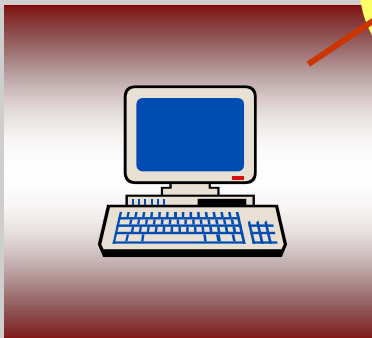
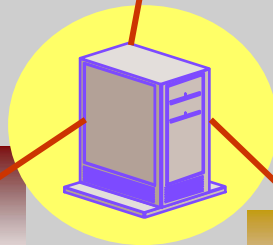


## SHORT MESSAGE SERVICE (SMS)



### IN THIS ISSUE

- Short Message Service (SMS)
- Short Message Service for PSTN
- CDOT Access Network based on 256 P RAX

## SHORT MESSAGE SERVICE

Short Message Service (SMS) enables transfer of short messages between a mobile handset and a Short Message Entity (SME) which is capable of sending or receiving messages, such as mobile handsets, computer terminals, e-mail systems, pagers etc. SMS was first introduced in Europe a decade ago. It is a very popular service worldwide and is being extensively used in India also.

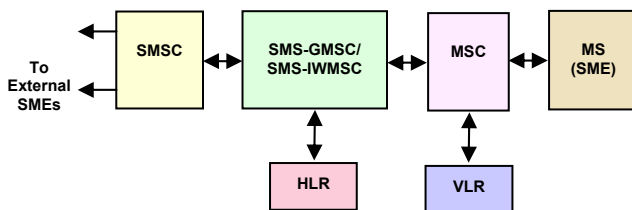
### Types of SMS

**Point-to-Point Short Message Service:** Point-to-Point SMS provides means to send limited size messages from one mobile to another or from a PC to mobile and vice versa. The maximum size of these messages can be 160 characters.

**Point-to-Multi-point Short Message Service:** The message originated from an SME can be transmitted to multiple (predefined addresses) SMEs simultaneously.

### SMS Architecture

The Architecture of a GSM network, which offers the SMS, is shown below:



### SMSC Overview

The provision of Short Message Service makes use of a Short Message Service Centre (SMSC), which serves as an interworking and relaying function of the message transfer between the SMEs. The SMSC is a database that checks, accepts, buffers, processes and distributes all Short Messages in a mobile network. The SMSC has the provision for forwarding the messages in two ways, one without storing in a database (instantaneous delivery) and other with

storing the messages and then forwarding (store and forward service) depending on various parameters. It automatically appends the MSISDN of the sender to the short message text to enable the recipient to identify the sender. This enables the recipient to reply back.

The SMS is sent and received over signalling path simultaneously with voice, Data and Fax calls using a radio channel.

**Gateway MSC for Short Message Service (SMS-GMSC):** A function of an MSC capable of receiving a short message from an SMSC, interrogating an HLR for routing & SMS information and delivering the short message to the visited MSC of the recipient MS.

**Interworking MSC for Short Message Service (SMS-IW MSC):** A function of an MSC capable of receiving a short message from within the PLMN and submitting it to the recipient SMSC.

### Message Transfer Mechanism

SMS makes use of the Mobile Application Part (MAP), which defines the methods and mechanisms of communication in wireless networks, and uses the services of the SS7 Transaction Capabilities Application Part (TCAP). An SMS service layer makes use of the MAP signalling capabilities and enables the transfer of short messages between the peer entities. GSM network uses GSM MAP as defined by European Telecommunication Standards Institute (ETSI) and CDMA uses IS-41 as defined by the Telecommunication Industry Association.

#### Do you SMS ?

A recent survey on Mobile Services indicates that the Indian cell phone users are getting addicted to SMS. An average usage of 5.8 Short Messages per day per subscriber is reported. SMS is more popular than voice-mail and about 72% of cell phone users are utilising the service.

Source : 'Voice & Data'

The following basic MAP operations are necessary to provide the end-to-end short message service:

- **Routing information request** – Before attempting short message delivery, the SMSC must retrieve routing information to determine the serving MSC for the mobile station at the time of the delivery attempt. This is done by way of an interrogation of the HLR, which is accomplished via the use of the `SMSrequest` and `sendRoutingInforForShortMsg` mechanisms in IS-41 and GSM, respectively.
- **Point-to-point short message delivery** – The mechanism provides a means for the SMSC to transfer a short message to the MSC that serves the addressed mobile station and attempts to deliver a message to an MS whenever the MS is registered, even when the MS is engaged in a voice or data call. The short message delivery operation provides a confirmed delivery service. The operation works in tandem with the base-station subsystem while the message is being forwarded from the MSC to the MS. Therefore, the outcome of the operation comprises either success (i.e. delivery to the mobile) or failure caused by one of several possible reasons. The point-to-point short message delivery is accomplished via the use of the short message delivery-point-to-point (SMD-PP) and `forward_ShortMessage` mechanisms in IS-41 and GSM, respectively.
- **Short message waiting indication** – The operation is activated when a short message delivery attempt by the SMSC fails due to a temporary failure and provides a means for the SMSC to request the HLR to add an SMSC address to the list of SMSCs to be informed when the indicated mobile station becomes accessible. This short-message waiting indication is realised via the use of the SMS notification indicator and set message waiting data mechanisms in IS-41 and GSM.

- **Service centre alert** – The operation provides a means for the HLR to inform the SMSC, which has previously initiated unsuccessful short-message delivery attempts to a specific mobile station, that the mobile station is now recognised by the mobile network to be accessible. This service-centre alert is accomplished via the use of the SMS notification and alert service-centre mechanisms in IS-41 and GSM respectively.

## User Applications

SMS comprises of two basic point-to-point services.

- Mobile Originated Short Message(MO-SM)
- Mobile Terminated Short Message(MT-SM)

Some of the popular applications of SMS technology, utilising both MT-SM and MO-SM where appropriate, are as follows:

- **Notification services** – Notification services are currently the most widely deployed SMS services. Voice-mail & e-mail message notification indicates the user that mail messages are present in a voice/e-mail mailbox.
- **Information services** – A wide variety of information services can be provided by the SMS, including weather reports, entertainment information (e.g. cinema, theatre, concerts), financial information (e.g. stock quotes, exchange rates) and directory assistance.
- **Ring-tone services** – This service enables a user to download ring-tones from Internet to a mobile phone. Ring-tone composers allow mobile users to compose their unique ring-tones on Internet and download them to their phones.
- **Picture Message Service:** Pictures can be downloaded from Internet site to a mobile handset or sent to another mobile user.
- **E-mail & Paging interworking** – Existing e-mail/paging services can easily be integrated with SMS.

## SHORT MESSAGE SERVICE FOR PSTN

With the huge popularity of SMS in mobile Network, the fixed service providers are also toying with the idea of introducing it in the PSTN Network. It is deployed by some of the Service Providers in Europe. ETSI has recently standardised the protocols for short message service in PSTN/ ISDN. The protocols used for this service, support a User Based Solution (UBS), where messages are transported via a Short Message Service Centre (SMSC) in a normal voice call through the network. The signalling is carried out in the voice band using a bi-directional half duplex 1200 Baud Frequency Shift Keying (FSK) modularity. SMS messages are delivered to end terminal by the SMSC using store and forward principle.

By interconnection with SMSC in GSM network, transfer of messages from a PSTN subscriber to a mobile handset and vice-versa will also be possible.

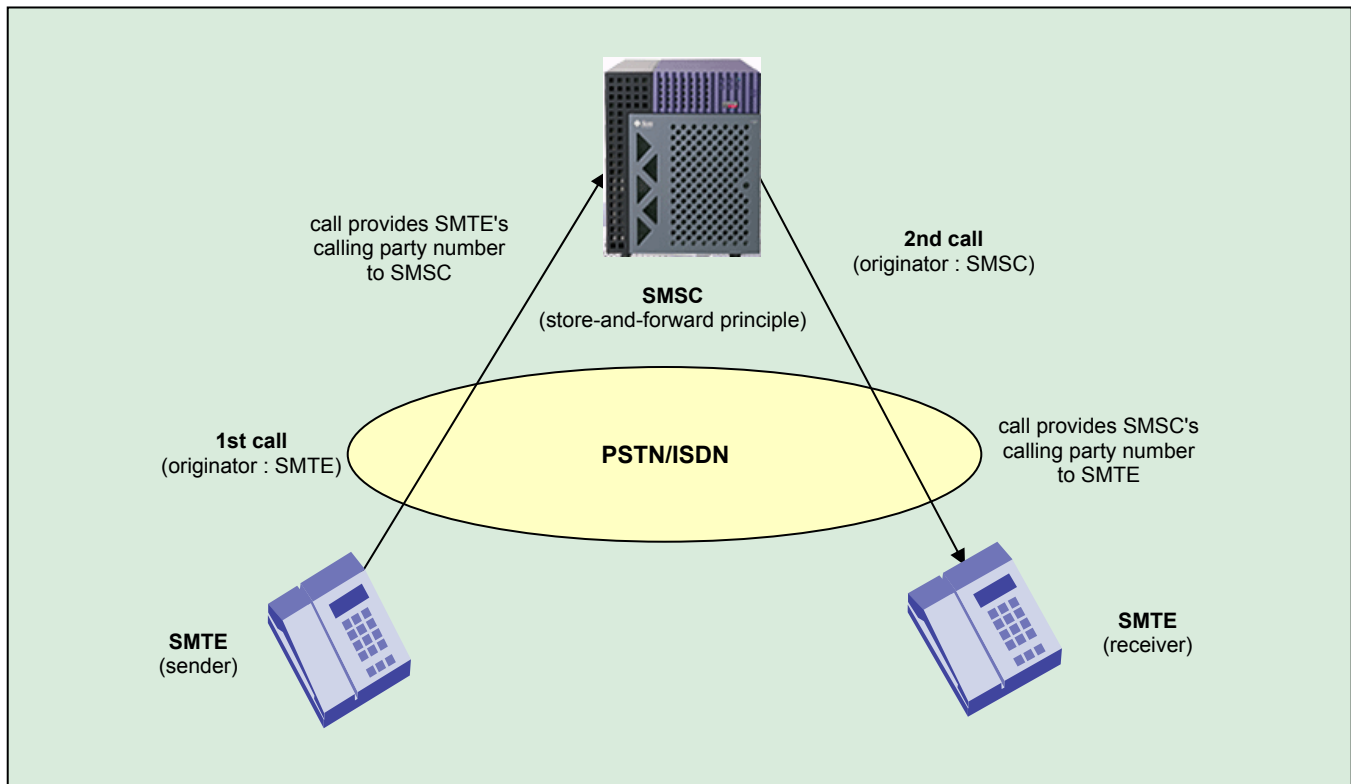
The system consists of a Short Message

Terminal (SMTE), a Short Message Service Centre (SMSC) and the PSTN/ISDN. The SMTE is connected to the network via a PSTN or an ISDN access. The SMSC may be connected to the network either via an ISDN Primary Rate Interface (PRI), CCS7 or other connection types. To send and receive SMS a voice-band communication path is established in the PSTN/ISDN between the SMTE and SMSC using a normal voice-call through the network.

### General Principle

General principle for transfer of a SM from the 'sender' to the SMSC (SM submission) and the transfer of a SM from the SMSC to the 'receiver' (SM delivery), is shown below.

The SM transfer is split up into two steps. In the first step, the SMTE establishes a call to the SMSC and submits the SM to it. The network provides the caller ID (CLI) of the SMTE to the SMSC. The SMSC in turn, uses this information to identify the SMTE.



After the voice band connection between SMTE and SMSC has been established, the end-to-end SM data transfer phase is entered for Short Message transfer from SMTE to SMSC. After the SM has been transferred, the connection between SMTE and SMSC is released.

In the second step, the SMSC establishes a call to the SMTE to which the SM is to be delivered. In this case, the network provides the CLI of the SMSC to the SMTE. The SMTE uses this CLI information to identify and connect an incoming call from the SMSC automatically.

As in the first step, the Short Message is transmitted from the SMSC to the SMTE after the voice band connection between SMSC and SMTE has been established. After the SM has been transferred, the connection between SMSC and SMTE is released.

## Requirements of SMS Terminals

SMS in the PSTN/ISDN will only be supported by SMTE designed for this feature. The main requirements that have to be met to support SMS in the PSTN/ISDN are briefly explained below.

### • SMSC Phone Numbers

For each SMS Provider supported by the SMTE, the SMTE should be able to store at least one SMSC number including one digit Sub address of Short Message Entity (SME). Sub address allows the addressing of different terminals connected to one subscriber line or multiple SMS users (multiple SMEs) within a terminal. The SMTE can protect the user's access to received messages by a PIN code. The SMTE only processes calls from the SMSC if the Called Sub address value is equal to one of the SME Sub address values stored in the SMTE.

### • Outgoing Calls

To submit a short message, the SMTE dials the number of the SMSC which is stored in the SMTE, extended by its own Sub address.

If a connection to the SMSC could not be established at the first attempt, the SMTE may make some further attempts before the submission is considered to be failed. The user may also manually initiate the call to the SMSC.

### • Incoming calls

The SMTE only process calls from the SMSC if the Called Sub address is equal to one of the values stored in the SMTE.

If the Called Sub address value does not match the Sub address value stored in the SMTE, the incoming call shall not be processed or answered by the SMTE.

## Ringling Suppression

Terminals that support SMS in the PSTN/ISDN may not ring if called by the SMSC.

SMTEs connected to the PSTN may suppress the first ringing cadence if the PSTN transmits the caller ID information between the first and the second ringing cadence. If the received caller ID information is equal to the number of the SMSC, the SMTE should suppress all following ringing cadences, too. If not, the SMTE should start to ring with the second ringing cadence.

## Other Scenarios

- If the SMS memory of the SMTE is full, the SMTE will not receive the messages.
- If the SMTE is busy on an external call, the SMTE may not be able to accept calls from the SMSC.

## Tariff

The tariff for SMS in PSTN should be attractive enough to encourage its use by the subscribers. Since the standards available now use normal voice calls, it is envisaged that SMS service would be charged by off line processing of CDRs generated by SMSC with tariffs lower than that for normal PSTN calls.

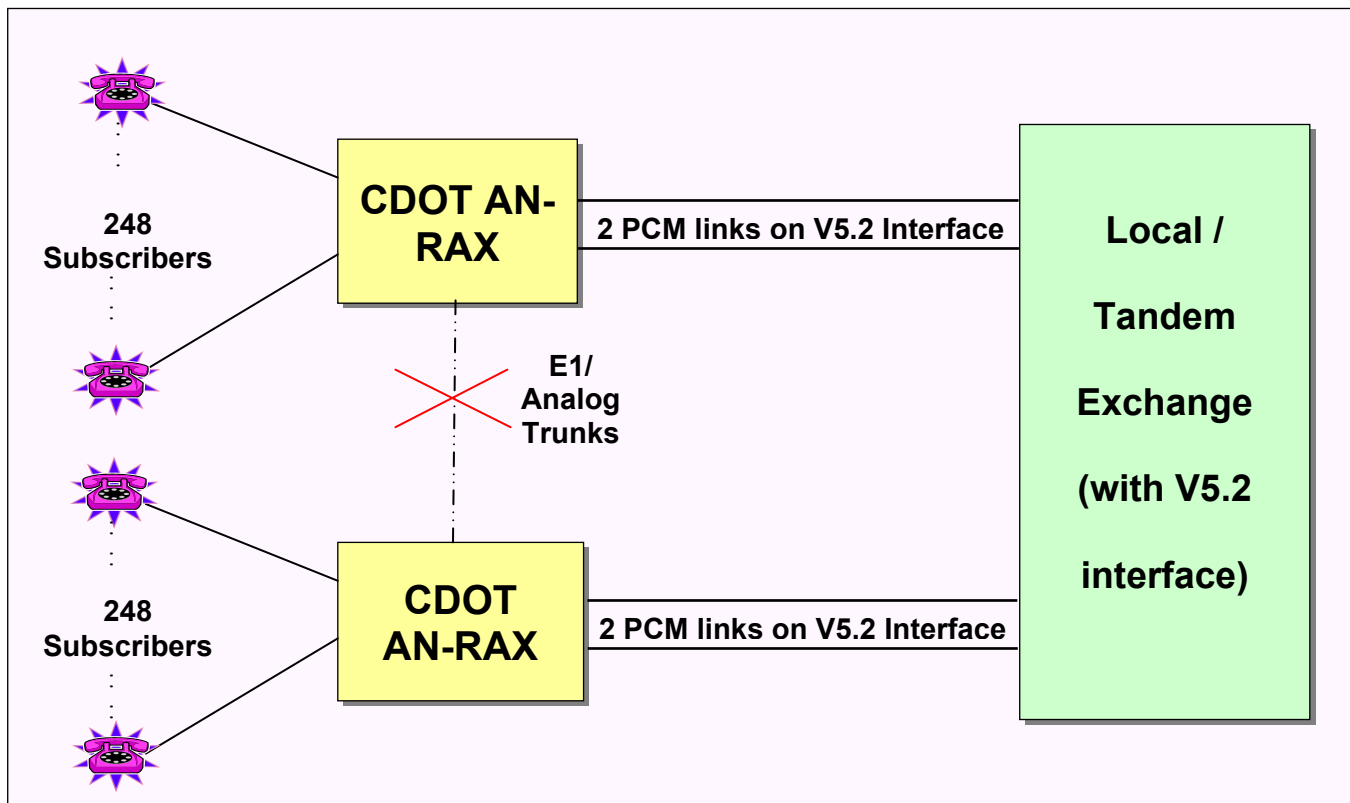
## CDOT ACCESS NETWORK BASED ON 256 PORT RAX

CDOT has developed an Access Network based on 256 P RAX (AN- RAX). It can be connected to any Local Exchange (LE) supporting V5.2 interface on two 2Mbps PCMs. All the subscriber services supported by the LE will be transparently available to AN -RAX subscribers. However, line testing has to be carried out from the AN-RAX.

CDOT 256 P RAXs working in the BSNL network can be converted to CDOT AN-RAXs by parenting it to any Local Exchange supporting V5.2 interface on two PCMs instead of junctions on R2 signalling as shown in the figure. Hardware and software changes will be required. Line cards can be added in place of service cards, analog trunk cards and digital trunk cards to increase the capacity from 184 (maximum at present) to 248 (maximum) in AN-RAX.

### Advantages

- The administration, billing and subscriber management will be done from LE.
- Numbering Plan of RAX subscribers becomes a part of numbering plan of the Local Exchange to which AN has been connected.
- All services including supplementary services available in LE can be provided to AN subscribers.
- Feature enhance retrofits can easily be carried out at a common LE site rather than at many standalone installations, as is the case today.
- No separate network synchronization is required since the AN-RAX will work on the clock extracted from E1 trunks coming from the LE.



AN-RAX supports only analog subscribers. AN-RAX can recognise and transfer the access related information e.g. setup, release and certain line status of AN-RAX to LE and provides BORSCHT functionalities. It will also be responsible to carry out V5.2 related protocol functions in response to the instructions received from LE. AN-RAX is solely responsible for subscriber line testing.

LE provides subscriber administration, services, DTMF senders/receivers, tone generators, announcements, charging, switching, line monitoring and traffic measurements for AN-RAX subsystem.

In case of link failure between AN-RAX and LE, the failure information will be available both at LE and AN-RAX. The visual alarm condition will also be generated both at LE and AN-RAX. All the calls attempts by AN-RAX subscribers will be rejected by AN-RAX and appropriate announcement will be fed to the subscribers. The records of all the link failures will be available with AN-RAX and LE.

### Conversion of 256 P RAX to AN-RAX

The following changes are involved in the conversion process:

#### New Equipment to be added

1. AN-RAX Controller Card (ARC) - 2 Nos.
2. AN-RAX Interface Card (ARI) - 2 Nos.
3. VT-100 Dumb Terminal - 1 No.
4. New Cables - 4 Nos.
5. Strappings on motherboard :
  - Master frame - 20 straps
  - Slave frame - 4 straps

#### Approvals issued by TEC during the period July 2002 to September 2002

Type Approvals.....	137
Interface Approvals.....	54
Service Test Certificates.....	34
<b>Total .....</b>	<b>225</b>

#### Equipment to be removed

1. **PCBs** : RAT, RMF, RSC, RAP, RDS, RDC, TWT, EMF.
2. RAX Maintenance Panel and associated cables.
3. 80 column printer.

#### Other Changes

- ☛ Line cards can be added in AN-RAX in place of RAT, RMF, RSC, RAP, RDS, RDC, TWT, EMF cards to increase the capacity from 184 lines to 248 lines.
- ☛ In case of tie working between two 256 P RAXs, each RAX after conversion to AN-RAX shall be connected to LE by two 2Mbps PCMs.
- ☛ Before switching off the exiting RAX, printout of meter reading of RAX subscribers should be taken. Subscribers meters will start from zero after conversion.
- ☛ After the conversion, the subscribers should be asked to re-register their password for the dynamic locking of STD/ISD.

#### Status

The interworking functionality of CDOT AN-RAX has been tested with CDOT (Ver. 2\_2\_1\_4), EWSD (Ver. 13), 5ESS and OCB-283 (Ver. R24) exchanges. Field trial of AN-RAX has been successfully completed with CDOT SBM at village Dadiana (Sirhind) in Punjab Circle.

Technology Approval for CDOT AN- RAX has been issued by TEC.

A conversion kit will be available through C-DOT manufacturers to convert the existing 256 P RAX to AN-RAX.

#### Approvals issued by TEC upto 31.09.2002

Type Approvals.....	5800
Interface Approvals.....	3400
Service Test Certificates.....	1492
<b>Grand Total .....</b>	<b>10692</b>

## IMPORTANT ACTIVITIES OF TEC DURING THE 2<sup>ND</sup> QUARTER OF 2002 - 2003

### A. Preparation of GRs/IRs & Technical documents

Following GRs/IRs and Technical documents issued:

#### GRs

- ATM based Next Generation Network for PSTN TAX/Transit
- Executive Telephone System (1+2)
- Firewall System
- Uninterrupted Power Supply (UPS).

#### Revised GRs

- 2/34 Mbps Optimux and regenerator Type - A & Type - B.
- Digital Wireless Local Loop System.
- Fibre Glass Reinforced Ployester (FRP) CD Cabinet casing for mounting IDC type cable terminal blocks.
- Lead Sleeves.
- Medium Size Digital Local, Tandem cum Transit Exchange.
- Plumber's Metal.
- PVC Insulated Galvanised mild steel wire.
- Stand Alone STP and Integrated STP.
- STM-16 Synchronous Mux for long haul applications (TM & ADM).
- STM-4 Synchronous Mux for Long haul N/W application (TM & ADM).
- STM-4 Synchronous Mux for Metro N/W application (TM & ADM).

- STM-16 Synchronous Mux for Metro applications (TM & ADM).
- WLL Base Station Panel and Omni Antennas for 800 MHz and 1900 MHz.

#### IR

- H.323/SIP Terminal for Private Use.

#### Revised IRs

- Executive Telephone System.
- Group 3 FAX Card.

### B. Tests and Field trials

Tests/field trials have been carried out for:

- BSNL IMPCS project in four zones including coverage and IN system and billing & customer care system.
- CDOT AN-RAX.
- DWDM 32 chl of M/s ARM, M/s HFCL and M/s ITI.
- Fraud Management and Control Centre.
- BHCA test for WLL System of M/S UTL.

### C. Other Activities

#### • Manufacturer Forum conducted for

- Next Generation Network NGN based on IP/MPLS technology.
- Digital Channel Multiplication Equipment.
- Electronic Telephone Instruments.
- GSM base station Antennas.
- STM-1 equipment operating in Ku band.

#### • Field Support

- Solutions provided for Interworking problems of WLL systems.

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