ETSI TS 101 368 V7.0.0 (1999-08)

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 7.0.0 Release 1998)

GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS

Reference

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Foreword

This Technical Specification (TS) has been produced by the Special Mobile Group (SMG).

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

Version 7.x.y

where:

7 indicates GSM Release 1998 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.

The present document 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

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, 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.
- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

[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 the present document 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.

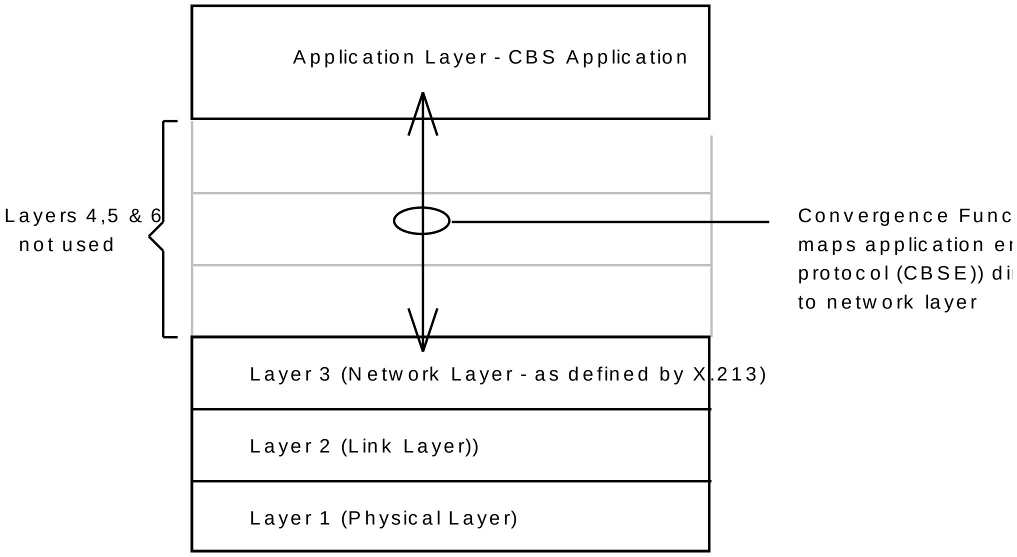


Figure 1

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-IdentifierMessage-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-IdentifierOPTIONAL,
    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

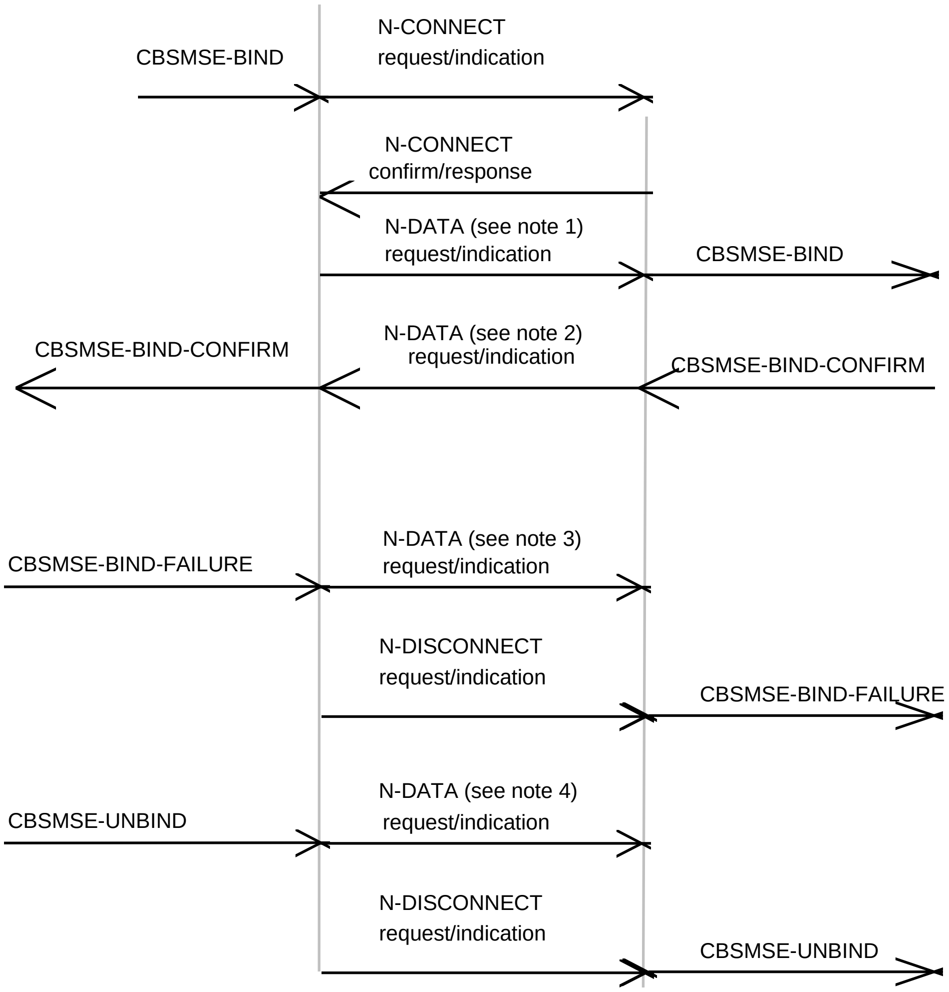
For the purpose of establishing the association between CBSEs in CBC and BSC then either the CBC or the BSC shall be designated as the entity responsible for initiating the association by the operation CBSE-BIND.

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
03.49	s29		R98		7.0.0	Specification version upgrade to Release 1998 version 7.0.0

History

Document history		
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