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Aac

AAFC is the short duration of increased and alternative communication. Communication systems, strategies and tools that replace or complement natural speech are known as augmented and alternative communication (AAC). These tools support a person who has difficulty communicating using speech. The first A of the AAFC means increased communication. When you increase something, you add to it or supplement. Increased communication is when you complete your speech with something (signs, symbols, a table of letters, for example) to make your message clearer to your listener. The AAFC's second A means alternative communication. That's when you're not able to talk, or your speech isn't understandable, even when you add something to it. In this case, you need a different way of communicating. Basically, AAFC are the tools, systems and strategies that help a person communicate when they are not able to communicate effectively using speech. Who is it? There are several reasons why a person may not be able to communicate using speech. They may have an intellectual disability that has affected the development of the person's speech. They may have an acquired disorder that has affected the person's ability to speak. Communicating without speaking Communicating without words can cause frustration for many people. The person who does not speak and his communication partner can become confused and frustrated when messages cannot be transmitted effectively. Often, a person who does not speak will have many thoughts that he wishes to communicate, but there is no way to get those thoughts out. When a person is unable to speak, others often judge their competence, potential and ability to think and learn. A person who does not speak will quickly learn that certain things are easy to communicate (e.g., reach the TV remote to suggest that you want to switch channels), and some things are difficult (e.g., the TV show reminds you of a family member who has left). What types of AAFC are often used? AAFC incorporates all the tools and strategies that a person can use to communicate when they are unable to speak. Unaided AAFC - or CAA that does not require physical help or tools: Facial Expressions Body Language Gestures Sign Language Help AAC - or CAA that uses tools or equipment. Symbol Cards Choice Cards Keyboards Speech-Generating Devices AAFC Applications on Mobile Devices when we set up for AAFC, we may use a high-tech tool (e.g., a speech-generating device or AAFC app on an iPad), or a light-tech/paper tool (e.g., a communication book or table). Many people who can't talk can't read and read yet. We introduce these users to visual symbols that represent words or perhaps phrases. Proloquo2Go is the AAC solution based on The symbols of AssistiveWare. An AAFC system can be a text-based system with a keyboard. This is usually for a person who but has developed or retained effective literacy skills. Proloquo4Text is the text-based AAC solution from AssistiveWare. Many people who do not speak but use the AAFC are multimodal communicators. This means that they have several ways to communicate their messages. Perhaps they use a combination of vocalizations and approximations of words, gestures and signs as well as an AAC system. All different methods of communication must be valued and respected. Any communication will tell us something about the person and the situation. Just because a person has some oral communication in the form of words or vocalizations does not mean that they should not be eligible for the CAA. By giving a person with limited speech, an AAFC system will give them more words and language, and the ability to communicate much more than they can with speech alone. Benefits of AAFC When a person cannot speak, it is truly powerful to give them more tools to communicate their thoughts and ideas, desires and wishes. People who use CAA describe countless benefits, including: stronger friendships and deeper relationships of richer and more frequent social roles: a family member, friend, professional, student have increased their autonomy and decision-making power over their own lives, greater independence from others greater participation in their family life, and better sharing of information with physicians have improved personal security in a variety of health care settings. , as hospitals or long-term institutions, more jobs and volunteer opportunities have improved physical and mental health speech therapists, educators and families often report additional benefits. These include increased speech production or attempts at spoken words, stronger relationships with family members and caregivers, a better understanding of receptive language, and more. Conversely, there are often difficulties when AAFC is not introduced. People who use aac say that before having a communication system they have experienced: more social isolation and loneliness has increased frustration and acting with close people a greater vulnerability, especially when they are alone in a care setting feel excluded from important decisions about their own inability to live to show what they know or can learn AAFC is simply a tool that supports people who can not speak. But communication is always a street of two, an interaction between two or more people. Families, friends, schoolchildren, colleagues, doctors and others all benefit from training and advice on how to be a good communication partner for people who use CAA. Training communication partners includes learning how the person using the CAA wants to be supported. The AAFC's journey Communication is a fundamental human right. A person with communication difficulties can find his or her voice with AAFC. Before you start the aac journey, you can if AAFC is really necessary. Will AAFC be beneficial? When should we consider the AAFC? If you need help answering these questions, please see the article Do we need AAFC? If you want to see where you stand on the AAFC journey, to make plans to support change and progress, please use our AAFC Learning Guide. This can help you consider choosing the right AAC system for one person, being set up for AAFC, and then helping to build the language and actual communication. Good luck, please contact our support team if you need help along the way! The AssistiveWare team references and links ASHA Clinical Topic: Augmentative and Alternative Communication Ahern, Kate. 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How to Help Kids With Working Memory Issues by Rae Jacobson Parents Guide to ADHD Medications by Child Mind Institute The Most Common Misdiagnoses in Children by Linda Spiro, PsyD How to Spot Dyscalculia by Rae Jacobson Post-Traumatic Stress Disorder Basics by Child Mind Institute How to Help Anxious Kids in Social Situations by Katherine Martinelli Anxiety in the Classroom by Rachel Ehmke The benefits of an unsupervised game will make you want to roll back your children's activities in a great wayby Katie McPherson How to avoid passing on anxiety to your children by Brigit Katz 3 Defining ADHD Characteristics that everyone neglects by William Dodson, M.D. Should we teach emotions at school? by Grace Rubenstein Lossy audio compression format Advanced Audio CodingFilename extensionMPEG/3GPP container .m4a, .mp4, .3gp Apple container .m4a, .m4b, .m4p, .m4r, .m4v ADTS stream .aac media type audio/aac audio/aacp audio/3gpp audio/3gpp2 audio/mp4 audio/mp4a-latm audio/mpeg4-genericDeveloped byBell, Fraunhofer, Dolby, Sony, Nokia, LG Electronics, NEC, NTT Docomo, Panasonic[1]Initial Panasonic[1]Initial 23 years ago (1997)[2]Type of formatSust format, compression lossyConverted by MPEG-4 Part 14, 3GP and 3G2, ISO basic multimedia file format and audio data exchange format (ADIF)StandardISO/IEC 13818-7,ISO/IEC 14496-3 Advanced Audio Coding (AAC) is an audio coding standard for digital audio compression lossy. Designed to be the successor to the MP3 format, AAC generally achieves higher sound quality than mp3 at the same bit rate. [3] AAFC was standardized by ISO and IEC under the MPEG-2 and MPEG-4 specifications. [4] [5] As part of the AAFC, HE-AAC (AAC) is part of MPEG-4 Audio and is adopted in the DAB and Digital World Radio standards, and DVB-H and ATSC-M/H. AAC supports the inclusion of 48 full-bandwidth audio channels (up to 96 kHz) in a stream plus 16 low-frequency channels (LFE, limited to 120 Hz), up to 16 coupling or dialogue channels, and up to 16 streams of data. The quality of the stereo is satisfactory with modest requirements at 96 kbps in attached stereo mode; however, hi-fi transparency requires data rates of at least 128 kbps (VBR). MpEG-4 audio tests showed that AAFC meets the requirements called transparent for ITU at 128 kbps for stereo, and 320 kbps for 5.1 audio. [citation needed] AAFC uses only a discrete modified cosine transformation algorithm (MDCT), which gives it higher compression efficiency than mp3, which uses a hybrid coding algorithm that is part of the MDCT and FFT part. [3] AAC is the default or standard audio format for iPhone, iPod, iPad, Nintendo DSi, Nintendo 3DS, iTunes, DivX Plus Web Player, PlayStation 3 and various Nokia Series 40 phones. It is supported on PlayStation Vita, Wii, Sony Walkman MP3 series and later, Android and BlackBerry. AAC is also supported by manufacturers of car audio systems on dashboards. [when?] [wave] Historical Context The discrete transformation of cosine (DCT), a type of transformational coding for lossy compression, was proposed by Nasir Ahmed in 1972, and developed by Ahmed with T. Natarajan and K. R. Rao in 1973, publishing their results in 1974. [6] [7] [8] This led to the development of the modified discrete cosine transformation (MDCT), proposed by J. P. Princen, A. W. Johnson and A.B. Bradley in 1987,[9] following previous work by Princen and Bradley in 1986. The MP3 audio coding standard introduced in 1994 used a hybrid coding algorithm that is part of the MDCT and FFT. [11] AAFC uses a purely MDCT algorithm, giving it higher compression efficiency than MP3. AAFC was developed with the cooperation and contributions of companies such as Bell Labs, IIS, Dolby Laboratories, LG Electronics, NEC, NTT Docomo, Panasonic, Sony Corporation,[1] ETRI, JVC Kenwood, Philips, Microsoft and NTT. [12] It was officially declared an international standard by the Moving Picture Experts Group in April 1997. It is specified as part 7 of the MPEG-2 and Sub-Part 4 of Part 3 of THE MPEG-4 standard. [13] Standardization In 1997, AAFC was first introduced as MPEG-2 Part 7, officially known as ISO/IEC 13818-7:1997. This part of MPEG-2 was a new part, since MPEG-2 already included MPEG-2 Part 3, officially known as ISO/IEC 13818-3: MPEG-2 BC (Backwards Compatible). [14] [15] Therefore, MPEG-2 Part 7 is also known as MPEG-2 NBC (Non-Backward Compatible), because it is not compatible with MPEG-1 audio formats (MP1, MP2 and MP3). [14] [16] [17] [18] MPEG-2 Part 7 defines three profiles: low-complexity profile (AAC-LC/LC-AAC), main profile (AAC Main) and evolutionary sampling rate profile (AAC-SSR). The AAC-LC profile consists of a basic format very similar to the perceptual audio coding format (PAC) of AT and T[19][20][21] with the addition of the time format of noise (TNS),[22] the Kaiser window (described below), a non-uniform quantifier, and an overhaul of the bitstream format to manage up to 16 stereo channels, 16 mono channels, 16 low-frequency channels (LFE) and 16 comment channels in one bitstream. The main profile adds a set of recursive predictors that are calculated on each faucet of the filter bank. The SSR uses a 4-band PQMF filter bank, with four shorter wire banks, to enable scalable sampling rates. In 1999, Part 7 of MPEG-2 was updated and included in the MPEG-4 family of standards and became known as MPEG-4 Part 3, MPEG-4 Audio or ISO/IEC 14496-3:1999. This update included several improvements. One of these improvements has been the addition of audio object types that are used to enable interoperability with a diverse range of other audio formats such as TwinVQ, CELP, HVXC, Text-To-Speech Interface and MPEG-4 Structured Audio. Another notable addition to this version of the AAC standard is perceptual Noise Substitution (PNS). In this regard, AAFC profiles (AAC-LC profiles, AAC Main and AAC-SSR profiles) are combined with perceptual noise substitution and are defined in the MPEG-4 audio standard as audio object types. [23] The types of MPEG-4 audio objects are combined into four MPEG-4 audio profiles: Principal (which includes most types of MPEG-4 audio objects), scalable (AAC LC, AAC LTP, CELP, HVXC, TwinVQ, Wavetable Synthesis, TTSI), Speech (CELP, HVXC, TTSI) and low Synthesis rate (Wavetable Synthesis, TTSI). [24] [25] Reference software for mpeg-4 part 3 is specified in MPEG-4 Part 5 and compliance bit-streams are specified in MPEG-4 Part 4. MPEG-4 Audio remains backward-compatible with MPEG-2 Part 7. [26] The MPEG-4 2 audio version (ISO/IEC 14496-3:1999/Amd 1:2000) has defined new types of audio objects: low-delay AAC-LD (AAC-LD) object type, bit-sliced (BSAC) object type, parametric audio coding using harmonic and individual line plus resilient noise and error (ER) versions of object types. [27] [28] [29] It has also defined four new audio profiles: High-quality audio Low-delayed audio profile, natural audio profile and mobile audio work profile on the Internet. [30] The HE-AAC (AAC LC with SBR) and AAC (AAC LC) profile were first standardized in ISO/IEC 14496-3:2001/Amd 1:2003. [31] The HE-AAC v2 profile (AAC LC with SBR and Parametric Stereo) was first specified in ISO/IEC 14496-3:2005/Amd 2:2006. [32] [33] [34] The type of stereo parametric audio object used in HE-AAC v2 was first defined in ISO/IEC 14496-3:2001/Amd 2:2004. [35] [36] [37] The current version of the AAC standard is defined in ISO/IEC 14496-3:2009. [38] AAC v2 is also standardized by the European Telecommunications Standards Institute (ETSI) as TS 102005. [35] The MPEG-4 Part 3 also contains other ways to compress sound. These include loss-free compression formats, synthetic audio and low-bit compression formats commonly used for speech. AAC's improvements to advanced MP3 audio coding are designed to replace the MPEG-1 3 audio layer, known as MP3, which was specified by ISO/IEC in 11172-3 (MPEG-1 Audio) and 13818-3 (MPEG-2 Audio). Blind tests in the late 1990s showed that AAFC demonstrated higher sound quality and transparency than MP3 for files coded at the same rate. [3] Improvements include: more sample rates (8 to 96 kHz) than MP3 (16 to 48 kHz); up to 48 channels (MP3 supports up to two channels in MPEG-1 mode and up to 5.1 channels in MPEG-2 mode); arbitrary bit rates and variable image length. Standardized constant bit rate with bit tank; higher efficiency and a simpler filter bank. AAFC uses pure MDCT (modified discrete cosine transformation), rather than hybrid mp3 coding (which was part of the MDCT and FFT part); higher coding efficiency for stationary signals (AAC uses a blocksize of 1024 or 960 samples, allowing more efficient coding than the 576 blocks of MP3 samples); Higher coding accuracy for transient signals (AAC uses a blocksize of 128 or 120 samples, allowing more accurate coding than the 192 blocks of MP3 samples); the possibility of using the Kaiser-Bessel derived window function to eliminate spectral leaks at the expense of widening the main lobe; much better handling audio frequencies above 16 kHz; more flexible joint stereo (different methods can be used in different frequency ranges); additional modules (tools) added to increase compression efficiency: NST, upside-down prediction, perceptual noise substitution (PNS), etc. These modules can be combined different encoding profiles. Overall, the AAC format allows developers more flexibility to design codecs than MP3, and corrects many of the design choices made in the original MPEG-1 audio specification. This increased flexibility often leads to more simultaneous encoding strategies and, as a result, more efficient compression. This is especially true at very low bit rates where the top stereo coding, pure MDCT, and better transform the window window mp3 unable to compete. Although the MP3 format has an almost universal hardware and software support, mainly because mp3 was the format of choice during the crucial early years of widespread music file sharing/distribution on the Internet, AAC is a serious competitor due to some unwavering industry support. [39] AAC Functionality is a broadband audio coding algorithm that exploits two primary coding strategies to dramatically reduce the amount of data needed to represent high-quality digital audio: Signal components that are perceptually irrelevant are discarded. Redundancies in the coded audio signal are eliminated. The actual encoding process consists of the following steps: the signal is converted from the time domain to the frequency domain using the discrete forward modified cosine transformation (MDCT). This is done using filter banks that take an appropriate number of time samples and convert them into frequency samples. The frequency domain signal is quantified according to a psychoacoustic and coded model. Internal error correction codes are added. The signal is stored or transmitted. In order to avoid corrupted samples, a modern implementation of the Luhn mod N algorithm is applied to each image. [40] The MPEG-4 audio standard does not define a single or small set of highly efficient compression systems, but rather a complex toolkit for performing a wide range of operations, from low-bit speech coding to high-quality audio coding and music synthesis. The MPEG-4 family of audio coding algorithms covers the range, from low-flow speech encoding (up to 2 kbps) to high-quality audio coding (at 64 kbps per channel and more). AAFC offers sampling frequencies between 8 kHz and 96 kHz and a number of channels between 1 and 48. Unlike the MP3 hybrid filter bank, AAC uses modified discrete cosine processing (MDCT) as well as window length increase of 1024 or 960 points. AAC encoders can dynamically switch between a single MDCT length block of 1024 points or 8 blocks of 128 points (or between 960 points and 120 points, respectively). If a signal change or transient occurs, 8 shorter windows of 128/120 points each are chosen for their best time resolution. By default, the longer window of 1024 points/960 points is otherwise used because the increased frequency resolution allows for a more sophisticated psychoacoustic model, which improves coding efficiency. AAC modular encoding takes a modular approach to encoding. Depending on the complexity of the to code, desired performance and acceptable output, implementers can create profiles to define which of a specific set of tools they want to use for a particular application. The MPEG-2 Part 7 (Advanced Audio Coding) standard was first published in 1997 and offers three default profiles:[2][41] Low Complexity (LC) - the simplest and most widely used and and Main Profile (Main) - like the LC profile, with the addition of reverse prediction Evolutionary Sampling Rates (SSR) aka Sample-Rate Scalable (SRS) The MPEG-4 Part 3 (MPEG-4 Audio) standard has defined various new compression tools (aka types of audio objects) and their use in new profiles. AAFC is not used in some MPEG-4 audio profiles. The MPEG-2 Part 7 AAC LC profile, the AAFC main profile and the AAFC SSR profile are combined with the substitution of perceptual noise and defined in the MPEG-4 audio standard as audio object types (as AAC LC, AAC Main and AAC SSR). These are combined with other types of objects in MPEG-4 audio profiles. [23] Here is a list of some audio profiles defined in MPEG-4:[32][42] Main article: MPEG-4 Part 3: Audio Profiles Main Audio Profile - defined in 1999, uses most types of MPEG-4 audio objects (AAC Main, AAC-LC, AAC-SSR, AAC-LTP, AAC Scalable, TwinVQ, CELP, HVXC, TTSI, Main synthesis) Scalable audio profile - defined in 1999, uses AAC-LC, AAC-LTP, AAC Scalable , TwinVQ , CELP, HVXC, TTSI Speech Audio Profile - defined in 1999, uses celp, HVXC, TTSI Synthetic Audio Profile - defined in 1999, TTSI, Main synthesis High Quality Audio Profile - defined in 2000, uses AAC-LC, AAC-LTP, AAC Scalable, CELP, ER-AAC-LC, ER-AAC-LTP, ER-AAC Scalable, ER-CELP Low Delay Audio Profile - defined in 2000, uses CELP, HVXC, TTSI, ER-AAC-LD, ER-CELP, ER-HVXC Low Delay AAC v2 - defined in 2012 , uses AAC-LD, AAC-ELD and AAC-ELDv2[43] Mobile Audio Internetworking Profile - defined in 2000, uses the ER-AAC-LC, ER-AAC-Scalable, ER-TwinVQ, ER-BSAC, ER-AAC-LD AAC Profile - defined in 2003, uses AAC-LC High Efficiency AAC Profile - defined in 2003, uses AAC-LC, SBR High Efficiency AAC v2 Profile - defined in 2006, uses AAC-LC, SBR PS Extended High Efficiency AAC xHE-AAC - defined in 2012, uses USAC One of the many improvements to MPEG-4 Audio is a type of object called Long-Term Prediction (LTP) , which is an improvement in the main profile using a front predictor with lower computational complexity. [26] AAFC Error Protection Toolkit The application of error protection allows error correction to some extent. Error correction codes are generally also applied to the entire payload. However, since different parts of an AAFC payload have a different sensitivity to transmission errors, this would not be a very effective approach. The AAC payload can be subdivided into parts with different error sensitivities. Independent error correction codes can be applied to any of these parts using the error protection tool AUDIO MPEG-4. This toolkit provides error correction ability to the most sensitive parts of the payload in order to keep the extra overheads low. The toolbox is compatible with simpler, pre-existing AAC set-top boxes. Much of the error-correcting functions of the toolbox audio signal information more evenly in the data stream. Error-resistant AAC (ER) error resilience techniques can be used to make the coding system itself more robust against errors. For aac, three custom methods have been developed and defined in MPEG-4 Audio Huffman Codeword Reordering (UNHCR) to prevent the spread of errors in Virtual Codebooks (VCB11) spectral data to detect Serious errors in reversible spectral data Variable Length Code (RVLC) to reduce the spread of errors in AAC Low Delay Scale Factor Data Main Article: AAC-LD MPEG-4 Low Delay Audio Coding Standards, Enhanced Low Delay and Enhanced Low Delay v2 (AAC-LD, AAC-ELD, AAC-ELDv2) as defined in ISO/IEC 14496-3:2009 and ISO/IEC 14496-3:2009/Amd 3 are designed to combine the benefits of perceptual audio coding with the low time required for two-way communication. They are closely derived from the MPEG-2 Advanced Audio Coding (AAC) format. [44] [45] [46] AAC-ELD is recommended by GSMA as a super-wide-band voice codec in the IMS profile for HDVC Service. [47] Licenses and Patents No license or payment is required for a user to broadcast or distribute content in AAC format. [48] This reason alone could have made AAFC a more attractive format for distributing content than its PREDECESSOR MP3, particularly for streaming content (such as Internet radio) depending on the case of use. However, a patent license is [when?] required for all manufacturers or developers of AAC codecs. [49] For this reason, free and open source software implementations such as FFmpeg and FAAC can only be distributed as a source, in order to avoid patent infringement. (See below under Products that support AAFC, Software.) AAFC patent holders include Bell Labs, Dolby, Fraunhofer, LG Electronics, NEC, NTT Docomo, Panasonic, Sony Corporation,[1] ETRI, JVC Kenwood, Philips, Microsoft and NTT. [12] Extensions and improvements Some extensions were added to the first AAC standard (defined in Part 7 of MPEG-2 in 1997): Perceptual noise substitution (PNS), added in MPEG-4 in 1999. It allows the coding of noise as pseudorandom data. Long-Term Predictor (LTP), added in MPEG-4 in 1999. This is a forward predictor with lower computational complexity. [26] Error Resilience (ER), added in mpeg-4 audio version 2 in 2000, used for transport on error-prone channels[50] AAC-LD (Low Delay), defined in 2000, used for real-time conversation applications High Efficiency AAC (HE-AAC), aka aacPlus v1 or AAC, the combination of SBR (Spectral Spectral Replication) and AAC LC. Used for low bitrates. Defined in 2003. HE-AAC v2, aka aacPlus v2 or eAAC, the combination of Parametric Stereo (PS) and HE-AAC; used for even weaker bitrates. Defined in 2004 and 2006. MPEG-4 Lossless Scalable (SLS), defined in 2006, can complete an AAC stream to provide a option, as in fraunhofer IIS HD-AAC container formats Product Main Article: MPEG-4 Part 3: Audio Storage and Transport In addition to the MP4, 3GP and other container formats based on the ISO basic multimedia file format for file storage, AAC audio data was first packaged into a file for MPEG-2 using the audio data exchange format (ADIF),[51] consisting of a single header tracked by raw AAC audio data blocks. [52] However, if the data is to be broadcast in an MPEG-2 transport stream, a self-synchronization format called the data transport audio stream (ADTS) is used, consisting of a series of images, each image having a header followed by the audio data of the AAFC. [51] This file and streaming-based format are set in mpeg-2 part 7, but are only considered informative by MPEG-4, so an MPEG-4 set-top box does not need to support either format. [51] These containers, along with a gross AAC stream, can support the .aac file extension. MPEG-4 Part 3 also defines its own self-synchronization format called a low overhead audio stream (LOAS) that summarizes not only AAC, but any MPEG-4 audio compression system such as TwinVQ and ALS. This format is what has been set for use in DVB transport flows when coders use either SBR or parametric stereo AAC extensions. However, it is limited to a single non-multiplexed AAC stream. This format is also called low overhead audio transport multiplex (LATM), which is just a multiple-stream interlaced version of a LOAS. [51] Products that support the AAFC This section needs additional citations for verification. Please help improve this article by adding quotes to reliable sources. Unsurned material may be challenged and removed. Find sources: Advanced Audio Coding - News Newspapers Books scholar JSTOR (September 2017) (Learn how and when to delete this model message) Japanese HDTV IsDB-T Standards In December 2003, Japan began broadcasting the terrestrial standard DTV ISDB-T that implements MPEG-2 video and AAC MPEG-2 audio. In April 2006, Japan began broadcasting the mobile sub-program ISDB-T, called 1seg, which was the first implementation of H.264/AVC video with he-AAC audio in the terrestrial HDTV broadcasting service on the planet. International ISDB-Tb In December 2007, Brazil began broadcasting the terrestrial TVN standard called International ISDB-Tb that implements H.264/stroke video coding with AAC-LC audio on the main program (single or multi) and H.264/AVC video with HE-AACv2 audio in the 1seg mobile sub-program. DVB ETSI, the governing body for standards in the DVB suite, supports the AAFC, HE-AAC and HE-AAC v2 audio in DVB applications since at least 2004. [53] DVB programs that use H.264 compression for video normally use HE-AAC for audio. [citation needed] iTunes and iPod Hardware In April 2003, Apple brought the public's attention to AAC by announcing that its iTunes iTunes iPod products would support songs in AAC MPEG-4 format (via a firmware update for older iPods). Customers could download music in a closed form of AAFC (see FairPlay) via the iTunes Store or create DRM-free files from their own CDs using iTunes. In the following years, Apple began offering music videos and movies, which also use AAC for audio encoding. On May 29, 2007, Apple began selling DRM-free songs and music videos to participating record companies. These files adhere primarily to the AAC standard and are playable on many non-Apple products, but they include personalized iTunes information such as album illustration and a purchase receipt, in order to identify the customer in case the file is leaked on peer-to-peer networks. However, it is possible to remove these custom tags to restore interoperability with players who strictly comply with AAC specifications. [citation needed] As of January 6, 2009, almost all music from the U.S. iTunes Store has become DRM-free, with the rest becoming DRM-free at the end of March 2009. ITunes supports a Variable Bit Rate (VBR) encoding option that encodes AAC tracks in an Average Bit Rate (ABR) system. [citation needed] In September 2009, Apple added support for HE-AAC (which is entirely part of the MP4 standard) only for radio streams, not for file playback, and iTunes still lacks support for true VBR coding. The underlying QuickTime API, however, offers a true VBR encoding profile. Other portable players Archos Cowon (unofficially supported on some models) Creative Zen Portable Fiio (all current models) Nintendo 3DS Nintendo DSi Philips GoGear Muse PlayStation Portable (PSP) with firmware 2.0 or more Samsung YEPP SanDisk Sansa (some models) Walkman Zune Any portable player that fully supports the third-party rockbox rockbox mobile phone firmware For a number of years , many mobile phones from manufacturers such as Nokia , Motorola, Samsung, Sony Ericsson, BenQ-Siemens and Philips supported the reading of AAC. The first phone of its kind was the Nokia 5510 released in 2002 which also plays MP3s. However, this phone was a commercial failure [citation needed] and these phones with built-in music players did not gain mainstream popularity until 2005 when the trend to have AAC as well as MP3 support continued. Most new smartphones and phones on paper to music support the reading of these formats. Sony Ericsson phones support various AAC formats in the MP4 container. AAC-LC is supported all phones from K700, phones starting with W550 have the support of HE-AAC. The latest devices such as the P990, K610, W890i and later support HE-AAC v2. Nokia XpressMusic and other next-generation Nokia media phones like N- and E-Series also support the AAC format in the LC, HE, M4A and HEv2 profiles. These also supports the reading of AAC coded audio LTP. BlackBerry phones running the 10 operating systems support AAC reading natively. Some previous generation BlackBerry OS devices also support AAC. Apple's bada OS iPhone supports AAFC and FairPlay files that were previously used as the default encoding format in the iTunes Store until DRM restrictions were removed in March 2009. Android 2.3[55] and later supports AAC-LC, HE-AAC and HE-AAC v2 in MP4 or M4A containers as well as several other audio formats. Android 3.1 and later supports raw ADTS files. Android 4.1 can code AAC. WebOS by HP/Palm supports AAC, AAC, eAAC, and .m4a containers in its native music player as well as several third-party players. However, it does not support Apple's FairPlay DRM files downloaded from iTunes. Windows Phone's Silverlight run time supports AAC-LC, HE-AAC and HE-AAC v2 decoding. Other Apple iPad devices: Supports AAFC and FairPlay files protected by AAFC used as the default encoding format in iTunes Store Palm OS PDAs: Many Palm OS-based PDAs and smartphones can play AAC and HE-AAC with third-party Pocket Tunes software. Version 4.0, released in December 2006, added support for native AAFC and HE-AAFC files. The AAC codec for TCPMP, a popular video player, was removed after version 0.66 due to patent issues, but can still be downloaded from sites other than corecodec.org. CorePlayer, TCPMP's business tracking, includes AAC support. Other palm bone programs supporting AAC include Kinoma Player and AeroPlayer. Windows Mobile: Supports AAC either by the native windows media player or by third-party products (TCPMP, CorePlayer)[citation needed] Epson: Supports AAC playback in the P-2000 and P-4000 Multimedia/Photo Storage Viewers Sony Reader: plays M4A files containing AAC, and displays metadata created by iTunes. Other Sony products, including the A-Series and E Network Walkmans, support AAC with firmware updates (released in May 2006) while the S-Series supports it out of the box. Sonos Digital Media Player: supports the reading of AAC Barnes and Noble Nook Color files: supports the reading of AAC Roku SoundBridge coded files: a network audio player, supports the reading of coded AAC Squeezebox files: network audio player (manufactured by Slim Devices, Logitech) supports playstation PlayStation 3 file playback: supports encoding and decoding Xbox 360 AAC files: supports AAC streaming via Zune software, and supported iPods connected via the Wii USB port: supports AAC files via the version From December 11, 2007. All AAC profiles and bitrates are supported as long as they are in the extension .m4a file. This update has removed MP3 compatibility, but users who have installed this can freely downgrade to the old version if they wish. [58] Livescribe Pulse and Echo Smartpens: Record and store audio in AAC format. Audio files can be replayed using the built-in speaker of the pen, pen, or on a computer using Livescribe Desktop software. AAC files are stored in the Windows operating system user's My Documents folder and can be distributed and harmed without Livescribe's specialized hardware or software. Google Chromecast: Supports LC-AAC and HE-AAC Audio Playback[59] Software Almost all current players in computer media include built-in set-top boxes for AAC, or can use a library to decode it. On Microsoft Windows, DirectShow can be used this way with the corresponding filters to enable AAC playback in any DirectShow-based player. Mac OS X supports AAC via QuickTime libraries. Adobe Flash Player, since updated version 9 3, can also play AAC feeds. [60] [61] Since Flash Player is also a browser plugin, it can read AAC files through a browser as well. The Rockbox open source firmware (available for multiple portable players) also offers support for AAFC to varying degrees, depending on the player model and the AAC profile. Optional iPod support (unprotected AAC file playback) for Xbox 360 is available for free download on Xbox Live. [62] The following is an incomplete list of other software player applications: 3ivx MPEG-4: a suite of DirectShow and QuickTime plugins that supports AAC encoding or AAC/HE-AAC decoding in any DirectShow CorePlayer app: also supports the LC and HE AAC ffdshow: a free open source directshow filter for Microsoft Windows that uses FAAD2 to support the AAC 00 coding foobar20: a freeware audio player for Windows that supports LC and HE AAC KMPlayer MediaMonkey AIMP Media Player Classic Home Cinema mp3tag MPlayer or xine: often used as AAC set-top boxes on Linux or Macintosh MusicBee: an advanced music manager and player who also supports encoding and tearing through a RealPlayer plugin : includes RealNetworks RealAudio 10 AAC encode Songbird: supports AAC on Windows, Linux and Mac OS X , including the DRM rights management encoding used for music purchased from the iTunes Store, with a Sony SonicStage VLC plug-in media player: supports reading and encoding Winamp raw MP4 and AAC files for Windows: includes an AAC encoder that supports LC and HE AAC Windows Media Player 12: Released with Windows 7, supports the reading of AAC files natively Another Real: Rhapsody supports the RealAudio AAC codec, in addition to offering coded subscription tracks with AAC XBMC: supports AAC (both LC and HE). XMMS: supports MP4 playback using a plugin provided by the faad2 library of these players (e.g., foobar2000, Winamp and VLC) also support the decoding of ADTS (Audio Data Transport Stream) using the SHOUTcast protocol. The plug-ins for Winamp and foobar2000 allow the creation of such flows. Nero Digital Audio In May 2006, Nero AG released a free AAC encoding tool, Nero Digital Audio (the AAC codec part became Nero AAC Codec),[63] which is capable of encoding LC-AAC, LC-AAC, and HE-AAC v2 streams. The tool is a command line interface tool only. A separate utility is also included to decode to PCM WAV. Various tools, including the foobar2000 audio player and MediaCoder can provide a graphical interface for this encoder. FAAC and FAAD2 Main Article: FAAC FAAC and FAAD2 are for Freeware Advanced Audio Coder and Decoder 2 respectively. FAAC supports the types of LC, Main and LTP audio objects. [64] FAAD2 supports the types of audio objects LC, Main, LTP, SBR and PS.[65] Although FAAD2 is free software, faac is not free software. Fraunhofer FDK AAC Main Article: Fraunhofer FDK AAC A Fraunhofer-written open-source encoder/set-top box included in Android has been brought to other platforms. This is the recommended AAC encoder of FFmpeg. [citation needed] FFmpeg and Libav See also: FAAC - Alternatives for AAC encoding in unix-like operating systems The native AAC encoder created in the FFmpeg libavcodec, and forked with Libav, was considered experimental and poor. A significant amount of work has been done for FFmpeg Release 3.0 (February 2016) to make its version usable and competitive with the rest of the AAC encoders. Libav did not merge this work and continues to use the old version of the AAC encoder. These encoders are open-source under LGPL license and can be built for any platform that FFmpeg or Libav frameworks can be built. FFmpeg and Libav can use the Fraunhofer FDK AAC library via libfdk-aac, and while the native encoder FFmpeg has become stable and good enough for common use, FDK is still considered the highest quality encoder available for use with FFmpeg. Libav also recommends using FDK AAC if it is available. [68] See also Comparison of AAC-LD MPEG-4 Part 4 (container format) ALAC - Apple's Vorbis No.2 no-loss codec - the main open and royalty-free competitor to AAC and MP3 Opus - an open, royalty-free codec for pre-calculated and interactive use, standardized in 2012 References

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