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Overview The Business Registrations and Licensing Agency (BRELA) is now implementing online service for the Registrations of Business Names, Industrial Licenses, Companies, Trade and Service Marks and Patents. The Online Registration System (ORS) allow users to send new applications and process post registration matters for Companies which have already updated their Company information in the Online Registration System (ORS). Thus, it is important to have data of all Companies uploaded by the respective officers of the Company before the system can allow a Company to perform post incorporation activities. Categories Any two or more persons associated for any lawful purpose may form an incorporated Company and obtain a Certificate of Incorporation. There are two types of Companies Registrable here in Tanzania Investment Centre (TIC) Local Companies: This is a type of a Company Where the liability of members is Limited to the amount of shares held by them in the Memorandum of Association . Foreign Companies: These are those Companies incorporated outside Tanzania and wishes to establish a place of business within Tanzania. Where the Certificate of compliance is issued upon reception of the necessary required documents for registration Entitled Person Any person may register a company in Tanzania where the age Limit provided is minimum 21 years and maximum of 70 years as per section 194 of Companies Act Cap.212. How to Apply In order to access the Online Registration System one has to create an account and become a registered user of the system. The following are the requirements needed for creating an Online Registration Account. For Tanzanians:- National Identification number (NIN) Tax identification Number (TIN) from TRA Foreign Company:- Visit Online Registration System (ORS) through Url address ⬤ or by visiting the BRELA website www.brela.go.tz .Then select Limited Company Online Registration. The user manual is provided on the same website. Post registration Matters Any changes after Incorporating a Company has to be communicated to the Registrar. All the procedure is done online, all Companies registered before February, 2018 have to update their Company information in the Online Registration System (ORS). There after they could communicate or File any document required as the case may be. Invoice for payment is generated online and sent to the applicant for payments. Filing fees are as provided under the BRELA website www.brela.go.tz Fee Structure Local Company: Registration Fees: This depends with the Initial Share Capital written in the Memorandum. Filing Fees: This is charged for filing of the document. Stamp duty. These categories can be obtained in the BRELA website www.brela.go.tz Foreign Company: Registration Fees: USD 750.00 Filling any document required to be delivered to the Registrar USD 220.00 For filling Balance sheet/accounts USD 220.00. For more information on this part just visit BRELA website www.brela.go.tz MODE OF PAYMENT: The system will request you to choose mode of payment you wish to pay either by Bank ie. CRDB OR NMB Bank or by Mobile money transfer ie. M pesa, Tigo pesa AIRTEL Money and Hallo pesa. And an invoice having a Control number will be sent to you to effect the required payments. Required attachments Local Company: Consolidated form, this one is generated online after filling all the particulars you download for signatures of all the directors and company secretary. Certified Copy of Certificate of Incorporation. Certified Copy of Memorandum and Articles of Association, Statutes or Chatter or any other instrument defining the Constitution of the Company the case may be. Copy of mostly recent accounts and related reports of the Company. Form no 434 (Situation of registered Office abroad and in Tanzania, List of Directors of the Company, Persons who resides in Tanzania representing the Company and declaration which is to be attested by the Commissioner for Oaths/Notary Public). Integrity pledge Form. Foreign Company: Consolidated form, this one is generated online after filling all the particulars you download for signatures of all the directors and company secretary. Certified Copy of Certificate of Incorporation Certified Copy of Memorandum and Articles of Association, Statutes or Chatter or any other instrument defining the Constitution of the Company the case may be. Copy of mostly recent accounts and related reports of the Company. Form no 434 (Situation of registered Office abroad and in Tanzania, List of Directors of the Company, Persons who resides in Tanzania representing the Company and declaration which is to be attested by the Commissioner for Oaths/Notary Public). Integrity pledge Form Afisa Mtendaji Mkuu wa BRELA Ndugu Godfrey Nyaisa akiwa kwenye picha ya pamoja ya Wakuu wa Taasisi na Mgeni Rasmi Mheshimiwa Kassim Majaliwa Majaliwa, Waziri Mkuu (Mb) katika Kongamono la Biashara, Uwekezaji na Utalii linalofanyika katika Maonesho ya Osaka Expo 2025, Japan tarehe 26/5/202 The Business Registrations and Licensing Agency (BRELA)[(registers companies in Tanzania. Based on the data available on Open Corporates, it appears that BRELA assigns each organisation with a unique identifier . "The Business Registrations and Licensing Agency (BRELA) is an Executive Agency under the Ministry of Industry and Trade responsible for business administration and regulation of the laws; namely Companies Registration, Business Names Registration, Trade and Service Marks Registration, granting of Patents and issuing of Industrial License." [1] The Business Registrations and Licencing Agency (BRELA) has started to list registered companies in Tanzania through the Online Registration System (ORS) which can be searched for business and company names by the general public. Please note, however, that not all businesses may yet be present on the ORS as updated data or annual returns are required in order to populate the database.[2] [1] 2] You can suggest an edit to our information about this list by posting an issue or submitting a pull request. The contributors handbook details how to propose changes to an existing list, and how you can request or propose a new list. Regional airline in Tanzania Air Excel IATA ICAO Call sign — XLL TINGA-TINGA Founded1997Commenced operations1998AOC #28HubsArusha AirportFleet size9Destinations12HeadquartersArusha, TanzaniaKey peopleMike KalaitzakisWebsitewww.airexcelonline.com An Air Excel Reims-Cessna F406 Caravan II at Arusha Airport Air Excel is an airline based in Arusha, Tanzania offering both scheduled and air charter services.[1] Scheduled flights are operated to the following destinations:[2] Hub Future Terminated route City Country Airport Arusha Tanzania Arusha Airport Lake Manyara National Park Tanzania Lake Manyara Airport Seronera Tanzania Seronera Airstrip Kilimanjaro Tanzania Kilimanjaro International Airport Dar es Salaam Tanzania Julius Nyerere International Airport Zanzibar Tanzania Abeid Amani Karume International Airport The Air Excel fleet consists of the following aircraft:[3] Air Excel Fleet Aircraft In Service Cessna 208B 8 Let L-410 Turbolet 1 Total 9 ^ "Company Profile". Air Excel. Retrieved 28 January 2013. ^ "Flight Schedule" (PDF). Air Excel. 1 January 2012. Retrieved 28 January 2013. ^ "Aircraft". Air Excel. Retrieved 2 November 2021. Wikimedia Commons has media related to Air Excel. Official website Retrieved from " To verify if a business name or company is registered in Tanzania, you can utilize the Online Registration System (ORS) provided by the Business Registrations and Licensing Agency (BRELA). BRELA is the government's Executive Agency tasked with facilitating business registrations and licensing services, as well as regulating business conduct in Tanzania. By accessing the ORS portal, individuals can search for businesses registered with BRELA. SIMILAR: Jinsi ya Kuweka na Kutoa pesa Wasafi Bet The ORS platform is specifically designed to streamline the process of checking the registration status of businesses and companies registered with BRELA. It provides an efficient and convenient means of confirming the legitimacy of a business entity. This online service is accessible for businesses that have completed registration or updated their information through the electronic registry system. It's important to note that this service is exclusively available for entities registered within the ORS platform. For inquiries regarding businesses not listed on ORS or for further assistance, individuals may utilize the "Request for a custom search result" e-service (available for registered users) or follow the standard search procedures at BRELA offices. By leveraging these resources, individuals can ensure compliance with regulatory requirements and make informed decisions regarding business engagements in Tanzania. How to check/search registered business name BRELA Here's how to check if a business name is registered with BRELA (Business Registrations and Licensing Agency) in Tanzania: Using BRELA's Online Registration System (ORS) Visit the ORS: Go to the BRELA ORS website: Free Search: Click on the "Free search" option. Enter Search Criteria: Type in the business name you want to check. Results: The system will display any matching registered business names. If there are no matches, the business name might not be registered. Check more LIFE HACK articles; For other uses, see Mwanza (disambiguation). City of Mwanza Region in TanzaniaMwanza City Rock CityCity of Mwanza RegionFrom top: Bismarck Rock, Mwanza city from Capri Point FlagMwanza CityLocation of MwanzaCoordinates: 2°31′S 32°54′E / 2.517°S 32.900°E / -2.517; 32.900CountryTanzaniaAdmin. divisionMwanza RegionFirst Settled1892Incorporated Town1978Incorporated City2000Districts List NyamaganaIlemela Government • TypeCity Council • Lord MayorMr. James Bwire • City DirectorMr. Kiomoni Kiburwa KibambaElevation3,740 ft (1,140 m)Population (2022 census)[1] • Urban1,104,521Time zoneGMT + 3Area code028ClimateAw Mwanza City, also known as Rock City to the residents,[2] is a port city and capital of Mwanza Region on the southern shore of Lake Victoria in north-western Tanzania. With an urban population of 1,104,521[1] and a population of 3,699,872 in the region (2022 census),[3] it is Tanzania's second largest city, after Dar es Salaam.[4][5] It is also the second largest city in the Lake Victoria basin after Kampala, Uganda and ahead of Kisumu, Kenya at least in population size. Within the East African community, Mwanza city is the fifth largest city after Dar es Salaam, Nairobi, Mombasa, and Kampala. It is slightly ahead of Kigali, Kisumu, and Bujumbura in the population of city proper limits. Mwanza city is also the capital city of Mwanza Region, and is administratively divided into two municipal districts within that Region - Ilemela and Nyamagana. The Sukuma constitute over 90 percent of the population of the Mwanza Region. Other ethnic groups in the region, in much smaller proportions, include the Zinza, Haya, Sumbwa, Nyamwezi, Luo, Kurya, Jita, Shashi and Kerewe. They live mainly in the Mwanza city area. National policy, however, gives very little importance to ethnic groupings and reliable data is difficult to find.[6] Historical populationYearPop.±% 1978 110,553— 1988 172,287+55.8% 2002 385,810+123.9% 2012 706,453+83.1% 2022 1,104,521+56.3%source:[7] The bridge of Furahisha in Mwanza represents transportation and safety of its people. This has a created safe space for the citizens and it stand as a remarkable symbol of Mwanza. In 2011 the City Council announced plans to create a major commercial development in the Ilemela District.[8] Construction works on Rock City Mall were finalized in early 2016. This mall is the first of its size in Mwanza and one of the biggest malls in the country.[9] Tanzania Breweries Limited has a brewery in Mwanza.[10] One major occupation of the inhabitants along the shores of Lake Victoria in Mwanza region is fishing, and there are five fish processing plants in the area.[11] The Nile perch were previously introduced to the lake, and are exported in large quantities.[12] The consequences of the Nile perch industry are the subject of the Academy Award nominated documentary Darwin's Nightmare (2004) by Hubert Sauper.[13] Water supply coverage is at 75% and sewerage at 23.7%.[14] Projects to increase coverage including the UN Habitat Lake Victoria Water and Sanitation (LVWATSAN-Mwanza) project.[15] Water is managed by the Mwanza Urban Water Supply and Sanitation Authority (Mwauwasa), established in 1996 and wholly owned by the government of Tanzania.[14] The authority covers Mwanza City, Kisesa Township in Magu District,[14] Misungwi town and Nyahiti Village in Misungwi District,[16] Geita, Sengerema and Nansio,[17] and Lamadi in Simiyu Region.[16] Mwauwasa operates a wastewater treatment plant in Butuja Ilemela.[18] The Mwanza city map Saanane Island National Park is located on a rocky island in Lake Victoria, 500 meters from Capri Point in the centre of Mwanza.[19] The westernmost gate (Ndabaka Gate) of Serengeti National Park is located at around 150 kilometres by road from Mwanza town. Day trips to Serengeti National Park are organised by several tour operators in Mwanza.[20] Rubondo Island National Park can be reached by road and boat, or by a direct flight from Mwanza. It is located around 110 kilometres west of Mwanza town.[21] The Sukuma Museum is located in Bujora, just east of Mwanza near Kisesa. It gives an overview of the history, architecture, culture and language of the Sukuma tribe, from which the majority of the native population originates.[22] St. Augustine University of Tanzania, administration building. St. Augustine University of Tanzania (SAUT) is the main university in Mwanza. The University extends over 600 acres (243 ha) in the Nyegezi-Malimbe area 10 km south of Mwanza City. It lies 4 km off the main Mwanza- Shinyanga road on the south eastern shores of Lake Victoria. The University is a half-hour's drive from Mwanza by car or by bus.[23] Among the places of worship, they are predominantly Christian churches and temples : Africa Inland Church Tanzania, Roman Catholic Archdiocese of Mwanza (Catholic Church), Anglican Church of Tanzania (Anglican Communion), Evangelical Lutheran Church in Tanzania (Lutheran World Federation), Baptist Convention of Tanzania (Baptist World Alliance), Assemblies of God.[24] There are also Muslim mosques. In the Temple Street, close to each other there are a large Hindu Temple built in the late 50's, one of the first such temples in Tanzania, a Vaishnava Sanatana Mandir, and a BAPS (Swaminarayan) temple - all of them serving the Hindu community. View of Lake Victoria and Mwanza Mwanza features a tropical savanna climate under the Köppen climate classification. Temperatures are relatively consistent throughout the course of the year, tempered by the city's altitude. Thus, the climate is not quite as hot as one might expect, given the city's location near the equator. Average temperatures in Mwanza are roughly 23.5 °C (74.3 °F) throughout the year. The city features a lengthy wet season which runs from October through May and a short pronounced dry season that covers the remaining four months. Mwanza receives on average roughly 1,050 millimetres (41 in) of precipitation annually. Climate data for Mwanza (1991-2020) Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Year Record high °C (°F) 35.0(95.0) 35.0(95.0) 36.6(97.9) 34.0(93.2) 35.6(96.1) 35.0(95.0) 34.0(93.2) 34.2(93.6) 34.5(94.1) 36.0(96.8) 35.6(96.1) 34.2(93.6) 36.6(97.9) Mean daily maximum °C (°F) 27.8(82.0) 28.8(83.8) 28.7(83.7) 28.5(83.3) 28.5(83.3) 28.9(84.0) 28.9(84.0) 29.1(84.4) 29.3(84.7) 28.9(84.0) 27.9(82.2) 27.5(81.5) 28.6(83.5) Daily mean °C (°F) 22.8(73.0) 23.3(73.9) 23.2(73.8) 23.1(73.6) 23.2(73.8) 22.7(72.9) 22.2(72.0) 22.6(72.7) 23.4(74.1) 23.4(74.1) 22.9(73.2) 22.8(73.0) 23.0(73.3) Mean daily minimum °C (°F) 18.1(64.6) 18.0(64.4) 18.2(64.8) 18.4(65.1) 18.1(64.6) 16.5(61.7) 15.6(60.1) 16.7(62.1) 17.7(63.9) 18.3(64.9) 18.4(65.1) 18.3(64.9) 17.7(63.9) Record low °C (°F) 10.8(51.4) 11.0(51.8) 14.0(57.2) 14.0(57.2) 13.0(55.4) 12.0(53.6) 11.0(51.8) 11.0(51.8) 13.0(55.4) 13.0(55.4) 10.8(51.4) 12.0(53.6) 10.8(51.4) Average precipitation mm (inches) 113.7(4.48) 82.0(3.23) 154.5(6.08) 173.0(6.81) 70.3(2.77) 25.7(1.01) 5.0(0.20) 23.7(0.93) 42.3(1.67) 120.6(4.75) 158.3(6.23) 146.0(5.75) 1,115.1(43.91) Average precipitation days (≥ 1.0 mm) 9.9 6.7 10.7 13.0 7.3 1.9 0.5 2.3 4.0 8.8 13.4 11.9 90.4 Average relative humidity (%) 71 71 69 74 70 66 58 58 59 61 71 73 67 Mean monthly sunshine hours 229.4 211.9 235.6 231.0 254.2 282.0 285.2 266.6 252.0 241.8 210.0 223.2 2,922.9 Mean daily sunshine hours 7.4 7.5 7.6 7.7 8.2 9.4 9.2 8.6 8.4 7.8 7.0 7.2 8.0 Source 1: NOAA[25] Source 2: Deutscher Wetterdienst (extremes, humidity, and sun),[26] Tokyo Climate Center (mean temperatures 1991–2020)[27] Aircraft at Mwanza Airport. The Mwanza Railway Station. Two ferries from Kamanga arriving at the port of Mwanza. Mwanza is served by the Mwanza Airport, which is designated as a regional airport.[28] Air Tanzania offers flights to Dar es Salaam.[29] Precision Air has daily flights to Mwanza, including from Nairobi (via Kilimanjaro),[30] and Air Tanzania also flies to the city.[31] The city is connected by rail with Shinyanga on a branch of Tanzania's Central Railway.[32] Twice a week the train departs to Dar es Salaam, via Dodoma, Tabora and Kigoma.[33] Nyegezi bus station is located in Nyamagana district. Buses going to the south and west leave from Nyegezi, as well as international services.[34] Buzuruga bus station is located in Ilemela district. Buses going to the east, North and the Kenyan border depart from Buzuruga bus station.[34] In December 2014 the regular ferry service between Mwanza, Bukoba and Kampala was halted whilst the ferry boat MV Victoria underwent major maintenance.[35][needs update] The CCM Kirumba Stadium. The CCM Kirumba Stadium has hosted matches of the Tanzania national football team.[36] Mbao FC is a football team from Mwanza that was promoted to the Tanzanian Premier League at the end of the 2015/2016 football season.[37] Tampere, Finland: The relationship between Tampere and Mwanza is part of the North-South Local Government Co-operation Programme.[38] Tifariti, Sahrawi Arab Democratic Republic[39] Würzburg, Germany[40] The Jamatkhana Mosque. The Nyakahoja Catholic Church. A street sight of Mwanza downtown. Mwanza a city among the rocks. Nyerere road, Mwanza The Mwanza city centre. Bismark rock in Rock city. 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Retrieved 27 August 2017. ^ "Mbao FC Promoted to Premier League". www.allafrica.com. ^ "Tampere-Mwanza Local Governance Cooperation project", The City of Tampere ^ "Tifariti commune signs cooperation, twinning agreements with several African cities", Agence Maghreb Arabe Presse, published on the website of The Free Library, 21 December 2009 ^ "HIV: New Problems for Africa", University of Würzburg Wikimedia Commons has media related to Mwanza. Mwanza travel guide from Wikivoyage Retrieved from " Dar es Salaam. About 200 companies and business names were registered with the Business Registration and Licensing Agency (Brela) in the past two weeks, an official has said. This comes as Tanzania was increasingly looking up to formalisation of businesses to grow the economy and expand the tax base. Speaking during the ongoing 45th Dar es Salaam International Trade Fair (DITF), Brela head of the information and communications, Ms Rhoida Andusamile, said in recognition of the challenges faced by traders who want to register their businesses, the agency has started training business officers at district levels on how to help businesses formalise their businesses. "We have provided such training programmes in the Northern and Central Zones and our aim is to reach the whole country," she said. She said many business operators were finding it hard to open accounts with Brela because they did not have e-mail addresses. "For starters, we create an email for them first and open an account for them before actual registration," she said, noting that by the close of the 45th DITF later today, a total of 500 business names will have been registered. She said a business licence issued by district councils is referred to as Group B licence, and can only be used within the district that issued it, while those issued by Brela are used countrywide. The fee for registering a business name is Sh20,000, while that of a company varies from Sh95,000 to Sh440,000 depending on the amount of money which shareholders will invest as capital. Afisa Mtendaji Mkuu wa BRELA Ndugu Godfrey Nyaisa akiwa kwenye picha ya pamoja ya Wakuu wa Taasisi na Mgeni Rasmi Mheshimiwa Kassim Majaliwa Majaliwa, Waziri Mkuu (Mb) katika Kongamono la Biashara, Uwekezaji na Utalii linalofanyika katika Maonesho ya Osaka Expo 2025, Japan tarehe 26/5/202 Largest city in Tanzania and capital of Dar es Salaam Region For the Egyptian city, see Dar El Salam. For other uses, see Dar al-Salam (disambiguation). This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources: "Dar es Salaam" – news · newspapers · books · scholar · JSTOR (February 2021) (Learn how and when to remove this message) Largest city of Tanzania in Coastal Indian OceanDar es Salaam DarLargest city of TanzaniaAerial view of Dar es SalaamSt. Joseph's CathedralAskari MonumentMohammed VI MosqueBenjamin Mkapa StadiumPort of Dar es SalaamSkyline from MV Kigamboni FlagSealDar es SalaamLocation of Dar es SalaamCoordinates: 06°48′58″S 39°16′49″E / 6.81611°S 39.28028°E / -6.81611; 39.28028Country TanzaniaZoneCoastal Indian OceanDistricts List IlalaKigamboniKinondoniUbungoTemeke Government • Regional CommissionerAlbert Challamila • Lord MayorOmary Said KumbilamotoArea[1] • Total1,599 km2 (617 sq mi) • Water0 km2 (0 sq mi)Population (2023 estimate)[2] • Total7,776,000 • Density4,900/km2 (13,000/sq mi)Time zoneUTC+3 (EAT)Postcode11xxxArea code022HDI (2018)0.699medium · 2ndWebsitedcc.go.tz Dar es Salaam (/ˌdɑːr ɛs səˈlɑːm/; from Arabic: دار السَّلَام, romanized: Dār as-Salām, lit. 'Abode of Peace') is the largest city and financial hub of Tanzania. It is also the capital of the Dar es Salaam Region. With a population of over 7 million people, Dar es Salaam is the largest city in East Africa by population and the sixth-largest in Africa. Located on the Swahili coast, Dar es Salaam is an important economic center and one of the fastest-growing cities in the world.[3] Experts predict that the city's population will grow to over 10 million before 2030.[4] The city was founded in the mid-19th century. It was the main administrative and commercial center of German East Africa, Tanganyika, and Tanzania. The decision was made in 1974 to move the capital to Dodoma which was officially completed in 1996.[5] Dar es Salaam is Tanzania's most prominent city for arts, fashion, media, film, television, and finance. It is the capital of the co-extensive Dar es Salaam Region, one of Tanzania's 31 administrative regions, and consists of five districts: Kinondoni in the north; Ilala in the centre; Ubungo and Temeke in the south; and Kigamboni in the east across the Kurasini estuary. Further information: History of Zanzibar Image of the port of Dar es Salaam from the book Von Unseren Kolonien by Ottomar Beta in the year 1908 In the 19th century, 'Mzizima (Swahili for "healthy town") was a coastal fishing village on the periphery of Indian Ocean trade routes.[6][7] In 1865 or 1866, Sultan Majid bin Said of Zanzibar began building a new city very close to Mzizima[7] and named it Dar es Salaam. The name is commonly translated from Arabic as "abode (home) of peace", from dar ("house"), and es salaam ("of peace").[7] Dar es Salaam fell into decline after Majid's death in 1870, but was revived in 1887 when the German East Africa Company established a station there. The town's growth was facilitated by its role as the administrative and commercial centre of German East Africa and industrial expansion following the construction of the Central Railway Line in the early 1900s.[8] In the East African campaign of World War I, British and Empire forces captured German East Africa. The Royal Navy bombarded the city with the monitor Mersey on 21 July 1916 and battleship HMS Vengeance on 21 August.[9] The German colonial authorities surrendered the city on 3 September.[10] German East Africa became the British Tanganyika Territory. Dar es Salaam remained the administrative and commercial centre. Under British indirect rule, European areas such as Oyster Bay and African areas (e.g., Kariakoo and Ilala) developed separately from the city centre. The city's population also included a large number of workers from British India, many of whom came to take advantage of trade and commercial opportunities. After World War II, Dar es Salaam experienced a period of rapid growth.[11] Political developments, including the formation and growth of the Tanganyika African National Union, led to Tanganyika's independence from colonial rule in December 1961. Dar es Salaam continued to serve as its capital, even when Tanganyika and the People's Republic of Zanzibar merged to form Tanzania in 1964. In 1973, provisions were made to relocate the capital to Dodoma, a more centrally located city in the interior. The relocation process to Dodoma was completed, although Dar es Salaam continued to be the location of most government offices.[12] In 1967, the Tanzanian government declared the ujamaa policy, which made Tanzania lean towards socialism. The move hampered the potential growth of the city as the government encouraged people not to move into cities and instead remain in Ujamaa socialist villages. By the 1980s, the policy failed to combat the increasing poverty and hunger that Tanzania faced, and had delayed necessary development. This situation led to the liberalization policy of the 1980s that essentially ended socialism and silenced its proponents within Tanzania's government through political repression.[13][14]Dar es Salaam in the 1930s, with the Old Boma and St. Joseph's Cathedral prominently in view Until the late 1990s, Dar es Salaam was not regarded in the same echelon as Africa's leading cities like Cairo, Nairobi, Johannesburg, Lagos, or Addis Ababa. During the 2000s, businesses opened and prospered; growth expanded in the construction sector, with new multi-storey buildings, bridges and roads;[15] Tanzanian banks headquartered in the city became better regulated[clarification needed]; and the Dar es Salaam Stock Exchange expanded. The port is prominent for entrepot trade with landlocked countries like Rwanda, Burundi, Zambia, and the eastern portion of the Democratic Republic of the Congo. The city's skyline features tall buildings, among them the 35-storey PSPF Tower (finished in 2015) and the Tanzania Ports Authority (TPA) Tower, the tallest in the country (completed in 2016).[16] A number of historical buildings and elements of urban planning, such as parts of the harbour and streets going back to colonial times, still exist. The Old Boma, one of the city's oldest buildings, was built in 1866–67 by Majid bin Said, sultan of Zanzibar, and enlarged under German rule. The Botanical Gardens now are close to the National Museum of Tanzania. The present-day State House goes back to Majid bin Said, and were the seat of the German and later the British colonial governments. Along with the Azania Front Lutheran Church, built between 1899 and 1902,[17] and the Roman Catholic St. Joseph's Cathedral, constructed around the same period,[18] Ocean Road Hospital are early historical buildings in Dar es Salaam.[19] Dar es Salaam is located at 6°48′ S, 39°17′ E (−6.8000, 39.2833),[20] on a natural harbour on the coast of East Africa, with sandy beaches in some areas. PPF tower under construction. Further information: Regions of Tanzania and Districts of Tanzania Dar es Salaam Region is divided into five administrative districts,[21] four of which are governed by municipal councils[a] that are affiliated with the city's suburbs or wards. Districts of Dar es Salaam Region District Population(2016)[24]:7 Area(km2) Ilala District 1,528,489 210 Kigamboni District 1,510,129 N/A Kinondoni District 1,164,177 527 Temeke District 204,029 656 Ubungo District 1,058,597 N/A Dar es Salaam Region 5,465,420 1,393 Kinondoni is the most populated of the districts. It houses half of the city's population and several high-income suburbs. Tanzanite Bridge Masaki, Oyster Bay and Ada Estate are the high-income suburbs located along the central beach. During the Colonial Era, they were the major European suburbs of the city. Diplomats and expatriates currently reside in these areas. Oyster Bay Beach (also known as Coco Beach) is the only white sandy beach east of Kinondoni. Mikocheni and Regent Estate are also suburbs within the district. These are high and middle-income areas with Mikocheni B enjoying a higher population density than Mikocheni A and Regent Estate. According to the 2012 census, the Mikocheni ward had a population of 32,947.[25]:page 75 Bagamoyo rd, Mwnanyamala, Kinondoni District, Dar es Salaam Msasani is a peninsula to the northeast of the city center and home to expatriates from the United Kingdom and other western countries. It contains a mixture of traditional shops and western-oriented resorts and stores including the redevelopment of the former Msani Slipway shipyard by architect Antoni Folkers Mbezi Beach is the beachfront suburb located along the northern Dar es Salaam Beach. It contains several tourist hotels, residences and a kite-surfing area by Upepo Avenue. Sinza, Kijitonyama, Magomeni, Kinondoni and Mwenge are more ethnically mixed than the areas above and are located west of Dar es Salaam's Central Business District. The administrative district of Ilala contains almost all government offices, ministries, and the Central Business District. It is the transportation hub of the city, as the Julius Nyerere International Airport, Central Railway Station and Tazara Railway Station are all within the district's boundaries. The residential areas are mainly middle- to high-income, among them: The Askari Monument along Samora Avenue marks the exact centre of Dar es Salaam, in the Ilala district. Upanga and Kisutu have the highest concentration of Asian communities within Dar es Salaam, with residents of Indian and Arabic descent. These areas contain colonial houses and mansions built in Indian, Arabic and European styles. Upanga is divided into Upanga East and Upanga West. Kariakoo is the shopping district of the city: shops, bazaars, and merchants sell products from foodstuffs to hardware. The Kariakoo Market contains the only underground section of the city. It is the major supply point of the food consumed by all Dar es Salaam residents. Tabata, Segerea and Ukonga are located slightly farther west from the city center. Ilala, among the middle-income suburbs very near to the city center, is marked by the Askari Monument and suffers from gang activity.[26] This section does not cite any sources. Please help improve this section by adding citations to reliable sources. Unsourced material may be challenged and removed. (December 2022) (Learn how and when to remove this message) Temeke is the main industrial district of the city, where manufacturing (both heavy and light industry) is located. To the east is the Port of Dar es Salaam, the largest port in the country. Temeke is believed to have the largest concentration of low-income residents due to industry. It is home to military and police officers as well as port officials. Kurasini, located on the harbour, contains Dar es Salaam Port, the Police College, the Mgulani Police Barracks and the Dar es Salaam International Trade Fair grounds. The main residents are police officers and port officials. Kigamboni Bridge at night Chang'ombe is one of the few higher-income areas in Temeke. It has maintained this status due to the presence of African high colonial officers and some industry owners from the Colonial Era. Chang'ombe houses the Dar es Salaam University College of Education, the National Stadium and Uhuru Stadium. Temeke, Mtoni, Tandika, Kijichi, and Mbagala are middle to low-income suburbs, of which the last is the largest suburb in the entire district. The Ubungo terminal serves as a transportation link to most large Dar es Salaam urban nodes.[clarification needed] The narrow-gauge commuter rail runs from there to the city centre, with ten level crossings along the route. This district is characterised with a lot of potential social and economic centres such as industries i.e. Urafiki textile industry, bus station and various institutes and universities such as National Institute of Transport(NIT) Kigamboni (also known as South Beach), a beachfront suburb on a peninsula, is home to an economically diverse population. Access to the suburb is mainly by ferry, although the Kigamboni Bridge provides an alternative. Dar es Salaam experiences tropical climatic conditions, typified by hot and humid weather throughout much of the year due to its proximity to the equator and the warm Indian Ocean. It has a tropical savanna climate (Köppen: Aw/As). Annual rainfall is approximately 1,150 millimetres or 45 inches, and in a normal year there are two rainy seasons: the "long rains" in April and May, and the "short rains" in November and December. Climate data for Dar es Salaam (Julius Nyerere International Airport) 1991–2020 Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Year Record high °C (°F) 35.8(96.4) 35.2(95.4) 36.9(98.4) 35.5(95.9) 32.9(91.2) 33.0(91.4) 31.8(89.2) 31.9(89.4) 33.8(92.8) 33.7(92.7) 34.0(93.2) 34.5(94.1) 36.9(98.4) Mean daily maximum °C (°F) 32.4(90.3) 32.8(91.0) 32.4(90.3) 31.1(88.0) 30.3(86.5) 30.0(86.0) 29.7(85.5) 30.1(86.2) 30.8(87.4) 31.5(88.7) 31.7(89.1) 32.1(89.8) 31.2(88.2) Daily mean °C (°F) 28.2(82.8) 28.2(82.8) 27.7(81.9) 26.7(80.1) 26.0(78.8) 24.6(76.3) 23.8(74.8) 24.1(75.4) 24.9(76.8) 26.1(79.0) 26.9(80.4) 27.9(82.2) 26.3(79.3) Mean daily minimum °C (°F) 24.9(76.8) 24.5(76.1) 24.0(75.2) 23.2(73.8) 22.0(71.6) 20.3(68.5) 19.3(66.7) 19.1(66.4) 19.5(67.1) 20.8(69.4) 22.6(72.7) 24.2(75.6) 22.0(71.6) Record low °C (°F) 18.1(64.6) 18.4(65.1) 19.6(67.3) 19.6(67.3) 15.9(60.6) 14.4(57.9) 13.7(56.7) 12.8(55.0) 14.2(57.6) 15.0(59.0) 17.6(63.7) 18.8(65.8) 12.8(55.0) Average rainfall mm (inches) 54.2(2.13) 70.8(2.79) 169.6(6.68) 263.6(10.38) 172.2(6.78) 31.3(1.23) 15.8(0.62) 17.8(0.70) 20.2(0.80) 77.3(3.04) 114.4(4.50) 110.2(4.34) 1,117.4(43.99) Average rainy days (≥ 1.0 mm) 4.2 4.2 11.3 16.6 11.3 3.9 3.0 3.1 3.6 5.4 8.5 7.5 82.6 Average relative humidity (%) 77 76 80 84 81 78 77 76 75 76 78 78 79 Mean monthly sunshine hours 235.6 223.2 213.9 156.0 213.9 222.0 223.2 266.6 252.0 275.9 252.0 241.8 2,776.1 Mean daily sunshine hours 7.6 7.9 6.9 5.2 6.9 7.4 7.2 8.6 8.4 8.9 8.4 7.8 7.6 Source 1: NOAA;[27] all-time extreme temperature[28] Source 2: Deutscher Wetterdienst (extremes, humidity, and sun),[29] Tokyo Climate Center (mean temperatures 1991–2020)[30] View of Dar es Salaam's daytime skyline, showing the city centre (Posta) and beyond A 2019 paper published in PLOS One estimated that under Representative Concentration Pathway 4.5, a "moderate" scenario of climate change where global warming reaches ~2.5–3 °C (4.5–5.4 °F) by 2100, the climate of Dar es Salaam in the year 2050 would most closely resemble the current climate of Barquisimeto in Venezuela. The annual temperature and temperatures of the warmest month would increase by 1.3 °C (2.3 °F), while the temperature of the coldest month would go down by 0.1 °C (0.18 °F).[31][32] According to Climate Action Tracker, the current warming trajectory appears consistent with 2.7 °C (4.9 °F), which closely matches RCP 4.5.[33] Moreover, according to the 2022 IPCC Sixth Assessment Report, Dar es Salaam is one of 12 major African cities (Abidjan, Alexandria, Algiers, Cape Town, Casablanca, Dakar,

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Media related to Dar es Salaam at Wikimedia Commons Retrieved from " 2This article needs to be updated. The reason given is: Article is messy and contains out of date information.. Please help update this article to reflect recent events or newly available information. (October 2023)Broadband cellular network technology This article is about the mobile internet access standard. For other uses, see 4G (disambiguation). Part of a series on theWireless network technologies Analog 0G1G (1.5G) Digital 2G (2.5G, 2.75G, 2.9G)3G (3.5G, 3.75G, 3.9G/3.95G)4G (4G/4.5G, 4.5G, 4.9G)5G (5.5G)6G Mobile telecommunicationsvte 4G refers to the fourth-generation of cellular network technology, first introduced in the late 2000s and early 2010s. Compared to preceding third-generation (3G) technologies, 4G has been designed to support all-IP communications and broadband services, and eliminates circuit switching in voice telephony.[1] It also has considerably higher data bandwidth compared to 3G, enabling a variety of data-intensive applications[2] such as high-definition media streaming and the expansion of Internet of Things (IoT) applications.[1] The earliest deployed technologies marketed as "4G" were Long Term Evolution (LTE), developed by the 3GPP group, and Mobile Worldwide Interoperability for Microwave Access (Mobile WiMAX), based on IEEE specifications.[3][4] These provided significant enhancements over previous 3G and 2G. In November 2008, the International Telecommunication Union-Radio communications sector (ITU-R) specified a set of requirements for 4G standards, named the International Mobile Telecommunications Advanced (IMT-Advanced) specification, setting peak speed requirements for 4G service at 100 megabits per second (Mbit/s)(=12.5 megabytes per second) for high mobility communication (such as from trains and cars) and 1 gigabit per second (Gbit/s) for low mobility communication (such as pedestrians and stationary users).[5] Since the first-release versions of Mobile WiMAX and LTE support much less than 1 Gbit/s peak bit rate, they are not fully IMT-Advanced compliant, but are often branded 4G by service providers. According to operators, a generation of the network refers to the deployment of a new non-backward-compatible technology. On December 6, 2010, ITU-R recognized that these two technologies, as well as other beyond-3G technologies that do not fulfill the IMT-Advanced requirements, could nevertheless be considered "4G", provided they represent forerunners to IMT-Advanced compliant versions and "a substantial level of improvement in performance and capabilities with respect to the initial third generation systems now deployed". Both the original LTE and WiMAX standards had previously sometimes been referred to as 3.9G/3.95G.[6][7] The ITU's new definition for 4G also included Evolved High Speed Packet Access (HSPA+).[8] Mobile WiMAX Release 2 (also known as WirelessMAN-Advanced or IEEE 802.16m) and LTE Advanced (LTE-A) are IMT-Advanced compliant backwards compatible versions of the above two systems, standardized during the spring 2011,[citation needed] and promising speeds in the order of 1 Gbit/s. In January 2012, the ITU backtracked on its previous definition for 4G, claiming that Mobile WiMAX 2 and LTE Advanced are "true 4G" while their predecessors are "transitional" 3G-4G.[1] As opposed to earlier generations, a 4G system does not support traditional circuit-switched telephony service, but instead relies on all-Internet Protocol (IP) based communication such as IP telephony. As seen below, the spread spectrum radio technology used in 3G systems is abandoned in all 4G candidate systems and replaced by OFDMA multi-carrier transmission and other frequency-domain equalization (FDE) schemes, making it possible to transfer very high bit rates despite extensive multi-path radio propagation (echoes). The peak bit rate is further improved by smart antenna arrays for multiple-input multiple-output (MIMO) communications. In the field of mobile communications, a "generation" generally refers to a change in the fundamental nature of the service, non-backwards-compatible transmission technology, higher peak bit rates, new frequency bands, wider channel frequency bandwidth in Hertz, and higher capacity for many simultaneous data transfers (higher system spectral efficiency in bit/second/Hertz/site). New mobile generations have appeared about every ten years since the first move from 1981 analog (1G) to digital (2G) transmission in 1992. This was followed, in 2001, by 3G multi-media support, spread spectrum transmission and a minimum peak bit rate of 200 kbit/s, in 2011/2012 to be followed by "real" 4G, which refers to all-IP packet-switched networks giving mobile ultra-broadband (gigabit speed) access. While the ITU has adopted recommendations for technologies that would be used for future global communications, they do not actually perform the standardization or development work themselves, instead relying on the work of other standard bodies such as IEEE, WiMAX Forum, and 3GPP. In the mid-1990s, the ITU-R standardization organization released the IMT-2000 requirements as a framework for what standards should be considered 3G systems, requiring 2000 kbit/s peak bit rate.[9] The fastest 3G-based standard in the UMTS family is the HSPA+ standard, which has been commercially available since 2009 and offers 21 Mbit/s downstream (11 Mbit/s upstream) without MIMO, i.e. with only one antenna, and in 2011 accelerated up to 42 Mbit/s peak bit rate downstream using either DC-HSPA+ (simultaneous use of two 5 MHz UMTS carriers)[10] or 2x2 MIMO. In theory speeds up to 672 Mbit/s are possible, but have not been deployed yet. The fastest 3G-based standard in the CDMA2000 family is the EV-DO Rev. B, which is available since 2010 and offers 15.67 Mbit/s downstream. In 2008, ITU-R specified the IMT Advanced (International Mobile Telecommunications Advanced) requirements for 4G systems. Main article: LTE frequency bands This article refers to 4G using IMT-Advanced (International Mobile Telecommunications Advanced), as defined by ITU-R. An IMT-Advanced cellular system must fulfill the following requirements:[11] Be based on an all-IP packet switched network. Have peak data rates of up to approximately 100 Mbit/s for high mobility such as mobile access and up to approximately 1 Gbit/s for low mobility such as nomadic/local wireless access.[5] Be able to dynamically share and use the network resources to support more simultaneous users per cell. Use scalable channel bandwidths of 5–20 MHz, optionally up to 40 MHz.[5][12] Have peak link spectral efficiency of 15 bit/s·Hz in the downlink, and 6.75 bit/s·Hz in the up link (meaning that 1 Gbit/s in the downlink should be possible over less than 67 MHz bandwidth). System spectral efficiency is, in indoor cases, 3 bit/s·Hz·cell for downlink and 2.25 bit/s·Hz·cell for up link.[5] Smooth handovers across heterogeneous networks. In September 2009, the technology proposals were submitted to the International Telecommunication Union (ITU) as 4G candidates.[13] Basically all proposals are based on two technologies: LTE Advanced standardized by the 3GPP 802.16m standardized by the IEEE Implementations of Mobile WiMAX and first-release LTE were largely considered a stopgap solution that would offer a considerable boost until WiMAX 2 (based on the 802.16m specification) and LTE Advanced was deployed. The latter's standard versions were ratified in spring 2011. The first set of 3GPP requirements on LTE Advanced was approved in June 2008.[14] LTE Advanced was standardized in 2010 as part of Release 10 of the 3GPP specification. Some sources consider first-release LTE and Mobile WiMAX implementations as pre-4G or near-4G, as they do not fully comply with the planned requirements of 1 Gbit/s for stationary reception and 100 Mbit/s for mobile. Confusion has been caused by some mobile carriers who have launched products advertised as 4G but which according to some sources are pre-4G versions, commonly referred to as 3.9G, which do not follow the ITU-R defined principles for 4G standards, but today can be called 4G according to ITU-R. Vodafone Netherlands for example, advertised LTE as 4G, while advertising LTE Advanced as their '4G+' service. A common argument for branding 3.9G systems as new-generation is that they use different frequency bands from 3G technologies; that they are based on a new radio-interface paradigm; and that the standards are not backwards compatible with 3G, whilst some of the standards are forwards compatible with IMT-2000 compliant versions of the same standards. As of October 2010, ITU-R Working Party 5D approved two industry-developed technologies (LTE Advanced and WirelessMAN-Advanced)[15] for inclusion in the ITU's International Mobile Telecommunications Advanced program (IMT-Advanced program), which is focused on global communication systems that will be available several years from now. Main article: LTE Advanced LTE Advanced (Long Term Evolution Advanced) is a candidate for IMT-Advanced standard, formally submitted by the 3GPP organization to ITU-T in the fall 2009, and as of 2013 has been released to the public.[16][needs update]The target of 3GPP LTE Advanced is to reach and surpass the ITU requirements.[17] LTE Advanced is essentially an enhancement to LTE. It is not a new technology, but rather an improvement on the existing LTE network. This upgrade path makes it more cost effective for vendors to offer LTE and then upgrade to LTE Advanced which is similar to the upgrade from WCDMA to HSPA. LTE and LTE Advanced will also make use of additional spectrums and multiplexing to allow it to achieve higher data speeds. Coordinated Multi-point Transmission will also allow more system capacity to help handle the enhanced data speeds. Data speeds of LTE-Advanced LTE Advanced Peak download 1000 Mbit/s Peak upload 0500 Mbit/s This section needs to be updated. Please help update this article to reflect recent events or newly available information. (August 2021) The IEEE 802.16m or WirelessMAN-Advanced (WiMAX 2) evolution of 802.16e is under development, with the objective to fulfill the IMT-Advanced criteria of 1 Gbit/s for stationary reception and 100 Mbit/s for mobile reception.[18] Main article: LTE (telecommunication) Telia-branded Samsung LTE modem Huawei 4G+ Dual Band Modem The pre-4G 3GPP Long Term Evolution (LTE) technology is often branded "4G – LTE", but the first LTE release does not fully comply with the IMT-Advanced requirements. LTE has a theoretical net bit rate capacity of up to 100 Mbit/s in the downlink and 50 Mbit/s in the uplink if a 20 MHz channel is used — and more if multiple-input multiple-output (MIMO), i.e. antenna arrays, are used. The physical radio interface was at an early stage named High Speed OFDM Packet Access (HSOPA), now named Evolved UMTS Terrestrial Radio Access (E-UTRA). The first LTE USB dongles do not support any other radio interface. The world's first publicly available LTE service was opened in the two Scandinavian capitals, Stockholm (Ericsson and Nokia Siemens Networks systems) and Oslo (a Huawei system) on December 14, 2009, and branded 4G. The user terminals were manufactured by Samsung.[19] As of November 2012, the five publicly available LTE services in the United States are provided by MetroPCS,[20] Verizon Wireless,[21] AT&T Mobility, U.S. Cellular,[22] Sprint,[23] and T-Mobile US.[24] T-Mobile Hungary launched a public beta test (called friendly user test) on 7 October 2011, and has offered commercial 4G LTE services since 1 January 2012.[citation needed] In South Korea, SK Telecom and LG U+ have enabled access to LTE service since 1 July 2011 for data devices, slated to go nationwide by 2012.[25] KT Telecom closed its 2G service by March 2012 and completed nationwide LTE service in the same frequency around 1.8 GHz by June 2012. In the United Kingdom, LTE services were launched by EE in October 2012,[26] by O2 and Vodafone in August 2013,[27] and by Three in December 2013.[28] Data speeds of LTE[29] LTE Peak download 0150 Mbit/s Peak upload 0050 Mbit/s The Mobile WiMAX (IEEE 802.16e-2005) mobile wireless broadband access (MWBA) standard (also known as WiBro in South Korea) is sometimes branded 4G, and offers peak data rates of 128 Mbit/s downlink and 56 Mbit/s uplink over 20 MHz wide channels. [citation needed] In June 2006, the world's first commercial mobile WiMAX service was opened by KT in Seoul, South Korea.[30] Sprint has begun using Mobile WiMAX, as of 29 September 2008, branding it as a "4G" network even though the current version does not fulfill the IMT Advanced requirements on 4G systems.[31] In Russia, Belarus and Nicaragua WiMax broadband internet access were offered by a Russian company Scartel, and was also branded 4G, Yota.[32] Data speeds of WiMAX WiMAX Peak download 0128 Mbit/s Peak upload 0056 Mbit/s In the latest version of the standard, WiMax 2.1, the standard has been updated to be not compatible with earlier WiMax standard, and is instead interchangeable with LTE-TDD system, effectively merging WiMax standard with LTE. This section possibly contains original synthesis. Source material should verifiably mention and relate to the main topic. Relevant discussion may be found on the talk page. (April 2017) (Learn how and when to remove this message) Just as Long-Term Evolution (LTE) and WiMAX are being vigorously promoted in the global telecommunications industry, the former (LTE) is also the most powerful 4G mobile communications leading technology and has quickly occupied the Chinese market. TD-LTE, one of the two variants of the LTE air interface technologies, is not yet mature, but many domestic and international wireless carriers are, one after the other turning to TD-LTE. IBM's data shows that 67% of the operators are considering LTE because this is the main source of their future market. The above news also confirms IBM's statement that while only 8% of the operators are considering the use of WiMAX, WiMAX can provide the fastest network transmission to its customers on the market and could challenge LTE. TD-LTE is not the first 4G wireless mobile broadband network data standard, but it is China's 4G standard that was amended and published by China's largest telecom operator – China Mobile. After a series of field trials, is expected to be released into the commercial phase in the next two years. Ulf Ewaldsson, Ericsson's vice president said: "the Chinese Ministry of Industry and China Mobile in the fourth quarter of this year will hold a large-scale field test, by then, Ericsson will help the hand." But viewing from the current development trend, whether this standard advocated by China Mobile will be widely recognized by the international market is still debatable. Main article: Ultra Mobile Broadband UMB (Ultra Mobile Broadband) was the brand name for a discontinued 4G project within the 3GPP2 standardization group to improve the CDMA2000 mobile phone standard for next generation applications and requirements. In November 2008, Qualcomm, UMB's lead sponsor, announced it was ending development of the technology, favoring LTE instead.[33] The objective was to achieve data speeds over 275 Mbit/s downstream and over 75 Mbit/s upstream. At an early stage the Flash-OFDM system was expected to be further developed into a 4G standard. The iBurst system (or HC-SDMA, High Capacity Spatial Division Multiple Access) was at an early stage considered to be a 4G predecessor. It was later further developed into the Mobile Broadband Wireless Access (MBWA) system, also known as IEEE 802.20. This section needs additional citations for verification. Please help improve this article by adding citations to reliable sources in this section. Unsourced material may be challenged and removed. (August 2015) (Learn how and when to remove this message) The following key features can be observed in all suggested 4G technologies: Physical layer transmission techniques are as follows:[34] MIMO: To attain ultra high spectral efficiency by means of spatial processing including multi-antenna and multi-user MIMO Frequency-domain-equalization, for example multi-carrier modulation (OFDM) in the downlink or single-carrier frequency-domain-equalization (SC-FDE) in the uplink: To exploit the frequency selective channel property without complex equalization Frequency-domain statistical multiplexing, for example (OFDMA) or (single-carrier FDMA) (SC-FDMA, a.k.a. linearly precoded OFDMA, LP-OFDMA) in the uplink: Variable bit rate by assigning different sub-channels to different users based on the channel conditions.[35] Turbo principle error-correcting codes: To minimize the required SNR at the reception side Channel-dependent scheduling: To use the time-varying channel Link adaptation: Adaptive modulation and error-correcting codes Mobile IP utilized for mobility IP-based femtocells (home nodes connected to fixed Internet broadband infrastructure) As opposed to earlier generations, 4G systems do not support circuit switched telephony. IEEE 802.20, UMB and OFDM standards[36] lack soft-handover support, also known as cooperative relaying. This section may contain information not important or relevant to the article's subject. Please help improve this section. (May 2010) (Learn how and when to remove this message) Recently, new access schemes like Orthogonal FDMA (OFDMA), Single Carrier FDMA (SC-FDMA), Interleaved FDMA, and Multi-carrier CDMA (MC-CDMA) are gaining more importance for the next generation systems. These are based on efficient FFT algorithms and frequency domain equalization, resulting in a lower number of multiplications per second. They also make it possible to control the bandwidth and form the spectrum in a flexible way. However, they require advanced dynamic channel allocation and adaptive traffic scheduling. WiMax is using OFDMA in the downlink and in the uplink. For the LTE (telecommunication), OFDMA is used for the downlink; by contrast, Single-carrier FDMA is used for the uplink since OFDMA contributes more to the PAPR related issues and results in nonlinear operation of amplifiers. IFDMA provides less power fluctuation and thus requires energy-inefficient linear amplifiers. Similarly, MC-CDMA is in the proposal for the IEEE 802.20 standard. These access schemes offer the same efficiencies as older technologies like CDMA. Apart from this, scalability and higher data rates can be achieved. The other important advantage of the above-mentioned access techniques is that they require less complexity for equalization at the receiver. This is an added advantage especially in the MIMO environments since the spatial multiplexing transmission of MIMO systems inherently require high complexity equalization at the receiver. In addition to improvements in these multiplexing systems, improved modulation techniques are being used. Whereas earlier standards largely used Phase-shift keying, more efficient systems such as 64QAM are being proposed for use with the 3GPP Long Term Evolution standards. Unlike 3G, which is based on two parallel infrastructures consisting of circuit switched and packet switched network nodes, 4G is based on packet switching only. This requires low-latency data transmission. As IPv4 addresses are (nearly) exhausted,[Note 1] IPv6 is essential to support the large number of wireless-enabled devices that communicate using IP. By increasing the number of IP addresses available, IPv6 removes the need for network address translation (NAT), a method of sharing a limited number of addresses among a larger group of devices, which has a number of problems and limitations. When using IPv6, some kind of NAT is still required for communication with legacy IPv4 devices that are not also IPv6-connected. As of June 2009[update], Verizon has posted specifications that require any 4G devices on its network to support IPv6.[37][38] Main articles: MIMO and Multi-user MIMO The performance of radio communications depends on an antenna system, termed smart or intelligent antenna. Recently, multiple antenna technologies are emerging to achieve the goal of 4G systems such as high rate, high reliability, and long range communications. In the early 1990s, to cater for the growing data rate needs of data communication, many transmission schemes were proposed. One technology, spatial multiplexing, gained importance for its bandwidth conservation and power efficiency. Spatial multiplexing involves deploying multiple antennas at the transmitter and at the receiver. Independent streams can then be transmitted simultaneously from all the antennas. This technology, called MIMO (as a branch of intelligent antenna), multiplies the base data rate by (the smaller of) the number of transmit antennas or the number of receive antennas. Apart from this, the reliability in transmitting high speed data in the fading channel can be improved by using more antennas at the transmitter or at the receiver. This is called transmit or receive diversity. Both transmit/receive diversity and transmit spatial multiplexing are categorized into the space-time coding techniques, which does not necessarily require the channel knowledge at the transmitter. The other category is closed-loop multiple antenna technologies, which require channel knowledge at the transmitter. One of the key technologies for 4G and beyond is called Open Wireless Architecture (OWA), supporting multiple wireless air interfaces in an open architecture platform. SDR is one form of open wireless architecture (OWA). Since 4G is a collection of wireless standards, the final form of a 4G device will constitute various standards. This can be efficiently realized using SDR technology, which is categorized to the area of the radio convergence. In 1991, WiLAN founders Hatim Zaghloul and Michel Fattouche invented wideband orthogonal frequency-division multiplexing (WOFDM), the basis for wideband wireless communication applications,[39] including 4G mobile communications.[40]Cellular network standards and generation timeline. The 4G system was originally envisioned by the DARPA, the US Defense Advanced Research Projects Agency.[citation needed] DARPA selected the distributed architecture and end-to-end Internet protocol (IP), and believed at an early stage in peer-to-peer networking in which every mobile device would be both a transceiver and a router for other devices in the network, eliminating the spoke-and-hub weakness of 2G and 3G cellular systems.[41][page needed] Since the 2.5G GPRS system, cellular systems have provided dual infrastructures: packet switched nodes for data services, and circuit switched nodes for voice calls. In 4G systems, the circuit-switched infrastructure is abandoned and only a packet-switched network is provided, while 2.5G and 3G systems require both packet-switched and circuit-switched network nodes, i.e. two infrastructures in parallel. This means that in 4G traditional voice calls are replaced by IP telephony. In 2002, the strategic vision for 4G—which ITU designated as IMT Advanced—was laid out. In 2004, LTE was first proposed by NTT DoCoMo of Japan.[42] In 2005, OFDMA transmission technology is chosen as candidate for the HSOPA downlink, later renamed 3GPP Long Term Evolution (LTE) air interface E-UTRA. In November 2005, KT Corporation demonstrated mobile WiMAX service in Busan, South Korea.[43] In April 2006, KT Corporation started the world's first commercial mobile WiMAX service in Seoul, South Korea.[44] In mid-2006, Sprint announced that it would invest about US$5 billion in a WiMAX technology buildout over the next few years[45] ($7.8 billion in real terms[46]). Since that time Sprint has faced many setbacks that have resulted in steep quarterly losses. On 7 May 2008, Sprint, Imagine, Google, Intel, Comcast, Bright House, and Time Warner announced a pooling of an average of 120 MHz of spectrum; Sprint merged its Xohm WiMAX division with Clearwire to form a company which will take the name "Clear". In February 2007, the Japanese company NTT DoCoMo tested a 4G communication system prototype with 4×4 MIMO called VSF-OFCDM at 100 Mbit/s while moving, and 1 Gbit/s while stationary. NTT DoCoMo completed a trial in which they reached a maximum packet transmission rate of approximately 5 Gbit/s in the downlink with 12×12 MIMO using a 100 MHz frequency bandwidth while moving at 10 km/h,[47] and is planning on releasing the first commercial network in 2010. In September 2007, NTT Docomo demonstrated e-UTRA data rates of 200 Mbit/s with power consumption below 100 mW during the test.[48] In January 2008, a U.S. Federal Communications Commission (FCC) spectrum auction for the 700 MHz former analog TV frequencies began. As a result, the biggest share of the spectrum went to Verizon Wireless and the next biggest to AT&T.[49] Both of these companies have stated their intention of supporting LTE. In January 2008, EU commissioner Viviane Reding suggested re-allocation of 500–800 MHz spectrum for wireless communication, including WiMAX.[50] On 15 February 2008, Skyworks Solutions released a front-end module for e-UTRAN.[51][52][53] In November 2008, ITU-R established the detailed performance requirements of IMT-Advanced, by issuing a Circular Letter calling for candidate Radio Access Technologies (RATs) for IMT-Advanced.[54] In April 2008, just after receiving the circular letter, the 3GPP organized a workshop on IMT-Advanced where it was decided that LTE Advanced, an evolution of current LTE standard, will meet or even exceed IMT-Advanced requirements following the ITU-R agenda. In April 2008, LG and Nortel demonstrated e-UTRA data rates of 50 Mbit/s while travelling at 110 km/h.[55] On 12 November 2008, HTC announced the first WiMAX-enabled mobile phone, the Max 4G[56] On 15 December 2008, San Miguel Corporation, the largest food and beverage conglomerate in southeast Asia, has signed a memorandum of understanding with Qatar Telecom QSC (Qtel) to build wireless broadband and mobile communications projects in the Philippines. The joint-venture formed wi-tribe Philippines, which offers 4G in the country.[57] Around the same time Globe Telecom rolled out the first WiMAX service in the Philippines. On 3 March 2009, Lithuania's LRTC announcing the first operational "4G" mobile WiMAX network in Baltic states.[58] In December 2009, Sprint began advertising "4G" service in selected cities in the United States, despite average download speeds of only 3–6 Mbit/s with peak speeds of 10 Mbit/s (not available in all markets).[59] On 14 December 2009, the first commercial LTE deployment was in the Scandinavian capitals Stockholm and Oslo by the Swedish-Finnish network operator TeliaSonera and its Norwegian brandname NetCom (Norway). TeliaSonera branded the network "4G". The modem devices on offer were manufactured by Samsung (dongle GT-B3710), and the network infrastructure created by Huawei (in Oslo) and Ericsson (in Stockholm). TeliaSonera plans to roll out nationwide LTE across Sweden, Norway and Finland.[60][61] TeliaSonera used spectral bandwidth of 10 MHz, and single-in-single-out, which should provide physical layer net bit rates of up to 50 Mbit/s downlink and 25 Mbit/s in the uplink. Introductory tests showed a TCP throughput of 42.8 Mbit/s downlink and 5.3 Mbit/s uplink in Stockholm.[62] On 4 June 2010, Sprint released the first WiMAX smartphone in the US, the HTC Evo 4G.[63] On November 4, 2010, the Samsung Craft offered by MetroPCS is the first commercially available LTE smartphone[64] On 6 December 2010, at the ITU World Radiocommunication Seminar 2010, the ITU stated that LTE, WiMAX and similar "evolved 3G technologies" could be considered "4G".[65] In 2011, Argentina's Claro launched a pre-4G HSPA+ network in the country. In 2011, Thailand's Truemove-H launched a pre-4G HSPA+ network with nationwide availability. On March 17, 2011, the

22 GSM [60] Brunei No Service UNN 2021-06-01 GSM National Wholesale Network used by DSTCom, Progresif and imagine.[61][62] Canada Bell 2019-04-30 cdmaOne Shutdown of CDMA transmitters commenced in remote areas in 2017, followed by an official announcement in June 2018 that 2G devices will lose service soon.[63][64] Rogers Wireless TBD GSM 1900 MHz shutdown in Jun 2021.850 MHz remains active.[65][66][67][68] SaskTel 2017-07-31 cdmaOne [69][70] Telus Mobility 2017-05-31 cdmaOne [71][72] Cayman Islands partiallyunconfirmed Digicel 2020-07-01 GSM [73][74] FLOW 2024-04-22 GSM China China Mobile active GSM 900 MHz: 15 MHz GSM1800 MHz: 25 MHz GSM [75] China Telecom 2025 cdmaOne Local shutdown commenced on 01 Jun 2020.CDMA2000 1xRTT, EV-DO Rev. 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Government originally did not allow the license to be renewed due to unpopularity, however the government later reversed the decision and held an auction for CDMA2000 service, which PCCW-HKT won the auction and provided CDMA2000 service immediately after 3's license expiry. 3 2021-09-30 GSM [92] CMHK active GSM 1800 MHz only CSL 2005 D-AMPS Service previously provided by Pacific Link, which subsequently merged into CSL. Shut down due to license expiry. Government did not allow the license to be renewed due to unpopularity. CSL 2017-10-31 cdmaOne Service previously provided by PCCW. After acquisition of CSL by HKT, its mobile business PCCW Mobile was merged into CSL. No service for local customers, only served incoming roaming tourists.CSL terminated its CDMA family business upon its licence expiry, and CDMA2000 1xRTT, EV-DO Rev. 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Preceded by2nd Generation (2G) Mobile Telephony Generations Succeeded by4th Generation (4G) Retrieved from " 6Mobile phone specification system project 3rd Generation Partnership Project 2Abbreviation3GPP2TypeStandards organization The 3rd Generation Partnership Project 2 (3GPP2) was a collaboration between telecommunications associations to make a globally applicable third generation (3G) mobile phone system specification within the scope of the ITU's IMT-2000 project. In practice, 3GPP2 was the standardization group for CDMA2000, the set of 3G standards based on the earlier cdmaOne 2G CDMA technology. The participating associations were ARIB/TTC (Japan), China Communications Standards Association, Telecommunications Industry Association (North America) and Telecommunications Technology Association (South Korea). The agreement was established in December 1998. Ultra Mobile Broadband (UMB) was a 3GPP2 project to develop a fourth-generation successor to CDMA2000. In November 2008, Qualcomm, UMB's lead sponsor, announced it was ending development of the technology, favoring LTE instead.[1] 3GPP2 should not be confused with 3GPP; 3GPP is the standard body behind the Universal Mobile Telecommunications System (UMTS) that is the 3G upgrade to GSM networks, while 3GPP2 was the standard body behind the competing 3G standard CDMA2000 that is the 3G upgrade to cdmaOne networks that was used mostly in the United States (and to some extent also in Japan, China, Canada, South Korea and India). GSM/UMTS were the most widespread 2G/3G wireless standards worldwide. Most countries used only the GSM family. A few countries, including China, the United States, Canada, Ukraine, Trinidad and Tobago, India, South Korea and Japan, used both standards. 3GPP2 had its last activity in 2013,[2] and the group has been dormant ever since. The 3GPP2 website was taken offline in 2023, primarily due to CDMA carriers deploying 3GPP's LTE instead of UMB the decade prior and later shutting down CDMA networks making the 3GPP2 redundant and unneeded. However, as of 2024 the 3GPP2 website has since come back online. ^ Qualcomm halts UMB project, Reuters, 13 November 2008 ^ "3GPP2 Technology Webinar". 3GPP2. 3GPP2 Official Web site About 3GPP2 TIA – U.S. 3GPP2 Standards Developer This article about wireless technology is a stub. You can help Wikipedia by expanding it.vte Retrieved from " 7Mobile telecommunications standards body 3rd Generation Partnership ProjectAbbreviation3GPPFormation1998; 27 years ago (1998)TypeStandards organizationRegion served WorldwideWebsitewww.3gpp.org The 3rd Generation Partnership Project (3GPP) is an umbrella term for a number of standards organizations which develop protocols for mobile telecommunications. Its best known work is the development and maintenance of:[1] GSM and related 2G and 2.5G standards, including GPRS and EDGE UMTS and related 3G standards, including HSPA and HSPA+ LTE and related 4G standards, including LTE Advanced and LTE Advanced Pro 5G NR and related 5G standards, including 5G-Advanced An evolved IP Multimedia Subsystem (IMS) developed in an access independent manner 3GPP is a consortium with seven national or regional telecommunication standards organizations as primary members ("organizational partners") and a variety of other organizations as associate members ("market representation partners"). The 3GPP organizes its work into three different streams: Radio Access Networks, Services and Systems Aspects, and Core Network and Terminals.[2] The project was established in December 1998 with the goal of developing a specification for a 3G mobile phone system based on the 2G GSM system, within the scope of the International Telecommunication Union's International Mobile Telecommunications-2000, hence the name 3GPP.[3] It should not be confused with 3rd Generation Partnership Project 2 (3GPP2), which developed a competing 3G system, CDMA2000.[4] The 3GPP administrative support team (known as the "Mobile Competence Centre") is located at the European Telecommunications Standards Institute headquarters in the Sophia Antipolis technology park in France.[5] The seven 3GPP Organizational Partners are from Asia, Europe and North America. Their aim is to determine the general policy and strategy of 3GPP and perform the following tasks: The approval and maintenance of the 3GPP scope; The maintenance of the Partnership Project Description; Take the decision to create or cease a Technical Specification Groups, and approve their scope and terms of reference; The approval of Organizational Partner funding requirements; The allocation of human and financial resources provided by the Organizational Partners to the Project Co-ordination Group; Act as a body of appeal on procedural matters referred to them. Together with the Market Representation Partners (MRPs) perform the following tasks: The maintenance of the Partnership Project Agreement; The approval of applications for 3GPP partnership; Take the decision against a possible dissolution of 3GPP. The Organizational Partners are:[6] Organizational Partners Organization Country/region Website Association of Radio Industries and Businesses (ARIB) Japan ARIB Alliance for Telecommunications Industry Solutions (ATIS) USA ATIS China Communications Standards Association (CCSA) China CCSA European Telecommunications Standards Institute (ETSI) Europe ETSI Telecommunications Standards Development Society (TSDSI) India TSDSI Telecommunications Technology Association (TTA) South Korea TTA Telecommunication Technology Committee (TTC) Japan TTC The 3GPP Organizational Partners can invite a Market Representation Partner to take part in 3GPP, which: Has the ability to offer market advice to 3GPP and to bring into 3GPP a consensus view of market requirements (e.g., services, features and functionality) falling within the 3GPP scope; Does not have the capability and authority to define, publish and set standards within the 3GPP scope, nationally or regionally; Has committed itself to all or part of the 3GPP scope; Has signed the Partnership Project Agreement. As of January 2025[update], the Market Representation Partners are:[6] Market Representation Partners Organization Website 5G-ACIA 5G Automotive Association 5G Americas Deterministic Networking Alliance (5GDNA) 6G Smart Network and Services Industry Association (6G-IA) 5G Slicing Association (5GSA) 5G Media Action Group (5G-MAG) Automotive Edge Computing Consortium (AECC) Broadband India Forum Cellular Operators Association of India (COAI) China Society of Automotive Engineers (CSAE) CTIA Global Satellite Operators Association (GSOA) Global Certification Forum (GCF) Global mobile Suppliers Association (GSA) GSMA IPV6 Forum Next Generation Mobile Networks (NGMN) Public Safety Communication Europe (PSCE) Forum Small Cell Forum TCCA TD Industry Alliance Wireless Broadband Alliance 3GPP standards are structured as Releases. Discussion of 3GPP thus frequently refers to the functionality in one release or another. Version[7] Released[8] Info Phase 1 1992 GSM Features Phase 2 1995 GSM Features, EFR Codec, Release 96 1997 Q1 GSM Features, 14.4 kbit/s User Data Rate, Release 97 1998 Q1 GSM Features, GPRS Release 98 1999 Q1 GSM Features, AMR codec, EDGE, GPRS for PCS1900 Release 99 2000 Q1 Specified the first UMTS 3G networks, incorporating a CDMA air interface[9] Release 4 2001 Q2 Originally called the Release 2000 – added features including an all-IP Core Network[10] Release 5 2002 Q1 Introduced IMS and HSDPA[11] Release 6 2004 Q4 Integrated operation with Wireless LAN networks and adds HSUPA, MBMS, enhancements to IMS such as Push to Talk over Cellular (PoC), GAN[12] Release 7 2007 Q4 Focuses on decreasing latency, improvements to QoS and real-time applications such as VoIP.[13] This specification also focus on HSPA+ (High Speed Packet Access Evolution), SIM high-speed protocol and contactless front-end interface (Near Field Communication enabling operators to deliver contactless services like Mobile Payments), EDGE Evolution. Release 8 2008 Q4 First LTE release. All-IP Network (SAE). New OFDMA, FDE and MIMO based radio interface, not backwards compatible with previous CDMA interfaces. Dual-Cell HSDPA. UMTS HNB. Release 9 2009 Q4 SAES Enhancements, WiMAX and LTE/UMTS Interoperability. Dual-Cell HSDPA with MIMO, Dual-Cell HSUPA. LTE HeNB. Evolved multimedia broadcast and multicast service (eMBMS). Release 10 2011 Q1 LTE Advanced fulfilling IMT Advanced 4G requirements. Backwards compatible with release 8 (LTE). Multi-Cell HSDPA (4 carriers). Release 11 2012 Q3 Advanced IP Interconnection of Services. Service layer interconnection between national operators/carriers as well as third-party application providers. Heterogeneous networks (HetNet) improvements, Coordinated Multi-Point operation (CoMP). In-device Co-existence (IDC). Release 12 2015 Q1 Enhanced Small Cells (higher order modulation, dual connectivity, cell discovery, self configuration), Carrier aggregation (2 uplink carriers, 3 downlink carriers, FDD/TDD carrier aggregation), MIMO