



adroitSDK is Ittiam's SDK for development of **multimedia applications for video streaming and recording** use cases. Based on Ittiam's patented Adroit software architecture, adroitSDK comprises of **embedded middleware** for video, audio, text, metadata, image, speech and graphics processing. This includes audio/video encode, audio/video decode, networking protocols, file formats, media quality enhancement and security features. adroitSDK is offered with **Standard and Advanced Feature** sets:

- **Standard Features:** Typical use cases and formats that video networking applications require.
- **Advanced Features:** Multi-channel operation, hybrid use cases, additional formats for complex applications.

Streaming & Recording Configurations of SDK

- **adroitStream** Encoder (Server) SDK
- **adroitPlay** Decoder (Player/ Client) SDK
- **adroitRecordPro** Recorder, Server & Player Hybrid SDK
- **adroitLive-E** Low-Latency Encoder (Server) SDK
- **adroitLive-D** Low-Latency Decoder (Client) SDK
- **adroitXCode** Transcoder SDK
- **adroitWave** Audio SDK (ACIP)
- **adroitMix** Mixer/Switcher SDK

Analytics, Vision & Graphics SDK

adroitVista

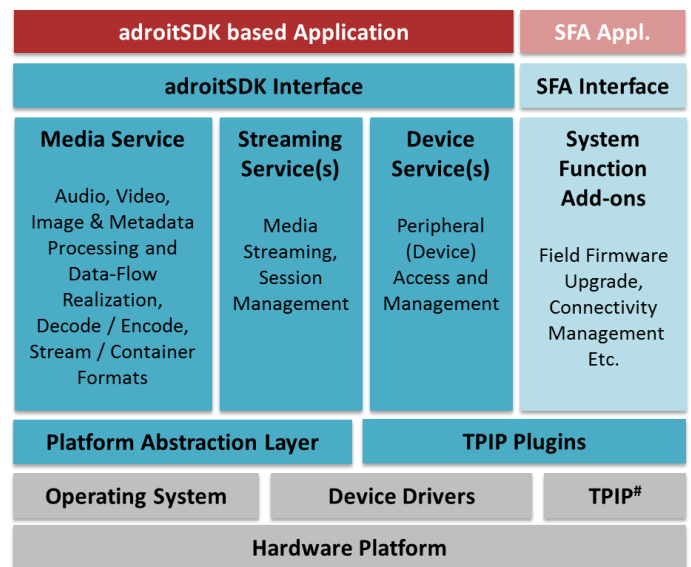
Motion Detection; Object Tracking; Detection of Perimeter Violation, Loitering, Left /Removed Object, OCR, etc.

Resizing, Rotation, Mirroring, Composition, Blending, Overlay, De-noising, Fisheye Distortion Correction, Contrast Enhancement, Edge Sharpening, Video Stabilization, Image Stitching, etc.

adroitSDK Highlights

- **Off-the-shelf** SDK configurations suited to multiple use cases
- Best-in-class quality, streaming latency* and channel density
- Robust, field-proven, standards-compliant
- Extensive configurability via simple C APIs
- Flexible usage and easy integration
 - SDK modules in object code with intuitive APIs
 - Sample application with source code
 - Source code licensing option
- Available on **multiple embedded & mobile processors**
 - ARM
 - TI DM816x, Sitara™ AM57x, OMAP4, etc.
 - NVIDIA Tegra X1, K1, etc.
 - Intel x86, Atom, Haswell, etc.
 - Qualcomm APQ8060/8074, etc.
 - Freescale iMX6, etc.
- Available on **multiple operating systems**
 - Linux
 - iOS
 - Android
 - Windows
- Long Term Support
- Source-code licensing option
- **Customizable**

* As low as 50msec glass-to-glass for 1080p60 video



■ adroitSDK
 ■ 3rd Party / Ittiam
 ■ Customer

Target Applications

- Intelligence Surveillance Reconnaissance (ISR)
- Industrial Automation and Robotics
- Enterprise/Broadcast Streaming
- Medical Imaging and Documentation
- Situational Awareness
- Unmanned Vehicle Navigation
- Digital Signage
- Graphics and Visualization

adroitSDK Configurations

Streaming Server SDK (adroitStream)

- Encoding and streaming of live audio and video to remote clients over IP network
- Streaming of stored audio and video from files to remote clients over IP network

Player/Client SDK (adroitPlay)

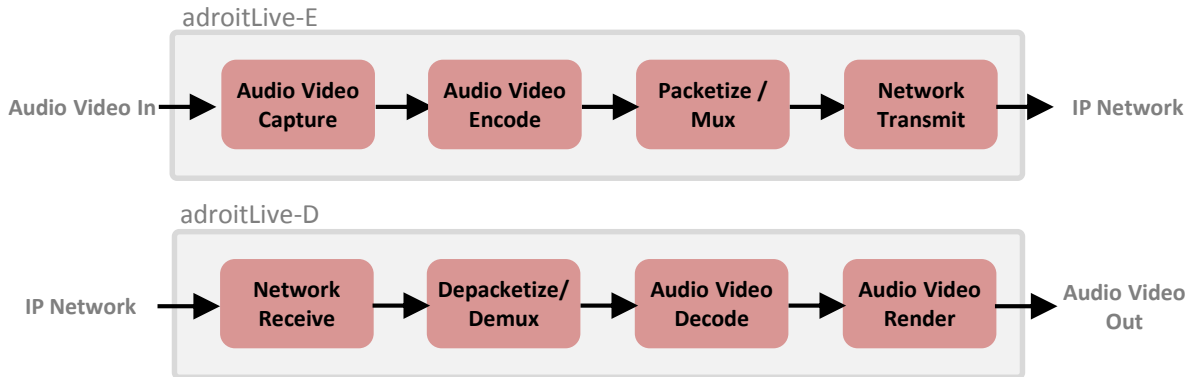
- Playback of media streamed from a remote server over IP network, after decoding
- Playback of stored media files from local storage, after decoding

Low Latency Encoder SDK (adroitLive-E)

- Encoding and streaming of live audio and video with low latency of operation to remote clients over IP network

Low Latency Decoder SDK (adroitLive-D)

- Reception of streamed audio and video from a remote server over IP network, decoding and rendering of media with low latency of operation



Recorder, Server & Player SDK (adroitRecordPro)

- Encoding and streaming of live audio and video to remote clients over IP network.
- Encoding and recording of live audio and video onto local/network storage.
- Streaming or local playback of recorded files.
- Playback of media streamed from a remote server over IP network, after decoding.

Transcoder SDK (adroitXCode)

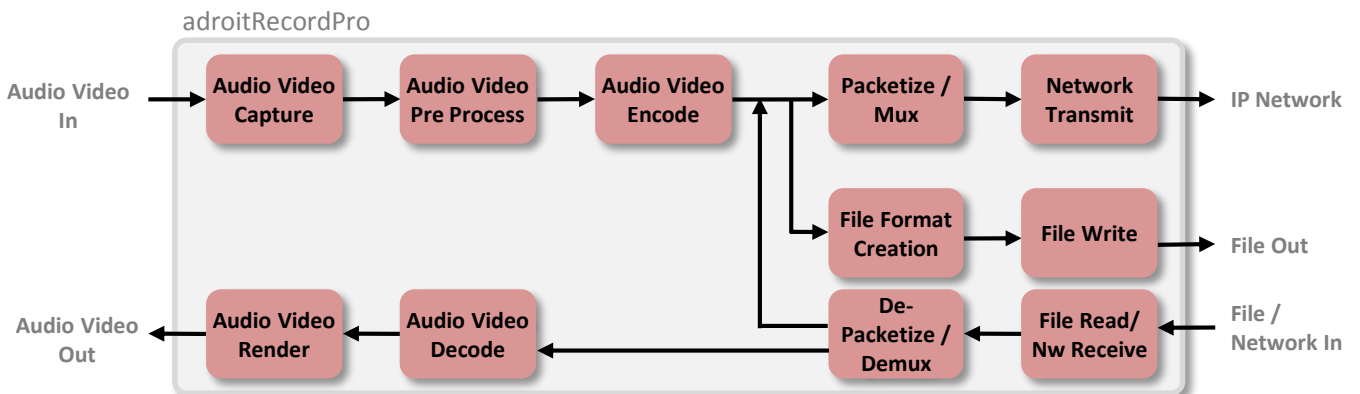
- Reception of incoming media streams from remote server over IP network, transcoding and (a) streaming transformed stream over IP network (b) saving transformed media to local/network storage.
- Retrieving media files from storage, transcoding and (a) streaming the transformed stream over IP network (b) saving transformed media to storage.

Mixer/Switcher SDK (adroitMix)

- Capturing uncompressed audio/video inputs
- Receiving audio video streams from remote clients over IP network and decoding
- Switching/mixing of uncompressed inputs and decoded streams for display

Audio & Speech SDK (adroitWave)

- Server: Encoding of uncompressed audio/speech and streaming over IP network (ACIP)
- Client: Receiving audio/speech streams over IP network and decoding (ACIP)
- Buffer input and output



• STANDARD FEATURES

- **Server**
 - Streaming from live source or stored file
- **Player/Client**
 - Playback of incoming network stream
 - Playback from local storage
 - Trick-mode for file playback (seek, fast/slow forward & rewind, single step, pause)
- **Recorder**
 - Recording from live source or network stream
 - Split file recording (recording done in continuous set of small independently playable files)
 - Allows data protection in case of power failure during recording
- **Transcoder**
 - Network stream and/or stored file input/output
 - Transcoding (compression format conversion)
 - Trans-rating (frame rate, sampling rate, bit rate conversion)
 - Trans-scaling (video resolution conversion)
 - Trans-muxing (streaming format, file format conversion)
- **Common Features**
 - Audio only/video only mode of operation
 - SD/Full HD input and output video formats
 - Mono/stereo input and output audio formats
 - AV synchronization
 - Unicast/multicast network streams
 - Constant Bit Rate (CBR), Variable Bit Rate (VBR) and Constrained Variable Bit Rate (CVBR) streaming
 - Statistics collection & reporting
 - Memory management
 - Exception and event management
 - Logging
 - Command-line Sample Application to illustrate usage of SDK APIs

• ADVANCED FEATURES

- **Multi-channel operation**
 - Independent configuration & control of channels
- **Simultaneous modes of operation**
 - Simultaneous streaming and recording
 - Local preview of live source during streaming or recording
 - Simultaneous live and file streaming
 - Simultaneous live and network recording
 - Network recording with local preview (playback)
 - Simultaneous network and file playback
 - Combinations of streaming, playback, recording, transcoding use cases Example: Simultaneous live streaming, file playback and live recording for a DVR
- **Server, Transcoder**
 - Encoding a Region Of Interest (ROI)
 - Network traffic shaping
 - Adaptive bitrate streaming
- **Player/Client, Transcoder**
 - Video composition (mixing) during multi-channel playback
 - Picture in Picture (PiP), Picture and Picture (PaP)
 - Surround sound enhancements
 - Switching to alternate content sources during remote server or storage disk failure
 - Handling network impairments for loss prone networks
 - Network bandwidth reservation
 - Network jitter handling
 - Adaptive bitrate streaming
- **Recorder**
 - Pre-event recording
 - Generation of thumbnails
- **Other Features**
 - Video input signal presence detection (source disconnect and reconnect)
 - Auto detection of live video input format
 - Pre/post processing
 - Video resizing to standard, non-standard resolutions
 - Video de-interlacing
 - Video frame-rate conversion
 - Audio resampling
 - Stereo/mono conversion for audio
 - Text/image overlay on video
 - Generating image snapshots from input video periodically or on demand
 - KLV metadata insertion/extraction

adroitSDK Features

• ADVANCED FEATURES (CONTD.)

▪ Other Features (Contd.)

- Asynchronous & synchronous metadata, user data
- Digital signatures insertion (watermarking) for tamper proofing
- Masking selected portions of input video for privacy reasons (privacy masking)
- Encryption/decryption of network streams for security (AES)
- RTCP based bitrate adaptation

• CONFIGURATION & CONTROL

▪ Video compression properties

- Compression format, Compression ratio or bit-rate
- Encode resolution, frame rate, GOP structure
- Quality preset (quantization parameters)
- Adaptive intra-refresh period

▪ Audio compression properties

- Compression format, Compression ratio or bit-rate
- Sampling rate

▪ Video display properties

- Display resolution, Display position
- Video composition method (PIP, PAP)

▪ Audio playback properties

- Dynamic selection of audio stream to decode

▪ Subtitle playback properties

- Dynamic selection of subtitle track to decode

▪ Rate control mode

- Constant Bit rate (CBR), Variable bit rate (VBR), Constrained Bit Rate (CVBR)

▪ Network parameters

- Streaming format
- Network bitrate adaptation in presence of RTCP

▪ Recording parameters

- Recording file format
- Segment duration for split file recording
- Pre-event duration of pre-event recording

• FORMATS

▪ Audio Video inputs and outputs

- Analog Audio: Line In, Line Out
- Analog Video: Component, Composite
- Digital: 3G-SDI, HDMI

▪ Audio compression

- HE-AAC, AAC-LC, MP3, MPEG-1 layer 2, PCM, L16

▪ Audio sampling rates

- 8 KHz to 48 KHz

▪ Video Frame Rates

- Up to 60 frames/fields per second for supported video resolutions

▪ Video compression

- H.265 (HEVC), H.264, MPEG-2, MPEG-4, MJPEG

▪ Video resolutions

- 2160p (4K Ultra HD), 1080p, 720p, D1-NTSC, D1-PAL, 4CIF, VGA, CIF, SIF, QVGA, QCIF, QSIF
- Custom/non-standard resolutions

▪ Network protocols

- MPEG2-TS, RTP/RTCP, MPEG-DASH, HLS

▪ File formats

- MPEG-2 TS, MXF, MP4, MP3, AVI

• SYSTEM FUNCTION ADD-ONS

▪ Fail-safe field firmware updates

▪ User profile management & authentication

▪ Database management

▪ Network connectivity management

▪ Exception and event reporting

▪ Built-In self tests

adroitSDK Package Contents

- SDK Object code with simple C-callable interfaces
- Sample Application software (source code)
- (Optional) Patches for BSP, Third Party IPs (TPIPs)
- (Optional) Platform Abstraction Layer (source code)
- (Optional) System Function Add-ons (object code)
- Documentation: User Manual (with API document), Sample Application Build & Run Guide, Detailed Performance Specifications, (Optional) BSP Build Guide

Write to ids-mkt@ittiam.com for more details

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