReportRequest to FALSE for all conditions;
   - "EnableSRRrelatingToPreviouslySubmittedSM" set the internal field StatusReportRequest to TRUE for all conditions;
   - "DeletePreviouslySubmittedSM" delete the identified Short Message and generate an internal request to send a Status Report with value "smDeletedByOriginatingSME" if the internal StatusReportRequest field is set for this condition;
3) afterwards, send an smsCommand return result APDU to the Sending User PINX/Sending User Message Centre and re-enter the current state.

6.5.3.1.3 Status-Report

NOTE 5 - The Status Report-related procedures within the Service Centre are independent of those for the normal Short Message.

In state SMS-SC-SR-Idle on an internal request to send a Status Report for a specific Short Message the Service Centre shall send an smsStatusReport invoke APDU to the Sending User PINX/Sending User Message Centre using the following smsStatusReport APDU elements:

- messageReference: value contained in the previously received smsSubmit or smsCommand invoke APDU. If the Status Report is the result of an smsCommand where commandType was "Enquiry" the messageReference used in the Status Report shall be the messageNumber contained in the smsCommand invoke APDU (i.e. the messageReference of the previously submitted Short Message to which the "Enquiry" refers).
- dischargeTime: time at which a previously submitted smsSubmit invoke APDU was successfully delivered to or attempted to deliver to the Receiving User or disposed of by the SC,
- serviceCentreTimeStamp: the serviceCentreTimeStamp assigned to the original smsSubmit invoke APDU,

and other elements as described in 6.3.1, start timer T5 and enter state SMS-SC-SR-Wait.

On receipt in state SMS-SC-SR-Wait of an smsStatusReport return result APDU from the Sending User PINX/Sending User Message Centre the Service Centre shall stop timer T5 and enter state SMS-SC-SR-Idle.

6.5.3.2 Exceptional procedures

6.5.3.2.1 Short Message

For a general description of all possible error values and their usage refer to annex E.

On receipt in state SMS-SC-Idle of an smsSubmit invoke APDU from the Sending User PINX/Sending User Message Centre and this APDU contains

- either element rejectDuplicates set to TRUE and messageReference and destinationAddress of a previously received Short Message from the same originatingAddress;
- or element messageReference that is identical to the messageReference of a previously received Short Message from the same Sending User, but indicates a different destinationAddress;

the Service Centre shall send an smsSubmit return error APDU to the Sending User PINX/Sending User Message Centre with failureCause "smRejectedDuplicateSM", discard the smsSubmit invoke APDU and enter state SMS-SC-Idle.

If element protocolIdentifier of the received smsSubmit invoke APDU indicates a specific interworking and if interworking is not supported by the Service Centre it shall return an smsSubmit return error APDU with failureCause "telematicInterworkingNotSupported" and enter state SMS-SC-Idle.

On receipt in state SMS-SC-Deliver-Wait of an smsDeliver return error APDU from the Receiving User PINX the Service Centre shall check the APDU element failureCause.

If it contains the value “memoryCapacityExceeded” or “simSmsStorageFull” or if an additional Cause Information Element has been received, the Service Centre shall

1) stop timer T3;

2) generate an internal request to send a Status Report with value “errorInSme” if the internal StatusReportRequest field is set for this condition;

3) start timer T4 if the smsDeliver return error APDU element scAddressSaved is set to FALSE (i.e. the Receiving User PINX will not send an scAlert invoke APDU if the smsDeliver invoke APDU can be re-sent) and

4) enter state SMS-SC-Await-Alert.

If a different failureCause was received, the Service Centre shall

1) stop timer T3;

2) delete the Short Message;

3) generate an internal request to send a Status Report with an appropriate value if the internal StatusReportRequest field is set for this condition and

4) enter state SMS-SC-Idle.

On receipt in state SMS-SC-Deliver-Wait of an smsDeliver reject APDU the Service Centre shall

1) stop timer T3;

2) delete the Short Message;

3) generate an internal request to send a Status Report with value “connectionRejectedBySME” if the internal StatusReportRequest field is set for this condition and

4) enter state SMS-SC-Idle.

On expiry of timer T3 in state SMS-SC-Deliver-Wait the Service Centre may

- either re-send the smsDeliver invoke APDU to the Receiving User PINX, start timer T3, generate an internal request to send a Status Report with value “noResponseFromSME” if the internal StatusReportRequest field is set for this condition and re-enter state SMS-SC-Deliver-Wait or

- delete the Short Message, generate an internal request to send a Status Report with value “smDeletedByScAdministration” if the internal StatusReportRequest field is set for this condition and enter state SMS-SC-Idle.

On receipt in state SMS-SC-Await-Alert of an scAlert invoke APDU from the Receiving User PINX the Service Centre shall stop timer T4 if running, check the scAlert invoke APDU and depending on the outcome send an scAlert return result or return error APDU to the Receiving User PINX. If the scAlert is valid the SC shall

1) send the smsDeliver invoke APDU to the Receiving User PINX of the user whose number was contained in the scAlert invoke APDU;

2) start timer T3 and

3) enter state SMS-SC-Deliver-Wait.

On expiry of timer T4 in state SMS-SC-Await-Alert the Service Centre shall

1) send the smsDeliver invoke APDU to the Receiving User PINX;

2) start timer T3 and

3) enter state SMS-SC-Deliver-Wait.

NOTE 6 - The number of times the Service Centre may repeat the delivery attempt for a Short Message depends on the duration of timer T4 and the Validity Period for this Short Message. If no Validity Period was indicated by the Sending User, an SC-specific default value will be assumed.

On receipt in state SMS-SC-Await-Alert of an internal indication that the Validity Period for a Short Message expired the Service Centre shall stop timer T4 if running and shall either

- once again re-send the smsDeliver invoke APDU to the Receiving User PINX with priority set to TRUE, start Timer T3 and enter state SMS-SC-Deliver-Wait or

- delete the Short Message, generate an internal request to send a Status Report with value “smValidityPeriodExpired” if the internal StatusReportRequest field is set for this condition and enter state SMS-SC-Idle.

On receipt in state SMS-SC-Deliver-Wait of an smsDeliver return error or return reject APDU for a Short Message for which the Validity Period has already expired, the Service Centre shall stop Timer T3 and generate an internal request to send a Status Report with value “smValidityPeriodExpired” if the internal StatusReportRequest field is set for this condition and enter state SMS-SC-Idle.

6.5.3.2.2 Command

On receipt in any state of an smsCommand invoke APDU, if no Short Message can be identified, the Service Centre shall

1) return an smsCommand return error APDU to the Sending User PINX/Sending User Message Centre with failureCause “commandCannotBeActioned”;

2) generate an internal request to send a Status Report with value “smDoesNotExist” if the internal StatusReportRequest field is set for this condition and

3) re-enter the current state.

6.5.3.2.3 Status Report

On receipt in state SMS-SC-SR-Wait of an smsStatusReport return error APDU or an smsStatusReport reject APDU or on expiry of timer T5 the Service Centre shall stop timer T5 (if running) and enter the SMS-SC-SR-Idle and may afterwards re-send the smsStatusReport invoke APDU according to the procedures described in section 6.5.3.1.1.

6.5.4 Actions at a Receiving User PINX

All invoke, return error, return result and reject APDUs shall be transported using the Call Reference of Call Independent Signalling Connections (CISC). Therefore the Receiving User PINX shall set up a call independent signalling connection in accordance with the procedures described in 7.3 in ISO/IEC 11582. The Receiving User PINX is responsible for the clearing of this call independent signalling connection.

Due to internal administration, the Receiving User PINX shall, upon starting operation for a specific user, either

- enter state SM-Rec-MC-case-Idle if the Short Messages are stored and managed at the Receiving User Message Centre or

- enter state SM-Rec-User-case-Idle if the Short Messages are stored and managed locally, either by the Receiving Users terminal equipment or by the Receiving User PINX.

6.5.4.1 Normal procedures

In state SM-Rec-MC-case-Idle upon receipt of an smsDeliver return result, reject, return error APDU or an scAlert invoke APDU from the Receiving User Message Centre the Receiving User PINX shall send these APDUs to the Service Centre.

In state SM-Rec-MC-case Idle upon receipt of an smsDeliver invoke APDU, an scAlert return result, return error or reject APDU the Receiving User PINX shall send these APDUs to the Receiving User Message Centre.

On receipt in state SMS-Rec-User-case-Idle of an smsDeliver invoke APDU from the Service Centre the Receiving User PINX shall attempt to deliver the SM to the Receiving User. If the SM can successfully be delivered the Receiving User PINX shall send an smsDeliver return result APDU to the Service Centre and enter state SMS-Rec-User-case-Idle.

6.5.4.2 Exceptional procedures

In state SMS-Rec-User-case-Idle, if element protocolIdentifier of the received smsDeliver invoke APDU is set to “shortMessageType0” the Receiving User PINX shall send an smsDeliver return result APDU to the Service Centre but may discard its contents due to internal configuration or restrictions of the Receiving Users terminal equipment.

If the attempt by the Receiving User PINX to deliver a Short Message received from the Service Centre to the Receiving User is not successful, the Receiving User PINX shall

- if SMWD is not implemented,

  1) send to the Service Centre an smsDeliver return error APDU with the following elements

     - failureCause set to “memoryCapacityExceeded” or “simSmsStorageFull”,

     - optionally protocolIdentifier as received in the original smsDeliver invoke APDU,

     - optionally userData as received in the original smsDeliver invoke APDU,

     - scAddressSaved set to FALSE and

  2) enter state SMS-Rec-User-case-Idle.

- if SMWD is implemented

  1) save the Service Centre Address as indicated in the CallingPartyNumber Information Element of the call-independent-signalling-connection on which the smsDeliver invoke APDU was received, if not saved already;

  2) send to the Service Centre an smsDeliver return error APDU with the following elements

     - failureCause set to “memoryCapacityExceeded” or “simSmsStorageFull”,
     - optionally protocolIdentifier as received in the smsDeliver invoke APDU,
     - optionally userData as received in the smsDeliver invoke APDU,
     - scAddressSaved set to TRUE and

  3) enter state SMS-Rec-User-case-AlertWait.

On receipt in state SMS-Rec-User-case-AlertWait of an internal indication that the user is reachable or that the user has memory available again the Receiving User PINX shall send an scAlert invoke APDU to all Service Centres which are stored in the SMWD, start timer T6 and enter state SMS-Rec-User-case-AlertResp for each of the sent scAlert invoke APDUs.

On receipt in state SMS-Rec-User-case-AlertWait of an smsDeliver invoke APDU with element priority set to TRUE the Receiving User PINX shall attempt to deliver the SM to the Receiving User.

If the SM can be delivered the Receiving User PINX shall

1) return an smsDeliver return result APDU to the Service Centre as described in section 6.5.4.1;

2) send an scAlert invoke APDU with element originatingAddress set to the Party Number of the Receiving User for all Service Centres that are contained in the SMWD to the Service Centres;

3) start timer T6 and enter state SMS-Rec-User-case-Alert-Resp.

If the SM can not be delivered then, if the SC Address is not yet stored in SMWD, the SC Address as indicated in the CallingPartyNumber Information element of the call-independent-signalling-connection shall be saved in SMWD and the Receiving User PINX shall send an smsDeliver return error APDU to the Service Centre with scAddressSaved set to TRUE (see above).

On receipt in state SMS-Rec-User-case-AlertWait of an smsDeliver invoke APDU the Receiving User PINX shall,

1) if the SC Address is not saved already in SMWD, save it there;

2) return an smsDeliver return error APDU to the Service Centre with scAddressSaved set to TRUE (see above) and

3) re-enter state SMS-Rec-User-case-AlertWait.

On receipt in state SMS-Rec-User-case-AlertResp of an scAlert return result APDU the Receiving User PINX shall delete the address of the SC from the SMWD, stop timer T6 and enter state SMS-Rec-User-case-Idle.

On receipt in state SMS-Rec-User-case-AlertResp of an scAlert return error or reject APDU or upon expiry of timer T6, the Receiving User PINX shall stop timer T6 (if running) and shall

- either delete the address of the SC from the SMWD and enter state SMS-Rec-User-case-Idle
- or re-send the scAlert invoke APDU to the Service Centre, start timer T6 and re-enter state SMS-Rec-User-case-AlertResp.

On receipt in state SMS-Rec-User-case-AlertResp of an smsDeliver invoke APDU from the SC, the Receiving User PINX shall treat this APDU as described in section 6.5.4.1 but shall not enter state SMS-Rec-User-case-Idle but re-enter SMS-Rec-User-case-AlertResp instead. Timer T6 shall not be stopped in this case.

NOTE 7 - The number of times the Receiving User PINX may repeat the scAlert is an implementation matter.

6.5.5 Actions at a Receiving User Message Centre

All invoke, return error, return result and reject APDUs shall be transported using the Call Reference of Call Independent Signalling Connections (CISC). Therefore the Receiving User Message Centre shall set up a call independent signalling connection in accordance with the procedures described in 7.3 in ISO/IEC 11582. The Receiving User Message Centre is responsible for the clearing of this call independent signalling connection.

6.5.5.1 Normal procedures

On receipt in state SMS-Rec-MC-Idle of an smsDeliver invoke APDU from the Receiving User PINX the Receiving User Message Centre shall check the APDU element protocolIdentifier. If it is set to

- "shortMessageType0" the Receiving User Message Centre shall perform the procedures as described for this case in section 6.5.4.2.
- "replaceShortMessage" the Receiving User Message Centre shall perform the procedures as described for the "replaceShortMessage" value in the protocolIdentifier in section 6.5.3.2.

If the Short Message is saved the Receiving User Message Centre shall send an smsDeliver return result APDU to the Sending User PINX, indicate the reception of a new Short Message to the Receiving User using SS-MWI and enter state SMS-Rec-MC-Idle.

6.5.5.2 Exceptional procedures

In state SMS-Rec-MC-Idle, if element protocolIdentifier of the received smsDeliver invoke APDU is set to "shortMessageType0" the Receiving User Message Centre shall send an smsDeliver return result APDU to the Receiving User PINX but may discard its contents due to internal configuration or restrictions of the Receiving User Message Centre.

On receipt in state SMS-Rec-MC-Idle of an smsDeliver invoke APDU from the Receiving User PINX if it is not possible for the Receiving User Message Centre to save the SM it shall,

- if SMWD is implemented,
  1) save the Service Centre address as indicated in the CallingPartyNumber Information element of the call-independent-signalling-connection on which the smsDeliver invoke APDU was received, if not saved already;
  2) send an smsDeliver return error APDU to the Service Centre with the following elements
     - failureCause "memoryCapacityExceeded",
     - optionally protocolIdentifier as received in the original smsDeliver invoke APDU,
     - optionally userData as received in the original smsDeliver invoke APDU,
     - scAddressStored set to TRUE and
  3) enter state SMS-Rec-MC-AlertWait.
- if SMWD is not implemented
  1) send an smsDeliver return error APDU to the Receiving User PINX with the following elements
     - failureCause set to "memoryCapacityExceeded",
     - optionally protocolIdentifier as received in the original smsDeliver invoke APDU,
     - optionally userData as received in the original smsDeliver invoke APDU,
     - scAddressStored set to FALSE and
  2) enter state SMS-Rec-MC-Idle.

On receipt in state SMS-Rec-MC-AlertWait of an internal indication that the user is reachable or that the user has memory available again the Receiving User Message Centre shall send an scAlert invoke APDU to all Service Centres which are stored in the SMWD, start timer T7 and enter state SMS-Rec-MC-AlertResp for each of the sent scAlert invoke APDUs.

On receipt in state SMS-Rec-MC-AlertWait of an smsDeliver invoke APDU with element priority set to TRUE the Receiving User Message Centre shall attempt to save the SM, following the procedures described in 6.5.5.1. If the SM can be saved the Receiving User Message Centre shall

1) return an smsDeliver return result APDU to the Receiving User PINX as described in section 6.5.5.1;
2) send an scAlert invoke APDU to the Receiving User PINX with element originatingAddress set to the Party Number of the Receiving User for all Service Centres which are stored in the SMWD;
3) start timer T7 and enter state SMS-Rec-MC-AlertResp.

If the SM can not be saved then, if the SC Address is not yet stored in SMWD, the SC address as indicated in the CallingPartyNumber Information element of the call-independent-signalling-connection shall be saved in SMWD, the Receiving User Message Centre shall send an smsDeliver return error APDU to the Receiving User PINX with scAddressStored set to TRUE and enter state SMS-Rec-MC-AlertWait.

On receipt in state SMS-Rec-MC-AlertWait of an smsDeliver invoke APDU the Receiving User Message Centre shall

1) if the SC Address is not saved already in SMWD save it there;

2) return an smsDeliver return error APDU with failureCause “memoryCapacityExceeded” and with scAddressStored set to TRUE to the Receiving User PINX and

3) re-enter state SMS-Rec-MC-AlertWait.

On receipt in state SMS-Rec-MC-AlertResp of an scAlert return result APDU or upon expiry of timer T7 the Receiving User Message Centre shall stop timer T7 (if running), delete the SC Address from the SMWD field and enter state SMS-Rec-MC-Idle.

On receipt in state SMS-Rec-MC-AlertResp of an scAlert return error or reject APDU the Receiving User Message Centre shall stop timer T7 (if running) and shall

- either delete the address of the SC from the SMWD and enter state SMS-Rec-MC-Idle
- or re-send the scAlert invoke APDU to the Service Centre, start timer T7 and re-enter state SMS-Rec-MC-AlertResp.

On receipt in state SMS-Rec-MC-AlertResp of an smsDeliver invoke APDU from the Receiving User PINX the Receiving User Message Centre shall treat this APDU as described in section 6.5.5.1 but shall not enter state SMS-Rec-MC-Idle but re-enter SMS-Rec-MC-AlertResp instead. Timer T7 shall not be stopped in this case.

NOTE 8 - The number of times the Receiving User Message Centre may repeat the scAlert is an implementation matter.

6.6 SMS impact on interworking with public ISDNs

NOTE 9 - The interworking with the GSM network is described in annex D.

6.7 SMS impact on interworking with non-ISDNs

Not applicable.

6.8 Protocol Interactions between SMS and supplementary services and ANFs

This clause specifies protocol interactions with supplementary services and ANFs for which stage 3 standards had been published at the time of publication of this International Standard. For interactions with supplementary services and ANFs for which stage 3 standards are published subsequent to the publication of this International Standard, see those other stage 3 standards.

NOTE 10 - Simultaneous conveyance of APDUs for SMS and supplementary service or ANF in the same message, each in accordance with the requirements of its respective stage 3 standard, does not, on its own, constitute a protocol interaction.

NOTE 11 - Additional interactions that have no impact on the signalling protocol at the Q reference point can be found in the relevant stage 1 specification.

6.8.1 Calling Line Identification Presentation (SS-CLIP)

No protocol interaction.

6.8.2 Connected Line Identification Presentation (SS-COLP)

No protocol interaction.

6.8.3 Calling/ Connected Line Identification Restriction (SS-CLIR)

No protocol interaction.

6.8.4 Calling Name Identification Presentation (SS-CNIP)

No protocol interaction.

6.8.5 Calling/ Connected Name Identification Restriction (SS-CNIR)

No protocol interaction.

6.8.6 Connected Name Identification Presentation (SS-CONP)

No protocol interaction.

6.8.7 Completion of Calls to Busy Subscriber (SS-CCBS)

No protocol interaction.

6.8.8 Completion of Calls on No Reply (SS-CCNR)

No protocol interaction.

6.8.9 Call Transfer (CT)

No protocol interaction.

6.8.10 Call Forwarding Unconditional (SS-CFU)

No protocol interaction.

6.8.11 Call Forwarding Busy (SS-CFB)

No protocol interaction.

6.8.12 Call Forwarding No Reply (SS-CFNR)

No protocol interaction.

6.8.13 Call Deflection (SS-CD)

No protocol interaction.

6.8.14 Path Replacement (ANF-PR)

No protocol interaction.

6.8.15 Call Offer (SS-CO)

No protocol interaction.

6.8.16 Call Intrusion (SS-CI)

No protocol interaction.

6.8.17 Do Not Disturb (SS-DND)

No protocol interaction.

6.8.18 Do Not Disturb Override (SS-DNDO)

No protocol interaction.

6.8.19 Advice of charge (SS-AOC)

No protocol interaction.

6.8.20 Recall (SS-RE)

No protocol interaction.

6.8.21 Call Interception (ANF-CINT)

No protocol interaction.

6.8.22 Transit Counter (ANF-TC)

No protocol interaction.

6.8.23 Route Restriction Class (ANF-RRC)

No protocol interaction.

6.8.24 Message Waiting Indication (SS-MWI)

The Receiving User Message Centre shall, upon receipt and storage of an smsDeliver invoke APDU, send an mwiActivate invoke APDU with element basicService set to “shortMessageService” to the Receiving User PINX.

6.8.25 Wireless Terminal Location Registration (SS-WTLR)

No protocol interaction.

6.8.26 Wireless Terminal Mobility Incoming Call (SS-WTMI)

No protocol interaction.

6.8.27 Wireless Terminal Mobility Outgoing Call (SS-WTMO)

No protocol interaction.

6.8.28 Authentication of a CTM user (SS-WTAT)

No protocol interaction.

6.8.29 Authentication of the PISN (SS-WTAN)

No protocol interaction.

6.8.30 Private User Mobility Incoming Call (ANF-PUMI)

No protocol interaction.

6.8.31 Private User Mobility Outgoing Call (ANF-PUMO)

No protocol interaction.

6.8.32 Private User Mobility Registration (SS-PUMR)

No protocol interaction.

6.8.33 Common Information (ANF-CMN)

No protocol interaction.

6.8.34 Call Priority Interruption (Protection) (SS-CPI(P))

No protocol interaction.

6.8.35 Single Step Call Transfer (SS-SSCT)

No protocol interaction.

6.8.36 Simple Dialog (SS-SD)

No protocol interaction.

6.8.37 Call Identification and Call Linkage (ANF-CIDL)

No protocol interaction.

6.9 SS-SMS Parameter values (Timers)

6.9.1 Timer T1

Timer T1 shall operate at the Sending User PINX during state SMS-Send-Submit-Wait. Its purpose is to protect against an absence of response to smsSubmit invoke APDU.

Timer T1 shall have a value in the range of 4 to 6 seconds.

6.9.2 Timer T2

Timer T2 shall operate at the Sending User PINX during state SMS-Send-Command-Wait. Its purpose is to protect against an absence of response to smsCommand invoke APDU.

Timer T2 shall have a value in the range of 4 to 6 seconds.

6.9.3 Timer T3

Timer T3 shall operate at the Service Centre during state SMS-SC-Deliver-Wait. Its purpose is to protect against absence of response to smsDeliver invoke APDU.

Timer T3 shall have a value in the range of 4 to 6 seconds.

6.9.4 Timer T4

Timer T4 may operate optionally at the Service Centre, if Short Message Waiting Data is not implemented, during state SMS-SC-Await-Alert. Its purpose is to ensure the automatic repetition of the delivery attempt of a Short Message.

Timer T4 shall have an implementation dependent value.

6.9.5 Timer T5

Timer T5 shall operate at the Service Centre during state SMS-SC-SR-Wait. Its purpose is to protect against absence of response to smsStatusReport invoke APDU.

Timer T5 shall have a value in the range of 4 to 6 seconds.

6.9.6 Timer T6

Timer T6 shall operate at the Receiving User PINX during state SMS-Rec-User-case-AlertResp. Its purpose is to protect against an absence of response to scAlert invoke APDU.

Timer T6 shall have a value in the range of 4 to 6 seconds.

6.9.7 Timer T7

Timer T7 shall operate at the Receiving User Message Centre during state SMS-Rec-MC-AlertResp. Its purpose is to protect against absence of response to scAlert invoke APDU.

Timer T7 shall have a value in the range of 4 to 6 seconds.

Annex A

(normative)

Protocol Implementation Conformance Statement (PICS) Proforma

A.1 Introduction

The supplier of a protocol implementation which is claimed to conform to this International Standard shall complete the Protocol Implementation Conformance Statement (PICS) proforma in A.3.

A completed PICS proforma is the PICS for the implementation in question. The PICS is a statement of which capabilities and options of the protocol have been implemented. The PICS can have a number of uses, including use:

- by a protocol implementor, as a check list to reduce the risk of failure to conform to the standard through oversight;
- by the supplier and acquirer (or potential acquirer) of the implementation, as a detailed indication of the capabilities of the implementation, stated relative to the common basis for understanding provided by the standard PICS proforma;
- by user (or potential user) of the implementation, as a basis for initially checking the possibility of interworking with another implementation (note that, while interworking cannot be guaranteed, failure to interwork can often be predicted from incompatible PICS);
- by a protocol tester, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

A.2 Instructions for completing the PICS proforma

A.2.1 General structure of the PICS proforma

The PICS proforma is a fixed format questionnaire divided into subclauses each containing a group of individual items. Each item is identified by an item number, the name of the item (question to be answered) and the reference(s) to the clause(s) that specifies (specify) the item in the main body of this International Standard.

The "Status" column indicates whether an item is applicable and if so whether support is mandatory or optional. The following terms are used:

m	mandatory (the capability is required for conformance to the protocol);
o	optional (the capability is not required for conformance to the protocol, but if the capability is implemented, it is required to conform to the protocol specifications);
o.<n>	optional, but support of at least one of the group of options labelled by the same numeral <n> is required;
x	prohibited;
c.<cond>	conditional requirement, depending on support for the item or items listed in condition <cond>;
<item>:m	simple conditional requirement, the capability being mandatory if item number <item> is supported, otherwise not applicable;
<item>:o	simple conditional requirement, the capability being optional if item number <item> is supported, otherwise not applicable.

Answers to the questionnaire items are to be provided either in the "Support" column, by simply marking an answer to indicate a restricted choice (Yes or No) or in the "Not Applicable" column (N/A).

A.2.2 Additional information

Items of Additional Information allow a supplier to provide further information intended to assist the interpretation of the PICS. It is not intended or expected that a large quantity will be supplied, and a PICS can be considered complete without any such information. Examples might be an outline of the ways in which a (single) implementation can be set up to operate in a variety of environments and configurations.

References to items of Additional Information may be entered next to any answer in the questionnaire, and may be included in items of Exception information.

A.2.3 Exceptional information

It may occasionally happen that a supplier will wish to answer an item with mandatory or prohibited status (after any conditions have been applied) in a way that conflicts with the indicated requirements. No pre-printed answer will be found in the Support column for this. Instead, the supplier is required to write into the Support column an x.<i> reference to an item of Exception Information, and to provide the appropriate rationale in the Exception item itself.

An implementation for which an Exception item is required in this way does not conform to this International Standard. A possible reason for the situation described above is that a defect in the Standard has been reported, a correction for which is expected to change the requirement not met by the implementation.

A.3 PICS Proforma for ISO/IEC 21990

A.3.1 Implementation identification

Supplier	
Contact point for queries about the PICS	
Implementation Name(s) and Version(s)	
Other information necessary for full identification, e.g. name(s) and version(s) for machines and/or operating systems; system name(s).	

Only the first three items are required for all implementations; other information may be completed as appropriate in meeting the requirement for full identification.

The terms Name and Version should be interpreted appropriately to correspond with a supplier's terminology (e.g. Type, Series, Model).

A.3.2 Protocol summary

Protocol Version	1.0
Addenda Implemented (if applicable)	
Amendments implemented	
Have any exception items been required (see A.2.3)?	No [ ] Yes [ ] (The answer Yes means that the implementation does not conform to this International Standard.)

Date of Statement	

A.3.3 Short Message Service

Item	Name of Item	Reference	Status	N/A	Support
A1	Support of SMS in Sending User PINX		o.1		Yes [ ] No [ ]
A2	Support of SMS in Sending Message Centre		o.1		Yes [ ] No [ ]
A3	Support of SMS in Service Centre		o.1		Yes [ ] No [ ]
A4	Support of SMS in Receiving User PINX		o.1		Yes [ ] No [ ]
A5	Support of SMS in Receiving Message Centre		o.1		Yes [ ] No [ ]

A.3.4 Procedures for SMS

Item	Name of Item	Reference	Status	N/A	Support
B1	Procedures at the Sending User PINX	6.5.1	A1:m	[ ]	Yes [ ]
B2	Procedures at the Sending Message Centre	6.5.1	A2:m	[ ]	Yes [ ]
B3	Procedures at the Service Centre	6.5.3	A3:m	[ ]	Yes [ ]
B4	Procedures at the Receiving User PINX	6.5.4	A4:m	[ ]	Yes [ ]
B5	Procedures at the Receiving Message Centre	6.5.5	A5:m	[ ]	Yes [ ]
B6	Procedures for Status Report	6.5	c.1	[ ]	Yes [ ] No [ ]
B7	Procedures for Reply Path	6.5	c.2	[ ]	Yes [ ] No [ ]
B8	Procedures for Short Message Waiting Data	6.5	c.2	[ ]	Yes [ ] No [ ]
B9	Procedures for Concatenated Short Message	6.5	o	[ ]	Yes [ ] No [ ]
B.10	Procedures for Validity Period	6.5	c.1	[ ]	Yes [ ] No [ ]

c.1: If B1 or B2 or B3 then o else N/A

c.2: If B3 or B4 or B5 then o else N/A

A.3.5 Coding

Item	Name of Item	Reference	Status	N/A	Support
C1	Sending of smsSubmit invoke APDU and receipt of return result and return error APDUs	6.5.1	c.3	[ ]	Yes [ ]
C2	Sending of smsCommand invoke APDU and receipt of return result and return error APDUs	6.5.1	c.3	[ ]	Yes [ ]
C3	Receipt of smsStatusReport invoke APDU and sending of return result and return error APDUs	6.5.1	B.6:m	[ ]	Yes [ ]
C4	Sending of smsStatusReport invoke APDU and receipt of return result and return error APDUs	6.5.3	B.6:m	[ ]	Yes [ ]
C5	Receipt of smsSubmit invoke APDU and sending of return result and return error APDUs	6.5.3	B.3:m	[ ]	Yes [ ]
C6	Receipt of smsCommand invoke APDU and sending of return result and return error APDUs	6.5.3	B.3:m	[ ]	Yes [ ]
C7	Sending of smsDeliver invoke APDU and receipt of return result and return error APDUs	6.5.3	B.3:m	[ ]	Yes [ ]
C8	Receipt of scAlert invoke APDU and sending of return result and return error APDUs	6.5.3	B.8:m	[ ]	Yes [ ]
C9	Sending of scAlert invoke APDU and receipt of return result and return error APDUs	6.5.4, 6.5.5	B.8:m	[ ]	Yes [ ]
C10	Receipt of smsDeliver invoke APDU and sending of return result and return error APDUs	6.5.4, 6.5.5	c.4	[ ]	Yes [ ]
C11	Coding of Short Message Text as an IA5String	Annex E	m		Yes [ ]
C12	Coding of Short Message Text as an Octet String	Annex E	o		Yes [ ] No [ ]
C13	Coding of Short Message Text as an BMPString	Annex E	o		Yes [ ] No [ ]
C14	Coding of Short Message Text as Compressed Coded	Annex E	o		Yes [ ] No [ ]
C15	Coding of Validity Period in relative format	Annex E	B10: o.2	[ ]	Yes [ ] No [ ]
C16	Coding of Validity Period in absolute format	Annex E	B10: o.2	[ ]	Yes [ ] No [ ]
C17	Coding of Validity Period in enhanced format	Annex E	B10: o.2	[ ]	Yes [ ] No [ ]

c.3: If B1 or B2 then m else N/A

c.4 If B4 or B5 then m else N/A

A.3.6 Timers

Item	Name of Item	Reference	Status	N/A	Support
D1	Support of Timer T1	6.9.1	m		Yes [ ]
D2	Support of Timer T2	6.9.2	m		Yes [ ]
D3	Support of Timer T3	6.9.3	m		Yes [ ]
D4	Support of Timer T4	6.9.4	o		Yes [ ]
D5	Support of Timer T5	6.9.5	m		Yes [ ]
D6	Support of Timer T6	6.9.6	B.8:m		Yes [ ]
D7	Support of Timer T7	6.9.7	m		Yes [ ]

Annex B

(informative)

Examples of message sequences

This annex describes some typical message flows for SMS. the following conventions are used in the figures of this annex:

1

⟶	Protocol message (call-independent)
⇢	Service primitive to/ from user
xxx.inv	Invoke APDU for operation xxx
xxx.rr	Return result APDU for operation xxx
xxx.re	Return error APDU for operation xxx

2 The figures show messages exchanged via Protocol Control between PINXs involved in SMS. Only messages relevant to SMS are show.

3 Only the relevant information content (i.e. remote operation APDUs) is listed below each message name. The Facility information elements containing remote operation APDUs are not explicitly shown. Information with no impact on SMS is not shown.

B.1 Example message sequence for submission of a Short Message

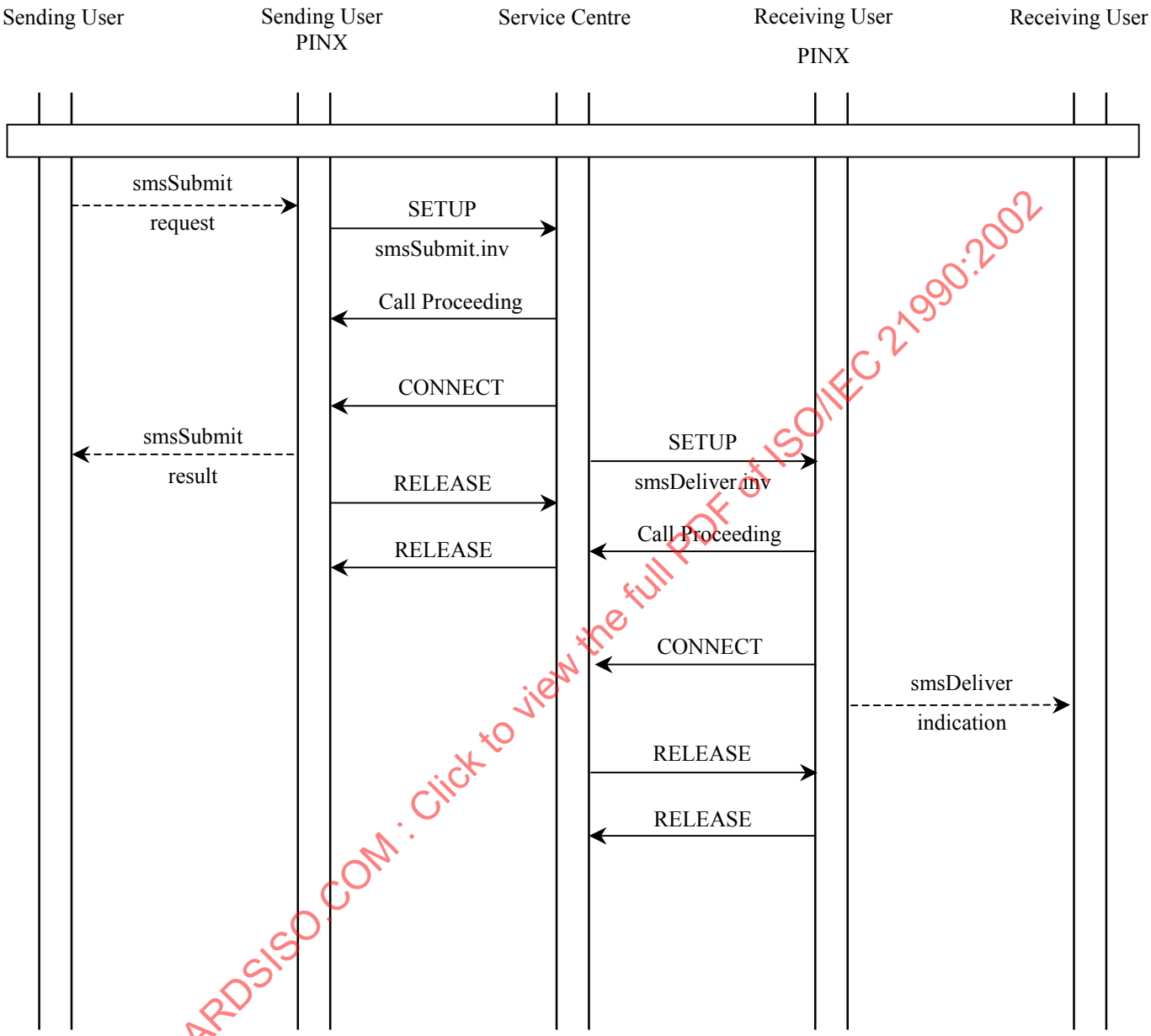


Figure B.1 – Message sequence for submission of a Short Message

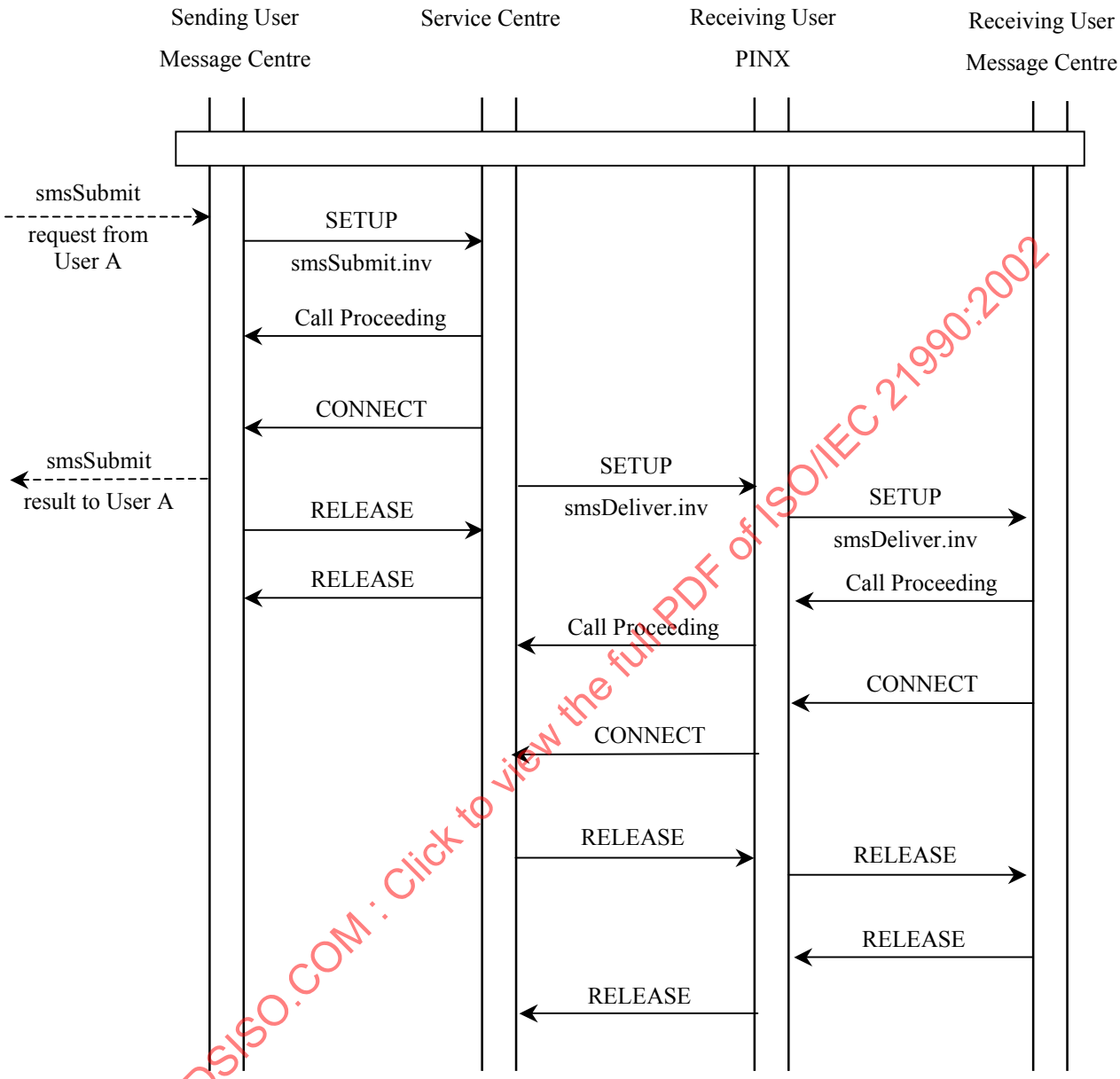


Figure B.2 – Message sequence for submission of a Short Message

B.2 Example message sequence for the submission of a Command

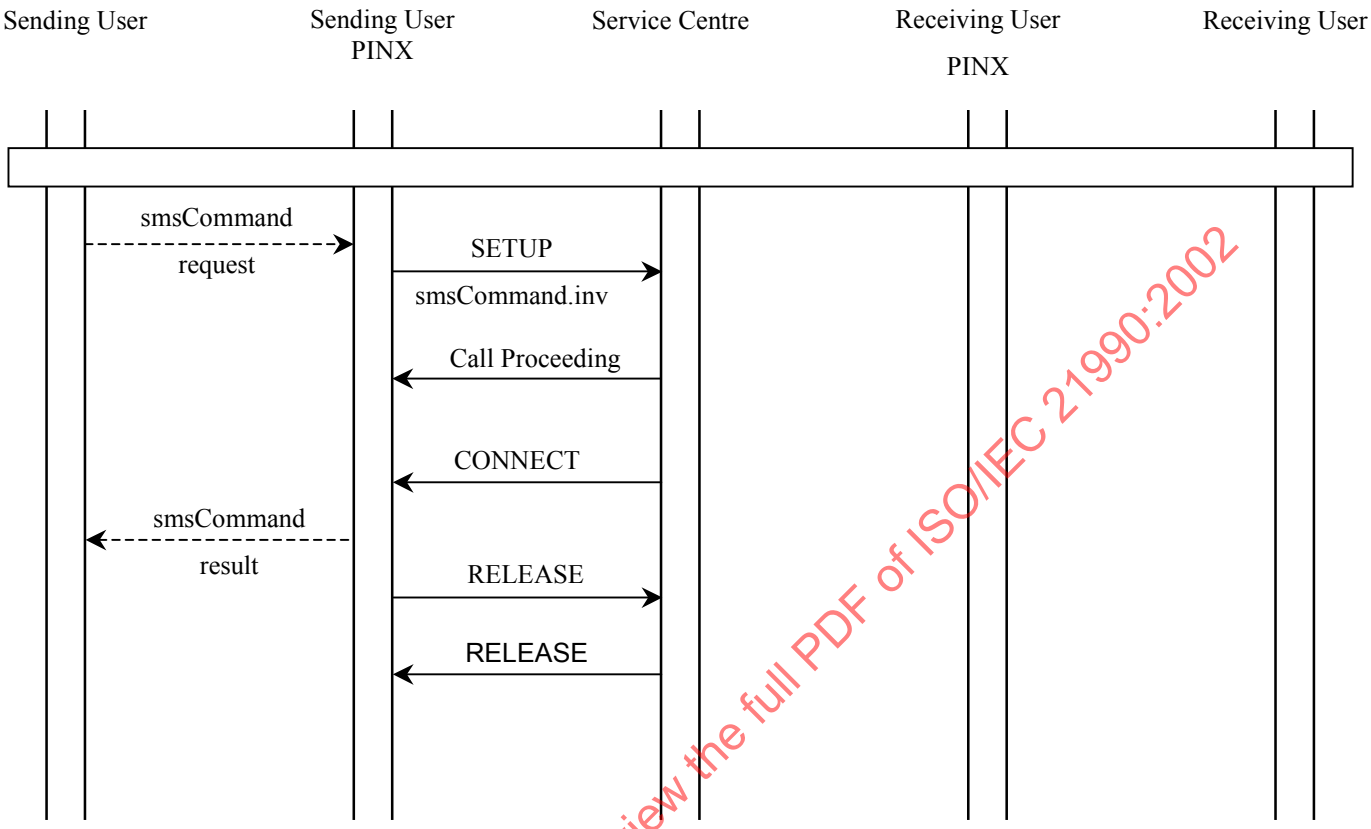


Figure B.3 – Message sequence for submission of a Command

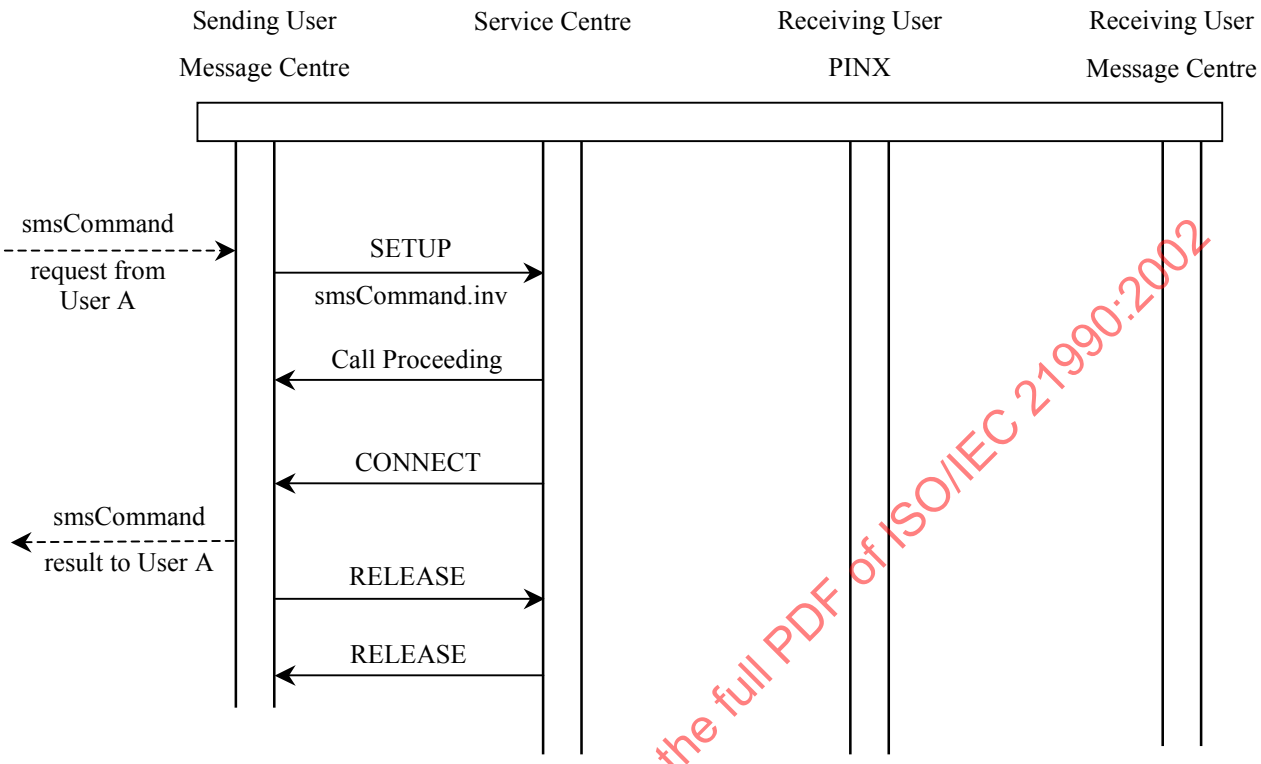


Figure B.4 – Message sequence for submission of a Command

B.3 Message sequence for submission of a Status Report

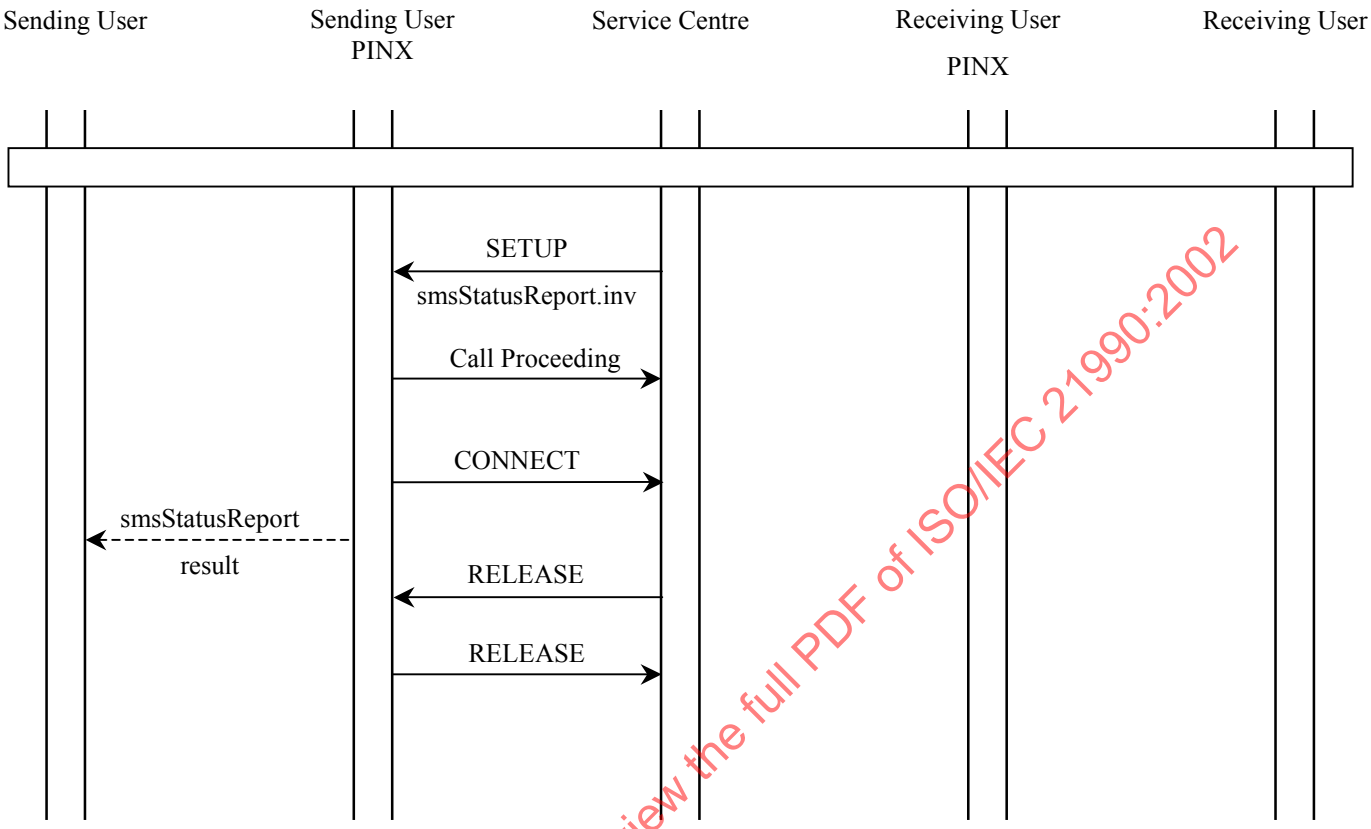


Figure B.5 – Message sequence for submission of a Status Report

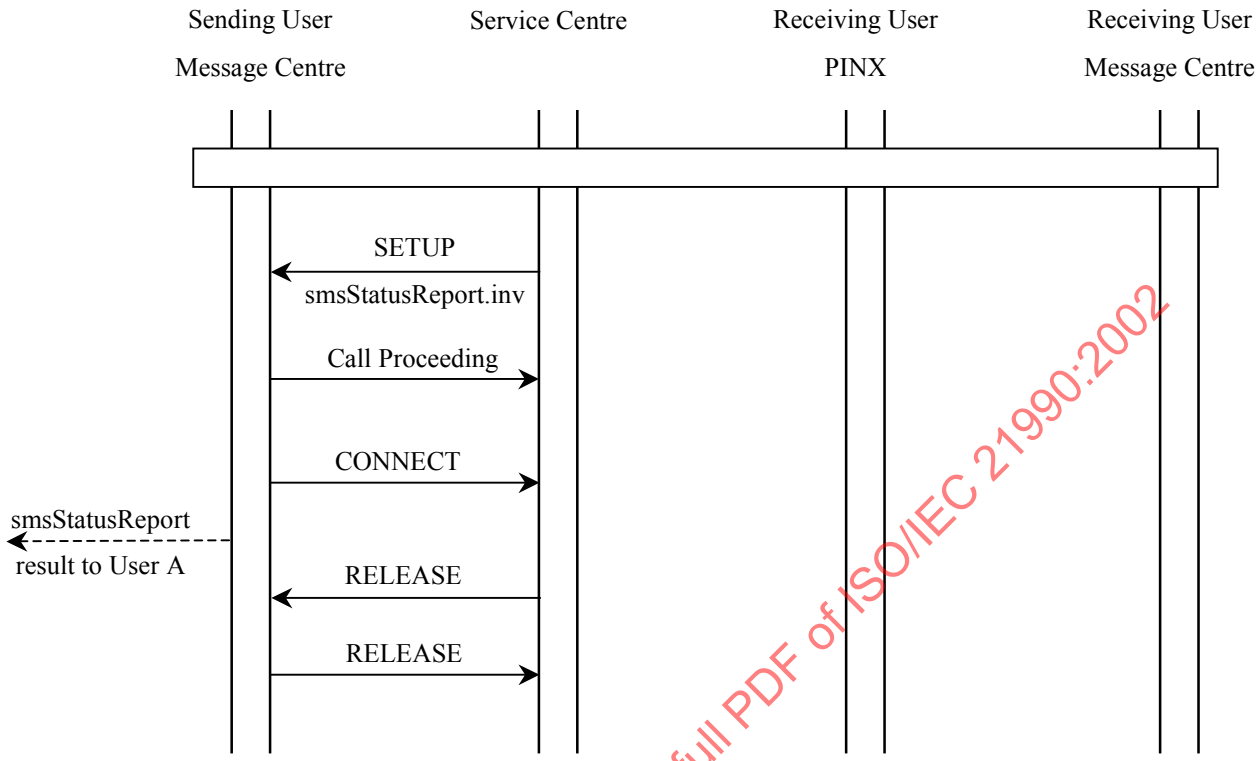
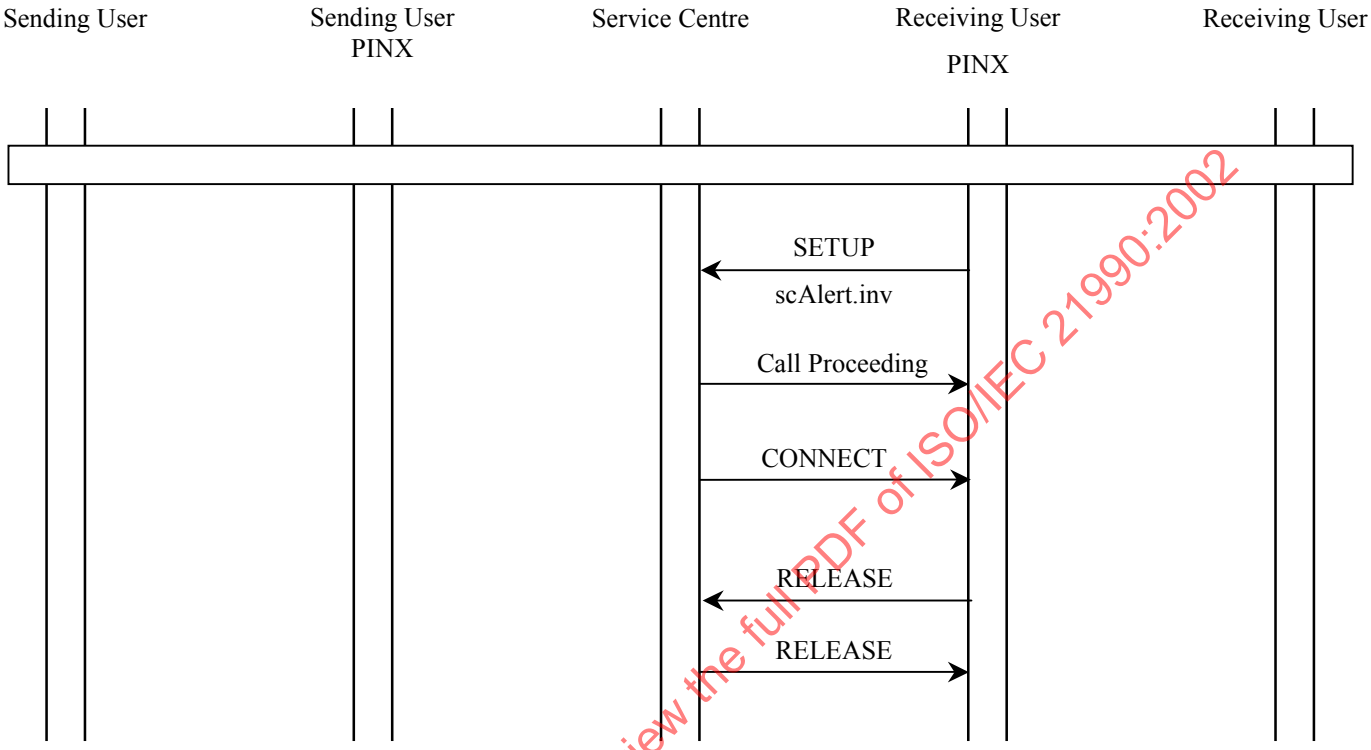


Figure B.6 – Message sequence for submission of a Status Report

B.4 Message sequence for submission of ScAlert

Figure B.7 – Message sequence for submission of ScAlert



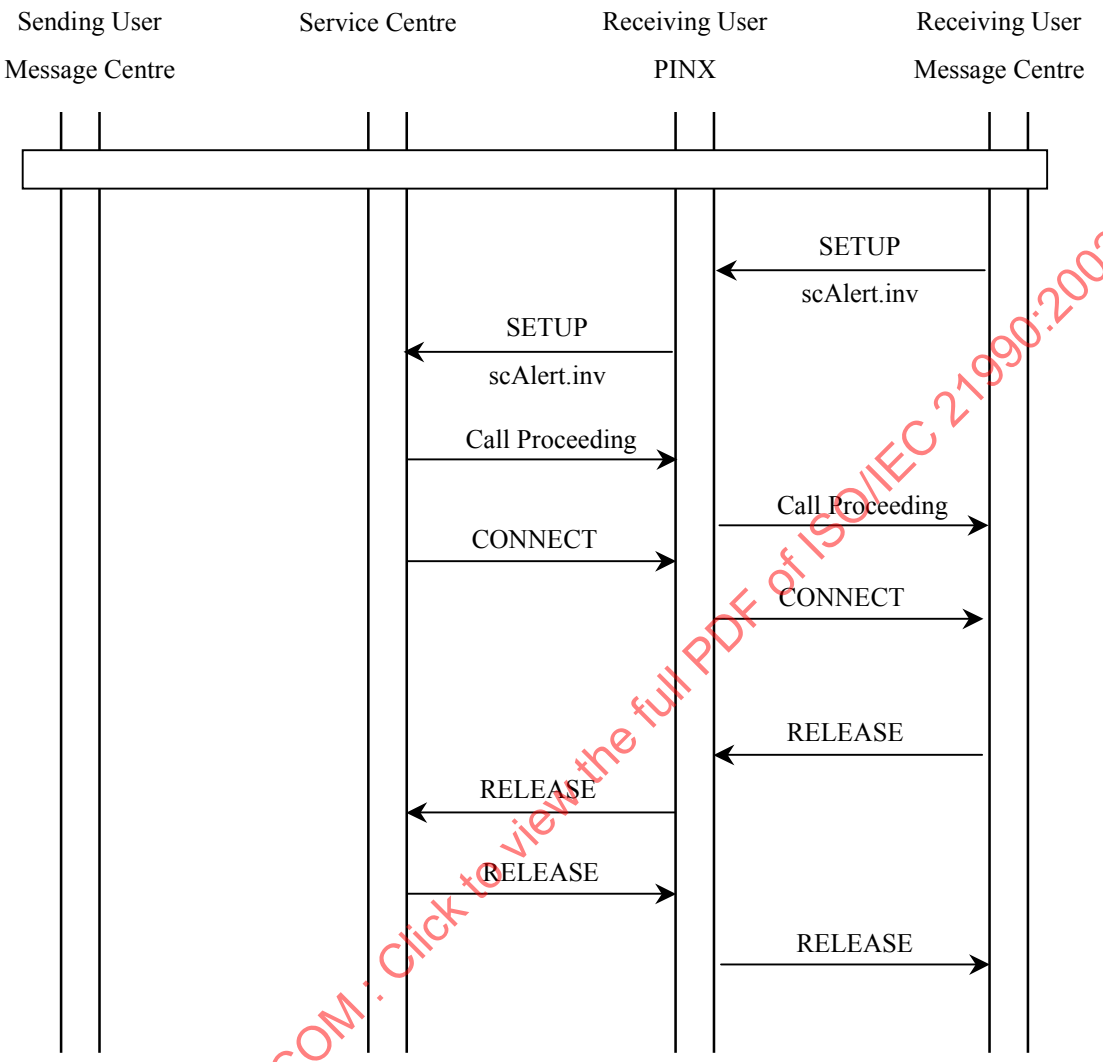


Figure B.8 – Message sequence for submission of an ScAlert

Annex C

(informative)

Specification and Description Language (SDL) representation of procedures

The diagrams in this annex use the Specification and Description language defined in ITU-T Rec. Z.100.

Each diagram represents the behaviour of an SMS Supplementary Service Control entity at a particular type of PINX. In accordance with the protocol model described in ISO/IEC 11582, the Supplementary Service Control entity uses, via the Coordination Function, the services of Generic Functional Transport Control and Basic Call Protocol.

Where an output symbol represents a primitive to the Coordination Function, and that primitive results in a PSS1 message being sent, the output symbol bears the name of the message and any remote operation APDU(s) contained in that message. In case of a message specified in ISO/IEC 11572, basic call actions associated with the sending of that message are deemed to occur.

Where an input symbol represents a primitive from the Coordination Function and that primitive results from a PSS1 message being received, the input symbol bears the name of the message and any remote operation APDU(s) contained in that message. In case of a message specified in ISO/IEC 11572, basic call actions associated with the receiving of that message are deemed to occur.

The following abbreviations are used:

.re	return error APDU
.ind	indication
.inv	invoke APDU
opt.	optional
.rej	reject APDU
.rr	return result APDU

C.1 SDL Representation of SS-SMS at the Sending User PINX

Figure C.1 shows the behaviour of an SMS Supplementary Service Control entity within the Sending User PINX,

- Input signals from the left represent messages received from the Sending User.
- Output signals to the right represent primitives to the Service Centre.

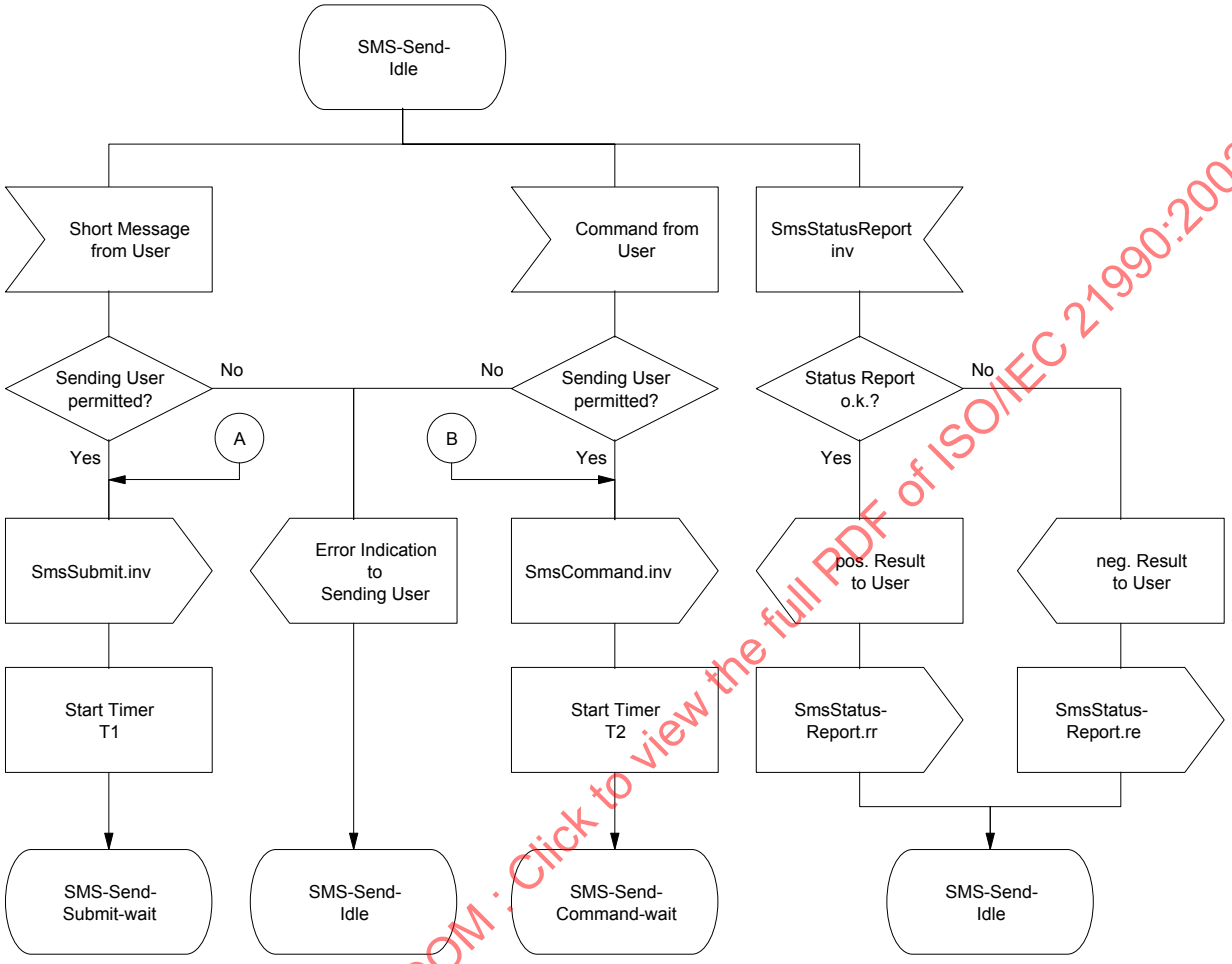


Figure C.1 - Sending User PINX SDL (sheet 1 of 3)

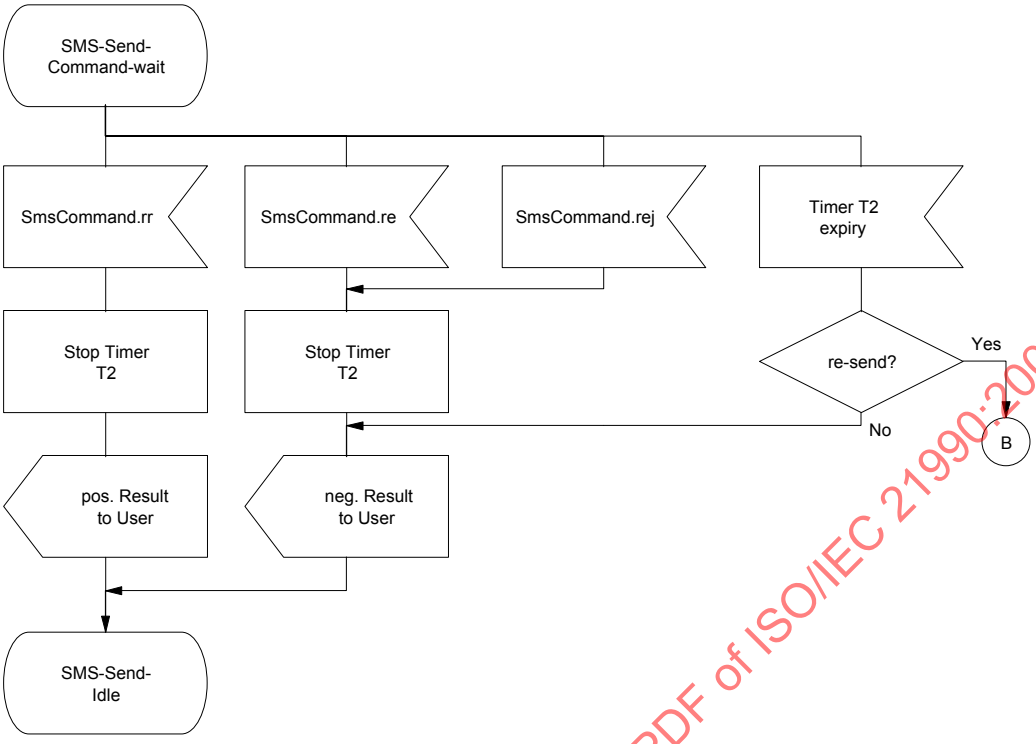


Figure C.1 - Sending User PINX SDL (sheet 2 of 3)

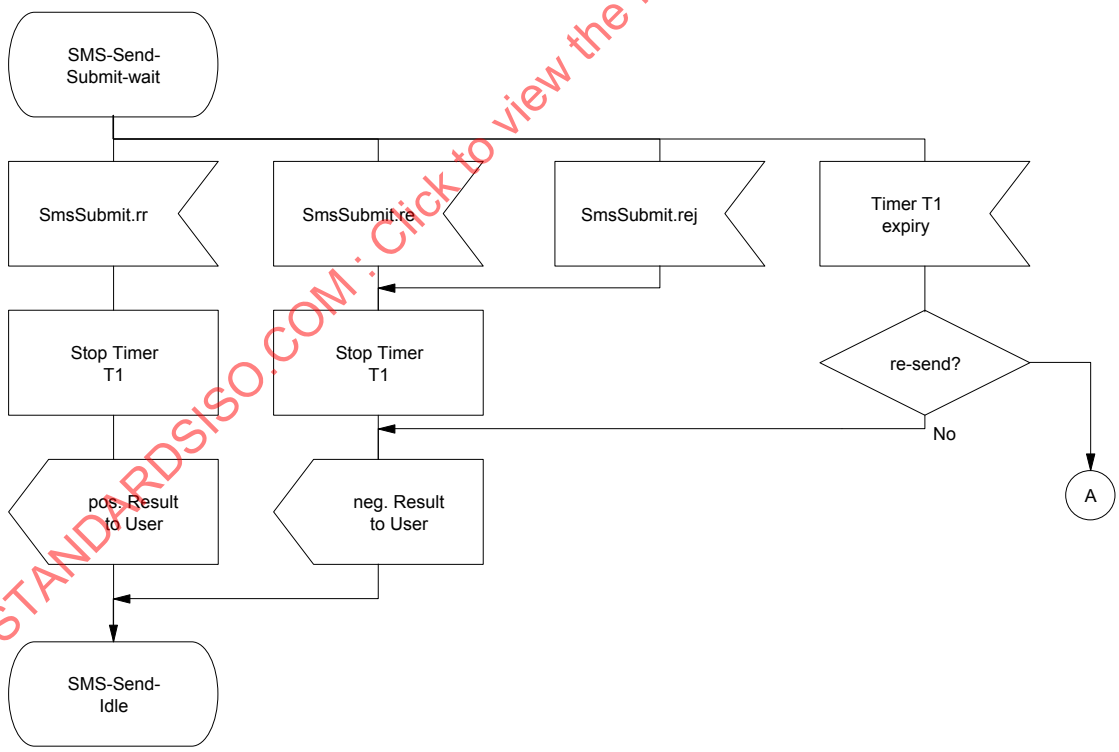


Figure C.1 - Sending User PINX SDL (sheet 3 of 3)

C.2 SDL Representation of SS-SMS at the Sending Message Centre

The SDL diagrams representing the behaviour of the Sending Message Centre are equal to those for the Sending User PINX, see section C.1 in annex C.

C.3 SDL Representation of SS-SMS at the Service Centre

Figure C.2 shows the behaviour of an SMS Supplementary Service Control entity within the Service Centre,

- Input signals from the left represent primitives received from the Sending User PINX or Sending Message Centre,
- Output signals to the right represent primitives sent to the Receiving User PINX.

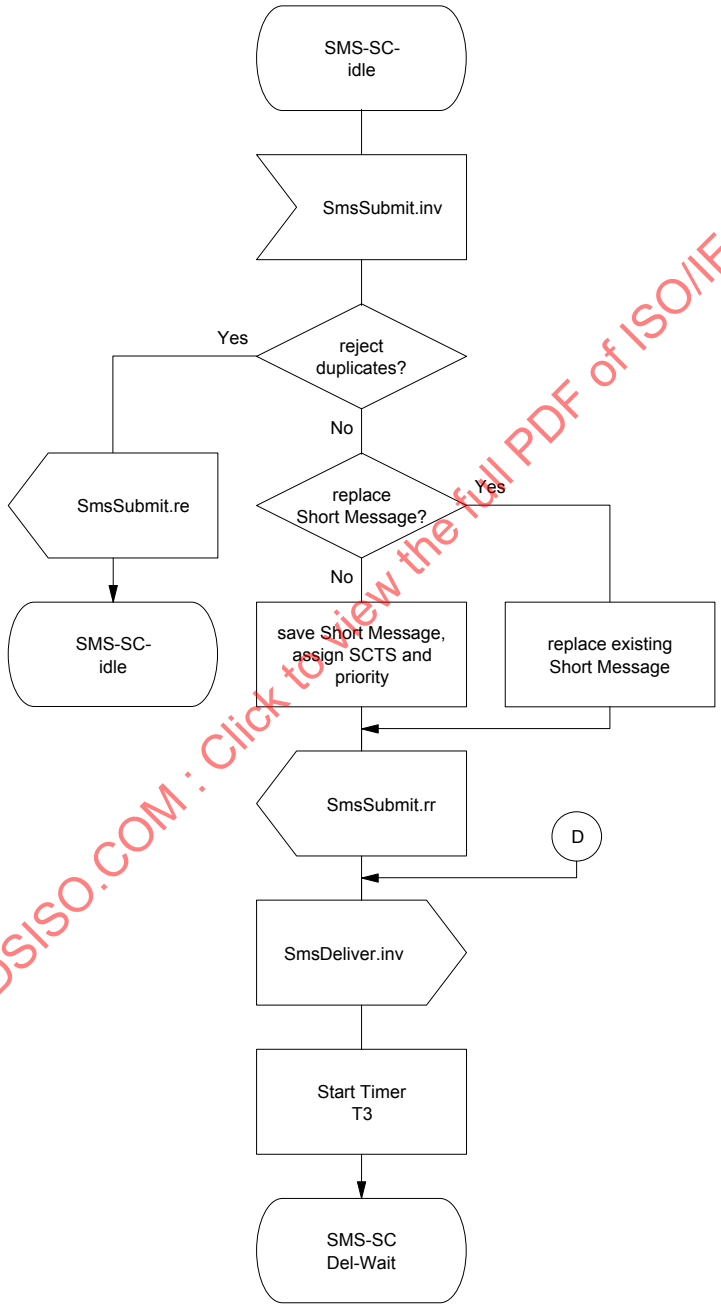


Figure C.2 - Service Centre SDL (sheet 1 of 7)

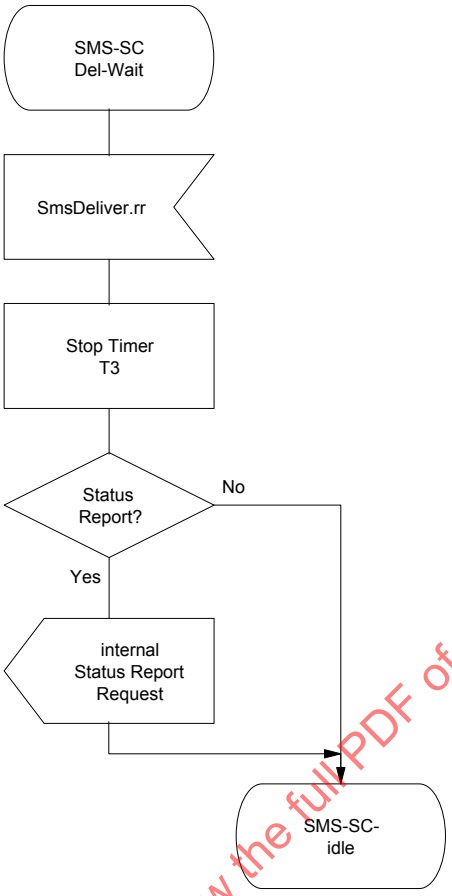


Figure C.2 - Service Centre SDL (sheet 2 of 7)

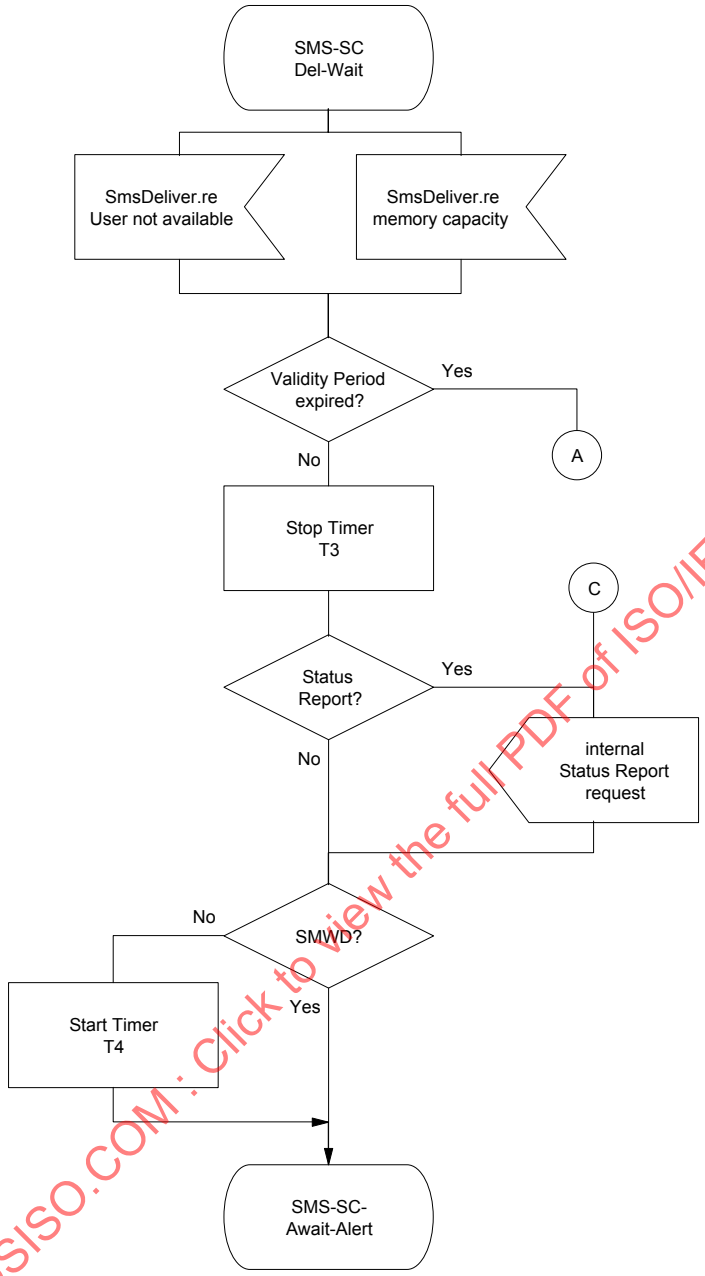


Figure C.2 - Service Centre SDL (sheet 3 of 7)

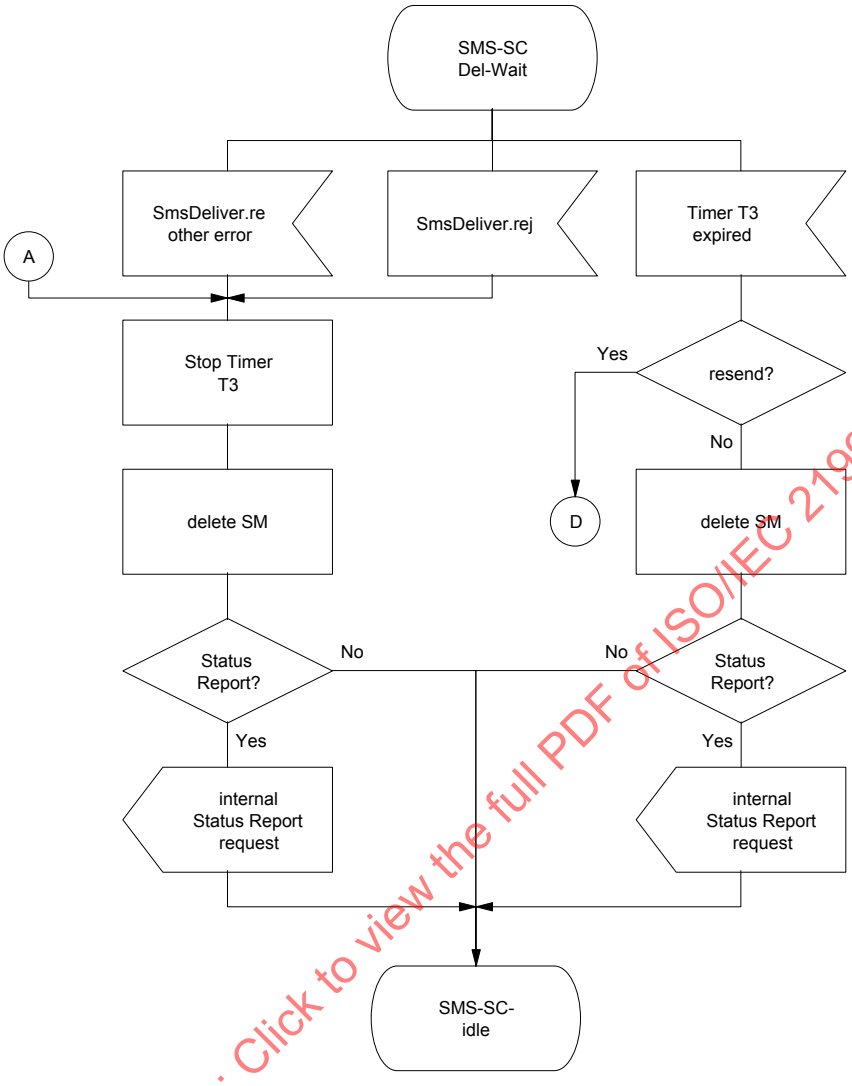


Figure C.2 - Service Centre SDL (sheet 4 of 7)

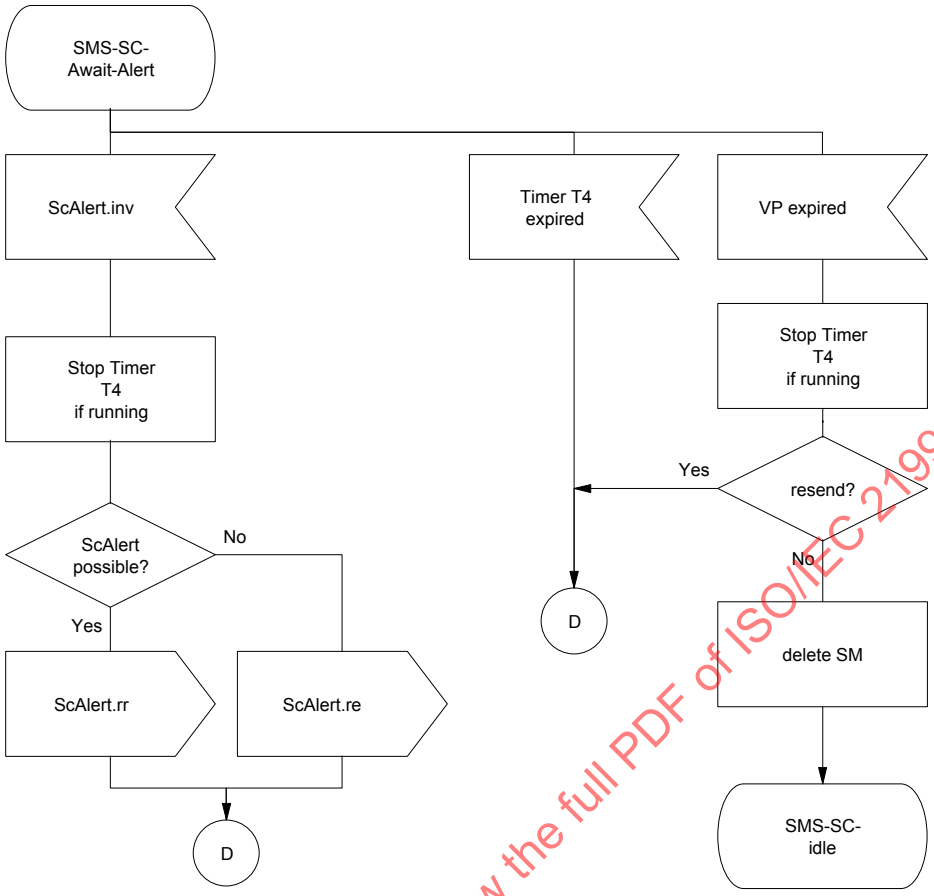


Figure C.2 - Service Centre SDL (sheet 5 of 7)

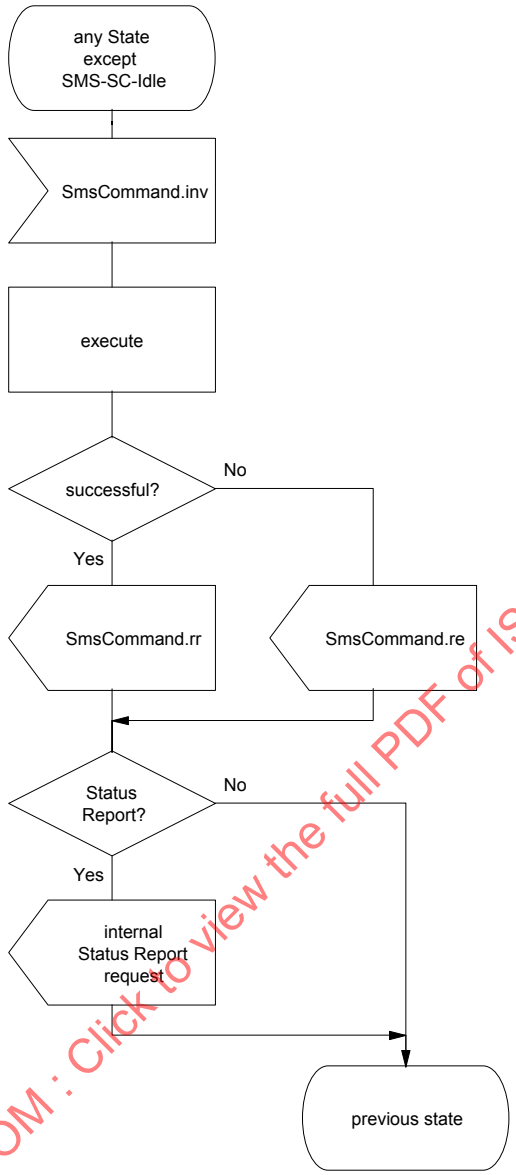


Figure C.2 - Service Centre SDL (sheet 6 of 7)

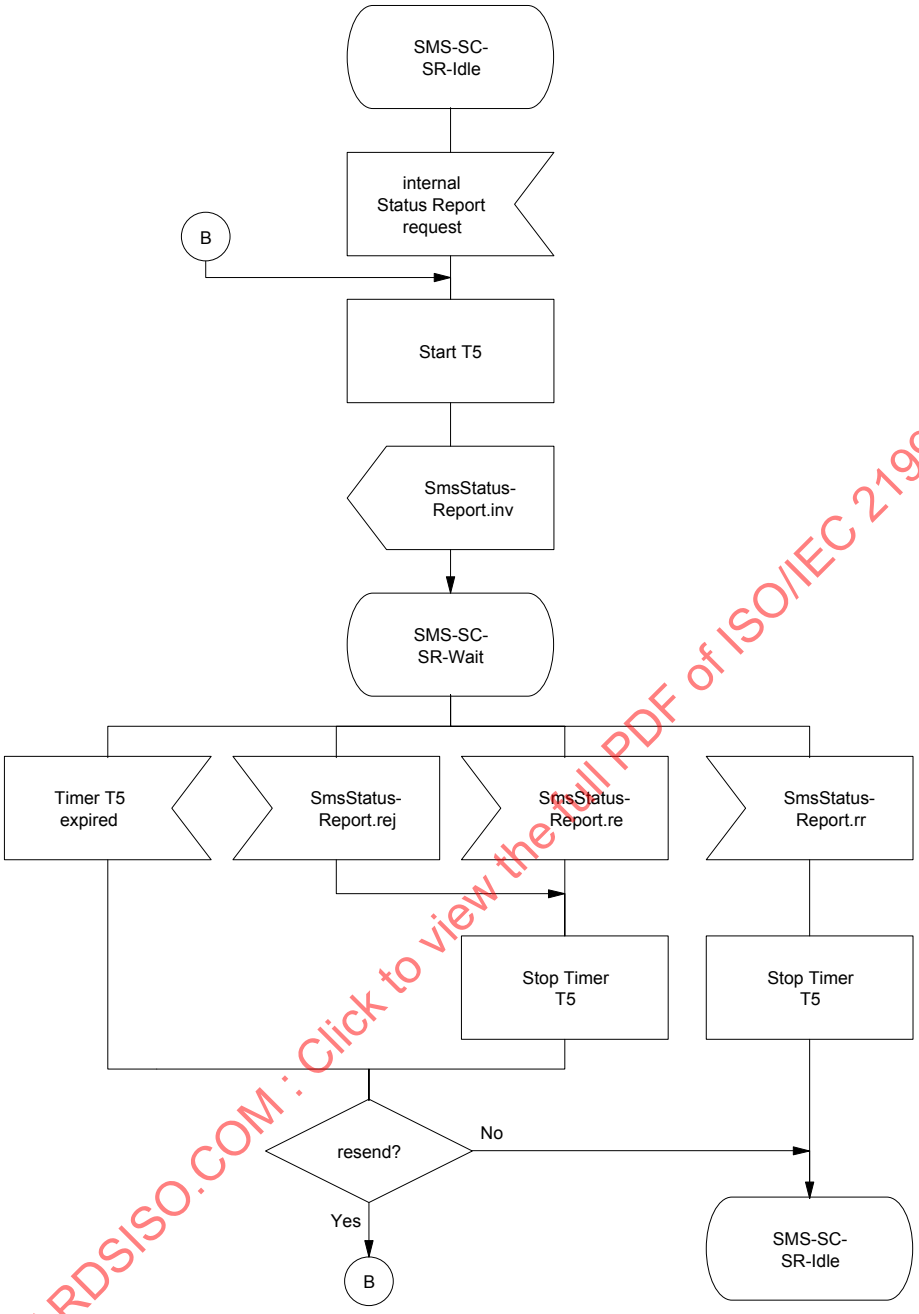


Figure C.2 - Service Centre SDL (sheet 7 of 7)

C.4 SDL Representation of SS-SMS at the Receiving User PINX

C.4.1 Receiving User PINX – Message Centre-case

Figure C.3 shows the behaviour of an SMS Supplementary Service Control entity within the Receiving User PINX,

- Input messages from the left represent primitives received from the Service Centre,
- Output messages to the right represent primitives sent to the Receiving Message Centre.

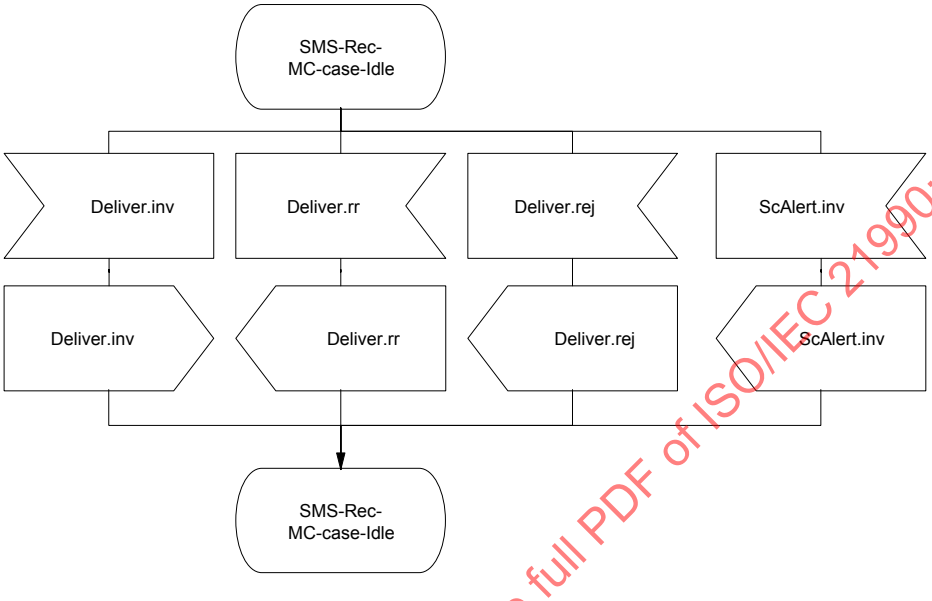


Figure C.3 - Receiving User PINX SDL (sheet 1 of 2)

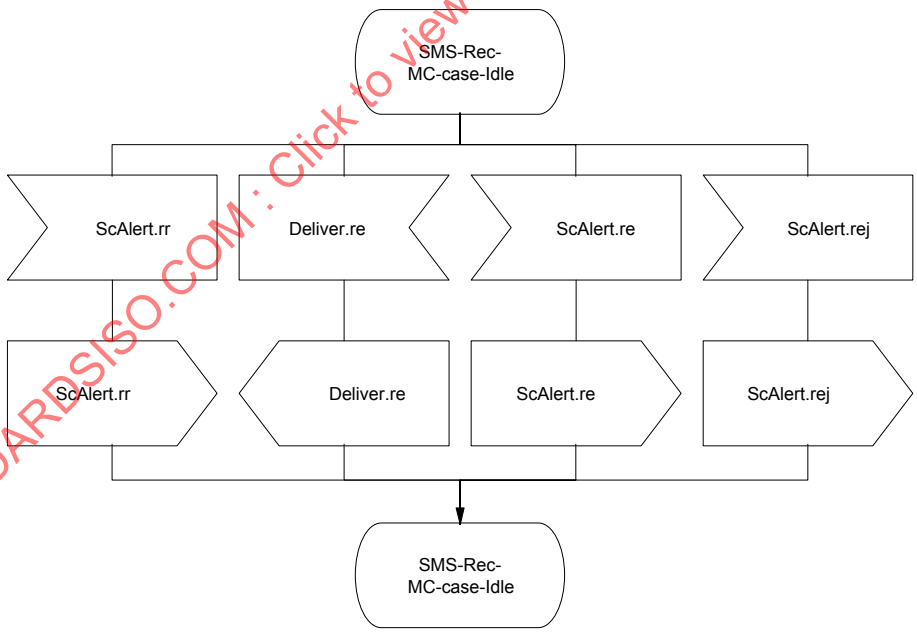


Figure C.3 - Receiving User PINX SDL (sheet 2 of 2)

C.4.2 Receiving User PINX – User Terminal-case

Figure C.4 shows the behaviour of an SMS Supplementary Service Control entity within the Receiving User PINX,

- Input messages from the left represent primitives received from the Service Centre,
- Output messages to the right represent primitives sent to the Receiving User Terminal.

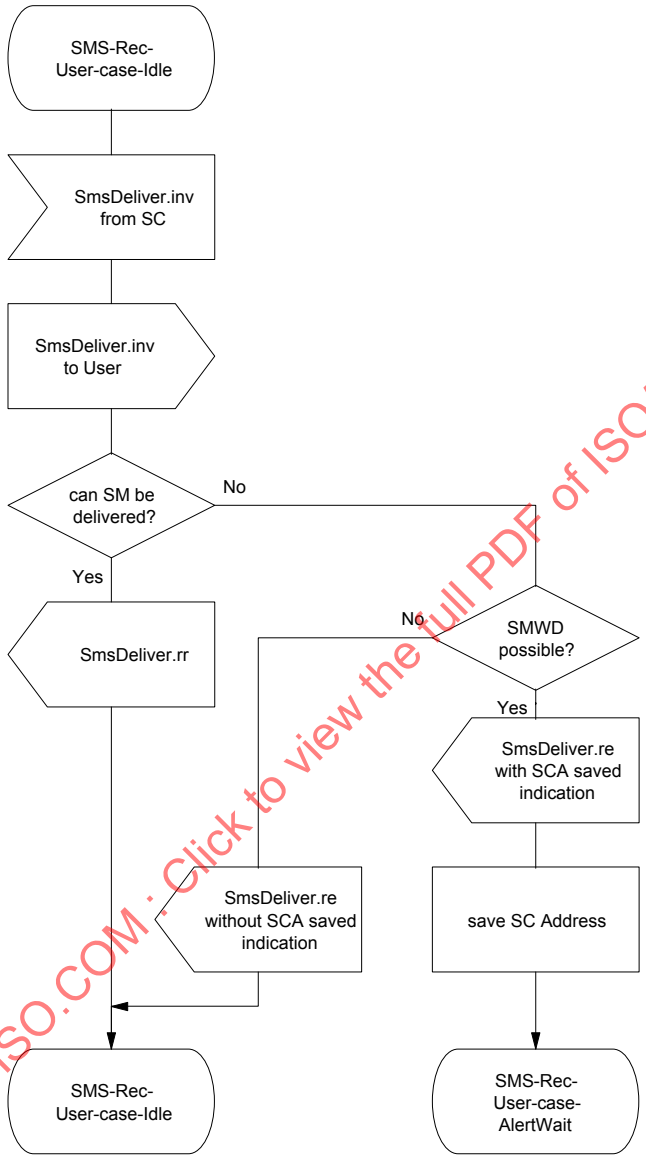


Figure C.4 - Receiving User PINX SDL (sheet 1 of 3)

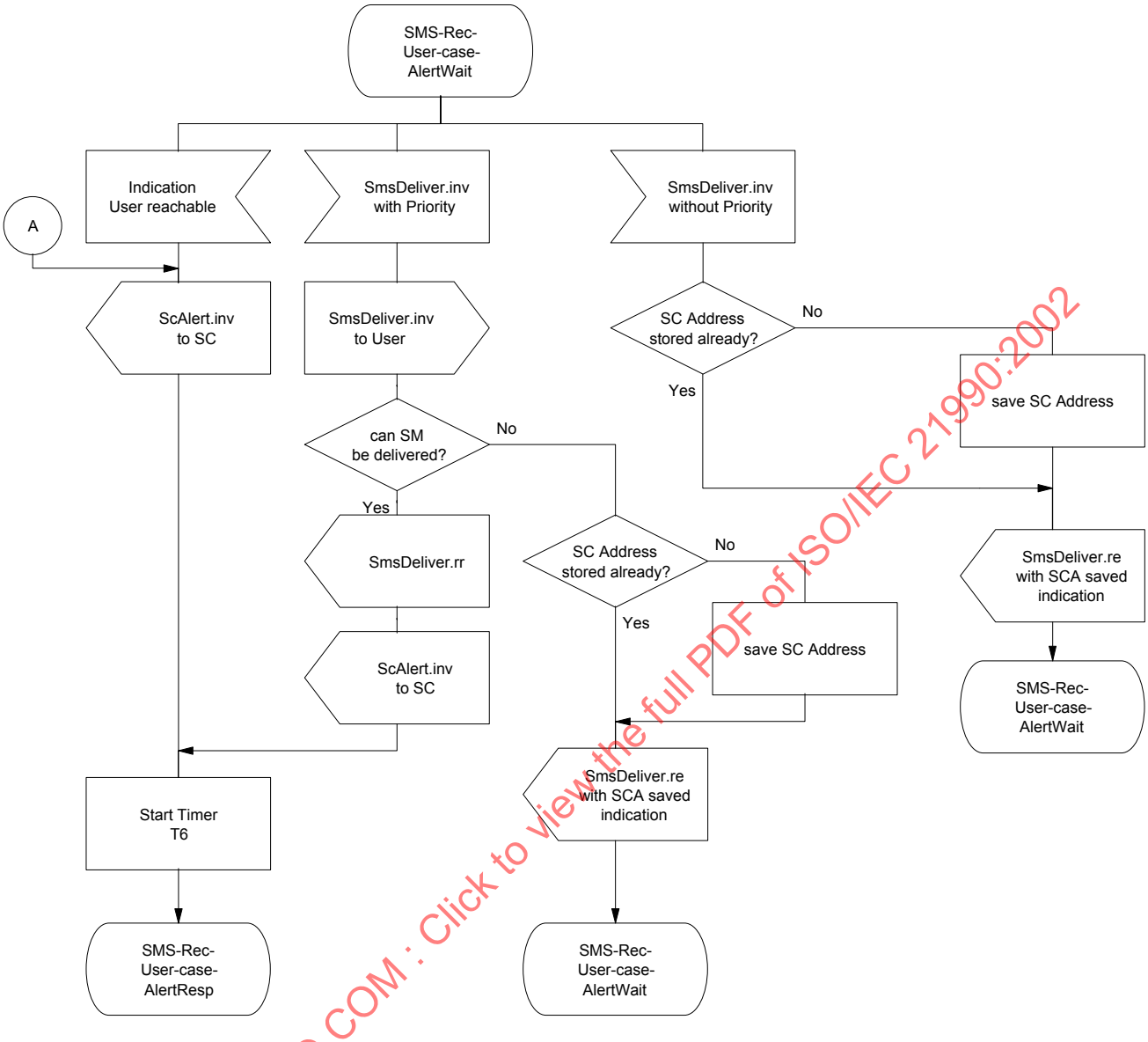


Figure C.4 - Receiving User PINX SDL (sheet 2 of 3)

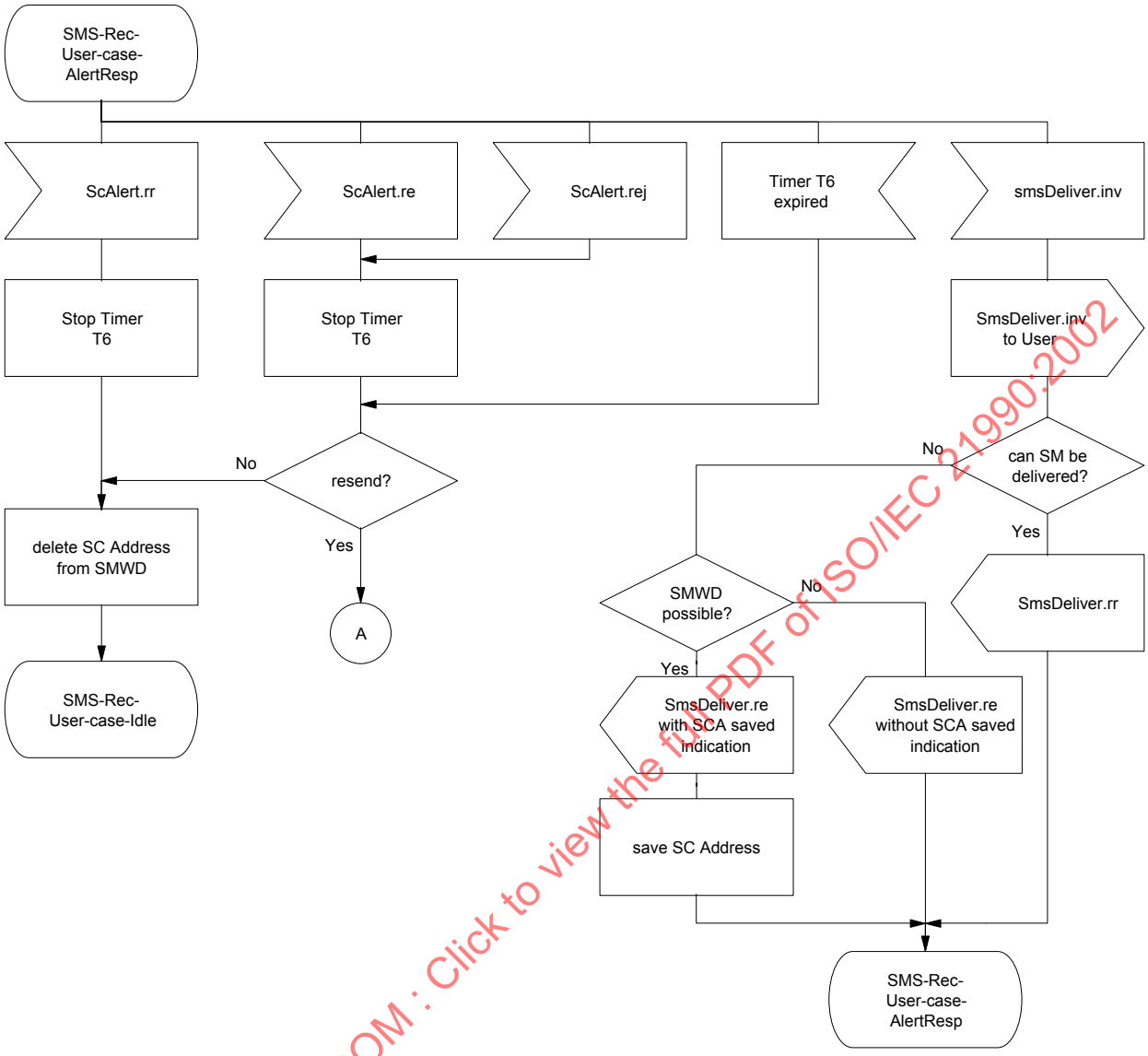


Figure C.4 - Receiving User PINX SDL (sheet 3 of 3)

C.5 SDL Representation of SMS at the Receiving Message Centre

Figure C.5 shows the behaviour of an SMS Supplementary Service Control entity within the Receiving Message Centre,

- Input messages from the left represent primitives received from Receiving User PINX,
- Output messages to the right represent primitives sent to the Receiving User Terminal.

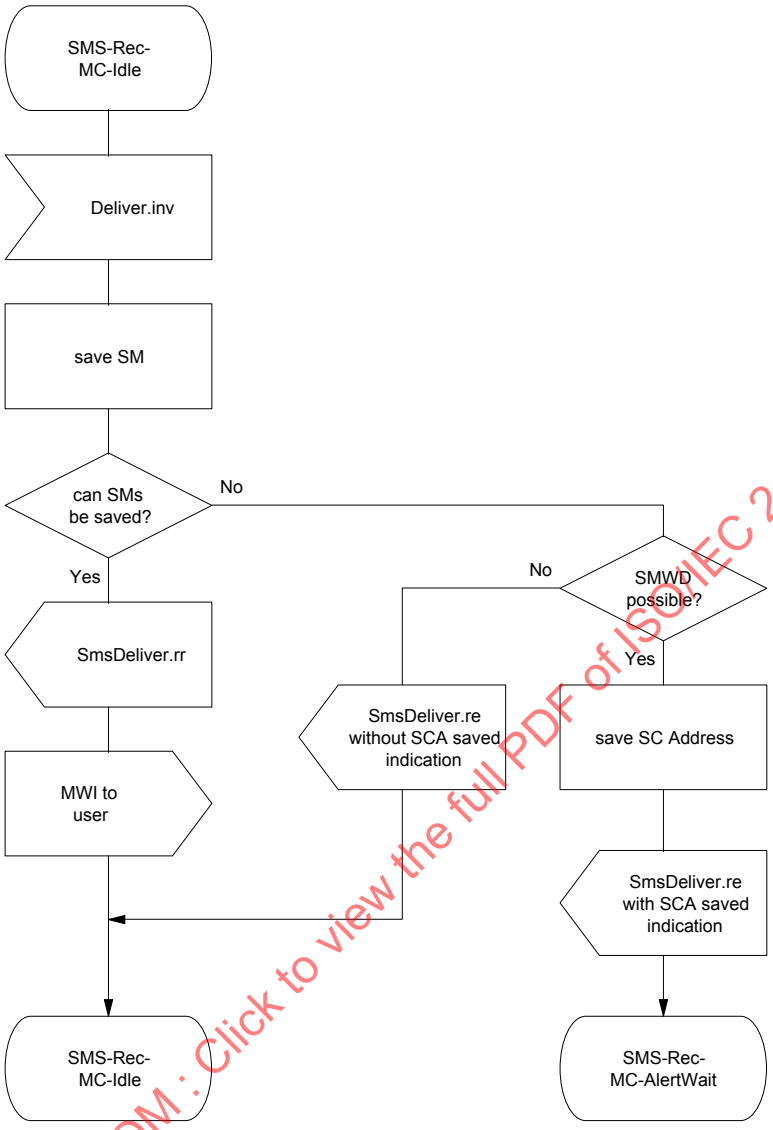


Figure C.5 - Receiving Message Centre SDL (sheet 1 of 3)

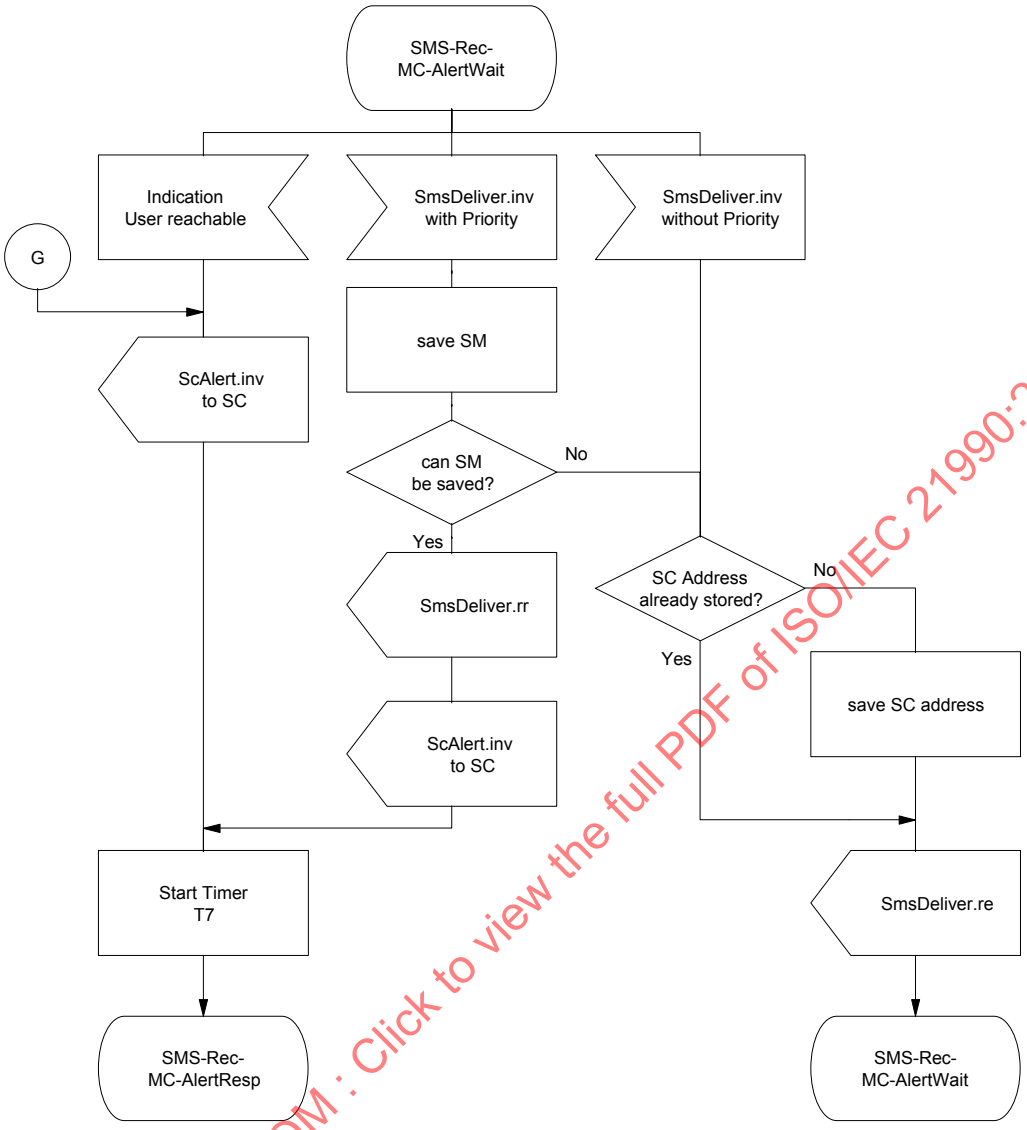


Figure C.5 - Receiving Message Centre SDL (sheet 2 of 3)

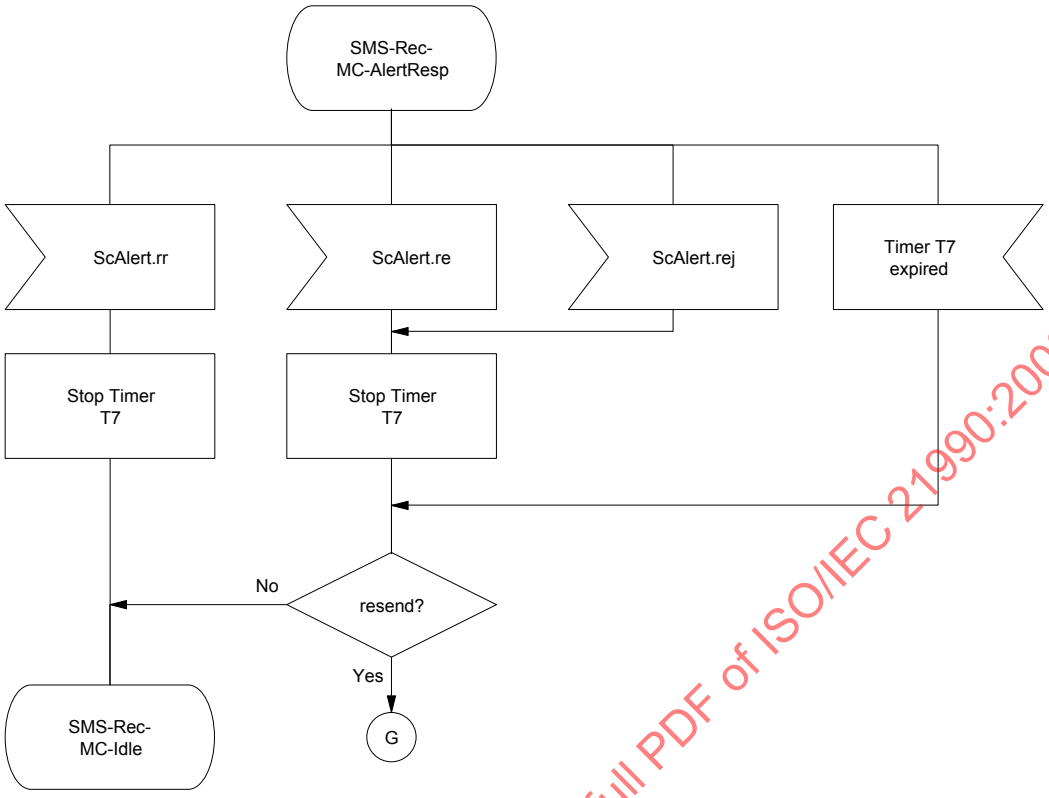


Figure C.5 - Receiving Message Centre SDL (sheet 3 of 3)

Annex D

(informative)

Mapping of QSIG-PDUs on GSM-PDUs

D.1 smsSubmit invoke APDU

smsSubmit invoke APDU (QSIG)	**SmsSubmit (GSM)**
Calling Party Number Information Element	RP-Originating-Address (RP-OA) 1 Octet Address-Length 1 Octet Type-of-Address 1-n Octet Address-Value
Called Party Number Information Element	RP-Destination-Address (RP-DA) –SCA see RP-OA
SmsSubmitArg of smsSubmit invoke APDU	
DestinationAddress	TP-Destination-Address (TP-DA) see RP-OA
OriginatingAddress	RP-Originating-Address (RP-OA) see RP-OA
MessageReference	TP-Message-Reference (TP-MR) 1 Octet (0..255)
SmsSubmitParameter	
ProtocolIdentifier	TP-Protocol-Identifier (TP-PID) 1 Octet section 9.2.3.9 ETSI TS 100 901
ValidityPeriod	TP-Validity-Period (TP-VP)
ValidityPeriodRel	1 Octet
ValidityPeriodAbs	7 Octets
ValidityPeriodEnh	7 Octets
singleShotSM	
enhanceVP	
validityPeriodRel	relative case, see above
validityPeriodSec	0..255 seconds
validityPeriodSemi	as Service-Centre-Time-Stamp
StatusReportRequest	TP-Status-Report-Request (TP-SRR) 1 Bit
ReplyPath	TP-Reply-Path (TP-RP) 1 Bit
RejectDuplicates	TP-Reject-Duplicates (TP-RD) 1 Bit
UserData	TP-User-Data (TP-UD)
UserDataHeader	
UserDataHeaderChoice	
smscControlParameterHeader	IEI SMSC Control Parameter 1 Octet
concatenated8BitSMHeader	IEI Concatenated SM, 8-bit Reference
concatenated8BitSM-ReferenceNumber	1 Octet
maximumNumberOf8Bit-SMInConcatenatedSM	1 Octet
sequenceNumberof8BitSM	1 Octet

concatenated16BitSMHeader	IEI Concatenated SM, 16-bit Reference
concatenated16BitSM-ReferenceNumber	2 Octet
maximumNumberOf16Bit-SMInConcatenatedSM	1 Octet
sequenceNumberof16BitSM	1 Octet
applicationPort8BitHeader	IEI Application port addressing scheme
destination8BitPort	1 Octet
originator8BitPort	1 Octet
applicationPort16BitHeader	IEI Application port addressing scheme
destination16BitPort	2 Octet
originator16BitPort	2 Octet
dataHeaderSourceIndicator	1 Octet
OriginalSender	
OriginalReceiver	
SMSC	
wirelessControlHeader	1-n Octet(s)
GenericUserValue	
parameterValue	
genericUserData	
Class	TP-Data-Coding-Scheme (TP-DCS)
Compressed	1 Bit
ShortMessageText	
shortMessageTextType	TP-Data-Coding-Scheme (TP-DCS)
iA5Coded	
octetCoded	
uniCoded	
compressedCoded	
shortMessageTextData	TP-User-Data
SmsExtension CHOICE{	not mappable
Extension	
SEQUENCE OF EXTENSION}	

D.2 smsDeliver invoke APDU

smsDeliver invoke APDU (QSIG)	**SmsDeliver (GSM)**
Calling Party Number Information Element	RP-Originating-Address (RP-OA) - SCA 1 Octet Address-Length 1 Octet Type-of-Address 1-n Octet Address-Value
Called Party Number Information Element	RP-Destination-Address (RP-DA) see RP-OA
SmsDeliverArg of smsDeliver invoke APDU	
OriginatingAddress	TP-Originating-Address (TP-OA) see RP-OA
DestinationAddress	TP-Destination-Address (TP-DA) see RP-OA
OriginatingName	not mappable
SmDeliverParameter	
ProtocolIdentifier	TP-Protocol-Identifier (TP-PID)
ServiceCentreTimeStamp	TP-Service-Centre-Time-Stamp (TP-SCTS)
Priority	RP-Priority-Request (RP-PRI)
MoreMessagesToSend	TP-More-Messages-To-Send (TP-MMS)
StatusReportIndication	TP-Status-Report-Indication (TP-SRI)

ReplyPath	TP-Reply-Path (TP-RP)
UserData	as described in section D.1 in annex D
smsExtension CHOICE{	not mappable
Extension	
SEQUENCE OF EXTENSION}	

D.3 smsStatusReport invoke APDU

smsStatusReport invoke APDU (QSIG)	**SmsStatusReport (GSM)**
Calling Party Number Information Element	RP-Originating-Address (RP-OA) - SCA 1 Octet Address-Length 1 Octet Type-of-Address 1-n Octet Address-Value
Called Party Number Information Element	RP-Destination-Address (RP-DA) see RP-OA
SmsStatusReportArg of smsStatusReport invoke APDU	
MessageReference	TP-Message-Reference (TP-MR)
ServiceCentreTimeStamp	TP-Service-Centre-Time-Stamp (TP-SCTS)
DischargeTime	TP-Discharge-Time (TP-DT)
RecipientAddress	TP-Recipient-Address (TP-RA)
RecipientName	not mappable
DestinationAddress	
Status	TP-Status (TP-ST)
priority	RP-Priority-Request (RP-PRI)
MoreMessagesToSend	TP-More-Messages-To-Send (TP-MMS)
StatusReportQualifier	TP-Status-Report-Qualifier (TP-SRQ)
ProtocolIdentifier	TP-Protocol-Identifier (TP-PID)
UserData	as described in D.1 in annex D
SmsExtension CHOICE{	not mappable
Extension,	
Sequence of Extension}	

D.4 smsCommand invoke APDU

smsCommand invoke APDU (QSIG)	**SmsCommand (GSM)**
SmsCommandArg	
destinationAddress	TP-Destination-Address (TP-DA)
messageReference	TP-Message-Reference (TP-MR)
messageNumber	TP-Message-Number (TP-MN)
protocolIdentifier	TP-Protocol-Identifier (TP-PID)
commandType	TP-Command-Type (TP-CT)
commandData	TP-Command-Data (TP-CD)
statusReportRequest	TP-Status-Report-Request (TP-SRR)
smsExtension CHOICE{	
Extension,	
Sequence of Extension}	