

ETSI/TC SMG

Date : April 1992

Released by : ETSI/PT 12

UPDATE NOTE

Recommendation GSM 07.02

**Terminal Adaptation Functions for Services using
Asynchronous Bearer Capabilities**

Released version February 1992: 3.7.1

Updated version April 1992: 3.8.0

1. Reason for Change

Change Request 07.02-12 GSM Phase 1 - approved at SMG#2 - is included.

2. Details of Change

Pages 5 and 6 have been changed and shall be replaced by the attached updated pages marked with the new version number and "Updated April 1992". The front sheet of the specification has also been updated to highlight the new version number.

In addition, the attached 'Document Change Control Record' (a list with the "history" of the recommendation) should be appended to the recommendation, and PT12 will update it when necessary.

3. Instructions to update GSM Recommendation

to remove		to insert	
old pages	no. of sheets	new pages	no. of sheets
		Document Change Control Record	1 1)
1 and 2	1	1 and 2	1
5 and 6	1	5 and 6	1

1) To be inserted after Release Note

The version 3.7.1 together with these changes constitutes version 3.8.0.

ETSI/TC SMG

Date : April 1992

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DOCUMENT CHANGE CONTROL RECORD

Recommendation GSM 07.02

**Terminal Adaptation Functions for Services using
Asynchronous Bearer Capabilities**

Released version February 1992: 3.7.1

Updated version April 1992: 3.8.0

Subject	Decided at	Pages Marked	Doc GSM	Pages affected
Change Request				
N° GSM 07.02-12	SMG#2	April 92	169/92	5, 6

END OF DOCUMENT CHANGE CONTROL RECORD

ETSI/GSM

Released by: ETSI PT12

Date: April 1992

Recommendation: GSM 07.02

Title: TERMINAL ADAPTATION FUNCTIONS (TAF) FOR SERVICES USING
ASYNCHRONOUS BEARER CAPABILITIES

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- 0. Scope of Recommendation
 - 1. Reference Configurations
 - 1.1. Customer Access Configurations
 - 1.2. Terminal Adaptation Function
 - 2. Terminal Adaptation Functions for Transparent Services
 - 2.1. Rate Adaptation
 - 2.2. Interchange Circuit Signalling Mapping
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 - 4.1. Mobile Originated Calls
 - 4.2. Mobile Terminated Calls
 - 5. Functionalities for the Support of Dedicated PAD Services
- Annex: Layer-2 Relay Functionality

Original Language: English

Number of Pages: 17

0. SCOPE

This recommendation defines the interfaces and Terminal Adaptation Functions (TAF) integral to a Mobile Termination (MT) which enables the attachment of asynchronous terminals to a MT (see recommendation GSM 04.02). The general aspects of Terminal Adaptation Functions are contained in recommendation GSM 07.01. This recommendation covers support of these services for the following interfaces and procedures:

- (i) V.21 DTE/DCE interface
- (ii) V.22 DTE/DCE interface
- (iii) V.23 DTE/DCE interface
- (iv) I.420 S interface
- (v) V.25 bis procedures

The asynchronous data rates between the MT and the TE2 are defined in recommendation GSM 02.02.

1. REFERENCE CONFIGURATION

Recommendations GSM 07.01 and GSM 04.02 describe the basic reference configurations.

1.1. Customer Access Configuration

This configuration is as shown in Figure 1 of recommendation GSM 04.02. This recommendation specifically refers to the Mobile Terminations (MTs) which support terminals of the type TE1 and TE2 with asynchronous capabilities. The TAF is functionally a part of an MT1, MT2 or MT0 with an integral asynchronous data capability.

1.2. Terminal Adaptation Function

The TAF provides facilities to allow manual or automatic call control functions associated with alternate speech/data, speech followed by data and circuit switched services. The following functions are also included:

- Conversion of electrical, mechanical, functional and procedural characteristics of the V series and ISDN type interfaces to those required by the PLMN.
- Bit rate adaptation of the V series data signalling rates and the ISDN 64 kbit/s to that provided in the PLMN.
- The mapping functions necessary to convert automatic calling and/or automatic answering procedures of recommendation V 25 bis and parameters for asynchronous operation.
- The mapping functions necessary to convert S interface signalling to the PLMN D_m channel signalling.

2.3.2. S Interface (I.420) Signalling Mapping

The mapping of Q.931 signalling to GSM 04.08 signalling requires the inclusion, by the MT, of PLMN specific elements (e.g. transparent or not, half/full rate channel). For asynchronous Bearer services, requests for bearer capabilities not listed in Table 4 (or where the "Users information layer 1 protocol" element does not indicate V.110) will result in call rejection.

2.3.3. Call Establishment Manual Operation - Utilizing Alternate Speech/Data or Speech Followed By Data Capabilities

During manual call establishment, the mobile user shall be able to hear network supervisory tones and answer tone.

On hearing answer tone, the user invokes the transition from speech to data in both the MS and the IWF. The mapping for this is shown in section 4.

2.3.4. Call Establishment Manual Operation - Utilizing the Unrestricted Digital Capability

In this case the user will not hear network supervisory tones or answer tone. The data transfer phase will be entered automatically.

3. TERMINAL ADAPTATION FUNCTIONS FOR NON TRANSPARENT SERVICES

The V.24 interface shall provide inband (XON/XOFF) and out of band (CT106) flow control. The use of CT105 for out of band flow control shall be implemented according to CCITT Rec. V.42.

3.1. Data Structure

3.1.1. Data Structure on S Interface

The protocol model for this is described in case 3a of recommendation GSM 03.10. The data structure will be according to CCITT V.110.

3.1.2. Data Structure on R Interface

The protocol model for this is described in case 3b of recommendation GSM 03.10. The data will consist of 7 or 8 bit characters with additional start and stop elements. The bit data can additionally have an associated parity bit, 8 bit data cannot have an additional parity bit.

3.1.3. Data Structure Provided by the L2R Function to the RLP Function

See Annex 1.

3.2. Signalling Mapping

This is identical to the transparent case with the exception of the transparent/non-transparent element, see section 4.

In addition, the L2R/RLP will give an explicit indication when the link into the connected network is established. If the link fails, an explicit "link lost" indication will be given. The mapping of these procedures to the V.24 interface is defined in Annex 1.

3.3. Flow Control

The passage of flow control information between L2Rs is described in Annex 1. Sections 3.3.1, 3.3.2 and 3.3.3 describe the operation of the flow control mechanisms. These mechanisms apply for all the non-transparent services covered by this recommendation, with the exception of Videotex profile 3 which is treated in section 3.3.4.

The Flow Control function chosen will be dependent upon the information contained in the user information layer 2" information element of the GSM BC. Where XON/XOFF, or RTS/CTS flow control is indicated then the IWF will select inband or outband flow control respectively. Where "Videotex profile 3" is indicated neither form of flow control is invoked.

3.3.1. Conditions Requiring Flow Control towards the Network

The L2R function will send immediately a "flow control active" indication in the following circumstances:

- (i) If the receive buffer from the radio side reaches a preset threshold.
- (ii) If local flow control is initiated by the TE2 (see section 3.3.3 a) or c)). On receipt of this flow control indication transmission of data from the receive buffer towards the TE2 is halted.

On removal of the buffer congestion or local flow control the L2R will send a "flow control inactive" indication.

In addition, for the local flow control condition, transmission of data from the receive buffers will be restarted.

3.3.2. Conditions Requiring Flow Control towards TE2

The L2R functions will immediately activate local flow control (see section 3.3.3 b) or d)) under the following circumstances:

- (i) The transmit buffer reaches a pre-set threshold.
- (ii) The L2R receives a "flow control active" indication.

On removal of buffer congestion or receipt of L2R/RLP "flow control inactive" the local flow control will be removed.

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RELEASE NOTE

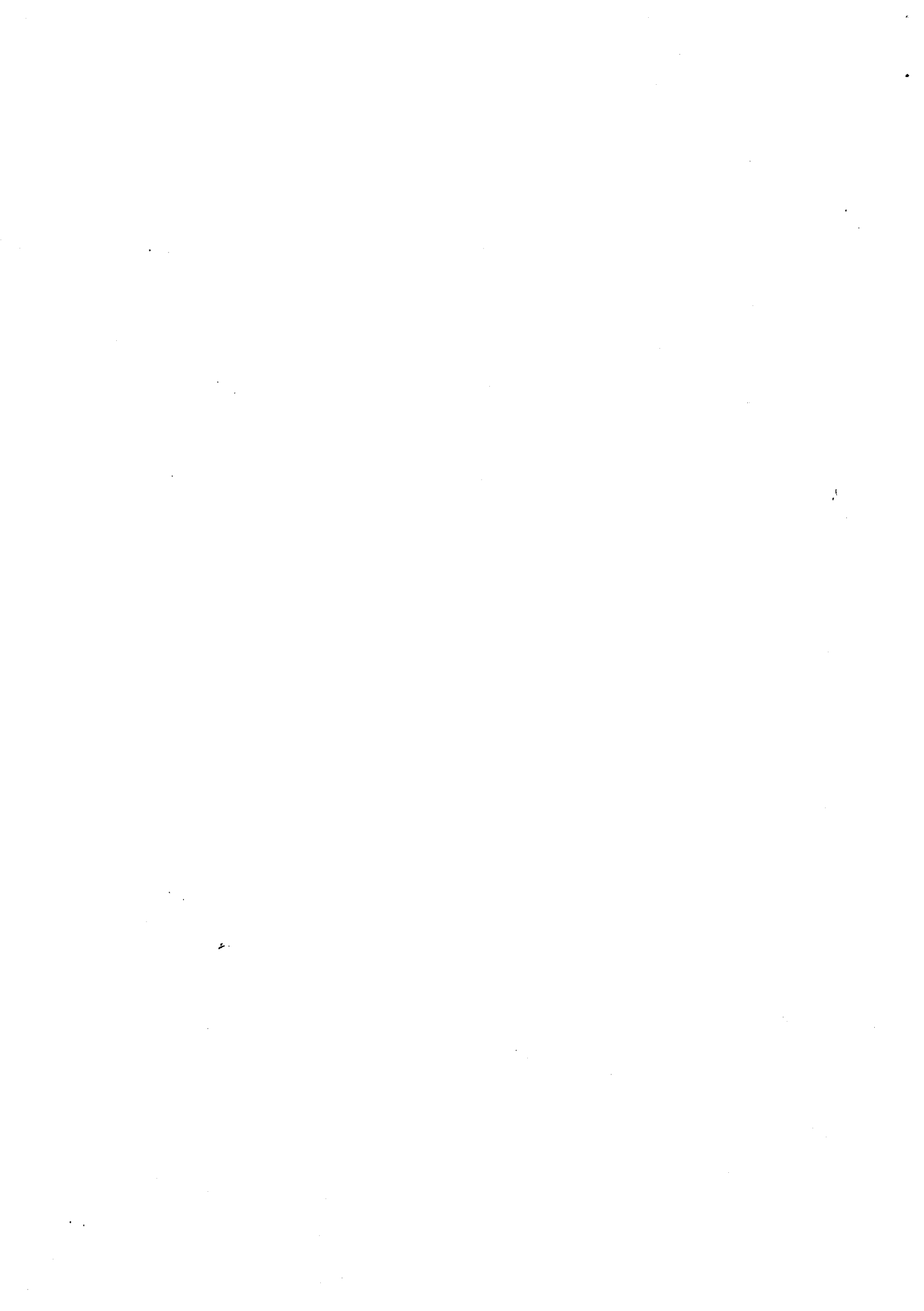
Recommendation GSM 07.02

**Terminal Adaptation Functions for Services using
Asynchronous Bearer Capabilities**

Previously distributed version : 3.7.0 (Updated Release 1/90)
New Released version February 92 : 3.7.1 (Release 92, Phase 1)

1. Reason for changes

Only pagenumbering has been changed since the previously distributed version.



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Foreword

This second Final draft Interim European Telecommunication Standard (I-ETS) has been produced by the Special Mobile Group (SMG), a Technical Committee of the European Telecommunications Standards Institute (ETSI).

The final drafts dealing with the GSM system were adopted by vote in May 1991 but were not published. This was because amendments, agreed by ETSI TC-SMG at subsequent meetings, were made to some of the drafts. However, other drafts have not been amended since the first vote.

This updated draft is now considered to be stable enough for submission to second vote.

This I-ETS specifies the Mobile Termination (MT) interfaces and Terminal Adaptation functions which enable the attachment of asynchronous terminals to MT's within the European digital cellular telecommunications system (phase 1).

Reference is made within this I-ETS to the following technical specifications (NOTE 1):

GSM 02.02	Bearer services supported by a GSM PLMN.
GSM 03.02	Network architecture.
GSM 03.10	PLMN connection types.
GSM 04.02	GSM PLMN access reference configuration.
GSM 04.08	Mobile radio interface - layer 3 specification.
GSM 04.21	Rate adaptation on the Mobile Station - Base Station System (MS-BSS) interface.
GSM 04.22	Radio link protocol for data and telematic services on the MS-BSS interface.
GSM 07.02	Terminal adaptation functions for services using asynchronous bearer capabilities.
GSM 07.03	Terminal adaptation functions for services using synchronous bearer capabilities.

The above specifications, together with annex 1 of this standard, are normative.

NOTE 1: ETSI has constituted stable and consistent documents which give technical specifications for the implementation of the European digital cellular telecommunications system. Historically, these documents have been identified as "GSM recommendations".

Some of these recommendations may subsequently become Interim European Telecommunication Standards (I-ETSs) or European Telecommunication Standards (ETSs), whilst the others will be renamed ETSI-GSM Technical Specifications. These ETSI-GSM Technical Specifications are, for editorial reasons, still referred to as GSM recommendations in some current GSM documents.

The numbering and version control system used for ETSI-GSM Technical Specifications is the same as that used for GSM recommendations.

NOTE 2: Items in this draft indicated as not complete, or requiring further study or work, are not required for the Phase 1 implementation of the European digital cellular telecommunications system.



ETSI/GSM

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Date: February 1992

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- Annex: Layer-2 Relay Functionality

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0. SCOPE

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- (i) V.21 DTE/DCE interface
- (ii) V.22 DTE/DCE interface
- (iii) V.23 DTE/DCE interface
- (iv) I.420 S interface
- (v) V.25 bis procedures

The asynchronous data rates between the MT and the TE2 are defined in recommendation GSM 02.02.

1. REFERENCE CONFIGURATION

Recommendations GSM 07.01 and GSM 04.02 describe the basic reference configurations.

1.1. Customer Access Configuration

This configuration is as shown in Figure 1 of recommendation GSM 04.02. This recommendation specifically refers to the Mobile Terminations (MTs) which support terminals of the type TE1 and TE2 with asynchronous capabilities. The TAF is functionally a part of an MT1, MT2 or MT0 with an integral asynchronous data capability.

1.2. Terminal Adaptation Function

The TAF provides facilities to allow manual or automatic call control functions associated with alternate speech/data, speech followed by data and circuit switched services. The following functions are also included:

- Conversion of electrical, mechanical, functional and procedural characteristics of the V series and ISDN type interfaces to those required by the PLMN.
- Bit rate adaptation of the V series data signalling rates and the ISDN 64 kbit/s to that provided in the PLMN.
- The mapping functions necessary to convert automatic calling and/or automatic answering procedures of recommendation V 25 bis and parameters for asynchronous operation.
- The mapping functions necessary to convert S interface signalling to the PLMN D_m channel signalling.

- Flow control (in some cases resulting in non-transparency of data as described in section 3.3).
- Layer 2 Relaying (see Annex 1).
- In-call modification function.
- Synchronization procedure, which means the task of synchronizing the entry to and the exit from the data transfer phase between two user terminals. This is described in GSM 07.01.
- Filtering of channel control information as described in GSM 07.01.
- Terminal compatibility checking

2. TERMINAL ADAPTATION FUNCTIONS FOR TRANSPARENT SERVICES

Recommendation GSM 03.10 refers to the connection types supporting the transparent services.

2.1. Rate Adaptation

Recommendation GSM 04.21 describes the rate adaptation scheme to be utilized over the Base Station (BS) to Mobile Station (MS) link. Recommendation GSM 03.10 refers to the rate adaptation elements to be provided in the MS.

2.1.1. Rate Adaptation - V series

This is provided as indicated in recommendation GSM 04.21.

2.1.2. Rate Adaptation - S Interface (I.420)

The ISDN rate adapted frame format is modified to the PLMN rate adapted format as indicated in recommendation GSM 04.21.

2.2. Interchange Circuit Signalling Mapping

2.2.1. V.21, V.22 and V.23 Interchange Circuits Mapping

The interface between the TE2 and the MT shall conform to CCITT V.24. The signals required at this interface are shown in Table 2.

- a) Signal levels at the interface shall conform to CCITT V.28.
- b) Interface function to status bit mapping.

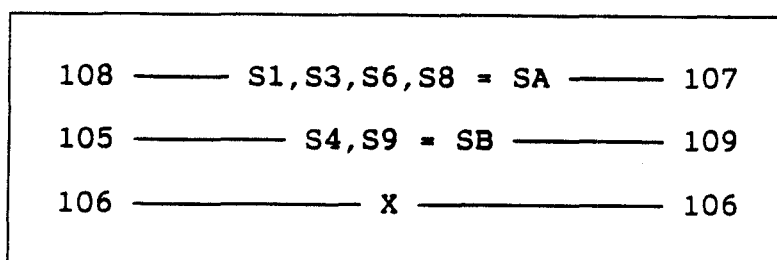
Recommendation GSM 04.21 refers to the frame structure and identifies the use of the status bits for the carriage of signalling information.

Status bits (S1,S3,S4,S6,S8,S9 and X):

The bits S and X are used to convey channel control information associated with the data bits in the data transfer stage as shown below. The S bits are put into two groups SA and SB to carry the condition of two interchange circuits. The X bit is used to carry the condition of circuit 106.

The mechanism for proper assignment of the control information from the transmitting signal rate adapter interface via these bits to the receiving signal rate adapter interface is shown below in Table 1.

For the S and X bits, a ZERO corresponds with the ON condition, a ONE with the OFF condition.



TE —> IWF

IWF —> TE

Table 1: General mapping scheme for V.21, V.22 and V.23 interchange circuits.

2.3. Call Establishment Signalling Mapping

2.3.1. Autocalling/answering

The mapping of the V.25 bis procedures to the messages of the PLMN signalling in recommendation GSM 04.08 is defined in section 4.

a) Auto Calling

This procedure is provided according to V.25 bis using only 108/2.

A subset of V.25 bis is shown in Table 3. This subset gives minimum level of control and indication.

During the call establishment phase, i.e. after signalling, call tone according to V.25 bis shall be generated in the IWF.

b) Auto Answer

This procedure is provided according to V.25 bis.

2.3.2. S Interface (I.420) Signalling Mapping

The mapping of Q.931 signalling to GSM 04.08 signalling requires the inclusion, by the MT, of PLMN specific elements (e.g. transparent or not, half/full rate channel). For asynchronous Bearer services, requests for bearer capabilities not listed in Table 4 (or where the "Users information layer 1 protocol" element does not indicate V.110) will result in call rejection.

2.3.3. Call Establishment Manual Operation - Utilizing Alternate Speech/Data or Speech Followed By Data Capabilities

During manual call establishment, the mobile user shall be able to hear network supervisory tones and answer tone.

On hearing answer tone, the user invokes the transition from speech to data in both the MS and the IWF. The mapping for this is shown in section 4.

2.3.4. Call Establishment Manual Operation - Utilizing the Unrestricted Digital Capability

In this case the user will not hear network supervisory tones or answer tone. The data transfer phase will be entered automatically.

3. TERMINAL ADAPTATION FUNCTIONS FOR NON TRANSPARENT SERVICES

The V.24 interface shall provide inband (XON/XOFF) and out of band (CT106) flow control. The use of CT105 for out of band flow control shall be implemented according to CCITT Rec. V.42.

3.1. Data Structure

3.1.1. Data Structure on S Interface

The protocol model for this is described in case 3a of recommendation GSM 03.10. The data structure will be according to CCITT V.110.

3.1.2. Data Structure on R Interface

The protocol model for this is described in case 3b of recommendation GSM 03.10. The data will consist of 7 bit characters (excluding parity if present) with additional start and stop elements.

3.1.3. Data Structure Provided by the L2R Function to the RLP Function

See Annex 1.

3.2. Signalling Mapping

This is identical to the transparent case with the exception of the transparent/non-transparent element, see section 4.

In addition, the L2R/RLP will give an explicit indication when the link into the connected network is established. If the link fails, an explicit "link lost" indication will be given. The mapping of these procedures to the V.24 interface is defined in Annex 1.

3.3. Flow Control

The passage of flow control information between L2Rs is described in Annex 1. Sections 3.3.1, 3.3.2 and 3.3.3 describe the operation of the flow control mechanisms. These mechanisms apply for all the non-transparent services covered by this recommendation, with the exception of Videotex profile 3 which is treated in section 3.3.4.

3.3.1. Conditions Requiring Flow Control towards the Network

The L2R function will send immediately a "flow control active" indication in the following circumstances:

- (i) If the receive buffer from the radio side reaches a preset threshold.
- (ii) If local flow control is initiated by the TE2 (see section 3.3.3 a) or c)). On receipt of this flow control indication transmission of data from the receive buffer towards the TE2 is halted.

On removal of the buffer congestion or local flow control the L2R will send a "flow control inactive" indication.

In addition, for the local flow control condition, transmission of data from the receive buffers will be restarted.

3.3.2. Conditions Requiring Flow Control towards TE2

The L2R functions will immediately activate local flow control (see section 3.3.3 b) or d)) under the following circumstances:

- (i) The transmit buffer reaches a pre-set threshold.
- (ii) The L2R receives a "flow control active" indication.

On removal of buffer congestion or receipt of L2R/RLP "flow control inactive" the local flow control will be removed.

3.3.3. Local Flow Control

Two methods of local flow control are allowed:

Outband

- a) From TE2: CT105 shall be turned off to indicate flow control active, and on to indicate flow control inactive.
- b) From TAF: CT106 shall be turned off to indicate flow control active, and on to indicate flow control inactive.

Inband

- c) From TE2: XOFF is sent to indicate flow control active. XON is sent to indicate flow control inactive. The XON/XOFF characters are extended by the L2R from the data stream and are not sent across the radio interface. Where XON/XOFF is utilized then the TAF will generate flow control active/inactive immediately i.e. the XON/XOFF characters do not enter the transmit buffer.
- d) From TAF: As from TE2

If the outband method is used, the L2R will pass the DC1/DC3 characters as data i.e. no flow control indications will be generated on receipt of DC1/DC3.

3.3.4. Flow Control for Videotex profile 3

If the users layer 2 indicates Videotex profile 3 then no flow control is used i.e. the X-bit is not set and DC1/DC3 are passed through as data. This is allowed since user action is necessary to prompt a new page, thus representing a form of end to end flow control at a higher layer.

3.4. Buffers

3.4.1. TX Buffers

Data received on CT103 from the TE2 shall be buffered such that if the MT is unable to transfer the data over the radio path then data is not lost.

The buffer shall be capable of holding 16-32 kbits.

When the buffer is half full, TE2 shall be flow controlled as per 3.3.2, unless Videotex profile 3 is being used (see 3.3.4).

3.4.2. RX Buffers

Data for transfer to the TE2 on CT104 shall be buffered such that if the TE2 is unable to accept data then data transferred from the MT is not lost.

The buffer size should be 16-32 kbits.

When the buffer becomes half full, the L2R will send a "flow control active" indication, unless Videotex profile 3 is being used.

3.5. Bit Transparency

V.25bis indications generated by the TAF shall be even parity, even if the parity condition for the user's application is different.

3.6. Transportation of 'BREAK' condition

The 'BREAK' condition must be recognized by the L2R function and passed immediately to the IWF. The L2R will generate a 'BREAK' condition to the TE2 on receipt of a 'BREAK' indication from the IWF. The information in the buffers will be discarded on the receipt of a 'BREAK' from the TE2 or on receipt of 'BREAK' from the IWF.

Annex 1 describes how the L2R will transport the 'BREAK' indication.

Circuit Number	Circuit Name	Ground	Data		Control	
			To TE2	From TE2	To TE2	From TE2
CT102	Common return	x				
CT103	Transmitted data			x		
CT104	Received data return		x			
CT105	Request to send					x
CT106	Ready for sending				x	
CT107	Data set ready				x	
CT108/2	Data terminal ready					x
CT109	Data channel received line signal detector				x	
CT125	Calling indicator (Note)				x	

Table 2: Minimum set of Interchange Circuits

Note: CT125 is used with the automatic answering function of the TAF.

	Description	IA5 Characters
Commands from TE2	Call Request with Number provided 0,1..9,*,#,A,B,C,D	CRN
	Connect Incoming Call	CIC
	Disregard Incoming Call	DIC
Indications to TE2	Call Failure Indication XX = CB, AB, NT, FC (Note)	CFI XX
	INcoming Call	INC
	VALid	VAL
	INValid	INV

Table 3: Minimum Set of Call Set-up Commands and Indications

Note: CB = Local MT busy
 AB = Abort call
 NT = No answer
 FC = Forbidden call *

* Forbidden call indication results from contravention of rules for repeat call attempts as defined by the appropriate national approvals administration. It is recommended that this is the responsibility of the MT, not the TE2.

4. TERMINAL INTERFACING TO GSM 04.08 MAPPING

Only those elements/messages that are of particular relevance are considered.

Interface procedures not directly mappable to GSM 04.08 (i.e. V.25 bis VAL/INV) are not considered. Mobile management procedures of GSM 04.08 are not considered applicable.

Mapping of other call establishment or clearing messages to the S interface e.g. "Call proceeding" etc have not been included. It is assumed these will be able to be mapped directly and are of no relevance to the V.25 bis or manual interface.

For the Alternate speech/unrestricted digital, Alternate speech/group 3 facsimile and Speech followed by unrestricted digital services it will be necessary for the TAF to generate a "Modify" message for transmission on the D_m channel. This shall be generated either manually or in the case of the Alternate Speech/unrestricted digital via the S interface. This shall be according to the defined procedure in GSM 04.08.

In addition for the Alternate speech/unrestricted digital case it will be necessary for the TAF to respond to an incoming "Modify" command with "Ack" or "Reject".

4.1. Mobile Originated Calls

a) Setup

Element	Derived from		
	MMI	V.25 bis message	S interface message
Called Address	Keypad	CRN/CRI/CRS	Setup
Called Sub Address	Keypad	CRI	Setup
HLC	Derived from internal settings or MMI information.		Setup
LLC	Same as HLC		Setup
BC	Same as HLC Table 4 gives allowed values		Setup (with additional information from MMI originated settings)

b) Release Complete

Element	Derived from		
	MMI	V.25 bis message	S interface message
Cause	Display (optional)	CFI	Release Complete

4.2. Mobile Terminated Calls

Call establishment is initiated by receipt of Setup at the MS:

a) Setup

Element	Mapped on to		
	MMI	V.25 bis message	S interface message
Called Address	Display (optional)	INC	Setup
Called Sub Address	Display (optional)	Not applicable	Setup
HLC	Display (optional)	Not applicable	Setup
LLC	Display (optional)	Not applicable	Setup
BC	Display (optional)	Not applicable	Setup (with PLMN specific elements removed)

b) Call Confirm

Information for the BC element in the call confirm is derived from e.g. MMI or by internal settings.

c) Connect

Connect is sent in response to connect from the S interface, from MMI, or when the timeout period referred to in V.25bis has expired. This period shall be between 5 and 10 seconds. During this time the automatic answering of the incoming call can be prevented by issuing a DIC command. The CIC can be used to cancel the effect of a preceding DIC command (see rec V.25bis).

Transfer Mode	: Circuit
Intermediate Rate	: 4, 8, 16 kbit/s
Information Transfer Capability	: Speech, Unrestric. digital, Speech followed by unrestr. digital, 3.1 kHz Ex PLMN,
Structure	: Unstructured, Service data unit integrity
Establishment	: Demand
Configuration	: Point to point
User Rate	: 300, 1200, 1200/75, 2400, 4800, 9600 bit/s (For 1200/75, the 75 is in the direction MS to network)
Modem Type	: V.21, V.22, V23, Autobauding type 1

Sync/Async	: Asynchronous
Radio Channel Requirement	: Full rate, Half rate, Dual rate / Half rate preferred, Dual rate / Full rate preferred
Connection Element	: Transparent, Non Transparent
Number of Stop Bits	: 1 or 2
Number of Data Bits	: 7 or 8 excluding parity if present
Parity	: Odd, Even, None, Forced to 0, Forced to 1
Duplex Mode	: Full
User Information Layer 2 Protocol	: IA5, Videotex profile 1, Videotex profile 3
Signalling Access Protocol	: X.28, I.440/450
Rate Adaptation	: X.30

Table 4: Bearer Capability Elements Required on D_m Channel

One element from each heading may be included in the set-up message. This is also the case for the call confirm message where the bearer capability is necessary for interworking.

Note to Table 4:

For the V.25 bis procedures the information transfer capability is always set to "Unrestricted digital" or "3.1 kHz Ex PLMN". For the manual procedures the information transfer attribute may be any of the values indicated.

For the S interface procedures the information transfer attribute shall be either "Unrestricted digital" or "Alternate speech/unrestricted digital".

5. FUNCTIONALITY FOR THE SUPPORT OF DEDICATED PAD SERVICES

The TAF will need to provide the following information in addition to the Bearer capability values of Table 4 in the case of Dedicated PAD access:

Numbering Plan Identifier	: Private Number Plan
Type of Number	: Dedicated PAD

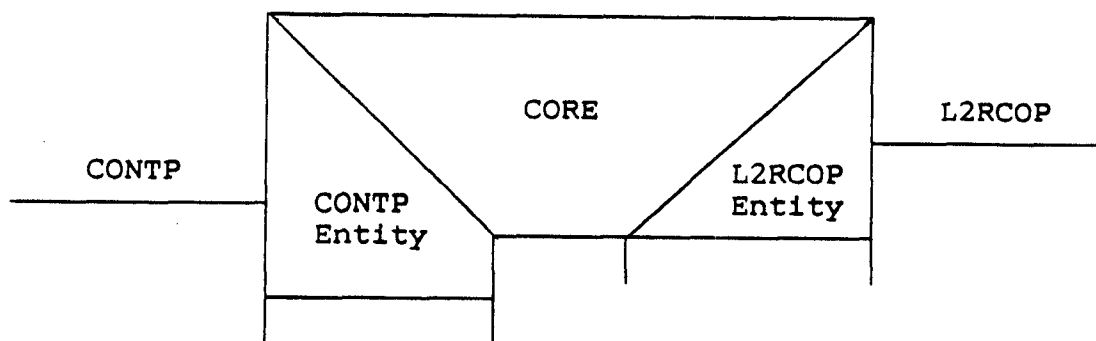
In addition, the called number should be a short code, coded as indicated in GSM 09.05.

ANNEX 1

L2R FUNCTIONALITY

1. INTRODUCTION

This annex describes the L2R functionality for non-transparent character oriented protocols. The general aspects of L2Rs are described in GSM recommendation 07.01. Figure 1 shows the 3 sub-functions of a character oriented L2R.



CONTP - Character Oriented Non-Transparent Protocol
 CORE - Character Oriented Relay Entity
 L2RCOP - L2R Character Oriented Protocol

Figure 1

Section 2 describes the L2R Character Oriented Protocol (L2RCOP) and section 3 the use of the L2RCOP.

2. THE L2RCOP

Information is transferred between L2Rs in fixed length n octet Protocol Data Units (PDUs). This corresponds to the RLP fixed length information field. The octets within the L2RCOP-PDU are numbered 0 to n-1, octet 0 is transmitted first. The bits within the octets are numbered 1 to 8, bit 1 is transmitted first.

- * Each octet contains a status octet, a character or fill.
- * Octet 0 always contains a status octet.
- * Status octets contain 3 status bits and 5 address bits
- * The 3 status bits correspond to SA, SB and X in CCITT Recommendation V.110. The SA, SB and X bits use bit positions 8,7,6 in the status octets. When a status bit changes the current state of all three bits shall be transmitted.

- * Character octets are coded in the following way:
 - * The first bit of the character received/transmitted corresponds to bit position 1 in the octet. The second bit to bit 2, and the seventh bit to bit 7. For order of transmission of IA5 characters see CCITT Recommendation V.4.
 - * 7 bit characters are padded with a 0 in bit position 8. Received parity (if used) is inserted in bit position 8, if parity is not used bit 8 is set to 0.
 - * Any start/stop bits are removed by the L2R.
- * Characters are inserted into L2RCOP-PDUs in order of transmission in octets 1 to n-1.
- * The address field in the status octets indicates the position of next status octet within the L2RCOP-PDU. This indicates the number of characters between status octets. Thus if two status octets are inserted into L2RCOP-PDU at offsets 1 and m the address value will be defined by m-1-1. Address bit 2⁰ corresponds to bit 1 in the status octets. Address bit 2¹ to bit 2 etc.
- * Status octets are inserted in the character stream whenever a status change needs to be transmitted.
- * Only address values 1 to n-2 (currently expected to be 23) in the address field of status octets are used for addressing purposes. The remaining codes are used to indicate:
 - * Last status change, remainder of L2RCOP-PDU empty. Address field value 31.
 - * Last status change, remainder of L2RCOP-PDU full of characters. Address field value 30.
 - * Destructive break signal, remainder of L2RCOP-PDU empty. Address field value 29.
 - * Address field values 24-28 are reserved.
- * When it is necessary to insert a status octet into the character stream when no status change has occurred, e.g. to indicate that the remainder of a L2RCOP-PDU is empty or to indicate a break signal, the current status shall be repeated.

An example of an L2RCOP PDU is shown in Figure 2.

	8	7	6	5	4	3	2	1	
0	SA	SB	X	0	0	0	1	1	
1	1	1	0	0	0	1	1	1	IA5 'G' (odd parity)
2	1	1	0	1	0	0	1	1	" 'S' " "
3	1	1	0	0	1	1	0	1	" 'M' " "
4	SA	SB	X	1	1	1	1	1	(last status change, rest of PDU empty)
.				.					
.				.					
.				.					
n									

Figure 2

3. USE OF THE L2RCOP

The CORE relays status changes, break conditions and characters in both directions between the CONTP entity and the L2RCOP entity.

The L2RCOP entity performs the following functions.

3.1. Radio Link Connection Control

Given appropriate indications from the signalling mechanisms the L2RCOP entity uses the services of the radio link to establish and release the connection to its peer L2RCOP entity in the IWF.

3.2. Data Transfer

The L2RCOP entity will assemble and disassemble L2RCOP-PDUs. Data characters are assembled into L2RCOP-PDUs until either:

- The PDU is full
- The Radio Link service can accept another Radio Link service Data Unit.

L2RCOP-PDUs are transferred to the peer L2RCOP entity using the data transfer services of the radio link.

3.3. Status Transfer

The L2RCOP entity transfers interface status information between L2Rs via the status octets in L2RCOP-PDUs. The meaning of the bits is exactly the same as that defined in CCITT Recommendation

V.110. Status changes are inserted in the L2RCOP-PDU in the position corresponding to the position in the character stream that the interface status change occurred.

3.4. Flow Control

Flow control information is transferred between L2Rs in 2 ways, these are:

- back pressure caused by L2R buffer conditions
- use of the X-bit in status octets:
 - flow control active, X-bit = ONE
 - flow control inactive, X-bit = ZERO

3.5. Break

The transfer of break conditions between L2Rs is via the status octets with appropriate coding of the address field.

The destructive break signal is the default break signal and destroys any characters held in L2R buffers. It will therefore result in an L2RCOP-PDU containing only the mandatory status octet coded as destructive break.

The termination of a break condition is indicated by sending an L2RCOP-PDU containing characters.

Document history		
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