ETSI

ETSI TECHNICAL REPORT

ETR 353

November 1996

Source: ETSI TC-SMG

Reference: DTR/SMG-040344Q

ICS: 33.020

Key words: Digital cellular telecommunications system, Global System for Mobile communications (GSM)

GSM ®

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

Digital cellular telecommunications system; Support of teletex in a GSM Public Land Mobile Network (PLMN) (GSM 03.44 version 5.0.0)

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Contents

Blank page

Foreword

This ETSI Technical Report (ETR) has been produced by the Special Mobile Group (SMG) Technical Committee (TC) of the European Telecommunications Standards Institute (ETSI).

This ETR describes the Support of teletex in a digital cellular telecommunication system.

This ETR is an informative document resulting from SMG studies which are related to the Digital cellular telecommunication system. This ETR is used to publish material which is of an informative nature, relating to the use or the application of ETSs and is not suitable for formal adoption as an ETS.

The specification from which this ETR has been derived was originally based on CEPT documentation, hence the presentation of this ETR may not be entirely in accordance with the ETSI/PNE rules.

Blank page

1   Scope

This ETSI Technical Report (ETR) describes the support of the teletex service by a GSM Public Land Mobile Network (PLMN).

2   References

This ETR incorporates by dated and undated reference, provisions from other publications. These normative 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 ETR only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

[1]   CCITT F.200 series Recommendations, Fascicle II.5: "Telematic, data transmission and teleconference services-Operations and quality of service".

[2]   CCITT T.300 series Recommendations, Fascicle VII.5: "Terminal equipment and protocols for telematic services".

[3]   CCITT X.200 series Recommendations, Fascicle VIII.4 Data communication networks: services an facilities, interfaces".

[4]   CCITT X.300 series Recommendations, Fascicle VIII.6: "Data communication networks: interworking between networks, mobile data transmission systems, internetwork management".

[5]   CCITT X.400 series Recommendations, Fascicle VIII.7: "Data communication networks: message handling systems".

[6]   CCITT T.0 series Recommendations, Fascicle VII.3 Terminal equipment and protocols for telematic services (T.60,T.61,T.62)".

[7]   CCITT T.65 series Recommendations, Fascicle VII.5: "terminal equipment and telematic services (T.70)".

[8]   CCITT X.1 series Recommendations, Fascicle VIII.2: "Data communication networks: services and facilities, interfaces (X.21,X.31,X.32)".

[9]   CCITT X.40 series Recommendations, Fascicle VIII.3: "Data communication networks: transmission, signalling and switching, network aspects, maintenance and administrative arrangements(X.52,X.71,X.75)".

[10]   CCITT V series Recommendations, Fascicle VIII.1: " Data communication over the telephone network (V.110)".

[11]   GSM 01.04 (ETR 350): "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[12]   GSM 02.02 (ETS 300 904): "Digital cellular telecommunications system (Phase 2+); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[13]   GSM 02.03 (ETS 300 905): "Digital cellular telecommunications system (Phase 2+); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[14]   GSM 03.10: "Digital cellular telecommunications system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".

[15]   GSM 03.70: "Digital cellular telecommunications system; Routeing of calls to/from Public Data Networks (PDN)".

[16]   GSM 07.01   (ETS 300 913): "Digital cellular telecommunications system (Phase 2+); General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[17]   GSM 07.03   (ETS 300 915): "Digital cellular telecommunications system (Phase 2+); Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities".

[18]   GSM 09.01 (ETR 359): "Digital cellular telecommunications system; General network interworking scenarios".

[19]   GSM 09.04: "Digital cellular telecommunications system; Interworking between the Public Land Mobile Network (PLMN) and the Circuit Switched Public Data Network (CSPDN)".

[20]   GSM 09.06   (ETS 300 975): "Digital cellular telecommunications system (Phase 2+); Interworking between a Public Land Mobile Network (PLMN) and a Packet Switched Public Data Network/Integrated Services Digital Network (PSPDN/ISDN) for the support of packet switched data transmission services".

[21]   GSM 09.07   (ETS 300 976): "Digital cellular telecommunications system (Phase 2+); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

2.1   Abbreviations

In addition to those below, definitions used in this ETR are listed in GSM 01.04.

AU	Access Unit (CCITT X.31)
CF	Conversion Facility (for Ttx/Tx service interworking)
GMSC	Gateway MSC
HDLC	High Level Data Link Control
IWU	Interworking Unit (CCITT X.71/CCITT X.75)
LAPB	Link Access Procedure Balanced
PLP	Packet Layer Protocol
TDS	Teletex Document Store
TID	Terminal Identification (CCITT F.200)
Ttx	Teletex
Ttx-MS	Teletex Mobile Station (i.e. a MS with Ttx terminal connected)
Ttx-TE	Teletex Terminal Equipment
Tx	Telex
VCS	Virtual Circuit Service

3   Introduction

3.1   Teletex service definition

The teletex (Ttx) service is an international telematic service as defined in CCITT F.200-series of recommendations.

As an essential characteristic it provides a basic level of compatibility between all terminals participating in the service.

Normally the service shall operate on a fully automatic basis and be open continuously.

Teletex subscriber equipment shall be in accordance with the CCITT recommendations T.60, T.61, T.62, and T.70. Especially it shall:

a)   have unique terminal identifications (TID);
b)   be able to send and/or receive documents without terminal operator intervention;
c)   have a certain set of indications to the terminal operator;
d)   in principle be able to accept calls continuously, if call numbers are published in the directories (In order to meet this requirement, it is allowed to use a document storage facility which can be network or customer premises based.);
e)   be able to prepare documents being forwarded to the telex service using appropriate conversion facilities within the network.

According to the CCITT T.70 (version 1988) the teletex service may be offered in the following types of networks:

a)   the Circuit Switched Public Data Network (CSPDN);
b)   the Packet Switched Public Data Network (PSPDN);
c)   the Public Switched Telephone Network (PSTN); and
d)   the Integrated Services Digital Network (ISDN).

The interworking between the different networks may be based on CCITT X.300-series of recommendations.

3.2   Context for the Support of Teletex in a GSM PLMN

Considering that

a)   international roaming of teletex subscribers must be supported;
b)   all CEPT countries have PSPDNs;
c)   PSPDNs providing an access unit AU (X.31 case A) support procedures according to CCITT X.32;
d)   each CEPT country will have an ISDN;
e)   ISDNs may provide the VCS;
f)   the teletex service supported by a GSM PLMN can participate in the internationally available teletex service, i.e. all teletex terminals, for which a call number is published in the service directory, can communicate with each other.

the following basic assumptions will apply:

a)   In principle no specific network interworking functions shall be necessary in a VPLMN for the support of teletex.
b)   No specific additional bearer service other than those defined in GSM 02.02 shall be needed in a VPLMN.
c)   Ttx specific IWFs, if any, must not have any impact on the MS of a roaming subscriber.
d)   Both PSTN and ISDN, if available, may be used as a transit network to the PSPDN.
e)   Presently no service interworking (especially for telex) directly from the GSM PLMN is provided. Conversion facilities within the fixed networks shall be used.

      NOTE: A mobile terminated call may be forwarded to a document storage facility called Teletex Document Store (TDS), if available, when the addressed Ttx-MS is temporarily unable to accept a call. The provision and the location of such a store is at the PLMN operator's discretion (e.g. within the PLMN or within a fixed network).

3.3   Reference Configuration of a Teletex Mobile Station

The reference configuration (figure 1/GSM 03.44) is equivalent to those configurations in GSM 07.03.

An explicit TA may be used between the R- and the S-interface reference point.

The configuration TE1-MT1 can only be supported by means of a specialized TAF including protocol conversion, if necessary, to guarantee the compatibility at the radio interface. For the time being this may be a national option.

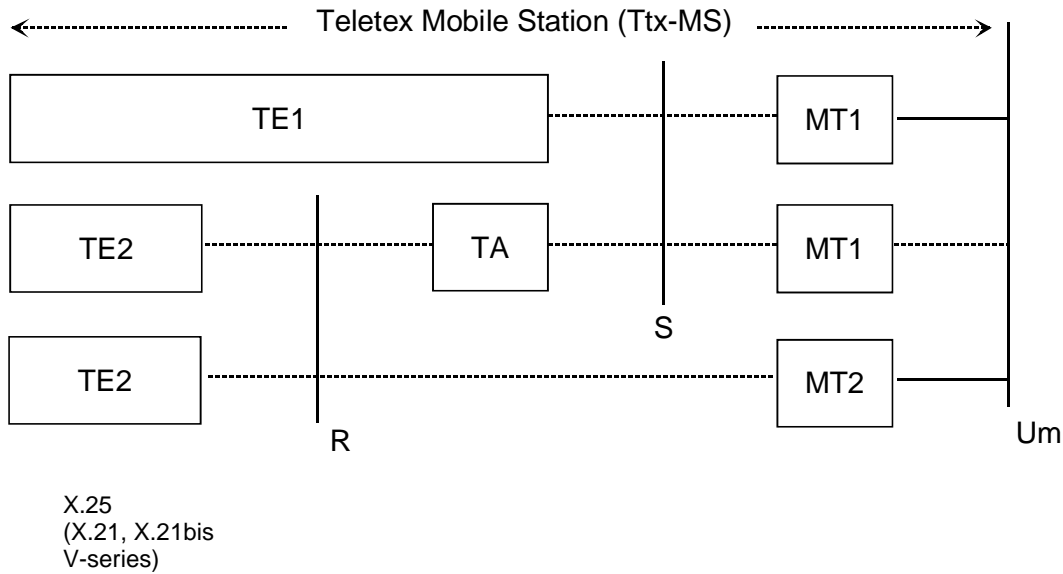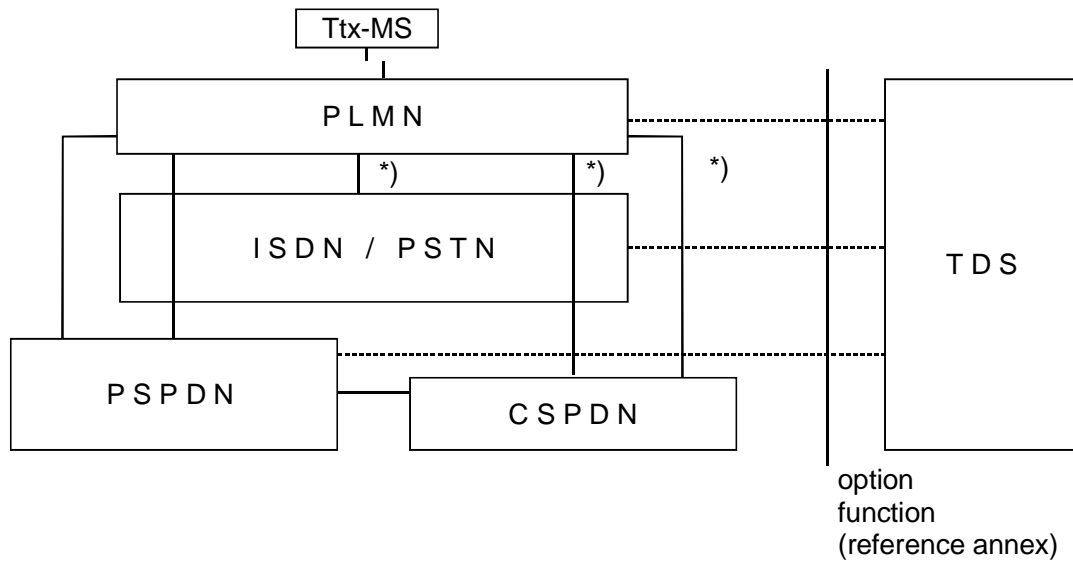Further configurations may be possible.

```
       ◄-------------------------- Teletex Mobile Station (Ttx-MS) --------------------►
```

┌─────────────────────────────────────┐   ┌──────────┐
│   │   │   │
│   TE1   │- - - - - - - │   MT1   │────────
│   │   │   │
└─────────────────────────────────────┘   └──────────┘

┌──────────────┐   ┌──────────┐   ┌──────────┐
│   │   │   │   │   │
│   TE2   │- - - - - │   TA   │- - - - - - - -│   MT1   │- - - - -
│   │   │   │   │   │
└──────────────┘   └──────────┘   └──────────┘

                                         S

┌──────────────┐   ┌──────────┐
│   │   │   │
│   TE2   │- - - - - - - - - - - - - - - - - - -│   MT2   │────────
│   │   │   │
└──────────────┘   └──────────┘
                  R   Um

```
X.25
(X.21, X.21bis
V-series)
```

Figure 1/GSM 03.44: Reference Configuration of a Teletex Mobile Station

4 Interworking for Teletex Support

4.1 Global Network Configuration for Teletex

Presently teletex is offered in the CSPDN, the PSPDN, the PSTN, and in the very next future in the ISDN. Figure 2/GSM 03.44 shows the different networks to which a GSM PLMN may have to interwork, when supporting the communication between teletex terminals.

```
                    ┌──────────┐
                    │  Ttx-MS  │
                    └──────────┘
        ┌───────────────────────────────────────┐          ┌──────────┐
        │              P L M N                   │- - - - - │          │
        └───────────────────────────────────────┘          │          │
              │        │    *)        *)     *)             │          │
        ┌─────┼────────┼──────────────┼────────┐            │          │
        │     │    I S D N / P S T N   │        │- - - - - -│   T D S  │
        └─────┼────────┼──────────────┼────────┘            │          │
              │        │              │                     │          │
    ┌─────────┼──┐     │              │                     │          │
    │         │  │     │              │                     │          │
    │ P S P D N│  │- - ─┼──────────────┼─ - - - - - - - - - -│          │
    └──────────┘  │  ┌──┴───────────┐  │                    └──────────┘
                  └──│   C S P D N   │──┘
                     └───────────────┘
                                                        option
                                                        function
                                                        (reference annex)
```

> *) This interworking requires a Ttx-specific IWF within the PLMN (see section 4.2)

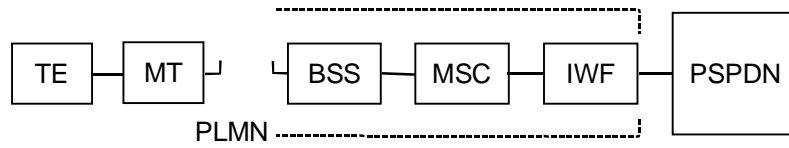**Figure 2/GSM 03.44: Global Network Configuration**

For service interworking with telex the national fixed network based Ttx/Tx conversion facility (CF) shall be used. For roaming subscribers this results in an international access. Whether the conversion facilities are prepared to receive such calls is not in the scope of this report.
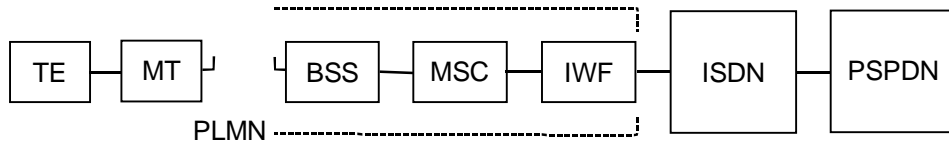
4.2 Network Interworking Scenarios

The following network interworking scenarios may be derived from the global network configuration. Some scenarios allow for different implementations of an IWF. For the interworking functions needed between the PLMN and the different networks refer to GSM 09.06 and 09.07. The choice of interworking scenario and the IWF is at the PLMN operator's discretion.

The PLMN and the particular PDN may be connected directly or via (a) transit network(s).
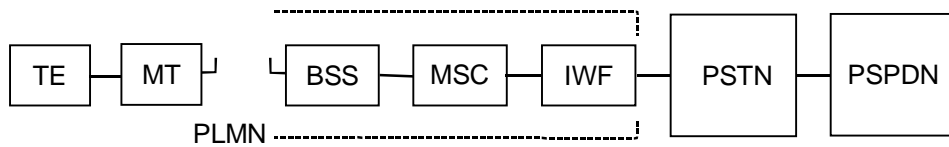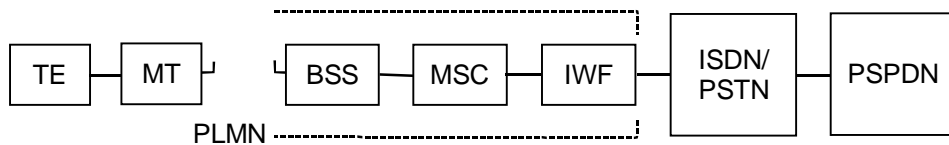
1)   Direct interworking PLMN to PSPDN

```
┌────┐   ┌────┐┘  └┌────┐   ┌────┐   ┌────┐   ┌────────┐
│ TE │───│ MT │    │ BSS│───│ MSC│───│ IWF│   │ PSPDN  │
└────┘   └────┘    └────┘   └────┘   └────┘   └────────┘
         PLMN
```

2)   Interworking PLMN to PSPDN via ISDN

```
┌────┐   ┌────┐┘  └┌────┐   ┌────┐   ┌────┐   ┌──────┐   ┌────────┐
│ TE │───│ MT │    │ BSS│───│ MSC│───│ IWF│───│ ISDN │   │ PSPDN  │
└────┘   └────┘    └────┘   └────┘   └────┘   └──────┘   └────────┘
         PLMN
```

3)   Interworking PLMN to PSPDN via PSTN

```
┌────┐   ┌────┐┘  └┌────┐   ┌────┐   ┌────┐   ┌──────┐   ┌────────┐
│ TE │───│ MT │    │ BSS│───│ MSC│───│ IWF│───│ PSTN │   │ PSPDN  │
└────┘   └────┘    └────┘   └────┘   └────┘   └──────┘   └────────┘
         PLMN
```

4)   Interworking PLMN to PSPDN via ISDN/PSTN

```
┌────┐   ┌────┐┘  └┌────┐   ┌────┐   ┌────┐   ┌──────┐   ┌────────┐
│ TE │───│ MT │    │ BSS│───│ MSC│───│ IWF│───│ISDN/ │   │ PSPDN  │
└────┘   └────┘    └────┘   └────┘   └────┘   │PSTN  │   └────────┘
         PLMN                                 └──────┘
```

5)   Direct interworking PLMN to CSPDN with protocol conversion

```
┌────┐   ┌────┐┘  └┌────┐   ┌────┐   ┌────┐   ┌────────┐
│ TE │───│ MT │    │ BSS│───│ MSC│───│ IWF│───│ CSPDN  │
└────┘   └────┘    └────┘   └────┘   └────┘   └────────┘
         PLMN
```
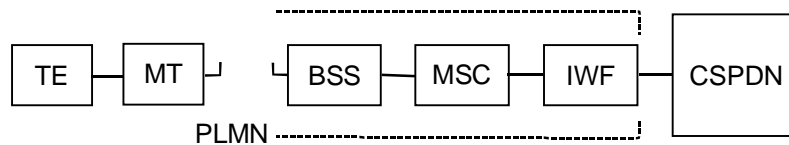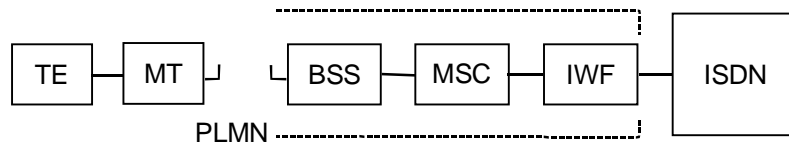
NOTE: This is a national option, because specific functionality in the IWF is needed .

6)   Interworking PLMN to CSPDN via ISDN with protocol conversion

```
┌────┐   ┌────┐┘  └┌────┐   ┌────┐   ┌────┐   ┌──────┐   ┌────────┐
│ TE │───│ MT │    │ BSS│───│ MSC│───│ IWF│───│ ISDN │   │ CSPDN  │
└────┘   └────┘    └────┘   └────┘   └────┘   └──────┘   └────────┘
         PLMN
```
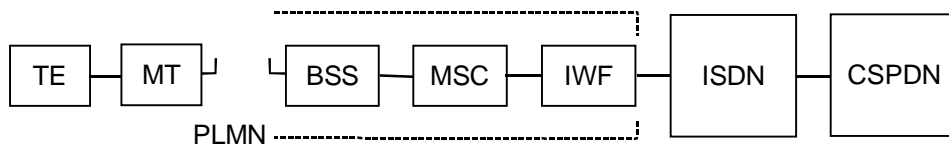
NOTE: This is a national option, because specific functionality in the IWF is needed .

7)   Direct interworking PLMN to ISDN with protocol conversion

```
┌────┐   ┌────┐┘  └┌────┐   ┌────┐   ┌────┐   ┌────────┐
│ TE │───│ MT │    │ BSS│───│ MSC│───│ IWF│───│ ISDN   │
└────┘   └────┘    └────┘   └────┘   └────┘   └────────┘
         PLMN
```

NOTE: Presently this interworking case applies only to the Ttx service within an ISDN using T.70-
             CSPDN protocols.

Figure 3/GSM 03.44: Network Interworking Scenarios

For the interworking PLMN to the different networks the following GSM specifications apply:

PLMN to CSPDN: GSM 09.04
PLMN to PSPDN: GSM 09.06
PLMN to PSTN/ISDN: GSM 09.07

4.3 Mobile-to-mobile Communication

A communication from a mobile to another mobile is treated like a call from/to a fixed network subscriber, e.g. using the packet functions as per GSM 09.06.

4.4 Use of GSM Supplementary Services

For supplementary services refer to GSM 09.06 and GSM 09.04.In addition Call forwarding supplementary services may be used to forward a mobile terminated call to a TDS (refer annex).

4.5 High Layer Compatibility Information Element

Mobile subscribers using the teletex service may code the high layer compatibility information element as described below. Depending on the network implementation this indication may be used by the network for teletex specific requirements.

Depending on the signalling capabilities of the fixed network the high layer compatibility information element may not be included in the call setup message to the MS in case of a mobile terminated call. Therefore a Ttx-MS shall not reject an incoming call due to the absence of this element.

Table 1/GSM 03.44: High layer compatibility information element for teletex

High layer characteristics Identification	Teletex (basic teletex)
	Document application profile for formatted mixed mode [*]
	Document application profile for processable mode [*]

[*]   for future use

Annex (informative):   Teletex Document Store (TDS)

A.1   Introduction

A TDS is an optional functional unit, the provision of which is necessary, if the PLMN operator wishes that mobile terminated calls should not fail due to temporary absence of a Ttx-MS. A particular TDS can be in charge of one or more PLMNs. Each PLMN is the HPLMN of the Ttx-MSs, that TDS is acting for.

The provision and location of a TDS is at the PLMN operator's discretion (e.g. within the HPLMN or within a fixed network).

It is not intended to receive documents instead of the Ttx terminal in general, but only occasionally, if the MS does not accept a call. This may include e.g. temporary user initiated unconditional call forwarding.

Whether use of unconditional call forwarding is required in general, when the Ttx-MS is roaming in a another GSM PLMN, depends e.g. on the signalling capabilities of the concerned networks.

Some requirements can be identified from the user point of view either being a subscriber to a PLMN or to a fixed network.

These requirements are that a TDS must

a)   be able to receive and store documents for a Ttx terminal (subscriber) it is in charge for;

b)   act instead of the terminal as being the terminal itself (negotiation of options), especially there must not be any unacceptable impact on the remote fixed network based Ttx terminal which forces the user of that terminal to change his/her communication habits;

c)   to be responsible for the delivery of the documents to the terminal it is in charge for.

A minimum set of functions is necessary to fulfil the requirements. To perform those functions, however, a TDS can be e.g. a separate stand-alone system or part of a Message Handling System MHS (based on X.400- and/or T.300-series of CCITT recommendations).

Once a document has been received and is stored in the document store the way to access and/or retrieve the document is not in the scope of this report. However, it should be noted that usually a Ttx terminal can only make use of the teletex protocols. During the process of receiving documents from another Ttx terminal located in a PLMN or in a fixed network the TDS has to behave like a Ttx terminal anyway (see also requirements above).

A.2   Minimum Set of Functions

The following function must be allocated to a TDS:

-     Ttx document reception;
-     Ttx document storage capability (document store);
-     either automatic forwarding Ttx documents to the Ttx-TE (subscriber) or document retrieval by the authorized Ttx-TE;
-     operation and maintenance facilities.

A.3   Receiving Teletex Documents into the Document Store

The Ttx document reception function of the TDS may be accessed e.g. using call forwarding facilities of the connected network. These facilities, if used, are activated by the network, whenever there is a match with the associated conditions, e.g. the addressed Ttx-TE in the PLMN does not answer the mobile terminated call. The address of the TDS must therefore be known to the network as forwarded-to address.

A.4   Getting Teletex Documents from the Document Store

The way of having access to the received documents and the detailed procedures are outside of the scope of this report.

History

Document history	
November 1996	First Edition