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Technical Specification

Digital cellular telecommunications system (Phase 2+); Example protocol stacks for interconnecting Cell Broadcast Centre (CBC) and Base Station Controller (BSC) (GSM 03.49 version 6.1.0 Release 1997)

Reference
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ETSI

Postal address
F-06921 Sophia Antipolis Cedex - FRANCE

Office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16
Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet
secretariat@etsi.fr
http://www.etsi.fr
http://www.etsi.org

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Foreword

This ETSI Technical Specification (TS) has been produced by the Special Mobile Group (SMG) of the European Telecommunications Standards Institute (ETSI).

This TS specifies three alternative approaches to the specification of protocol stacks of communication protocols for the purpose of fulfilling the service requirements of the primitives specified for the CBC - BSC interface in GSM 03.41 within the digital cellular telecommunications system (Phase 2/Phase 2+).

The contents of this TS are subject to continuing work within SMG and may change following formal SMG approval. Should SMG modify the contents of this TS it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version 6.x.y

where:

6 indicates GSM Release 1997 of Phase 2+

x the second digit is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

y the third digit is incremented when editorial only changes have been incorporated in the specification.

Introduction

The present document includes references to features which were introduced into the GSM Technical specifications after Release 96 of GSM Phase 2+. The text that is relevant, if the feature is supported, is marked with designators.

The following table lists all features that were introduced after Release 96 and have impacted this specification:

Feature	Designator
In Phase 2+ systems the Restart-Ind, Failure-Ind and Set-DRX-Resp PDUs supply consistent cell-list formats from the BSC.	$(Phase2PBscCellLists)$

1 Scope

No mandatory protocol between the Cell Broadcast Centre (CBC) and the Base Station Controller (BSC) is specified by GSM; this is a matter of agreement between CBC and PLMN operators.

This Technical Specification (TS) specifies three alternative approaches to the specification of protocol stacks of communication protocols for the purpose of fulfilling the service requirements of the primitives specified for the CBC - BSC interface in GSM 03.41.

One approach is based upon the use of the complete OSI reference model (see X.200), another approach is based upon the use of only the lower 3 OSI layers, and another approach is based upon the use of CCITT Signalling System No. 7 (see Q.700).

Specifications are based upon individual contributions. Any judgement concerning functionality, completeness and advantages/disadvantages of implementation is intentionally omitted.

1.1 References

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[2] GSM 03.41: "Digital cellular telecommunications system (Phase 2+); Technical realization of Short Message Service Cell Broadcast (SMSCB)".

[3] GSM 12.20: "Digital cellular telecommunication system (Phase 2); Network Management (NM) procedures and messages".

[4] CCITT Recommendation Q.700: "Introduction to CCITT Signalling System No.7".

[5] CCITT Recommendation Q.931: Integrated services digital network.(ISDN) User-Network interface layer 3 specification for basic control".

[6] CCITT Recommendation Q.932: "Generic procedures for the control of ISDN supplementary services".

[7] CCITT Recommendation Q.941: "ISDN user-network interface protocol profile for management".

[8] CCITT Recommendation Q.1400: "Architecture framework for the development of signalling and organisation, administration and maintenance protocols using OSI concepts".

[9] CCITT Recommendation X.2 (1988): "International data transmission services and optional user facilities in public data networks and ISDNs".

[10] CCITT Recommendation X.200: "Reference Model of Open Systems Interconnection for CCITT Applications".

[11] CCITT Recommendation X.213: "Information technology - Network service definition for Open Systems Interconnection".

[12] CCITT Recommendation X.215: "Session service definition for open systems interconnection for CCITT applications".

[13] CCITT Recommendation X.217: "Association control service definition for open systems interconnection for CCITT applications".

[14] CCITT Recommendation X.219: " Remote operations: model, notation and service definition".

[15] CCITT Recommendation X.225: "Session protocol specification for Open Systems Interconnection for CCITT Applications".

[16] CCITT Recommendation X.227: "Information technology - Open Systems Interconnection - protocol specification for the association".

[17] CCITT Recommendation X.229: "Remote operations Protocol specification".

[18] GSM 10.01: "Digital cellular telecommunication system (Phase 2+); GSM features and releases"

1.2 Abbreviations

Abbreviations used in this TS are listed in GSM 01.04.

2 A protocol stack which utilises an application-network layer convergence function for interconnecting CBC and BSC

A convergence function (see Draft CCITT Recommendation Q.941 Report R 22 May 1990) which maps an application entity protocol directly to the Network Layer service defined by X.213 can provide a practical alternative to ACSE, ROSE and OSI layers 6, 5 and 4.

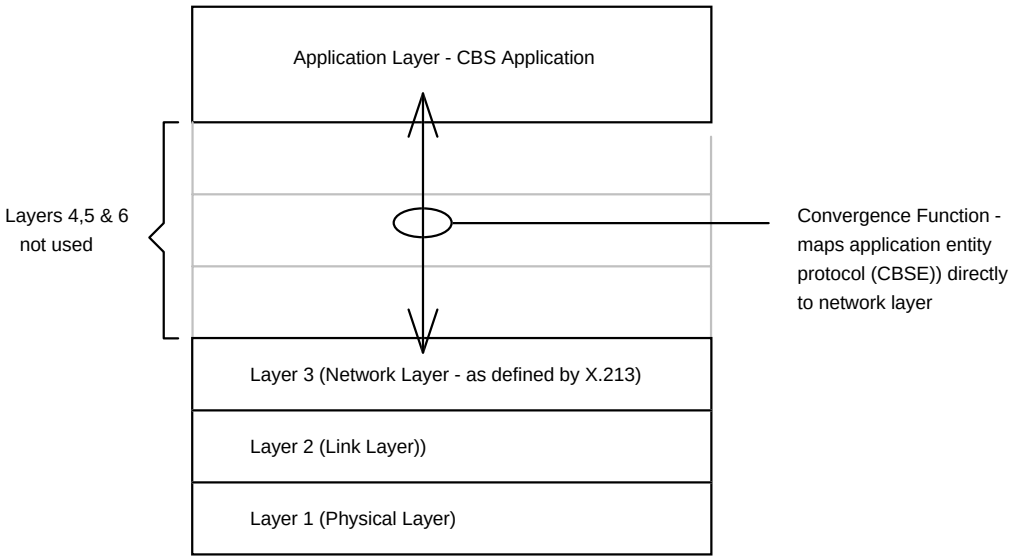


Figure 1

Draft CCITT Recommendation Q.941 proposes to map application layer protocols ACSE and ROSE via a convergence function to network layers defined by CCITT Recommendations Q.931 and Q.932.

The complexity of dealing with the many different network layer protocols is avoided by mapping the application protocols to the Network Layer Service defined by X.213. ACSE and ROSE are specifically defined in terms of the full

OSI stack. The use of ACSE and ROSE is avoided by incorporating the functionality provided by ACSE and ROSE into the CBS protocol. The convergence function is embedded in the CBS protocol.

2.1 CBSE Definition

The Cell Broadcast Short Message Service Element (CBSE) is defined in terms of the following service:

CBSE-BIND

This operation must be invoked by the party which is responsible for establishing the application association; only after the application association has been established may the remaining CBSE services be used. This operation reports either success (via CBSE-Bind-Confirm) or failure (via CBSE-Bind-Failure).

CBSE-BIND will be mapped to/from N-CONNECT request/indication with CBSE-BIND parameters carried in NS-user-data (if the network layer does not support NS-user-data of 128 octets then CBSE-BIND parameters may be carried by the first N-DATA request/indication following establishment of the network layer connection - see subclause 2.4).

This operation is retained for backward compatibility with Phase 2 systems.

NOTE: This PDU should be used in the case of a Phase 2+ entity communicating with a Phase 2 entity.

CBSE-VBIND

This operation must be invoked by the party which is responsible for establishing the application association; only after the application association has been established may the remaining CBSE services be used. This operation reports either success (via CBSE-Bind-Confirm) or failure (via CBSE-Bind-Failure).

CBSE-VBIND will be mapped to/from N-CONNECT request/indication with CBSE-VBIND parameters carried in NS-user-data (if the network layer does not support NS-user-data of 128 octets then CBSE-VBIND parameters may be carried by the first N-DATA request/indication following establishment of the network layer connection - see subclause 2.4).

This operation is used in Phase 2+ systems.

CBSE-BIND-CONFIRM

This operation must be invoked by a party to accept an application association.

CBSE-BIND-CONFIRM will be mapped to/from N-CONNECT confirm/response with CBSE-BIND-CONFIRM parameters carried in NS-user-data (if the network layer does not support NS-user-data of 128 octets then CBSE-BIND-CONFIRM may be carried as the second N-DATA request/indication following establishment of the network layer connection - see Section 2.4).

On receipt of a CBSE-BIND PDU, the recipient must assume that the sender is supporting the Phase 2 version of the interface and must reply with an untagged CBSE-BIND-CONFIRM. If a CBSE-VBIND PDU is received, the recipient must reply with a tagged CBSE-BIND-CONFIRM as a substructure of CBSEapdus.

CBSE-BIND-FAILURE

This operation must be invoked by a party to reject an attempted application association.

CBSE-BIND-FAILURE will be mapped to/from N-DISCONNECT request/indication with CBSE-BIND-FAILURE parameters carried in NS-user-data (if the network layer does not support NS-user-data of 128 octets then CBSE-BIND-FAILURE parameters shall be carried by the N-DATA request/indication preceding N-DISCONNECT.

GSM phase2 compliance:

If the network layer does not support NS-user-data of 128 octets then CBSE-BIND-FAILURE parameters will not be carried by the network layer - i.e. NS-user-data will be discarded).

CBSE-UNBIND

This operation must be invoked by a party to release the application association.

CBSE-UNBIND will be mapped to/from N-DISCONNECT request/indication with CBSE-UNBIND parameters be carried in NS-user-data (if the network layer does not support NS-user-data of 128 octets then CBSE-UNBIND parameters shall be carried by the N-DATA request/indication preceding N-DISCONNECT - see Section 2.4).

GSM phase 2 compliance:

If the network layer does not support NS-user-data of 128 octets then reception of N-DISCONNECT shall be interpreted as a CBSE-UNBIND even if the N-DISCONNECT is not preceded by a N-DATA packet carrying the CBSE-UNBIND parameters.

$start$(Phase2PBscCellLists)$

CBSE-WRITE-REPLACE, CBSE-KILL, CBSE-REPORT,

CBSE-STATUS-CBCH-QUERY, CBSE-STATUS-CBCH-QUERY-RESP, CBSE-STATUS-MESS-QUERY, CBSE-STATUS-MESS-QUERY-RESP, CBSE-REJECT, CBSE-RESTART-IND, CBSE-RESTART-IND-PHASE2P, CBSE-RESET, CSE-FAILURE-IND, CSE-FAILURE-IND-PHASE2P, CBSE-SET-DRX, CBSE-SET-DRX-RESP

Application data units CBSE-WRITE-REPLACE, CBSE-KILL, CBSE-REPORT, CBSE-STATUS-CBCH-QUERY, CBSE-STATUS-CBCH-QUERY-RESP, CBSE-STATUS-MESSAGE-QUERY, CBSE-STATUS-MESS-QUERY-RESP., CBSE- REJECT, CBSE -RESTART-IND, CBSE -RESTART-IND-PHASE2P, CBSE-RESET, CBSE-FAILURE-IND, CBSE-FAILURE-IND-PHASE2P, CBSE-SET-DRX, CBSE-SET-DRX-RESP provide the services specified via primitives Write-Replace, Kill, Report, Status-CBCH, Status-CBCH-Response, Status-Message, Status-Message-Response, Reject, Restart-Indication, Restart-Indication-Phase2P, Reset, Failure-Indication, Failure-Indication-Phase2P, Set-DRX and Set-DRX-Response respectively in GSM 03.41.

end(Phase2PBscCellLists)$

These application data units will be mapped to/from N-DATA request/indication.

2.2 ASN1 Specification

The Abstract Syntax Notation of the Cell Broadcast Short Message Service Element

CBSE

1st module of 2:

CBS-UsefulDefinitions

```
CBS-UsefulDefinitions   {
    ccitt identified-organization (4) etsi (0) mobile-domain (0)
    gsm-messaging (4) gsm-sms3 (12) usefulDefinitions (10) }

DEFINITIONS

IMPLICIT TAGS
::=
BEGIN


    ID  ::= OBJECT IDENTIFIER

mobile-domain ID    ::= {ccitt identified-organization (4) etsi (0) mobile-domain(0)}

--  root for all sms allocations

gsm-messaging ID    ::= { mobile-domain gsm-messaging(4) }

--  categories

gsm-sms3 ID     ::= { gsm-messaging 12 }

END
```

2nd module of 2:

Application Protocol

```
ApplicationProtocol {
    ccitt identified-organization (4) etsi (0) mobile-domain(0)
    gsm-messaging(4) gsm-sms3 (12) applicationProtocol(11) }

DEFINITIONS

IMPLICIT TAGS
::=
BEGIN

--  CBSE-BIND will be carried as N-CONNECT request/indication
--  CBSE-BIND-Parameters will carried in the User Data field of the N-CONNECT
--  request/indication message.
--  Note that this structure should be used by Phase 2 systems only.

CBSE-BIND-Parameters ::=  SEQUENCE {
            initiatorID [0] Name,
            password    [1] Password   OPTIONAL
                }

--  Above and in CBSE-BIND-CONFIRM
--  initiatorID/respID: identify the initiating/responding telecommunication subsystem
--  password: may assist in authentication

--  CBSE-VBIND-Parameters will only be used as an element of CBSEapdus in the
--  User Data field of the N-CONNECT request/indication message.
--  Note that this structure should be used by Phase 2+ and higher systems only.

CBSE-VBIND-Parameters ::=  SEQUENCE {
            initiatorID [0] Name,
            password    [1] Password   OPTIONAL,
            version     [2] Version
                }
```

```
--  Above
--  initiatorID/respID: identify the initiating/responding telecommunication subsystem
--  password: may assist in authentication
--  version: identify the interface version supported, defined below


Name ::=    SEQUENCE {
    operator            [0] Operator        OPTIONAL,
    bilateralAgreem     [1] BilateralAgreem OPTIONAL,
    dataNetworkAddress  [2] Xl2lAddress OPTIONAL,
    iSDNAddress     [3] CBS-Address OPTIONAL
            }

--  operator is a text string containing the name of the CBC/PLMN operator. bilateralagreem is a
text
--  string identifying the bilateral agreement between the CBC and the PLMN operators which allows
--  for this association to be established.
--  dataNetworkAddress is the PSPDN X.121 address of the CBC/BSC issuing the BIND or
--  CONFIRM, occurring only if a PSPDN is used.
--  iSDNAddress is the PLMN address of the CBC (same datum in both BIND and CONFIRM).
--  Any pair of subsets of these parameters may be used to identify the CBC and the BSC to one
--  another.

--  upper bound settings

Operator ::= PrintableString (SIZE (0..20))

BilateralAgreem  ::=  PrintableString  (SIZE (0 .. 20))

Xl2lAddress ::= NumericString  (SIZE(0..15))

--  Definition of Cell Broadcast Short Message Service address

CBS-Address ::= [APPLICATION 0]  SEQUENCE {
     address-type      INTEGER {  unknown-type(0),
                international-number(1),
                national-number(2),
                network-specific-number(3),
                short-number(4) },
     numbering-plan  INTEGER   { unknown-numbering(0),
                iSDN-numbering(1),
                data-network-numbering(3),
                telex-numbering(4),
                national-numbering(8),
                private-numbering(9) },
    address-value     CHOICE   {
                octet-format
                    SemiOctetString
               -- other formats are for further study
                }
}

--  each octet contains two binary coded decimal digits

SemiOctetString ::=  OCTET STRING (SIZE(1..10))

Password    ::=   PrintableString  (SIZE(0..20))

--  Version provides one of the indications given in the following table.
--  Any future substantive interface definition changes must be added to this table.
```

Table 1

Version indication	Document Version	Compatible with previous version
release-97	This mandates adherence to 03.49 version 6.0.0.	No (see Note 1)
reserved-1		
reserved-2		
reserved-3		
reserved-4		
reserved-5		
reserved-6		

```
Note 1: PDUs not backwards compatible with Phase 2 include, but may not be limited to, Report,
Reject, Status-CBCH-Resp, and Status-Mess-Resp.

Version ::=  INTEGER {
        release-97 (0),
        reserved-1 (1),
```

```
        reserved-2 (2),
        reserved-3 (3),
        reserved-4 (4),
        reserved-5 (5),
        reserved-6 (6)
        }

--  CBSE-BIND-CONFIRM will carried as N-CONNECT response/confirm
--  CBSE-BIND-CONFIRM parameters will be carried in User Data of the N-CONNECT
--  response/confirm message

CBSE-BIND-CONFIRM-Parameters ::=    SEQUENCE {
    respId      [0] Name,
    password    [1] Password     OPTIONAL
    }

--  The following defines the choices and tags for the N-DISCONNECT.request/indication User Data.

Applic-protocol-discs   ::= CHOICE {
    bindfail [1] CBSE-BIND-FAILURE,
    unbindreq [2] CBSE-UNBIND
        }

CBSE-BIND-FAILURE   ::= Connect-failure-reason

--  connect-failure-reason provides one of the error indications given in the following table.
```

Table 2

Error indications	Reason
not-entitled	The responder is not entitled to accept a request for an association between itself and the initiator.
temporary-overload	The responder is not capable of establishing an association due to temporary overload.
temporary-failure	The responder is not capable of establishing an association due to a temporary failure.
incorrect-ID-or-password	The responder will not accept the request to establish an association between itself and the initiator due to incorrect identity or password.
version-unsupported	The version specified is not supported by the recipient.

```
--
    Connect-failure-reason  ::=  INTEGER {
            not-entitled (0),
            temporary-overload (1),
            temporary-failure (2),
            incorrect-ID-or-password (3),
            version-unsupported (4)
            }

CBSE-UNBIND  ::= NULL

--  The following defines the choices and tags for the N-DATA.request/indication User Data

CBSMSEapdus     ::= CHOICE {
    cbse-WRITE-REPLACE          [1] Write-Replace,
    cbse-KILL                   [2] Kill,
    cbse-REPORT                 [3] Report,
    cbse-STATUS-CBCH-QUERY      [4] Status-CBCH,
    cbse-STATUS-CBCH-QUERY-RESP [5] Status-CBCH-Resp,
    cbse-STATUS-MESSAGE-QUERY   [6] Status-Message,
    cbse-STATUS-MESS-QUERY-RESP [7] Status-Mess-Resp,
    cbse-REJECT                 [8] Reject,
    cbse-RESTART-IND            [9] Restart-Ind,
    cbse-RESET                  [10] Reset,
    cbse-FAILURE-IND            [11] Failure-Ind,
    cbse-SET-DRX                [12] Set-DRX,
    cbse-SET-DRX-RESP           [13] Set-DRX-Resp,
    cbse-VBIND                  [14] CBSE-VBIND-Parameters,
    cbse-BIND-CONFIRM           [15] CBSE-BIND-CONFIRM-Parameters,
    cbse-BIND-FAILURE           [16] CBSE-BIND-FAILURE,
    cbse-UNBIND                 [17] CBSE-UNBIND,
    cbse-RESTART-IND-PHASE2P    [18] Restart-Ind-Phase2P, --    $(Phase2PBscCellLists)$
    cbse-FAILURE-IND-PHASE2P    [19] Failure-Ind-Phase2P  --    $(Phase2PBscCellLists)$
```

```
}


--  PDU parameter definitions from 03.41
Message-Identifier          ::= INTEGER (0 .. 65535)
Serial-Number               ::= INTEGER (0 .. 65535)
No-of-Pages                 ::= INTEGER (1 .. 15)
Cell-List                   ::= SEQUENCE {
                                length  INTEGER, -- number of cells in the list
                                disc    Cell-Id-Disc,
                                list    SEQUENCE OF Cell-Id
                                }
Channel                     ::= INTEGER {
                                basic-channel (0),
                                extended-channel (1)
                                }
Category                    ::= INTEGER {
                                high-priority (0),
                                normal-priority (1),
                                background (2)
                                }
Repetition-Period           ::= INTEGER (1 .. 1024)
No-of-Broadcast-Req         ::= INTEGER (0 ..65535)
No-of-Broadcasts-Compl-List ::= SEQUENCE OF SEQUENCE {
                                cell-id                     Cell,
                                no-of-broadcasts-compl      INTEGER,
                                no-of-broadcasts-compl-info No-of-Broadcasts-Compl-Info-Type
OPTIONAL
                                }
Cell-Id                     ::= OCTET STRING (SIZE(4))
--                              Note:
--                              If Cell-Id-Disc equals ciOnly then only the last 2 octets of
--                              Cell-ID are to be considered
--                              If Cell-Id-Disc equals lacOnly then only the first 2 octets of
--                              Cell-ID are to be considered. The unused octets are filler octets
--                              If Cell-Id-Disc equals allCells, Cell-ID only contains filler octets
Schedule-Period             ::= INTEGER (0 .. 40)
Reserved-Slots              ::= INTEGER (0 .. 40)
Failure-List                ::= SEQUENCE OF SEQUENCE {
                                cell-id     Cell,
                                cause       Failure-Reason,
                                diagnostic  Diagnostic-Info OPTIONAL
                                }
Cbch-Loading-List           ::= SEQUENCE OF SEQUENCE{
                                cell-id             Cell,
                                cbch-loading        Cbch-Loading
--                              indicates the predicted short term load, expressed as a percentage
--                              (min:0, max: 100)
                                }
Cbch-Loading                ::= INTEGER(0..100)
Failure-Reason              ::= INTEGER {
                                parameter-not-recognised (0),
                                unused-failure-reason-1 (1), -- not used
                                parameter-value-invalid (2),
                                valid-CBS-message-not-identified (3),
                                cell-identity-not-valid (4),
                                unrecognised-primitive (5),
                                missing-mandatory-element (6),
                                bss-capacity-exceeded (7),
                                cell-memory-exceeded (8),
                                bss-memory-exceeded (9),
                                unspecifed-error (10),
                                incompatible-DRX-parameter (11),
                                unused-failure-reason-12 (12), -- not used
                                cell-broadcast-not-supported (13),
                                cell-broadcast-not-operational (14),
                                extended-channel-not-supported (15),
                                message-reference-already-used (16)
                                }
Diagnostic-Info             ::= OCTET STRING (SIZE (1..20))
Data-Coding-Scheme          ::= INTEGER (0 .. 255)
Page-Inf                    ::= SEQUENCE {
                                message-info-useful-octets  Message-Info-Useful-Octets,
                                message-info-page           Message-Info-Page
                                }
Message-Info-Useful-Octets  ::= INTEGER (0..82)
Recovery-Indication         ::= BOOLEAN
--                              TRUE indicates data is available
--                              False indicates data is lost


--  Definitions used by the PDU parameters
```

```
Message-Info-Page           ::= OCTET STRING (SIZE(82))

Cell-Id-Disc                ::= OCTET STRING (SIZE(1))

--                              values from the following table
lacAndCi OCTET STRING (SIZE(1)) ::= '1'H -- 2 Octet lac, followed by 2 Octet Cell Id
ciOnly OCTET STRING (SIZE(1))   ::= '2'H -- Cell Id only
lacOnly OCTET STRING (SIZE(1))  ::= '5'H -- 2 Octet lac only, all cells in this LAC (NOT USED BY BSC)
allCells OCTET STRING (SIZE(1)) ::= '6'H -- all cells in this BSS  (NOT USED BY BSC)

Cell                        ::= SEQUENCE {
                                disc        Cell-Id-Disc,
                                id      Cell-Id
                                }
No-of-Broadcasts-Compl-Info-Type::=  INTEGER {
                                unknown (0),
                                overflow (1)
                                }


--  Definitions of PDUs

Write-Replace   ::= SEQUENCE {
    message-Identifier      Message-Identifier,
    new-Serial-Number       Serial-Number,
    no-of-Pages             No-of-Pages,
    data-coding-scheme      Data-Coding-Scheme,
    cell-list               Cell-List,
    repetition-Period       Repetition-Period,
    no-of-broadcast-req     No-of-Broadcast-Req,
    cbs-Page-Inf            SEQUENCE OF [15] Page-Inf,
    old-Serial-Number       [3] Serial-Number   OPTIONAL,
    category                [2] Category    OPTIONAL,
    channel-indicator       [4] Channel     OPTIONAL
    }


Kill    ::= SEQUENCE {
    message-Identifier      Message-Identifier,
    old-Serial-Number       Serial-Number,
    cell-List               Cell-List,
    channel-indicator       [4] Channel     OPTIONAL
    }

Report  ::= SEQUENCE {
    message-Identifier              Message-Identifier,
    serial-Number                   Serial-Number,
    no-of-Broadcasts-Compl-List     [0] No-of-Broadcasts-Compl-List OPTIONAL,
    failure-List                    [1] Failure-List OPTIONAL,
    channel-indicator               [4] Channel     OPTIONAL
}

Status-CBCH     ::= SEQUENCE{
    cell-List               Cell-List,
    channel-indicator       [4] Channel     OPTIONAL
}

Status-CBCH-Resp    ::= SEQUENCE{
    cbch-loading-List       [0] Cbch-Loading-List OPTIONAL,
    failure-List            [1] Failure-List OPTIONAL,
    channel-indicator       [4] Channel     OPTIONAL
}

Status-Message  ::= SEQUENCE {
    message-Identifier  Message-Identifier,
    old-Serial-No       Serial-Number,
    cell-List           Cell-List,
    channel-indicator   [4] Channel     OPTIONAL
    }

Status-Mess-Resp    ::= SEQUENCE {
    message-Identifier              Message-Identifier,
    old-serial-number               Serial-Number,
    no-of-Broadcasts-Compl-List     [0] No-of-Broadcasts-Compl-List OPTIONAL,
    failure-List                    [1] Failure-List OPTIONAL,
    channel-indicator               [4] Channel     OPTIONAL
}

Reject::= SEQUENCE {
    cause               Failure-Reason,
    diagnostic          Diagnostic-Info OPTIONAL,
    message-Identifier  [7] Message-Identifier  OPTIONAL,
    serial-Number       [3] Serial-Number   OPTIONAL
```

```
    }
--  $start$(Phase2PBscCellLists)$

--  The Restart-Ind PDU is retained for backward compatibility with Phase 2 systems,
--  and may be used in Phase 2+ systems
Restart-Ind ::= SEQUENCE {
    cell-list               Cell-List,
    recovery-Indication     Recovery-Indication     OPTIONAL
    }
--  coding of the recovery-Indication states is Data-available TRUE, Data-lost FALSE

--  The Restart-Ind-Phase2P PDU is used in Phase 2+ systems
Restart-Ind-Phase2P ::= CHOICE {
    restart-list1       [0] SEQUENCE {
                        cell-list               Cell-List,
                        recovery-Indication     Recovery-Indication OPTIONAL
                        },
    restart-list2       [1] SEQUENCE {
                        cell-list               SEQUENCE OF Cell,
                        recovery-Indication     Recovery-Indication OPTIONAL
                        }
    }
--  $end$(Phase2PBscCellLists)$



Reset           ::= SEQUENCE {
    cell-list       Cell-List
    }

Set-DRX ::= SEQUENCE {
    cell-list           Cell-List,
    schedule-Period     [6] Schedule-Period OPTIONAL,
    reserved-Slots      [2] Reserved-Slots  OPTIONAL,
    channel-indicator   [4] Channel         OPTIONAL
    }

--  $start$(Phase2PBscCellLists)$
Set-DRX-Resp    ::= SEQUENCE {
    cell-list                   [0] SEQUENCE OF Cell    OPTIONAL,
    failure-List                [1] Failure-List OPTIONAL,
    channel-indicator           [4] Channel     OPTIONAL
    }
--  $end$(Phase2PBscCellLists)$


--  $start$(Phase2PBscCellLists)$
--  The Failure-Ind PDU is retained for backward compatibility with Phase 2 systems,
--  and may be used in Phase 2+ systems
Failure-Ind ::= SEQUENCE{
    cell-list       Cell-List
}

--  $start$(Phase2PBscCellLists)$
--  The Failure-Ind-Phase2P PDU is used in Phase 2+ systems
Failure-Ind-Phase2P ::= CHOICE {
    failure-list1       [0] SEQUENCE {
                        cell-list       Cell-List
                        },
    failure-list2       [1] SEQUENCE OF Cell
    }
--  $end$(Phase2PBscCellLists)$


END
```

2.3 Application Rules for Avoidance of Collision of CBSE Operations

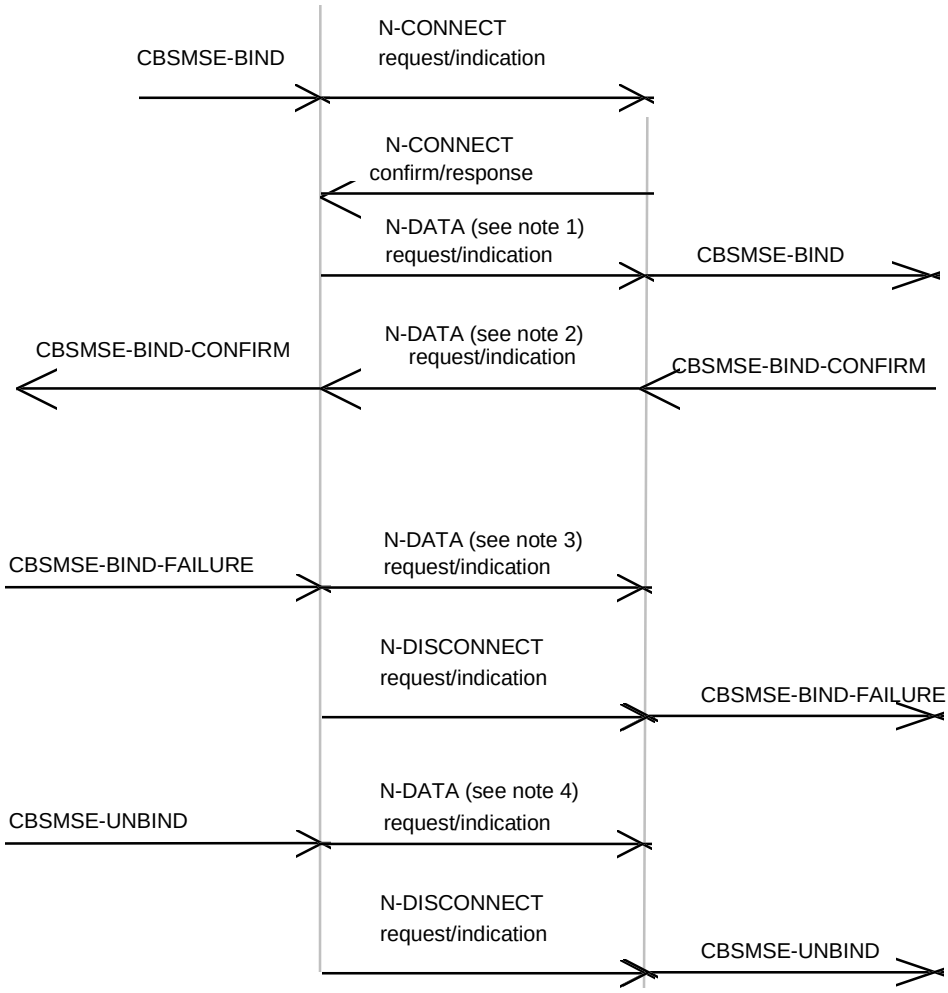
For the purpose of establishing the association between CBSEs in CBC and BSC then either the CBC or the BSC shall be designated as the entity responsible for initiating the association by the operation CBSE-BIND.

Following premature release of the association by N-DISCONNECT then either the CBC or the BSC shall be designated as the entity responsible for re-establishing the association.

Following receipt of N-RESET any command sent by the CBC, for which no corresponding response has been received by the CBC, will be re-sent to the BSC.

2.4 Non Support of 128 bytes of NS-user-data in Network Connection and Network Connection Release phases

It is generally intended to make the support of 128 bytes of NS user-data mandatory (see Sections 12.2.8 and 13.2.3 of X.213). CCITT Recommendation X.2 regards provision of Fast Select as essential, thereby ensuring support of 128 bytes of NS-user-data in network connection and network connection release phases. For an interim period support of 128 bytes of NS-user-data in network connection and network connection release phases will remain a provider option. The following figures are therefore provided in order to indicate how CBSE-BIND, CBSE-BIND-CONFIRM, CBSE-BIND-FAILURE and CBSE-UNBIND should be mapped to/from an OSI Network Service definition which does not support 128 bytes of NS-user-data in network connection and network connection release phases.



NOTE 1: CBSMSE-BIND parameters are carried as NS-user-data.

NOTE 2: CBSMSE-BIND-CONFIRM is carried as NS-user-data.

NOTE 3: CBSMSE-BIND-FAILURE is carried as NS-user-data

NOTE 4: CBSMSE-UNBIND parameters are carried as NS-user-data.

Figure 2

3 An OSI Protocol Stack For Interconnecting CBC and BSC

This clause specifies a stack of communication protocols in terms of the OSI Reference Model (see X.200) and therefore makes use of all seven layers for the purpose of fulfilling the service requirements of the primitives specified for the CBC - BSC interface in GSM 03.41. The CBS application layer (layer 7) is mapped to the Presentation Layer via ACSE (see X.217 and X.227) and ROSE (see X.219 and X.229). Only the Kernel functional unit of the Presentation Layer is used. Only the Kernel and Duplex functional units are used in the Session Layer (see X.215 and X.225).

3.1 Service elements on the application layer

An association (class 3) between CBRSEs is formed via ACSE and ROSE operations (class 2 and 5) are used to implement the service requirements specified for the CBC - BSC interface in GSM 03.41.

This results in an asynchronous asymmetric situation where the application entity in the CBC or BSC can invoke a CBRSE operation at any time.

The new CBRSE service element is first defined in the following subclause, and then specified in ASN.1 notation in subclause 3.2.

CBRSE definition

This service element defines the following services:

CBRSE-BIND This operation will normally be invoked by the CBC to establish the application association, but in exceptional circumstances (e.g. following loss of data) the BSC may invoke the operation; only thereafter the remaining CBRSE services may be used. This operation reports either success or failure (result or error).

CBR-WRITE-REPLACE, CBR-KILL, CBR-STATUS-CBCH-QUERY, CBR-STATUS-MESSAGE-QUERY, CBR-RESET, CBR-SET-DRX

These operations may be invoked by the application entity in the CBC; They are used to relay commands from the CBC to a given BSC. The operations report either success or failure.

```
$start$(Phase2PBscCellLists)$
```

CBR-RESTART-IND, CBR-RESTART-IND-PHASE2P, CBR-FAILURE-IND, CBR-FAILURE-IND-PHASE2P

This operation may be invoked by the application entity in the BSC. The operation reports success or failure.

```
$end$(Phase2PBscCellLists)$
```

CBR-UNBIND This operation must be invoked by the CBC as the last CBRSE operation before releasing the application association. This operation reports success only.

Of the services defined above, CBR-WRITE-REPLACE semantically means the relay of cell broadcast messages across the CBC-BSC-connection in order to add them to the message list in the BSC, whereas CBR-KILL is used to delete messages from the message list. The CBR-STATUS-CBCH-QUERY command inquires after the current loading of a specific cell broadcast channel, while the CBR-STATUS-MESSAGE-QUERY command requests status information concerning a specific message. The CBR-SET-DRX command sets the DRX related parameters. These five services combine the primitives defined in GSM 03.41, which can be invoked by the CBC.

The CBR-BIND service is used to exchange identifications, passwords, etc., and in order to negotiate the usage of the other services. The CBR-UNBIND service prepares for the release of the application association.

3.2 Detailed specification of the CBRSE services

On the following pages, the new CBRSE service element is specified with the ASN.1 notation, together with the entire protocol.

The Abstract Syntax Notation of
the Cell Broadcast Relay Service Element

CBRSE

1st module of 3:

CBS-UsefulDefinitions

```
CBS-UsefulDefinitions   {
    ccitt identified-organization (4) etsi (0) mobile-domain(0)
    gsm-messaging(4)  gsm-sms4(13)  usefulDefinitions(0) }

DEFINITIONS

IMPLICIT TAGS
::=
BEGIN

    EXPORTS     id-cb-ot-CBC, id-cb-ot-BSC, id-cb-port,
                    id-cb-ac-so, id-cb-CBRSE, id-cb-as-CBRSE;

    ID  ::= OBJECT IDENTIFIER

mobile-domain ID    ::= { ccitt identified-organization (4) etsi (0) mobile-domain (0)}

--  root for all sms allocations

    gsm-messaging   ID ::= { mobile-domain gsm-messaging (4) }

    gsm-sms4    ID  ::= {gsm-messaging (13)}

--  categories

    id-cb-mod   ID ::= { gsm-messaging 1 } -- modules
    id-cb-ot        ID ::= { gsm-messaging 2 } -- object type
    id-cb-pt        ID ::= { gsm-messaging 3 } -- port types
    id-cb-ac        ID ::= { gsm-messaging 4 } -- appl. contexts
    id-cb-ase       ID ::= { gsm-messaging 5 } -- ASEs
    id-cb-as        ID ::= { gsm-messaging 6 } -- abstract syntaxes

--  modules

    usefulDefinitions       ID ::= { gsm-sms4 0 }
    relayProtocol       ID ::= { gsm-sms4 1 }
    relayAbstractService    ID ::= { gsm-sms4 2 }

--  object types

    id-cb-ot-CBC        ID ::= { id-cb-ot 0 }
    id-cb-ot-BSC        ID ::= { id-cb-ot 1 }

--  port types

    id-cb-port      ID ::= { id-cb-pt 0 }

--  application contexts

    id-cb-ac-so     ID ::= { id-cb-ac 0 }

--  application service elements

    id-cb-CBRSE     ID ::= { id-cb-ase 0 }

--  abstract syntaxes

    id-cb-as-CBRSE      ID ::= { id-cb-as 0 }

END
```

2nd module of 3

RelayAbstractService

```
RelayAbstractService    {
    ccitt identified-organization (4) etsi (0) mobile-domain(0)
    gsm-messaging(4) gsm-sms4(13)  relayAbstractService(2) }

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

IMPORTS

    BIND, UNBIND
FROM Remote-Operations-Notation {
    joint-iso-ccitt remote-operations(4) notation(0) }

    OBJECT, PORT, ABSTRACT-BIND, ABSTRACT-UNBIND,
    ABSTRACT-OPERATION, ABSTRACT-ERROR
FROM AbstractServiceNotation {
    joint-iso-ccitt mhs-motis(6) asdc(2) modules(0) notation(1) }

    id-cb-ot-CBC, id-cb-ot-BSC, id-cb-port
FROM CBS-UsefulDefinitions{
    ccitt identified-organization (4) etsi (0) mobile-domain(0)
    gsm-messaging(4) gsm-sms4(13) usefulDefinitions(0) }

--  upper bound settings

    ub-operator-name-length INTEGER ::= 20

    ub-agreem-name-length INTEGER   ::= 20

    ub-X121Address-length INTEGER   ::= 15

    ub-password-length INTEGER      ::= 20

--  Objects

--  The CBC and the BSC are modelled as atomic objects, cBC--Object and bSC-Object. Each
--  object has one port for the interconnection. ([S] and [C] indicate supply and consumption of
--  services, respectively).

    cBC-Object  OBJECT
                    PORTS { cBR-port [S] }
                    ::= id-cb-ot-CBC

    bSC-Object  OBJECT
                    PORTS { cBR-port [C] }
                    ::= id-cb-ot-BSC

--  Port

    cBR-port    PORT
                CONSUMER INVOKES {CBR-Restart-Ind
--  $start$(Phase2PBscCellLists)$
                    CBR-Restart-Ind-Phase2P
                    CBR-Failure-Ind
                    CBR-Failure-Ind-Phase2P
--  $end$(Phase2PBscCellLists)$
                    }
            SUPPLIER INVOKES  { CBR-Write-Replace
                                CBR-Kill
                                CBR-Status-CBCH-Query
                                CBR-Status-Message-Query
                                CBR-Reset
                                CBR-Set-DRX
                 }
            ::= id-cb-port

--  The CBR-Bind operation

--  Both, BIND and UNBIND operations, are exclusively within the responsibility of the CBC. The
--  BIND operation is therefore always requested by the CBC
```

```
--  Note that this structure should be used by Phase 2 systems only.

    CBR-Bind ::=
                ABSTRACT-BIND
                TO { cBR-port }
                BIND
                ARGUMENT    CBR-Bind-Parameters
                RESULT      CBR-Bind-confirm
                BIND-ERROR  CBR-Bind-failure

--  The CBR-Unbind operation

--  The UNBIND is a harsh release of the association and all outstanding operations are aborted.
--  UNBIND is always requested by the CBC. The CBC and the BSC should negotiate (during
--  CBR-BIND) the use of services on the association (the operations parameter - list of
    operation
--  types for the association) in such a way that no harmful losses of operations occur.

    CBR-Unbind ::=
                ABSTRACT-UNBIND
                FROM { cBR-port }
                UNBIND
                ARGUMENT     Time-when-connected
                RESULT       Time-when-disconnected

-   Association control parameters

CBR-Bind-Parameters ::= SEQUENCE {
                    initiatorID [0] Name,
                    password    [1] Password OPTIONAL,
                    pswNeeded   [2] BOOLEAN,
                    iniType [3] Telecom-System-Type,
                    operations  [4] List-of-Operations,
                    transient   [5] BOOLEAN
}

--  Above and in SMR-Bind-confirm
--  initiatorID/respID: identify the initiating/responding telecommunication subsystem
--  password: may assist in authentication
--  pswNeeded (BIND only):requests password into SMR-Bind, SMR-Bind-Confirm
--  iniType/respType: identify the system entity
--  operations: lists the SM relay operations requested and supported on the association:
--  operations listed in both the BIND and the CONFIRM may be used (i.e. this is a negotiation
--  between CBC and BSC)
--  transient:forces the association (and the underlying connections), transient: it must be
--  UNBouND as soon as there are no operations to be performed

Name    ::= SEQUENCE {
            operator        [0] Operator        OPTIONAL,
            bilateralAgreem [1] BilateralAgreem OPTIONAL,
            dataNetworkAddress  [2] X121Address OPTIONAL,
            iSDNAddress     [3] CBS-Address OPTIONAL
               }

--  operator is a text string containing the name of the CBC/PLMN operator. bilateralAgreem is a
--  text string identifying the bilateral agreement between the CBC and the PLMN operators
--  which allows for this association to be established.
--  dataNetworkAddress is the PSPDN X.121 address of the CBC/BSC issuing the BIND or
--  CONFIRM, occurring only if a PSPDN is used.
--  iSDNAddress is the PLMN address of the CBC as seen by the MSs (same datum in both BIND
    and CONFIRM).

--  Any pair of subsets of these parameters may be used to identify the CBC and the BSC to one
--  another.

Operator ::=    PrintableString (SIZE(0..ub-operator-name-length))

BilateralAgreem ::=     PrintableString  (SIZE(0..ub-agreem-name-length))

X121Address ::= NumericString  (SIZE(0..ub-X121Address-length))

--  CBS-Address is specified later in this module.

    Password ::=    PrintableString  (SIZE(0..ub-password-length))

--  Version provides one of the indications given in the following table.
--  Any future substantive interface definition changes must be added to Table 1.

--  For definitions see Table 1.
```

```
Version ::=  INTEGER {
        release-97 (0),
        reserved-1 (1),
        reserved-2 (2),
        reserved-3 (3),
        reserved-4 (4),
        reserved-5 (5),
        reserved-6 (6)
        }

Telecom-System-Type ::= INTEGER {
                cell-Broadcast-Service-Centre   (0),
                public-Land-Mobile-Network  (1)
                --  Extensions are possible: additional telecommunication subsystems            --
    might adopt this service element for their interconnection.
}

List-of-Operations  ::= BIT STRING {
                    cBR-From-CBC-Write-Replace  (0),
                    cBR-From-CBC-Kill   (1),
                    cBR-From-CBC-Status-CBCH-Query  (2),
                    cBR-From-CBC-Status-Message-Query (3),
                    cBR-From-BSC-Restart-Ind (4),
                    cBR-From-CBC-Reset (5),
                    cBR-From-BSC-Failure-Ind (6),
                    cBR-From- CBC-Set-DRX (7),
                    cBR-From-BSC-VBind-Request (8),
                    cBR-From-BSC-Bind-Confirm (9),
                    cBR-From-BSC-Bind-Failure (10),
                    cBR-From-BSC-UnBind (11),
--  $start$(Phase2PBscCellLists)$
                    cBR-From-BSC-Restart-Ind-Phase2P (12),
                    cBR-From-BSC-Failure-Ind-Phase2P (13)
--  $end$(Phase2PBscCellLists)$

                    --  Extensions are possible: additional operations may be defined
                    --  within this service element. Existing systems should tolerate
                    --  unknown values, but negotiate not to perform unknown
                    --  operations.}

--  Note that this element replaces the CBR-Bind structure for Phase 2+ and beyond.

CBR-VBind-Request ::=
                ABSTRACT-VBIND
                TO { cBR-port }
                BIND
                ARGUMENT    CBR-VBind-Parameters
                RESULT      CBR-Bind-confirm
                BIND-ERROR  CBR-Bind-failure

CBR-Bind-confirm    ::= SEQUENCE {
                    respId  [0] Name,
                    password    [1] Password OPTIONAL,
                    respType    [3] Telecom-System-Type,
                    operations  [4] List-of-Operations,
                    transient   [5] BOOLEAN,
                    connectTime [6] Time-when-connected
                    }

CBR-Bind-failure  ::= SEQUENCE {
                    connect-failure-reason
                    [0] Connect-failure
                      }
```

```
--  connect-failure-reason contains one of the error indications given in the following table.
```

Table 3

Error indications	Reason
not-entitled	The responder is not entitled to accept a request for an association between itself and the initiator.
temporary-overload	The responder is not capable of establishing an association due to temporary overload.
temporary-failure	The responder is not capable of establishing an association due to a temporary failure (having impact on an entity at SM-RL or at layers above).
incorrect-ID-or-password	The responder will not accept the request to establish an association between itself and the initiator due to incorrect identity or password.
not-supported	The responder does not recognize the telecommunication subsystem type of the initiator, or cannot support any of the operations suggested on the association.
version-unsupported	The version specified is not supported by the recipient.

```
--

Connect-failure     ::= INTEGER {
                    not-entitled (0),
                    temporary-overload (1),
                    temporary-failure (2),
                    incorrect-ID-or-password (3),
                    not-supported (4),
                    version-unsupported (5)
                       }

    Time-when-disconnected  ::= UTCTime
    Time-when-connected     ::= UTCTime

--  The CBR-Write-Replace operation

CBR-Write-Replace ::=
            ABSTRACT-OPERATION
            ARGUMENT    Write-Replace
            RESULT  Report
            ERRORS  {Parameter-not-recognized,
                    Parameter-value-invalid,
                    Valid-CBS-message-not-identified,
                    Cell-identity-not-valid,
                    Unrecognized-primitive,
                    Missing-mandatory-element,
                    BSS-capacity-exceeded,
                    Cell-memory-exceeded,
                    BSS-memory-exceeded,
                    Cell-broadcast-not-supported,
                    Cell-broadcast-not-operational,
                    Extended-channel-not-supported,
                    Message-reference-already-used,                 Unspecified-error
                    }

--  The CBR-Kill operation

CBR-Kill ::=
            ABSTRACT-OPERATION
            ARGUMENT    Kill
            RESULT  Report
            ERRORS  {Parameter-not-recognized,
                    Parameter-value-invalid,
                    Cell-identity-not-valid,
                    Valid-CBS-message-not-identified,
                    Unrecognized-primitive,
                    Missing-mandatory-element,
                    Cell-broadcast-not-supported,
                    Cell-broadcast-not-operational,
                    Extended-channel-not-supported,
                    Unspecified-error
```

```
                    }

--  The CBR-Status-CBCH-Query operation

CBR-Status-CBCH-Query ::=
            ABSTRACT-OPERATION
            ARGUMENT    Status-CBCH
            RESULT  Status-CBCH-Resp
            ERRORS  {Parameter-not-recognized,
                    Parameter-value-invalid,
                    Cell-identity-not-valid,
                    Unrecognized-primitive,
                    Missing-mandatory-element,
                    Cell-broadcast-not-supported,
                    Cell-broadcast-not-operational,
                    Extended-channel-not-supported,
                    Unspecified-error
                    }

--  The CBR-Status-Message-Query operation

CBR-Status-Message-Query ::=
            ABSTRACT-OPERATION
            ARGUMENT    Status-Message
            RESULT  Status-Mess-Resp
            ERRORS  {Parameter-not-recognized,
                    Parameter-value-invalid,
                    Cell-identity-not-valid,
                    Valid-CBS-message-not-identified,
                    Unrecognized-primitive,
                    Missing-mandatory-element,
                    Cell-broadcast-not-supported,
                    Cell-broadcast-not-operational,
                    Extended-channel-not-supported,
                    Unspecified-error
                    }

--  The CBR-Restart-Ind operation
CBR-Restart-Ind ::=
            ABSTRACT-OPERATION
            ARGUMENT    Restart-Ind
            RESULT
            ERRORS  {Parameter-not-recognised,
                    Parameter-value-invalid,
                    Cell-identity-not-valid,
                    Unrecognized-primitive,
                    Missing-mandatory-element,
                    Unspecified-error
                    }

--  $start$(Phase2PBscCellLists)$
--  The CBR-Restart-Ind-Phase2P operation
CBR-Restart-Ind-Phase2P ::=
            ABSTRACT-OPERATION
            ARGUMENT    Restart-Ind-Phase2P
            RESULT
            ERRORS  {Parameter-not-recognised,
                    Parameter-value-invalid,
                    Cell-identity-not-valid,
                    Unrecognized-primitive,
                    Missing-mandatory-element,
                    Unspecified-error
                    }
--  $end$(Phase2PBscCellLists)$

--  The CBR-Reset operation

CBR-Reset ::=
            ABSTRACT-OPERATION
            ARGUMENT    Reset
            RESULT
            ERRORS  {Parameter-not-recognized,
                    Parameter-value-invalid,
                    Cell-identity-not-valid,
                    Unrecognized-primitive,
                    Missing-mandatory-element,
                    Cell-broadcast-not-supported,
                    Unspecified-error
                    }

--  The CBR-Failure-Ind operation

CBR-Failure-Ind ::=
```

```
            ABSTRACT-OPERATION
            ARGUMENT    Failure-Ind
            RESULT
            ERRORS  {Parameter-not-recognized,
                    Parameter-value-invalid,
                    Cell-identity-not-valid,
                    Unrecognized-primitive,
                    Missing-mandatory-element,
                    Unspecified-error
                    }

--  $start$(Phase2PBscCellLists)$
--  The CBR-Failure-Ind-Phase2P operation

CBR-Failure-Ind-Phase2P ::=
            ABSTRACT-OPERATION
            ARGUMENT    Failure-Ind-Phase2P
            RESULT
            ERRORS  {Parameter-not-recognized,
                    Parameter-value-invalid,
                    Cell-identity-not-valid,
                    Unrecognized-primitive,
                    Missing-mandatory-element,
                    Unspecified-error
                    }
--  $end$(Phase2PBscCellLists)$

--  The CBR-Set-DRX operation

CBR-Set-DRX ::=
            ABSTRACT-OPERATION
            ARGUMENT    Set-DRX
            RESULT      Set-DRX-Resp
            ERRORS      {Parameter-not-recognized,
                        Parameter-value-invalid,
                        Valid-CBS-message-not-identified,
                        Cell-identity-not-valid,
                        Unrecognized-primitive,
                        Missing-mandatory-element,
                        BSS-capacity-exceeded,
                        Unspecified-error,
                        Cell-broadcast-not-supported,
                        Cell-broadcast-not-operational,
                        Extended-channel-not-supported,
                        Incompatible-DRX-parameter
                        }

--  CBR operation ARGUMENT lists


--  PDU parameter definitions from 03.41
Message-Identifier          ::= INTEGER (0 .. 65535)
Serial-Number               ::= INTEGER (0 .. 65535)
No-of-Pages                 ::= INTEGER (1 .. 15)
Cell-List                   ::= SEQUENCE {
                                length  INTEGER, -- number of cells in the list
                                disc    Cell-Id-Disc,
                                list    SEQUENCE OF Cell-Id
                                }
Channel                     ::= INTEGER {
                                basic-channel (0),
                                extended-channel (1)
                                }
Category                    ::= INTEGER {
                                high-priority (0),
                                normal-priority (1),
                                background (2)
                                }
Repetition-Period           ::= INTEGER (1 .. 1024)
No-of-Broadcast-Req         ::= INTEGER (0 ..65535)
No-of-Broadcasts-Compl-List ::= SEQUENCE OF SEQUENCE {
                                cell-id                     Cell,
                                no-of-broadcasts-compl      INTEGER,
                                no-of-broadcasts-compl-info No-of-Broadcasts-Compl-Info-Type
OPTIONAL
                                }
Cell-Id                     ::= OCTET STRING (SIZE(4))
--                              Note:
--                              If Cell-Id-Disc equals ciOnly then only the last 2 octets of
--                              Cell-ID are to be considered
--                              If Cell-Id-Disc equals lacOnly then only the first 2 octets of
--                              Cell-ID are to be considered. The unused octets are filler octets
--                              If Cell-Id-Disc equals allCells, Cell-ID only contains filler octets
```

```
Schedule-Period             ::= INTEGER (0 .. 40)
Reserved-Slots              ::= INTEGER (0 .. 40)
Failure-List                ::= SEQUENCE OF SEQUENCE {
                                cell-id     Cell,
                                cause       Failure-Reason,
                                diagnostic  Diagnostic-Info OPTIONAL
                                }
Cbch-Loading-List           ::= SEQUENCE OF SEQUENCE{
                                cell-id             Cell,
                                cbch-loading        Cbch-Loading
--                              indicates the predicted short term load, expressed as a percentage
--                              (min:0, max: 100)
                                }
Cbch-Loading                ::= INTEGER(0..100)
Failure-Reason              ::= INTEGER {
                                parameter-not-recognised (0),
                                unused-failure-reason-1 (1), -- not used
                                parameter-value-invalid (2),
                                valid-CBS-message-not-identified (3),
                                cell-identity-not-valid (4),
                                unrecognised-primitive (5),
                                missing-mandatory-element (6),
                                bss-capacity-exceeded (7),
                                cell-memory-exceeded (8),
                                bss-memory-exceeded (9),
                                unspecifed-error (10),
                                incompatible-DRX-parameter (11),
                                unused-failure-reason-12 (12), -- not used
                                cell-broadcast-not-supported (13),
                                cell-broadcast-not-operational (14),
                                extended-channel-not-supported (15),
                                message-reference-already-used (16)
                                }
Diagnostic-Info             ::= OCTET STRING (SIZE (1..20))
Data-Coding-Scheme          ::= INTEGER (0 .. 255)
Page-Inf                    ::= SEQUENCE {
                                message-info-useful-octets  Message-Info-Useful-Octets,
                                message-info-page           Message-Info-Page
                                }
Message-Info-Useful-Octets  ::= INTEGER (0..82)
Recovery-Indication         ::= BOOLEAN
--                              TRUE indicates data is available
--                              False indicates data is lost


--  Definitions used by the PDU parameters
Message-Info-Page           ::= OCTET STRING (SIZE(82))

Cell-Id-Disc                ::= OCTET-STRING (SIZE(1))
--                              values from the following table
lacAndCi OCTET STRING (SIZE(1)) ::= '1'H -- 2 Octet lac, followed by 2 Octet Cell Id
ciOnly OCTET STRING (SIZE(1))   ::= '2'H -- Cell Id only
lacOnly OCTET STRING (SIZE(1))  ::= '5'H -- 2 Octet lac only, all cells in this LAC (NOT USED BY BSC)
allCells OCTET STRING (SIZE(1)) ::= '6'H -- all cells in this BSS  (NOT USED BY BSC)
Cell                        ::= SEQUENCE {
                                disc        Cell-Id-Disc,
                                id      Cell-Id
                                }
No-of-Broadcasts-Compl-Info-Type::=  INTEGER {
                                unknown (0),
                                overflow (1)
                                }


Write-Replace   ::= SEQUENCE {
    message-Identifier      Message-Identifier,
    new-Serial-Number       Serial-Number,
    no-of-Pages             No-of-Pages,
    data-coding-scheme      Data-Coding-Scheme,
    cell-list               Cell-List,
    repetition-Period       Repetition-Period,
    no-of-broadcast-req     No-of-Broadcast-Req,
    cbs-Page-Inf            SEQUENCE OF [15] Page-Inf,
    old-Serial-Number       [3] Serial-Number   OPTIONAL,
    category                [2] Category    OPTIONAL,
    channel-indicator       [4] Channel     OPTIONAL
    }

Kill    ::= SEQUENCE {
    message-Identifier      Message-Identifier,
    old-Serial-Number       Serial-Number,
    cell-List               Cell-List,
    channel-indicator       [4] Channel     OPTIONAL
```

```
    }

Status-CBCH     ::= SEQUENCE{
    cell-List               Cell-List,
    channel-indicator       [4] Channel     OPTIONAL
}

Status-Message  ::= SEQUENCE {
    message-Identifier  Message-Identifier,
    old-Serial-No       Serial-Number,
    cell-List           Cell-List,
    channel-indicator   [4] Channel     OPTIONAL
    }

--  $start$(Phase2PBscCellLists)$
--  The Restart-Ind PDU is retained for backward compatibility with Phase 2 systems,
--  and may be used in Phase 2+ systems
Restart-Ind ::= SEQUENCE {
    cell-list               Cell-List,
    recovery-Indication     Recovery-Indication     OPTIONAL
    }
--  coding of the recovery-Indication states is Data-available TRUE, Data-lost FALSE

--  The Restart-Ind-Phase2P PDU is used in Phase 2+ systems
Restart-Ind-Phase2P ::= CHOICE {
    restart-list1       [0] SEQUENCE {
                        cell-list               Cell-List,
                        recovery-Indication     Recovery        OPTIONAL
                        },
    restart-list2       [1] SEQUENCE {
                        cell-list               SEQUENCE OF Cell,
                        recovery-Indication     Recovery    OPTIONAL
                        }
    }

--  The Failure-Ind PDU is retained for backward compatibility with Phase 2 systems,
--  and may be used in Phase 2+ systems
Failure-Ind ::= SEQUENCE{
    cell-list   Cell-List
}

--  The Failure-Ind-Phase2P PDU is used in Phase 2+ systems
Failure-Ind-Phase2P ::= CHOICE {
    failure-list1       [0] SEQUENCE {
                        cell-list       Cell-List
                        },
    failure-list2       [1] SEQUENCE OF Cell
    }
--  $end$(Phase2PBscCellLists)$

Reset ::= SEQUENCE{
    cell-list   Cell-List
}

Set-DRX ::= SEQUENCE {
    cell-list           Cell-List,
    schedule-Period     [6] Schedule-Period OPTIONAL,
    reserved-Slots      [2] Reserved-Slots  OPTIONAL,
    channel-indicator   [4] Channel OPTIONAL
    }

Report  ::= SEQUENCE {
    message-Identifier              Message-Identifier,
    serial-Number                   Serial-Number,
    no-of-Broadcasts-Compl-List     [0] No-of-Broadcasts-Compl-List OPTIONAL,
    failure-List                    [1] Failure-List OPTIONAL,
    channel-indicator               [4] Channel     OPTIONAL
}

Status-CBCH-Resp    ::= SEQUENCE{
    cbch-loading-List       [0] Cbch-Loading-List OPTIONAL,
    failure-List            [1] Failure-List OPTIONAL,
    channel-indicator       [4] Channel     OPTIONAL

Status-Mess-Resp    ::= SEQUENCE {
    message-Identifier              Message-Identifier,
    old-serial-number               Serial-Number,
    no-of-Broadcasts-Compl-List     [0] No-of-Broadcasts-Compl-List OPTIONAL,
    failure-List                    [1] Failure-List OPTIONAL,
    channel-indicator               [4] Channel     OPTIONAL
}

--  $start$(Phase2PBscCellLists)$
```

```
Set-DRX-Resp    ::= SEQUENCE {
    cell-list                   [0] SEQUENCE OF Cell    OPTIONAL,
    failure-List                [1] Failure-List OPTIONAL,
    channel-indicator           [4] Channel     OPTIONAL
    }
--  $end$(Phase2PBscCellLists)$

--  CBR operation errors listed below

Parameter-not-recognized ::=
                ABSTRACT-ERROR
                PARAMETER Diagnostic-Info OPTIONAL

Parameter-value-invalid ::=
                ABSTRACT-ERROR
                PARAMETER Diagnostic-Info OPTIONAL

Valid-CBS-message-not-identified ::=
                ABSTRACT-ERROR
                PARAMETER Diagnostic-Info OPTIONAL

Cell-Identity-not-valid ::=
                ABSTRACT-ERROR
                PARAMETER Diagnostic-Info OPTIONAL

Unrecognized-primitive ::=
                ABSTRACT-ERROR
                PARAMETER Diagnostic-Info OPTIONAL

Missing-mandatory-element ::=
                ABSTRACT-ERROR
                PARAMETER Diagnostic-Info OPTIONAL

BSS-capacity-exceeded ::=
                ABSTRACT-ERROR
                PARAMETER Diagnostic-Info OPTIONAL

Cell-memory-exceeded ::=
                ABSTRACT-ERROR
                PARAMETER Diagnostic-Info OPTIONAL

BSS-memory-exceeded ::=
                ABSTRACT-ERROR
                PARAMETER Diagnostic-Info OPTIONAL

Unspecified-error ::=
            ABSTRACT-ERROR
            PARAMETER Diagnostic-Info OPTIONAL

Incompatible-DRX-parameter ::=
            ABSTRACT-ERROR
            PARAMETER Diagnostic-Info OPTIONAL

Cell-broadcast-not-supported ::=
            ABSTRACT-ERROR
            PARAMETER Diagnostic-Info OPTIONAL

Cell-broadcast-not-operational ::=
            ABSTRACT-ERROR
            PARAMETER Diagnostic-Info OPTIONAL

Extended-channel-not-supported ::=
            ABSTRACT-ERROR
            PARAMETER Diagnostic-Info OPTIONAL

Message-reference-already-used ::=
            ABSTRACT-ERROR
            PARAMETER Diagnostic-Info OPTIONAL


--  Definition of Cell Broadcast Relay Service address

CBS-Address ::= [APPLICATION 0] SEQUENCE {
    address-type    INTEGER  { unknown-type     (0),
                    international-number        (1),
                    national-number     (2),
                    network-specific-number (3),
                    short-number            (4) },
    numbering-plan  INTEGER { unknown-numbering (0),
                    iSDN-numbering      (1),
                    data-network-numbering  (3),
                    telex-numbering     (4),
                    national-numbering      (8),
```

```
                    private-numbering       (9)}
    address-value   CHOICE { octet-format
                    SemiOctetString
                    --other formats are for further study}
}

SemiOctetString ::= OCTET STRING (SIZE(1..10))
-- each octet contains two binary coded decimal digits

END
```

3rd module of 3

RelayProtocol

```
RelayProtocol {
    ccitt identified-organization (4) etsi (0) mobile-domain(0)
    gsm-messaging (4) gsm-sms4 (13) relayProtocol(1) }

DEFINITIONS

IMPLICIT TAGS
::=
BEGIN

IMPORTS
--  application service elements and application contexts

    aCSE, APPLICATION-SERVICE-ELEMENT, APPLICATION-CONTEXT
FROM Remote-Operations-Notation-extension {
    joint-iso-ccitt  remote-operations(4) notation-extension(2) }

rOSE
FROM Remote-Operations-APDUs {
    joint-iso-ccitt  remote-operations(4) apdus(1) }

--  object identifiers

    id-cb-ac-so, id-cb-CBRSE, id-cb-as-CBRSE,
FROM CBS-UsefulDefinitions{
    ccitt identified-organization (4) etsi (0) mobile-domain(0)
    gsm-messaging(4) gsm-sms4 (13)  usefulDefinitions(0) } ;

    aS-ACSE OBJECT IDENTIFIER ::=
        { joint-iso-ccitt association-control (2) abstractSyntax(1) apdus(0) version(1) }

--  abstract service parameters

    CBR-Bind, CBR-Unbind, CBR-Write-Replace, CBR-Kill,
    CBR-Status-CBCH-Query,
--  $start$(Phase2PBscCellLists)$
    CBR-Status-Message-Query, CBR-Reset, CBR-Restart-Ind, CBR-Restart-Ind-Phase2P,
    CBR-Failure-Ind, CBR-Failure-Ind-Phase2P, CBR-Set-DRX,
--  $end$(Phase2PBscCellLists)$
    Parameter-not-recognized, Parameter-value-invalid,
    Valid-CBS-message-not-identified, Cell-identity-not-valid,
    Unrecognized-primitive,
    Missing-mandatory-element, BSS-capacity-exceeded,
    Cell-memory-exceeded, BSS-memory-exceeded, Unspecified-error, Incompatible-DRX-parameter,
    Cell-broadcast-not-supported, Cell-broadcast-not-operational, Extended-channel-not-supported
FROM RelayAbstractService{
    ccitt identified-organization (4) etsi (0) mobile-domain(0)
    gsm-messaging(4) gsm-sms4(13) relayAbstractService(2) } ;

--  Application contexts

--  Only one application contexts is specified: the CBC is exclusively responsible for the BIND and
--  UNBIND operations.

cBC-BINDs-and-UNBINDs
        APPLICATION-CONTEXT
        APPLICATION-SERVICE-ELEMENTS { aCSE }
        BIND    CBR-Bind
        UNBIND  CBR-Unbind
        REMOTE OPERATIONS { rOSE }
        INITIATOR CONSUMER OF { cBRSE }
        ABSTRACT SYNTAXES { id-cb-as-CBRSE , aS-ACSE }
        ::= id-cb-ac-so

--  Application service elements
```

```
    cBRSE   APPLICATION-SERVICE-ELEMENT
            CONSUMER INVOKES {  CBR-Restart-Ind
--  $start$(Phase2PBscCellLists)$
                             CBR-Restart-Ind-Phase2P
                             CBR-Failure-Ind
                             CBR-Failure-Ind-Phase2P
--  $end$(Phase2PBscCellLists)$
                             CBR-From-BSC-VBind-Request
                             CBR-From-BSC-Bind-Confirm
                             CBR-From-BSC-Bind-Failure
                             CBR-From-BSC-UnBind
                             }
            SUPPLIER INVOKES { CBR-Write-Replace
                         CBR-Kill
                         CBR-Status-CBCH-Query
                         CBR-Status-Message-Query
                         CBR-Reset
                         CBR-Set-DRX
                         CBR-From-BSC-VBind-Request
                         CBR-From-BSC-Bind-Confirm
                         CBR-From-BSC-Bind-Failure
                         CBR-From-BSC-UnBind
                         }
            ::= id-cb-SMRSE

--  Remote operations

cbr-write-replace           CBR-Write-Replace
                        ::= 1
    -- Note:    localValue - words are omitted, since they are
    --  typically not used, and likely to be removed from
    --  the OPERATION and ERROR macros in ROSE.

cbr-kill                        CBR-Kill
                        ::= 2

cbr-status-CBCH-query           CBR-Status-CBCH-Query
                        ::= 3

cbr-status-message-query        CBR-Status-Message-Query
                        ::= 4

cbr-restart-ind                 CBR-Restart-Ind
                        ::= 5

cbr-reset                       CBR-Reset
                        ::= 6

cbr-failure-ind                 CBR-Failure-Ind
                        ::= 7

cbr-set-DRX                     CBR-Set-DRX
                        ::= 8

--  $start$(Phase2PBscCellLists)$
cbr-restart-ind-phase2p CBR-Restart-Ind-Phase2P
                        ::= 9

cbr-failure-ind-phase2p CBR-Failure-Ind-Phase2P
                        ::= 10
--  $end$(Phase2PBscCellLists)$

--  Remote errors, the localValues are provisional

parameter-not-recognized        Parameter-not-recognized
                        ::= 0

parameter-value-invalid         Parameter-value-invalid
                        ::= 2

valid-CBS-message-not-identified    Valid-CBS-message-not-identified
                        ::= 3

cell-identity-not-valid         Cell-identity-not-valid
                        ::= 4

unrecognized-primitive          Unrecognized-primitive
                        ::= 5

missing-mandatory-element       Missing-mandatory-element
                        ::= 6
```

```
bss-capacity-exceeded           BSS-capacity-exceeded
                        ::= 7
cell-memory-exceeded            Cell-memory-exceeded
                        ::= 8
bss-memory-exceeded         BSS-memory-exceeded
                        ::= 9
unspecified-error               Unspecified-error
                        ::= 10
incompatible-DRX-parameter      Incompatible-DRX-Parameter
                        ::= 11
cell-broadcast-not-supported    Cell-broadcast-not-supported
                        ::= 13
cell-broadcast-not-operational  Cell-broadcast-not-operational
                        ::= 14
extended-channel-not-supported  Extended-channel-not-supported
                        ::= 15
message-reference-already-used  Message-reference-already-used
                        ::= 16

END
```

3.3 Application rules

The following application rules specify the invocation of different operations on the association. Two alternative sets of application rules are given in 3.3.1 (for semi-permanent connections) and in 3.3.2 (for transient connections); additional sets are possible.

3.3.1 Application rule set 1 Semi-permanent symmetric connection

This set of application rules is to be used in situations where the connection (on all the protocol layers) between the CBC and the BSC is maintained for ever.

Within the CBR-BIND service, all operations are allowed on the association; semi-permanent connection is accepted (by not forcing the connection transient). This is negotiated within the CBR-BIND service as follows:

```
    name of parameter   value in request and report

    operations      {cBR-From-CBC-Write-Replace,
                    cBR-From-CBC-Kill,
                    cBR-From-CBC-Status-CBCH-Query,
                    cBR-From-CBC-Status-Message-Query,
                    cBR-From-BSC-Restart-Ind,
                    cBR-From-BSC-Reset,
                    cBR-From-BSC-Failure-Ind,
                    cBR-From-CBC-Set-DRX,
                    cBR-From-BSC-VBind-Request,
                    cBR-From-BSC-Bind-Confirm,
                    cBR-From-BSC-Bind-Failure,
                    cBR-From-BSC-UnBind,
--  $start$(Phase2PBscCellLists)$
                    cBR-From-BSC-Restart-Ind-Phase2P,
                    cBR-From-BSC-Failure-Ind-Phase2P
--  $end$(Phase2PBscCellLists)$

                    }

    transient           FALSE
```

`$start$(Phase2PBscCellLists)$`
The CBC invokes cBR-From-CBC-Write-Replace, cBR-From-CBC-Kill, cBR-From-CBC-Status-CBCH-Query, cBR-From-CBC-Status-Message-Query, cBR-From-CBC-Reset, cBR-From-CBC-Set-DRX operations as needed. The BSC invokes cBR-From-BSC-Restart-Ind, cBR-From-BSC-Restart-Ind-Phase2P, cBR-From-BSC-Failure-Ind and cBR-From-BSC-Failure-Ind-Phase2P.

`$end$(Phase2PBscCellLists)$`

The CBR-UNBIND operation is not normally invoked on the association.

3.3.2 Application rule set 2 Transient asymmetric connection

This set of application rules is to be used e.g. in situations where a CBC has connections with many BSCs, and there is a switched data network connecting them. A data network connection (and the higher layer connections on top of it) is maintained for the duration of the relay or alert operations only.

Within the CBR-BIND service, only one type of operation is negotiated for use on the association. The operation of that type must be invoked by the CBC or by the BSC in exceptional circumstances (e.g. in order to invoke CBR-RESET). The BSC or CBC accepts the one type of operation and forces the association transient.

The following is an example of a negotiation procedure within the CBR-BIND service, where the CBR-Write-Replace operation is initiated by the CBC.

```
name of parameter   value

iniType         cell-Broadcast-Service-Centre
respType            public-Land-Mobile-Network
operations      { cBR-From-CBC-Write-Replace }
transient           TRUE
```

The association for cBR-From-CBC-Kill, cBR-From-CBC-Status-CBCH-Query or cBR-From-CBC-Status-Message-Query, cBR-From-CBC-Reset, cBR-From-CBC-Set-DRX are negotiated according to the same principle, the CBC always being the initiator of the CBR-BIND.

The association may be used for invoking operations of the negotiated type(s) as long as there are such operations to be invoked (in other words, until all commands have been relayed).

4 An SS7 Protocol Stack For Interconnecting CBC And BSC

Concepts described in Q.1400 (see CCITT Study Group XI - Report R219) are used. These concepts enable, with minor modifications, the protocol specified in Section 3 of GSM 03.49 to be supported via an SS7 protocol stack.

Q.1400 specifies the use of OSI concepts via SS7 for the development of signalling and operations and management protocols. The protocol specified in Section 3 of this report can be carried via an SS7 protocol stack consisting of TCAP, SCCP and MTP (see Q.700 series) with minor adaptations:

- ROSE operation classes 2 and 5 are replaced by TCAP operation classes 1 and 4 respectively.
- TCAP provides a connectionless service. The services provided by CBRSE-BIND, CBR-UNBIND, CBR-Bind-confirm and CBR-Bind-failure are therefore not required and subclause 3.3 is not applicable.

PLMN networks may provide interworking between either of the protocols specified by clause 2 or 3 and the SS7 protocol stack for the purpose of fulfilling the service requirements of the primitives specified for the CBC - BSC interface in GSM 03.41.

Annex A (informative): Document change history

SPEC	SMG	CR	PHA	VERS	NEW_VE	SUBJECT
03.49	s25	A032	R97	5.7.0	6.0.0	Version Control for the CBC-BSC interface
03.49	s25	A033	R97	5.7.0	6.0.0	Write-Replace ASN.1
03.49	s26	A034	R97	6.0.0	6.1.0	CBC-BSC interface compatibility

History

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