

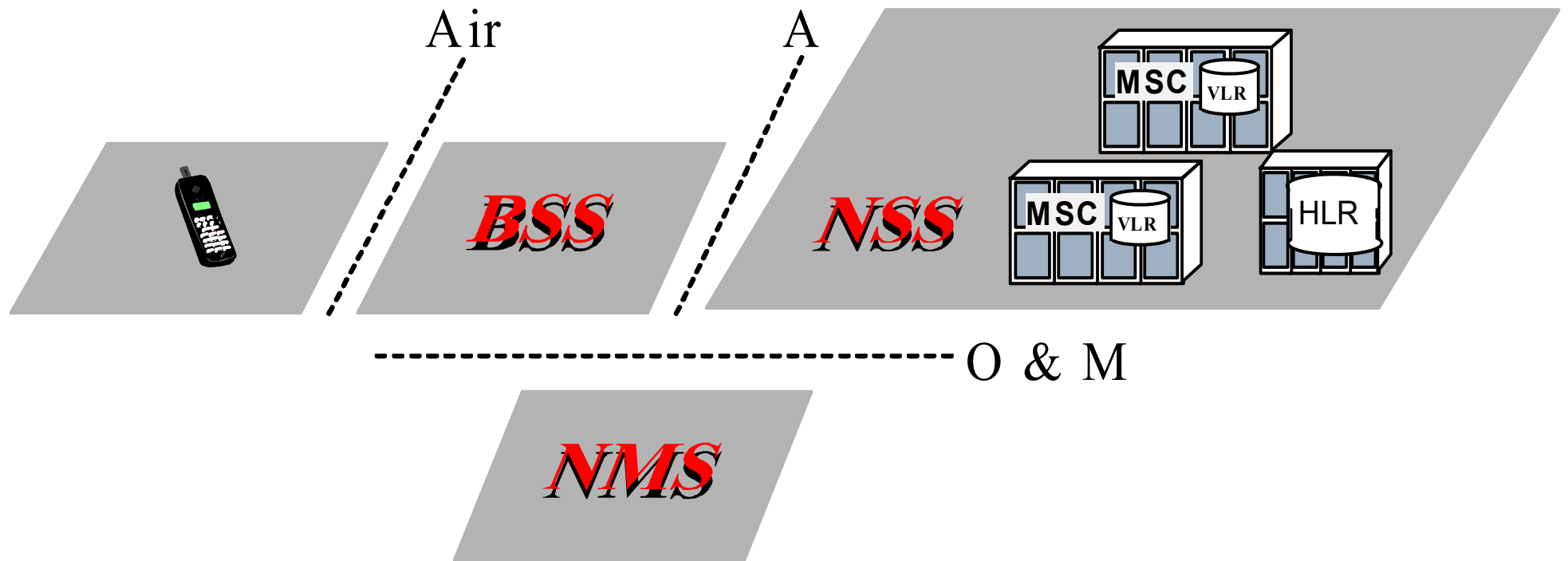


ARSITEKTUR SELULAR

PENGANTAR TELEKOMUNIKASI

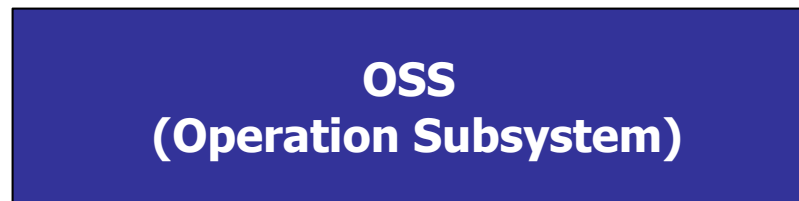
SUSMINI INDRIANI LESTARININGATI, M.T

ARSITEKTUR DASAR SISTEM GSM



- ▶ Arsitektur Jaringan GSM terdiri dari 3 bagian utama :
 - ▶ Radio Subsystem (RSS) = Base Station Subsystem (BSS) & Mobile Station (MS)
 - ▶ Network Switching Subsystem (NSS) = Switching Subsystem (SSS)
 - ▶ Network Management System (NMS) = Operation & Maintenance System (OMS)

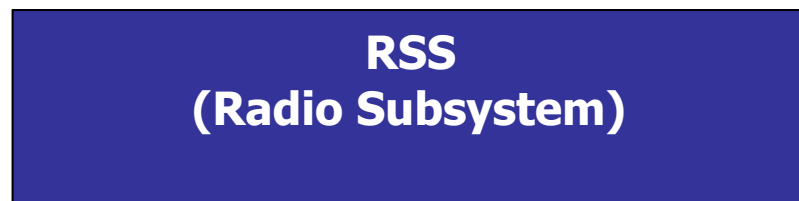
FUNGSI SUBSYSTEM GSM



- Administrasi Pelanggan**
- Keamanan**
- Operasi dan Pemeliharaan**

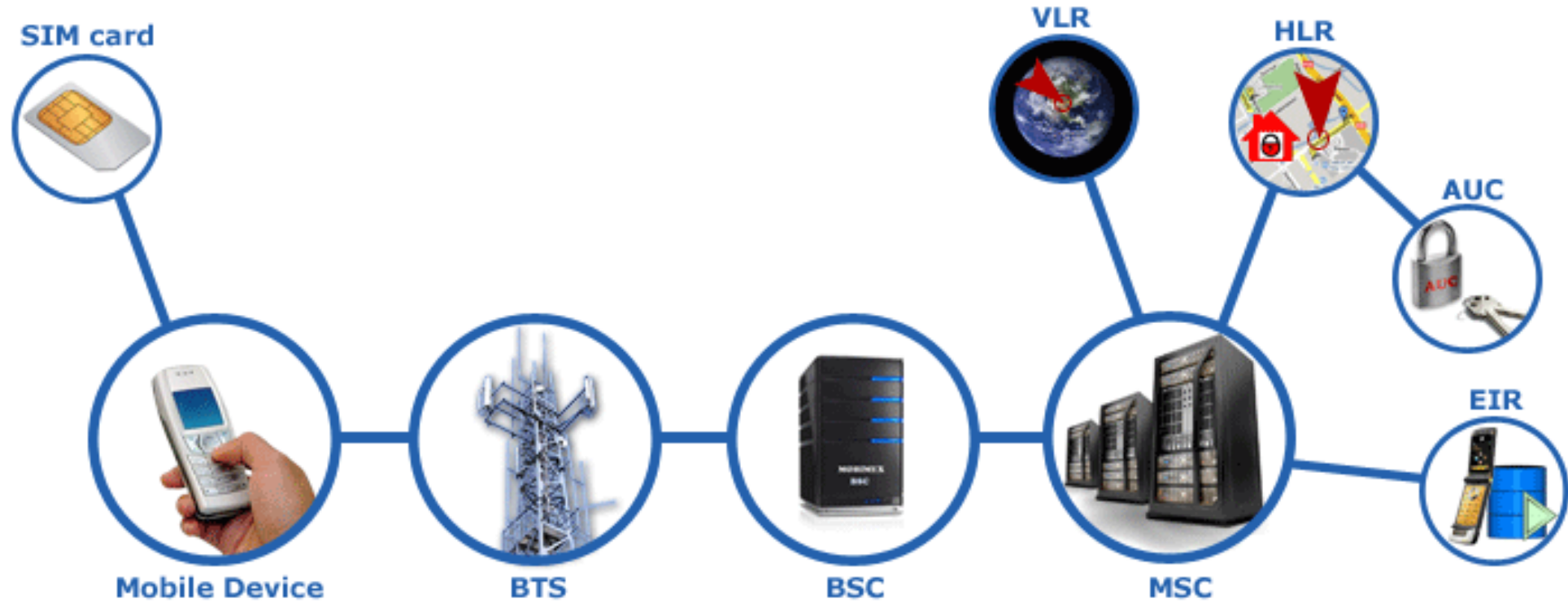


- Mobilitas Pelanggan**
- Pengaturan Komunikasi Pelanggan**
- Pengaturan Pensinyalan**

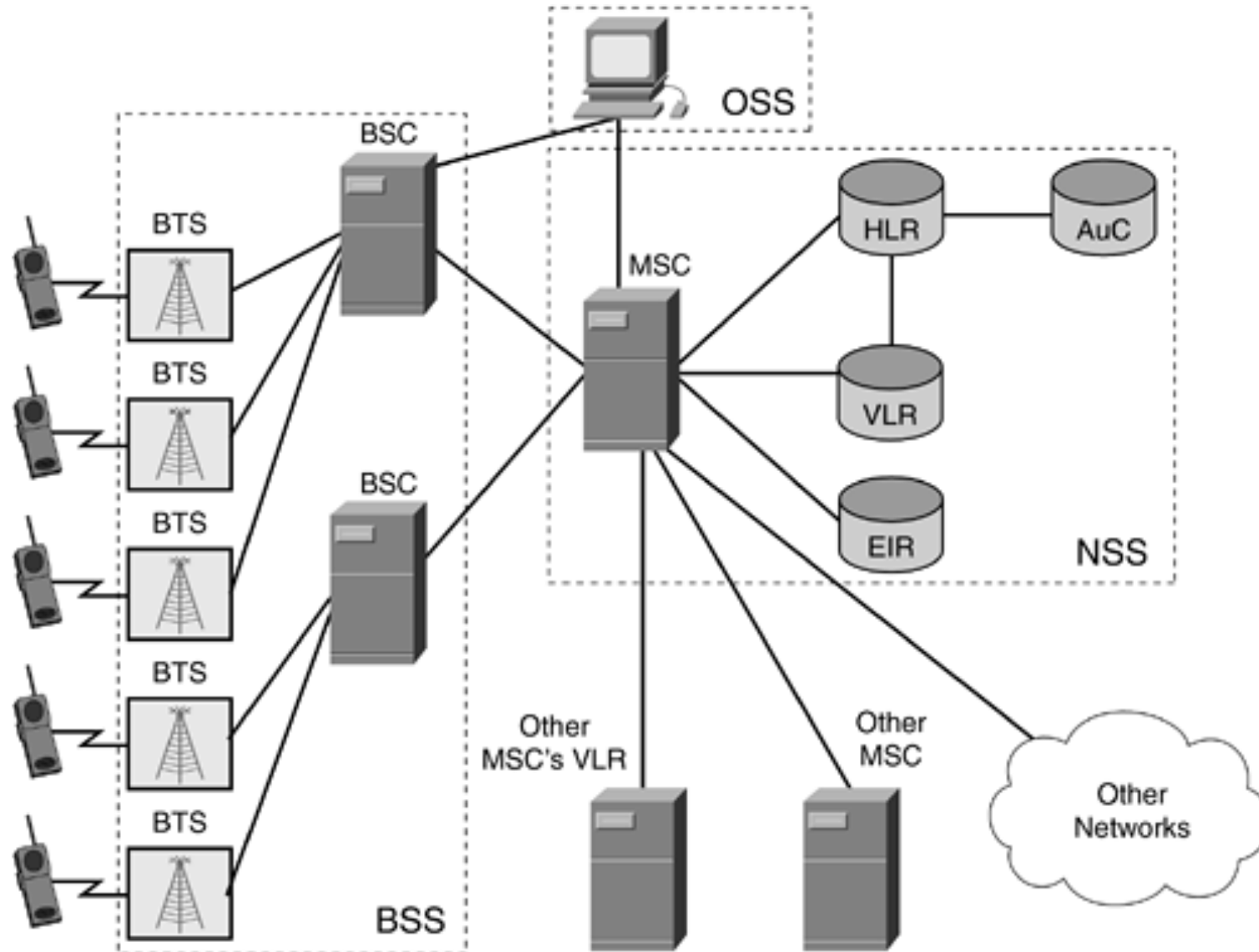


- BSC** — **Mengatur jaringan radio**
- BTS** — **Kanal Radio**
Perangkat transmisi

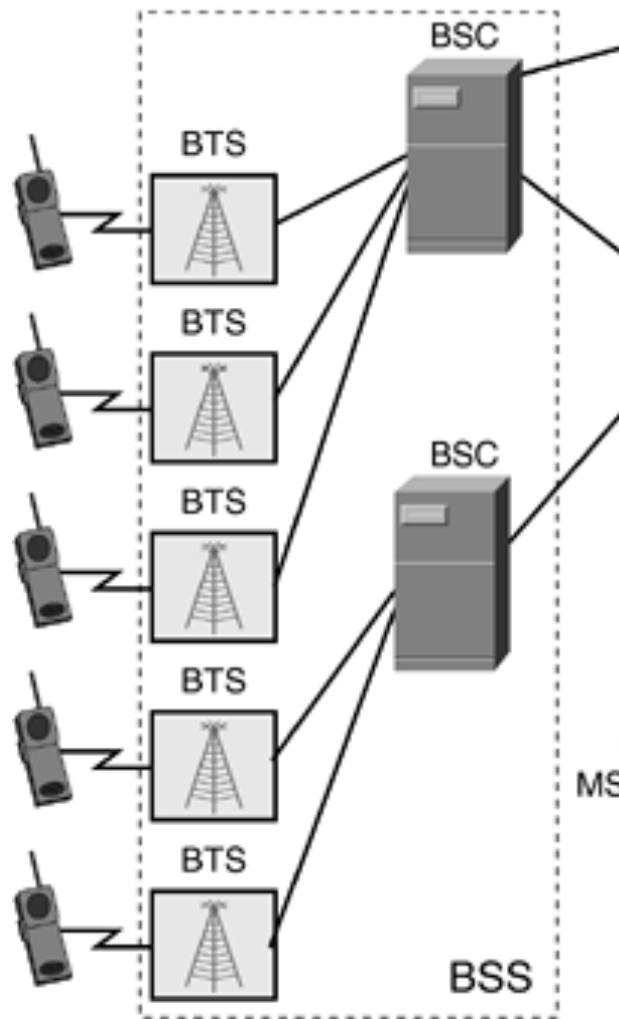
ARSITEKTUR JARINGAN GSM



GSM NETWORK COMPONENTS



BASE TRANSCEIVER STATION (BTS)



- ▶ **BSS** terdiri dari dua buah perangkat :
 - ▶ Base Transceiver Station (BTS)
 - ▶ Base Station Controller (BSC)
- ▶ BTS merupakan tranceiver yang mendefinisikan sebuah sel dan menangani hubungan link radio dengan MS.
- ▶ BTS terdiri dari perangkat pemancar dan penerima, seperti antenna dan pemroses sinyal untuk sebuah interface.

BASE TRANSCEIVER STATION (BTS)

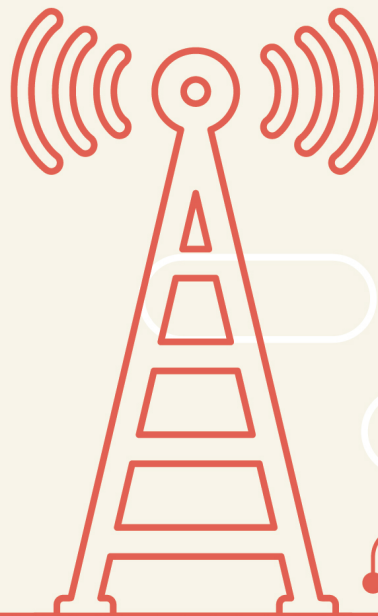


- ▶ Provide radio connection between mobile users and the switch
- ▶ One wireless system in a large metropolitan area may require hundreds of base stations to deliver unbroken coverage and provide sufficient capacity to handle all potential users

BTS

**BASE TRANSCIVER STATION
ATAU STASIUN PEMANCAR**

Berfungsi sebagai **pemancar dan penerima jaringan seluler** di suatu cakupan wilayah



BTS PER DAERAH

Sumatera	▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲	41.769
Jawa	▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲	105.654
Kalimantan	▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲	13.873
Bali-Nusa Tenggara	▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲	9.326
Sulawesi	▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲	11.566
Maluku-Papua	▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲	8.242

Pembangunan dan penggunaan menara bersama di Indonesia diatur dalam **Permenkominfo 02/PER/M.KOMINFO/3/2008** tentang **PEDOMAN PEMBANGUNAN DAN PENGGUNAAN BERSAMA MENARA TELEKOMUNIKASI**



INFO JUMLAH MENARA PEMANCAR TELEKOMUNIKASI DI INDONESIA TAHUN 2014



Telkomsel
84.420



XL Axiata
52.012



Indosat
40.229



3
37.000



Smartfren
6.115



Internux
2.544



Bakrie Telecom
2.360



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Tgl Pembuatan 04 12 2015

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http://statistik.kominfo.go.id/site/data?idtree=340&iddoc=1302&data-data_page=3
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Permenkominfo 02/PER/M.KOMINFO/3/2008 tentang PEDOMAN PEMBANGUNAN DAN PENGGUNAAN MENARA BERSAMA TELEKOMUNIKASI
<http://www.postel.go.id/?mod=reg&cid=40&year=2008>



BASE STATION CONTROLLER (BSC)



- ▶ The Base Station Controller (BSC) interfaces the switch and the base stations
 - ▶ Compresses speech signal former efficient transmission over the scarce radio spectrum
 - ▶ Controls the base stations and implements the handoff of calls from one base station to another as users drive across the system

TEXT

BSC

Controls up to 40 BTSs

Convey Information to/from the BTS

Connects terrestrial circuits and channels on the air interface

Control handovers performed by BTSs under its control

BTS

Contain RF Hardware

Limited control functionality

1 - 6 RF carriers per BTS

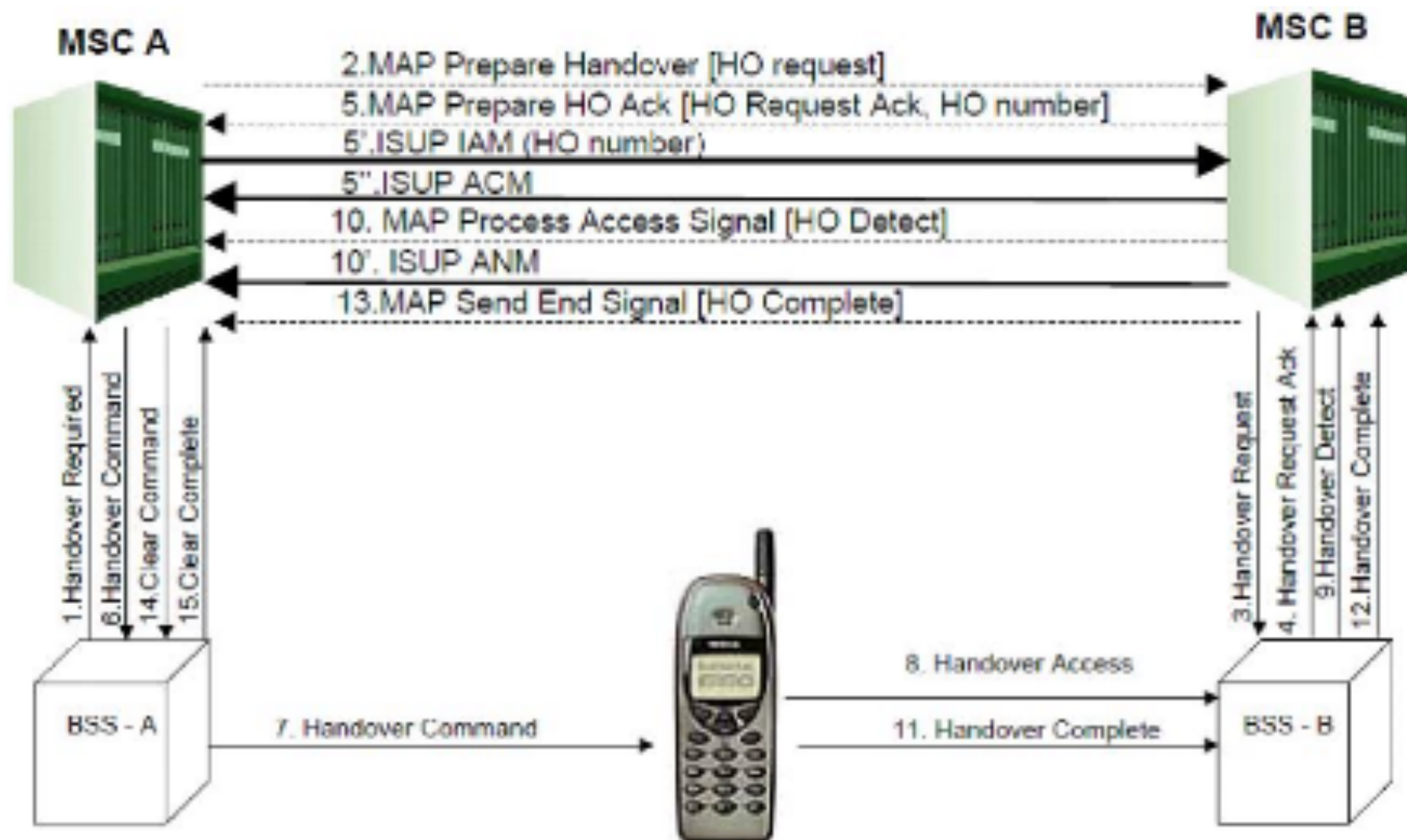
7 - 48 Simultaneous calls per BTS

MOBILE SWITCHING CENTER (MSC)

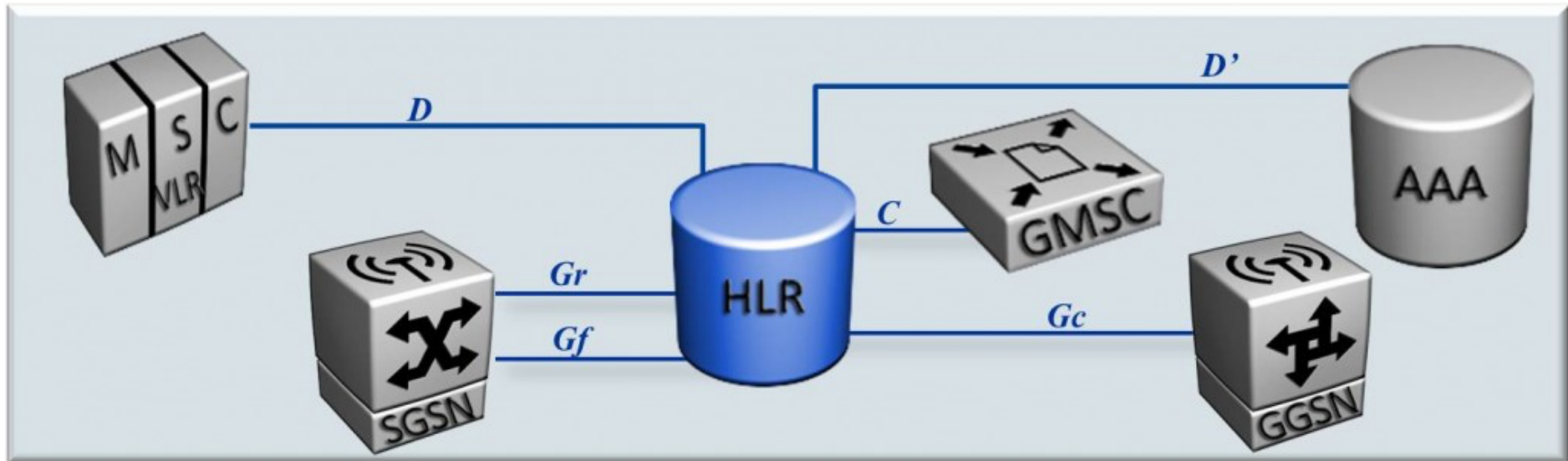


- ▶ The MSC is the heart of GSM network
- ▶ Switching centre which coordinates the routing calls in a large service area. In cellular radio system, the MSC connections the cellular base stations and the mobile to the PSTN (telephone network)
- ▶ It handles call routing, call setup and basic switching function
- ▶ An MSC handles multiple BSC's as well as coordinates with other MSC's

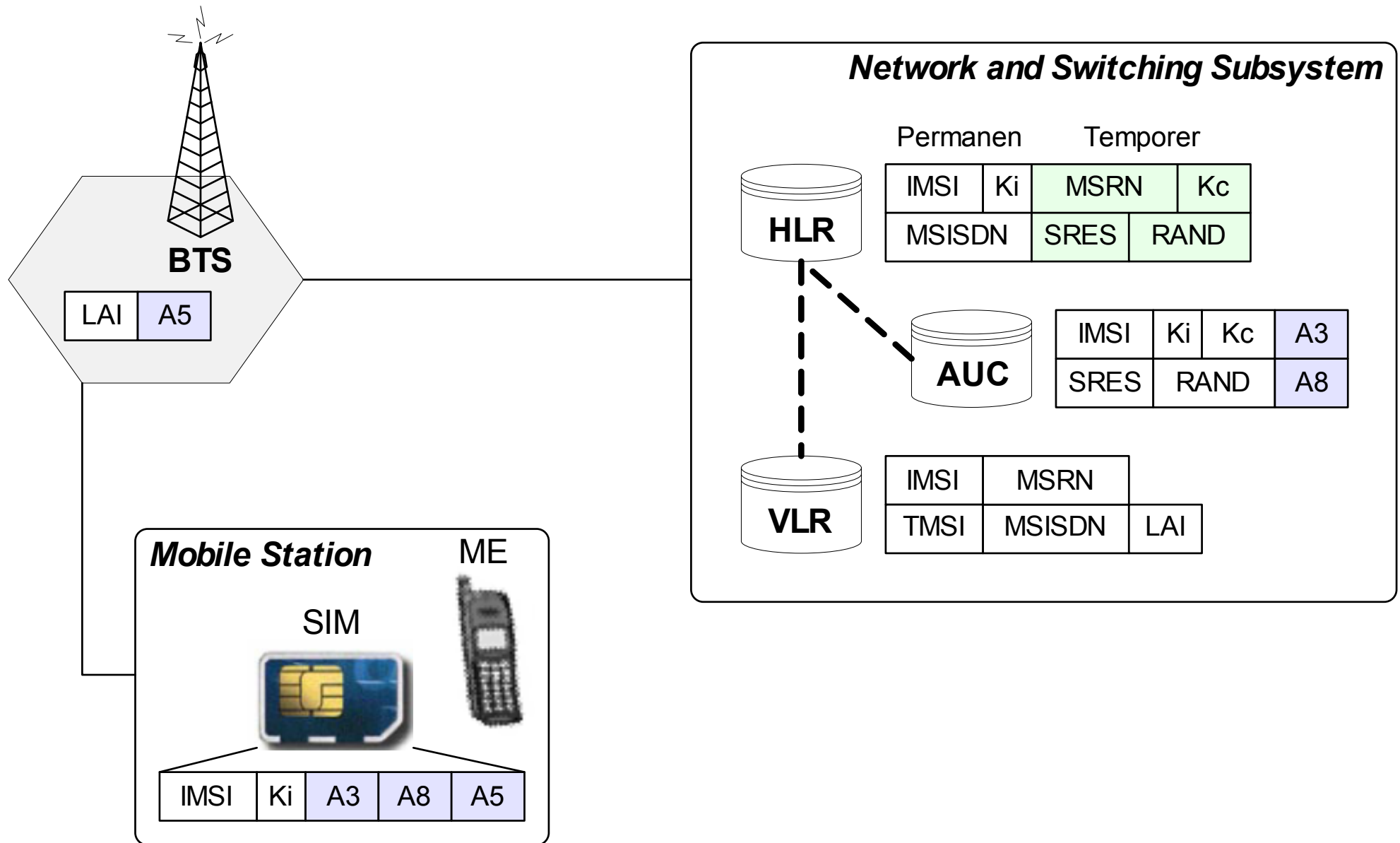
MSC TO MSC



HOME LOCATION REGISTER

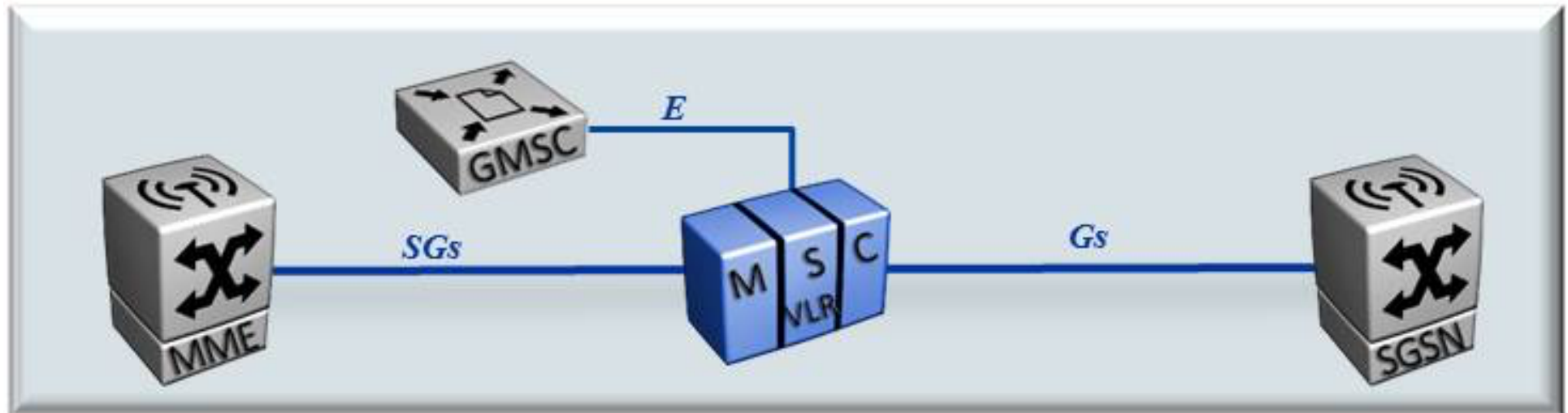


- ▶ Home Location Register or HLR is an intelligent database and service control function responsible for management of each individual subscriber's records. It contains details of each mobile phone subscriber - more precisely of its SIM card - that is authorised to use the GSM core network.



- ▶ **International Mobile Subscriber Identification (IMSI)** - This number identifies the mobile subscriber. It is only transmitted over the air during initialisation
- ▶ **Temporary Mobile Subscriber Identity (TMSI)** - This number identifies the subscriber, it is periodically changed by the system management to protect subscriber from being identified by someone attempting to monitor radio interface.
- ▶ **Location Area Identification (LAI)** - Identifies the current location of the subscriber.
- ▶ **Subscriber Authentication Key (Ki)** - This is used to authenticate the SIM Card
- ▶ **Mobile Station International Service Digital Network (MSISDN)** - This is the telephone number of the mobile. It is comprised of a country code, a national code and a subscriber number.

VISITOR LOCATION REGISTER (VLR)

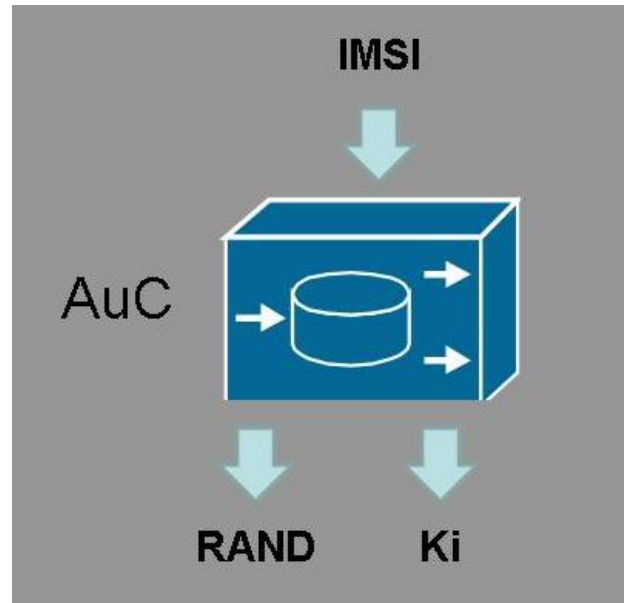


- ▶ The visitor location register is a database that contains temporary information about subscriber homed in one HLR who are roaming into another HLR. This information is needed by the MSC to service visiting subscribers.
- ▶ Roaming user record is added to VLR whenever an MSC detect a new mobile phone in its area.

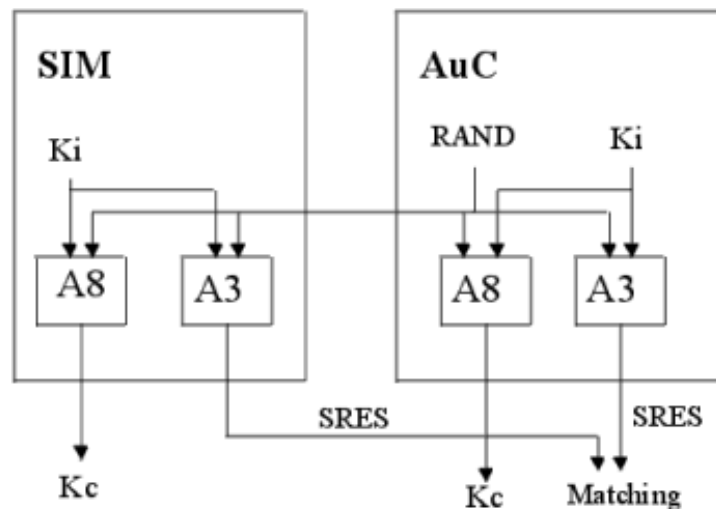
VISITOR LOCATION REGISTER (VLR)

- ▶ The visitor location register is a local subscriber holding details on those subscribers who enter the area of the network that it covers
- ▶ The details are held in the VLR until the subscriber moves into the area serviced by another VLR
- ▶ the data includes most of the information stored at the HLR, as well as more precise location and status information
- ▶ The additional data stored in VLR are
 - ▶ mobile status (busy/free/no answer, etc)
 - ▶ Location Area Identity (LAI)
 - ▶ Temporary Mobile Subscribers Identity (TMSI)
 - ▶ Mobile Station Roaming Number (MSRN)

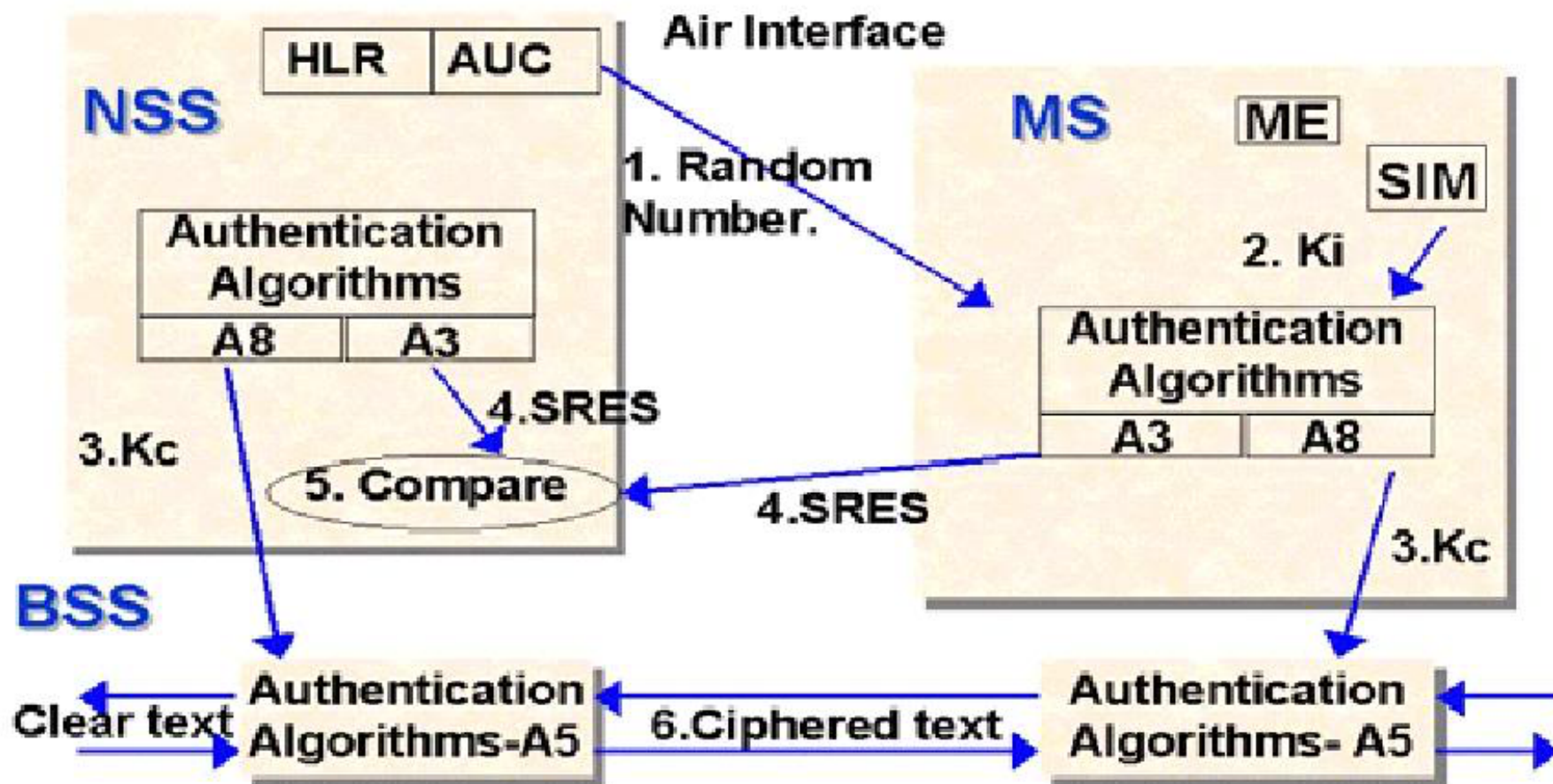
AUTHENTICATION CENTER (AUC)



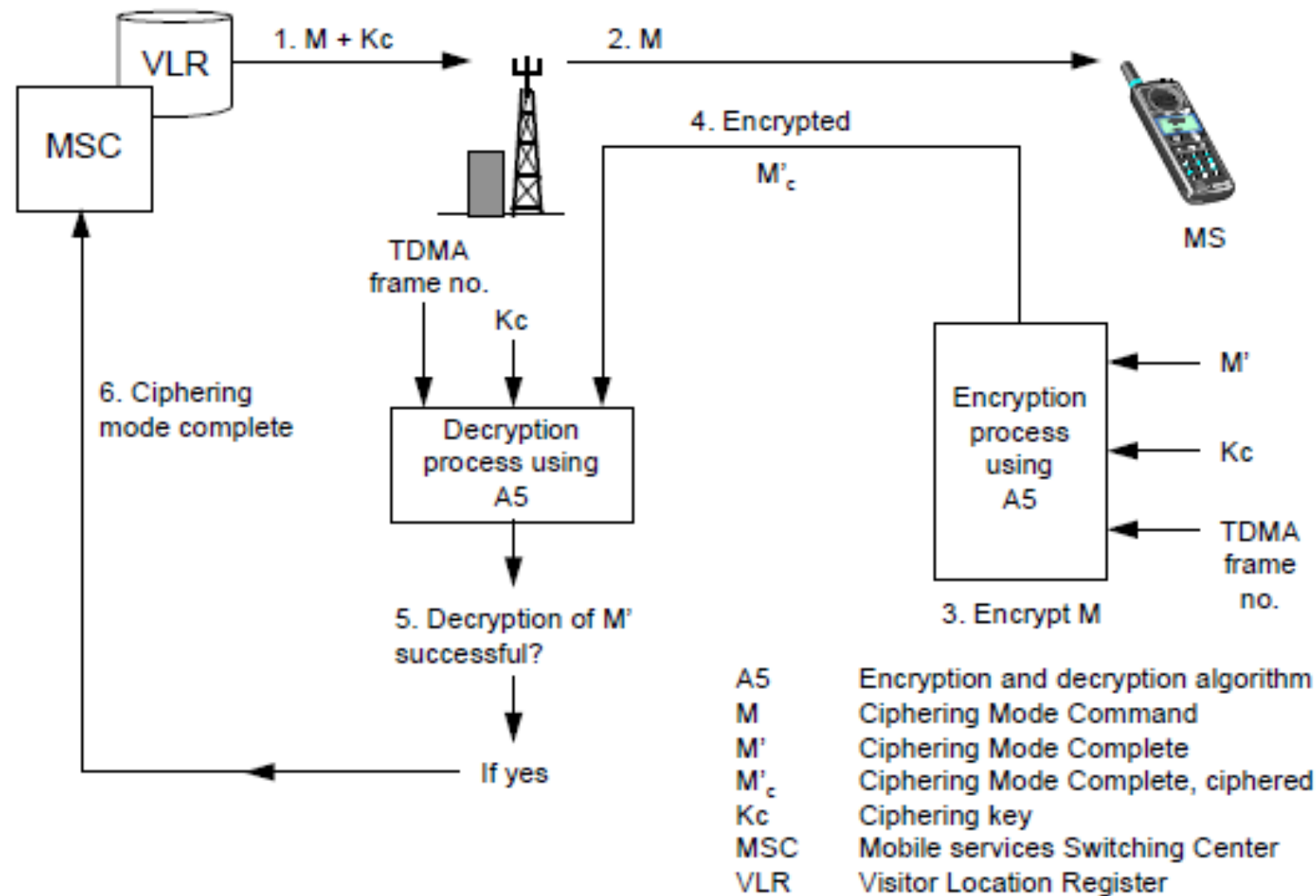
- ▶ The Authentication Centre or AuC is the function that authenticates each SIM card that attempt to connect to GSM network (typically when the phone is powered on). Once the authentication is successful, the HLR is allowed to manage the SIM and service describe above. An encryption key is also generated that is subsequently used to encrypt all wireless communication (voice, SMS, etc) between mobile phone and the GSM core network.



Authentication Process



PENGANTAR TELEKOMUNIKASI



MOBILE STATION (MS)

- ▶ Merupakan terminal yang dipakai oleh pelanggan untuk melakukan proses komunikasi
- ▶ Terdiri dari :
 - ▶ Mobile Equipment (ME)/HP --International Mobile Equipment Identity
 - ▶ Subscriber Identification Module (SIM)



- ▶ Catatan : MS tidak akan dapat berhubungan tanpa SIM card

