GSM Network and Services

Interfaces and protocols
- even more three letter acronyms
Interfaces

BSC

MSC

Um

A-bis

A

E

F

C

D

B

VLR

EIR

HLR

VLR
Signaling protocols BSS

- Um
  - CM
  - MM
  - RR
  - LAPDm
  - radio

- Abis
  - RR
  - BTSM
  - LAPDm
  - LAPD
  - radio
  - E1

- A
  - RR
  - BTSM
  - LAPD
  - E1
Signaling protocols BSS

- LAPD – Link Access Procedure D channel, the link layer defined for ISDN, provides retransmission, error detection ...

- E1 – the physical layer most often used for ISDN, 30 traffic channels and one signaling channel all of 64kbps
Signaling protocols BSS

- **RR** – radio resource management
  - idle mode: monitoring broadcast channels
  - dedicated mode: request, measure quality, power control, handover, synchronization of encryption, ...

- **BTSM** – BTS management, the BSC controls the radio resources of the BTS
Signaling protocols – MS/BSC/MSC
SS7 – signaling system number 7

- MTP – message transfer part, defines layer one to three.
  - MTP1: could be E1
  - MTP2: link layer, error detection, retransmission...
  - MTP3: addressing in the form of signaling points, one interface has a unique address, limited address range

- SCCP – signaling connection control part
  - segmentation, global addressing, sub addressing (similar to UDP ports), each mobile has a MSC unique SCCP address
DTAP/MM/CM

- Direct transfer application part
  - Will enclose a MM message so that it is transparently shipped over the BSC and BT to the MM layer at the mobile phone

- Mobility management
  - Location area updating, paging, authentication ...

- Connection Management
  - Call control, SMS, supplementary services
Signaling protocols – BSC/MSC

- BSS Application Part – the MSC will direct the BSC, for example when doing handover between two BSCs
Signaling protocols – MSC/HLR/VLR/…

- TCAP - transaction capabilities application part, defined in the SS7 stack
- MAP – mobile application part, this is the application layer protocol used by the nodes for example register updating and query
Which are important

- MAP
- BSSAP / BTSM
- CM
- MM
- RR
- LAPDm
- Radio
- ... and of course the traffic channels
Services – what is offered

• Bearer services
  – basic bit pipes in various sizes
• Tele services
  – Speech, SMS, fax, teletext ...
• Supplementary services
  – Controls the tele services
Bearer services

- Circuit switched data services
  - up to 9.6 kbps
  - up to 57.6 kbps using 4x14.4 HSCSD (how)
- Circuit switched data comes as:
  - transparent or non-transparent, the network does error detection and retransmission
- GRPS has introduced new bearer services
  - data services are migrating to GPRS
Teleservices

- Voice, TS11
- Emergency call, TS12
- Fax, TS61
- SMS,
  - mobile terminating TS21
  - mobile originating TS22
- Message Handling System, TS31
- Teletext TS51 – does anyone use this?
Supplementary services

• Call forwarding
  – always/busy/no reply/not reachable
• Barring
  – Outgoing: all or international
  – Incoming: all or international when roaming
• Number presentation
• Call waiting
• Multi-party
Transport of voice

- GSM Speech Code is converted in the TRAU (often in the BSC) to A-law (regular phone voice codec)