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Taiwanese computer and electronics company ASUSTek Computer Inc.Headquarters of Asus in TaipeiNative name華碩電腦股份有限公司Romanized nameHuáshuò Diànnǎo Gǔfèn Yǒuxiàn GōngsīTypePublicTraded asTWSE: 2357IndustryComputer hardwareElectronicsNetworking hardwareFounded2 April 1989; 33 years ago (1989-04-02)FoundersTed Hsu, M.T. Liao, Wayne Tsiah, T.H. Tung, Luca D.M.HeadquartersBeitou District, Taipei, TaiwanArea servedWorldwideKey people Jonney Shih (Chairman) ProductsPersonal computersmonitorsprojectorsmotherboardsgraphics cardsoptical storageperipheralswearablesserversworkstationsRevenue NT\$412.8 billion (2020)[1]Operating income NT\$24.9 billion (2020)[1]Net income NT\$28.4 billion (2020)[1]Total assets NT\$396 billion (2020)[1]Total assets NT\$396 billion (2020)[1]Total equity NT\$214 billion (2020) CompanyTranscriptionsStandard MandarinHanyu PinyinHuáshuò Diànnaŏ Gǔfèn Yǒuxiàn GōngsīTongyong PinyinHuashuo Diannao Gufen Yousiang Gongsihother MandarinXiao'erjing المُؤَوْفُ يَوْ شِيًا قُوْ فُ يَوْ شِيًا قُو لَا المَاسَ المَاسَوَعِ ديًا تَوْ قُوْ فُ يَوْ شِيًا فُو سَ Diannaŏ Gufen Yousiang Gongsihother MandarinXiao'erjing المال المال المحافي المال المحافي ا sek tiān-náu kố hūn ū hān kong siASUSTraditional Chinese華碩Simplified Chinese-Eminent"Eminence of/by the Chinese-Eminent"Eminence of/by the Chinese-Eminent"Eminence of/by the Chinese people(華人之碩; 华人之硕)TranscriptionsStandard MandarinHanyu PinyinHuáshuòHakkaRomanizationFà sakYue: CantoneseYale RomanizationFà 'eɪsu:s/,[3] /eɪ'su:s/,[4] /ɑ:'-/,[5] /a'-/,[5] /a'-/,[6] Chinese: 華碩電腦股份有限公司; pinyin: Huáshuò Diànnǎo Gǔfèn Yǒuxiàn Gōngsī; stylised as ASUSTeK or ASUS) is a Taiwanese[7] multinational computers, laptops, netbooks, mobile phones, networking equipment, monitors, wi-fi routers, projectors, motherboards, graphics cards, optical storage, multimedia products, peripherals, wearables, servers, workstations, and tablet PCs. The company is also an original equipment manufacturer (OEM). Asus is the world's 5th-largest PC vendor by unit sales as of January 2021.[8] Asus appears in BusinessWeek's "InfoTech 100" and "Asia's Top 10 IT Companies" rankings, and it ranked first in the IT Hardware category of the 2008 Taiwan Top 10 Global Brands survey with a total brand value of \$1.3 billion.[9] Asus has a primary listing on the London Stock Exchange under the ticker code ASKD. Name The company is usually referred to as ASUS or Huáshuò in Chinese: 华硕, literally "Eminence by the Chinese: 华硕, literally "Eminence by the company website, the name Asus originates from Pegasus, the winged horse of Greek mythology.[11] Only the last four letters of the word were used in order to give the name a high position in alphabetical listings.[12] As its marketing taglines, Asus has used Rock Solid. Heart Touching (2003-2009) and subsequently Inspiring Innovation Persistent Perfection (2009-2013). Since 2013, the company's tagline has been In Search of Incredible.[13] History Asus was founded in Taipei in 1989[14] by T.H. Tung, Ted Hsu, Wayne Hsieh and M.T. Liao,[15] all four having previously worked at Acer as hardware engineers. At this time, Taiwan had yet to establish a leading position in the computer-hardware business. Intel Corporation would supply any new processors to more established companies like IBM first, and Taiwanese companies would have to wait for approximately six months after IBM received their engineering prototypes. According to company history, Asus created a motherboard prototype for using an Intel 486, but it had to do so without access to the actual processor. When Asus approached Intel to request a processor to test it, Intel itself had a problem with its own 486 motherboard. Asus solved Intel's problem and it turned out that Asus' own motherboard worked correctly without the need for further modification. Since then, Asus was receiving Intel engineering samples ahead of its competitors.[16][17] In September 2005, Asus released the first PhysX accelerator card.[18] In December 2005, Asus entered the LCD TV market with the TLW32001 model.[19] In January 2006, Asus announced that it would cooperate with Lamborghini to develop the VX laptop series.[20] On 9 March 2006, Asus announced a joint venture with Gigabyte Technology. [22] On 5 June 2007, Asus announced the launch of the Eee PC at COMPUTEX Taipei. On 9 September 2007, Asus indicated support for Blu-ray, announcing the release of a BD-ROM/DVD writer PC drive, BC-1205PT.[23] ASUS subsequently released several Blu-ray based notebooks. In January 2008, Asus began a major restructuring of its operations, splitting into three independent companies: Asus (focused on applied first-party branded computers and electronics); Pegatron (focused on non-PC manufacturing such as cases and molding).[24][25] In the process of the restructuring, a highly criticized pension-plan restructuring effectively zeroed out the existing pension balances. The company paid out all contributions previously made by employees. [26] On 9 December 2008, the Open Handset Alliance announced that Asus had become one of 14 new members of the organization. These code to the Android Open Source Project, or support the ecosystem through products and services that will accelerate the availability of Android-based devices."[27] On 1 June 2010, Asus and Garmin deciding to exit the product category.[29] The two companies had produced six Garmin-ASUS branded smartphones over the prior two years.[29] In December 2010, Asus officially ended production of its Eee PC series due to declining sales caused by consumers increasingly switching to tablets and Ultrabooks.[31][32] Operations Asus has its headquarters in Beitou District, Taipei, Taiwan.[33] As of 2009[update] Asus had manufacturing facilities in Taiwan (Taipei, Luzhu, Nangang, Guishan), mainland China (Suzhou, Chongqing), Mexico (Ciudad Juárez) and the Czech Republic (Ostrava). The Asus Hi-Tech Park, located in Suzhou, covers 540,000 m2 (5,800,000 sq ft).[34] Asus operates around 50 service sites across 32 countries and has over 400 service partners worldwide.[35] Products Asus' products include 2-in-1s, laptops, tablet computers, desktop computers, smartphones, personal digital assistants (PDAs), servers, computer monitors, motherboards, graphics cards, sound cards, DVD disc drives, computer cases, computer components and computer cooling systems. One of Asus main lineup is the Vivo lineup consisting of laptops (VivoBooks), All-in-Ones (Vivo AiO), desktops (VivoPC), Stick PCs (VivoStick), Mini PCs (VivoMini), smartwatches (VivoMouse) and tablets (VivoTab).[36] ASUS ZenFone An Asus x21 ultrabook An Asus x smartphones, predominantly with Intel rather than ARM processors and often with two sim slots. Asus is currently very influential in big mobile markets like India, China, and other Asian countries. It is known as the ZenFone series. Prior to the ZenFone series. Prior to the ZenFone series. during the mid-2000s. First Generation (2014) ZenFone 2 ZenFone 5 ZenFone 6 Second Generation (2015) ZenFone 2 ZenFone 2 ZenFone 2 ZenFone 6 Second Generation (2015) ZenFone 2 ZenFone 2 ZenFone 4 (available in either 4-inch or 4.5-inch variant) ZenFone 5 ZenFone 6 Second Generation (2015) ZenFone 6 Second Generation (2015) ZenFone 2 ZenFone 6 Second Generation (2015) ZenFone 6 Second Generation (2015) ZenFone 6 Second Generation (2015) ZenFone 7 ZenFone 7 ZenFone 7 ZenFone 7 ZenFone 7 ZenFone 7 ZenFone 6 Second Generation (2015) ZenFone 7 Z ZenFone 3 series Fourth Generation (2017) ZenFone 4 series Fifth Generation (2018) ZenFone 5 series ZenFone Max series (M1 and M2) ZenFone 6 series ROG Phone 2 series Additionally, Asus also produced some hybrid devices with smartphones that can be docked in a tablet screen known as Padfone series. The product lineup are: PadFone (A66) PadFone (A66) PadFone Infinity (A80) PadFone Infinity (A80) PadFone X (A91) PadFone Infinity (A80) PadFone X (A91) PadFone X (A processors with the exceptions of few Padfone series and some ZenFone 2 models that use Qualcomm Snapdragon, though later phones in the series ROG Phone 3 series ROG Phone 3 series ROG Phone 5 series 2-in-1s Transformer Book VivoBook Flip ZenBook Flip ExpertBook Flip Chromebook EeeBook G Series N Series X Ser offered by Asus includes the EeeBook Series, X Series, A successor to the Google Nexus 7. Two days later, it was released.[40] Asus has also been working with Microsoft in developing Windows 8 convertible tablets.[41] In 2013, Asus revealed an Android-based tablet computer that, when attached to a keyboard, becomes a Windows 8 device, which it called the Transformer Book Trio.[42] The keyboard can be attached to a third party monitor, creating a desktop-like experience. Asus is also known for the following tablet computer lines: Eee Pad Transformer Eee Pad Transformer Eee Pad Slider Eee Slate Memo Pad 8 VivoTab ZenPad: 7.0 Z370CG, C 7.0 Z170MG/Z170CG, 8.0 Z380KL, 8.0 Z380C\*, S 8.0 Z580CA\*, 10 Z300C\* (Released 2015); 8.0 Z380M\*, Z8 ZT581KL, 3 8.0 Z581KL, 10 Z300M\*, Z8 ZT581KL, 10 ZT 10 Z500M\*, Z10 Z7500KL (2016); 3S 8.0 Z582KL, Z8s Z7582KL, Z8s Z7582KL RS400-E8-PS2 RS720-E8-RS24-ECP RS520-E8-RS36-ECP RS520-E8-RS36-ECP RS520-E8-RS36-ECP RS520-E8-RS36-ECP RS520-E8-RS300-E9-PS4 RS300-E9-PS2 RS100-E9-PS2 RS100-E9-PS4 RS300-E9-PS4 RS300-E9-P Gaming series Mini PCs Asus Tinker Board VivoMini Chrome Devices Chromebox C Year and Computer of the Year, [45] NBC.com's Best Travel Gadget, Computer Shopper's Best Netbook, and DIME magazine's 2008 Trend Award Winner. Asus subsequently added several products to its Eee lineup, including: EeeBox PC, a compact nettop Eee Top, an all-in-one touchscreen computer housed in an LCD monitor enclosure, Eee Stick, a plug-and-play wireless controller for the PC platform that translates users' physical hand-motions into corresponding movements onscreen Eee Pad Transformer, is a tablet computer that runs the Android operating system. [46] Eee Pad Transformer Prime, the successor to the original
Transformer. On 6 March 2009, Asus debuted its Eee Box B202, which PCMag saw as "the desktop equivalent of the ASUS EeePC", (the "Asus Eee Box" computer line was later renamed in 2010 to "ASUS EeeBox PC").[47] Essentio Series Asus N55 S Package Essentio is a line of desktop PCs. As of December 2011[update] the line consisted of the CG Series (designed for gaming), the CM series (for entertainment and home use) and the CS and CP slimline series.[48] Digital media receivers Asus sells digital media receivers Asus produces the R700T GPS device, which incorporates Traffic Message Channel.[50] Republic of Gamers (ROG) ASUS promotional model and ROG products ASUS ROG STRIX XG32VQR monitor Republic of Gamers is a brand used by Asus since 2006, encompassing a range of computer hardware, personal computers, peripherals, and accessories oriented primarily toward PC gaming. The line includes both desktops and high-spec laptops such as the Asus ROG Crosshair V Formula-Z Motherboard or the Asus ROG Strix G G731GT AU059T Laptop [citation needed] AMD graphics cards were marketed under the Arez brand due to the Nvidia GeForce Partner Program (51] However, when the GeForce Partner Program (51] However, when the GeForce Partner Program (51] However, when the GeForce Partner Program (51) However, when the GeForce SSD subsystem with two SSDs on one PCB,[52] At Computex 2018, Asus unveiled and announced ROG-branded gaming smartphone to compete against ZTE's nubia Red Magic, Xiaomi's Black Shark, and the Razer Phone. The ROG Phone will have a special version of the Snapdragon 845 CPU that can be overclocked, vapor cooling, an external heatsink fan with the USB-C and headphone connectors on its bottom, three different docks, and will be released in Q3 2018.[citation needed] In March 2021 Asus Launched the ASUS ROG PHONE 5 Series based on Qualcomm SM8350 Snapdragon 888 (5 nm), Octa-core processor. In January 2022, Asus announced the ROG Flow Z13 during the ROG's CES 2022 launch event. Equipped with the high-performance Intel's Core i9 processor and NVIDIA's GeForce RTX 3050 Ti graphic performance, making the biggest innovation breakthroughs on tablet form factor.[53] The Ultimate Force (TUF) The Ultimate Force is a brand used by Asus since about 2010.[54] The TUF Gaming brand is for Asus affordable, mid-range gaming products. Sound cards Asus released its first sound card, the Xonar DX, in February 2008. The Xonar DX was able to emulate the EAX 5.0 effects through the ASUS GX software while also supporting Open AL and DTS-connect. [55] In July 2008 ASUS launched the Xonar D1, which offered largely similar features to the Xonar DX but connected to the motherboard through the PCI interface instead of the PCI-E ×1 connection of the Xonar DX.[56] ASUS then released the Xonar DX.[57] In May 2009, Asus launched the Essence ST sound card, targeted at high-end audiophiles, and featuring 124 dB SNR rating and precision audio clock tuning.[58] In the same month, Asus refreshed the HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV 1.3 slim, a card targeted for HTPC users offering similar functionality to HDAV Xense sound card and a special edition of the Sennheiser PC350 headset.[60][61] In August 2010, ASUS released the Xonar DG sound card targeted at budget buyers and offering 5.1 surround sound support, 105 dB SNR rating, support for Dolby headphone and GX 2.5 support for Dolby headphone and PC market with the Vivo PC line in November 2013.[64] ASUS VivoPCs in India.[65] VivoPCs in India.[65] VivoPC along with a new model called VC60 which is equipped by Intel Core series processors.[66] Portable monitors In 2013, Asus released the MB168B+ was the only 1080p portable monitor. The base model shipped with a resolution of 1366 × 768, while the MB168B+ had a resolution of 1320 × 1080.[67] At the time of its release, the MB168B+ was the only 1080p portable monitor. According to Asus, it is the "world's slimmest and lightest USB monitor".[67] Desktop monitors ROG Swift PG348Q ROG Swift PG3 The Q-Connector is marked with bigger text than the front panel connectors on the motherboard, as well as protruding from the motherboard, limiting obstruction from heatsinks and other connectors [70][71] The Q-connector allows the many front-panel connectors [70][71] The Q-connector allows the many front-panel connectors to be removed as a single unit for maintenance. This greatly reduces the risk of incorrect connections when reassembling.[72] Other initiatives Esports Asus ROG has been an active advocate for esports, having establishment of a new esports academy in India, with plans to scout and train up professional gamers for the Counter-Strike: Global Offensive (CS: GO) PC game.[74] The initiative will provide shortlisted gamers with coaching, gaming equipment, and stipends to prepare them for competitive esports tournaments on both the national levels.[75] Environmental record Green ASUS In 2000, Asus launched Green ASUS,[76] a company-wide sustainable computing initiative overseen by a steering committee led by Jonney Shih, the Chairman of Asus. According to the company, Asus pursues green policies in "Design, Procurement, Manufacturing, and Marketing."[77] Recognition In 2006, Asus obtained IECQ (IEC Quality Assessment System for Electronic Components) HSPM (Hazardous Substance Process Management) certification for its headquarters and for all of its manufacturing sites.[78] In 2007, Oekom Research, an independent research institute specialising in corporate responsibility assessment, recognized Asus as a "highly environmental friendly company" in the "Computers, Peripherals and Office Electronics Industry".[79] In October 2008, Asus received 11 Electronic Product Environmental Assessment Tool (EPEAT) Gold Awards for its products, [80] including four of its N-Series notebooks, namely the N10, N20, N50, and N80. In the following month, it received EU Flower certification for the same N-Series notebooks at an award ceremony held in Prague. [79] In December 2008, Det Norske Veritas conferred the world's first EuP (Energy-using Product) certification for portable notebooks on these machines.[79] Recycling campaign In April 2008, Asus launched its "PC Recycling for a Brighter Future"[81][82] program in collaboration with Intel and with Tsann Kuen Enterprise Co. The program collected more than 1,200 desktop computers, notebooks and CRT/LCD monitors, refurbished them and donated them to 122 elementary and junior high schools, five aboriginal communities and the Tzu Chi Stem Cell Center. Controversies In September 2008, PC Pro discovered through a reader that Asus had accidentally shipped laptops that contained cracked and unlicensed software.[83] Both physical machines and recovery CDs contained confidential documents from Microsoft and other organizations, internal Asus documents, and sensitive personal information including CVs. At the time, an Asus spokesperson promised an investigation at "quite a high level", but declined to comment on how the files got on the machines and recovery media.[84] It was demonstrated that an unattended installation of Windows Vista could accidentally copy material from a flash drive with a parameter in the "unattend.xml" file on the personal flash drive being used to script the installation.[85][unreliable source?] In February 2014, a security vulnerability in the AiCloud functions on a number of Asus routers was compromised to distribute a text file warning of a vulnerability. disclosed in June 2013, allowing the ability to "traverse to any external storage plugged in through the USB ports on the behavior was "not an issue", but the vulnerability patched shortly prior to the breach.[86] The IP addresses of 12,937 routers, and 3,131 AiCloud accounts were also leaked by the hackers.[87] The U.S. Federal Trade Commission issued a complaint about the breach for the company's "failure to employ reasonable security practices has subjected consumers to substantial injury", alleging that Asus had also failed to perform basic penetration tests, allowed users to maintain a default admin password for the AiDisk feature and failed to notify users of security updates in a
timely fashion. As a result, it was also deemed that Asus had misled consumers over the security program", including independent audits every two years for the next 20 years. [88][87] In March 2019, Kaspersky Lab researchers disclosed a supply chain attack that affected the Asus Live Update software bundled on its laptops, dubbed ShadowHammer. Kaspersky stated that between June and November 2018, Asus servers had been compromised to distribute a modified version of Live Update, signed with an Asus signature, that contained a backdoor. It deployed a further payload if the device's network adapter matched an entry on an internal target list of around 600 MAC addresses. In response to ShadowHammer, Asus released a patched version of Live Update with improved security measures. Kaspersky and Symantec estimated that between 500,000 and 1 million devices were infected with the backdoor, although Asus attempted to downplay the severity of the breach did not affect the similar, identically named software associated with its motherboards.[89][90][91] In April 2019, ESET disclosed that a group known as BlackTech had performed targeted attacks with malware known as Plead, distributed via the updater for the Asus WebStorage service. ESET stated that the group was likely using a man-in-the-middle attack via a vulnerability in routers, in combination with the updater using an unencrypted HTTP connection.[92] In January 2022, Asus recalled some of its Z690 Maximus Hero motherboards due to a manufacturing flaw, where a RAM capacitor was installed backwards—causing them to burn out associated MOSFETs and prevent the motherboard from detecting memory. [93] During the Russian invasion of Ukraine in 2022, ASUS initially refused to join the international community and withdraw from the Russian market. In mid-March the company did announce its halting its operations in Russia, following a social media boycott and government pressure.[94][95] See also Taiwan ASRock Biostar DFI Elitegroup Computer Systems EVGA Corporation Gigabyte Technology Micro-Star International Fastra II List of wireless router firmware projects Tomato (firmware) References ^ a b c d e "ASUSTek Computer Inc. Annual Report 2020" (PDF). ASUSTek. 8 August 2021. Archived 6 December 2021. ^ "ASUS Corporate Social Responsibility". Csr.asus.com. Archived from the original on 7 February 2022. Retrieved 21 February 2022. Retrieved 21 February 2022. Retrieved 6 December 2021. ^ "ASUS Corporate Social Responsibility". Csr.asus.com. Archived from the original on 7 February 2022. Retrieved 21 February 2022. Retrieved 6 December 2021. ^ "ASUS Corporate Social Responsibility". 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Official website Retrieved from "2Manufacturer of computer network products 3Com CorporationTypePublicPrivate (from 1984[1] to 2010)IndustryComputer network products 3Com CorporationTypePublicPrivate (from 1984[1] to 2010]IndustryComputer network products 3Com CorporationTypePublicPrivate (from 1984[1] to
2010]IndustryComputer network products 3Com CorporationTypePublicPrivate (from 1984[1] to 2010]IndustryComputer network products 3Com CorporationType others[1]DefunctApril 12, 2010 (2010-04-12)FateAcquired by Hewlett-PackardSuccessorHewlett-PackardHeadquartersMarlborough, MassachusettsWebsitewww.3com.com 3Com Corporation was an American digital electronics manufacturer best known for its computer network products. The company was co-founded in 1979 by Robert Metcalfe, Howard Charney and others. Bill Krause joined as President in 1981. Metcalfe explained the network interface controller and switches, routers, wireless access points for computers. 3Com provided network interface controller and switches, routers, wireless access points for computers. and controllers, IP voice systems, and intrusion prevention systems. The company was based in Santa Clara, California. From its 2007 acquisition of 100 percent ownership of H3C Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Limited (H3C) — initially a joint venture with China-based Huawei Technologies Co., Lim share in Europe, Asia, and the Americas.[citation needed] 3Com products were sold under the brands 3Com, H3C, and TippingPoint. On April 12, 2010, Hewlett-Packard completed the acquisition of 3Com, and it no longer exists as a separate entity.[3] 3Com's products, support, and technologies were eventually merged into HPE's Aruba Networks business unit following HP's acquisition of Aruba in 2015 and subsequent split into HPE later that same year. History Xerox PARC (1972–1979) After reading an article on ALOHAnet, Robert Metcalfe became interested in computer networking. ALOHAnet was an over-the-air wide area network system in Hawaii using ultra high frequency radios and made several assumptions that Metcalfe thought would not be correct in practice. He developed his own theories of how to manage traffic, and began to consider an "ALOHAnet in a wire" networking system. In 1972, he joined Xerox PARC to develop these ideas, and after pairing up with David Boggs, the two had early 3 Mbit/s versions of Ethernet working in 1973. They then went on to build up a networking protocol known as PARC Universal Packet (PuP), with the entire system ready for build-out by late 1974.[4] At this point, Xerox management did nothing with it, even after being approached by prospective customers. Increasingly upset by management did nothing with it, even after being approached by prospective customers. year. Further development followed, resulting in the seminal Xerox Network Systems (XNS) protocol, which was completed by 1978. Once again, Metcalfe found that management was unwilling to actually do anything with the product, and he threatened to leave and in 1979 he left the company.[4] Founding and early days (1979–1996) Metcalfe subsequently co founded 3Com in 1979.[1] The other co-founders were Metcalfe's college friend Howard Charney and two others.[1] Bill Krause joined as President in 1982 and led 3Com until 1992 when he retired. 3Com began making Ethernet adapter cards for many early 1980s computer systems, including the DEC LSI-11, DEC VAX-11 and the IBM to be came CEO in 1982 and led 3Com until 1992 when he retired. PC. In the mid-1980s, 3Com branded their Ethernet technology as EtherSeries, while introducing a range of software and PC-based equipment to provide shared services over a local area network (LAN) using XNS protocols. These protocols were branded EtherShare (for file sharing), EtherNail (for email), and Ether-3270 (for IBM host emulation). The company's network software products included: 3+Share file and printer sharing. 3+Mail e-mail. 3+Remote for routing XNS between Ethernets. MultiConnect (?) was a chassis-based multi-port 10BASE2 Ethernet repeater. 3Server, a server-grade PC for running 3+ services. 3Station, a diskless workstation. 3+Open file and printer sharing (based on Microsoft's LAN Manager). Ethernet load balancing, response time, and RMON II distributed monitoring. 3Com 3C509BC (Etherlink III) Ethernet NIC from mid-1990s with 10BASE2, 15-pin AUI and 10BASE-T connectors. 3Com's expansion beyond its original base of PC and thin Ethernet products began in 1987 when it merged with Bridge Communications. This provided a range of equipment based on Motorola 68000 processors and using XNS protocols compatibly with 3Com's Etherterm PC software. CS/1, CS/200 communication servers ("terminal servers") Ethernet bridges and XNS routers GS/1-X.25 X.25 gateway CS/1-SNA SNA gateway NCS/1 network control software running on a Sun Microsystems computer By 1995, 3Com's status was such that they were able to enter into an agreement with the city of San Francisco to pay \$900,000 per year for the naming rights to Candlestick Park. That agreement ended in 2002. 1997–2000 3Com Ethernet / modems, and owner of Palm, Inc. USRobotics (USR), a maker of dial-up modems, as well as its Courier business-class modem line. This merger spelled theorem of the part of t beginning of the end of 3Com. In addition to consumer network electronics, USRobotics was a well-known manufacturer of a dialup access server, the "Total Control 1000", based largely on its Courier modem technology. This key business product competed against Cisco's AS5200 access server line in the mid-1990s as the explosion of the Internet led to service provider investment in dialup access server equipment. 3Com continued the development of the Total Control line until it was eventually spun off as a part of Commworks, which was then acquired by UTStarcom.[5] In August 1998, Bruce Claflin was named chief operating officer. The modem business was rapidly shrinking. 3Com attempted to enter the DSL business, but was not successful. In the lucrative server network interface card (NIC) business, 3Com after dramatic price slashing. It started developing Gigabit Ethernet cards in-house but later scrapped the plans. Later, it formed a joint venture with Broadcom, where Broadcom would develop the main integrated circuit component and the NIC would be 3Com branded. In 1999, 3Com acquired NBX, a Boston company with an Ethernet-based phone system for small and medium-sized businesses. This product proved popular with 3Com's existing distribution channel and saw rapid growth and adoption. As one of the first companies to deliver a complete networked phone system, and increased its distribution channel with larger telephony partners such as Southwestern Bell and Metropark Communications, 3Com helped make VoIP into a safe and practical technology with wide adoption. business and in June 2000, 3Com acquired internet radio startup Kerbango for \$80 million. It developed its Audrey appliance, which made an appearance on The Oprah Winfrey Show. It scrapped the Audrey and Kerbango products less than a year later. In March 2000, in a highly public and criticized move, 3Com exited the high-end core routers and switch market to focus on other areas of the business.[6] The CoreBuilder and NetBuilder and NetBuilder and NetBuilder were transitioned to Motorola. 3Com focused its efforts from 2000. CoreBuilder were transitioned to Motorola. to 2003 on building up the HomeConnect, OfficeConnect, SuperStack, NBX and Total Control product lines. Due to this perceived exit from the Enterprise market, 3Com would never gain momentum with large customers or carriers again. In July 2000, 3Com spun off Palm as an independent company. After the IPO, 3Com still owned 80% of Palm, but 3Com's market capitalization was smaller than Palm's. U.S. Robotics was also spun out again as a separate company at this time. 2001 and beyond In January 2001, Claflin became chief executive officer, replacing Éric Benhamou, CEO from 1990 to 2000. He was criticized for the costly diversification in the mobile handheld computer market. At this point, the company's at this time. main cash-cow, the network interface card business, was also shrinking rapidly, mainly because the functionality was integrated into the southbridge of many motherboards. The company started slashing or selling divisions and going through numerous rounds of layoffs. The company went from employing more than 12,000 employees to fewer than 2,000. In May 2003, the company moved its Silicon Valley Santa
Clara headquarters to Marlborough, Massachusetts. It also formed a venture called H3C with Huawei, whereby 3Com would sell and rebrand products under the joint venture.[7] In 2003, 3Com sold its CommWorks Corporation subsidiary to UTStarcom, Inc. CommWorks was based in Rolling Meadows, Illinois, and developed wireline telecommunications and wireless infrastructure technologies. [8] In January 2006, Claflin announced he would be leaving the company. In January 2006, R Scott Murray became CEO of 3Com and chairman of H3C Technology in China, the joint venture with Huawei Technologies. Murray voluntarily resigned from the company in August 2006 over his concerns about the questionable business ethics of Huawei and potential cyber security risks posed by Huawei. Edgar Masri returned to 3Com to head as president and CEO following Murray's departure. In September 2007, Bain Capital agreed to buy the company for \$2.2 billion, with minority equity financing from Huawei Technologies. However the deal met with U.S. government regulatory opposition and it fell through early in 2008, following concerns over Huawei's risk of conducting cyber security threats against the United States Government and its allies, Huawei's former dealings in Iran, and Huawei being operated by a former engineer[9] in China's People's Liberation Army.[10][11] Edgar Masri left the company in April 2008, partially as a result of the failed Bain transaction. In April 2008, Robert Mao was named chief executive, and Ron Sege president and chief executive, and Ron Sege president and chief executive, and Ron Sege president and chief executive. reported financial results for its fiscal 2009 first quarter, which ended August 29, 2008. Revenue in the quarter was \$79.8 million, compared with a net loss of \$18.7 million in the first quarter of fiscal year 2008. [13] The company reported that it had more than 2,700 engineers, with more than 1,400 United States patents and nearly 180 Chinese-issued patents, as well as more than 1050 pending chinese applications. It also reported pending applications for 35 separate inventions outside of China covering a wide range of networking technologies. Acquisition by HP On November 11, 2009, 3Com and Hewlett-Packard announced that Hewlett-Packard split into Hewlett-Packard Inc., the 3Com unit continued with HPE and was ultimately integrated into Aruba Networks along with the rest of HP's networking portfolio. Products Main article: 3Com Broducts 3Com 3c905-TX 10/100 PCI network interface controller Fixed configuration Ethernet switches Switch 5500G, 4800G, 4200G, Baseline, OfficeConnect; 3Com brand Fast Ethernet switches Switch 5500, 4500, 4210, Baseline, OfficeConnect; H3C brand switches S5600, S5500, S5100, S3600, S3610, S3600, S3610, S3600, S3600, S7500E. Wide area network routers Wireless access points, adapters, and connectivity products Internet access gateways and firewalls, both wired and wireless Network management applications Network security platforms including the TippingPoint Intrusion Prevention System. IP Telephony applications products utilized Voice over Internet Protocol (SIP). Voice platforms including VOX and NBX. Local area network interface cards IP Video Surveillance and Network Storage (marketed in China, South America and other key markets) Consumer USB webcams and associated software (3Com HomeConnect) The 3Com Laser Library which, at the time, was a revolutionary CD based documentation and tech support tool (brain child of Dirk Martin) Acquisitions 3Com came close to merging with computer maker Convergent Technologies, abandoning the pact just two days before a vote was scheduled in March 1986.[15] Later, 3Com went on to acquire the following: Bridge Communications in 1994 NiceCom in 1 AccessWorks, Sonix Communications, Primary Access, and Chipcom in 1995 Axon Networks and OnStream Networks in 1996 USRobotics merger/acquisition in 1997 (included product lines: Sportster, Courier, Palm, Megahertz, Conferencelink, Audrey, and more) NBX in 1999 Kerbango in 2000 TippingPoint in 2005 Huawei-3Com (H3C) in 2007 (Bought out Huawei's 49% stake for US\$882 million from a 2003 joint venture) Former subsidiaries CommWorks Corporation was a subsidiary of 3Com Corporation was a subsidiary of 3Com Corporation, based in Rolling Meadows, Illinois. It was sold to UTStarcom of Alameda, California in 2003. CommWorks was formerly the Carrier Network Business unit of 3Com, comprising several acquired companies: U.S. Robotics (Rolling Meadows, Illinois),[16] Call Technologies (Reston, Virginia),[17] and LANsource (Toronto, Ontario, Canada).[18] CommWorks was able to use technology from each company to create IP softswitch and IP communications software. U.S. Robotics provided media gateways (the Total Control 1000 product line, formerly used for dial-modem termination) and softswitch technology. Call Technologies provided Unified Messaging software. LANsource provided fax-over-IP software that was integrated with the Unified Messaging platform. The Carrier Network Business unit of 3Com developed an Inter-working function technology that became the first and dominant 2G CDMA wireless data gateway product. In partnership with Unwired Planet (now Openwave) and Qualcomm Quicknet connect allowed for 6 second connect times versus modems connecting the 2G CDMA market sample carriers included Sprint.[21] It led to follow on products that became core to CommWorks now UTStarcom offerings including the 2.5 and 3G packet data gateway products known as PDSN and Home Agents. CommWorks/3Com co-developed an H.323-based softswitch with AT&T in 1998 for use in a "transparent trunking" application for AT&T's residential long-distance customers.[22] Long distance telephone calls were redirected from the LEC's ingress CLASS 5 switch to the Total Control 1000 media gateway, where it was converted from TDM to IP and transported across AT&T's WorldNet IP backbone. When it reached the gateway and softswitch software to support SIP for MCI/WorldCom's hosted business offering in 2000.[23] Although 3Com sold CommWorks to UTStarcom,[24] they retained intellectual property rights to the softswitch technology. After modifying the software to enable enterprise PBX features, 3Com released this technology as VCX, the industry's first pure SIP PBX, in 2003.[25] See also 3Station Busy Override List of acquisitions by Hewlett-Packard References ^ a b c d e f Hedden, Heather Behn; Salamie, David E.; Meyer, Stephen (2010) [previous versions appeared in vol.11 and 34]. Jacques, Derek; Kepos, Paula (eds.). "3Com Corporation". International Directory of Company Histories. Farmington Hills, Michigan: St. James Press (Gale, Cengage Learning group). 106: 465–466. ISBN 978-1-55862-640-9. ^ "Bob Metcalfe: Serial Innovator". The Henry Ford. ^ a b "HP Completes Acquisition of 3Com Corporation, Accelerates Converged Infrastructure Strategy". News release. Hewlett-Packard. April 12, 2010. Retrieved August 27, 2011. ^ a b Pelkey 2007, 6.7. ^ "3Com / USR/ UTStar Total Control Access Server". ISPTrader web site. Archived from the original on 13 July 2011. Retrieved August 27, 2011. ^ Jim Duffy (March 20, 2000). 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Archived July 16, 2011, at the Wayback Machine Services". ^ [2] Archived July 16, 2011, at the Wayback Machine Services". ^ [2] Archived July 16, 2011, at the Wayback Machine Services". ^ [2] Archived July 16, 2011, at the Wayback Machine Services". ^ [2] Archived July 16, 2011, at the Wayback Machine Services". ^ [2] Archived July 16, 2011, at the Wayback Machine Services". ^ [2] Archived July 16, 2011, at the Wayback Machine Services". ^ [2] Archived July 16, 2011, at the Wayback Machine Services". ^ [2] Archived July 16, 2011, at the Wayback Machine Services". ^ [2] Archived July 16, 2011, at the Wayback Machine Services (Services Services). ^ [2] Archived July 16, 2011, at the Wayback Machine Services (Services Services). ^ [2] Archived July 16, 2011, at the Wayback Machine Ser of Computer Communications 1968-1988", 2007 External links Wikimedia Commons has media related to 3Com. HPE Networks H3C Technologies "3Com: Routers, Switches, VoIP, Wireless, Network Management". Official web site. Archived from the original on 1996-10-23. Eric Benhamou and the Turnaround of 3Com - interview with Sramanamitra.com Retrieved from " 3 3Com 3c509B-Combo card (3C509BC), second generation for the ISA, EISA, MCA and PCMCIA computer buses.[1] It was designed by 3Com, and put on the market in 1994.[1][2] Features The 3Com 3c5x9 family of network controllers has various interface combinations of computer bus including ISA, EISA, MCA and PCMCIA. For network connection, 10BASE-7 are used. Physical card configurations for Etherlink III [1] Adapter number Bus Network Connector 3C509-TPO ISA 10BASE-7 are used. 3C509-TP ISA 10BASE-T, AUI 8P8C, DA-15 3C509B-TP ISA 10BASE-T, AUI 8P8C, DA-15 3C509B-Coax ISA AUI, 10BASE2 BP8C, BNC 3C509B-Coax ISA AUI, 10BASE2 DA-15, BNC 3C509B-Coax ISA AUI, 10BASE2 BP8C, DA-15, BNC 3C509B-Coax ISA AUI, 10BASE2 BP8C, DA-15, BNC 3C509B-Coax ISA AUI, 10BASE2 BA 3C579 EISA AUI, 10BASE2 DA-15, BNC 3C579-TP EISA 10BASE-T, AUI 8P8C, DA-15 3C589-TP PCMCIA 10BASE-T, AUI 8P8C, AUI = On ISA and PCMCIA adapter numbers indicates that these adapters are part of the second generation of the Parallel Tasking EtherLink III technology.[1] This means EPROMs of type 64, 128, 256 kbit (2^10) are compatible, like the 27C256. Boot ROM address is located between 0xC0000 - 0xDE000.[1] Teardown example, the 3c509B-Combo The Etherlink III 3C509B-Combo is registered with the FCC ID DF63C509B. The main controller 3Com 9513S (or 9545S etc.), U6: 8 kByte 70 ns CMOS static RAM, U1: DIP-28 27C256 style EPROM for boot code, U3: 1024 bit 5V CMOS Serial EEPROM (configuration). Detailed teardown 3C509B-Combo 1994 ASSY 03-0021-001 REV-A 3C509B-C ALL RIGHTS RESERVED ASSY 03-0021-001 REV-A 5CC ID: DF63C509B Barcode: EA=0020AFDCC34C SN=6AHDCC34C MADE 2x8 VALOR ST7033 x00: Pulse transformer VALOR PT0018 CHINA M 9449 C U4: Plastic package 33x33 pins Parallel Tasking TM 3Com 40-0130-003 9545S 48324401 AT&T 40-01303 U6: 8192 x 8-bit 70 ns CMOS static RAM HY 6264A LJ-70 9509B KOREA Another chip with the same function: CY6264-70OSC (photo) U1: Boot ROM DIP-28 EPROM 8,16, or 32 kB (27/28C256) for boot code. U3: 256 Bit/1K 5.0V CMOS Serial EEPROM B 52AH 93C46 M8 Q41: N-Channel Logic level Power MOSFET 60V, 11A, 107 mQ (using ASSY 03-0021-004 due to obscured view) F3055L 96 45 (H)H VR41: 3-Terminal 0.5 A Negative Voltage Regulator (-5V) in D2PAK KA79 M05 ASSY 03-0021-004 REV-B has written on it: U.S. Patents: U.S. P The driver for OpenBSD,[3] NetBSD and FreeBSD is "ep";[4][5] for Linux it is "eth".[6][7] Patents 3c509B-C from 1996 specify the use of U.S. Patent 5,307,459 with a priority date of 1992-07-28. The patent describes a method where a data transfer counter triggers a threshold logic that generates an early indication or interrupt signal before the transfer is completed. The adapter also writes timing information into status registers such that a device driver can optimize for any latency.[8] Uses PC/TCP Packet Driver for use with MS-DOS or PC DOS on X86 Amiga networking (Miami Network Interface MNI, gg2-3c509.mni) See also AMD Lance Am7990 - 1985, AMD Am7990 network chip NE2000 - 1987, Novell's NE2000 network card RTL8139 - 1999, Realtek 8139 PCI network chip References ^ a b c d e f "EtherLink III Family of adapters" (PDF) (published 2011-08-29). August 1994. Retrieved 2016-04-06. (PDF) ^ "3Com 3C509B-TPO -WikiDevi". 2014-09-12. Retrieved 2016-04-06. (HTML) ^ "import from mindrot · kirei/flashboot@32e5b6b". GitHub. Retrieved 3 August 2017. ^ "FreeBSD 4.11-RELEASE #1" (TXT). Berklix.com. 2006-12-17. Retrieved 2017-08-04. ^ "cpu0: Intel 486DX (486-class)" (TXT). Fml.org. Retrieved 2017-08-04. ^ "LEAF Linux Embedded Appliance Framework / Mailing Lists". sourceforge.net. Retrieved 3 August 2017. ^ U.S. Patent 5,307,459 External links jaapsch.net - 27C256 256K (32K x 8) CMOS EPROM PIC18F452 and 3COM 3C509B". Gossamer-threads.com. Retrieved 3 August 2017. ^ U.S. Patent 5,307,459 External links jaapsch.net - 27C256 256K (32K x 8) CMOS EPROM PIC18F452 and 3COM 3C509B". PIC18F452 Workaround to install NE2000 / 3C509 Non Plug&Play ISA Network Adapters (2002) Retrieved from " 4Electrical connectors: 8P8C plug, 6P6C plug, 6P pictured above crimped onto a cable (with molded sleeve). A modular connector is a type of electronic devices and appliances, such as in computer networking, telecommunication equipment, and audio headsets. Modular connectors were originally developed for use on specific Bell System telephone sets in the 1960s, and similar types found use for simple interconnection of customer-provided telephone subscriber premises equipment to the telephone network. The Federal Communications Commission (FCC) mandated in 1976 an interface registration system, in which they became known as registered jacks. The convenience of prior existence for designers and ease of use led to a proliferation of modular connectors for many other applications. Many applications that originally used bulkier, more expensive connectors are for telephone and Ethernet. Accordingly, various electronic interface specifications exist for applications using modular connectors, which prescribe physical characteristics and assign electrical signals to their contacts. Nomenclature Modular connector arose from its original use in modular wiring components of telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone line connections and 4P4C used for handset connectors. Registered jack designations describe the signals and wiring used for voice and data communication at customer-facing interfaces of the public switched telephone network. It is common to use a registered jack number to refer to the physical connector itself; for instance, the 8P8C modular connectors may be called RJ45 because the registered jack standard of that name specified 8P8C modular connectors. Similarly, various six-position modular connectors may be called RJ45 because the registered jack standard of that name specified 8P8C modular connectors. designations exist.[citation needed] History The first types of small modular telephone connectors were created by AT&T in the mid-1960s for the plug-in handset and line cords of the Trimline telephone.[1] Driven by demand for multiple sets in residences with various lengths of cords, the Bell System introduced customer-connectable part kits and telephones. sold through PhoneCenter stores in the early 1970s. [2] For this purpose, Illinois Bell started installing modular telephone sets on a limited scale in June 1972. The patents by Edwin C. Hardesty and coworkers, US 3699498 (1972) and US 3860316 (1975), followed by other improvements, were the basis for the modular molded-plastic connectors that became commonplace for telephone cords by the 1980s. In 1976, these connectors were standardized nationally in the United States by the Registration Interface program of the Federal Communications for interconnections for interconnection of customer-premises equipment to the public switched telephone network (PSTN).[3][4] Gender Modular connectors have gender: plugs are considered to be male, while jacks or sockets are considered to be female. Plugs are used for fixed locations on surfaces of walls, panels, and equipment. Other than telephone extension cables, cables with a modular plug on one end and a jack on the other are rare. Instead, cables are usually connected using a female-to-female coupler, having two jacks wired back-to-back. Latching mechanism that secures the physical connection. As a plug is inserted into a jack, a plastic tab on the plug locks against a ridge in the socket so that the plug cannot be removed without disengaging the tab by pressing it against the plug body. The standard orientation for installed with a boot, a plastic covering over the tab down. The modular plug is often installed with may cause excessive bending or breaking of the tab. Such snagless cords, are usually constructed by installing the protective boot before the modular plug is crimped. Size and contacts 8P8C modular plug is crimped. Size and contacts 8P8C modular plug is crimped. contacts, with each number followed by P and C, respectively. For example, 6P2C is a connector having six positions and two installed contacts. Alternate designations omit the letters while separating the position and contact quantities with either an x (6x2) or a slash (6/2). When not installed, contacts are usually omitted from the outer positions inward, such that the number of contacts is almost always even. The connector body positions with omitted or unconnected contacts, to which are attached just two wires. The contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact position. For example, on a six-position, two-contact plug, where the outermost four positions do not have contacts, the innermost two contacts are numbered 3 and 4. Modular connectors
are manufactured in four sizes, with 4-, 6-, 8-, and 10-positions. The insulating plastic bodies of 4P and 6P connectors share an even larger body width. Insulation displacement contact types 8P8C plug with contacts for solid wire (left) and stranded wire (right) Contacts for solid wire (top left) and stranded wire (bottom right) Internally, the conductor, a mechanism known as insulation displacement. Ethernet cables, in particular, may have solid or stranded (tinsel wire) conductors and the sharp prongs that, when crimped, pierce the wire insulation displacement. are different in the 8P8C connectors made for each type of wire. A modular plugs for stranded have prongs that are designed to connect to multiple wire strands. Connector plugs are designed for either solid or stranded wire and a mismatch between plug and wire type may result in an unreliable connections. Interchangeability Some modular connectors of standard dimensions. The means of indexing may be non-standard cross-sectional dimensions or shapes, retention mechanism dimensions or configuration. For example, a Modified Modular Jack using an offset latching tab was developed by Digital Equipment Corporation to prevent accidental interchange of data and telephone cables. Modular Jack using an offset latching tab was developed by Digital Equipment Corporation to prevent accidental interchange of data and telephone cables. 8P8C[6] 22.48 11.68 8.00 The dimensions of modular connectors are such that a narrower plug can be inserted into a wider jack that has more positions than the plug's insertion area is 0.260 inches (6.60 mm) and the contacts are 0.040 inches (1.02 mm) apart (contact pitch), so the width is dependent on the number of pin positions.[7][8] However, not all plugs from all manufacturers have this capability, and some jack manufacturers warn that their jacks are not designed to accept smaller plugs without damage. If an inserted plug lacks slots to accommodate the jack's contacts at the outermost extremes, it may permanently deform those outermost contacts of an incompatible jack. Excessive resistance may be encountered when inserting an incompatible plug, as the outermost contacts, to accommodate the wider jack's to accommodate the wider jack's and and contacts in the jack are forcibly deformed. outermost contacts without damage. These special plugs may also be colored with a light blueish tinge, to aid in quick recognition. The special plugs are preferred for test equipment and adapters, which may be rapidly connected to a large number of corresponding connectors in quick succession for testing purposes. The use of the special plugs avoids inadvertent damage to the equipment under test, even when a narrower plug is inserted into a nominally incompatible wider jack. Termination of cables with modular connectors is similar across the various number of positions and contacts in the plug. The crimping tool contains a die which is often exchangeable and is closely matched to the shape and pin count of the die. When the tool is operated, the die compresses around the 8P8C plug. As the die compresses, these teeth force the plug contacts into the cable being terminated. The crimper may also permanently attach

the plug to the cable. Pinout The contact assignments (pinout) of modular connectors vary by applications, and Ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, standardized by registered jack designations, and Ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, and Ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, and Ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, and Ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, and Ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, and Ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, and Ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, and Ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, and ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, and ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, and ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by registered jack designations, and ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by the ANSI/TIA-568 standardized by registered jack designations, and ethernet over twisted pair is specified by the ANSI/TIA-568 standardized by the ANSI/TIA-568 standardized by the ANSI/TIA-568 standardized by the ANSI/TIA-568 standardized by the ANSI/TIA-568 the use of 8P8C connectors in RS-232 applications. For this reason, D-sub-to-modular contacts (pins or sockets) terminated but not inserted into the connector body, so that the D-sub contacts (pins or sockets) terminated but not inserted into the connector body. 4P4C connectors for the coiled handset cords, and is therefore often called a handset connector is not a registered jack, because it was not intended to connect directly to telephone lines. However it is often referred to as RJ9, RJ10, or RJ22. Handset wiring Handsets and often headsets for use with telephones commonly used for the receiver, and the outer pins are commonly used for the outer pins are commonly used for the receiver, equipment, including hands-free headsets. Data port The Macintosh 128K, Macintosh 512K and Macintosh Plus from Apple as well as the Amiga 1000 from Commodore used 4P4C connectors to connect the keyboard to the main computer housing. The connector provided power to the keyboard on the outer two contacts and received data signals on the inner pair. The cable between the computer and the keyboard was a coiled cord with an appearance very similar to a telephone handset. The connector wiring on the Apple computers, however, required a polarized straight through pinout. Using a telephone handset cable instead of the supplied cable could short out the +5 volt DC supply and damage the Apple computer or the keyboard.[12] Modular connectors are often used for data port connector with an adapter cord to a computer serial port so that remote control is possible from the computer.[13] 6P6C 6P4C crimp-on style connector. Modular plugs are described by the maximum number of physical contacts installed in these positions. The 6P2C, 6P4C, and 6P6C modular connectors are probably best known for their use as RJ11, RJ14, and RJ25 registered jacks, respectively. These interfaces use the same six-position modular connector body, but have different numbers of pins installed. RJ11 is a physical interface often used for terminating single telephone lines. RJ14 is similar, but for two lines, and RJ25 is for three lines. RJ14 is similar, but for two lines, and RJ25 is for three lines. RJ14 is similar, but for two lines, but uses an 8P8C connector. wiring Cables sold as RJ11 often actually use 6P4C connectors (six positions, four contacts) and RJ14 wiring - four wires running to a central junction box. Two of its six possible contact positions, four contacts) and ring, and the other two contact positions may be unused or provide low-voltage power for night-light or other features on the telephone set. In some installations an extra contact was also required for the ground connection for selective ringers. Pinout The pins of the 6P6C connector tab side down with the opening for the cable facing the viewer. Position Pair T/R ± RJ11 RJ14 RJ25 Twisted pair colors Old colors[A] German Australian colors Diagram 1 3 T + T3 white/green white jink orange 6P6C connector showing the location of pin 1 2 2 T + T1 T1 white/blue white/blue green brown white 5 2 R - R2 R2 orange orange/white yellow yellow black 6 3 R - R3 green green/white blue gray green ^ While the old solid color code was well established for pair 2, there are several conflicting conventions for pair 2 (and sometimes even pair 2). The colors shown above were taken from a vendor of silver satin flat 8-conductor phone cable that claims to be standard. 6-pair solid (old) bellwire cables previously used by the Bell System use white for pair 3 tip but some vendors' cable may substitute orange for white. At least one other vendor of flat 8-conductor cable uses the sequence blue, orange, black, red, green, yellow, brown and white/slate.[citation needed] ^ This color scheme originates in the (withdrawn) national standard DIN 47100. The scheme originates in the (withdrawn) national standard DIN 47100. shown here is the correct color code for interfacing with the RJ connector standards. However, with German domestic telephone equipment, and that in some neighboring countries, 6P4C plugs and sockets are typically only used to connect the telephone cord to the phone base unit, whereas the mechanically different TAE connector is used at the other end to connect to a service provider interface. Older base units may accommodate the additional connectors of TAE (E, W, a2, b2) and may feature non-RJ standard sockets that can be connected directly with 6P4C plugs. Further, flat DIN 47100 cables typically place the wires in ascending order. When used directly with 6P4C plugs, the color coding may be undetermined Powered version of RJ11 In the powered version of the RJ11 interface, pins 2 and 5 (black and yellow) may carry low voltage AC or DC power. While the telephone terminals, old telephone terminals, old telephone terminals with incandescent lights, such as the Western Electric Princess and Trimline telephones, need more power than the phone line can supply. Typically, the power on pins 2 and 5 is supplied by an AC adapter plugged into a nearby power to all of the jacks in the house. Compatibility with structured cabling Structured cabling networks adhering to ANSI/TIA-568, ISO/IEC 11801 (or ISO/IEC 15018 for home networks) are widely used for both computer networking and analog telephony. These standards specify the T568A or T568B wiring arrangements compatible with Ethernet. The 8P8C jack used by structured cabling physically accepts the 6-position connector used by RJ11, RJ14 and RJ25. Only RJ11 and RJ14 have full electrical compatibility because Ethernet-compatible pin-outs split the third pair of RJ25 across two separate cable pairs, rendering that pair unusable by an analog phone. Both the third and fourth pairs of RJ61 are similarly split. The incompatible T568A and T568B layouts were necessary to preserve the electrical properties of the third and fourth pairs for Ethernet, which operates at much higher frequencies than analog telephony. Because of these incompatibilities, and because RJ25 and RJ61 were never very common, the T568A and T568B conventions have largely displaced RJ25 and RJ61 for telephones with more than two lines. 8P8C Modular plug not yet crimped onto a cable An 8P8C modular connector with a RJ45S key cut The 8 position 8 contact (8P8C) connector is a modular connector commonly used to terminate twisted pair, registered jacks and
other telephone applications, RS-232 serial communication using the ANSI/TIA-568 (formerly TIA/EIA-568) and Yost standards, and other applications involving unshielded twisted pair, shielded twisted pair, and multi-conductor flat cable. An 8P8C modular connection consists of a male plug and a female jack, each with eight equally spaced contacts. On the plug, the contacts are flat metal bars positioned parallel to the connector body. Inside the jack, the contacts are metal spring wires angled away from the insertion interface. When the plug is mated with the jack, the contacts meet and create an electrical connector. Right: RJ45 male connector. Right: RJ45 male connector. Right: RJ45 male connector (with key) Although commonly referred to as RJ45 in the context of Ethernet and category 5 cables, RJ45 originally referred to a specific wiring configuration of an 8P8C connector.[14][15][16] The original RJ45S[a] was intended for high-speed modems, and is obsolete. The RJ45S jack mates with a keyed 8P2C modular plug,[18][19] and has pins 4 and 5 (the middle positions) wired for the ring and tip conductors of a single telephone applications. Generic 8P8C modular connectors are similar to those used for the RJ45S modem jacks or RJ61X telephone jacks were familiar with the pin assignments of the standard. However, the standard un-keyed modular connectors became ubiquitous for computer networking and informally inherited the name RJ45. Standardization The shape and dimensions of an 8P8C modular connector are specified for US telephone applications by the Administrative Council for Terminal Attachment (ACTA) in national standard does not use the short term 8P8C and covers more than just 8P8C modular connectors, but the 8P8C modular connector type is the eight position connector type is the eight po physical dimensions but also high-frequency performance requirements for shielded and unshielded versions of this connector for carrying frequencies up to 100, 250 and 600 MHz. Pinout T568B wiring, defined in TIA-568 BP8C connectors are frequently terminated using the T568B or T568B wiring. ANSI/TIA-568. The drawings to the right show that the copper connections and pairing are the same, the only difference is that the other end (Tx and Rx pairs reversed) is an Ethernet crossover cable. Before the widespread acceptance of auto MDI-X capabilities, a crossover cable was needed to interconnect similar network equipment (such as Ethernet hubs). Crossover cables are sometimes still used to connect two computers together without a switch or hub, however most network interface cards (NIC) in use today implement auto MDI-X to automatically configure themselves based or the type of cable plugged into them. A cable wired the same at both ends is called a patch or straight-through cable, because no pin/pair assignments are swapped. If a patch or straight cable is used to connect two computers with auto MDI-X capable NICs, one NIC will configure itself to swap the functions of its Tx and Rx wire pairs. Pin T568A pair T568A color T568B pair T568B color 10BASE-T/100BASE-TX signal[20] 1000BASE-T signal Wire Diagram 1 3 white/green stripe TD+ DA+ tip Pin numbering on plug and jack have the same number. 2 3 green solid 2 orange stripe 3 white/green stripe RD+ DB+ tip 4 1 blue solid 1 blue solid NC DC+ ring 5 1 white/blue stripe 1 white/blue stripe NC DD- tip 6 2 orange solid 3 green solid RD- DB- ring 7 4 white/brown stripe 4 white/brown stripe 4 white/blue stripe NC DD+ tip 8 4 brown solid RD- DB- ring 7 4 white/brown stripe 8 4 brown solid NC DD- ring Types and compatibility Two types of 8P8C plugs and crimping tools for installing the plug onto a cable are commonly available: Western Electric/Stewart Stamping (WE/SS) and Tyco/AMP. While the two types are similar, the tooling and plugs are produced exclusively by Tyco Electronics.[citation needed] Both types of modular plugs can be mated with a standard 8P8C modular jack. Both types of 8P8C plugs are more expensive and require shielded cable, but have a lower attenuation, and may reduce electromagnetic interference. Although a narrower 4-pin and 6-pin plug fits into the wider 8-pin jack and makes a connection with the available contacts on the plug, because the body of the smaller connector can potentially damage the springs of the larger jack. Applications, where interconnecting cables are terminated at each end with an 8P8C modular plug wired according to TIA/EIA standards. Most wired Ethernet communications are carried over Category 5 e or Category 5 (blue) pair is often used to carry telephony signals. While this allows an RJ11 plug to connect, it may damage the modular jack; an approved converter prevents damage. In landline telephony, an 8P8C jack is used at the point a line enters the building to allow the line to be broken to insert automatic dialing equipment, including intrusion alarm panels. The EIA/TIA-561 standard describes the use of 8P8C connectors for RS-232 serial interfaces. [23] This application is common as a console interface for network equipment, such as switches, routers, and headless computers. 8P8C modular connectors are also commonly used as a microphone connector for PMR, LMR, and amateur radio transceivers. Frequently the pinout is different, usually mirrored (i.e. what would be pins 1 to 8 in the ANSI/TIA-568 standard might be pins 8 to 1 in the radio and its manual). In analog mobile telephony, the 8P8C connector was used to connect an AMPS cellular handset to its (separate) base unit; this usage is now obsolete. The physical connector is standardized as the IEC 60603-7 8P8C modular connector with different categories of performance. The physical dimensions of the male and remaile connectors are specified in ANSI/TIA-568 standard to be compatible with both telephone and Ethernet. A similar standard jack once used for modem and data connections, the RJ45S, used a keyed variety of the 8P8C body with an extra tab that prevents it mating with other connectors; the visual difference compared to the more common 8P8C is subtle, but it is a different connectors; the visual difference compared to the more common 8P8C is subtle, but it is a different connector. The original RJ45S[18][24] keyed 8P2C modular connectors; the visual difference compared to the more common 8P8C is subtle, but it is a different connector. single telephone line and pins 7 and 8 shorting a programming resistor. Electronics catalogs commonly advertise 8P8C modular connectors as RJ45. An installer can wire the jack to any pin-out or use it as part of a generic structured cabling system such as ISO/IEC 15018 or ISO/IEC router to router crossover cable uses two 8-position connectors at each end. 10P10C by this was never a standard registered jack. The 10P10C has 10 router to router to router crossover cable uses two 8-position connectors at each end. 10P10C has 10 router to router crossover cable uses two 8-position connectors at each end. 10P10C has 10 router to router to router crossover cable uses two 8-position connectors at each end. 10P10C has 10 router to router crossover cable uses two 8-position connectors at each end. 10P10C has 10 router to router crossover cable uses two 8-position connectors at each end. 10P10C has 10 router to router crossover cable uses two 8-position connectors at each end. 10P10C has 10 contact positions and 10 contacts. The most common uses of the 10P10C connector are in proprietary data transfer systems, [26] and Equinox Super-Serial multi-port TIA-232 adapters. [26] 10P10C connector is uninterruptible power supplies. This connector is uninterruptible power supplies. also used by some vendors, for example, Cyclades (later absorbed by Equinox) used pin 1 as an RI (ring indicator) signal, which is seldom used, allowing an 8P8C plug to be inserted to their 10P10C socket for most applications. The Cisco Systems STS-10X terminal server features this connector. FordNet, a five-pair communications networking medium, also used the 10P10C between terminals. Motorola uses the 10-pin connector as a microphone connector in several of their mobile radio product lines.[citation needed] Polycom utilizes this connector on their Conference Link bus to connect their HDX and Group Series codecs and microphones to their SoundStructure audio mixers, although pins 1 and 10 are not used. [citation needed] The 10-pin connector is also used by Demag Cranes AG in some pendant connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c
connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their NI 9237.[27] M Technical requirements for connection of terminal equipment to the telephone network at the Wayback Machine (archived 2018-09-28) ANSI/TIA-1096-A: Telecommunications telephone network IEC 60603-7-1: Connectors for electronic equipment: Part 7-1: Detai specification for 8-way, shielded free and fixed connectors with common mating features, with assessed quality IEC 60603-7-2: Connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz IEC 60603-7-4: Connectors for electronic equipment: Part 7-4: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment: Part 7-5: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 600 MHz ISO/IEC 8877, EN 28877: Information Exchange between Systems—Interface Connector and Contact Assignments for ISDN Basic Access Interface Located at Reference Points S and T US government documents define registered jack applications of modular connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connector GG45 TERA Notes ^ The often omitted S suffix indicates this is a wiring configuration supporting a single telephone line. ^ WE/SS and Tyco/AMP 8P8C plug shave different spacings for the cable strain relief.[21][22] Using a WE/SS 8P8C crimp die set, and vice versa. ^ The body of a 6P6C or 4P4C plug typically projects out by more than one millimeter further than thecable strain relief.[21][22] Using a WE/SS 8P8C crimp die set, and vice versa. ^ The body of a 6P6C or 4P4C plug typically projects out by more than one millimeter further than thecable strain relief.[21][22] Using a WE/SS 8P8C crimp die set, and vice versa. ^ The body of a 6P6C or 4P4C plug typically projects out by more than one millimeter further than thecable strain relief.[21][22] Using a WE/SS 8P8C crimp die set, and vice versa. ^ The body of a 6P6C or 4P4C plug typically projects out by more than one millimeter further than the connector and damages the crimp die set. \*\* contacts and presses the outermost contacts of the larger connector further than if a full-size connector were inserted. ^ 4P4C and 10P10C connectors are not defined in these standards. References ^ a b Krumreich C.L., Mosing L.W., The Evolution of a Telephone, Bell Laboratories Record 44(1) p.14 (January 1966) ^ Walden S.W., Telephone Sets Go Mod (Modular, That Is), Bell Laboratories Record, Vol. 52(8) p. 238 (Sept. 1974) ^ AT&T, Registration Interface—Selection and General Information, Bell System Practices, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection A63-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection A63-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection A63-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection A63-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection A63-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection A63-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection A63-400-100 Issue 1, M Position Line Cord Module" (PDF). Bel-Stewart Connector. Bel. Retrieved 3 August 2021. ^ "RJ-45 Plug for Proposed CAT 6 Specifications" (PDF). Molex #449150001, Modular Plug, Category 6, Long Body, Unshielded, 8/8. Molex, LLC. Retrieved 3 August 2021. ^ "Six Conductor/Six Position Line Cord Module" (PDF). Bel-Stewart Connector. Bel. Retrieved 3 August 2021. ^ August 2021. ^ "RJ-45 Plug for Proposed CAT 6 Specifications" (PDF). Molex #449150001, Modular Plug". ^ BICSI (October 7, 2002). "Background Information". Telecommunications Cabling Installation (2nd ed.). McGraw-Hill Professional. p. 88. ISBN 0-07-140979-3. 4-position and 4-contact connectors are used primarily for telephone handsets to the phone, unfortunately for telephone handsets to the phone, unfortunately for telephone cable is the same as the telephone cable is the same as the telephone cable is the same as the telephone handsets to the phone, unfortunately for telephone handsets to the phone as the telephone cable is the same as the telephone cable is the same as the telephone cable is the same as the telephone handsets to the phone, unfortunately for telephone handsets to the phone as the telephone cable is the same as the telephone cable is the tele [...] this type of cable and pretty much any type of pre manufactured cable [...] is wired wrong for the Mac Plus. Under no circumstances should you use this cable as you will damage your keyboard and/or your Mac! ^ "Direc TV Channel Control" (wiki). GB-PVR. Archived from the original on 2008-10-19. Each end of a handset cord is wired opposite the other... Trulove 2005, pp. 23, 132: 'Designing LAN Wiring Systems: The 8-pin modular jack is sometimes referred to as an "RJ-45", because the connector/jack components are the same. However, RJ-45 actually applies to a special purpose jack configuration that is not used in LAN or standard telephone wiring. [...] Work Area Outlets: Modular jacks are often referred to as "RJ-45" jacks. This is not really the correct moniker, although it is in very common use.' ^ Oliviero, Andrew; Woodward, Bill (July 20, 2009). "Connectors". Cabling: The Complete Guide to Copper and Fiber-Optic Networking (4th ed.). Sybex. p. 294. ISBN 978-0-470-47707-6. The RJ (registered jack) prefix is one of the most widely (and incorrectly) used prefixes in the computer industry; nearly everyone, including people working for cabling companies, is guilty of referring to an eight-position modular jack (sometimes called an 8P8C) as an RJ-45. ^ Semenov, Andrey B.; Strizhakov, Stanislav K.; Suncheley, Igor R. (October 3, 2002). "Electrical Cable Connectors". Structured cable systems. Springer. p. 129. ISBN 3-540-43000-8. The traditional 8-contact connector, which is called Western Plug, 8PMJ (8-position modular jack), 8P8C (8 position 8 conductor), or somewhat incorrectly RJ-45, is used widely in SCS practice. ^ Trulove 2005, p. 219: 'User Cords and Connectors: This 8-pin modular jack), 8P8C (8 position 8 conductor), or somewhat incorrectly RJ-45, is used widely in SCS practice. ^ Trulove 2005, p. 219: 'User Cords and Connectors: This 8-pin modular jack), 8P8C (8 position 8 conductor), or somewhat incorrectly RJ-45, is used widely in SCS practice. ^ Trulove 2005, p. 219: 'User Cords and Connectors: This 8-pin modular jack), 8P8C (8 position 8 conductor), or somewhat incorrectly RJ-45, is used widely in SCS practice. ^ Trulove 2005, p. 219: 'User Cords and Connectors: This 8-pin modular jack), 8P8C (8 position 8 conductor), or somewhat incorrectly RJ-45, is used widely in SCS practice. ^ Trulove 2005, p. 219: 'User Cords and Connectors: This 8-pin modular jack), 8P8C (8 position 8 conductor), or somewhat incorrectly RJ-45, is used widely in SCS practice. ^ Trulove 2005, p. 219: 'User Cords and Connectors: This 8-pin modular jack), 8P8C (8 position 8 conductor), or somewhat incorrectly RJ-45, is used widely in SCS practice. ^ Trulove 2005, p. 219: 'User Cords and Connectors: This 8-pin modular jack), 8P8C (8 position 8 conductor), or somewhat incorrectly RJ-45, is used widely in SCS practice. ^ Trulove 2005, p. 219: 'User Cords and Connectors: This 8-pin modular jack), 8P8C (8 position 8 conductor), 8P8C RJ-45 connector. However, the RJ-45 wiring pattern (which includes an interface programming resistor) is so radically different from that of T568A and B that it really should not be called by that name at all.' ^ a b Modular jack wiring, Ontario, California: HVS, archived from the original on 2010-02-08 ^ Modular wiring reference, Siemon ^ IEEE 802.3 14.5.1 MDI connectors ^ "Stewart Connector 937-SP-3088 – Eight conductor/eight position line cord module" (PDF). Glen Rock, Pennsylvania: Bel Stewart
Connector. 2006-02-01. Archived from the original (PDF). Harrisburg, Pennsylvania: Tyco Electronics. 2008-03-31. Archived from the original on 2013-05-18, retrieved 2010-10-17 ^ a b Digi PortServer TS a b Digi PortServer TS 10P10C (RJ50) Modular RS-232 pinout, Pinouts guide. ^ NI 9237 4-Channel, ±25 mV/V, 24-Bit Simultaneous Bridge Module specifications. Bibliography Trulove, James (December 19, 2005), LAN wiring (3rd ed.), McGraw-Hill Professional, ISBN 0-07-145975-8. External links Wikimedia Commons has media related to Modular connectors. How to Make a Network Cable, a how-to article from wikiHow John R. Carlsen: On wiring modular telephone connectors[permanent dead link] graphical representation offec, and 6-position modified offset tab Common outlet configurations[permanent dead link] graphical representation of a figuration of the second sec pinouts Premium Modular Plugs at the Wayback Machine (archived 2013-02-15) Catalog page showing the difference between solid and stranded contacts 8 pin RJ45 (8P8C) male connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 5Electrical connector commonly used in telephone and computer networks Left to right, modular connectors: 8P8C plug, 6P6C plug, 6P such as in computer networking, telecommunication equipment, and audio headsets. Modular connectors were originally developed for use on specific Bell System telephone subscriber premises equipment to the telephone network. The Federal ission (FCC) mandated in 1976 an interface registration system, in which they became known as registered jacks. The convenience of prior existence for designers and ease of use led to a proliferation of modular connectors for many other applications. Many applications that originally used bulkier, more expensive connectors have converted to modular connectors. Probably the best-known applications of modular connectors, which prescribe physical characteristics and assign electrical signals to their contacts. Nomenclature Modular connectors are ofter referred to as modular phone jack and plug. The term modular connector, and Western jack and plug. The term modular wiring components of telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone equipment by the for teleph designations describe the signals and wiring used for voice and data communication at customer-facing interfaces of the public switched telephone network. It is common to use a registered jack standard of that name specified 8P8C modular connectors. Similarly, various six-position modular connectors may be called RJ11. Likewise, the 4P4C connector is sometimes called RJ11. Likewise, the 4 line cords of the Trimline telephone.[1] Driven by demand for multiple sets in residences with various lengths of cords, the Bell System introduced customer-connectable part kits and telephones, sold through PhoneCenter stores in the early 1970s.[2] For this purpose, Illinois Bell started installing modular telephone sets on a limited scale in June 1972. The patents by Edwin C. Hardesty and coworkers, US 3699498 (1972) and US 3860316 (1975), followed by other improvements, were the basis for the modular molded-plastic connectors were standardized nationally in the United States by the Registration Interface program of the Federal Communications Commission (FCC), which designated a series of Registered Jack (RJ) specifications for interconnection of customer-premises equipment to the public switched telephone network (PSTN).[3][4] Gender Modular connectors have gender: plugs are considered to be male, while jacks or sockets are considered to be female. Plugs are used to terminate cables and cords, while jacks are used for fixed locations on surfaces of walls, panels, and equipment. Other than telephone extension cables, cables are usually connected using a female-to-female coupler, having two jacks wired back-to-back. Latching tab and orientation Most modular connectors are designed with a latching mechanism that secures the physical connection. As a plug is inserted into a jack, a plastic tab on the plug locks against a ridge in the socket so that the plug cannot be removed without disengaging the tab by pressing it against the plug body. The standard orientation for installing a jack in a the tab down. The modular plug is often installed with a boot, a plastic covering over the tab and body, to prevent the latching tab to hook into other cords or edges, which may cause excessive bending or breaking of the tab. Such snagless cords, are usually constructed by installing the protective boot before the modular Size and contacts 8P8C modular plug pin numbering. Modular connectors are designated using two numbers that represent the maximum number of contacts, with each number of contacts. Alternate designations omit the letters while separating the position and contact quantities with either an x (6x2) or a slash (6/2). When not installed, contacts are usually omitted from the outer positions with omitted or unconnected contacts are unused for the electrical connection but ensure that the plug fits correctly. For instance, RJ11 cables often have connectors with six positions and four contacts, to which are attached just two wires. The contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact positions are numbered sequences. it on the right. Contacts are numbered by the contact position. For example, on a six-position, two-contact plug, where the outermost four positions do not have contacts, the innermost two contacts are numbered 3 and 4. Modular connectors are manufactured in four sizes, with 4-, 6-, 8-, and 10-positions. The insulating plastic bodies of 4P and 6P connectors have different widths, whereas 8P or 10P connectors share an even larger body width. Insulation displacement contact types 8P8C plug with contacts for solid wire (left) and stranded wire (left) and stranded wire (bottom right) Internally, the contacts for solid wire (left) and stranded wire (bottom right) and stranded wire (left) and stranded wire (bottom right). and connect with the conductor, a mechanism known as insulation displacement. Ethernet cables, in particular, may have solid or stranded (tinsel wire) conductors and the sharp prongs are different in the 8P8C connectors made for each type of wire. A modular plug for solid (single-strand) wire often has three slightly splayed prongs on each contact to securely surround and grip the conductor. Modular plugs for stranded have prongs that are designed to connect to multiple wire strands. Connector plugs are designed for either solid or stranded wire and a mismatch between plug and wire type may result in an unreliable
connection. Interchangeability Some modular connectors are indexed, meaning their dimensions that are designed for either solid or stranded wire and a mismatch between plug and wire type may result in an unreliable connection. are intentionally non-standard, preventing connections with connectors of standard dimensions. The means of indexing may be non-standard cross-sectional dimensions or configuration. For example, a Modified Modular Jack using an offset latching tab was developed by Digital Equipment Corporation to prevent accidental interchange of data and telephone cables. Modular connector typical dimensions (millimeters) Connector Length Width Height 4P4C[citation needed] 7.7 6P6C[5] 13.34 9.85 6.60 8P8C[6] 22.48 11.68 8.00 The dimensions of modular connectors are such that a narrower plug can be inserted into a wider jack that has more positions than the plug, leaving the jack's outermost contacts unconnected. The height of the plug's insertion area is 0.260 inches (6.60 mm) and the contacts are 0.040 inches (1.02 mm) apart (contact pitch), so the width is dependent on the number of pin positions.[7][8] However, not all plugs from all manufacturers have this capability, and some jack manufacturers warn that their jacks are not designed to accept smaller plugs without damage. If an inserted plug lacks slots to accommodate the jack's contacts at the outermost contacts of an incompatible jack. forcibly deformed. Special modular plugs have been manufactured (for example, the Siemon UP-2468[9]) which have extra slots beyond their standard contacts, to accommodate the wider jack's outermost contacts without damage. These special plug connectors can be visually identified by carefully looking for the extra slots molded into the plug. The molded plastic bodies of the special plugs may also be colored with a light blueish tinge, to aid in quick recognition. The special plugs are preferred for test equipment and adapters, which may be rapidly connected to a large number of corresponding connectors in quick succession for testing purposes. The use of the special plugs are preferred for test equipment and adapters, which may be rapidly connected to a large number of corresponding connectors in quick succession for testing purposes. equipment under test, even when a narrower plug is inserted into a nominally incompatible wider jack. Termination of cables with modular connectors is similar across the various number of positions and contacts in the plug. The crimping tool contains a die which is often exchangeable and is closely matched to the shape and pin count of the modular plug. A crimping die-set looks similar to an 8P8C jack, except for the eight teeth lining the top portion of the die compresses, these teeth force the plug contacts into the conductors of the cable being terminated. The crimper may also permanently deform part of the plastic plug body in such a way that it grips the outer sheath of the cable. Pinout The contact assignments (pinout) of modular connectors vary by application. Telephone network connections are standardized by registered jack designations, and Ethernet over twisted pair is specified by the ANSI/TIA-568 standard. For other applications. For this reason, D-sub-to-modular adapters are typically shipped with the D-sub contacts (pins or sockets) terminated but not inserted into the connector body, so that the D-sub-to-modular contact pairing can be assigned as needed. 4P4C 4P4C modular connector is the standard modular connector used on both ends of telephone handset cords, and is therefore often called a handset connector. [10] This handset connector is not a registered jack, because it was not intended to connect directly to telephone lines. However it is often referred to as RJ9, RJ10, or RJ22. Handset wiring Handsets and often headsets for use with telephones commonly use a 4P4C connector. The two center pins are commonly used for the receiver, and the outer pins connect the transmitter so that a reversal of conductors between the ends of a cord does not affect the signal routing. This may differ for other equipment, including hands-free headsets. Data port The Macintosh 128K, Macintosh 512K and Macintosh Plus from Apple as well as the Amiga 1000 from Commodore used 4P4C connectors to connect the keyboard on the outer two contacts and received data signals on the inner pair. The cable between the computer and the keyboard was a coiled cord with an appearance very similar to a telephone handset cable.[11] The connector on the Amiga 1000 used crossover wiring, similar to a telephone handset. The connector wiring on the Apple computers, however, required a polarized straight through pinout. Using a telephone handset cable instead of the supplied cable could short out the +5 volt DC supply and damage the Apple computers, however, required a polarized straight through pinout. are often used for data links, such as serial line connectors, because of their compact dimensions. For example, some DirecTV set top boxes include a 4P4C data port connector with an adapter cord to a computer serial port so that remote control is possible from the computer.[13] 6P6C 6P4C crimp-on style connector. Modular plugs are described by the maximum number of physical contact positions and the actual number of contacts installed in these positions. The 6P2C, 6P4C, and 6P6C modular connectors are probably best known for their use as RJ11, RJ14, and RJ25 registered jacks, respectively. These interfaces use the same six-position modular connector body, but have different numbers of pins installed. RJ11 is a physical interface often used for terminating single telephone lines. RJ14 is similar, but for two lines, and RJ25 is for three lines. RJ14 wiring Cables sold as RJ11 often actually use 6P4C connectors (six positions, four contacts) and RJ14 wiring – four wires running to a central junction box. Two of its six possible contact positions connect tip and ring, and the other two contact positions an extra contact was also required for the ground connection for selective ringers. Pinout The pins of the 6P6C connector are numbered 1 to 6, counting left to right when holding the connector tab side down with the opening for the cable facing the viewer. Position Pair T/R ± RJ11 RJ14 RJ25 Twisted pair colors [B] Australian colors [B] Aust 1 2 2 T + T2 T2 white/orange white/orange black green red 3 1 R - R1 R1 Blue blue/white red white blue 4 1 T + T1 T1 white/blue white/blue green freen/white blue 3 2 R - R2 R2 orange orange/white blue 4 1 T + T1 T1 white/blue white/blue green brown white 5 2 R - R2 R2 orange orange/white blue 4 1 T + T1 T1 white/blue green brown white 5 2 R - R2 R2 orange orange/white blue 4 1 T + T1 T1 white/blue green brown white 5 2 R - R3 green green/white blue 4 1 T + T1 T1 white/blue green area white blue 4 1 T + T1 T1 white/blue green brown white 5 2 R - R3 green green/white blue 4 1 T + T1 T1 white/blue green brown white 5 2 R - R3 green green/white blue 4 1 T + T1 T1 white/blue green area white blue 4 1 T + T1 T1 white/blue green brown white 5 2 R - R3 green green/white blue 4 1 T + T1 T1 white/blue green brown white 5 2 R - R3 green green/white blue 4 1 T + T1 T1 white/blue green brown white 5 2 R - R3 green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green brown white 5 2 R - R3 green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green brown white 5 2 R - R3 green green/white blue 4 1 T + T1 T1 white/blue green brown white 5 2 R - R3 green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white blue 4 1 T + T1 T1 white/blue green green/white/blue green/white/blue green green/white/blue green green/white/blue gree several conflicting conventions for pair 3 (and sometimes even pair 2). The colors shown above were taken from a vendor of silver satin flat 8-conductor phone cable by the Bell System use white for pair 3 tip but some vendors' cable may substitute orange for white. At least one other vendor of flat 8-conductor cable uses the sequence blue, orange, black, red, green, yellow, brown and white/slate.[citation needed] ^ This color scheme originates in the (withdrawn) national standard DIN 47100. The scheme originates in the (withdrawn) national standard DIN 47100. equipment, and that in some neighboring countries, 6P4C plugs and sockets are typically only used to connect the telephone cord to the phone base unit, whereas the mechanically different TAE connector is used at the other end to connect to a service provider interface. feature non-RJ standard sockets that can be connected directly to TAE plugs. Further, flat DIN 47100 cables typically place the wires in ascending order. When used directly with 6P4C plugs, the color coding may be undetermined. Powered version of RJ11 In the powered version of the RJ11 interface, pins 2 and 5 (black and yellow) may carry low voltage AC or DC power. While the telephone line on pins 3 and 4 (red and green) supplies enough power for most telephone terminals, old telephone terminals with incandescent lights, such as the Western Electric Princess and Trimline telephone, need more power than the phone line can supply. Typically, the power on pins 2 and 5 is supplied by an AC adapter plugged into a nearby power outlet which potentially even
supplies power to all of the jacks in the house. Compatibility with structured cabling Structured cabling Structured cabling specify the T568A or T568E wiring arrangements compatible with Ethernet. The 8P8C jack used by structured cabling physically accepts the 6-position connector used by RJ11, RJ14 and RJ25. Only RJ11 and RJ25. Only RJ11 and RJ25. phone. Both the third and fourth pairs of RJ61 are similarly split. The incompatible T568A and T568B layouts were necessary to preserve the electrical properties of these incompatibilities, and because RJ25 and RJ61 were never very common the T568A and T568B conventions have largely displaced RJ25 and RJ61 for telephones with more than two lines. 8P8C An 8P8C modular connector sia modular connector is a modular connector flat cable These connectors are commonly used for Ethernet over twisted pair, registered jacks and other telephone applications, RS-232 serial communication using the ANSI/TIA-568 (formerly TIA/EIA-568) and Yost standards, and other telephone applications involving unshielded twisted pair, shielded twisted pair, and multi-conductor flat cable. An 8P8C modular connection consists of a male plug and a female jack, each with eight equally spaced contacts. On the plug, the contacts are flat metal bars positioned parallel to the connector body. Inside the jack, the contacts are flat metal bars positioned parallel to the contects are metal spring wires angled away from the insertion interface. When the plug is mated with the jack, the contacts meet and create an electrical connection. Th spring tension of the jack contacts ensures a good interface. Left: Generic 8P8C (or 8PMJ, 8-position modular jack) male connector. [14][15][16] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original RJ45S[a] was intended for high-speed modems, and is obsolete. The RJ45S jack mates with a keyed 8P8C socket.[17] The original RJ45S[a] was intended for high-speed modems, and is obsolete. The RJ45S jack mates with a keyed 8P8C socket.[17] The original RJ45S[a] was intended for high-speed modems, and is obsolete. and pins 7 and 8 shorting a programming resistor. This is a different mechanical interface and wiring scheme than ANSI/TIA-568 T568A and T568B schemes with the 8P8C modular connectors are similar to those used for the RJ45S plug is keyed and not compatible with non-keyed 8P8C modular jacks. Telephone installers who wired RJ45S modem jacks or RJ61X telephone jacks were familiar with the pin assignments of the standard. However, the standard un-keyed modular connectors became ubiquitous for computer networking and informally inherited the name RJ45. modular connector are specified for US telephone applications by the Administrative Council for Terminal Attachment (ACTA) in national standard ANSI/TIA-1096-A and international standard does not use the short term 8P8C and covers more than just 8P8C modular connectors, but the 8P8C modular connector type is the eight position connector type described therein, with eight contacts installed. For data communication applications (LAN, structured cabling), International Standard IEC 60603 specifies in parts 7-1, 7-2, 7-4, 7-5, and 7-7 not only the same physical dimensions but also high-frequency performance requirements for shielded and unshielded versions of this connector for carrying frequencies up to 100, 250 and 600 MHz. Pinout T568A or T568B wiring, defined in TIA-568 T568B wiring, defined in TIA-568 Be8C connectors are frequently terminated using the the only difference is that the orange and green pairs (colors) are swapped. A cable wired as T568A at one end and wired as T568B at the other end (Tx and Rx pairs reversed) is an Ethernet hubs). Crossover cable was needed to interconnect similar network equipment (such as Ethernet hubs). Crossover cables are sometimes still used to connect two computers together without a switch or hub, however most network interface cards (NIC) in use today implement auto MDI-X to automatically configure themselves based on the type of cable plugged into them. A cable wired the same at both ends is called a patch or straight-through cable, because no pin/pair assignments are swapped. If a patch or straight cable is used to connect two computers with auto MDI-X capable NICs, one NIC will configure itself to swap the functions of its Tx and Rx wire pairs. Pin T568B pair T568B pair T568B color 10BASE-T/100BA white/orange stripe TD+ DA+ tip Pin numbering on plug. Connected pins on plug and jack have the same number. 2 3 green solid 2 orange solid TD- DA- ring 3 2 white/orange stripe 3 white/green stripe 3 white/green stripe 3 white/plue stripe 1 white/blue stripe 1 white/blue stripe 1 white/blue stripe 1 white/blue stripe 3 white/green stripe 3 white/orange stripe 3 white/green stripe 3 wh white/brown stripe 4 white/brown stripe NC DD+ tip 8 4 brown solid 4 brown solid NC DD- ring Types and compatibility Two types of 8P8C plugs and crimping (WE/SS) and Tyco/AMP. While the two types are similar, the tooling and plug types cannot be interchanged.[b] WE/SS compatible plugs are available from a large number of manufacturers, whereas Tyco/AMP plugs are produced exclusively by Tyco Electronics.[citation needed] Both types of 8P8C modular jack. Both types of 8P8C modular jack. tolerances as needed. Shielded plugs are more expensive and require shielded cable, but have a lower attenuation, and may reduce electromagnetic interference. Although a narrower 4-pin and 6-pin plug fits into the wider 8-pin jack and makes a connection with the available contacts on the plug, because the body of the smaller connector may stress the remaining contacts,[c] the smaller connector can potentially damage the springs of the larger jack. Applications are commonly used in computer networking applications, where interconnecting cables are terminated at each end with an 8P8C modular plug wired according to TIA/EIA standards. Most wired Ethernet communications are carried over Category 5e or Category 5e or Category 6 cable terminated with 8P8C modular plugs. The connector is also used in other telecommunications connect, it may damage the modular jack; an approved converter prevents damage. In landline telephony, an 8P8C jack is used at the point a line enters the building to allow the line to be broken to insert automatic dialing equipment, including intrusion alarm panels. The EIA/TIA-561 standard describes the use of 8P8C connectors for RS-232 serial interfaces. [23] This application is common as a console interface for network equipment, such as switches, routers, and headless computers. 8P8C modular connectors are also commonly used as a microphone connector for PMR, LMR, and amateur radio transceivers. Frequently the pinout is different, usually mirrored (i.e. what would be pins 1 to 8 in the ANSI/TIA-568 standard might be pins 8 to 1 in the radio and its manual). In analog mobile telephony, the 8P8C connector was used to connector was used to connector is standardized as the IEC 60603-7 8P8C modular connector with different categories of performance. The physical dimensions of the male and female connectors are specified in ANSI/TIA-1096-A and ISO-8877 standards and normally wired to the T568A and T568B pinouts specified in the ANSI/TIA-568 standard jack once used for modem and data connections, the RJ45S, used a keyed variety of the 8P8C body with an extra tab that prevents it mating with other connectors; the visual difference compared to the more common 8P8C is subtle, but it is a different connector. The original RJ45S[18][24] keyed 8P2C modular connector, obsolete today, had pins 5 and 4 wired for tip and ring of a single telephone line and pins 7 and 8 shorting a programming resistor. Electronics catalogs commonl advertise 8P8C modular connectors as RJ45. An installer can wire the jack to any pin-out or use it as part of a generic structured cabling system such as ISO/IEC 15018 or ISO/I with differently wired connectors at each end. 10P10C bas an RJ50 connector, although this was never a standard registered jack. The 10P10C connector is commonly referred to as an RJ50 connector, although this was never a standard registered jack. The 10P10C bas 10 contacts at each end. 10P10C bas 10 contacts at each transfer systems, [25] such as the Digiboard [26] and Equinox Super-Serial multi-port TIA-232 adapters. [26] 10P10C connectors are also used to implement RS-485 interfaces, and for data link connectors are also used by Equinox) used pin 1 as an RI (ring indicator) signal, which is seldom used, allowing an 8P8C plug to be inserted to their 10P10C socket for most applications. The Cisco Systems STS-10X
terminal server features this connector as a microphone connector in several of their mobile radio product lines.[citation needed] Polycom utilizes this connector on their Conference Link bus to connect their HDX and Group Series codecs and microphones to their SoundStructure audio mixers, although pins 1 and 10 are not used.[citation needed] The 10-pin connector is also used by Demag Cranes AG in some pendant connections. National Instruments is also using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connection of terminal equipment: Technical requirements for connection of terminal equipment to the telephone network at the end of the second se Wayback Machine (archived 2018-09-28) ANSI/TIA-1096-A: Telecommunications telephone terminal equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment to the telephone 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60603-7-1: Connectors for electronic equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment to the telephone network IEC 60603-7-1: Con assessed quality IEC 60603-7-2: Connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz IEC 60603-7-4: Connectors, for data transmissions with frequencies up to 100 MHz IEC 60603-7-4: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz IEC 60603-7-4: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz IEC 60603-7-4: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with 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100 MHz IEC 60603-7-4: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz IEC 60603-7-4: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz IEC 60603-7-4: Detail specification for 8-way, unshielded, free and fixed connect frequencies up to 250 MHz IEC 60603-7-5: Connectors for electronic equipment: Part 7-5: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment: Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment: Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment: Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment: Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment: Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment: Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment: Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment: Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment: Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors for electronic equipment electronic transmissions with frequencies up to 600 MHz ISO/IEC 8877, EN 28877: Information Technology—Telecommunications and Information Exchange between Systems—Interface Located at Reference Points S and T US government documents define registered jack applications of modular connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 Ethernet connector GG45 TERA Notes ^ The often omitted S suffix indicates this is a wiring configuration supporting a single telephone line. ^ WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS 8P8C crimp die set, and vice versa. ^ The body of a 6P6C or 4P4C plug typically projects out by more than one millimeter further than the contacts and presses the outermost contacts of the larger connector further than if connector were inserted. ^ 4P4C and 10P10C connectors are not defined in these standards. References ^ a b Krumreich C.L., Mosing L.W., The Evolution of a Telephone Sets Go Mod (Modular, That Is), Bell Laboratories Record 44(1) p.14 (January 1966) ^ Walden S.W., Telephone Sets Go Mod (Modular, That Is), Bell Laboratories Record 44(1) p.14 (January 1966) ^ Walden S.W., Telephone Sets Go Mod (Modular, That Is), Bell Laboratories Record 44(1) p.14 (January 1966) ^ Walden S.W., Telephone Sets Go Mod (Modular, That Is), Bell Laboratories Record 44(1) p.14 (January 1966) ^ Walden S.W., Telephone Sets Go Mod (Modular, That Is), Bell Laboratories Record 44(1) p.14 (January 1966) ^ Walden S.W., Telephone Sets Go Registration Interface—Selection and General Information, Bell System Practices, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection (Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection (Section
463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection (Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection (Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection (Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection (Secti ^ "RJ-45 Plug for Proposed CAT 6 Specifications" (PDF). Molex #449150001, Modular Plug, Category 6, Long Body, Unshielded, 8/8. Molex, LLC. Retrieved 3 August 2021. ^ "RJ-45 Plug for Proposed CAT 6 Specifications" (PDF). Molex #449150001, Module" (PDF). Bel-Stewart Connector. Bel. Retrieved 3 August 2021. ^ "RJ-45 Plug for Proposed CAT 6 Specifications" (PDF). Molex #449150001, Modular Plug, Category 6, Long Body, Unshielded, 8/8. Molex, LLC. Retrieved 3 August 2021. ^ "RJ-45 Plug for Proposed CAT 6 Specifications" (PDF). Modular Plug, Category 6, Long Body, Unshielded, 8/8. Molex, LLC. Retrieved 3 August 2021. ^ "Universal Modular Plug". ^ BICSI (October 7, 2002). "Background Information". Telecommunications Cabling Installation (2nd ed.). McGraw-Hill Professional. p. 88. ISBN 0-07-140979-3. 4-position and 4-contact connectors are used primarily for telephone handset cords. ^ "Apple Macintosh Plus", My Old Computers, archived from the original on 2009-02-27, retrieved 2010-10-16. ^ "Mac Plus Keyboard Cable", Syrinx, UK: Megadon, ...the cable is the same as the telephone cable that connects handsets to the phone, unfortunately [...] this type of cable and pretty much any type of pre manufactured cable [...] is wired wrong for the Mac Plus. Under no circumstances should you use this cable as you will damage your keyboard and/or your Mac! ^ "Direc TV Channel Control" (wiki). GB-PVR. Archived from the original on 2008-10-19. Each end of a handset cord is wired opposite the other... ^ Trulove 2005, pp. 23, 132: 'Designing LAN Wiring Systems: The 8-pin modular jack is sometimes referred to as an "RJ-45", because the connector/jack components are the same. However, RJ-45 actually applies to a special purpose jacks are often referred to as "RJ-45" jacks. This is not really the correct moniker, although it is in very comm use.' ^ Oliviero, Andrew; Woodward, Bill (July 20, 2009). "Connectors". Cabling: The Complete Guide to Copper and Fiber-Optic Networking (4th ed.). Sybex. p. 294. ISBN 978-0-4707-6. The RJ (registered jack) prefix is one of the most widely (and incorrectly) used prefixes in the computer industry; nearly everyone, including people working for cabling companies, is guilty of referring to an eight-position modular jack (sometimes called an 8P8C) as an RJ-45. ^ Semenov, Andrey B.; Strizhakov, Stanislav K.; Suncheley, Igor R. (October 3, 2002). "Electrical Cable Connectors". Structured cable systems. Springer. p. 129. ISBN 3-540-43000-8. The traditional 8-contact connector, which is called Western Plug, 8PMJ (8-position modular jack), 8P8C (8 position 8 conductor), or somewhat incorrectly RJ-45, is used widely in SCS practice. ^ Trulove 2005, p. 219: 'User Cords and Connectors: This 8-pin modular plug is probably the most subject to name abuse, because it resembles the specialized RJ-45 connector. However, the RJ-45 wiring pattern (which includes an interface programming resistor) is so radically different from that of T568A and B that it really should not be called by that name at all.' ^ a b Modular wiring reference, Siemon ^ IEEE 802.3 14.5.1 MDI connectors ^ "Stewart Connector 937-SP-3088 – Eight conductor/eight position line cord module" (PDF). Glen Rock, Pennsylvania: Bel Stewart Connector. 2006-02-01. Archived from the original (PDF) on 2011-07-24 from the original (PDF). Harrisburg, Pennsylvania: Tyco/AMP 5-554739-2 – Modular plug assembly, 8 position, flat oval cable" (PDF). 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Carlsen: On wiring modular telephone connectors[permanent dead link] Modular wiring reference[permanent dead link] showing differences between 8P8C, true RI45 8-position modified offset tab Common outlet configurations[permanent dead link] graphical representation of twisted pair pinouts Premium Modular Plugs at the Wayback Machine (archived 2013-02-15) Catalog page showing the difference between solid and stranded contacts 8 pin RJ45 (8P8C) male connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram at the Wayback Machine (archived 2013-06-01) Retrieved from " 6Electrical connector diagram at the Wayback Machine (archived 2013-06-01) Retrieved from " 6E 6P4C plug, 4P4C plug, 6P6C jack. An 8P8C modular plug. This is the common crimp type plug, of the same kind pictured above crimped onto a cable (with molded sleeve). A modular connector is a type of electrical connector for cords and cables of electronic devices and appliances, such as in computer networking, telecommunication equipment, and audio headsets. Modular connectors were originally developed for use on specific Bell System telephone sets in the 1960s, and similar types found use for simple interconnection of customer-provided telephone system, in which they became known as registered jacks. The convenience of prior existence for designers and ease of use led to a proliferation of modular connectors have converted to modular connectors. Probably the best-known applications of modular connectors for many other applications of modular connectors have converted to modular connectors. are for telephone and Ethernet. Accordingly, various electronic interface specifications exist for applications using modular connectors, which prescribe physical characteristics and assign electronic interface specifications exist for applications using modular connectors, which prescribe physical characteristics and plug. The term modular connector arose from its original use in modular wiring components of telephone equipment by the Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone line connectors. Registered jack designations describe the signals and wiring used for voice and data communication at customer-facing interfaces of the public switched telephone network. It is common to use a registered jack standard of that name specified 8P8C modular connectors. Similarly, various six-position modular connectors may be called R111. Likewise, the 4P4C connector is sometimes called R19 or R122 though no such official designations exist. [citation needed] History The first types of small modular telephone connectors were created by AT&T in the mid-1960s for the plug-in handset and line cords of the Trimline telephone. [1] Driven by demand for multiple sets in residences with various lengths of cords, the Bell System introduced customer-connectable part kits and telephones, sold through PhoneCenter stores in the early 1970s. [2] For this purpose, Illinois Bell started installing modular telephone sets on a limited scale in June 1972. The patents by Edwin C. Hardesty and coworkers, US 3699498 (1972) and US 3860316 (1975), followed by other improvements, were the basis for the modular molded-plastic connectors that became commonplace for telephone cords by the Registration Interface program of the Federal Communications Commission (FCC), which designated a series of Registered [ack (R]) specifications for interconnection of customer-premises equipment to the public switched telephone network (PSTN).[3][4] Gender Modular connectors have gender: plugs are used for fixed locations on surfaces of walls, panels, and equipment. Other than telephone extension cables, cables with a modular plug on one end and a jack on the other are rare. Instead,
cables are usually connected using a female-to-female coupler, having two jacks wired back-to-back. Latching that secures the physical connection. As a plug is inserted into a jack, a plastic tab on the plug locks against a ridge in the socket so that the plug body. The standard orientation for installing a jack in a vertical surface is with the tab down. The modular plug is often installed with a boot, a plastic covering over the tab and body, to prevent the latching tab to hook into other cords or edges, which may cause excessive bending of the tab. Such snagless cords, are usually constructed by installing the protective boot before the modular plug is crimped. Size and contacts 8P8C modular plug pin numbering. Modular connectors are designated using two numbers that represent the maximum number of contacts, with each number of installed contacts, with each number of install slash (6/2). When not installed, contacts are usually omitted from the outer positions inward, such that the number of contacts are unused for the electrical connection but ensure that the plug fits correctly. For instance, RJ11 cables often have connectors with six positions and four contacts, to which are attached just two wires. The contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have it on the right. Contacts are numbered by the contact position. For example, on a six-position, twocontact plug, where the outermost four positions do not have contacts, the innermost two contacts are numbered 3 and 4. Modular connectors have different widths, whereas 8P or 10P connectors share an even larger body width. Insulation displacement contact types 8P8C plug with contacts for solid wire (left) and stranded wire (right) Contacts for solid wire (bottom right) Internally, the contacts on the plugs have sharp prongs that, when crimped, pierce the wire insulation displacement. Ethernet cables, in particular, may have solid or stranded (tinsel wire) conductors and the sharp prongs are different in the 8P8C connectors made for each type of wire. A modular plug for stranded have prongs that are designed to connect to multiple wire strands. Connector plugs are designed for either solid or stranded wire and a mismatch between plug and wire type may result in an unreliable connectors of standard dimensions. The means of indexing may be non-standard cross-sectional dimensions or shapes, retention mechanism dimensions or configuration. For example, a Modified Modular Jack using an offset latching tab was developed by Digital Equipment Corporation to prevent accidental interchange of data and telephone cables. Modular connector typical dimensions (millimeters) Connector Length Width Height 4P4C[citation needed] 7.7 6P6C[5] 13.34 9.85 6.60 8P8C[6] 22.48 11.68 8.00 The dimensions of modular connectors are such that a narrower plug can be inserted into a wider jack that has more positions than the plug, leaving the jack's outermost contacts unconnected. The height of the plug's insertion area is 0.260 inches (6.60 mm) and the contacts are 0.040 inches (1.02 mm) apart (contact pitch), so the width is dependent on the number of pin positions.[7][8] However, not all plugs from all manufacturers have this capability, and some jack manufacturers have this capability, and some jack manufacturers warn that their jacks are not designed to accept smaller plugs without damage. If an inserted plug lacks slots to accommodate the jack's contacts at the outermost extremes, it may permanently deform those outermost contacts of an incompatible plug, as the outermost contacts of an incompatible plug, as the outermost contacts of an incompatible plug. UP-2468[9]) which have extra slots beyond their standard contacts, to accommodate the wider jack's outermost contacts without damage. These special plugs may also be colored with a light blueish tinge, to aid in quick recognition. The special plugs are preferred for test equipment and adapters, which may be rapidly connected to a large number of corresponding connectors in quick succession for testing purposes. The use of the special plugs avoids inadvertent damage to the equipment under test, even when a narrower plug is inserted into a nominally incompatible wider jack. Termination A modular plug crimping tool with exchangeable crimping dies. Termination of cables with modular connectors is similar across the various number of positions and contacts in the plug. The crimping die-set looks similar to an 8P8C jack, except for the eight teeth lining the top portion of the die compresses around the 8P8C plug. As the die compresses, these teeth force the plug contacts into the conductors of the cable being terminated. The crimper may also permanently deform part of the plastic plug body in such a way that it grips the outer sheath of the cable for secure fastening and strain relief. These actions permanently attach the plug to the cable. Pinout The contact assignments (pinout) of modular connectors vary by application. Telephone network connectors vary by application. For other applications, standardization may be lacking; for example, multiple conventions exist for the use of 8P8C connectors in RS-232 applications. For this reason, D-sub-to-modular contact pairing can be assigned as needed. 4P4C 4P4C modular connector is the standard modular connector is the standard modular connector is not a handset cord. The four-position four-conductor (4P4C) connector is not a registered jack, because it was not intended to connect directly to telephone lines. However it is often referred to as RJ9, RJ10, or RJ22. Handsets and often headsets for use with telephones commonly used for the receiver, and the outer pins connect the transmitter so that a reversal of conductors between the ends of a cord does not affect the signal routing. This may differ for other equipment, including hands-free headsets. Data port The Macintosh 128K, Ma provided power to the keyboard on the outer two contacts and received data signals on the inner pair. The cable between the computer and the keyboard was a coiled cord with an appearance very similar to a telephone handset. The connector wiring on the Apple computers, however, required a polarized straight through pinout. Using a telephone handset cable instead of the supplied cable could short out the +5 volt DC supply and damage the Apple computer or the keyboard. [12] Modular connectors are often used for data links, such as serial line connections, because of their compact dimensions. For example, some DirecTV set top boxes include a 4P4C data port connector with an adapter cord to a computer serial port so that remote control is possible from the computer.[13] 6P6C 6P4C crimp-on style connector. Modular plugs are described by the maximum number of physical contact positions and the actual number of contacts installed in these positions. The 6P2C, 6P4C, and 6P6C modular connectors are probably best known for their use as RJ11, RJ14, and RJ25 registered jacks, respectively. These interfaces use the same six-position modular connector body, but have different numbers of pins installed. RJ11 is a physical interface often used for terminating single telephone lines. RJ14 is similar, but for two lines, and RJ25 is for three lines. RJ61 is a similar registered jack for four lines, but uses an 8P8C connector. RJ11 wiring Cables sold as RJ11 often actually use 6P4C connectors (six positions, four contacts) and RJ14 wiring – four wires running to a central junction box. Two of its six possible contact positions, four contacts) and RJ14 wiring – four wires running to a central junction box. unused or provide low-voltage power for night-light or other features on the telephone set. In some installations an extra contact was also required for the ground connector tab side down with the opening for the cable facing the viewer. Position Pair T/R ± RJ11 RJ14 RJ25 Twisted pair colors 25-pair colors Old colors[B] Australian colors [B] Australian colors white/blue white/blue green brown white 5 2 R - R2 R2 orange orange/white yellow yellow black 6 3 R - R3 green green/white blue gray green ^ While the old solid color code was well established for pair 1 and usually pair 2, there are several conflicting conventions for pair 3 (and sometimes even pair 2). The colors shown above were taken from a vendor of silver satin flat 8-conductor phone cable that claims to be standard. 6-pair solid (old) bellwire cables previously used by the Bell System use white for pair 3 tip but some vendors' cable may substitute orange for white. At least one other vendor of flat 8-conductor cable uses the sequence blue, orange, black, red, green, yellow, brown and white/slate.[citation needed] ^ This color scheme originates in the (withdrawn) national standard DIN 47100. The scheme shown here is the correct color code for interfacing with the RJ connector standards. However, with German domestic telephone cord to the phone base unit, whereas the mechanically different TAE connector is used at the other end to connect to a service provider interface. Older base units may accommodate the additional connectors of TAE (E. W. a2, b2) and may feature non-RI standard sockets that can be connected directly to TAE plugs. Further, flat DIN 47100 cables typically place the wires in ascending order. When used directly with 6P4C plugs, the color coding may be undetermined. Powered version of RJ11 In the powered version of RJ11 In the powered version of the RJ11 interface, pins 2 and 5 (black and yellow) may carry low voltage AC or DC power. While the telephone line on pins 3 and 4 (red and green) supplies enough power for most telephone terminals, old telephone terminals with incandescent lights, such as the Western Electric Princess and Trimline telephones, need more power outlet which potentially even supplies power to all of the jacks in the house. Compatibility with
structured cabling Structured cabling networks adhering to ANSI/TIA-568, ISO/IEC 11801 (or ISO/IEC 15018 for home networks) are widely used for both computer networks) are widely used for both computer standards specify the T568A or T568B wiring arrangements compatible with Ethernet. The 8P8C jack used by structured cabling physically accepts the 6-position connector used by RJ11, RJ14 and RJ25. Only RJ11 and RJ25 across two separate cable pairs, rendering that pair unusable by an analog phone. Both the third pair of RJ61 are similarly split. The incompatible T568A and T568B layouts were necessary to preserve the electrical properties of the third and fourth pairs for Ethernet, which operates at much higher frequencies than analog telephony. Because of these incompatibilities, and Because RJ25 and RJ61 were never very common, the T568A and T568B conventions have largely displaced RJ25 and RJ61 for telephones with more than two lines. 8P8C An 8P8C modular plug not yet crimped onto a cable An 8P8C modular connector with a RJ45S key cut The 8 position 8 contact (8P8C) connector is a modular connector is a modular connector set commonly used for Ethernet over twisted pair, registered jacks and other telephone applications, RS-232

serial communication using the ANSI/TIA-568 (formerly TIA/EIA-568) and Yost standards, and other applications involving unshielded twisted pair, shielded twisted pair, and multi-conductor flat cable. An 8P8C modular connection consists of a male plug and a female jack, each with eight equally spaced contacts. On the plug, the contacts are flat metal bars positioned parallel to the connector body. Inside the jack, the contacts are metal spring wires angled away from the insertion interface. When the plug is mated with the jack, the contacts meet and create an electrical connection. The spring tension of the jack contacts meet and create an electrical connection. Right: RJ45 male connector (with key) Although commonly referred to as RJ45 in the context of Ethernet and category 5 cables, RJ45 originally referred to a specific wiring configuration of an 8P8C connector.[14][15][16] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original RJ45S[a] was intended for high-speed modems, and is obsolete. The RJ45S jack mates with a keyed 8P2C modular plug,[18][19] and has pins 4 and 5 (the middle positions) wired for the ring and tip conductors of a single telephone line and pins 7 and 8 shorting a programming resistor. This is a different mechanical interface and wiring scheme than ANSI/TIA-568 T568A and T568B schemes with the 8P8C connector in Ethernet and telephone applications. Generic 8P8C modular connectors are similar to those used for the RJ45S plug is keyed and not compatible with non-keyed 8P8C modular jacks. Telephone installers who wired RJ45S modem jacks or RJ61X telephone jacks were familiar with the pin assignments of the standard. However, the standard un-keyed modular connectors became ubiquitous for computer networking and informally inherited the name RJ45. Standardization The shape and dimensions of an 8P8C modular connector are specified for US telephone applications by the Administrative Council for Terminal Attachment (ACTA) in national standard ANSI/TIA-1096-A and international standard ISO-8877. This standard does not use the short term 8P8C and covers more than just 8P8C modular connector type is the eight position connector type described therein, with eight contacts installed. For data communication applications (LAN, structured cabling), International Standard IEC 60603 specifies in parts 7-1, 7-2, 7-4, 7-5, and 7-7 not only the same physical dimensions but also high-frequency performance requirements for shielded and unshielded versions of this connector for carrying frequency performance requirements for shielded and unshielded versions but also high-frequency performance requirements for shielded and unshielded versions of this connector for carrying frequencies up to 100, 250 and 600 MHz. Pinout T568A wiring, defined in TIA-568 T568B wiring, defined wiring, defined wiring, defined wiring, defined wiring, de 8P8C connectors are frequently terminated using the T568A or T568B assignments that are defined in ANSI/TIA-568. The drawings to the right show that the only difference is that the only difference i pairs reversed) is an Ethernet crossover cable. Before the widespread acceptance of auto MDI-X capabilities, a crossover cables are sometimes still used to connect two computers together without a switch or hub, however most network interface cards (NIC) in use today implement auto MDI-X to automatically configure themselves based on the type of cable plugged into them. A cable wired the same at both ends is called a patch or straight-through cable, because no pin/pair assignments are swapped. If a patch or straight cable is used to connect two computers with auto MDI-X capable NICs, one NIC will configure itself to swap the functions of its Tx and Rx wire pairs. Pin T568A color T568B pair T568B color 10BASE-T/100BASE-TX signal[20] 1000BASE-TX signa orange solid TD – DA – ring 3 2 white/blue stripe 8 4 brown solid 8 green solid 8 brown solid 8 green solid 8 gree 8P8C plugs and crimping tools for installing the plug onto a cable are commonly available: Western Electric/Stewart Stamping (WE/SS) and Tyco/AMP. While the two types are similar, the tooling and plug types cannot be interchanged.[b] exclusively by Tyco Electronics.[citation needed] Both types of modular plugs are more expensive and require shielded cable, but have a lower attenuation, and may reduce electromagnetic interference. Although a narrower 4-pin and 6-pin plug fits into the wider 8-pin jack and makes a connector may stress the remaining contacts, [c] the smaller connector may stress the remaining contacts on the plug, because the body of the smaller connector may stress the remaining contacts are commonly used in computer networking applications, where interconnecting cables are terminated at each end with an 8P8C modular plugs. The connector is also used in other telecommunications are carried over Category 5 e or connections, including ISDN and T1. Where building network and telephone wiring is pre-installed, the center (blue) pair is often used to carry telephony signals. While this allows an RJ11 plug to connect, it may damage the modular jack; an approved converter prevents damage. In landline telephony, an 8P8C jack is used at the point a line enters the building to allow the line to be broken to insert automatic dialing equipment, including intrusion alarm panels. The EIA/TIA-561 standard describes the use of 8P8C connectors for RS-232 serial interfaces. [23] This application is common as a console interface for network equipment, such as switches, routers, and headless computers. 8P8C modular connectors are also used as a microphone connector for PMR, LMR, and amateur radio transceivers. Frequently the pinout is different, usually mirrored (i.e. what would be pins 8 to 1 in the radio and its manual). In analog mobile telephony, the 8P8C connector was used to connect an AMPS cellular handset to its base unit; this usage is now obsolete. The physical connector is standardized as the IEC 60603-7 8P8C modular connector with different categories of performance. The physical dimensions of the male and female connector securic in the ANSI/TIA-568 standard to be compatible with both telephone and Ethernet. A similar standard jack once used for modem and data connections, the RJ45S, used a keyed variety of the 8P8C body with an extra tab that prevents it mating with other connectors; the visual difference compared to the more common 8P8C is subtle, but it is a different connector. The original R]45S[18][24] keyed 8P2C modular connector, obsolete today, had pins 5 and 4 wired for tip and ring of a single telephone line and pins 7 and 8 shorting a programming resistor. Electronics catalogs commonly advertise 8P8C modular connectors as R]45. An installer can wire the jack to any pin-out or use it as part of a generic structured cabling system such as ISO/IEC 15018 or ISO/IEC 11801 using 8P8C patch panels for both phone and data. Crossover cables A router to router crossover cable uses two 8-position connectors at each end. 10P10C blug The 10P10C connector is eferred to as an RJ50 connector, although this was never a standard registered jack. The 10P10C has 10 contact positions and 10 contacts. The most common uses of the 10P10C connector are in proprietary data transfer systems, [25] such as the Digiboard [26] and Equinox Super-Serial multi-port TIA-232 adapters. [26] 10P10C connectors are also used to implement RS-485 interfaces, and for data link connections in uninterruptible power supplies. This connector is also used by some vendors, for example, Cyclades (later absorbed by Equinox) used pin 1 as an RI (ring indicator) signal, which is seldom used, allowing an 8P8C plug to be inserted to their 10P10C socket for most applications. The Cisco Systems STS-10X terminal server features this connector. FordNet, a five-pair communications networking medium, also used the 10P10C between terminals. Motorola uses the 10-pin connector in several of their mobile radio product lines. [citation needed] Polycom utilizes this connector in several of their mobile radio product their mobile radio product lines. [citation needed] Polycom utilizes this connector in several of their mobile radio product lines. [citation needed] Polycom utilizes this connector in several of their mobile radio product lines. [citation needed] Polycom utilizes this connector in several of their mobile radio product lines. [citation needed] Polycom utilizes this connector in several of their mobile radio product lines. [citation needed] Polycom utilizes this connector in several of their mobile radio product lines. [citation needed] Polycom utilizes the several of their mobile radio product lines. [citation needed] Polycom utilizes the several of their mobile radio product lines. [citation needed] Polycom utilizes the several of their mobile radio product lines. [citation needed] Polycom utilizes the several of their mobile radio product lines. [citation needed] Polycom utilizes the several of their mobile radio product lines. [citation needed] Polycom utilizes the several of their mobile radio product lines. [citation needed] Polycom utilizes the several of the several HDX and Group Series codecs and microphones to their SoundStructure audio mixers, although pins 1 and 10 are not used.[citation needed] The 10p10c connector is also using the 10p10c connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their MTS FlexTest Controller Family.[citation needed] Standards ANSI/TIA-968-A: Telephone terminal equipment to the telephone network at the Wayback Machine (archived 2018-09-28) ANSI/TIA-1096-A: Telephone terminal equipment to the telephone terminal equipment to the telephone terminal equipment. connection of terminal equipment to the telephone network IEC 60603-7-1: Connectors for electronic equipment: Part 7-1: Detail specification for 8-way, unshielded,
free and fixed connectors, for data transmissions with frequencies up to 100 MHz IEC 60603-7-4: Connectors for electronic equipment: Part 7-4: Detail specification for 8-way, unshielded, free ectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-7: Connectors for electronic equipment: Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 600 MHz ISO/IEC 8877, EN 28877: Information Technology—Telecommunications and Information Exchange between Systems—Interface Connector and Contact Assignments for ISDN Basic Access Interface Located at Reference Points S and T US government documents define registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connector GG45 TERA Notes ^ The often omitted S suffix indicates this is a wiring configuration supporting a single telephone line. ^ WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacing for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacing for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacing for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacing for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacing for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C plugs have different spacing for the cable strain relief.[21][22] Using a WE/SS and Tyco/AMP 8P8C die set, and vice versa. ^ The body of a 6P6C or 4P4C plug typically projects out by more than one millimeter further than if a full-size connector further than the contacts of the larger connector further than if a full-size connector further than if a full-size connector further than the contacts of the larger connector further than if a full-size connector further than the contacts of the larger conta The Evolution of a Telephone, Bell Laboratories Record 44(1) p.14 (January 1966) ^ Walden S.W., Telephone Sets Go Mod (Modular, That Is), Bell Laboratories Record, Vol. 52(8) p. 238 (Sept. 1974) ^ AT&T, Registration Interface—Selection and General Information, Bell System Practices, Section 463-400-100 Issue 1, May 1976 ^ FCC 47 CFR Part 68 Connection of Terminal Equipment to the Telephone Network, Section 68.502 superseded by T1.TR5-1999 ^ "Six Conductor/Six Position Line Cord Module" (PDF). 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Retrieved 3 August 2021. ^ 7, 2002). "Background Information". Telecommunications Cabling Installation (2nd ed.). McGraw-Hill Professional. p. 88. ISBN 0-07-140979-3. 4-position and 4-contact connectors are used primarily for telephone handset cords. ^ "Apple Macintosh Plus", My Old Computers, archived from the original on 2009-02-27, retrieved 2010-10-16. ^ "Mac Plus Keyboard Cable", Syrinx, UK: Megadon, ... the cable is the same as the telephone cable that connects handsets to the phone, unfortunately [...] is wired wrong for the Mac Plus. Under no circumstances should you use this cable as you will damage your keyboard and/or your Mac! ^ "Direc TV Channel Control" (wiki). GB-PVR. Archived from the original on 2008-10-19. Each end of a handset cord is wired opposite the other... ^ Trulove 2005, pp. 23, 132: 'Designing LAN Wiring Systems: The 8-pin modular jack is sometimes referred to as an "RJ-45", because the connector/jack components are the same. However, RJ-45 actually applies to a special purpose jack configuration that is not used in LAN or standard telephone wiring. [...] Work Area Outlets: Modular jacks are often referred to as "RJ-45" jacks. This is not really the correct moniker, although it is in very common use.' ^ Oliviero, Andrew; Woodward, Bill (July 20, 2009). "Connectors". Cabling: The Complete Guide to Copper and Fiber-Optic Networking (4th ed.). Sybex. p. 294. ISBN 978-0-470-47707-6. The RJ (registered jack) prefix is one of the most widely (and incorrectly) used prefixes in the computer industry; nearly everyone, including people working for cabling companies, is guilty of referring to an eight-position modular jack (sometimes called an 8P8C) as an RJ-45. Semenov, Andrey B. Strizhakov, Stanislav K.; Suncheley, Igor R. (October 3, 2002). "Electrical Cable Connectors". Structured cable systems. Springer. p. 129. ISBN 3-540-43000-8. The traditional 8-contact connector, which is called Western Plug, 8PMJ (8-position modular jack), 8P8C (8 position 8 conductor), or somewhat incorrectly RJ-45, is used widely in SCS practice. ^ Trulove 2005, p. 219: 'User Cords and Connectors: This 8-pin modular plug is probably the most subject to name abuse, because it resembles the specialized RJ-45 connector. However, the RJ-45 wiring pattern (which includes an interface programming resistor) is so radically different from that of T568A and B that it really should not be called by that name at all.' ^ a b Modular jack wiring, Ontario, California: HVS, archived from the original on 2010-02-08 ^ Modular wiring reference, Siemon ^ IEEE 802.3 14.5.1 MDI connectors ^ "Stewart Connectors 2006-02-01. Archived from the original (PDF) on 2018-04-18. Retrieved 2018-04-18. ^ "Tyco/AMP 5-554739-2 - Modular plug assembly, 8 position, flat oval cable" (PDF). Harrisburg, Pennsylvania: Tyco Electronics. 2008-03-31. 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a b Digi PortServer TS 10P10C (RJ50) Modular RS-232 pinout, Pinouts guide, archived from the original on 2013-05-18, retrieved 2010-10-17 ^ a b Digi PortServer TS 10P10C (RJ50) Modular RS-232 pinout, Pinouts guide, archived from the original on 2013-05-18, retrieved 2010-10-17 ^ a b Digi PortServer TS 10P10C (RJ50) Modular RS-232 pinout, Pinouts guide, archived from the original on 2013-05-18, retrieved 2010-10-17 ^ a b Digi PortServer TS 10P10C (RJ50) Modular RS-232 pinout, Pinouts guide, archived from the original on 2013-05-18, retrieved 2010-10-17 ^ a Digi PortSe McGraw-Hill Professional, ISBN 0-07-145975-8. External links Wikimedia Commons has media related to Modular connectors. How to Make a Network Cable, a how-to article from wikiHow John R. Carlsen: On wiring modular telephone connectors. How to Make a Network Cable, a how-to article from wikiHow John R. Carlsen: On wiring modular telephone connectors. RJ45 8-position keyed connector, 6P6C, and 6-position modified offset tab Common outlet configurations[permanent dead link] graphical representation of twisted pair pinouts Premium Modular Plugs at the Wayback Machine (archived 2013-02-15) Catalog page showing the difference between solid and stranded contacts 8 pin RJ45 (8P8C) male connector diagram and applications pinouts at the Wayback Machine (archived 2013-06-01) Retrieved from " 7Electrical connectors: 8P8C plug, 6P6C plug, 6P4C plug, 6P6C plug crimped onto a cable (with molded sleeve). A modular connector is a type of electrical connector for cords and cables of electronic devices and appliances, such as in computer networking, telecommunication equipment, and audio headsets. Modular connectors were originally developed for use on specific Bell System telephone sets in the 1960s, and similar types found use for simple interconnection of customer-provided telephone subscriber premises equipment to the telephone network. The Federal Communications Commission (FCC) mandated in 1976 an interface registration system, in which they became known as registered jacks. The convenience of prior existence for designers and ease of use led to a system. proliferation of modular connectors for many other applications. Many applications that originally used bulkier, more expensive connectors are for telephone and Ethernet. Accordingly, various electronic interface specifications exist for applications using modular connectors, which prescribe physical characteristics and assign electrical signals to their contacts. Nomenclature Modular connectors are often referred to as modular phone jack and plug, RJ connector, and Western jack and plug. Western Electric Company in the 1960s.[1] This includes the 6P2C used for telephone line connections and 4P4C used for handset connectors. Registered jack number to refer to the physical connector itself; for instance, the 8P8C modular connectors. Similarly, various six-position modular connectors may be called RJ11. Likewise, the 4P4C connector is sometimes called RJ9 or RJ22 though no such official designations exist.[citation needed] History The first types of small modular telephone connectors were created by AT&T in the mid-1960s for the plug-in handset and line cords, the Bell System introduced customer-connectable part kits and telephone. sold through PhoneCenter stores in the early 1970s. [2] For this purpose, Illinois Bell started installing modular telephone sets on a limited scale in June 1972. The patents by Edwin C. Hardesty and coworkers, US 3699498 (1972) and US 3860316 (1975), followed by other improvements, were the basis for the modular molded-plastic connectors that became commonplace for telephone cords by the 1980s. In 1976, these connectors were standardized nationally in the United States by the Registration Interface program of the Federal Communications for interconnections for interconnection of customer-premises equipment to the public switched telephone network (PSTN).[3][4] Gender Modular connectors have gender: plugs are considered to be male, while jacks or sockets are considered to be female. Plugs are used for fixed locations on surfaces of walls, panels, and equipment. Other than telephone extension cables, cables with a modular plug on one end and a jack on the other are rare. Instead, cables are usually connected using a female-to-female coupler, having two jacks wired back-to-back. Latching tab and orientation Most modular connectors are designed with a latching tab and orientation Most modular connectors are designed with a latching two jacks wired back-to-back. Latching tab and orientation Most modular connectors are designed with a latching tab and orientation Most modular connectors are designed with a latching tab and orientation Most modular connectors are designed with a latching tab and orientation Most modular connected using a female-to-female coupler, having two jacks wired back-to-back. in the socket so that the plug cannot be removed without disengaging the tab by pressing it against the plug body. The standard orientation for installed with a boot, a plastic covering over the tab down. The modular plug is often installed with may cause excessive bending or breaking of the tab. Such snagless cords, are usually constructed by installing the protective boot before the modular plug is crimped. Size and contacts 8P8C modular plug is crimped. Size and contacts 8P8C modular plug is crimped. contacts, with each number followed by P and C, respectively. For example, 6P2C is a connector having six positions and two installed contacts. Alternate designations omit the letters while separating the positions and two installed contacts. Alternate designations omit the letters while separating the positions and two installed contacts. that the number of contacts is almost always even. The connector body positions with omitted or unconnected contacts are numbered for the electrical connectors with six positions and four contacts, to which are attached just two wires. The contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom, jacks will have contact position. For example, on a six-position, two-contact plug, where the outermost four positions do not have contacts, the innermost two contacts are numbered 3 and 4. Modular connectors are manufactured in four sizes, with 4-, 6-, 8-, and 10-positions. The insulating plastic bodies of 4P and 6P connectors share an even larger body width. Insulation displacement contact types 8P8C plug with contacts for solid wire (left) and stranded wire (right) Contacts for solid wire (top left) and stranded wire (bottom right) Internally, the conductor, a mechanism known as insulation displacement. Ethernet cables, in particular, may have solid or stranded (tinsel wire) conductors and the sharp prongs that, when crimped, pierce the wire insulation displacement. are different in the 8P8C connectors made for each type of wire. A modular plugs for stranded have prongs that are designed to connect to multiple wire strands. Connector plugs are designed for either solid or stranded wire and a mismatch between plug and wire type may result in an unreliable connection. Interchangeability Some modular connectors are indexed, meaning their dimensions are indexed, meaning their dimensions or shapes, retention mechanism dimensions or configuration. For example, a Modified Modular Jack using an offset latching tab was developed by Digital Equipment Corporation to prevent accidental interchange of data and telephone cables. Modular Jack using an offset latching tab was developed by Digital Equipment Corporation to prevent accidental interchange of data and telephone cables. 8P8C[6] 22.48 11.68 8.00 The dimensions of modular connectors are such that a narrower plug can be inserted into a wider jack that has more positions than the plug's insertion area is 0.260 inches (1.02 mm) apart (contact pitch), so the width is dependent on the number of pin positions.[7][8] However, not all plugs from all manufacturers have this capability, and some jack soluts to accommodate the jack's contacts at the outermost extremes, it may permanently deform those outermost contacts of an incompatible jack. Excessive resistance may be encountered when inserting an incompatible plug, as the outermost contacts in the jack are forcibly deformed. Special modular plugs have been manufactured (for example, the Siemon UP-2468[9]) which have extra slots beyond their standard contacts, to accommodate the wider jack's outermost contacts without damage. These special plugs connectors can be visually identified by carefully looking for the extra slots molded into the plug. The molded plastic bodies of the special plugs may also be colored with a light blueish tinge, to aid in quick recognition. The special plugs are preferred for test equipment and adapters, which may be rapidly connected to a large number of corresponding connectors in quick succession for testing purposes. The use of the special plugs avoids inadvertent damage to the equipment under test, even when a narrower plug is inserted into a nominally incompatible wider jack. cables with modular connectors is similar across the various number of positions and contacts in the plug. The crimping die-set looks similar to an 8P8C jack, except for the eight teeth lining the top portion of the die. When the tool is the die compresses around the 8P8C plug. As the die compresses, these teeth force the plug contacts into the cable being terminated. The crimper may also permanently deform part of the plastic plug body in such a way that it grips the outer sheath of the cable for secure fastening and strain relief. These actions permanently attach the plug to the cable. Pinout The contact assignments (pinout) of modular connectors vary by application. Telephone network connections are standardized by registered jack designations, and Ethernet over twisted pair is specified by the
ANSI/TIA-568 standard. For other applications, standardized by registered jack designations, and Ethernet over twisted pair is specified by the ANSI/TIA-568 standard. the use of 8P8C connectors in RS-232 applications. For this reason, D-sub-to-modular contacts (pins or sockets) terminated but not inserted into the connector body, so that the D-sub contacts (pins or sockets) terminated but not inserted into the connector body. 4P4C connectors for the coiled handset cord. The four-position four-conductor (4P4C) connector is the standard modular connector is not a registered jack, because it was not intended to connect directly to telephone lines. However it is often referred to as RJ9, RJ10, or RJ22. Handset wiring Handsets and often headsets for use with telephones commonly use a 4P4C connector. The two center pins are commonly used for the receiver, and the outer pins connect the transmitter so that a reversal of conductors between the ends of a cord does not affect the signal routing. This may differ for other equipment, including hands-free headsets. Data port The Macintosh 128K, Macintosh 512K and Macintosh Plus from Apple as well as the Amiga 1000 from Commodore used 4P4C connectors to connect the keyboard to the main computer housing. The connector provided power to the keyboard on the outer two contacts and received data signals on the inner pair. The cable between the computer and the keyboard was a coiled cord with an appearance very similar to a telephone handset. The connector wiring on the Apple computers, however, required a polarized straight through pinout. Using a telephone handset cable instead of the supplied cable could short out the +5 volt DC supply and damage the Apple computer or the keyboard.[12] Modular connectors are often used for data links, such as serial line connector with an adapter cord to a computer serial port so that remote control is possible from the computer.[13] 6P6C 6P4C crimp-on style connector. Modular plugs are described by the maximum number of physical contacts installed in these positions. The 6P2C, 6P4C, and 6P6C modular connectors are probably best known for their use as RJ11, RJ14, and RJ25 registered jacks, respectively. These interfaces use the same six-position modular connector body, but have different numbers of pins installed. RJ11 is a physical interface often used for terminating single telephone lines. RJ14 is similar, but for two lines, and RJ25 is for three lines. RJ14 is similar, but for two lines, and RJ25 is for three lines. RJ14 is similar, but for two lines, but uses an 8P8C connector. RJ11 is a physical interface often used for terminating single telephone lines. wiring Cables sold as RJ11 often actually use 6P4C connectors (six positions, four contacts) and RJ14 wiring – four wires running to a central junction box. Two of its six possible contact positions, four contacts) and ring, and the other two contacts positions may be unused or provide low-voltage power for night-light or other features on the telephone set. In some installations an extra contact was also required for the ground connector tab side down with the opening for the cable facing the viewer. Position Pair T/R ± RJ11 RJ14 RJ25 Twisted pair colors 25-pair colors Old colors[A] German colors[B] Australian colors Diagram 1 3 T + T3 white/green white/green white/green white/green white/green white/orange black green red 3 1 R - R1 R1 R1 blue blue/white red white/blue whi R - R3 green green/white blue gray green ^ While the old solid color code was well established for pair 2, there are several conflicting conventions for pair 2. The colors shown above were taken from a vendor of silver satin flat 8-conductor phone cable that claims to be standard. 6-pair solid (old) bellwire cables previously used by the Bell System use white for pair 3 tip but some vendors' cable may substitute orange for white. At least one other vendor of flat 8-conductor cable uses the sequence blue, orange, black, red, green, yellow, brown and white/slate.[citation needed] ^ This color scheme originates in the (withdrawn) national standard DIN 47100. The scheme shown here is the correct color code for interfacing with the RJ connector standards. However, with German domestic telephone equipment, and that in some neighboring countries, 6P4C plugs and sockets are typically only used to connect the telephone equipment, and that in some neighboring countries, 6P4C plugs and sockets are typically only used to connect the telephone equipment. connect to a service provider interface. Older base units may accommodate the additional connectors of TAE (E, W, a2, b2) and may feature non-RJ standard sockets that can be connected directly to TAE plugs. Further, flat DIN 47100 cables typically place the wires in ascending order. When used directly with 6P4C plugs, the color coding may be undetermined Powered version of RJ11 In the powered version of the RJ11 interface, pins 2 and 5 (black and yellow) may carry low voltage AC or DC power. While the telephone terminals, old telephone terminals, old telephone terminals, old telephone terminals with incandescent lights, such as the Western Electric Princess and Trimline telephones, need more power than the phone line can supply. Typically, the power on pins 2 and 5 is supplied by an AC adapter plugged into a nearby power outlet which potentially even supplies power to all of the jacks in the house. Compatibility with structured cabling Structured cabling networks adhering to ANSI/TIA-568, ISO/IEC 11801 (or ISO/IEC 15018 for home networks) are widely used for both computer networking and analog telephony. These standards specify the T568B wiring arrangements compatibility because dy RJ11, RJ14 and RJ25. Only RJ11 and RJ14 have full electrical compatibility because Ethernet-compatible pin-outs split the third pair of RJ25 across two separate cable pairs, rendering that pair unusable by an analog phone. Both the third and fourth pairs of RJ61 are similarly split. The incompatible T568A and T568B layouts were necessary to preserve the electrical properties of the third pair of RJ25 across two separate cable pairs, rendering that pair unusable by an analog phone. Both the third pair of RJ25 across two separate cable pairs, rendering that pair of RJ25 across two separate cable pairs of RJ61 are similarly split. higher frequencies than analog telephony. Because of these incompatibilities, and because RJ25 and RJ61 were never very common, the T568A and T568B conventions have largely displaced RJ25 and RJ61 for telephones with more than two lines. 8P8C Modular plug not yet crimped onto a cable An 8P8C modular plug not yet crimped onto a cable An 8P8C modular plug not yet crimped onto a cable An 8P8C modular plug not yet crimped onto a cable An 8P8C modular plug not yet crimped onto a cable An 8P8C modular plug not yet crimped onto a cable An 8P8C modular plug not yet crimped onto a cable An 8P8C modular plug not yet crimped onto a cable An 8P8C modular plug not yet crimped onto a cable An 8P8C modular plug not yet position 8 contact (8P8C) connector is a modular connector commonly used to terminate twisted pair, registered jacks and other telephone applications, RS-232 serial communication using the ANSI/TIA-568 (formerly TIA/EIA-568) and Yost standards, and other applications involving unshielded twisted pair, shielded twisted pair, and multi-conductor flat cable. An 8P8C modular connection consists of a male plug and a female jack, each with eight equally spaced contacts. On the plug, the contacts are flat metal bars positioned parallel to the connector body. Inside the jack, the contacts are metal spring wires angled away from the insertion interface. When the plug is mated with the jack, the contacts meet and create an electrical connector. Right: RJ45 male connector. Right: RJ45 male connector (with key) Although commonly referred to as RJ45 in the context of Ethernet and category 5 cables, RJ45 originally referred to a specific wiring configuration of an 8P8C connector.[14][15][16] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system-standard RJ45 plug has a key which excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system excludes insertion in an un-keyed 8P8C socket.[17] The original telephone-system excludes insertion in an un-keyed 8P8C socket.[ modular plug,
[18][19] and has pins 4 and 5 (the middle positions) wired for the ring and tip conductors of a single telephone line and pins 7 and 8 shorting a programming resistor. This is a different mechanical interface and wiring scheme than ANSI/TIA-568 T568A and T568B schemes with the 8P8C connector in Ethernet and telephone applications. Generic 8P8C modular connectors are similar to those used for the RJ45S modem jacks or RJ61X telephone installers who wired RJ45S modem jack ubiquitous for computer networking and informally inherited the name RJ45. Standardization The shape and dimensions of an 8P8C modular connector are specified for US telephone applications by the Administrative Council for Terminal Attachment (ACTA) in national standard ANSI/TIA-1096-A and international standard ISO-8877. This standard does not use the short term 8P8C and covers more than just 8P8C modular connector type is the eight contacts installed. For data communication applications (LAN, structured cabling), International Standard IEC 60603 specifies in parts 7-1, 7-2, 7-4, 7-5, and 7-7 not only the same physical dimensions but also high-frequency performance requirements for shielded and unshielded versions of this connector for carrying frequencies up to 100, 250 and 600 MHz. Pinout T568A wiring, defined in TIA-568 T568B wiring, ANSI/TIA-568. The drawings to the right show that the copper connections and pairing are the same, the only difference is that the orange and green pairs (colors) are swapped. A cable wired as T568B at the other end (Tx and Rx pairs reversed) is an Ethernet crossover cable. Before the widespread acceptance of auto MDI-X capabilities, a crossover cable was needed to interconnect similar network equipment (such as Ethernet hubs). Crossover cables are sometimes still used to connect two computers together without a switch or hub, however most network interface cards (NIC) in use today implement auto MDI-X to automatically configure themselves based on the type of cable plugged into them. A cable wired the same at both ends is called a patch or straight-through cable, because no pin/pair assignments are swapped. If a patch or straight cable is used to connect two computers with auto MDI-X capable NICs, one NIC will configure itself to swap the functions of its Tx and Rx wire pairs. Pin T568A pair T568A color T568B pair T568B color 10BASE-T/100BASE-T 1 blue solid NC DC+ ring 5 1 white/blue stripe NC DD- tip 6 2 orange solid 3 green solid RD- DB- ring 7 4 white/brown stripe 8 4 brown solid RD- DB- ring 7 4 white/brown stripe 8 4 brown solid 8 preven Electric/Stewart Stamping (WE/SS) and Tyco/AMP. While the two types are similar, the tooling and plug types cannot be interchanged.[b] WE/SS compatible plugs are produced exclusively by Tyco Electronics.[citation needed] Both types of modular plugs can be mated with a standard 8P8C modular jack. Both types of 8P8C plugs are available in shielded and unshielded varieties for different attenuation, and may reduce electromagnetic interference. Although a narrower 4-pin and 6-pin plug fits into the wider 8-pin jack and makes a connection with the available contacts on the plug, because the body of the smaller connector may stress the remaining contacts, [c] the smaller connector s are commonly used in computer networking applications, where interconnecting cables are terminated at each end with an 8P8C modular plug wired according to TIA/EIA standards. Most wired Ethernet communications are carried over Category 5e or Category 5e (blue) pair is often used to carry telephony signals. While this allows an RJ11 plug to connect, it may damage the modular jack; an approved converter prevents damage. In landline telephony, an 8P8C jack is used at the point a line enters the building to allow the line to be broken to insert automatic dialing equipment, including intrusion alarm panels. The EIA/TIA-561 standard describes the use of 8P8C connectors for RS-232 serial interfaces. [23] This application is common as a console interface for network equipment, such as switches, routers. 8P8C modular connectors are also commonly used as a microphone connector for PMR, LMR, and amateur radio transceivers. Frequently the pinout is different, usually mirrored (i.e. what would be pins 1 to 8 in the ANSI/TIA-568 standard might be pins 8 to 1 in the radio and its manual). In analog mobile telephony, the 8P8C connector was used to connect an AMPS cellular handset to its (separate) base unit; this usage is now obsolete. The physical connector is standardized as the IEC 60603-7 8P8C modular connector with different categories of performance. The physical dimensions of the male and female connectors are specified in ANSI/TIA-568 standard to be compatible with both telephone and Ethernet. A similar standard jack once used for modem and data connections, the RJ45S, used a keyed variety of the 8P8C body with an extra tab that prevents it mating with other connectors; the visual difference compared to the more common 8P8C is subtle, but it is a difference compared to the more common 8P8C is subtle, but it is a different connectors; the visual difference compared to the more common 8P8C is subtle, but it is a different connector. The original RJ45S[18][24] keyed 8P2C modular connector, obsolete today, had pins 5 and 4 wired for tip and ring of a single telephone line and pins 7 and 8 shorting a programming resistor. Electronics catalogs commonly advertise 8P8C modular connectors as RJ45. An installer can wire the jack to any pin-out or use it as part of a generic structured cabling system such as ISO/IEC 15018 or ISO/IEC 11801 using 8P8C patch panels for both phone and data. Crossover cables A router to router crossover cable uses two 8-position connectors and a unshielded twisted pair (UTP) cable with differently wired connector is commonly referred to as an RJ50 connector, although this was never a standard registered jack. The 10P10C has 10 contact positions and 10 contacts. The most common uses of the 10P10C connector are in proprietary data transfer systems, [25] such as the Digiboard [26] and Equinox Super-Serial multi-port TIA-232 adapters. [26] 10P10C connector is uninterruptible power supplies. also used by some vendors, for example, Cyclades (later absorbed by Equinox) used pin 1 as
an RI (ring indicator) signal, which is seldom used, allowing an 8P8C plug to be inserted to their 10P10C socket for most applications. The Cisco Systems STS-10X terminal server features this connector. FordNet, a five-pair communications networking medium, also used the 10P10C between terminals. Motorola uses the 10-pin connector as a microphone connector in several of their mobile radio product lines.[citation needed] Polycom utilizes this connector on their Conference Link bus to connect their HDX and Group Series codecs and microphones to their SoundStructure audio mixers, although pins 1 and 10 are not used. [citation needed] The 10-pin connector is also used by Demag Cranes AG in some pendant connector for their NI 9237.[27] MTS Systems Corporation is using the 10p10c connector for their MTS FlexTest Controller Family.[citation needed] Standards ANSI/TIA-968-A: Telephone terminal equipment: Technical requirements for connection of terminal equipment to the telephone network at the Wayback Machine (archived 2018-09-28) ANSI/TIA-1096-A: Telecommunications telephone network IEC 60603-7-1: Connectors for electronic equipment: Part 7-1: Detail specification for 8-way, shielded free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment: Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors for electronic equipment for 8-way, unshielded, free and fixed connectors for electronic equipment for 8-way, unshielded, free and fixed connectors for 8-way, unshielded, free and fixed connectors for 8-way, unshielded, free and fixed connectors for 8-way, unshielded, free and fixed connec Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz IEC 60603-7-5: Connectors for electronic equipment: Part 7-5: Detail specification for 8-way, shielded, free and fixed connectors for electronic equipment equipment. Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 600 MHz ISO/IEC 8877, EN 28877: Information Exchange between Systems—Interface Connector and Contact Assignments for ISDN Basic Access Interface Located at Reference Points S and T US government documents define registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 EtherCON – ruggedized 8P8C Ethernet connectors for telecommunications.[d] See Registered jack § History and authority See also BS 6312 – British equivalent to RJ25 – B single telephone line. ^ WE/SS and Tyco/AMP 8P8C plugs have different spacings for the cable strain relief.[21][22] Using a WE/SS 8P8C crimp die set, and vice versa. ^ The body of a 6P6C or 4P4C plug typically projects out by more than one millimeter further than the contacts and presses the outermost contacts of the larger connector further than if a full-size connector were inserted. ^ 4P4C and 10P10C connectors are not defined in these standards. 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pp. 23, 132: 'Designing LAN Wiring Systems: The 8-pin modular jack is sometimes referred to as an "R]-45", because the connector/jack components are the same. However, R]-45 actually applies to a special purpose jack configuration that is not used in LAN or standard telephone wiring. [...] Work Area Outlets: Modular jacks are often referred to as "RJ-45" jacks. This is not really the correct moniker, although it is in very common use.' ^ Oliviero, Andrew; Woodward, Bill (July 20, 2009). "Connectors". Cabling: The Complete Guide to Copper and Fiber-Optic Networking (4th ed.). Sybex. p. 294. ISBN 978-0-4707-6. The RJ (registered jack) prefix is one of the most widely (and incorrectly) used prefixes in the computer industry; nearly everyone, including people working for cabling companies, is quilty of referring to an eight-position modular jack (sometimes called an 8P8C) as an RJ-45. ^ Semenov, Andrey B.; Strizhakov, Stanislav K.; Suncheley, Igor R. (October 3, 2002). "Electrical Cable Connectors". Structured cable systems. Springer. p. 129. ISBN 3-540-43000-8. The traditional 8-contact connector, which is called Western Plug, 8PMJ (8-position modular jack), 8P8C (8 position 8 conductor), or somewhat incorrectly RJ-45, is used widely in SCS practice. ^ Trulove 2005, p. 219: 'User Cords and Connectors: This 8-pin modular plug is probably the most subject to name abuse, because it resembles the specialized RJ-45 connector. However, the RJ-45 wiring pattern (which includes an interface programming resistor) is so radically different from that of T568A and B that it really should not be called by that name at all.' ^ a b Modular jack wiring, Ontario, California: HVS, archived from the original on 2010-02-08 ^ Modular wiring reference, Siemon ^ IEEE 802.3 14.5.1 MDI connectors ^ "Stewart Connector 937-SP-3088 - Eight conductor/eight position line cord module" (PDF). Glen Rock, Pennsylvania: Bel Stewart Connector. 2006-02-01. Archived from the original (PDF). Harrisburg, Pennsylvania: Tyco Electronics. 2008-03-31. Archived from the original (PDF) on 2011-07-24. Retrieved 2009-09-10. ^ "RJ45", Layer 1, Zytrax. ^ "Modular Wiring Reference". Siemon. Retrieved 2010-10-14. ^ 10 pin RJ50 (10P10C) male (connector diagram and applications), Pinouts guide, archived from the original on 2013-05-18, retrieved 2010-10-17. ^ a b Digi PortServer TS 10P10C (RJ50) Modular RS-232 pinout, Pinouts guide. ^ NI 9237 4-Channel, ±25 mV/V, 24-Bit Simultaneous Bridge Module specifications. Bibliography Trulove, James (December 19, 2005), LAN wiring (3rd ed.), McGraw-Hill Professional, ISBN 0-07-145975-8. External links Wikimedia Commons has media related to Modular connectors. How to Make a Network Cable, a how-to article from wikiHow John R. Carlsen: On wiring modular telephone connectors[permanent dead link] graphical representation of twisted pair pinouts Premium Modular Plugs at the Wayback Machine (archived 2013-02-15) Catalog page showing the difference between solid and stranded contacts 8 pin RJ45 (8P8C) male connector #4P4C From a merge: This is a redirect from a page that was merged into another page. This redirect was kept in order to preserve this page's edit history after its content. Please do not remove the tag that generates this text (unless the need to recreate content on this page has been demonstrated) or delete this page. For redirects with substantive page histories that did not result from page merges use {{R with history}} instead. Retrieved from "9 Display title4P4C Redirects toModular connector (info) Default sort key4P4C Page length (in bytes)53 Page ID5464447 Page content languageen - English Page content l 30 watchers Number of redirects to this page0 Wikidata item IDNone Page views in the past 30 days162 EditAllow all users (no expiry set) NoveAllow all users (no expiry set) NoveAllow all users (no expiry set) View the protection log for this page. Page creatorNtoxtiger (talk | contribs) Date of latest edit12:11, 16 October 2010 Total number of edits55 Recent number of edits55 Recent number of distinct authors0 Hidden category (1)This page is a member of 1 hidden category (1)This page is a member of 1 hidden category (1)This page is a member of 1 hidden category (1)This page is a member of edits55 Recent number of distinct authors0 Hidden category (1)This page is a member of 1 hidden category (1)Thi editor protected)Template:Redirect template (view source) (protected)Module:No globals (view source) (protected)Module:Yesno (view source) (protected)Module:No globals (view source) (protected)Module:Yesno (view source) (protected)Module:No globals (view source) (protected)Module:No globals (view source) (protected)Module:Yesno (view source) (protected)Module:No globals (view source) (protected)Module:Yesno (view source) (protected)Module (protected) Revision history search Revision history statistics Edits by user Page view statistics WikiChecker Lint errors on page Retrieved from

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