I'm not a bot

Fibre Channel is a high-speed network technology used to connect server to data storage area network. It handles high performance of disk storage for applications on many corporate networks. It supports data backup and replication. Fibre Channel is needed, as it is very flexible and enables the transfer of data at a faster speed. The topologies, that bring about the flexibility in the fibre channel are - Point to point topology. Fibre channel arbitrated loop. Switched fabric topology. NOTE - Topology refers to the physical/logical arrangement of nodes or other devices in a network. Basic port details, to know to understand the mentioned topologies - PortTypeAssociated TopologyN_portNodePoint to point or Fabric.NL_portNodeNode connected to an arbitrated loop.F_portFabricFabric port.FL_portFabricFabric connected to an arbitrated loop.L_portLoopHub port on an arbitrated loop.L_C_FLoop Link Control Facility [L_C_F] is a hardware facility that binds to each end of the link and governs transmission and reception of information.E_portNode This inter-switch expansion port is used to connect to an E_port of another switch to build a larger fabric. FC_switchSwitchA network switch that interconnects servers and storage ports. Point to point topology : A single link connects two ports in this topology. This topology is inexpensive but it doesn't require a hub. To create point to point configuration, you can provide multiple 'N' ports on each node. Each point to point connection provides the full bandwidth supported by 'N' ports. Depending on the type of the link (multi-mode or single-mode fiber), the two nodes can be separated by up to 500m (multi-mode fiber) or 10km (single-mode fiber). Fibre channel arbitrated loop topology [FC-AL] : It is a high-speed fibre channel [FC] topology in which fibre channel ports/hubs use arbitration to establish a point-to-point circuit and prevent multiple ports/hubs from sending frames at the same time. Here devices are connected in a one-way ring. So, when ports/hubs in a loop topology have information to transmit, they must send out an arbitration signal to decide, which port/hub can use the channel. The port in control of the channel then sends an 'open' arbitrated signal to the destination port and transmits its information. Since all the ports in the loop are connected, every port will see and pass along the data, but ignore the data unless it is addressed to that particular port. FC-AL can join up to 126 ports on one controller. It is still used internally in many fibre channel switches but rarely to connect hosts to storage these days. FC- hubs provide bypass circuits that prevent the loop from breaking if one device fails or is removed. NOTE - A bypass circuit bypasses high-frequency components of power supply. Switched Fabric Topology : This is the topology, that is very much in use nowadays. The network of switches in a fibre channel habitat is referred to as a fabric. Ports on one node can communicate with ports on other nodes attached to the same fabric. With the fabric topology, many connections can be alert at a time. The any-to-any connection service and peer-peer communication service provided by a fabric is fundamental to fibre channel architecture. Fibre channel can hold-up both channel and network protocol simultaneously. Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Skip to main content In the world of data storage, there are many options available for organizations to choose from. One of the most popular options is Fibre Channel Storage, also known as FC storage. FC storage is a high-speed data transfer technology that has been used for decades to connect servers and storage devices. Fibre Channel (FC) storage has been widely used in enterprise-level storage systems. It offers high reliability, scalability, and performance, making it a popular choice for mission-critical storage applications. Fibre Channel Storage is a storage area network (SAN) technology that connects servers to storage devices, allowing for high-speed data transfer between them. It uses fiber-optic cables or copper wires to transfer data between devices at high speeds and can support distances of up to several kilometers. FC storage supports both block and file-level access to data, making it suitable for a wide range of applications, including databases, virtualization, and large-scale file systems. Fibre Channel Storage was developed in the early 1990s as a replacement for SCSI (Small Computer System Interface) technology. At the time, SCSI was the most popular technology for connecting servers and storage devices. However, SCSI had limitations in terms of distance, scalability, and performance. Fibre Channel Storage was developed to address these limitations and provide a more robust and scalable storage solution. Fibre Channel Storage works by using Fibre Channel (FC) protocol to transmit data between devices. Fibre Channel is a high-speed serial data transfer technology that can transmit data at speeds of up to 128 Gbps. Fibre Channel Storage can be used to connect servers and storage devices over long distances, up to several kilometers, using fiber-optic cables. Fibre Channel Storage uses a topology called Fibre Channel Arbitrated Loop (FC-AL). In FC-AL, devices are connected in a loop, with each device connected to the next. The loop is controlled by an Arbitrated Loop Controller (ALC), which controls access to the loop. Devices communicate with each other by sending data packets around the loop. When a device wants to transmit data, it sends a request to the ALC. The ALC grants access to the loop and the device can transmit data. Fibre Channel Storage can also be used in a point-to-point topology, where two devices are connected directly using a fiber-optic cable. Point-to-point connections are used for high-performance applications, where low latency is critical. FC storage provides high-speed data transfer rates of up to 32 Gbps, making it ideal for high-performance applications that require low latency and high throughput. This high performance also makes it suitable for handling large data transfers and backups. FC storage is known for its high reliability, which makes it ideal for mission-critical applications. It uses error detection and correction mechanisms to ensure that data is transmitted accurately and without loss. FC storage also provides redundancy options that increase the overall resilience of the storage system. FC storage is highly scalable, and it can support large storage networks with thousands of devices. It is also easy to add new devices to the network without disrupting existing operations. This scalability makes FC storage ideal for organizations that need to expand their storage infrastructure over time. FC storage offers a high level of security, which makes it suitable for applications that require secure data transfer. It uses built-in security features such as zoning, which restricts access to specific devices and prevents unauthorized access to data. FC storage is compatible with a wide range of storage systems, including block and file-level access. This compatibility makes it easier for organizations to integrate FC storage into their existing storage infrastructure without requiring significant changes or modifications. FC storage supports both block and file-level access to data, making it an ideal choice for a wide range of applications. It can be used for databases, virtualization, and large-scale file systems, which provides flexibility in how the storage system is utilized. This flexibility makes it an excellent choice for organizations with diverse storage needs. FC storage can be more expensive than other storage technologies, such as iSCSI or NFS. This cost may include hardware, software, and maintenance, which can make it less accessible for small to medium-sized businesses. FC storage can be complex to set up, configure, and maintain. It requires specialized knowledge and expertise, which can increase the overall cost of ownership. As a result, organizations may need to invest in training their staff or hire specialized personnel to manage their FC storage systems. FC storage is not always compatible with other storage technologies. This can make it difficult to integrate FC storage into existing systems, particularly if organizations have already invested in other storage technologies. This incompatibility can also limit the overall flexibility and interoperability of the storage system. FC storage is limited in its distance capabilities. While it can support long distances, it requires expensive and specialized equipment, such as repeaters or optical amplifiers. This limitation can impact the overall scalability of the storage system. FC storage can consume a lot of power, particularly when compared to other storage technologies. This can impact the overall cost of ownership and may require organizations to invest in additional power infrastructure. Fibre Channel storage is a high-performance, reliable, and scalable storage technology that is ideal for enterprise-level storage applications. It offers high-speed data transfer rates, high reliability, and security features that make it ideal for mission-critical applications. However, its complexity, cost, and compatibility challenges can make it less accessible for smaller businesses. Despite these challenges, FC storage remains a popular choice for enterprise-level storage solutions, and it is likely to remain so for the foreseeable future. Subscribe to get the latest posts sent to your email. In the world of data storage, there are many options available for organizations to choose from. One of the most popular options is Fibre Channel Storage, also known as FC storage. FC storage is a high-speed data transfer technology that has been used for decades to connect servers and storage devices. Fibre Channel (FC) storage has been widely used in enterprise-level storage systems. 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Despite these challenges, FC storage remains a popular choice for enterprise-level storage solutions, and it is likely to remain so for the foreseeable future. Subscribe to get the latest posts sent to your email. ,the free encyclopedia that anyone can edit.117,937 active editors 7,001,149 articles in EnglishThe English-language Wikipedia thanks its contributors for creating more than seven million articles! Learn how you can take part in the encyclopedia's continued improvement.GL Mk.II transmitter vanRadar, Gun Laying, MarkI, or GL Mk.I for short, was an early World WarII radar system developed by the British Army to provide information for anti-aircraft artillery. There were two upgrades, GL/EF (elevation finder) and GL Mk.II (pictured), both improving the ability to determine a target's bearing and elevation. GL refers to the radar's ability to direct the guns onto a target, known as gun laying. The first GL sets were developed in 1936 using separate transmitters and receivers mounted on gun carriages. Several were captured in 1940, leading the Germans to believe falsely that British radar was much less advanced than theirs. The GL/EF attachment provided bearing and elevation measurements accurate to about a degree: this caused the number of rounds needed to destroy an aircraft to fall to 4,100, a tenfold improvement over early-war results. The Mk.II, which was able to directly guide the guns, lowered the rounds-per-kill to 2,750. About 410 Mk.Is and 1,679 Mk.IIs were produced. (Fullarticle...)Recently featured: Andrea NavageroNosy KombaMcDonnell Douglas Phantom in UK serviceArchiveBy emailMore featured articlesAboutLieke Klaver ahead in the women's 400 metres final... that a 400-metre race in 2025 (pictured) was won by Lieke Klaver, who pretended that an absent competitor was running in front of her?... that the land snail Drymaeus poecilus is notable for the striking variety of colors and patterns on its shell?... that a forensic investigation of Signalgate has determined how a journalist was included in a group chat about Operation Rough Rider?... that two of the players involved in the 2005 Vietnamese football match-fixing scandal did not accept payment because they felt ashamed?... that a rebellion against a peace treaty with the Yuan dynasty operated out of the Historic Site of Anti-Mongolian Struggle on Jeju Island?... that Nathan Frink fled the United States with enslaved children to settle in Canada, where he was elected as a Member of the Legislative Assembly and caught in a smuggling conspiracy?... that Seattle's women's ice hockey team has an expected rival, despite not even having played their first game?... that Cave Johnson Couts was separately acquitted for shooting his foreman, firing on funeral mourners, and whipping a native laborer to death?... that characters' scars in an episode of The Last of Us were made with a paste-based appliance and a food mixer?ArchiveStart a new articleNominate an articleNgg wa Thiong'oKenyan writer and activist Ngg wa Thiong'o (pictured) dies at the age of 87.In sumo, nosato Daiki is promoted to yokozuna.In association football, Liverpool win the Premier League title.In motor racing, lex Palou wins the Indianapolis 500.Ongoing: Gaza warM23 campaignRussian invasion of UkrainetimelineSudanese civil wartimelineRecent deaths: Phil RobertsonMary K. GaillardPeter DavidAlan YentobGerry ConnollySebastio SalgadoNominate an articleMay 30: Statehood Day in Croatia (1990)Johann Sebastian Bach1431 Hundred Years' War: After being convicted of heresy, Joan of Arc was burned at the stake in Rouen, France.1723 Johann Sebastian Bach (pictured) assumed the office of Thomaskantor in Leipzig, presenting the cantata Die Elenden sollen essen in St.Nicholas Church.1922 The Lincoln Memorial in Washington, D.C., featuring a sculpture of the sixteenth U.S. president Abraham Lincoln by Daniel Chester French, opened.1963 Buddhist crisis: A protest against pro-Catholic discrimination was held outside the National Assembly of South Vietnam in Saigon, the first open demonstration against President Ng nh Dim.2008 The Convention on Cluster Munitions, prohibiting the use, transfer, and stockpiling of cluster bombs, was adopted.Ma Xifan (d.947)Colin Blythe (b.1879)Norris Bradbury (b.1909)Wynonna Judd (b.1964)More anniversaries: May 29May 30May 31ArchiveBy emailList of days of the yearAboutSeventeen performing "Oh My!" in 2018South Korean boy band Seventeen made their debut on May 26, 2015, when they performed a showcase for their debut EP 17 Carat in front of a crowd of 1,000 people. Since then, the group have held 9 concert tours, 13 fan meetings, and have performed at a number of music festivals and awards shows. Their concert tours include the Right Here World Tour, which sold over one million tickets, and the Follow Tour, which was noted by Billboard as being the top grossing K-pop tour of 2023. In 2024, Seventeen made their first appearances at festivals in Europe, when they were the first South Korean act to perform at Glastonbury Festival's Pyramid Stage and as headliners for Lollapalooza Berlin. Seventeen's live performances are well regarded by fans and critics alike, and garnered them the award for Top K-pop Touring Artist at the 2024 Billboard Music Awards. (Fulllist...)Recently featured: Accolades received by Top Gun: MaverickNational preserve76th Primetime Emmy AwardsArchiveMore featured listsIgnace Tonen (1840 or 1841 15 March 1916), also known as Nias or by his Ojibwe name Maiagizis ('right/correct sun'), was a Teme-Augama Anishnabai chief, fur trader, and gold prospector in Upper Canada. He was a prominent employee of the Hudson's Bay Company. Tonen was the elected deputy chief before being the lead chief and later the life chief of his community. In his role as deputy, he negotiated with the Canadian federal government and the Ontario provincial government, advocating for his community to receive annual financial support from both. His attempts to secure land reserves for his community were thwarted by the Ontario premier Oliver Mowat. Tonen's prospecting triggered a 1906 gold rush and the creation of Kerr Addison Mines Ltd., although one of his claims was stolen from him by white Canadian prospectors. This photograph shows Tonen in 1909.Photograph credit: William John Winter; restored by Adam CuerdenRecently featured: Australian white ibisHell Gate BridgeAnemonoides blandaArchiveMore featured picturesCommunity portal The central hub for editors, with resources, links, tasks, and announcements.Village pump Forum for discussions about Wikipedia itself, including policies and technical issues.Site news Sources of news about Wikipedia and the broader Wikimedia movement.Teahouse Ask basic questions about using or editing Wikipedia.Help desk Ask questions about using or editing Wikipedia.Reference desk Ask research questions about encyclopedic topics.Content portals A unique way to navigate the encyclopedia.Wikipedia is written by volunteer editors and hosted by the Wikimedia Foundation, a non-profit organization that also hosts a range of other volunteer projects: CommonsFree media repository MediaWikiWiki software development Meta-WikiWikimedia project coordination WikibooksFree textbooks and manuals WikidataFree knowledge base WikinewsFree-content news WikiquoteCollection of quotations WikisourceFree-content library WikispeciesDirectory of species WikiversityFree learning tools WikivoyageFree travel guide WiktionaryDictionary and thesaurusThis Wikipedia is written in English. Many other Wikipedias are available; some of the largest are listed below. 1,000,000+ articles DeutschEspaolFranaisItalianoNederlandsPolskiPortugusSvenskaTing Vit 250,000+ articles Bahasa IndonesiaBahasa MelayuBn-lm-gCataletinaDanskEestiEsperantoEuskaraMagyarNorsk bokmlRomnSimple EnglishSloveninaSrpskiSrpskohrvatskiSuomiTrkeOzbekcha 50,000+ articles AsturianuAzrbaycancaBosanskiFryskGaeilgeGalegoHrvatskiKurdLatvieuLietuviNorsk nynorskShqipSlovenina Retrieved from " 2EP by Seventeen17 CaratEP by SeventeenReleasedMay29,2015(2015-05-29)GenreK-popdance-pophip hopLength16:48LanguageKoreanLabelPledis EntertainmentLOEN EntertainmentSeventeen chronology17 Carat(2015)Boys Be(2015)Singles from 17 Carat "Adore U"Released: May 29, 201517 Carat is the debut extended play (EP) by South Korean boy group Seventeen. It was released on May 29, 2015, by Pledis Entertainment and distributed by LOEN Entertainment. "Adore U" serves as the lead single for the EP.17 Carat features five tracks written, co-written, and co-produced by Seventeen's group members. "Adore U" was chosen as the lead single for the EP and was performed on multiple music shows by the group. "Shining Diamond" was used as a pre-single on the group's reality debut show. The group stated that the tracklist was chosen to reflect Seventeen's core concept of "boys' passion".[1] The album has two physical versions: one with a "black" themed photo card set, and the other with a "white" themed photo card set. All copies include a CD containing the songs and a fold-up poster/lyric sheet."Adore U" is the lead single of the extended play. It was written by Woozi, S.Coups, and Yeon Dong-geon.[2] The Korea Herald states "'Adore U' is a funky pop song about a teenage boy trying to navigate through puppy love."[3] It marks the beginning of the group's trilogy composed of the singles Adore U, Mansae, and Pretty U about a boy meeting, falling in love and asking out a girl. The track was composed and arranged by Woozi, Bumzu, and Yeon Dong-geon. The music video for the single was released on May 29, 2015, and was directed by Dee Shin. The dance choreography accompaniment to the song was choreographed by Hoshi and focuses on "storytelling, and on highlighting each member's strengths onstage".[4] The single has sold more than 38,000 digital copies and peaked at number 13 on the Billboard US World Chart.The EP has sold over 82,972 copies in South Korea.[5] It peaked at number 4 on the Korean Gaon Album Chart[6] and number 8 on the US World Billboard Chart.[7]Year-end listsCritic/publicationListRankRef.BillboardThe 10 Best K-pop Album of 2015Placed[8]Hoshi participated in the choreography of "Adore U" and "Shining Diamond", Dino choreographed "Jam Jam".[9]Official track list[10]No.TitleLyricsMusicArrangementsLength1."Shining Diamond"WooziVernonS.CoupsKim Min-jeongWooziMasterKeyRishiMasterKeyRishi3:242.""Adore U"" (; Akkinda)WooziVernonS.CoupsBumzuWooziBumzuYeon Dong-geonWooziBumzuYeon Dong-geon3:073."Ah Yeah" (Hip-Hop unit)S. CoupsVernonWonwooMingyuCream DoughnutRishiCream DoughnutRishi3:294."Jam Jam" (Performance unit + Vernon)WooziHoshiDinoVernonWooziCream DoughnutCream Doughnut3:255."20" (Vocal unit)WooziWooziWon Yeong-heonWon Yeong-heonDong Ne-hyeong3:23Weekly chart performance for 17 CaratChart (2015-2023)PeakpositionJapanese Albums (Oricon)[11]46South Korean Albums (Gaon)[12]4US World Albums (Billboard)[13]8Year-end chart performance for 17 CaratChart (2015)PeakpositionSouth Korean Albums (Gaon)[14]47^ "Seventeen hopes to shine like diamonds with '17 Carat'". The Korea Herald. 26 May 2015. Retrieved 30 November 2016.^ "Adore U". Color Coded Lyrics. 29 May 2015. Retrieved 29 November 2016.^ "Seventeen hopes to shine like diamonds with '17 Carat". The Korea Herald. 26 May 2015. Retrieved 30 November 2016.^ "Seventeen hopes to shine like diamonds with '17 Carat'". The Korea Herald. 26 May 2015. Retrieved 30 November 2016.^ Cumulative sales of 17 Carat:"2015 Album Chart"."2016 12 Album Chart"."2017 11 Album Chart".^ "2015 Albums". Gaon Music Chart. Korea Music Content Industry Association. Archived from the original on September 10, 2016. Retrieved November 29, 2016.^ "June 27, 2015". Billboard. Retrieved 29 November 2016.^ Benjamin, Jeff; Oak, Jessica (December 12, 2015). "The 10 Best K-Pop Albums of 2015". Billboard. Archived from the original on September 18, 2021. Retrieved October 31, 2021.^ , (18 June 2015). "[My Name] (3) - , , , | ". (in Korean). The Korea Economic Daily. . Retrieved 18 July 2021.^ "SEVENTEEN 1st Mini Album '17 CARAT'".^ " 20230710" [Weekly album ranking as of July 10, 2023]. Oricon News (in Japanese). Archived from the original on July 5, 2023. Retrieved February 18, 2024.^ "2015 27 Album Chart". Gaon Chart (in Korean). Archived from the original on August 7, 2016. Retrieved February 18, 2024.^ "Seventeen Chart History (World Albums)". Billboard. Retrieved February 17, 2024.^ "2015 Album Chart". Gaon Chart (in Korean). Archived from the original on May 7, 2017. Retrieved February 17, 2024.Retrieved from " 3The following pages link to 17 Carat External tools(link counttransclusion countsorted list) See help page for transcluding these entriesShowing 50 items.View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)Main Page (links | edit)Pledis Entertainment discography (links | edit)List of 2015 albums (links | edit)2015 in South Korean music (links | edit)Seventeen (South Korean band) (links | edit)S.Coups (links | edit)Vernon (rapper) (links | edit)Wonwoo (links | edit)List of awards and nominations received by Seventeen (links | edit)Seventeen discography (links | edit)Love & Letter (links | edit)Joshua (singer) (links | edit)Seventeen TV (links | edit)17 carat (redirect page) (links | edit)Going Seventeen (links | edit)List of Seventeen live performances (links | edit)Teen, Age (links | edit)Al1 (links | edit)Bumzu (links | edit)Boys Be (EP) (links | edit)You Make My Day (links | edit)You Made My Dawn (links | edit)Jun (Chinese entertainer) (links | edit)List of Stray Kids live performances (links | edit)The8 (links | edit)An Ode (links | edit)Seungkwan (links | edit)Fallin' Flower (links | edit)Heng:gar (links | edit)Semicolon (EP) (links | edit)Your Choice (links | edit)Going Seventeen (web series) (links | edit)Not Alone (Seventeen song) (links | edit)Attacca (EP) (links | edit)Rock with You (Seventeen song) (links | edit)Woozi (links | edit)Hoshi (South Korean singer) (links | edit)Don't Wanna Cry (Seventeen song) (links | edit)Darl+ing (links | edit)Face the Sun (links | edit)Left & Right (Seventeen song) (links | edit)24H (EP) (links | edit)We Make You (links | edit)Hot (Seventeen song) (links | edit)Dream (Seventeen EP) (links | edit)BSS (band) (links | edit)FML (EP) (links | edit)Super (Seventeen song) (links | edit)Always Yours (album) (links | edit)Seventeenth Heaven (links | edit)View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)Retrieved from " WhatLinksHere/17_Carat"From VSI OpenVMS WikiFibre Channel is a high-performance ANSI standard network and storage interconnect for PCI-based Alpha systems. It is a full-duplex serial interconnect and can simultaneously transmit and receive over 100 megabytes per second. Fibre Channel supports simultaneous access of SCSI storage by multiple nodes connected to a Fibre Channel switch. A second type of interconnect is needed for node-to-node communications. FeaturesHigh-speed transmission, 2 Gb/s, 4 Gb/s, 8 Gb/s (depending on adapter). It is a full-duplexserial interconnect that can simultaneously transmit and receive over 100 MB/s.Scalable configuration to support department to enterprise configurations.Long-distance interconnects: Fibre Channel supports multi mode fiber at 500 meters per link. Fibre Channel supports longer-distance interswitch links (ISLs) up to 100 kilometers per link, using single-mode fiber and up to 600 kilometers per link with FC/ATM links. In addition, SANworks Data Replication Manager (DRM) configurations provide long distance ISLs through the use of the Open Systems Gateway and Wave Division Multiplexors.High availability: multipath support is available to provide configurations with no single point of failure.Fibre Channel technology supports simultaneous use of these transport protocols: OpenVMS SupportThe following Fibre Channel features are supported by OpenVMS:FeatureOpenVMS SupportHigh-speed transmissionOpenVMS supports 2 Gb/s, full-duplex, serial interconnect (can simultaneously transmit and receive 200 MB of data per second).Choice of mediaOpenVMS supports fiber-optic media.Long interconnect distancesOpenVMS supports multimode fiber-optic media at 500 meters per link and single-mode fiber-optic media (for interswitch links, ISLs) for distances up to 100 kilometers per link.Multiple protocolsOpenVMS supports SCSI3. Possible future support for IP.Numerous topologiesOpenVMS supports switched FC (highly scalable, multiple concurrent communications) and multiple switches (fabric). Support is planned for arbitrated loop on the StorageWorks Modular Storage Array (MSA) 1000 storage system, only.The following Fibre Channel enterprise storage arrays are supported by OpenVMS:HSG60 - Fibre Channel based StorageWorks controller that supports up to two UltraSCSI wide single-ended device ports and two host ports.HSG80 - Fibre Channel based StorageWorks controller that supports up to six UltraSCSI wide single-ended device ports and two host portsThe following Fibre Channel storage systems are supported by OpenVMS: Addresses, WWIDs and Device NamesFibre Channel devices for disk and tape storage come with factory-assigned worldwide IDs (WWIDs). These WWIDs are used by the system for automatic FC address assignment. The FC WWIDs and addresses also provide the means for the system manager to identify and locate devices in the FC configuration. The FC WWIDs and addresses are displayed, for example, by the Alpha console and by the HSG or HSV console. In most situations, Fibre Channel devices are configured to have temporary addresses. The device's address is assigned automatically each time the interconnect initializes. The device may receive a new address each time a Fibre Channel is reconfigured and reinitialized. This is done so that Fibre Channel devices do not require the use of address jumpers. There is one Fibre Channel address per port.In order to provide more permanent identification, each port on each device has a WWID, which is assigned at the factory. Every Fibre Channel WWID is unique. Fibre Channel also has node WWIDs to identify multiported devices. WWIDs are used by the system to detect and recover from automatic address changes. They are useful to system managers for identifying and locating physical devices.OpenVMS names for Fibre Channel devices take the form FGx0, where:FG represents Fibre Channelx represents the unit letter, A to Z0 is a constantExamples of OpenVMS names for Fibre Channel devices include FGA0 and FGB0.Fibre Channel path names are craeted by concatenating the SCSI pseudodevice name, a decimal point (.), and the WWID of the storage subsystem port that is being accessed: for example, PGB0.4000-1FE1-0000-0D04. Refer to Guidelines for OpenVMS Cluster Configurations, chapter 6, for more details on FC path names.See also Computer storage networking technologyThis article has multiple issues. Please help improve it or discuss these issues on the talk page. (Learn how and when to remove these messages) This article may be too technical for most readers to understand. Please help improve it to make it understandable to non-experts, without removing the technical details. (April 2024) (Learn how and when to remove this message)This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources:"Fibre Channel"news newspapers books scholar JSTOR (April 2024) (Learn how and when to remove this message) (Learn how and when to remove this message)Fibre ChannelLayer4.Protocol mappingLUN maskingLayer3.Common servicesLayer2.NetworkFibre Channel fabricFibre Channel zoningRegistered state change notificationLayer1.Data linkFibre Channel 8b/10b encodingLayer0.PhysicalFibre Channel (FC) is a high-speed data transfer protocol providing in-order, lossless[1] delivery of raw block data.[2] Fibre Channel is primarily used to connect computer data storage to servers[3][4] in storage area networks (SAN) in commercial data centers.Fibre Channel networks form a switched fabric because the switches in a network operate in unison as one big switch. Fibre Channel typically runs on optical fiber cables within and between data centers, but can also run on copper cabling.[3][4] Supported data rates include 1, 2, 4, 8, 16, 32, 64, and 128 gigabit per second resulting from improvements in successive technology generations. The industry now notates this as Gigabit Fibre Channel (GFC).There are various upper-level protocols for Fibre Channel, including two for block storage. Fibre Channel Protocol (FCP) is a protocol that transports SCSI commands over Fibre Channel networks.[3][4] FICON is a protocol that transports ESCON commands, used by IBM mainframe computers, over Fibre Channel. Fibre Channel can be used to transport data from storage systems that use solid-state flash memory storage medium by transporting NVMe protocol commands.When the technology was originally devised, it ran over optical fiber cables only and, as such, was called "Fiber Channel". Later, the ability to run over copper cabling was added to the specification. In order to avoid confusion and to create a unique name, the industry decided to change the spelling and use the British English fibre for the name of the standard.[5]Fibre Channel is standardized in the T11 Technical Committee of the International Committee for Information Technology Standards (INCITS), an American National Standards Institute (ANSI)-accredited standards committee. Fibre Channel started in 1988, with ANSI standard approval in 1994, to merge the benefits of multiple physical layer implementations including SCSI, HIPPI and ESCON.Fibre Channel was designed as a serial interface to overcome limitations of the SCSI and HIPPI physical-layer parallel-signal copper wire interfaces. Such interfaces face the challenge of, among other things, maintaining signal timing coherence across all the data-signal wires (8, 16 and finally 32 for SCSI, 50 for HIPPI) so that a receiver can determine when all the electrical signal values are "good" (stable and valid for simultaneous reception sampling). This challenge becomes evermore difficult in a mass-manufactured technology as data signal frequencies increase, with part of the technical compensation being ever reducing the supported connecting copper-parallel cable length. See Parallel SCSI. FC was developed with leading-edge multi-mode optical fiber technologies that overcame the speed limitations of the ESCON protocol. By appealing to the large base of SCSI disk drives and leveraging mainframe technologies, Fibre Channel developed economies of scale for advanced technologies and deployments became economical and widespread.Commercial products were released while the standard was still in draft.[6] By the time the standard was ratified lower speed versions were already growing out of use.[7] Fibre Channel was the first serial storage transport to achieve gigabit speeds[8] where it saw wide adoption, and its success grew with each successive speed. Fibre Channel has doubled in speed every few years since 1996.In addition to a modern physical layer, Fibre Channel also added support for any number of "upper layer" protocols, including ATM, IP (IPFC) and FICON, with SCSI (FCP) being the predominant usage.Fibre Channel has seen active development since its inception, with numerous speed improvements on a variety of underlying transport media. The following tables shows the progression of native Fibre Channel speeds:[9]Fibre Channel variants[10]NameLine-rate (gigabaud)Line codingNominal throughput per direction (MB/s)Market availability133 Mbit/s0.13281258b10b12.51993266 Mbit/s0.2656258b10b251994[6]533 Mbit/s0.531258b10b50?1GFC (Gen 1)1.06258b10b10019972GFC (Gen 2)2.1258b10b20020014GFC (Gen 3)4.258b10b40020048GFC (Gen 4)8.58b10b800200816GFC (Gen 5)14.02564b66b1,600201132GFC (Gen 6)28.05256b257b3,2002016[11]64GFC (Gen 7)28.9256b257b (FC-FS-5)6,4002020128GFC (Gen 8)56.1[12]256b257b12,800Planned 2025FC used throughout all applications for Fibre Channel infrastructure and devices, including edge and ISL interconnects. Each speed maintains backward compatibility at least two previous generations (I.e., 32GFC backward compatible to 16GFC and 8GFC)Inter-Switch Link variants[10]NameLine-rate (gigabaud)Line codingNominal throughput per direction (MB/s)Market availability10GFC10.5187564b66b1,2002009128GFC (Gen 6)28.05 4256b257b12,8002016[11]256GFC (Gen 7)28.9 4256b257b25,6002020Inter-Switch Links, ISLs, are usually multi-lane interconnects used for non-edge, core connections, and other high speed applications demanding maximum bandwidth. ISLs utilize high bit-rates to accommodate the funneling of edge connections. Some ISL solutions are vendor-proprietary.Two major characteristics of Fibre Channel networks are in-order delivery and lossless delivery of raw block data. Lossless delivery of raw data block is achieved based on a credit mechanism.[1]There are three major Fibre Channel topologies, describing how a number of ports are connected together. A port in Fibre Channel terminology is any entity that actively communicates over the network, not necessarily a hardware port. This port is usually implemented in a device such as disk storage, a Host Bus Adapter (HBA) network connection on a server or a Fibre Channel switch.[3]Topology diagram of a Fibre Channel point-to-point connectionPoint-to-point (see FC-FS-3). Two devices are connected directly to each other using N_ports. This is the simplest topology, with limited connectivity.[3] The bandwidth is dedicated.Arbitrated loop (see FC-AL-2). In this design, all devices are in a loop or ring, similar to Token Ring networking. Adding or removing a device from the loop causes all activity on the loop to be interrupted. The failure of one device causes a break in the ring. Fibre Channel hubs exist to connect multiple devices together and may bypass failed ports. A loop may also be made by cabling each port to the next in a ring.A minimal loop containing only two ports, while appearing to be similar to point-to-point, differs considerably in terms of the protocol.Only one pair of ports can communicate concurrently on a loop.Maximum speed of 8GFC.Arbitrated Loop has been rarely used after 2010 and its support is being discontinued for new gen switches.Switched Fabric (see FC-SW-6). In this design, all devices are connected to Fibre Channel switches, similar conceptually to modern Ethernet implementations. Advantages of this topology over point-to-point or Arbitrated Loop include:The Fabric can scale to tens of thousands of ports.The switches manage the state of the Fabric, providing optimized paths via Fabric Shortest Path First (FSPF) data routing protocol.The traffic between two ports flows through the switches and not through any other ports like in Arbitrated Loop.Failure of a port is isolated to a link and should not affect operation of other ports.Multiple pairs of ports may communicate simultaneously in a Fabric.AttributePoint-to-pointArbitrated loopSwitched fabricMax ports2127~16777216 (224)Address size8-bit ALPA24-bit port IDSide effect of port failureLink failsLoop fails (until port bypassed)Access to mediumDedicatedArbitratedDedicatedFibre Channel is a layered technology that starts at the physical layer and progresses through the protocols to the upper-level protocols like SCSI and SBCCS.Fibre Channel does not follow the OSI model layering, and is split into five layers:FC-4 Protocol-mapping layer, in which upper-level protocols such as NVM Express (NVMe), SCSI, IP, and FICON are encapsulated into Information Units (IUs) for delivery to FC-2. Current FC-4s include FCP-4, FC-SB-5, and FC-NVMe.FC-3 Common services layer, a thin layer that could eventually implement functions like encryption or RAID redundancy algorithms; multiport connections;FC-2 Signaling Protocol, defined by the Fibre Channel Framing and Signaling standard, consists of the low level Fibre Channel network protocols; port to port connections;FC-1 Transmission Protocol, which implements line coding of signals;FC-0 physical layer, defined by Fibre Channel Physical Interfaces standard, includes cabling, connectors etc.;Fibre Channel products are available at 1, 2, 4, 8, 10, 16 and 32 and 128 Gbit/s; these protocol flavors are called accordingly 1GFC, 2GFC, 4GFC, 8GFC, 10GFC, 16GFC, 32GFC or 128GFC. The 32GFC standard was approved by the INCITS

with a socket into which the iButton clips, but from which it is easily removed.Each 1-Wire chip has a unique identifier code. This feature makes the chips, especially iButtons, suitable electronic keys. Some uses include locks, burglar alarms, computer systems, manufacturer-approved accessories, time clocks and courier and maintenance keys for smart safes. iButtons have been used as Akbil smart tickets for the public transport in Istanbul.Apple MagSafe- and MagSafe-2-connectorequipped power supplies, displays, and Mac laptops use the 1-Wire protocol to send and receive data to and from the connected Mac laptop, via the middle pin of the connector. Data include power supply model, wattage, and serial number; and laptop commands to send full power, and illuminate the red or green light-emitting diodes in the connector.[3]Genuine Dell laptop power supplies use the 1-Wire protocol to send data via the third wire to the laptop computer about power, current and voltage ratings. The laptop will then refuse charging if the adapter does not meet requirements.[4]In any MicroLan, there is always one master in overall charge, which may be a personal computer or a microcontroller. The master initiates activity on the bus, simplifying the avoidance of collisions on the bus. Protocols are built into the master's software to detect collisions. After a collision, the master retries the required communication.A 1-Wire network is a single open drain wire with a single pull-up resistor. The pull-up resistor pulls the wire up to 3 or 5 volts. The master device and all the slaves each have a single open-drain connection to drive the wire, and a way to sense the state of the wire. Despite the "1-Wire" name, all devices must also have a second conductor for a ground connection to permit a return current to flow through the data wire.[5] Communication occurs when a master or slave briefly pulls the bus low, i.e., connects the pull-up resistor to ground through its output MOSFET. The data wire is high when idle, and so it can also power a limited number of slave devices. Data rates of 16.3kbit/s can be achieved. There is also an overdrive mode that speeds up the communication by a factor of 10.A short 1-Wire bus can be driven from a single digital I/O pin on a microcontroller. A universal asynchronous receiver-transmitter (UART) can also be used.[6] Specific 1-Wire driver and bridge chips are available. Universal Serial Bus "bridge" chips are also available. Bridge chips are particularly useful to drive cables longer than 100m. Up to 300-meter twisted pairs, i.e., telephone cables, have been tested by the manufacturer. These extreme lengths require adjustments to the pull-up resistances from 5 to 1 k.The master starts a transmission with a reset pulse, which pulls the wire to 0 volts for at least 480s. This resets every slave device on the bus. After that, any slave device, if present, shows that it exists with a "presence" pulse: it holds the bus low for at least 60s after the master releases the bus.To send a binary number "1", the bus master sends a very brief (115 s) low pulse. To send a binary number "0", the master sends a 60s low pulse. The falling (negative) edge of the pulse is used to start a monostable multivibrator in the slave device. The multivibrator in the slave reads the data line about 30s after the falling edge. The slave's internal timer is an inexpensive analog timer. It has analog tolerances that affect its timing accuracy. Therefore, the pulses are calculated to be within margins. Therefore, the "0" pulses have to be 60s long, and the "1" pulses can't be longer than 15s.When receiving data, the master sends a 115 s 0 volt pulse to start each bit. If the transmitting slave unit wants to send a "1", it does nothing, and the bus goes to the pulled-up voltage. If the transmitting slave wants to send a "0", it pulls the data line to ground for 60 s.The basic sequence is a reset pulse followed by an eight-bit command, and then data are sent or received in groups of eight bits.When a sequence of data is being transferred, errors can be detected with an eight-bit CRC (weak data protection).Many devices can share the same bus. Each device on the bus has a 64-bit serial number, of which eight bits are used as a checksum, thus allowing a "universe" of 256 (over 7.2 1016) unique device identities. The least significant byte of the serial number is an eight-bit number that tells the type of the device. The most significant byte is a standard (for the 1-Wire bus) eight-bit CRC.[7]There are several standard broadcast commands, as well as commands used to address a particular device. The master can send a selection command, then the address of a particular device. The next command is executed only by the addressed device.The 1-Wire bus enumeration protocol, like other singulation protocols, is an algorithm the master uses to read the address of every device on the bus. Since the address includes the device type and a CRC, recovering the roster of addresses also produces a reliable inventory of the devices on the bus. To find the devices, the master broadcasts an enumeration command, and then an address, "listening" after each bit of an address. If a slave's address matches all the address bits sent so far, it returns a 0. The master uses this simple behavior to search systematically for valid sequences of address bits. The process is much faster than a brute force search of all possible 56-bit numbers, because as soon as an invalid bit is detected, all subsequent address bits are known to be invalid. The 56-bit address space is searched as a binary tree, allowing up to 75 devices to be found per second. The order in which device addresses are discovered by this enumeration protocol is deterministic and depends only on the device type and serial number. Bit-reversing these 56 bits yields the order of discovery for devices using Maxim's published algorithm (algorithm defined in Application Note 187[8]). The search algorithm can be implemented in an alternative form, initially searching paths with address bits equal to 1, rather than 0. In this case, inverting the 56 address bits and then reversing them yields the order of discovery.The location of devices on the bus is sometimes significant. For these situations, a microcontroller can use several pins, or the manufacturer has a 1-Wire device that can switch the bus off or pass it on. Software can therefore explore sequential bus domains.[7]Every 1-Wire devices 64-bit ROM ID ends with an 8-bit family code. In most cases this byte is assigned to a single part number, so reading it from the bus is usually enough to identify the devicefor example, 0x10 (DS18S20 thermometer),[9] 0x01 (DS2401 silicon serial number),[10] or 0x2D (DS2431 1 kbit EEPROM).[11]Various people have created online databases of family codes from the broad range of 1-Wire memory, authenticator, ID, and battery-monitor devices.[12]The following signals were generated by an FPGA, which was the master for the communication with a DS2432 (EEPROM) chip, and measured with a logic analyzer. A logic high on the 1-Wire output, means the output of the FPGA is in tri-state mode and the 1-Wire device can pull the bus low. A low means the FPGA pulls down the bus. The 1-Wire input is the measured bus signal. On input sample time high, the FPGA samples the input for detecting the device response and receiving bits.When developing and/or troubleshooting the 1-Wire bus, examination of hardware signals can be very important. Logic analyzers and bus analyzers are tools that collect, analyze, decode, and store signals to simplify viewing the high-speed waveforms.SDI-12, a single data wire communications schemeSingle-wire transmission line, a technique for electric power transmission with only "1 wire" without a ground return wire pathTouch memory^ "Reading and Writing 1-Wire Devices Through Serial Interfaces". Maxim Integrated. Retrieved 2022-12-21.^ "Overview of 1-Wire Technology and Its Use". Analog Devices. Archived from the original on 2023-06-27. Retrieved 2023-07-21.^ ""Teardown and exploration of Apple's Magsafe connector"". rightTo.com. Retrieved 2017-07-18.^ "Hacking Dell Laptop Charger Identification". hackaday.com. 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Retrieved 2025-04-25.1-Wire DeviceAccessing, Reading, and Writing to 1-Wire devices using a UARTUsing a UART to Implement a 1-Wire Bus MasteriButton, iButtonLinkGuidelines for Reliable Long Line 1-Wire NetworksChoosing the Right 1-Wire Master for Embedded ApplicationsOWFS 1-Wire file system for LinuxGuides to working with 1-Wire, for programmers and engineersGetting 1-Wire sensors working in Linux using OWFS1-wire Arduino tutorialGuide to writing software for 1-Wire/ MicroLan using Lazarus, "the free Delphi".Retrieved from " 3The following pages link to 1-Wire External tools(link counttransclusion countsorted list) See help page for transcluding these entriesShowing 50 items.View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)Accelerated Graphics Port (links | edit)Parallel ATA (links | edit)Bus (computing) (links | edit)Extended Industry Standard Architecture (links | edit)Industry Standard Architecture (links | edit)MIDI (links | edit)Peripheral Component Interconnect (links | edit)SCSI (links | edit)USB (links | edit)VESA Local Bus (links | edit)16550 UART (links | edit)Cyclic redundancy check (links | edit)EEPROM (links | edit)Direct memory access (links | edit)PC Card (links | edit)PCMCIA (links | edit)Physical layer (links | edit)ST-506/ST-412 (links | edit)NuBus (links | edit)ACCESS.bus (links | edit)IC (links | edit)Apple Desktop Bus (links | edit)Micro Channel architecture (links | edit)HyperTransport (links | edit)InfiniBand (links | edit)PCI Express (links | edit)HIPPI (links | edit)Fibre Channel (links | edit)VMEbus (links | edit)S/PDIF (links | edit)S-100 bus (links | edit)Scalable Coherent Interface (links | edit)Futurebus (links | edit)QuickRing (links | edit)Data link layer (links | edit)Plug and play (links | edit)GPIB (links | edit)SATA (links | edit)Front-side bus (links | edit)SBus (links | edit)KNX (links | edit)Serial communication (links | edit)Zigbee (links | edit)Bus mastering (links | edit)Enhanced Small Disk Interface (links | edit)CAN bus (links | edit)DMX512 (links | edit)RS-422 (links | edit)Back-side bus (links | edit)Serial Peripheral Interface (links | edit)View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)Retrieved from " WhatLinksHere/1-Wire"Many enterprise data centers with SANs for mission-critical workloads and sensitive data subject to regulatory requirements rely on Fibre Channel. One of the reasons is the ability to prevent data loss and downtime with powerful security features and synchronous data mirroring. However, Fibre Channel is not the only SAN protocol. Understanding the pros and cons of Fibre Channel on the one hand and Ethernet-based SAN protocols on the other will help you get the most out of your SAN.Fibre Channel is a high-speed data transfer protocol designed for enabling storage area networks (SANs). Given that SANs are intended to connect blocks of data across storage devices to servers, Fibre Channel Protocol is optimized to transmit in-order, lossless raw block data with low latency. As a result, Fibre Channel is the preferred protocol for data centers with mission-critical workloads requiring synchronous data mirroring.Fibre is UK English spelling and Fiber is US English spelling. However, the popular SAN data transfer protocol is in fact spelled Fibre Channel on both sides of the pond. When originally developed, the data transfer protocol ran over optical fiber cables and was accordingly named Fiber Channel. However, once support for copper cabling was added, industry universally adopted the UK spelling, Fibre Channel, to form a unique name and avoid confusion.Ethernet is a family of data transfer protocols designed for connecting computers within a local area network (LAN). Fibre Channel is designed specifically for block-level storage in SANs, while Ethernet can be used for both block-level (SAN) and file-level (NAS) storage.Synchronous mirroring is made possible with Fibre Channel while Ethernet only supports asynchronous mirroring. Therefore, understanding synchronous mirroring and determining whether it is needed is crucial before proceeding to analyze other pros and cons of Fibre Channel and Ethernet.With asynchronous mirroring, data is copied from one server to another on demand or according to a schedule. This may be good enough for some disaster recovery scenarios, but when even the slightest service interruption or data loss is not tolerable, enterprises tend to go for synchronous mirroring.With synchronous mirroring, data is automatically copied from one server to another the moment any change is made, ensuring both servers are identical. The advantage: if the primary server goes offline for any reason, regardless whether due to hardware failure or a natural disaster like a fire, a secondary server can instantly take over.SANs with asynchronous mirroring can use Fibre Channel Protocol or iSCSI, but synchronous mirroring is only possible with Fibre Channel Protocol. Your backup and replication application may have certain requirements in terms of asynchronous or synchronous mirroring, and this can influence which type of mirroring you choose. Many corporate and governmental data centers prefer Fibre Channel for mission-critical workloads.In the context of a SAN, Fibre Channel is most commonly deployed using the Fibre Channel Protocol (FCP) and Ethernet under the internet Small Computer Systems Interface (iSCSI) protocol. Fibre Channel Protocol runs on a customized SAN infrastructure and transmits data separately from other workloads. The benefit of this is that it enables:lower latencyhigher performanceenhanced security, monitoring and compliance capabilitiessynchronous data mirroringAn iSCSI SAN uses existing network infrastructure to transmit block-level storage alongside other workloads over Ethernet. The advantages of this are:lower infrastructure costlower network design complexitysupport for faster speeds like 100Gsupport for longer distances over 100 kmMost data centers running a SAN for mission-critical workloads go for Fibre Channel because it is proven to reliably handle even the most demanding workloads without dropping data packets. Additionally, a slower but steadier Fibre Channel connection can still outperform faster Ethernet speeds.However, its common for enterprises to use Fibre Channel for some use cases and Ethernet for others within their business over the same fiber pair. For instance, a bank may run key workloads subject to regulatory requirements like withdrawals over Fibre Channel while running other workloads over Ethernet.One of the most effective ways to deploy a SAN is to use Fibre Channel transceivers that can be connected directly to a Fibre Channel switch. Its easier to ensure the best performance for your SAN with minimal hassle by choosing parts that are tested to work seamlessly together. For instance, look for a Fibre Channel transceiver that is carefully tested and approved for use with your Fibre Channel switch as part of a DWDM connectivity solution.Smartoptics offers solutions for all types of 32G/16G Fiber Channel SAN connectivity, whether using embedded transceivers or transponder based DWDM networking. Download our solution brief to learn more about using WDM to extend your SAN capacity and reach.Want to know more about our approved solutions for Fibre Channel? Read about our approved Brocade collection and our Cisco approved fiber channel solutions.

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