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## **Digital cellular telecommunications system (Phase 2+); Example protocol stacks for interconnecting Cell Broadcast Centre (CBC) and Base Station Controller (BSC) (GSM 03.49 version 5.5.0)**

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## Contents

Foreword .....	5
1 Scope .....	7
1.1 References .....	7
1.2 Abbreviations .....	8
2 A protocol stack which utilises an application-network layer convergence function for interconnecting CBC and BSC .....	8
2.1 CBSE Definition .....	9
2.2 ASN1 Specification .....	10
2.3 Application Rules for Avoidance of Collision of CBSE Operations .....	14
2.4 Non Support of 128 bytes of NS-user-data in Network Connection and Network Connection Release phases .....	14
3 An OSI Protocol Stack For Interconnecting CBC and BSC .....	16
3.1 Service elements on the application layer .....	16
3.2 Detailed specification of the CBRSE services .....	16
3.3 Application rules.....	26
3.3.1 Application rule set 1 Semi-permanent symmetric connection .....	26
3.3.2 Application rule set 2 Transient asymmetric connection .....	27
4 An SS7 Protocol Stack For Interconnecting CBC And BSC .....	27
History.....	28

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## Foreword

This Global System for Mobile communications Technical Specification (GTS) has been produced by the Special Mobile Group (SMG) of the European Telecommunications Standards Institute (ETSI).

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

Version 5.x.y

where:

- y     the third digit is incremented when editorial only changes have been incorporated in the specification;
- x     the second digit is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

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## 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 Global System for Mobile communications Technical Specification (GTS) 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

This GTS incorporates by dated and undated reference, provisions from other publications. These references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this GTS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- [1] GSM 01.04 (ETR 350): "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2] GSM 03.41 (ETS 300 902): "Digital cellular telecommunications system (Phase 2+); Technical realization of Short Message Service Cell Broadcast (SMSCB)".
- [3] GSM 12.20 (ETS 300 622): "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".

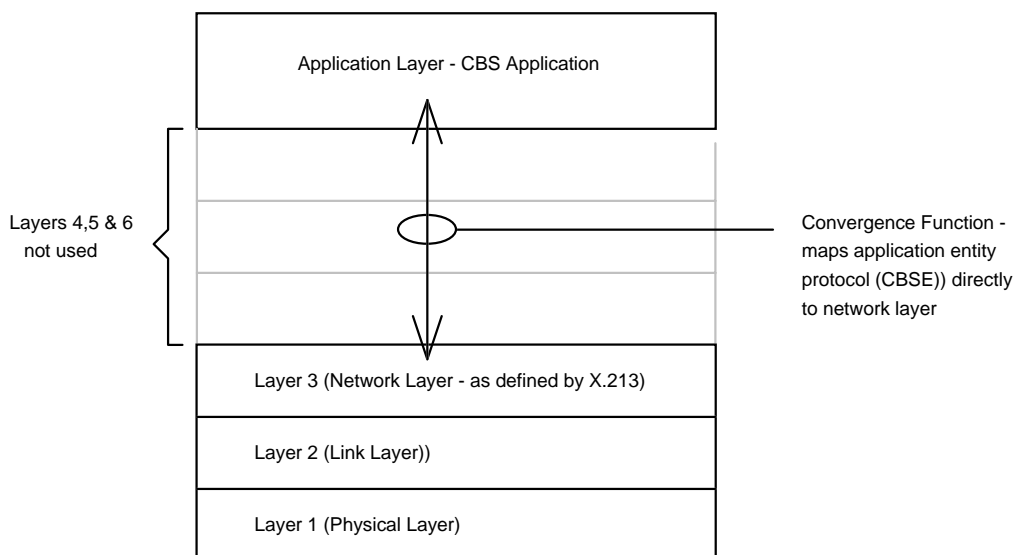
- [13] CCITT Recommendation X.217: "Association control service definition for open systems interconnection for CCITT applications".
- [14] CCITT Recommendation X.219: " Remote operations: model, notation and service definition".
- [15] CCITT Recommendation X.225: "Session protocol specification for 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".

**1.2 Abbreviations**

Abbreviations used in this GTS 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 section 2.4).

### 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).

### 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 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 may be carried by the N-DATA request/indication preceding N-DISCONNECT - see Section 2.4 ).

### CBSE-WRITE-REPLACE, CBSE-KILL-MESSAGE, CBSE-REPORT,

CBSE-STATUS-CBCH-QUERY, CBSE-STATUS-CBCH-QUERY-RESP., CBSE-STATUS-MESS.-QUERY, CBSE-STATUS-MESS.-QUERY-RESP., CBSE-REJECT, CBSE-BSC-RESTART, CBSE-SET-DRX. CBSE-SET-DRX-RESP

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

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 be carried in the User Data field of the N-CONNECT  
-- request/indication message.

```
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

```
Name ::= SEQUENCE {
  operator [0] Operator OPTIONAL,
  bilateralAgree [1] BilateralAgree OPTIONAL,
  dataNetworkAddress [2] X121Address OPTIONAL,
  isDNAddress [3] CBS-Address OPTIONAL
}
```

-- operator is a text string containing the name of the CBC/PLMN operator. bilateralagree 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))

X121Address ::= 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),
                              SDN-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))

-- 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 1**

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.

```

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

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-MESSAGE       [2] Kill-Message,
  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-BSC-RESTART        [9] BSC-Restart,
  cbse-RESET               [10] Reset,
  cbse-FAILURE-IND         [11] Failure-Ind
  cbse-SET-DRX             [12] Set-DRX,
  cbse-SET-DRX-RESP       [13] Set-DRX-Resp
}

Write-Replace ::= SEQUENCE {
  message-Identifier      INTEGER (0 .. 65535),
  new-Serial-Number       Serial-Number,
  no-of-Pages             INTEGER (1 .. 15),
  data-coding-scheme      INTEGER (0 .. 255),
  cell-list               Cell-List,
  repetition-Rate         INTEGER (1 .. 1024),
  no-of-broadcast-req     INTEGER (0 .. 65535),
  cbs-Page-Inf            SEQUENCE OF Page-Inf,
  old-Serial-Number       [3] Serial-Number OPTIONAL,
  category                [2] Category OPTIONAL,
  channel-indicator       [4] Channel OPTIONAL
}

Channel ::= INTEGER {
  basic channel (0),
  extended channel (1),
}

Page-Inf ::= SEQUENCE {
  message-info-useful-octets INTEGER (0..82),
  message-info-page         Message-Info-Page
}

Category ::= INTEGER {
  high-priority (0),
  normal-priority (1),
  background (2)
}

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

Cell-Id-Disc ::= OCTET-STRING (SIZE(1))
-- values from the following table

lacAndCi ::= '00000001' -- 2 Octet lac followed by 2 Octet Cell Id
ciOnly ::= '00000010' -- Cell Id only
lacOnly ::= '00000101' --2 Octet LAC only, all cells in this LAC
allCells ::= '00000110' -- all cells in this BSS

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

Cell ::= SEQUENCE OF {
  disc Cell-Id-Disc,
  id Cell-Id
}

Cell-List ::= SEQUENCE {
  length INTEGER, -- number of cells in the list
  disc Cell-Id-Disc,
  list SEQUENCE OF Cell-Id
}

Serial-Number ::= INTEGER (0 .. 65535)

Kill-Message ::= SEQUENCE {
  message-Identifier      INTEGER (0 .. 65535),
  old-Serial-Number       Serial-Number,
  cell-List               Cell-List,
}
```

```

channel-indicator      [4] Channel    OPTIONAL
}

Report ::= SEQUENCE {
  message-Identifier    INTEGER (0 .. 65535),
  serial-Number         Serial-Number
  [0] SEQUENCE OF SEQUENCE {
    cell-id             Cell,
    no-of-broadcasts-compl INTEGER
  } OPTIONAL,
  [1] SEQUENCE OF SEQUENCE {
    cell-id             Cell,
    cause               Failure-Reason,
    diagnostic           Diagnostic-Info OPTIONAL
  } OPTIONAL,
  channel-indicator    [4] Channel    OPTIONAL
}

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

Status-CBCH-Resp ::= SEQUENCE{
  [0] SEQUENCE OF SEQUENCE{
    cell-id             Cell,
    cbch-loading        INTEGER(0..100)

    -- indicates the predicted short term load, expressed as a percentage
    -- (min:0, max: 100)

  } OPTIONAL,
  [1] SEQUENCE OF SEQUENCE{
    cell-id             Cell,
    cause               Failure-Reason,
    diagnostic           Diagnostic-Info OPTIONAL
  } OPTIONAL,
  channel-indicator    [4] Channel    OPTIONAL
}

Status-Message ::= SEQUENCE {
  message-Identifier    INTEGER (0..65535),
  current-Serial-No     Serial-Number,
  cell-List             Cell-List,
  channel-indicator     [4] Channel    OPTIONAL
}

Status-Mess-Resp ::= SEQUENCE {
  message-Identifier    INTEGER (0 .. 65535),
  old-serial-number     Serial-Number,
  [0] SEQUENCE OF SEQUENCE {
    cell-id             Cell,
    no-of-broadcasts-compl INTEGER
  } OPTIONAL,
  [1] SEQUENCE OF SEQUENCE {
    cell-id             Cell,
    cause               Failure-Reason,
    diagnostic           Diagnostic-Info OPTIONAL
  } OPTIONAL,
  channel-indicator     [4] Channel    OPTIONAL
}

Reject ::= SEQUENCE {
  cause                 Failure-Reason,
  diagnostic             Diagnostic-Info OPTIONAL,
  message-Identifier     INTEGER (0 .. 65535) OPTIONAL,
  serial-Number          Serial-Number OPTIONAL
}

Failure-Reason ::= INTEGER {
  parameter-not-recognised (0),
  (1), -- not used
  parameter-value-invalid (2),
  valid-CBS-message-not-identified (3),
  cell-identity-not-valid (4),
  unrecognised-message (5),
  missing-mandatory-element (6),
  bss-capacity-exceeded (7),
  cell-memory-exceeded (8),
  bss-memory-exceeded (9),
  unspecified-error (10),
  incompatible-DRX-parameter (11),
  cell-not-empty (12)
}

```

```

Diagnostic-Info ::= OCTET STRING (SIZE (1..20))

BSC-Restart ::= SEQUENCE {
  cell-list          Cell-List,
  recovery-Indication Recovery OPTIONAL
}

Recovery ::= BOOLEAN {
  Data-available TRUE,
  Data-lost      FALSE
}

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

Set-DRX ::= SEQUENCE {
  cell-list          Cell-List,
  schedule-Period   INTEGER (0 .. 48) OPTIONAL,
  reserved-slots    [2] INTEGER (0 .. 48) OPTIONAL,
  channel-indicator [4] Channel OPTIONAL
}

Set-DRX-Resp ::= SEQUENCE {
  cell-list          Cell-List,
  SEQUENCE OF SEQUENCE {
    cell-id          Cell,
    cause            Failure-Reason} OPTIONAL,
  channel-indicator [4] Channel OPTIONAL
}

Failure-Ind ::= SEQUENCE {
  cell-list Cell-List
}

END

```

### 2.3 Application Rules for Avoidance of Collision of CBSE Operations

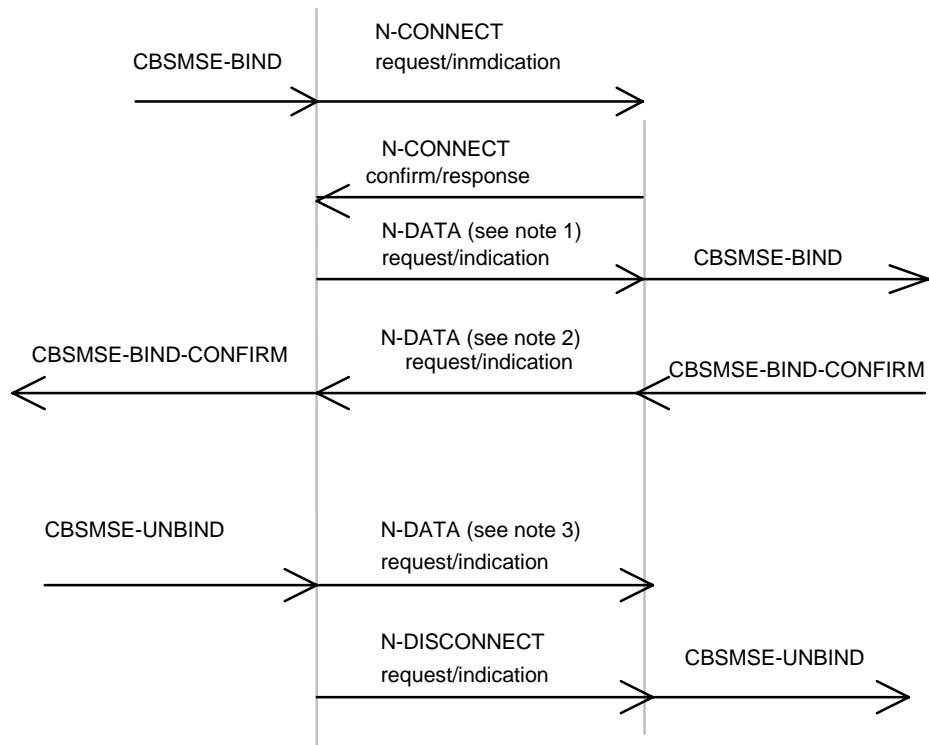
For the purpose of establishing the association between CBSEs in CBC and BSC then either the CBC or the BSC shall be designated as the entity responsible for initiating the association by the operation CBSE-BIND.

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 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-UNBIND parameters are carried as NS-user-data

Figure 2

### 3 An OSI Protocol Stack For Interconnecting CBC and BSC

This section 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 section, and then specified in ASN.1 notation in section 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-MESSAGE, 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.

**CBR-RESTART, CBR-FAILURE**

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

**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-MESSAGE 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
        CBR-Failure
    }
    SUPPLIER INVOKES { CBR-Write-Replace
        CBR-Kill-Message
        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

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,
    bilateralAgreeem [1] BilateralAgreeem OPTIONAL,
    dataNetworkAddress [2] X121Address OPTIONAL,
    iSDNAddress       [3] CBS-Address OPTIONAL
}

-- operator is a text string containing the name of the CBC/PLMN operator. bilateralAgreeem 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))

BilateralAgreeem ::= PrintableString (SIZE(0..ub-agreeem-name-length))

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

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

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

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-Message (1),
    cBR-From-CBC-Status-CBCH-Query (2),
    cBR-From-CBC-Status-Message-Query (3),
    cBR-From-BSC-Restart (4),
    cBR-From-CBC-Reset (5),
    cBR-From-BSC-Failure (6)
    cBR-From-CBC-Set-DRX (7)
    -- 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.}
```

```
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 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 (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.

```
--
```

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

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

```
-- The CBR-Write-Replace operation
```

```
CBR-Write-Replace ::=
    ABSTRACT-OPERATION
    ARGUMENT Write-Replace
    RESULT Report-Success
    ERRORS {Parameter-not-recognized,
    Parameter-value-invalid,
    Valid-CBS-message-not-identified,
    Cell-identity-not-valid,
    Unrecognized-message,
    Missing-mandatory-element,
    BSS-capacity-exceeded,
    Cell-memory-exceeded,
    BSS-memory-exceeded,
    Unspecified-error
}
```

```
-- The CBR-Kill-Message operation
```

```
CBR-Kill-Message ::=
    ABSTRACT-OPERATION
    ARGUMENT Kill-Message
    RESULT Report-Success
    ERRORS {Parameter-not-recognized,
    Parameter-value-invalid,
    Unrecognized-message,
    Missing-mandatory-element,
    Unspecified-error
}
```



```

        Incompatible-DRX-parameter,
        cell-not-empty
    }

-- CBR operation ARGUMENT lists

Write-Replace ::= SEQUENCE {
    message-identifier    INTEGER (0 .. 65535),
    new-serial-number     Serial-Number,
    no-of-pages           INTEGER (1 .. 15),
    data-coding-scheme    INTEGER (0 .. 255),
    cell-list             Cell-List,
    repetition-rate       INTEGER (1 .. 1024),
    no-of-broadcast-req   INTEGER (0 .. 65535),
    cBS-page-info         SEQUENCE OF Page-Inf,
    old-serial-number     [1] Serial-Number    OPTIONAL,
    category              INTEGER (0..2)      OPTIONAL,
    channel-indicator     [2] Channel          OPTIONAL
}

Kill-Message ::= SEQUENCE {
    message-identifier    INTEGER (0 .. 65535),
    old-serial-number     Serial-Number,
    cell-list            Cell-List,
    channel-indicator    [2] Channel          OPTIONAL
}

Status-CBCH-Request ::= SEQUENCE {
    cell-list            Cell-List,
    channel-indicator    [2] Channel          OPTIONAL
}

Status-Message-Request ::= SEQUENCE {
    message-identifier    INTEGER (0 .. 65535),
    old-serial-no        Serial-Number,
    channel-indicator    [2] Channel          OPTIONAL
}

Restart-Indication ::= SEQUENCE {
    cell-list            Cell-List,
    recovery-Indication  BOOLEAN            OPTIONAL
}

Failure-Indication ::= SEQUENCE{
    cell-list            Cell-List
}

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

Set-DRX ::= SEQUENCE {
    cell-list            Cell-List          OPTIONAL,
    schedule-Period      INTEGER (0 .. 48)  OPTIONAL,
    reserved-slots       INTEGER (0 .. 48)  OPTIONAL,
    channel-indicator    [2] Channel        OPTIONAL
}

-- CBR operation RESULT list

Report-Success ::= SEQUENCE {
    message-identifier    INTEGER (0 .. 65535),
    serial-number         Serial-Number,
    [0] SEQUENCE OF SEQUENCE{
        cell-id           Cell,
        no-of-broadcasts-compl  INTEGER
    }OPTIONAL,
    [1] SEQUENCE OF SEQUENCE{
        cell-id           Cell,
        cause             Failure-Reason,
        diagnostic        Diagnostic-Info  OPTIONAL
    }OPTIONAL,
    channel-indicator    [2] Channel        OPTIONAL
}

Status-CBCH-Response ::= SEQUENCE{
    [0] SEQUENCE OF SEQUENCE {
        cell-id           Cell,
        cbch-loading      INTEGER (0..1019)
        -- indicates the total number of messages broadcast
        -- across the air interface within last 32
        -- minutes (min: 0, max: 1019)
    }OPTIONAL
    [1] SEQUENCE OF SEQUENCE{

```

```

        cell-id          Cell,
        cause            Failure-Reason,
        diagnostic       Diagnostic-Info OPTIONAL
    }OPTIONAL,
    channel-indicator   [2] Channel    OPTIONAL
}

Status-Message-Response ::= SEQUENCE {
    message-identifier  INTEGER (0 .. 65535),
    old-serial-number   Serial-Number,
    [0] SEQUENCE OF SEQUENCE {
        cell-id         Cell,
        no-of-broadcasts-compl  INTEGER
    }OPTIONAL
    [1] SEQUENCE OF SEQUENCE{
        cell-id         Cell,
        cause           Failure-Reason,
        diagnostic       Diagnostic-Info OPTIONAL
    }OPTIONAL,
    channel-indicator   [2] Channel    OPTIONAL
}

Set-DRX-Response ::= SEQUENCE {
    cell-list           Cell-List      OPTIONAL,
    SEQUENCE OF SEQUENCE{
        cell-id         Cell,
        cause           Failure-Reason} OPTIONAL,
    channel-indicator   [2] Channel    OPTIONAL
}

-- 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-message ::=
    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

Serial-Number ::= INTEGER (0 .. 65535)

Page-Inf ::= SEQUENCE{
    message-info-useful-octets  INTEGER (0..82),
    message-info-page          Message-Info-Page
}

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

```

```
Cell-Id-Disc ::= OCTET-STRING (SIZE(1))
-- values from the following table
```

```
lacAndCi    ::= '00000001' --2 Octet lac followed by 2 Octet Cell Id
ciOnly      ::= '00000010' --Cell Id only
lacOnly     ::= '00000101' --2 Octet LAC only, all cells in this LAC
allCells    ::= '00000110' -- all cells in this BSS
```

```
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.
```

```
Cell ::= SEQUENCE OF {
  disc      Cell-Id-Disc,
  id        Cell-Id
}
```

```
Cell-List ::= SEQUENCE {
  length    INTEGER,
  disc      Cell-Id-Disc,
  list      SEQUENCE OF Cell-Id
}
```

```
Diagnostic-Info ::= OCTET STRING (SIZE (1 .. 20))
```

```
-- 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-Message,
  CBR-Kill-Message, CBR-Status-CBCH-Query,
  CBR-Status-Message-Query, CBR-Reset, CBR-Restart,
  CBR-Failure, CBR-Set-DRX,
  Parameter-not-recognized, Parameter-value-invalid,
  Valid-CBS-message-not-identified, Cell-identity-not-valid,
  Unrecognized-message,
  Missing-mandatory-element, BSS-capacity-exceeded,
  Cell-memory-exceeded, BSS-memory-exceeded, Unspecified-error, incompatible-DRX-parameter
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
    CBR-Failure
  }
  SUPPLIER INVOKES { CBR-Write-Replace
    CBR-Kill-Message
    CBR-Status-CBCH-Query
    CBR-Status-Message-Query
    CBR-Reset
    CBR-Set-DRX
  }
  ::= 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-message          CBR-Kill-Message
                           ::= 2

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

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

cbr-restart              CBR-Restart
                           ::= 5

cbr-reset                CBR-Reset
                           ::= 6

cbr-failure              CBR-Failure
                           ::= 7

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

-- Remote errors, the localValues are provisional

parameter-not-recognized  Parameter-not-recognized
                           ::= 1

parameter-value-invalid   Parameter-value-invalid
                           ::= 3

valid-CBS-message-not-identified  Valid-CBS-message-not-identified
                           ::= 4

cell-identity-not-valid   Cell-identity-not-valid
                           ::= 5

unrecognized-message      Unrecognized-message
                           ::= 6

missing-mandatory-element  Missing-mandatory-element
                           ::= 7

bss-capacity-exceeded     BSS-capacity-exceeded
                           ::= 8

cell-memory-exceeded      Cell-memory-exceeded
                           ::= 9

bss-memory-exceeded       BSS-memory-exceeded
                           ::= 10

unspecified-error         Unspecified-error
                           ::= 11

incompatible-DRX-parameter  Incompatible-DRX-Parameter
                           ::= 12

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-Message,
cBR-From-CBC-Status-CBCH-Query,
cBR-From-CBC-Status-Message-Query,
cBR-From-BSC-Restart,
cBR-From-BSC-Reset,
cBR-From-BSC-Failure
cBR-From-CBC-Set-DRX
}

transient          FALSE

```

The CBC invokes cBR-From-CBC-Write-Replace, cBR-From-CBC-Kill-Message, cBR-From-CBC-Status-CBCH-Query, cBR-From-CBC-Status-Message-Query, cBR-From-CBC-Set-DRX operations as needed. The BSC invokes CBR-BSC-RESTART.

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-BSC-RESTART). 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-Message, cBR-From-CBC-Status-CBCH-Query or cBR-From-CBC-Status-Message-Query, 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 Sections 3.3 is not applicable.

PLMN networks may provide interworking between either of the protocols specified by Sections 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.

## History

<b>Document history</b>	
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