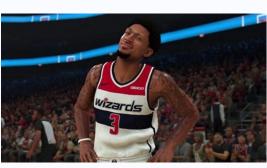
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The 2K Series, logos, artworks, and other assets are properties of 2K Sports and Take-Two Interactive. For two decades, NBA 2K has redefined sports entertainment, establishing itself as an important piece of hoops culture by creating basketball video games with an immersive experience in the palm of your hand. Whether you choose to play as some

of the biggest NBA and WNBA stars on the hardwood in PLAY NOW, test your managerial skills within MyNBA (New Gen) or MyGM and MyLEAGUE (Current Gen), collect and assemble a dream team in MyTEAM, or write your legacy in MyCAREER, NBA 2K offers authentic, state-of-the-art gameplay as you dribble, shoot, and slam your way through the league. NBA 2K invites you to compete at the highest level and witness mind-bending realism. Subscribe to receive news and promotional messages from 2K and its affiliates. NBA 2K23 locker codes gives players access to everything from free VC to trophy packs, so here's everything you need to know about how to redeem them in September 2022. NBA 2K have been incorporating locker codes into their games for a while now, and NBA 2K23 continues the trend of offering players free goodies. However, these codes are relatively hard to come by and tend to have either a short redemption period or a limited number of activations — so make sure to claim them fast. Therefore, if you want to get hold of the rewards, you'll need to be quick and ensure you're checking for new releases regularly. This page will be updated often, revealing new codes for you to cash in. Without further adieu, here are all the currently working NBA 2K23 locker codes in September 2022, as well as how you can redeem them in a few short steps. Updated September 26, 2022, to confirm code validity. One code expired. Contents: Working NBA 2K23 locker codes in NBA 2K23 locker codes typically expired. after a week, so it's likely that new ones will arrive soon. NBA 2K23's Twitter page too for any additional updates. How to redeem locker codes in NBA 2K23 Visual ConceptsMake sure to put the codes in carefully when redeeming. With codes coming and going rapidly in the game, it's worth knowing exactly where and how to enter the locker codes, so follow this list of steps to get your rewards in no time: Load the game upGo into the 'Myteam' menuGo to the Community Hub sectionClick 'Locker Codes' Put the code in carefully All expired NBA 2K23 locker codes When the working locker codes, expire they will be moved to the below table alongside any rewards that they previously redeemed: What are locker codes used for? Locker codes used for? Locker codes in NBA 2K23 serve to grant you rewards and help you progress. You can get anything from VC, the in-game currency, to cosmetic packs, to high-profile players, so it's well worth redeeming if you get the chance. Ultimately, despite the codes usually expiring quickly or having a limit on the number of people who can redeem them, NBA 2K23 locker codes are extremely useful and will help you progress further through the seasons and the game in general. So there you have it — those are all the currently working locker codes for NBA 2K23 in September 2022. For additional tips and tricks, be sure to check out some of our other NBA 2K23 guides: Best NBA 2K23 builds for each position | Best NBA 2K23 dribble moves & skill controls | NBA 2K Mobile codes | How to increase teammate grade in NVA 2K23 MyCareer | All Ronnie 2K locations | Best Finishing badges in NBA 2K23 | Best Defense & Rebounding badges in NBA 2K23 | Best Playmaking badges in NBA 2K23 | Best Playmaking badges in NBA 2K23 is an exciting part of the MyCAREER journey, but... NBA 2K23 GUIDE In NBA 2K23 you can set up spawn points to various locations to make where... MyCAREER one of the more overlooked aspects in MyCAREER on NBA2K23 is the use of leadership...LATEST NEWS NBA 2K Mobile and Season 5 in this guide.... Creating your build(s) in NBA 2K23 is an exciting part of the MyCAREER journey, but also comes with the risk of potentially spending your... In NBA 2K23 you can set up spawn points to various locations to make where you want to go a lot quicker. This was... One of the more overlooked aspects in MyCAREER on NBA2K23 is the use of leadership points. In this article, we will dive deeper and... Here are Episode 3's correct answers for the interactive NBA 2K23 2KTV quiz to win free VC. For a full archive of past episode... Here is the latest NBA 2K23 MyTEAM Locker Code. This locker code is for Silencers Pack and expires on September 30, 2022. For the complete... The annual MyTEAM Unlimited \$250,000 tournament is starting Saturday, October 15th for NBA 2K23. You must reach the Emerald Unlimited tier to be entered.... Grinding a build is never fun on NBA 2K, especially when you are on your 2nd MyPLAYER save. Luckily for you, NBA2KW has gone... In the first week or so since NBA 2K23 has launched, there have been a number of recent small patches, updates, and hotfixes for... MyTEAM is a card collecting mode in the newly released NBA 2K23. MyTEAM has been in the game since 2K11 and has captivated millions... Image not available forColor: To view this video download Flash Player 1. Fast and safe NBA 2K22 VC delivery is guaranteed as always. 2. Please fill in your correct character name and choose correct account server while submitting your order. And also, Please provide us your valid personal information which is prorected 100% in order to get touch with you more convenient if any problems. 3.After your payment goes through, please contact with our Live support Online instantly, we will arrange your NBA 2K22 VC delivery as soon as possible. 4.If you have any questions, please feel free to contact our customer service email or 24/7 Live Chat online. "Want extra VC when you start playing #NBA2K23?" / Image courtesy of 2KIn anticipation of the worldwide launch of NBA 2K23, 2K and American Express announced that they will be giving free VC for a limited time via a pre-order promotion. Here's a breakdown of how to claim some extra Virtual Currency (VC) through the NBA 2K23 AMEX pre-order option. Want extra VC when you start playing #NBA2K23? Pre-order 2K23 on the 2K Store with your Amex® Card to receive a code for 35,000 in Virtual CurrencyTerms apply. Learn more: pic.twitter.com/v7chE6S3ez—NBA 2K (@NBA2K) August 25, 2022To earn 35,000 VC (\$9.99 US value) in NBA 2K23 for free, the only thing those interested need to do is pre-order or purchase any edition of the game on the 2K Store with an American Express Card. Those who do so will be sent an email containing a one-time use Locker Code for the VC. The offer expires at the end of the year on Dec. 31, 2022.Of course, VC is king in the NBA 2K series, whether you're a fan of MyCAREER, MyTEAM or another mode. From upgrading attributes to buying players packs, VC significantly speeds up your progress. NBA 2K23 is set to release worldwide for PlayStation 4, PS5, Xbox One, Xbox Series X|S, Nintendo Switch and PC (via Steam) on Sept. 9, 2022. For more on NBA 2K23, feel free to check out: Display devices or content having horizontal resolution of approximately 2,000 pixels [1] In the movie projection industry, Digital Cinema Initiatives is the dominant standard for 2K output and defines 2K resolution as 2048 × 1080.[2][3] For television and consumer media, 1920 × 1080 is the most common 2K resolution, but this is normally referred to as 1080p. Resolutions Examples of 2K resolutions Format Resolution Display aspect ratio Pixels DCI 2K (native resolution) 2048 × 1080 1.90:1 (256:135, ≈17:9) 2,211,840 DCI 2K (flat cropped) 1998 × 1080 1.85:1 2,157,840 DCI 2K (CinemaScope cropped) 2048 × 1536 1.33:1 (4:3) 3,145,728 WUXGA 1920 × 1200 1.60:1 (16:10) 2,304,000 Full HD 1920 × 1080 1.78:1 (16:9) 2,073,600 QWXGA 2048 × 1152 1.78:1 (16:9) 2,359,296 Standards and terminology In the cinematography industry, 2K resolution around 2000 pixels wide. Typically this is done at 2048 × 1556, but the exact dimensions vary based on the aspect ratio and size of the scan area.[4]:714 Another common 2K resolution in cinema is 2048 × 1080. This is the resolution of the 2K container format standardized by DCI in their Digital Cinema System Specification in 2005.[2][3] The resolutions for a 2K distribution:[6]: 6 2048 × 1080 (full frame, 256:135 or ≈ 1.90 :1 aspect ratio) 1998 \times 1080 (flat crop, 1.85:1 aspect ratio) 2048 \times 858 (CinemaScope crop, ≈ 2.39 :1 aspect ratio) 400es not refer specifically to the DCI standard. Usage of the term "2K" predates the publication of the DCI standard. The resolution 1920 \times 1080 has also been referred to as a 2K resolution by other standards organizations like NHK Science & Technology Research Laboratories and ITU Radiocommunication Sector (which were involved in the standardization of 1080p HDTV and 4K UHDTV).[10][11] Another resolution by other standards organizations like NHK Science & Technology Research Laboratories and ITU Radiocommunication Sector (which were involved in the standardization of 1080p HDTV and 4K UHDTV).[10][11] mistake in marketing[12] and is called QHD by the DCI. See also 1440p 21:9 8K resolution References ^ James, Jack (2006). Digital Intermediates for Film and Video. Focal Press. p. 125. ISBN 978-0-240-80702-7. Retrieved April 19, 2014. ^ a b "Digital Cinema System Specification" (PDF). Digital Cinema Initiatives. 10 October 2012. Archived from the original (PDF) on 27 May 2016. Retrieved 2 April 2015. ^ a b Swinson, Peter R (November 2005). "DCI and OTHER Film Formats" (PDF). 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Retrieved 2021-08-18. $^{\circ}$ "JOURNALS | Broadcast Technology | NHK STRL". www.nhk.or.jp. 2021-08-17. Archived from the original on 2021-08-17. Retrieved 2021-08-18. $^{\circ}$ "JOURNALS | Broadcast Technology | NHK STRL". www.nhk.or.jp. 2021-08-17. Archived from the original on 2018-04-30. Retrieved 2021-08-18. 17. p. 18. Archived (PDF) from the original on 17 Aug 2021. Retrieved 2021-08-18. ^ "What is Resolution of Monitor? Full HD vs 2K vs 4K". BenQ. Retrieved 2022-09-17. Retrieved 2021-08-18. ^ "What is Resolution of Monitor? Full HD vs 2K vs 4K". menu to view.) 8K resolution refers to an image or display resolution with a width of approximately 8,000 pixels. 8K UHD (7680 × 4320) is the highest resolution. TV manufacturers pushed to make 4K a new standard by 2017. At CES 2019, the first 8K TVs were unveiled.[2] The feasibility of a fast transition to this new standard is questionable in view of the absence of broadcasting resources.[3] It is predicted (2018 forecast by Strategy Analytics) that 8K-ready devices will still only account for 3% of UHD TVs by 2023 with global sales of 11 million units a year.[4] However, TV manufacturers remain optimistic as the 4K market grew much faster than expected, with actual sales exceeding projections nearly six-fold in 2013, a transmission network's capability to carry HDTV resolution was limited by internet speeds and relied on satellite broadcast to transmit the high data rates. The demand is expected to drive the adoption of video compression standards and to place significant pressure on physical communication networks in the near future.[6] As of 2018[update], few cameras had the capability to shoot video in 8K, NHK being one of the few companies to have created a small broadcasting camera with an 8K image sensor.[7] By 2018, Red Digital Cinema camera company had delivered three 8K cameras in both a Full Frame sensor and Super 35 sensor. [8] Until major content sources are available, 8K is speculated to become a mainstream consumer display resolution around 2023 as mentioned in UHD forum Phase-B recommendations. [citation needed] Despite this, filmmakers are pushing demand for 8K cameras due to their ability to capture better 4K footage. 8K standards and technology The term "8K" is generic and refers to any resolution with a horizontal pixel count of approximately 8,000. Several different 8K resolutions with a horizontal pixel count of approximately 8,000. Several different 8K resolutions have been standardized by various organizations. History Astro Design 8K camera being displayed at the 2013 NAB Shown and technology The term "8K" is generic and refers to any resolution with a horizontal pixel count of approximately 8,000. NHK and Hitachi demonstrating their 8K camera at the 2013 NAB Show Japan's public broadcaster NHK was the first to start research and development of 4320p resolution in 1995. The format was standardized by SMPTE in October 2007, Interface standardized by SMPTE in October 2007, Interface standardized by SMPTE in August 2010 and recommended as the international standard for television by ITU-R in 2012. Followed by public displays at electronics shows and screenings of 2014 Winter Olympics in Sochi and public viewings in February 2014 and the FIFA World Cup in Brazil in June 2014 using HEVC with partners AstroDesign and Ikegami Electronics.[9][10][11] On January 6, 2015, the MHL Consortium announced the release of the superMHL specification which will support 8K resolution at 120 fps, 48-bit video, the Rec. 2020 color space, high dynamic range support, a 32-pin reversible superMHL connector, and power charging of up to 40 watts.[12][13][14] On March 1, 2016, The Video Electronics Standards Association (VESA) unveiled DisplayPort 1.4, a new format that allows the use of 8K resolution (7680 × 4320) at 60 Hz with HDRR and 32 audio channels through USB-C.[15] On January 4, 2017, the HDMI Forum announced HDMI 2.1 featuring support for 8K video with HDR, will be "released early in Q2 2017".[16] 8K Association Formed at CES 2019 to Help Develop 8K Ecosystem.[17] In early February 2020, Samsung Electronics announced during their Unpacked event that their Samsung Galaxy S20 can video record in 8K, which uses 600 MB of storage per minute, [18] First cameras On April 6, 2013, Astrodesign Inc. announced the AH-4800, capable of recording 8K resolution. In April 2015, it was announced by Red that their newly unveiled Red Weapon VV is also capable of recording 8K footage. In October 2016, they announced two additional 8K cameras, Red Weapon BK S35 and Red Epic-W 8K S35.[19] The Red Weapon Monstro VV, their fourth camera capable of shooting 8K, with additional improvements in dynamic range and noise reduction, among other features. Mobile phone cameras In May 2019, mobile phone vendors started releasing the first mobile phone with 8K video recording capabilities, such as the ZTE Nubia Red Magic 3 series. This is enabled by the sufficient resolution of image sensors used in mobile phones, and by the sufficient chipset performance. However, mobile phones with up to 5K (2880p) or 6K (3240p) video cameras have never been released. Asus ZenFone 7 Redmi K30 Pro Redmi K30 Pr S22 Xiaomi Mi 10 Xiaomi Mi 10 Xiaomi Mi 10 Ultra Xiaomi Mi 10 Ultra Xiaomi Mi 11 Productions In 2007, the original 65 mm negative of the 1992 film Baraka was re-scanned at 8K with a film scanner built specifically for the job at FotoKem Laboratories, and used to remaster the 2008 Blu-ray release. Chicago Sun-Times critic Roger Ebert described the Blu-ray release as "the finest video disc I have ever viewed or ever imagined."[20] A similar 8K scan/4K intermediate digital restoration of Lawrence of Arabia was made for Blu-ray and theatrical re-release during 2012 by Sony Pictures, the new 8K scan has such high resolution that when examined, showed a series of fine concentric lines in a pattern "reminiscent of a fingerprint" near the top of the frame. This was caused by the film emulsion melting and cracking in the desert heat during production. Sony had to hire a third party to minimize or eliminate the rippling artifacts in the new restored version.[21] On May 17, 2013, the Franklin Institute premiered To Space and Back, an 8K×8K, 60 fps, 3D video running approximately 25 minutes. During its first run at the Fels Planetarium it was played at 4K, 60 fps, 3D video running approximately 25 minutes. was filmed in 8K and 22.2 sound format.[24] On May 1, 2015, an 8K abstract computer animation was screened at the Filmatic Festival at the University of California, San Diego. The work was created as an assignment in the VIS 40/ICAM 40 Introduction to Computing in the Arts class taught at UCSD by Associate Teaching Professor Brett Stalbaum during the winter guarter of 2015, with each student producing three hundred 8192 × 4800 pixel frames. The work's music soundtrack was composed by Mark Matamoros. [25][26] On January 6, 2016, director James Gunn stated that the 2017 film Guardians of the Galaxy Vol. 2 would be the first feature film to be shot in 8K, using the Red Weapon 8K VV.[27] Broadcasting Japanese public broadcaster NHK began research and development on 8K in 1995, having spent over \$1 billion on R&D since then.[28] Codenamed Super Hi-Vision (named after its old Hi-Vision analog HDTV system), NHK also was simultaneously working on the development of 22.2 channel surround sound audio. The world's first 8K television was unveiled by Sharp at the Consumer Electronics Show (CES) in 2012.[29] Experimental transmissions of the resolution were tested with the 2012 Summer Olympics, and at the Cannes Film Festival showcased publicly on a 220" screen, with a three-year roadmap that entails the launch of 8K test broadcasting in 2016, with plans to roll out full 8K services by 2018, and in time for the 2020 Summer Olympics, [30] which were delayed to 2021 due to the COVID-19 pandemic. On December 1, 2018, NHK launched BS8K, a broadcast channel transmitting at 8K resolution. [31][32][33] On February 28, 2020, it was reported that BT Sport would broadcast the UEFA Europa League in 8K HDR10+ as early as August 2020.[34] Gaming Sony announced Xbox Series X with 8K graphic support, released in November 2020.[36] Nvidia's GeForce RTX 3090 promises to enable 8K 60 fps HDR gaming, recording, and streaming with ShadowPlay on PCs.[37][38] Editing Given adequate hardware, 8K video can be edited by all major non-linear video editors such as Avid Media Composer, Adobe Premiere Pro, Lightworks, Vegas Pro, Final Cut Pro X, Edius, DaVinci Resolutions Resolutions Resolutions Resolutions Resolution Aspect ratio Total pixels $7680 \times 2160 \ 3.55 : 1 \ 032 : 9 \ 16.59 \ \text{Mpx}$ $7680 \times 3200 \ 2.40 : 1 \ 024 : 10 \ 24.58 \ \text{Mpx}$ $7680 \times 3240 \ 2.370 : 1 \ 016 : 9 \ 37.75 \ \text{Mpx}$ $8192 \times 4320 \ 1.69 : 1 \ 016 : 9 \ 37.75 \ \text{Mpx}$ $8192 \times 8192 \times 8$ resolution of the UHDTV2 format defined in SMPTE ST 2036-1,[39][40] as well as the 8K UHDTV format defined in ITU-R BT.2020.[41] It was also chosen by the DVB project as the resolution of 4K UHD (four times as many total pixels), four times the linear resolution of 1080p (16 times as many total pixels), and six times the linear resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display. 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2012 Panasonic's 145" 8K Plasma Display 8K Plasma Display 8K Plasma Display 8K Plasma Display 8 Funkausstellung Berlin (IFA) 2012 LG's 98" 8K LCD TV, 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2015 Samsung's 110" 8K 3D LCD TV, 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2015 BOE 98" 8K TV at CEATEC 2015[43] LG's 98-inch UH9800 with ColorPrime Plus technology - International Consumer Electronics Show (CES) 2016[44] Samsung 98-inch ULED 8K TV - International Consumer Electronics Show (CES) 2016[46] Changhong 98-inch 98ZHQ2R "8K Super UHD", 7680 × 4320 resolution - International Consumer Electronics Show (CES) 2016 [47] Samsung Q9S 85-inch QLED TV - International Consumer Electronics Show (CES) 2018 Samsung Q9O R - 65, 75, 82, and 85 inch 8K Electronics Show 2021 virtual event. Sony Z9K - 65, 75, 85, and 100 inch 8K Ultra HD Bravia International Consumer Electronics Show 2022 hybrid event. TCL 75 inch 8K QLED TV - FIBA Basketball World Cup 2019 Edition displayed at IFA 2018[49] Hisense U9E - 75 inch 8K QLED at IFA global press conference 2019[50] Samsung QLED 8K TV 0700T/0800T/0950TS Samsung.com Projectors Digital Projection INSIGHT Laser 8K at Integrated Systems Europe 2018[51] Monitors Canon 30" 8K reference display - September 2015 Sharp's prototype 27-inch 8K 120 Hz IGZO desktop monitor with HDR (CEATEC 2016) Philips 328P8K 8K UHD desktop Monitor (ces 2017) Dell UltraSharp 32 Ultra HD 8K Monitor (UP3218K) (CES 2017)[52][53] BOE 8K 13.3 inch Narrow Bezel Laptop Display at CITE 2018[54] 8K VR Headset Pimax Vision 8K X, made up of two 3840 × 2160 screens @ 90 Hz, started Crowdfunding in October 2017, with the product released and shipped in September 2020.[55] Cameras Astrodesign AH-4800, 1.7-inch CMOS camera capable of recording in 8K resolution. Unveiled by on April 6, 2013. RED Weapon Vista Vision 35MM 8K (8192 × 4320) at 60 fps in full-sensor mode, or up to 75 fps in a scope (2.40:1) frame format. The camera has a 40.96 mm × 21.6 mm sensor based on the previous generation Dragon sensor. Unveiled at NAB 2015, released end of 2015. RED DSMC2 Helium with an S35MM 8K 29.9 mm × 15.77 mm 35.4 megapixel CMOS sensor—up to 60 fps at 8K 2.4:1 (8192 × 4320) and 75 fps at 8K 2.4:1 (8192 × 4320) and 75 fps at 8K 29.9 mm × 15.77 mm 35.4 megapixel CMOS Helium sensor —up to 30 fps at 8K (8192 \times 4320) with a dynamic range of 16.5+ stops; release date: October 2016. RED DSMC2 Monstro 8K VV[56] 40.96 mm \times 21.60 mm 35.4 megapixel CMOS "with a dynamic range of 17+ stops; release date: October 2016. RED DSMC2 Monstro 8K VV[56] 40.96 mm \times 21.60 mm 35.4 megapixel CMOS "with a dynamic range of 17+ stops; release date: October 2016. RED DSMC2 Monstro 8K VV[56] 40.96 mm \times 21.60 mm 35.4 megapixel CMOS "with a dynamic range of 17+ stops; release date: October 2016. RED DSMC2 Monstro 8K VV[56] 40.96 mm \times 21.60 mm 35.4 megapixel CMOS "with a dynamic range of 17+ stops; release date: October 2016. RED DSMC2 Monstro 8K VV[56] 40.96 mm \times 21.60 mm 35.4 megapixel CMOS "with a dynamic range of 17+ stops; release date: October 2016. RED DSMC2 Monstro 8K VV[56] 40.96 mm \times 21.60 mm 35.4 megapixel CMOS "with a dynamic range of 18-5 megapixel CMOS" with a dynamic range of 18-5 megapixel CMOS "with a dynamic range of 18-5 megapixel CMOS" with a dynamic range of 18-5 megapixel CMOS "with a dynamic range of 18-5 megapixel CMOS" with a dynamic range of 18-5 megapixel CMOS with a dynamic range of 18-5 megapixel CMOS" with a dynamic range of 18-5 megapixel CMOS w 2017. Ikegami S35MM SHK-810 8K broadcast camera. Unveiled at NAB 2015. Hitachi S35MM SK-UHD8000 broadcast camera. Unveiled at NAB 2015. 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May 2016 Sharp S35MM 8C-B60A 8K Professional broadcast Camcorder[57] Nov 2017 Cinemartin Fran 8K VV Global Shutter, announced on May 8, 2018, starting sales in fall 2018. Company went to bankruptcy on April 1, 2019, and camera is no longer available. It never reached production stage, only prototype.[58] Blackmagic URSA Mini Pro 12K, originally 110 fps in 8K,[59] since September 2020 firmware update up to 160 fps for DCI, 16:9 and 6:5 Anamorphic aspect ratio modes and up to 160 fps for DCI, 16:9 and 6:5 Anamorphic aspect ratio modes and up to 160 fps for DCI, 16:9 and 6:5 Anamorphic aspect ratio modes and up to 160 fps for DCI, 16:9 and 6:5 Anamorphic aspect ratio modes. Announced in San Diego, CA - January 26, 2021 - Sony Electronics Nikon Z 9 camera. Announced on October 28, 2021. Sony VENICE 2 camera (Full-Frame 8.6K image sensor) Announced November 15, 2021. Action Cameras Byroras CA100 shoots 8K @ 15 fps, up to 40 m underwater Nello X3K+ shoots 8K @ 15 fps Smartphones with 8K camera

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Main page: Category: Mobile phones with 8K video recording Samsung Galaxy S20 series, shoots 8K @ 24 fps, went on sale from August 2020 Samsung Galaxy S21 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S22 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S22 series, shoots 8K @ 24 fps, went on sale from August 2020 Samsung Galaxy S21 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S22 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S22 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S22 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S22 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S22 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S22 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S22 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S22 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S22 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S23 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S23 series, shoots 8K @ 24 fps, went on sale from January 2021 Samsung Galaxy S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps, went on sale from January S23 series, shoots 8K @ 24 fps
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and digital cinematography commonly use several different 4K resolutions. In television and consumer media, 3840 \times 2160 (DCI 4K). The 4K television market share increased as prices fell dramatically during 2014[2] and 2015. Comparison of common
broadcast resolutions Comparison of common display resolutions 4K standards and terminology The term "4K" is generic and refers to any resolution with a horizontal pixel count of approximately 4,000.[3]:2 Several different 4K resolutions have been standardized by various organizations. The terms "4K" and "Ultra HD" are used more widely in
marketing than "2160p". While typically referring to motion pictures, some digital camera vendors have used the term "4K photo" for still photographs, making it appear like an especially high resolution even though 3840×2160 pixels equal approximately 8.3 megapixels, which is not especially high for still photographs. [4] DCI Digital Cinema Systems
Specification Comparison of DCI and UHD resolutions In 2005, Digital Cinema Initiatives (DCI), a prominent standards organization in the cinema industry, published the Digital Cinema production, with resolutions of 2048 \times 1080 and
 4096 \times 2160 respectively.[5]:§4.3.1 The resolution of the video content inside follows the SMPTE 428-1 standard,[5]:§3.2.1 which establishes the following resolutions for a 4K distribution:[6]: 4096 \times 2160 (full frame, 256:135 or \approx 1.90:1 aspect ratio) 3996 \times 2160 (flat crop, 1.85:1 aspect ratio) 4096 \times 1716 (CinemaScope crop, \approx 2.39:1 aspect ratio)
2K distributions can have a frame rate of either 24 or 48 FPS, while 4K distributions must have a frame rate of 24 FPS.[5]:§3.1.4.2 Some articles claim that the terms "2K" and "4K" were coined by DCI and refer exclusively to the 2K and 4K formats defined in the DCI standard.[7] However, usage of these terms in the cinema industry predates the
publication of the DCI standard,[8][9][10][11] and they are generally understood as casual terms for any resolution approximately 2000 or 4000 pixels in width, rather than names for specific resolutions.[3]:2[12]:109 SMPTE UHDTV standard In 2007, the Society of Motion Picture and Television Engineers published SMPTE ST 2036-1, which defines
parameters for two UHDTV systems called UHDTV1 and UHDTV2.[13][14] The standard defines the following characteristics for these systems: A resolution of 3840 × 2160 (UHDTV1) or 7680 × 4320 (UHDTV2)[14]: §5.1 A framerate of 23.976, 24, 25, 29.97, 30, 50, 59.94, 60, 100,
119.88, or 120 Hz with progressive scan[14]: §1.2 RGB, Y'CBCR 4:4:4, 4:2:2, or 4:2:0 pixel encoding[14]: §7.7 10 bpc (36 bit/px) or 12 bpc (36 bit/px) or 12 bpc (36 bit/px) are the sameters, and the electro-optical transfer function. These are the sameter function.
characteristics later standardized in ITU-R BT.2020. UHDTV1 systems are permitted to use BT.709 color primaries up to 60 Hz.[14]:§6.2 ITU-R UHDTV standard In 2012, the International Telecommunication Union, Radiocommunication UHDTV.
standard.[15] It adopts the same image parameters defined in SMPTE ST 2036-1.[16] Although the UHDTV standard does not define any official names for the formats it defines, ITU typically uses the terms "4K", "4K UHDTV" to refer to the 3840 × 2160 system in public announcements and press releases ("8K" for the 7680 × 4320
system).[17] In some of ITU's other standards documents, the terms "UHDTV1" and "UHDTV2" are used as shorthand.[18] CEA Ultra HD In October 2012, the Consumer Electronics Association (CEA) announced their definition of the term Ultra HD In October 2012, the Consumer Electronics Association (CEA) announced their definition of the terms "UHDTV1" and "UHDTV2" are used as shorthand.[18] CEA Ultra HD In October 2012, the Consumer Electronics Association (CEA) announced their definition of the terms "UHDTV1" and "UHDTV2" are used as shorthand.[18] CEA Ultra HD In October 2012, the Consumer Electronics Association (CEA) announced their definition of the terms "UHDTV1" and "UHDTV2" are used as shorthand.[18] CEA Ultra HD In October 2012, the Consumer Electronics Association (CEA) announced their definition of the terms "UHDTV1" and "UHDTV2" are used as shorthand.[18] CEA Ultra HD In October 2012, the Consumer Electronics Association (CEA) announced their definition of the terms "UHDTV1" and "UHDTV2" are used as shorthand.[18] CEA Ultra HD In October 2012, the Consumer Electronics Association (CEA) announced their definition of the terms "UHDTV1" and "UHDTV2" are used as shorthand.[18] CEA Ultra HD In October 2012, the Consumer Electronics Association (CEA) announced their definition of the terms "UHDTV1" and "UHDTV2" are used as shorthand and "UHDTV2" are used as shorthand as a shorthand and "UHDTV2" are used as a shorthand as a shorthand and "UHDTV2" are used as a shorthand as a shorthand
HD product as a TV, monitor, or projector with the following characteristics: [20] A resolution of 3840 \times 2160 or larger An aspect ratio of 1.77:1 (16:9) or wider Support for color depth of 8 bpc (24 bit/px) or higher At least one HDMI input capable of supporting 3840 \times 2160 at 24, 30, and 60 Hz progressive scan (though not necessarily with RGB /
Y'CBCR 4:4:4 color), and HDCP 2.2 Capable of processing images according to the color space defined in ITU-R BT.709 Capable of upscaling HD content (i.e. 720p / 1080p) The CEA definition in CEA's definition is only a minimum
requirement, displays with higher resolutions such as 4096 × 2160 or 5120 × 2880 also qualify as "Ultra HD" displays, provided they meet the other requirements. 2160p resolutions, like 3840 × 2160 or 5120 × 2880 also qualify as "Ultra HD" displays, provided they meet the other requirements.
SDTV formats, which refer to a format by the number of pixels/lines along the vertical axis (such as "1080p" for 1920 \times 1080 progressive scan, or "480i" for the 480-line interlaced SDTV formats) rather than the horizontal pixel sount (\approx4000 or "4K" for 3840 \times 2160). The term "2160p" could be applied to any format with a height of 2160 pixels, but it
is most commonly used in reference to the 4K UHDTV resolution of 3840 \times 2160 due to its association with the well-known 720p and 1080p HDTV formats. Although 3840 \times 2160 is both a 4K resolution and a 2160p resolution, these terms cannot always be used interchangeably since not all 4K resolutions are 2160 pixels tall, and not all 2160p
resolutions are \approx4000 pixels wide. However, some companies have begun using the term "4K" to describe devices with support a resolution, even if it is not close to 4000 pixels wide. For example, many "4K" dash cams only support a resolution of 2880 × 2160 (4:3);[24][25] although this is a 2160p resolution, it is not a 4K resolution.
Conversely, Samsung released a 5120 × 2160 (64:27) TV, but marketed it as a "4K" TV despite its 5K-class resolution. [26][27] M+ or RGBW TV controversy In 2015, LG Display announced the implementation of a new technology. [28] The
media and internet users later called this "RGBW" TVs because of the white sub pixel. Most of the new M+ technology was employed on 4K TV sets which led to a controversy after tests showed that the addition of a white sub pixel replacing the traditional RGB structure would reduce the resolution by around 25%. After tests done by Intertek in
which the technical aspects of LG M+ TVs were analyzed and they concluded that "the addressable resolution display is 2,880 X 2,160 for each red, green, blue", in other words, the LG TVs were technically 2.8K as it became known in the controversy. [29][30] Although LG Display has developed this technology for use in notebook display, outdoor and
smartphones, it is more popular in the TV market due to the supposed 4K UHD marketed resolution but still being incapable of achieving true 4K UHD resolution as defined by the CTA as 3840x2160 active pixels with 8-bit per color. This negatively impacts the rendering of text, making it a bit fuzzier, which is especially noticeable when a TV is used
as a PC monitor.[31][32][33][34][35] CinemaWide 4K In 2019, Sony was granted the CinemaWide 4K In 2019, Sony was granted the CinemaWide 4K product with the
following characteristics: A resolution of 3840 × 1644 or larger An aspect ratio of 21:9 Capable of playing back 4K resolution video (2160p) in an aspect ratio of 21:9 Capable of upscaling non-4K content (i.e. 720p / 1080p)[38] Sony Xperia smartphones are the most widely known products that equipped with CinemaWide 4K display, such as Xperia 1,
Xperia 1 II and Xperia 1 III. Adoption Video sharing website YouTube and the television industry have adopted 3840 × 2160 as their 4K standard.[39][40] As of 2014[update], 4K content from major broadcasters remained limited.[41] On April 11, 2013, Bulb TV created by Canadian serial entrepreneur Evan Kosiner became the first broadcaster to
provide a 4K linear channel and VOD content to cable and satellite companies in North America.[42][43][44][45] The channel is licensed by the Canadian Radio-Television and Telecommunications Commission to provide educational content.[46] However, 4K content is becoming more widely available online[when?] including on Apple TV, YouTube
Netflix, Hulu, and Amazon.[47][48] By 2013, some UHDTV models were available to general consumers in the range of US$600.[49][50] As of 2015[update], prices on smaller computer and television panels had dropped below US$400.[51] ATSC On March 26, 2013, the Advanced Television Systems Committee announced new proposals of a new
standard called ATSC 3.0 which would implement UHD broadcasts at resolutions of up to 3840 \times 2160 or 7680 \times 4320.[52][53][54][55] The standard would also include framerates of up to 120 \text{ Hz}, the Digital Video Broadcasting Project released a new set of
standards intended to guide the implementation of high resolution content in broadcast television. Dubbed DVB-UHDTV, it establishes two standards use resolutions of 3840 × 2160 and 7680 × 4320 respectively, with framerates of up to 60 Hz, color depth up to 10 bpc
(30 bit/px), and HEVC encoding for transmission.[59] DVB is currently focusing on the implementation of the UHD-1 standard.[60] DVB finalized UHD-1 Phase 2 adds features such as high dynamic range (using HLG and PQ at 10 or 12 bits), wide color gamut
(BT. 2020/2100 colorimetry), and high frame rate (up to 120 Hz).[61][60] Video streaming YouTube, since 2010,[62] and Vimeo allow a maximum upload resolution of 4096 × 3072 pixels (12.6 megapixels, aspect ratio 4:3).[63][64] Vimeo's 4K content is currently limited to mostly nature documentaries and tech coverage.[65][66] High Efficiency Video
Coding (HEVC or H.265) should allow streaming 4K content with a bandwidth of 20 to 30 Mbit/s.[67] In January 2014, Naughty America launched the first adult video service streaming in 4K.[68][69] Mobile phone cameras See also: Category: Mobile phones with 4K video recording The first mobile phones to be able to record at 2160p (3840 × 2160)
were released in late 2013, including the Samsung Galaxy Note 3, which is able to record 2160p at 30 frames per second. In the year 2014, the OnePlus One was released with the option to record 2160p at 30 frames per second. In the year 2015, Apple
announced the iPhone 6s was released with the 12 Mpx camera that has the option to record 4K at 25 or 30 frames per second. In the years 2017 and 2018, mobile phone chipsets reached sufficient processing power that mobile phone chipsets reached sufficient processing power that mobile phone with the 12 Mpx camera that has the option to record 4K at 25 or 30 frames per second. In the years 2017 and 2018, mobile phone chipsets reached sufficient processing power that mobile phone with the 12 Mpx camera that has the option to record 4K at 25 or 30 frames per second. In the years 2017 and 2018, mobile phone chipsets reached sufficient processing power that mobile phone with the 12 Mpx camera that has the option to record 4K at 25 or 30 frames per second. In the years 2017 and 2018, mobile phone chipsets reached sufficient processing power that mobile phone with the 12 Mpx camera that has the option to record 4K at 25 or 30 frames per second. In the years 2017 and 2018, mobile phone with the 12 Mpx camera that has the option to record 4K at 25 or 30 frames per second. In the years 2017 and 2018, mobile phone with the 12 Mpx camera that has the option to record 4K at 25 or 30 frames per second. In the years 2017 and 2018, mobile phone with the 12 Mpx camera that has the option to record 4K at 25 or 30 frames per second.
and more realistic appearance.[70] History Samsung UN105S9 105-inch (2,700 mm) ultra-high-definition 4K television In 1984, Hitachi released the CMOS graphics processor ARTC HD63484, which was capable of displaying up to 4K resolution when in monochrome mode.[71] The resolution was targeted at the bit-mapped desktop publishing
market.[71] The first commercially available 4K camera for cinematographic purposes was the Dalsa Origin, released in 2003.[72][73] 4K technology was developed by several research groups in university, Naval Postgraduate School and others that realized[74]
several demonstrations in venues such as IGrid in 2004 and CineGrid. YouTube began supporting 4K for video by selecting "Original" from the quality settings until December 2013, when the 2160p option appeared in the quality menu.[76] In
November 2013, YouTube began to use the VP9 video compression standard, saying that it was more suitable for 4K than High Efficiency Video Coding (HEVC). Google, which owns YouTube, developed VP9.[75] Theaters began projecting movies at 4K resolution in 2011.[77] Sony was offering 4K projectors as early as 2004.[78] The first 4K home
theater projector was released by Sony in 2012.[79] Despite this, few finished films have 4K resolution and enlarged to fit a 4K format.[80] Sony is one of the leading studios promoting UHDTV content, as of 2013[update]
 offering a little over 70 movie and television titles via digital download to a specialized player that stores and decodes the video. The large files ($\approx40\text{ GB}), distributed through consumer broadband connections, raise concerns about data caps.[81] In 2014, Netflix began streaming House of Cards, Breaking Bad,[82] and "some nature documentaries" at
4K to compatible televisions with an HEVC decoder. Most 4K televisions sold in 2013 did not natively support HEVC, with most major manufacturers announcing support in 2014.[84] They are now currently available though Amazon Video.
[85] In March 2016 the first players and discs for Ultra HD Blu-ray—a physical optical disc format supporting 4K resolution and high-dynamic-range video (HDR) at 60 frames per second—were released. [86] On August 2, 2016, Microsoft released the Xbox One S, which supports 4K streaming and has an Ultra HD Blu-ray disc drive, but does not
support 4K gaming.[87] On November 10, 2016, Sony released the PlayStation 4 Pro, which supports 4K streaming and gaming,[88] though not all games are rendered at
native 4K.[91] Home video projection This section may need to be rewritten to comply with Wikipedia's quality standards. You can help. The talk page may contain suggestions. (August 2017) Though experiencing rapid price drops beginning in 2013 for viewing devices, the home cinema digital video projector market saw little expansion, with only a
few manufacturers (only Sony as of 2015[update]) offering limited 4K-capable lineups, with native 4K projectors commanding five-figure price tags well into 2015 before finally breaking the US$10,000 barrier.[92] Critics state that at normal direct-view panel size and viewing distances, the extra pixels of 4K are redundant at the ability of normal
human vision.[citation needed] Projection home cinemas, on the other hand, employ much larger screen sizes without necessarily increasing viewing distance to scale. JVC has used a technique known as "e-shift" to extrapolate extra pixels from 1080p sources to display 4K on screens through upscaling or from native 4K sources at a much lower price
than native 4K projectors.[93] This technology of non-native 4K entered its fourth generation for 2016.[94][95][96] JVC used this same technology to provide 8K flight simulation for Boeing that met the limits of 20/25 visual acuity.[97] Pixel shifting, as described here, was pioneered in the consumer space by JVC, and later in the commercial space by
 Epson. That said, it is not the same thing as "true" 4K. More recently, some DLP projectors claim 4K UHD (which the JVCs and Epsons do not claim). As noted above, DCI 4K is 4096 × 2160, while 4K UHD is 3840 × 2160, producing a slight difference in aspect ratio rather than a significant difference in resolution. Traditional displays, such as LCD or
official resolution of 4K UHD (and therefore Blu-ray UHD discs). The 4K UHD projectors have a 2718 × 1528 pixel structure. Those projectors process the true 4K of data and project it with overlapping pixels, which is what
pixel shifting is. Unfortunately, each of those pixels is far larger: each one has 50% more area than true 4K. Pixel shifting projectors project a pixel, shift it up to the right, by a half diameter, and project it again, with modified data, but that second pixel overlaps the first. In other words, pixel shifting cannot produce adjacent vertical lines of RGBRGE
or other colors where each line is one pixel (1/3840th of the screen) wide. Adjacent red and green pixels would end up looking like yellow, with a fringe on one side of red, on the other of green - except that the next line of pixels overlaps as well, changing the color of that fringe. 4K UHD or 1080p pixel shifting cannot reveal the fine detail of a true 4K
projector such as those Sony ships (business, education and home markets). Also, JVC has one true 4K projector priced at $35,000 (as of mid-2017). So while 4K UHD appears like it has a pixel structures with 1/4 the area of 1080p, that does not happen with pixel shifting. Only a true 4K projector offers that level of resolution. This is why "true" 4K
detail. Some companies like Kaleidescape offer media servers that allow for 4K UHD Blu-ray movies with high dynamic range in a home theater. [98] Broadcasting In November 2014, United States satellite provider Directly became the first pay TV provider to offer access to 4K content, although limited to selected video-on-demand films. [99] In
August 2015, British sports network BT Sport launched a 4K feed, with its first broadcast in high-definition, and a separate 4K broadcast. As the network did not want to mix 4K footage with upconverted HD footage, this telecast
did not feature traditional studio segments at pre-game or half-time, but those hosted from the stadium by the match commentators using a 4K camera. BT envisioned that if viewers wanted to watch studio analysis, they would switch to the HD broadcast and then back for the game. Footage was compressed using H.264 encoders and transmitted to
BT Tower, where it was then transmitted back to BT Sport studios and decompressed for distribution, via 4K-compatible BT TV set-top boxes on an eligible BT Infinity internet plan with at least a 25 Mbit/s connection.[100][101] In late 2015 and January 2016, three Canadian television providers - including Quebec-based Vidéotron, Ontario-based
Rogers Cable, and Bell Fibe TV, announced that they would begin to offer 4K compatible set-top boxes that can stream 4K content to subscribers over gigabit internet, Canadian media conglomerate Rogers Communications announced that it
planned to produce 101 sports telecasts in 4K in 2016 via its Sportsnet division, including all Toronto Blue Jays home games, and "marquee" National Hockey League games beginning in January 20, 2016, including selected Toronto Raptors games and regional
NHL games.[104][105][106] On January 14, 2016, in cooperation with BT Sport, Sportsnet broadcast the first ever NBA game produced in 4K - a Toronto Raptors game, TSN presented the first live 4K telecast produced in North America.[102][104][107] Three
days later, Sportsnet presented the first NHL game in 4K.[108] Dome Productions, a joint venture of Bell Media and Rogers Media (the respective owners of TSN and Sportsnet), constructed a "side-by-side" 4K mobile production unit shared by Sportsnet and TSN's first 4K telecasts; it was designed to operate alongside a separate HD truck and utilize
cameras capable of output in both formats.[109] For the opening game of the 2016 Toronto Blue Jays season, Dome constructed "Trillium" - a production truck integrating both 4K and 1080i high-definition units.[111] In February 2016,
Univision trialed 4K by producing a closed circuit telecast of a football friendly between the national teams of Mexico and Senegal from Miami in the format. The broadcast was streamed privately to several special viewing locations. Univision aimed to develop a 4K streaming app to publicly televise the final of Copa América Centenario in 4K.[112]
[113][114] In March 2016, DirecTV and CBS Sports announced that they would produce the "Amen Corner" supplemental coverage from the Masters golf tournament in 4K.[117] After having trialed the technology in limited matches at the 2013
FIFA Confederations Cup,[118] and the 2014 FIFA World Cup (via private tests and public viewings in the host city of Rio de Janeiro),[119] the 2018 FIFA World Cup was the first FIFA World Cup was the first FIFA World Cup was the first FIFA World Cup in which all matches were produced in 4K. Host Broadcasting Services stated that at least 75% of the broadcast cut on each match would come from 4K.
cameras (covering the majority of main angles), with instant replays and some camera angles being upconverted from 1080p sources. These broadcasts were made available from selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, and selected rightsholders, such as the BBC in the United Kingdom, an
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resolution of the UHDTV1 format defined in SMPTE ST 2036-1,[14] as well as the 4K UHDTV format defined by ITU-R in Rec. 2020,[15] and is also the minimum resolution of Ultra HD displays and project for their 4K broadcasting standard, UHD-1.[60] This resolution of Ultra HD displays and project for their 4K broadcasting standard, UHD-1.[60] This resolution of Ultra HD displays and project for their 4K broadcasting standard, UHD-1.[60] This resolution for CEA's definition of Ultra HD displays and project for their 4K broadcasting standard, UHD-1.[60] This resolution for CEA's definition of Ultra HD displays and project for their 4K broadcasting standard, UHD-1.[60] This resolution for CEA's definition of Ultra HD displays and project for their 4K broadcasting standard, UHD-1.[60] This resolution for CEA's definition of Ultra HD displays and project for their 4K broadcasting standard, UHD-1.[60] This resolution for CEA's definition of Ultra HD displays and project for their 4K broadcasting standard, UHD-1.[60] This resolution for CEA's definition of Ultra HD displays and project for their 4K broadcasting standard, UHD-1.[60] This resolution for CEA's definition of Ultra HD displays and project for their 4K broadcasting standard, UHD-1.[60] This resolution for CEA's definition for CEA's definit for CEA's definition for CEA's definition for CEA's definition 
resolution has an aspect ratio of 16:9, with 8,294,400 total pixels. It is exactly double the horizontal and vertical resolution of 720p (1280 × 720) for a total of 9 times as many pixels. It is sometimes referred to as "2160p", based on the naming
patterns established by the previous 720p and 1080p HDTV standards. In 2013, televisions capable of displaying UHD resolutions were seen by consumer electronics companies as the next trigger for an upgrade cycle after a lack of consumer electronics companies as the next trigger for an upgrade cycle after a lack of consumer electronics.
 has a total of 8,847,360 pixels with an aspect ratio of 256:135 (\approx19:10). It was standardized as the resolution of the 4K container format defined by Digital Cinema Initiatives in the Digital Cinema System specification, and is the native resolution of the 4K container format defined by Digital Cinema Initiatives in the Digital Cinema System specification, and is the native resolution of the 4K container format defined by Digital Cinema System specification allows several different
resolutions for the content inside the container, depending on the desired aspect ratio) 3996 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 3996 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 1716 (CinemaScope crop, ≈2.39:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspect ratio) 4096 × 2160 (full frame, 256:135 or ≈1.90:1 aspe
horizontal and vertical resolution of DCI 2K (2048 × 1080), with four times as many pixels overall. Digital movies made in 4K may be produced, scanned, or stored in a number of other resolution of 4096 × 3112 is often used for acquiring
 "open gate" or anamorphic input material, a resolution based on the historical resolution of scanned Super 35 mm film. [126] Other 4K resolutions Various other non-standardized 4K resolution based on the historical resolution of scanned Super 35 mm film. [126] Other 4K resolution was used in the Canon DP-V3010, a 30-inch (76 cm) 4K reference monitor
designed for reviewing cinema footage in post-production, released in 2013.[127] 4096 \times 2304 (1.77:1 or 16:9); this resolution was used in the 21.5-inch (55 cm) LG UltraFine 22MD4KA 4K monitor, jointly announced by LG and Apple in 2016[128] and used in the 21.5-inch (55 cm) LG UltraFine 22MD4KA 4K monitor, jointly announced by LG and Apple in 2016[128] and used in the 21.5-inch (55 cm) LG UltraFine 22MD4KA 4K monitor, jointly announced by LG and Apple in 2016[128] and used in the 21.5-inch (55 cm) LG UltraFine 22MD4KA 4K monitor, jointly announced by LG and Apple in 2016[128] and used in the 21.5-inch (55 cm) LG UltraFine 22MD4KA 4K monitor, jointly announced by LG and Apple in 2016[128] and used in the 21.5-inch (55 cm) LG UltraFine 22MD4KA 4K monitor, jointly announced by LG and Apple in 2016[128] and used in the 21.5-inch (55 cm) LG UltraFine 22MD4KA 4K monitor, jointly announced by LG and Apple in 2016[128] and used in the 21.5-inch (55 cm) LG UltraFine 22MD4KA 4K monitor, jointly announced by LG and Apple in 2016[128] and used in the 21.5-inch (55 cm) LG UltraFine 22MD4KA 4K monitor, jointly announced by LG and Apple in 2016[128] and used in the 21.5-inch (55 cm) LG UltraFine 22MD4KA 4K monitor, jointly announced by LG and Apple in 2016[128] and used in 2016[128] and used in 2016[128] and used in 2016[128] and 2
in the 22.2-inch (56 cm) IBM T220 and T221 monitors, released in 2001 and 2002 respectively. This resolution is also referred to as "WQUXGA", and is four times the resolution is largely used by 360 videos[130] as they largely use a 2:1 aspect ratio. The reason is to represent a
360° on the horizontal axis and a 180° on the vertical. 3840 × 1600 (2.40:1 or 12:5); a number of computer monitors with this resolution is equivalent to WQXGA (2560 × 1600) extended in width by 50%, or 3840 × 2160 reduced in height by
\approx26%.[131] LG refers to this resolution as "WQHD+" (Wide Quad HD+),[132] while Acer uses the term "UW-QHD+" (Ultra-wide 4K).[134][135] 3840 × 1080 (3.55:1 or 32:9); this resolution was first used in the Samsung C49HG70, a 49-inch (120 cm) curved gaming
monitor released in 2017. This resolution is equivalent to dual 1080p displays (1920 × 1080) side-by-side, but with no border interrupting the image. It is also exactly one half of a 4K UHD (3840 × 2160) display. Samsung refers to this resolution as "DFHD" (Dual Full HD).[136] Recording Sony Handycam FDR-AX1 See also: List of 4K video recording
devices Detail benefit The main advantage of recording video at the 4K standard is that fine spatial detail is resolved well.[137] Individual still frames extracted from 3840×2160-pixel video footage can act as 8.3 megapixels at 1080p and 0.9 megapixels at 720p. If the final video quality is reduced to 2K from
a 4K recording, more detail is apparent than would have been achieved from a native 2K recording.[137] Increased fineness and contrast is then possible with output to DVD and Blu-ray.[138] Some cinematographers record at 4K with the Super 35 film format to offset any resolution loss that may occur during video processing.[139] Chromae
subsampling In full size, this image shows the difference between four subsampling schemes. Note how similar the color images appear. The lower row shows the resolution of the color images appear. The lower row shows the resolution of the color images appear.
at only one quarter the resolution as the brightness information. [140] For 3840 \times 2160 video, this means that the color information is only stored at 1920 \times 1080. [141] [142] Bit rates (usually 10 to 30 Mbit/s). This higher bit rates
reduces the visibility of compression artifacts, even if viewed on monitors with a lower resolution of 1920 × 1080 List of 4K video recording devices 2K resolution - digital video formats with a horizontal resolution of around 2,000 pixels 5K
resolution - digital video formats with a horizontal resolution of around 5,000 pixels, aimed at non-television computer monitor usage 8K resolution - digital video formats with a horizontal resolution of around 10,000 pixels 16K resolution - experimental VR
format Aspect ratio (image) - proportional relationship between an image's width and height Digital cinema Graphics display resolutions up to 8192 × 4320 Rec. 2020 - ITU-R recommendation for UHDTV, defining formats with resolutions of 4K (3840) and resolutions up to 8192 × 4320 Rec. 2020 - ITU-R recommendation for UHDTV, defining formats with resolutions of 4K (3840) and resolutions up to 8192 × 4320 Rec. 2020 - ITU-R recommendation for UHDTV, defining formats with resolutions of 4K (3840) and resolutions up to 8192 × 4320 Rec. 2020 - ITU-R recommendation for UHDTV, defining formats with resolutions of 4K (3840) and resolutions up to 8192 × 4320 Rec. 2020 - ITU-R recommendation for UHDTV, defining formats with resolutions of 4K (3840) and resolutions up to 8192 × 4320 Rec. 2020 - ITU-R recommendation for UHDTV, defining formats with resolutions of 4K (3840) and resolutions up to 8192 × 4320 Rec. 2020 - ITU-R recommendation for UHDTV, defining formats with resolutions of 4K (3840) and resolutions up to 8192 × 4320 Rec. 2020 - ITU-R recommendation for UHDTV, defining formats with resolutions of 4K (3840) and resolutions up to 8192 × 4320 Rec. 2020 - ITU-R recommendation for UHDTV, defining formats with resolutions up to 8192 × 4320 Rec. 2020 - ITU-R recommendation for UHDTV and resolutions up to 8192 × 4320 Rec. 2020 - ITU-R recommendation for UHDTV and recom
× 2160) and 8K (7680 × 4320) Ultra-high-definition television (UHDTV) - various standards for high-resolution television (UHDTV) - various standards for high-resolution television (UHDTV). Visual Effects in a Digital World. Morgan Kaufmann. p. 587. ISBN 9780080520711. 4K resolution: A general term referring to any digital image containing an X resolution of
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2012-10-18, retrieved 2013-01-29. Video "4K resolution video test sequences for Research", Ultra video, FI: TUT. Retrieved from "4Video or display resolutions with a width of around 5,000 pixels Resolution refers to display formats with a horizontal
resolution of around 5,000 pixels. The most common 5K resolution is 5120 × 2880, which has an aspect ratio of 16:9 with around 14.7 million pixels (just over seven times as many pixels as 1080p Full HD), with exactly two times the linear resolution of 1440p and four times that of 720p. This resolution is typically used in computer monitors to achieve
a higher pixel density, and is not a standard format in digital television and digital cinematography, which feature 4K resolutions of 5120 \times 2880 offers 1280 extra columns and 720 extra lines of display area, an increase of 33.33% in each dimension. This additional
display area can allow 4K content to be displayed at native resolution without filling the entire screen, which means that additional software such as video editing suite toolbars will be available without having to downscale the content previews.[2] As of 2016, the world uses 1080p as the mainstream HD standard. However, there is a rapid increase in
media content being released in 4K and even 5K resolution. Online streaming services such as Netflix and Amazon Video launched videos in 4K resolution are actively expanding their collection of videos in 4K resolution. As 4K content becomes more common, the usefulness of 5K displays in editing and content creation may lead to a
higher demand in the future. History Samsung 105 inch Ultra HD television First camera with 5K video capture on April 14, 2008, Red Digital Cinema Camera Company launched one of the first camera with 5K video capture at a
framerate of up to 100 fps.[4] Cameras with 5K resolution are used occasionally for recording films in digital cinematography. Some photographic still images, but not when capturing video. For example, the Canon EOS 5D Mark IV announced in August 2016 has a maximum
resolution of 6720 × 4480 pixels (around 30 megapixels in a 3:2 aspect ratio) which is used for high resolution Samsung first demonstrated its 105-inch UN105S9W curved OLED TV at CES 2014. While Samsung lists the
UN105S9W as a 4K UHD TV, it actually has native resolution of 5120 \times 2160 (a 64:27 or \approx21:9 aspect ratio) which classifies it as a 5K display due to the horizontal pixel count of \approx5,000.[5] First monitor with 5K resolution On September 5, 2014, Dell unveiled the first monitor with a 5K resolution, the UltraSharp UP2715K. This monitor featured a 27-
inch 5120 × 2880 display, giving it a pixel density of around 218 px/in.[6] The monitor only supported DisplayPort version 1.2, which is limited to 5120 × 2880 at 30 Hz. To work around this, the UP2715K implemented a system by which the bandwidth of two DisplayPort connections could be combined to achieve 60 Hz, using a picture-by-picture mode
to virtually treat the display as two smaller 2560 \times 2880 monitors side-by-side and driving each half with a separate DisplayPort connection. Examples of 5K resolutions 27" Retina 5K iMac (2014) Resolution Aspect ratio Total pixels (Mpx) Comments 5120 \times 1440 \ 3.5 \ 32:9 7.37 \ Equivalent to two QHD (2560 <math>\times 1440) images side-by-side 5120 \times 2160 \ 2.370
64:27 (21+1/3:9) 11.06 Equivalent to 4K UHD (3840 × 2700 1.896 256:135 (\approx17:9) 13.82 Same aspect ratio as the DCI 2K (2048 × 1080) and DCI
4 \text{K} (4096 \times 2160) \text{ formats } 5120 \times 2880 \ 1.7 \ 16:9 \ 14.75 \text{ Double the size of } 2560 \times 1440) \text{ in each dimension } 5120 \times 3840 \ 1.3 \ 4:3 \ 19.66 \text{ Five times the size of } 1024 \times 768 \text{ in each dimension } 5120 \times 4096 \ 1.25 \ 5:4 \ 20.97 \text{ The } 24\text{-inch } 2021 \text{ iMac has a } 16:9 \text{ resolution of } 1024 \times 768 \text{ in each dimension } 5120 \times 3000 \ 1.6 \ 8:5 \ 1000 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1.0 \ 1
4480 × 2520, which is considered neither 4K or 5K but 4.5K. List of devices with 5K resolution Monitors AspectRatio Device Size (in) Dimensions (mm) Dimension
diagonal) 5120 × 2880 14.75 218 Dual DisplayPort 1.2 First 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K monitor released Apple Retina 5K iMac[7] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K imac[8] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K imac[8] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K imac[8] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K imac[8] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K imac[8] Custom internal 8-lane DP 1.2 interface First desktop with integrated 5K imac[8] Custom internal 8-lane DP 1.2 integrated 5K imac[8] Custom internal 8-lane DP 1.2 integrated 5K imac[8] Custom integrated 5K imac[8] Custom integrated 5K imac[8] Custom integrated 5K imac[8] Custom integ
XB2779QQS DisplayPort 1.4 LG UltraFine 5K Display[10] Thunderbolt 3 First 5K Thunderbolt 3 Connected monitor released, aimed at Mac users, though basic functionality works on other operating systems 64:27(≈21:9) LG 34WK95U 34 793.77 ×
340.19(863.6 \text{ diagonal})\ 31.25 \times 13.39\ (33\ \text{diagonal})\ 5120 \times 2160\ 11.06\ 163\ \text{Thunderbolt}\ 3\ /\ \text{USB-C},\ \text{DisplayPort}\ 1.4\ 32:9\ \text{Philips}\ \text{Brilliance}\ 49999H\ 49\ 1,198.08 \times 336.96\ (1,244.6\ \text{diagonal})\ 47.17 \times 13.27\ (49\ \text{diagonal})\ 5120 \times 1440\ 7.37\ 109\ \text{HDMI}\ 2.0,
DisplayPort 1.4, USB-C First 5120 \times 1440 monitor Dell Ultrasharp U4919DW DisplayPort 1.4, Thunderbolt 3 LG 49WL95 HDMI 2.0, DisplayPort 1.4, USB-C Samsung CRG9 DisplayPort
Comments 64:27(≈21:9) LG 105UC9[12] 105 5120 × 2160 11.06 53 Samsung UN105S9W[13] Display interface and graphics card support In order to fully utilize a display both require support for advanced connection interfaces, since traditional interfaces such as VGA or DVI don't provide adequate
bandwidth for 5K resolutions at acceptable framerates. The earliest interface to support 5120 × 2880 at 30 Hz or above was DisplayPort, using the HBR2 transmission speed introduced in version 1.2. This could support 5120 × 2880 at 30 Hz with 30 bit/px color depth. HBR2 was first implemented in the AMD Radeon HD 6850 and 6870 in October
2010.[14] NVIDIA introduced HBR2 support on their products with the Kepler family of GPUs, starting with the GeForce GTX 680 in March 2012. HDMI gained similar capability in version 2.0, which increased the maximum allowed transmission speed to 600 MHz TMDS (18 Gbit/s). The NVIDIA GeForce GTX 980, launched in late 2014, was the first
graphics card to implement this capability, which was sufficient for 5120 × 2880 at 30 Hz with 30 bit/px color depth. The NVIDIA GeForce GTX 1080 launched in mid 2016 and was the first graphics card to introduce support 5120 × 2880 at
60 Hz with 24 bit/px color depth. It was followed shortly by the AMD Radeon RX 480, which introduced support for HBR3 and 600 MHz HDMI transmission on the AMD side.[16] Although 5K 60 Hz over a single cable was only made possible in 2016 with the launch of the GeForce 1000 series and Radeon RX 400 series, monitors which predate version
1.3 of the DisplayPort standard such as the Dell UltraSharp UP2715K offer the ability to run at 5K 60 Hz by using two HBR2 DisplayPort connections concurrently in a specialized picture-by-picture mode.[17] The Apple Retina 5K iMac released in 2014 used a custom internal interface with 8 lanes of DisplayPort at HBR2 speed (a standard DP
connection is 4 lanes) to drive its display panel at 60 Hz.[18] Display mode Maximum refresh frequency (Hz) Resolution Ratio Color depth HDMI 2.0 HDMI 2.1 DP 1.3-1.4 DP 2.0 5120 × 2180 (16:9) 8 bpc (24 bit/px) 30 100 30 60 200 10 bpc (30 bit/px)
30 85 30 50 144 Only the highest standard frequencies (24 / 30 / 50 / 60 / 75 / 85 / 100 / 120 / 144 / 200 / 240) are listed. CVT-RB timing format and uncompressed RGB or YCBCR 4:4:4 color mode are assumed. See also Film portal Tv portal 1080p Full HD - digital video format
with a vertical resolution of 1440, aimed at non-television computer monitor usage 21:9 - a common widescreen cinema aspect ratio 4K resolution - digital video formats with a horizontal resolution of around 8000 pixels 10K resolution - digital video formats with a
horizontal resolution of around 10,000 pixels, aimed at non-television computer monitor usage 16K resolution - experimental VR format Aspect ratio (image) - proportional relationship between an image's width and height Display resolution References ^ "Dell's new LCD monitor to be start of 5K resolution?". ZDNet. September 18, 2014.
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The first devices available featured ultra-wide "21:9" screens with the vertical resolution of 8K, which has a native 16:9 aspect ratio of 64:27 (\$\approx21:9\$) and a resolution of 10240 \$\approx 4320.[1] In November 2016, the Consumer Technology Association published CTA-861-G, an update to their standard for digital video transmission formats. This revision added support for 10240 × 4320, a 10K resolution with an aspect ratio of 64:27 (≈21:9), at up to 120 Hz.[2] On January 4, 2017, HDMI version 2.1 was officially announced, and was later released on November 28, 2017.[3][4][5] HDMI 2.1 includes support for all the formats listed in the CTA-861-G standard, including 10K (10240 × 4320) at up to 120 Hz.[4][5] HDMI 2.1 specifies a new Ultra High Speed HDMI cable which supports a bandwidth of up to 48 Gbit/s. Display Stream Compression (DSC) 1.2a is used for video formats higher than 8K resolution with 4:2:0 chroma subsampling.[4][5][6] Cameras As of 2021[update], there are multiple companies producing photo cameras capable of 10K and higher resolutions, such as Phase One,[7][8] Fujifilm,[9][10] Hasselblad,[11][12] and Sony.[13][14] Other companies also create sensors capable of 10K resolution, though they are mostly not available to the general public, and are often used for scientific or industrial purposes.[15][16][17] Blackmagic Design is the only company producing a video camera capable of filming in resolutions 10K or higher with their URSA Mini Pro 12K.[18][19] See also Ultrawide formats References ^ Larsen, Ramus (2015-05-05). "TV with 10K resolution exhibited by Chinese BOE". flatpanelshd. Retrieved 2017-01-14. ^ "CTA-861-G — A DTV Profile for Uncompressed High Speed Digital Interfaces" (PDF). Consumer Technology Association (CTA). Archived from the original (PDF) on 2017-11-30. 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