# Broadband at bell labs in 1970, is

Business, Industries

BROADBAND COMMUNICATION DET-730

ASSIGNMENT SUBMITEDTO SUBMITED BY

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GSM ARCHITECTURE GSM ARCHITECTURE GSMis a mobile communication modem; it represents the Global System for MobileCommunications (GSM). The idea of ?? GSM, developed at Bell Labs in 1970, is themost widely used mobile communication system in the world. GSM is an opendigital cellular technology used to transport mobile voice and data services inthe 850MHz, 900MHz, 1800MHz and 1900MHz bands. The GSM system was developed as a digital system that uses Time Division Multiple Access (TDMA) technology for communication. The GSM digitizes and reduces the data and then sends it over a channel with two different client data streams, each of which is in its own slot.

The digital system can carry 64kbps to 120Mbps data rates. INTROLINK: https://www. elprocus.

com/gsm-architecture-features-working/ A GSM network consists of thefollowing components:· The Mobile Station (MS)· The Base Station Subsystem(BSS)· The Network Switching Subsystem (NSS)· The Operation SupportSubsystem (OSS) MOBILE STATION: MSby the radio

transceiver, display and digital signal processor and SIM cardsand other physical devices. It provides an air interface for users in the GSMnetwork. Therefore, other services are also provided, including: · Voice teleservices· Data bearer services· The features' supplementaryservices THEMOBILE STATION FUNCTIONS MobileStation also provides a receiver for SMS messages, enabling users to switchbetween voice and data usage. Moreover, mobile facilitates access to voicemessaging systems. Mobile Station also provides access to various data servicesavailable in the GSM network. These data services include: · The X.

25 packet switches to PAD via PAD at 9. 6 Kbps over a synchronous or asynchronous dial-up connection. · General Packet Radio Service (GPRS), which uses data transmission methods based on X. 25 or IP at speeds up to 115 Kbps. · High-speed, circuit-switched data at speeds up to 64 Kbps.

LINK: https://www. tutorialspoint. com/gsm/gsm_mobile_station. htm VOICE TELESERVICES The ability to carry traffic is used by Teleservice to transmit data. These services are further diverted by: · Voice call· Videotext and Facsimile · Short text messages Video call: The most basic Teleservice supported by GSM is the phone. This includes full-speed voice and emergency calls at 13 kbps and the nearest emergency service provider by dialing three digits. Videotext and facsimile: Another set of remote services includes video text access, Teletex transport, Facsimile alternative voice and Facsimile group 3, Auto Facsimile group 3, and more.

Short text messages: The Short Message Service (SMS) service is a text messaging service that allows sending and receiving text messages on your GSM phone. In addition to simple text messages, other textual data, including news, sports, finance, languages, and location-based data, can be transmitted. Bearer Services Data services or bearer services are used over GSM phones. Receiving and sending data is a key cornerstone for a wide range of mobile Internet access and mobile data transfer.

GSM current data transfer rate of 9. 6k. New developments that will drive the transmission rate of GSM user data are now available for HSCSD (High Speed ?? Circuit Switched Data) and GPRS (General Packet Radio Service). SupplementaryServices Additional services are additional services provided in addition to remote services and hosting services. These services include caller identification, call forwarding, call waiting, multiparty calls, and outgoing (international) calls. . .

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com/gsm/gsm_user_services. htm BASE STATION SUBSYSTEM

(BSS) The BSS is composedof two parts:· The Base Transceiver Station

(BTS)· The Base Station Controller (BSC). . . ..

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. . . The BTS and BSC communicate via the designated Abis interface, making it possible to operate between components made by different vendors. The BSS radio components can consist of four to seven or nine cells.

BSS may have one or more base stations. The BSS uses the Abis interface between BTS and BSC. Then connect from the BSS to a separate high-speed line (T1 or E1) of the mobile MSC. . .

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. . . . . THE BASE TRANSCEIVER STATION(BTS) TheBTS accommodates the radio transceivers that define the cell and handles theradio link protocol with the MS. In metropolitan areas, many BTSs may bedeployed.

The BTS corresponds to thetransceivers and antennas used in each cell of the network. The BTS is usuallyplaced in the center of a cell. Its transmit

power defines the size of a cell. Each BTS has 1 to 16 transceivers, depending on the density of users in thecell.

Each BTS serves as a single cell. It also includes the followingfeatures: Encoding, encrypting, multiplexing, modulating, and feeding the RF signals to the antenna Transcoding and rate adaptation Time and frequency synchronizing Voice through full- or half-rate services Decoding, decrypting, and equalizing received signals Random access detection Timing advances Uplink channel measurements THEBASE STATION CONTROLLER (BSC) TheBSC manages the radio resources of one or more BTS. It handles radio channelsettings, frequency hopping and switching. The BSC is the connection betweenthe mobile device and the MSC. The BSC also translates the 13 Kbps voicechannel used over the radio link to a standard 64 Kbps channel used by PublicSwitched Telephone Network (PSDN) or ISDN. It allocates andreleases MS frequencies and time slots.

The BSC also handles inter-cellhandovers. It controls the power transfer between BSS and MS in its area. The functionof the BSC is to allocate the necessary time slots between the BTS and the MSC.

It is a switching device that handles radio resources. Other features include: Control of frequency hopping Performing traffic concentration to reduce the number of lines from the MSC Providing an interface to the Operations and Maintenance Center for the BSS Reallocation of frequencies among BTSs Time and frequency synchronization Power management Time-delay measurements of received signals from the MSLINK: https://www. tutorialspoint. com/gsm/gsm_base_station_subsystem.

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. .. . . . . NETWORK SWITCHING SUBSYSTEMS(NSS)

The main part is the Mobile SwitchingCenter (MSC) Network Switching System (NSS) performs mobile exchanges and callexchanges between other fixed or mobile network users as well as the managementof mobile services such as authentication. The exchange system includes thefollowing functional elements: HO ME LOCATION REGISTER (HLR)HLR is a database for storing andmanaging subscriptions. The HLR is considered the most important databasebecause it stores permanent data about subscribers, including the subscriber’sservice profile, location information, and activity status. When an individualbuys a subscription in the form of a SIM, all information about thesubscription is registered in the operator’s HLR. MOBILE SERVICES SWITCHING CENTER (MSC) The core part of the network subsystemis MSC. The MSC performs call exchanges between mobile and other fixed ormobile network users as well as the management of mobile services such asroaming subscriber registration, authentication, location updating, handoff andcall routing. It also performs ticketing, network

interfaces, public channelsignalling and more. Each MSC is identified by a unique ID. VISITOR LOCATIONREGISTER (VLR)The VLR is a database that contains theuser’s temporary information that the MSC needs to access the user. The VLR isalways integrated with the MSC. When a mobile station roams to a new MSC area, the VLR connected to that MSC will request data about that mobile station fromthe HLR. Later, if the mobile station makes a call, the VLR will have theinformation needed for call setup without having to interrogate the HLR eachtime. AUTHENTICATION CENTER (AUC) The Certification Authority is asecured database that stores copies of the keys stored on each user’s SIM cardfor authentication and encryption of radio channels. AUC protects networkoperators from the kinds of fraud found in today’s cellular world. P EQUIPMENT IDENTITYREGISTER (EIR)Device Identity Registration (EIR) is adatabase that contains a list of all valid mobile devices on the network, withthe International Mobile Equipment Identity (IMEI) identifying each MS. If theIMEI is reported as stolen or not approved, the IMEI is marked as invalid. GATEWAY MOBILE SWITCHING CENTER (GMSC)GMSC is the point at which the MEterminates the call initially and does not know the location of the MS. Therefore, the GMSC is responsible for obtaining the MSRN (Mobile StationRoaming Number) from the HLR based on the MSISDN (Mobile Station ISDN Number, MS’s “ Telephone Number”) and routes the call to the correct VisitingMSC. The term “ MSC” part in the term GMSC is misleading because thegateway operation does not require any link to the MSC. SMS GATEWAY (SMS-G)The SMS-G or SMS gateway is a term usedto describe uniformly the two short message service gateways defined in the GSMstandard. Two gateways

handle different directions of the message. SMS-GMSC(Short Message Service Gateway Mobile Switching Centre) is used to send shortmessages to the ME. SMS-IWMSC (Short Message Interworking Mobile SwitchingCentre) is used for short messages originating on this network. The role ofSMS-GMSC is like that of GMSC, and SMS-IWMSC provides a fixed access point forshort message service centres. LINK: https://www. tutorialspoint. com/gsm/gsm_network_switching_subsystem. htm LINK: http://www. radio-electronics. com/info/cellulartelecomms/gsm_technical/gsm_architecture. php OPERATION SUPPORTSUBSYSTEM (OSS)The Operations and Maintenance Centre(OMC) connects to all devices and BSCs in the switching system. Theimplementation of OMC is called Operations and Support System (OSS). Here are some of the OMC functions:· Administration and commercial operation (subscription, endterminals, charging and statistics).· Security Management.· Network configuration, Operation and Performance Management.· Maintenance Tasks. Operation and maintenance functionsbased on the ITU-T Series M. 30 standardized telecom management network (TMN)concept. The figure below shows the OMCsystem covering all GSM elements: OSS is a functional entity fornetwork operator monitoring and control systems. The purpose of OSS is toprovide cost-effective customer support for the centralized, regional and localoperations and maintenance activities required for GSM networks. An importantfunction of open source software is to provide an overview of the network andsupport for the maintenance activities of different operation and maintenanceorganizations. LINK: https://www. tutorialspoint. com/gsm/gsm_operation_support_subsystem. htm Additional components

of the GSMarchitecture include database and messaging system capabilities: Home Location Register (HLR) Visitor Location Register (VLR) Equipment Identity Register (EIR) Authentication Centre (AUC) SMS Serving Centre (SMS SC) Gateway MSC (GMSC) Chargeback Centre (CBC) Transcoder and Adaptation Unit (TRAU) The figure below shows the GSM networkwith additional elements: The MS and BSS communicate via theUm interface. It is also known as the air interface or radio link. The BSScommunicates with Network Services Switching (NSS) centres over the Ainterface.

GSM NETWORK AREAS In the GSM network, the followingaspects are defined: CELL: Cell is the basic servicearea; a BTS covers a cell. Each cell has a Cell Global Identification (CGI), anumber that uniquely identifies the cell. LOCATION AREA: A group of cells form a location area (LA). This is the area the user called when they received the call. Each LA isassigned a Location Area Identity (LAI). Each Los Angeles is served by one ormore BSCs. MSC/VLR SERVICE AREA: An areacovered by an MSC is called an MSC / VLR service area. PLMN: The area covered by a network operator iscalled the Public Land Mobile Network (PLMN). The PLMN may contain one or moreMSCs. CONCLUSION The development of communicationand the improvement of people’s living standards are directly related to theuse of mobile phones. Cellular mobile radios – high-end, sophisticatedtechnologies that allow everyone to communicate with anyone. The rapid growthof the mobile phone industry has become a pillar of business success andefficiency as part of a global modern lifestyle. In the work of this thesis, I tryto reflect on the GSM system. I hope I have given the overall style of GSM andthe philosophy behind the design. GSM is a standard

that guaranteesinteroperability, and will not benefit the public in terms of cost and servicequality by not stifling competition and innovation among suppliers. Features and benefits of the GSMsystem include superior voice quality, low end-of-line, operational and servicecosts, high levels of security, international roaming support for low-power handsets, and new business and networking facilities. In the coming days, 3G mobilephones will be available worldwide, facilitating video conferencing for mobilephones. LINK: http://kanik-engineering. blogspot. co. nz/2009/10/conclusion. html REFERENCES https://www. elprocus. com/gsm-architecture-features-working/https://www. tutorialspoint. com/gsm/gsm_mobile_station. htmhttps://www. tutorialspoint. com/gsm/gsm_user_services. htmhttps://www. tutorialspoint. com/gsm/gsm_base_station_subsystem. htmhttps://www. tutorialspoint. com/gsm/gsm_network_switching_subsystem. htmhttp://www. radio-electronics. com/info/cellulartelecomms/gsm_technical/gsm_architecture. phphttps://www. tutorialspoint. com/gsm/gsm_operation_support_subsystem. htmhttp://kanik-engineering. blogspot. co. nz/2009/10/conclusion. html