1.

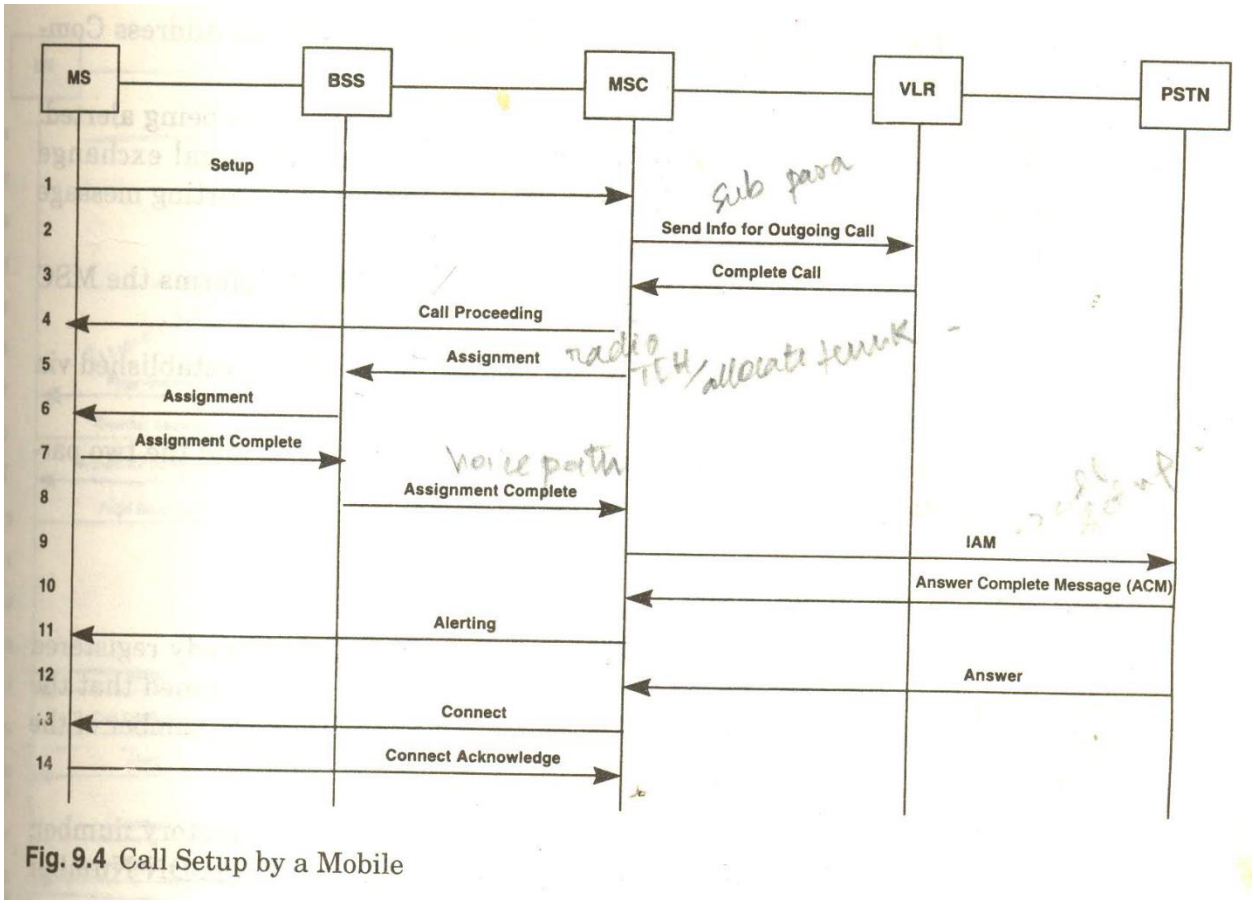



**Fig. 9.4** Call Setup by a Mobile

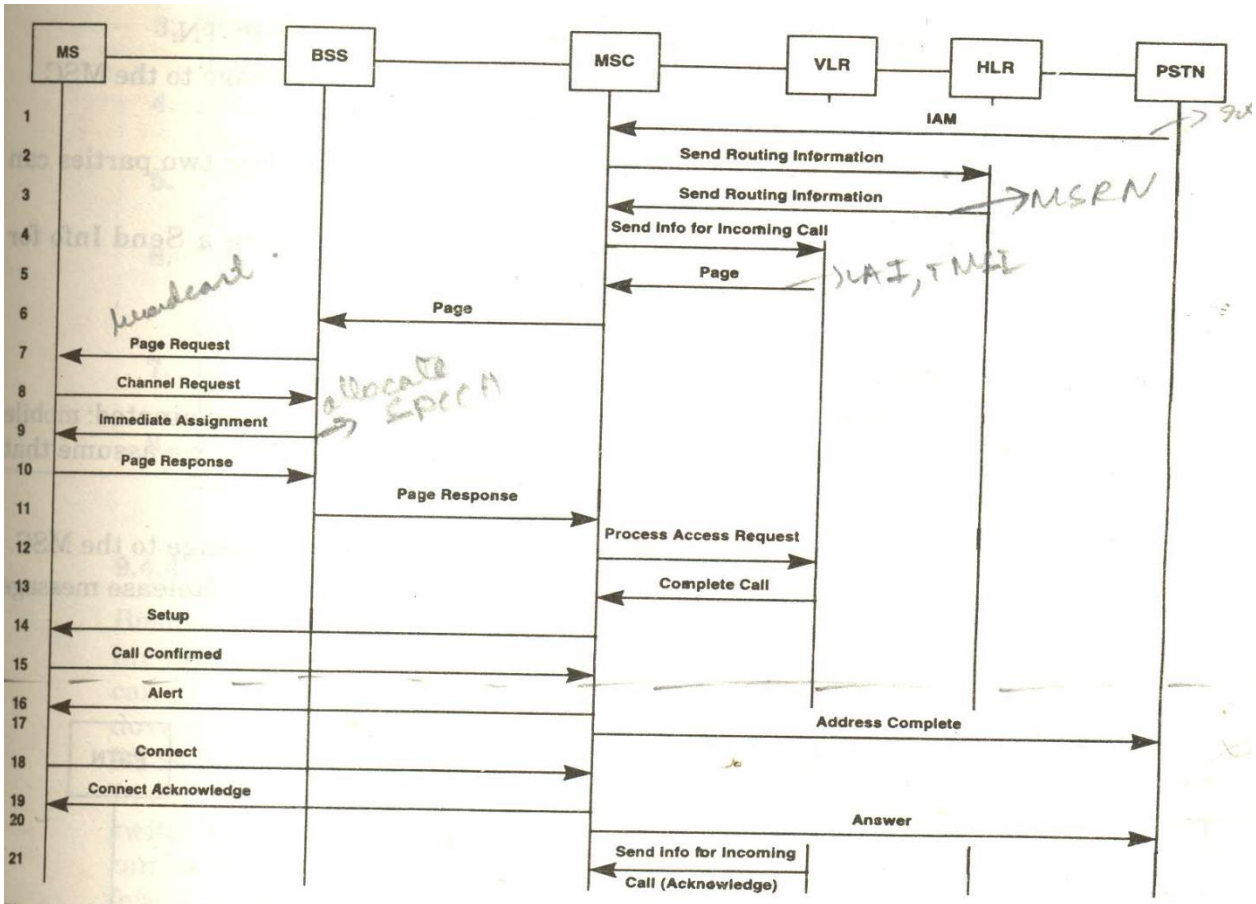



Fig. 9.5 Mobile-Terminated Call

3.

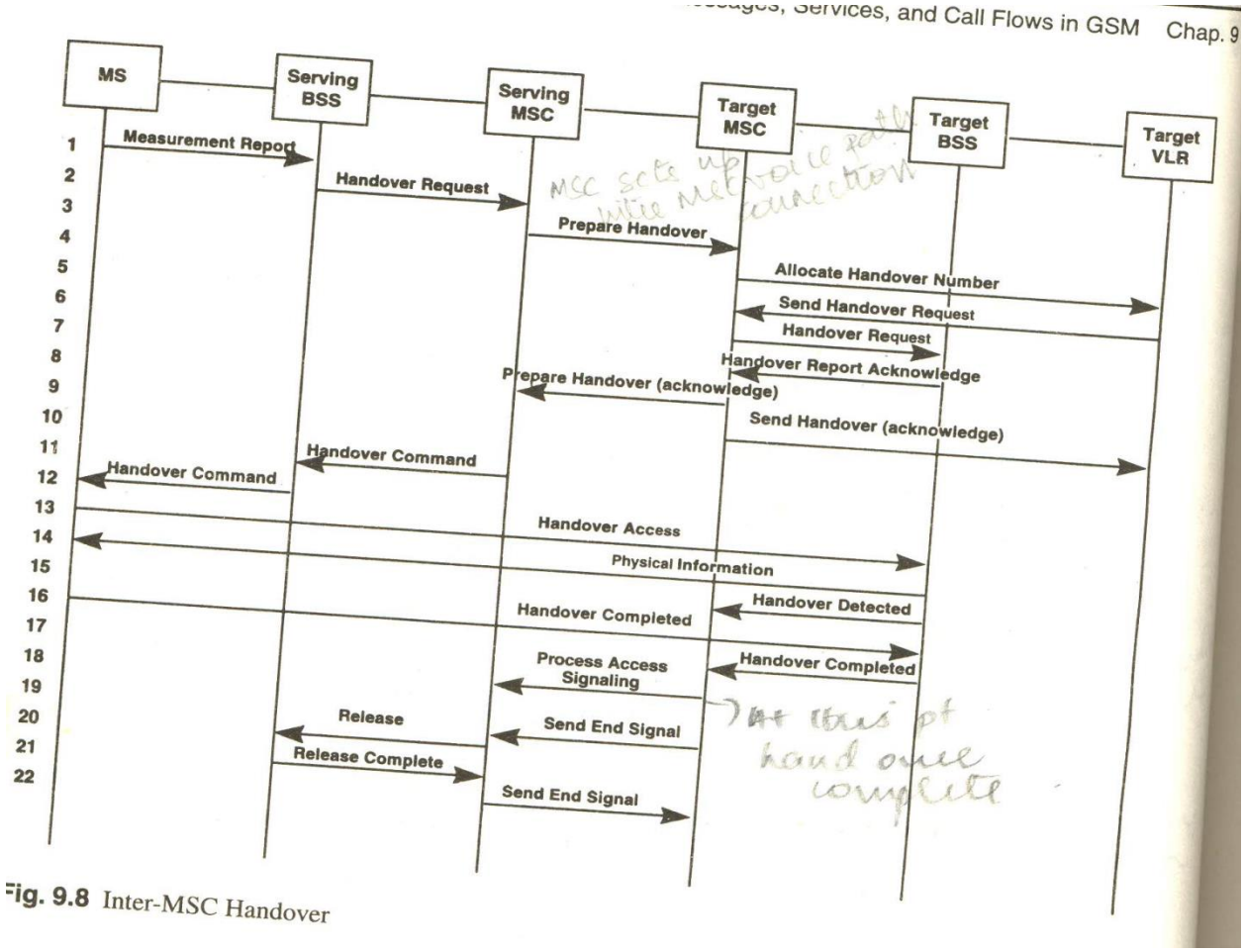



Fig. 9.8 Inter-MSC Handover

4.

Many cellular users carry a pager in addition to a cellular phone.

Reasons for use of pager-

1. Older analog phones not operate for an entire day on a single battery. With a pager the

User can apply power to the phone only when making the calls so battery power is conserved

2. cellular service charges for air time for both incoming and out going calls. A cellular user may not want to receive incoming calls from a person or from an organization. He can keep the phone switched off

3. To avoid fraud.
4. Pagers can also be used to receive sms at less cost

When GSM system supports paging by delivery of the page to a display on the phone the

Service is called SMS

SMS consists of message entry features, administration features and transmission capabilities. These features are distributed between a GSM system and SMS message center.(SMSMC)

GSM phone can act like a two way pager so user does not need to separate the pager

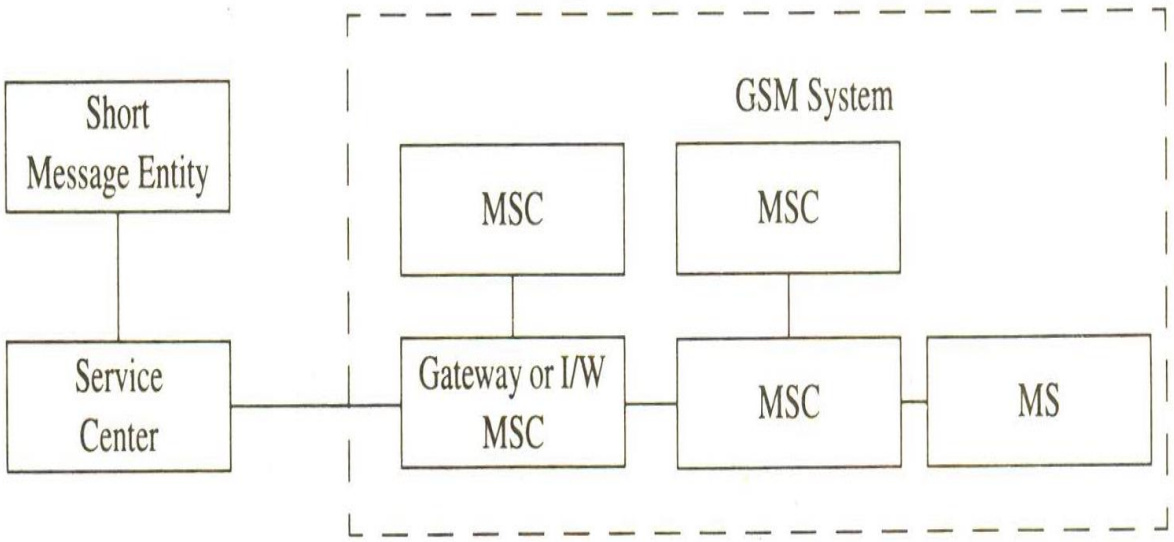



**Fig. 10.9** Architecture of SMS

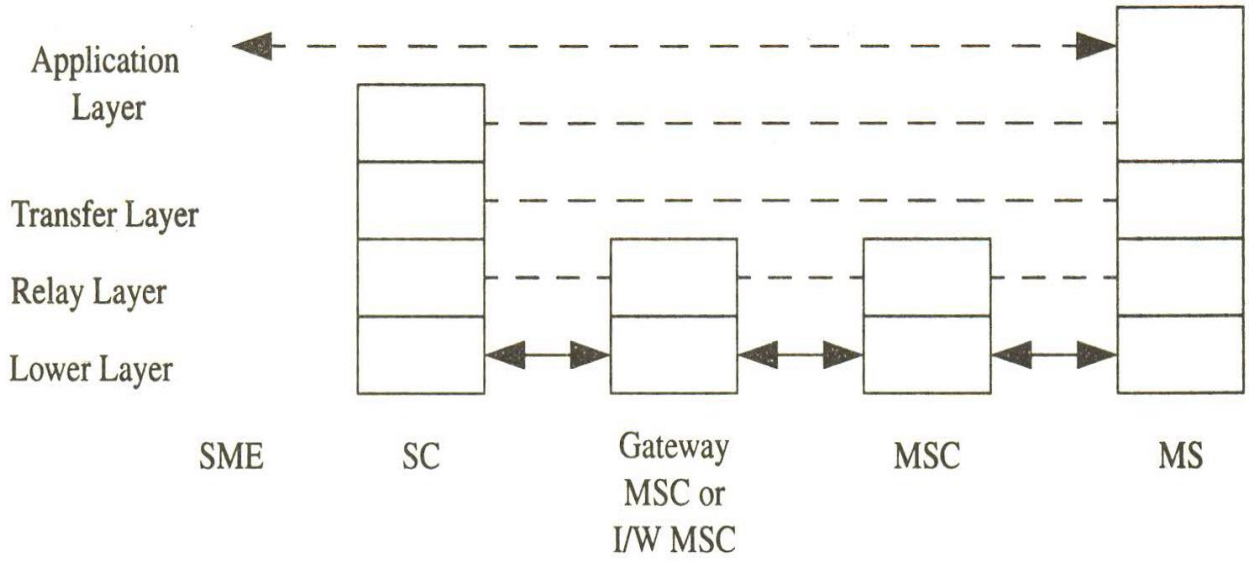



**Fig. 10.10** Protocol Stack for SMS

Application layer: this depends on the specific service supported by the SME. For alphanumeric Service the display on the phone will present the letters and numbers transmitted

Transfer layer: this transfers short messages from the service center to the MS. This gives the Status of messages sent in either direction

Relay layer: this is used to deliver services to the transfer layer

Lower layer: this is the physical layer of GSM

Second type of service is the SMS cell broad cast

Multiple MSs are sent the same message via a broadcast message. This service provides the same information to many MSs in the system.

The information service provider that originates the information is called cell broadcast entity.

the information is transferred to cell broadcast center which relays the information

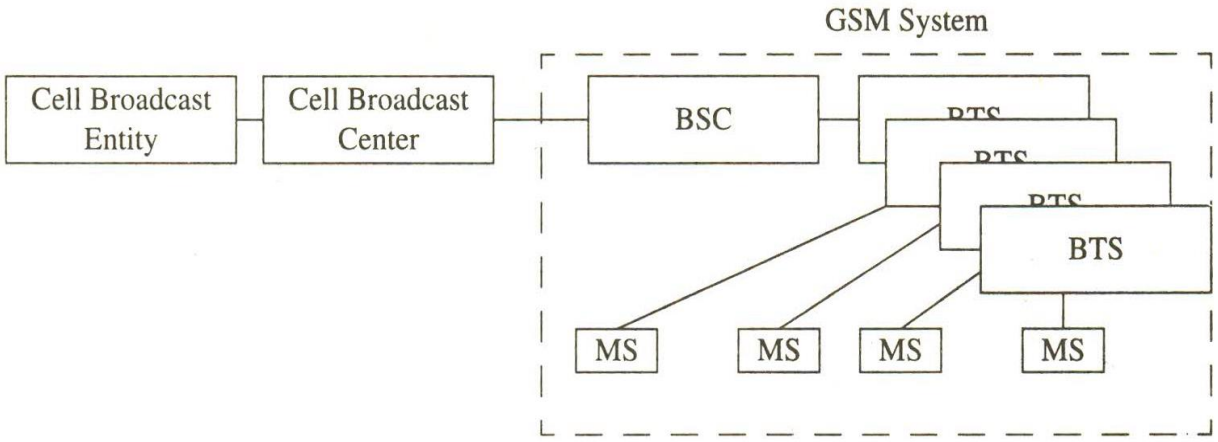



**Fig. 10.11** Architecture of SMSCB

5.

**GSM GPRS:-** Extends the packet capabilities of GSM to higher data rates and longer messages

Supports point to point and point to multipoint messages

Two new nodes are added to support GPRS(general packet radio service)

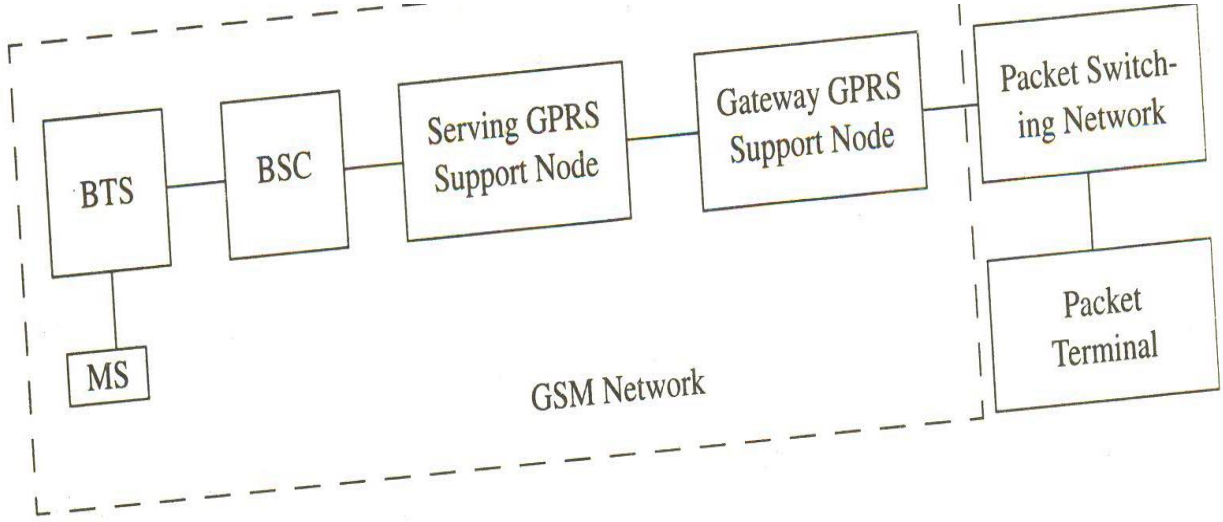



**Fig. 10.12** GPRS Network Architecture

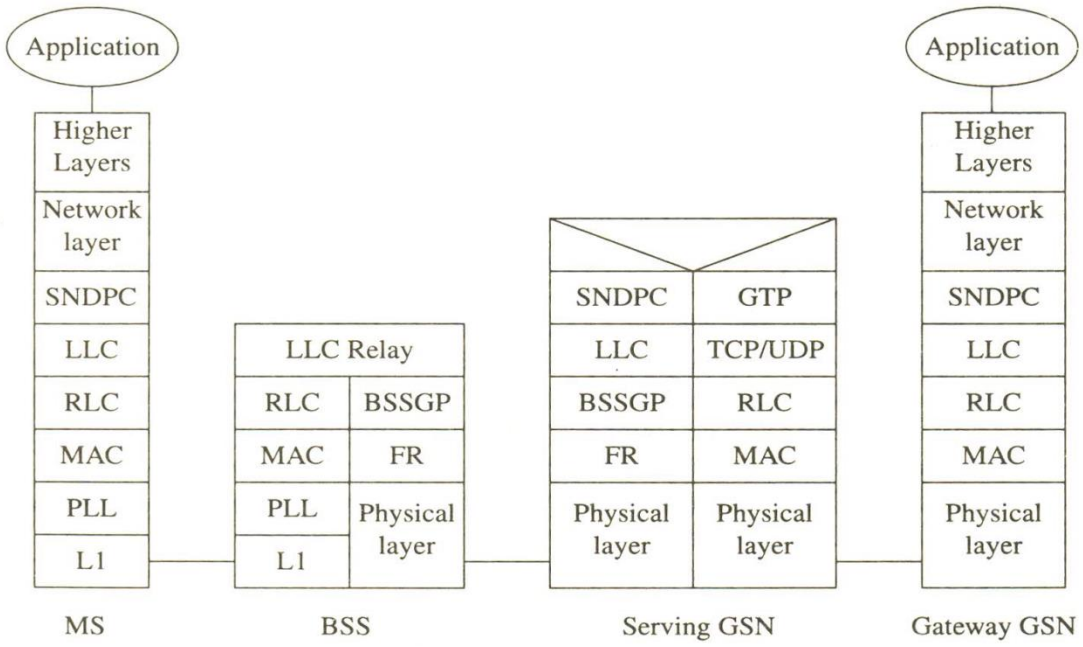



**Fig. 10.13** Protocol Stack for GPRS

SNDCP(sub network dependent convergence protocol) performs header compression

LLC (logical link control)provides link layer control between MS and GPRS

RLC(radio link control) transmits data, performs error detection, error correction using ARQ

MAC (medium access control) operates similar to a slotted ALOHA

Phy link  layer manages error correction radio channel congestion

Radio frq layer manages frq modulation

BSSGP(BSS GPRS protocol) provides routing

Frame relay(FR)  supports packet communication between nodes

GTP(GPRS tunnel protocol)  routes PDU through the network by adding packet routing information

TCP/UDP  and IP for internet

6.

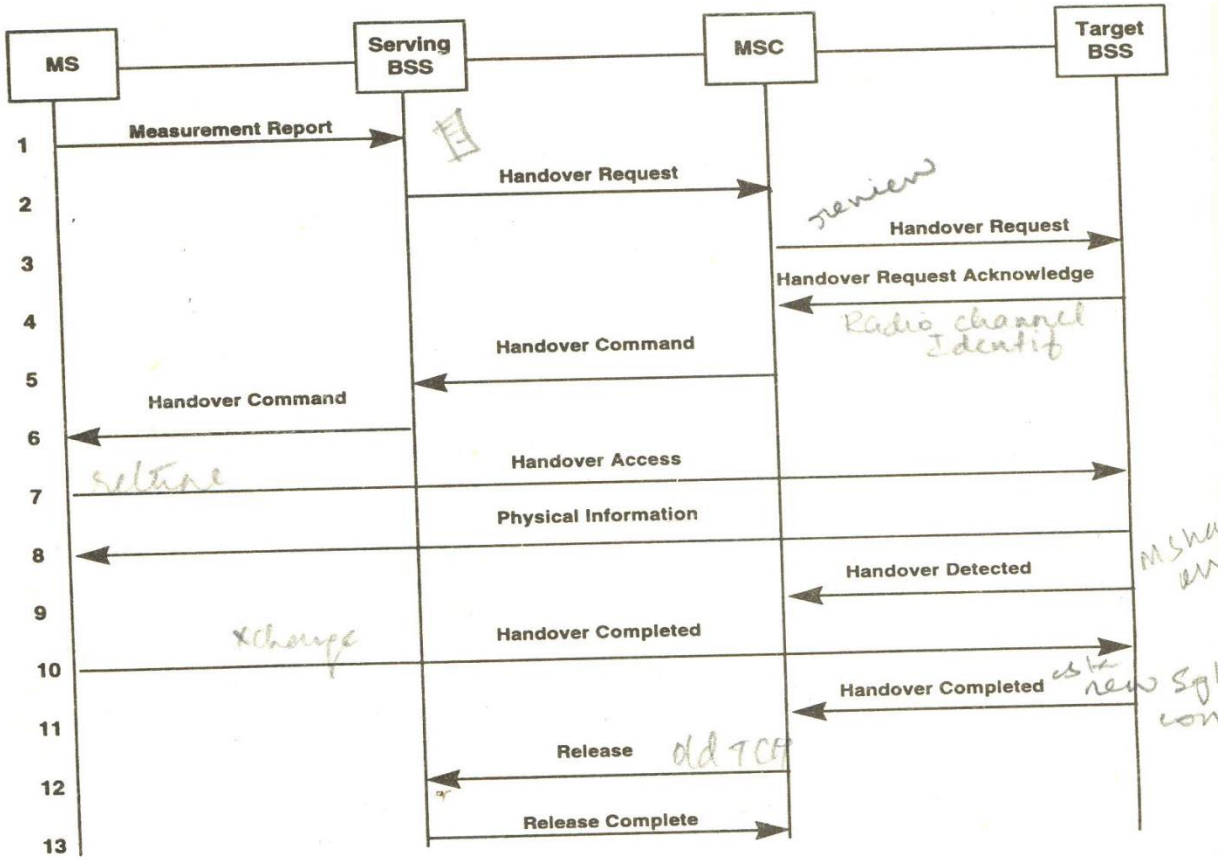



**Fig. 9.7** Intra-MSC Handover

7(a)

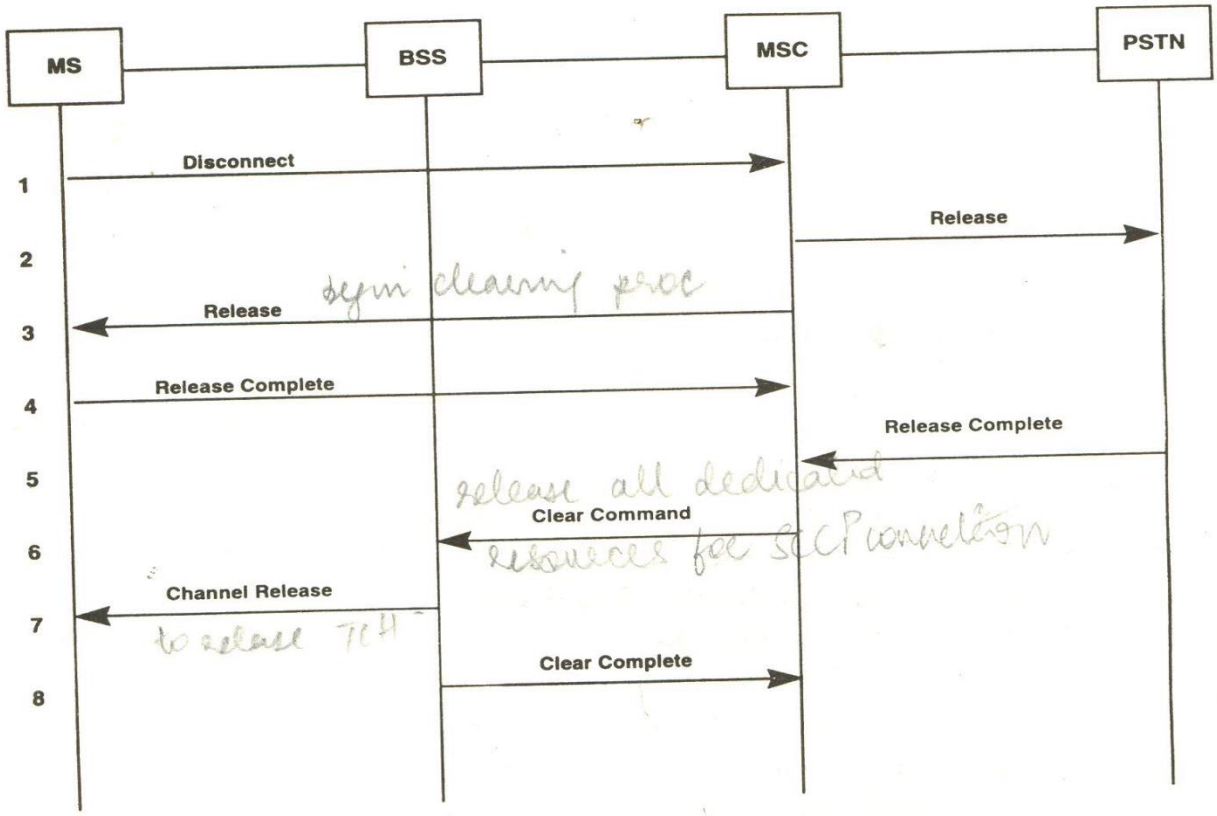
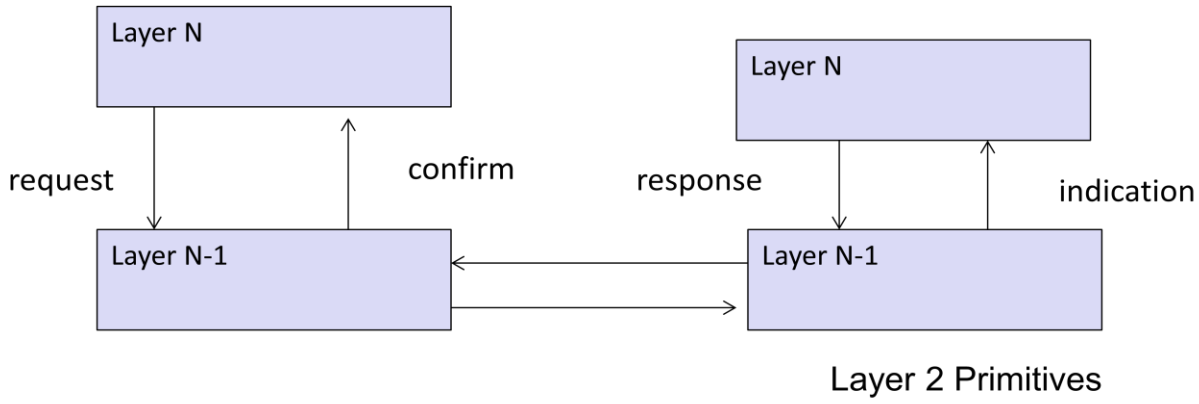



**Fig. 9.6** Call Release—Mobile Initiated

7(b)




Upper layers on one side of the interface communicate with their corresponding layer on the other side of the interface by sending messages to next lower layer

The primitives are
**Request**: when higher layer requests a service from lower layer

**Indication**: lower layer on the other side indicates the request to the next higher layer using the indication primitive

**Response**: the higher layer on other side acknowledges the indication using the response primitive

**confirm**: the lower layer on the requesting side confirms the request by sending a confirm primitive to next higher layer