

GSM and Similar Architectures

Lesson 01 GSM Services

Global system for mobile communications (GSM)

- A mobile communication standard
- GSM communication— uses cellular networks
- The GSM standard operates in the frequency ranges of 900, 1800, and 1900 MHz

Global system for mobile communications (GSM)

- Tri-band (operable in GSM 900/1800/1900) phones enable easy international roaming in GSM networks
- GSM— a second generation (2G) communication standard

Three types of integrated services for voice and data

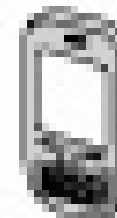
- Teleservices
- Supplementary services
- Bearer services

Teleservices

Teleservices

(Point-to-point cellular broadcast)

- Telephone/fax
- Voice full 13 kbps
- SMS up to 160 characters
- Emergency number 112
- MMS—GIF, JPG, WBMP
- Teletext
- Videotext access
- Fax group 3



Half data rate speech

Enhanced full rate speech

Can be implemented
differently

Supplementary services

Supplementary services

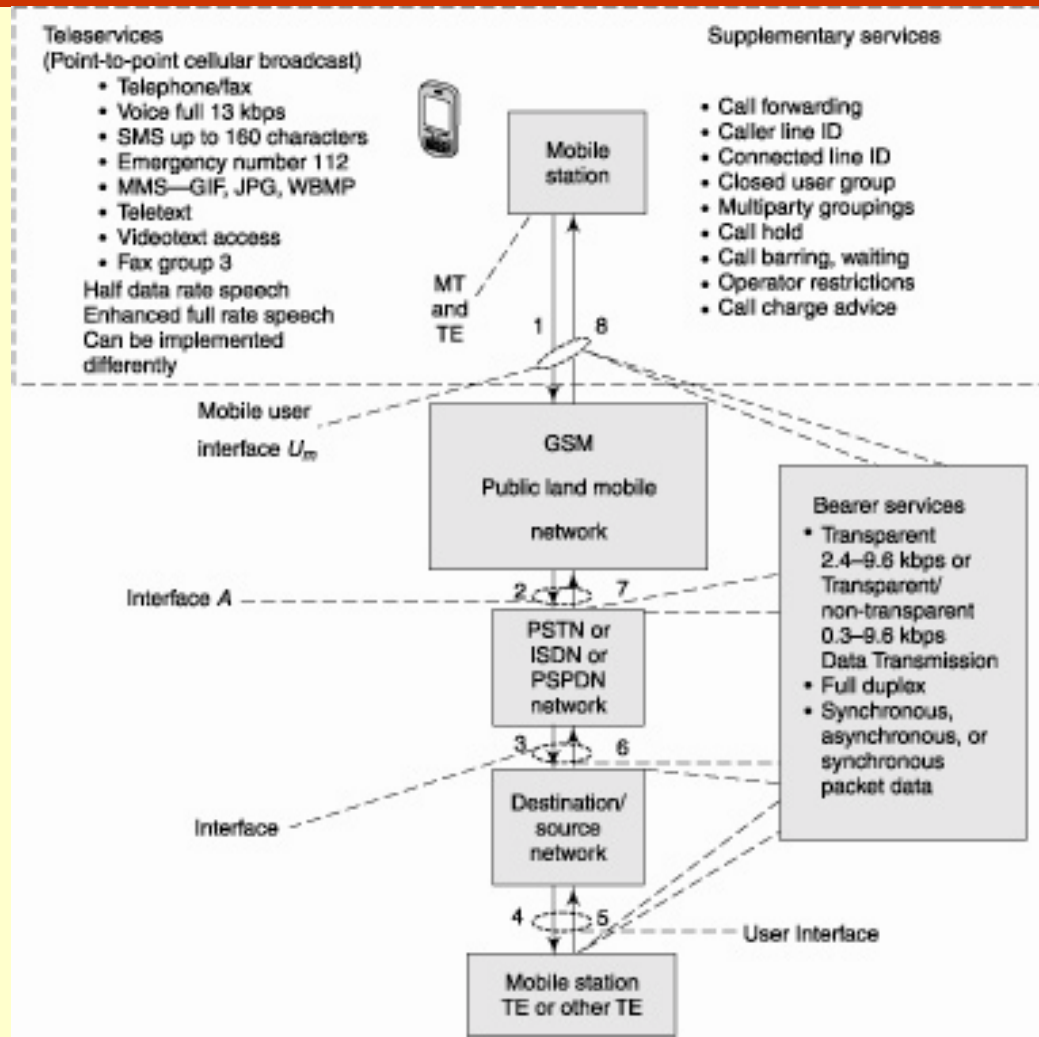
- Call forwarding
- Caller line ID
- Connected line ID
- Closed user group
- Multiparty groupings
- Call hold
- Call barring, waiting
- Operator restrictions
- Call charge advice

Bearer services

Bearer services

- Transparent
2.4–9.6 kbps or
Transparent/
non-transparent
0.3–9.6 kbps
Data Transmission
- Full duplex
- Synchronous,
asynchronous, or
synchronous
packet data

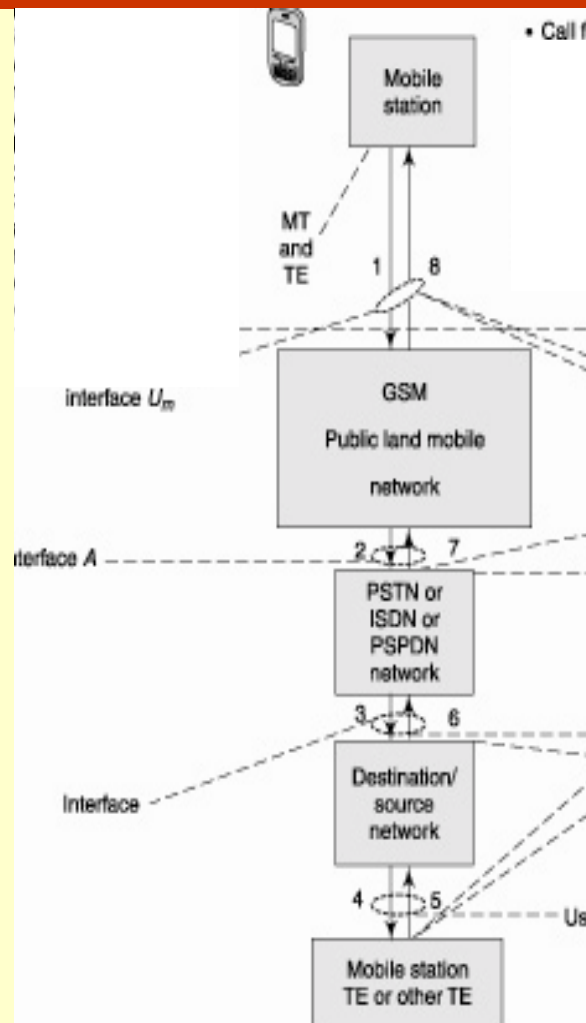
Integration of teleservices, bearer services, and supplementary services



Connection

- Establishes between two TEs—the source and the destination
- The destination TE may or may not belong to a GSM network

Connection between two terminal equipments or mobile terminals



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Interfaces

- A mobile terminal acts as an interface between a communications network (for example, interface between the GSM public land mobile network) and terminal, TE — the source or destination of the service
- The TE used by a caller to connect and talk (communicate) and MT for mobile communication

Connection

- Depends on the source–destination network which may be a GSM, PSTN (public switched telephone network), ISDN (integrated services digital network), PSPDN (public switched public data network), or any other network carrying the data to the end-point TE

Connection from caller

- A caller TE transmits through interface 1 to a GSM public land mobile network
- Through 2 to a PSTN network
- Through 3 to a source–destination network
- Through 4 to a terminal or mobile station TE
- In place of the PSTN network, there may be an ISDN or PSPDN network

Connection from called TE to caller MT

- The connected TE communicates back by transmitting through interfaces 5, 6, 7, and 8

Sets of the Interfaces

- Four sets of interfaces (1, 8), (2, 7), (3, 6), and (4, 5). There is a transceiver in each set
- The symbol U_m (user mobile interface) conventionally denotes the interface (1, 8)
- Symbol A denotes a mobile network interface (2, 7) to a PSTN or other wired network

Four transceivers

- Transmit as well as receive in full duplex mode
- Full duplex mode means simultaneous two-way transmission
- The MT interface can also be half-duplex transmission
- Half duplex means that two-way transmission possible but not both ways at the same time

Teleservices

- Services offered by a mobile-service network to a caller (TE)
- Telephonic-voice at full data rate (13.4 kbps)
- Fax
- SMS
- Emergency number 112 for emergency calls

Teleservices

- MMS [supporting GIF, JPG, WBMP, teletext, and videotext access (GIF, JPG, and WBMP are formats of files that store pictures)]
- Point-to-point — from a TE to another TE
- A point-to-point service is implemented using cellular communication

Additional teleservices (introduced in phase 2 of GSM)

- Half data-rate speech or enhanced full-rate speech services, and these may or may not be rendered by cellular and point-to-point access systems
- A GSM smart phone, which connects to a GSM public land mobile network

Additional teleservices

- A number of teleservices including phone, voice data (for example, recorded message played on auto-answer of incoming calls), SMS, and MMS to another GSM or PSTN network

Phase 2 Supplementary Services

- Caller line forwarding (redirection), caller line identification
- Line identification to the caller
- Closed user group formation
- Multiparty groupings (e.g., in an enterprise)
- Call holding, call waiting, and barring calls from specified numbers or groups

Phase 2 Supplementary Services

- Restricted provisioning of certain services to the users
- Internet and email access granted on special requests from users)
- Providing information regarding call charges, remaining phone account balance, etc

Bearer services

- Transmission of data (voice signals are also transmitted as data) between two user network interfaces [(1,8) and (4,5)] using the intermediate interfaces [(2,7) and (3,6)] at a mobile network

Bearer

- Means a set of data which is transmitted from or received by a TE i.e., the voice-data or data set that has been formatted in certain specified formats
- This data transmits at certain standardized rates through the interfaces

Bearer

- Voice-data— data that is obtained after digitizing, coding, encoding, appending error detection and correction bits, and encrypting of a voice signal

Bearer Services

- Each TE has a user interface
- The interface (1, 8) of a mobile station connects the MT to a GSM public land mobile network
- The interface (4, 5) of a PSTN phone connects to a PSTN network

Bearer Services

- An intermediate PSTN network acts as an interface for a GSM public land mobile network
- In place of PSTN, there may be ISDN, PSPDN, or some other network

Bearer service (service through the interfaces)

- (a) transparent and uses data rates of 2.4 kbps, 4.8 kbps, or 9.6 kbps or
- (b) non-transparent and uses lower data rates (300 bps to 9.6 kbps)

Bearer services classification

- Synchronous data transfer
- Asynchronous data transfer
- Synchronous data packet transfer

Summary

- GSM 900/1800/1900 bands
- Teleservices
- Supplementary services
- Bearer services
- Connection using interfaces
- Four type of interfaces

End of Lesson 01
GSM Services