

# **Intel<sup>®</sup> Integrated Performance Primitives V5.0 Beta for Linux\* on Intel<sup>®</sup> Personal Internet Client Architecture Processors with Intel<sup>®</sup> Wireless MMX<sup>™</sup> Technology Release Notes**

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*Intel Confidential*

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## 1. Description

This package contains the Intel® Integrated Performance Primitives (Intel® IPP) Version 5.0 Beta for Linux\* on the Intel® Personal Internet Client Architecture (Intel® PCA) Processor Family with Intel® Wireless MMX™ technology.

This version includes the following features, which are described in the [Features of Intel® IPP](#) section:

- Part I Signal processing – signal processing primitives
- Part II Video Codecs – H.263 video decoder, H.264 video decoder, and MPEG-4 video codec primitives
- Part III Audio Codecs – MP3 audio codec and AAC audio decoder primitives
- Part IV Image Codecs – JPEG and JPEG 2000 image codec primitives
- Part V Image processing – image processing primitives
- Part VI Speech Codecs –GSM-AMR narrowband codec, G.723.1/A codec, and G.729 codec primitives
- Part VII Cryptography – FIPS standardized symmetric/asymmetric ciphers and hash/HMAC/DAA algorithm
- Part VIII Speech recognition – feature extraction and vector quantization, voice activity detection, acoustic echo cancellation, and noise reduction primitives

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Intel® IPP Version 5.0 Beta is based on the Intel® IPP Version 4.1, but adds new speech codec primitives, signal processing and image processing primitives. See the [Features of Intel® IPP](#) section for more information.

Intel® IPP Version 5.0 Beta was developed under the following environment:

- Development Tools
  - arm-linux-gcc (GCC) 3.4.3, glibc 2.3.2 and binutils 2.14.90 20030825
  - iwmmxt\_le-gcc (GCC) 3.3.1, glibc 2.3.2 and binutils 2.14 20030612
- Processor – Intel® PCA with Intel® Wireless MMX™ technology, such as the Intel® PXA27x Processor Family
- Reference Board – platforms that support Intel® PCA with Intel® Wireless MMX™ Technology, such as the Intel® PXA27x Processor Development Kit
- Operating System
  - MontaVista\* Linux\* Consumer Electronics Edition 3.1: Linux\* Kernel V2.4.20\_mvlcee31\_mainstone
  - Linux\* Preview Kit for the Intel® PXA27x Processor Development Kit Linux\* Kernel V2.6.9- intc1

This software is aimed at the above environment. Efforts were made to keep the software in the ANSI C style whenever possible. Although the audio codec binary libraries have been tested, no warranty, expressed or implied, is associated with these libraries as well as all the associated materials in this package.

## 2. Features of Intel® IPP

The Intel® IPP version 5.0 Beta is organized into the following parts:

Parts	Features
Part I -Signal processing primitives	<ul style="list-style-type: none"> <li>• Vector Initialization, Arithmetic, Thresholding, and Statistics</li> <li>• Filtering</li> <li>• Convolution</li> <li>• Transforms</li> <li>• Sample generation</li> <li>• Windowing</li> <li>• Kodiak</li> </ul>
Part II -Video codecs: H.263 video decoder, H.264 video decoder and MPEG-4 video codec primitives	<ul style="list-style-type: none"> <li>• Variable length decoding (VLD) and inverse zigzag positioning</li> <li>• Variable length encoding (VLE) and forward zigzag positioning (MPEG-4 only)</li> <li>• Inverse quantization</li> <li>• Forward quantization</li> <li>• Inverse discrete cosine transforms (IDCT)</li> <li>• Forward discrete cosine transforms (DCT)</li> <li>• Motion vector decoding and padding</li> <li>• Motion vector encoding (MPEG-4 Only)</li> <li>• Texture padding (MPEG-4 Only)</li> <li>• Overlapped block motion compensation (OBMC)</li> <li>• Coefficient prediction</li> <li>• Block based decoding</li> <li>• Block based encoding (MPEG-4 only)</li> <li>• Deblocking filtering</li> <li>• Motion compensation and reconstruction</li> <li>• Motion estimation</li> <li>• Binary alpha block (BAB) decoding (MPEG-4 only)</li> </ul>

Parts	Features
	<ul style="list-style-type: none"> <li>Context-based adaptive variable length decoding (CAVLC) (H.264 only)</li> <li>1/4 luma and 1/8 chroma sample interpolation (H.264 only)</li> <li>Inverse 4x4 and 2x2 integer transform (H.264 only)</li> </ul>
Part III -Audio codecs: MP3 audio codec and AAC audio decoder primitives	<ul style="list-style-type: none"> <li>Frame packing and unpacking operations</li> <li>Huffman encoding and decoding</li> <li>Quantization and requantization module</li> <li>Modified discrete cosine transform and inverse transform (MDCT and IMDCT)</li> <li>Pseudo quadrature mirror analysis and synthesis filter bank (PQMF)</li> <li>Psychoacoustic model</li> <li>Long term prediction</li> <li>Perceptual noise substitution</li> <li>Temporal noise shaping</li> <li>Middle/Side stereo module</li> <li>Intensity stereo module</li> <li>Temporal noise shaping (TNS) module</li> </ul>
Part IV -Image codecs: JPEG and JPEG 2000 image codec primitives	<ul style="list-style-type: none"> <li>Color conversion</li> <li>Discrete cosine transform (DCT)/quantization and IDCT/dequantization</li> <li>Huffman encoding and decoding</li> <li>Baseline sequential DCT-based encoding and decoding</li> <li>Progressive DCT-based encoding and decoding</li> <li>Reversible and irreversible discrete wavelet transform (DWT)</li> </ul>
Part V: Image processing primitives	<ul style="list-style-type: none"> <li>General arithmetic and logical operations</li> <li>Filtering</li> <li>Linear transforms</li> <li>Color space conversion</li> <li>Morphological operations</li> <li>Statistics</li> <li>Camera image processing</li> <li>Camera raw data processing</li> </ul>
Part VI: Speech codecs: GSM-AMR wideband codec, GSM-AMR narrowband codec, G.723.1/A codec and G.729 codec primitives	<ul style="list-style-type: none"> <li>Linear prediction (LP) analysis</li> <li>Adaptive-codebook search</li> <li>Fixed-codebook search</li> <li>Discontinuous transmission</li> <li>Filtering</li> <li>Post-filtering</li> </ul>
Part VII: Cryptography – FIPS standardized symmetric/asymmetric ciphers, hash/HMAC/DAA algorithm	<ul style="list-style-type: none"> <li>DES ECB/CBC/CFB modes</li> <li>TDES ECB/CBC/CFB modes</li> <li>AES ECB/CBC/CFB modes</li> <li>RIJNDAEL 128 ECB/CBC/CFB modes</li> <li>RIJNDAEL 192 ECB/CBC/CFB modes</li> <li>RIJNDAEL 256 ECB/CBC/CFB modes</li> <li>Blowfish ECB/CBC/CFB modes</li> <li>Twofish ECB/CBC/CFB modes</li> <li>DAA DES/ TDES /Rijndael128/192/256 /Blowfish /Twofish</li> </ul>

Parts	Features
	<ul style="list-style-type: none"> <li>• SHA1/SHA256/384/512 /MD5 message digest</li> <li>• HMAC SHA1/SHA256/384/512 /MD5</li> <li>• Variable length big number arithmetic</li> <li>• Modulus inversion, exponentiation</li> <li>• Pseudo-random number</li> <li>• Prime generation and test</li> <li>• RSA key generation and key check, RSA encryption/decryption</li> <li>• DSA key generation and key check, DSA signature/verification</li> </ul>
Part VIII: Speech recognition — Feature extraction, vector quantization, voice activity detection, acoustic echo cancellation and noise reduction primitives	<ul style="list-style-type: none"> <li>• Feature extraction</li> <li>• Vector quantization</li> <li>• Voice activity detection</li> <li>• Noise reduction</li> <li>• Acoustic echo cancellation</li> </ul>

### 3. Kit Contents

The installation file contains the following:

- [Global Header Files](#)
- [Library Components](#)
- [Supporting Documents](#)
- [Sample Code](#)

Each binary library has a release version and a debug version. In the debug version, the functions check the input arguments and provide error codes when incorrectly used. In the release version, input arguments are not fully checked, and incorrect usage may result in unpredictable behavior.

For more information, see the *Intel® Integrated Performance Primitives on Intel® Personal Internet Client Architecture Processors Reference Manual*.

#### 3.1 Global Header Files

Filename	Description
ipp.h	Contains references to all include files.
ippdefs.h	Contains Intel® IPP Common Types and Macro Definitions.
ippSP.h	Contains the header file for the signal-processing domain. This header file contains the "C" prototype for every primitive in this domain and associated structures, constants, etc.
ippVC.h	Contains the header file for the video codec domain. This header file contains the "C" prototype for every primitive in this domain and associated structures, constants, etc.
ippAC.h	Contains the header file for the audio codec domain. This header file contains the "C" prototype for every primitive in this domain and associated structures, constants, etc.
ippJP.h	Contains the header file for the image codec domain. This header file contains the "C" prototype for every primitive in this domain and associated structures, constants, etc.

Filename	Description
ippIP.h	Contains the header file for the image-processing domain. This header file contains the "C" prototype for every primitive in this domain and associated structures, constants, etc.
ippSC.h	Contains the header file for the speech codec domain. This header file contains the "C" prototype for every primitive in this domain and associated structures, constants, etc.
ippCP.h	Contains the header file for the cryptography domain. This header file contains the "C" prototype for every primitive in this domain and associated structures, constants, etc.
ippSR.h	Contains the header file for the speech recognition domain. This header file contains the "C" prototype for every primitive in this domain and associated structures, constants, etc.

## 3.2 Library Components

Filename	Description
ippSP_WMMX50BLNX_r.a	Release version of signal processing binary library file
ippSP_WMMX50BLNX_d.a	Debug version of signal processing binary library file
ippVC_WMMX50BLNX_r.a	Release version of video codec binary library file
ippVC_WMMX50BLNX_d.a	Debug version of video codec binary library file
ippAC_WMMX50BLNX_r.a	Release version of audio codec binary library file
ippAC_WMMX50BLNX_d.a	Debug version of audio codec binary library file
ippJP_WMMX50BLNX_r.a	Release version of image codec binary library file
ippJP_WMMX50BLNX_d.a	Debug version of image codec binary library file
ippIP_WMMX50BLNX_r.a	Release version of image processing binary library file
ippIP_WMMX50BLNX_d.a	Debug version of image processing binary library file
ippSC_WMMX50BLNX_r.a	Release version of speech codec binary library file
ippSC_WMMX50BLNX_d.a	Debug version of speech codec binary library file
ippCP_WMMX50BLNX_r.a	Release version of cryptographic primitives binary library file
ippCP_WMMX50BLNX_d.a	Debug version of cryptographic primitives binary library file
ippSR_WMMX50BLNX_r.a	Release version of speech recognition binary library file
ippSR_WMMX50BLNX_d.a	Debug version of speech recognition binary library file
ippSP_WMMX50BLNX_r.so	Release version of signal processing shared library file
ippSP_WMMX50BLNX_d.so	Debug version of signal processing shared library file
ippVC_WMMX50BLNX_r.so	Release version of video codec shared library file
ippVC_WMMX50BLNX_d.so	Debug version of video codec shared library file
ippAC_WMMX50BLNX_r.so	Release version of audio codec shared library file
ippAC_WMMX50BLNX_d.so	Debug version of audio codec shared library file
ippJP_WMMX50BLNX_r.so	Release version of image codec shared library file
ippJP_WMMX50BLNX_d.so	Debug version of image codec shared library file
ippIP_WMMX50BLNX_r.so	Release version of image processing shared library file
ippIP_WMMX50BLNX_d.so	Debug version of image processing shared library file

Filename	Description
ippSC_WMMX50BLNX_r. so	Release version of speech codec shared library file
ippSC_WMMX50BLNX_d. so	Debug version of speech codec shared library file
ippCP_WMMX50BLNX_r. so	Release version of cryptographic primitives shared library file
ippCP_WMMX50BLNX_d. so	Debug version of cryptographic primitives shared library file
ippSR_WMMX50BLNX_r. so	Release version of speech recognition shared library file
ippSR_WMMX50BLNX_d. so	Debug version of speech recognition shared library file

### 3.3 Supporting Documents

The following documentation is included with this kit:

- ReleaseNotes.pdf (this file)
- ipplic.htm (license agreement)
- RefMan\_IPP\_MB.pdf (reference manual)
- INSTALL.txt (installation guide)
- README.txt (readme information)

### 3.4 Sample Code

The following sample code is provided to illustrate the usage of Intel® IPP in different applications:

- Adaptive Noise Cancellation
- Filtering
- OSCR Timer
- Artificial Reverberation
- Signal Generation
- Vector Manipulation

**Note:** The sample code may not represent the best implementation of Intel® IPP primitives. Therefore, the sample code must not be used in benchmark systems or for any other purposes other than understanding the usage of Intel® IPP functions. See the license agreement for more information.

## 4. Related Documents

See the *Intel® Integrated Performance Primitives on Intel® Personal Internet Client Architecture Processors Reference Manual*.

Other related documentation that may be helpful while reading this document are listed in the reference section of the *Intel® Integrated Performance Primitives on Intel® Personal Internet Client Architecture Processors Reference Manual*.

## 5. System Requirements

This release requires:

- Host PC: Intel® Pentium® 4 processor 1.5 GHz, 512MB RAM or greater
- Operating System: Red Hat\* Linux\* Release 7.2 or higher
- Development Tools
  - iwmmxt\_le-gcc (GCC) 3.3 (MontaVista), glibc 2.3.2 and binutils 2.14 20030612
  - arm-linux-gcc (GCC) 3.3.2, glibc 2.3.2 and binutils 2.14.90.0.7 20031029
- Red Hat\* RPM version 4.0.3 or higher
- Target Platform: platforms that support Intel® PCA with Intel® Wireless MMX™ technology, such as the Intel® PXA27x Processor Development Kit

## 6. Changes Since Last Release (Intel® IPP Version 4.1)

- Dynamic library support is added in this release.
- New APIs listed below are available and described in the *Intel® Integrated Performance Primitives on Intel® Personal Internet Client Architecture Processors Reference Manual*.

Section	New Intel® IPP APIs
Speech codec	ippsAutoCorr_G729B ippsLevinsonDurbin_G729B ippsLPCToLSP_G729_16s ippsLPCToLSP_G729A_16s ippsLSFToLSP_G729_16s ippsLSFQuant_G729_16s ippsLSFDecode_G729B_16s ippsLSFDecode_G729_16s ippsLSFDecodeErased_G729_16s ippsLSPToLPC_G729_16s ippsLSPQuant_G729_16s ippsLSPToLSF_G729_16s ippsLagWindow_G729_32s_I ippsOpenLoopPitchSearch_G729_16s ippsOpenLoopPitchSearch_G729A_16s ippsAdaptiveCodebookSearch_G729_16s ippsAdaptiveCodebookSearch_G729A_16s ippsAdaptiveCodebookGain_G729_16s ippsAdaptiveCodebookGain_G729A_16s ippsAdaptiveCodebookContribution_G729_16s ippsFixedCodebookSearch_G729_32s16s ippsFixedCodebookSearch_G729A_32s16s ippsToeplizMatrix_G729_16s32s ippsDecodeGain_G729_16s ippsDecodeAdaptiveVector_G729_16s_I ippsGainControl_G729_16s_I ippsGainControl_G729A_16s_I ippsResidualFilter_G729_16s ippsSynthesisFilter_G729_16s



Section	New Intel® IPP APIs
	ippsSynthesisFilterZeroStateResponse_NR_16s ippsLongTermPostFilter_G729_16s ippsLongTermPostFilter_G729A_16s ippsLongTermPostFilter_G729B_16s ippsShortTermPostFilter_G729_16s ippsShortTermPostFilter_G729A_16s ippsTiltCompensation_G729_16s ippsTiltCompensation_G729A_16s ippsHarmonicFilter_16s_I ippsHighPassFilterSize_G729 ippsHighPassFilterInit_G729 ippsHighPassFilter_G729_16s_ISfs ippsIIR16sLow_G729_16s ippsPreemphasize_G729A_16s ippsPreemphasize_G729A_16s_I ippsInterpolate_G729_16s ippsInterpolateC_G729_16s_Sfs ippsInterpolateC_NR_G729_16s_Sfs ippsGainQuant_G729_16s
Image Processing	ippiYCbCr422RszCscRotRGB_8u_P3C3R ippiInitAlloc_10RGGbToYCbCr_RotRsz_P3R ippi10RGGbToYCbCr_RotRsz_8u_P3R ippiFree_10RGGbToYCbCr_RotRsz_P3R ippiInitAlloc_AE_10RGGb_8u_C1R ippiFree_AE_10RGGb_8u_C1R ippiAE_10RGGb_8u_C1R ippiInitAlloc_AWB_10RGGb_8u_C1R ippiFree_AWB_10RGGb_8u_C1R ippiAWB_10RGGb_8u_C1R
Signal Processing	ippsResampleFIRInit_16s ippsResampleFIR_16s_Sfs ippsFFTInv_CToC_32sc_Sfs ippsFFTFwd_RToCCS_32s_Sfs

## 7. [Installation](#)

To install the Intel® IPP for Linux\* package, please refer to INSTALL.txt included within this release kit.

### 7.1 Installed Files and Libraries

The following table provides the installed files and the directories where they reside (where ~ is the directory chosen during the installation process):

Directory	Description
~/ipp/5.0/pca_wmmx	Main directory. <ul style="list-style-type: none"> <li>• ReleaseNotes.pdf – release notes (this file)</li> <li>• ipplc.htm – license agreement</li> <li>• RefMan_IPP_MB.pdf – reference manual</li> </ul>

Directory	Description
	<ul style="list-style-type: none"> <li>INSTALL.txt – Installation guide</li> <li>README.txt – Readme information</li> </ul>
~/ipp/5.0/pca_wmmx/include	Directory for C "include" files. <ul style="list-style-type: none"> <li>ipp.h – master Intel® IPP include file</li> <li>ippdefs.h – master Intel® IPP definition include file</li> <li>ipp*.h – include files for each domain accessed through ipp.h</li> </ul>
~/ipp/5.0/pca_wmmx/lib	Directory for static binary library components.
~/ipp/5.0/pca_wmmx/lib/mvlcee/	Directory for one set of static binary library components compatible with the toolchain from MontaVista CEE 3.0 gold release. <ul style="list-style-type: none"> <li>*.a – chosen static library files</li> </ul>
~/ipp/5.0/pca_wmmx/lib/pvkit/	Directory for one set of static binary library components compatible with the toolchain: arm-linux-gcc 3.3.2. <ul style="list-style-type: none"> <li>*.a – chosen static library files</li> </ul>
~/ipp/5.0/pca_wmmx/bin	Directory for shared library components.
~/ipp/5.0/pca_wmmx/bin/mvlcee/	Directory for one set of shared library components compatible with the toolchain from MontaVista CEE 3.0 gold release. <ul style="list-style-type: none"> <li>*.so – chosen shared library files</li> </ul>
~/ipp/5.0/pca_wmmx/bin/pvkit/	Directory for one set of shared library components compatible with the toolchain: arm-linux-gcc 3.3.2. <ul style="list-style-type: none"> <li>*.so – chosen shared library files</li> </ul>
~/ipp/5.0/pca_wmmx/examples	<ul style="list-style-type: none"> <li>Directory for sample code</li> </ul>
~/ipp/5.0/pca_wmmx/examples/AdaptiveNoiseCanc	Directory for sample code of adaptive noise cancellation. <ul style="list-style-type: none"> <li>readme.txt – brief overview</li> <li>Makefile_mvlcee – Linux makefile using the toolchain from MontaVista CEE 3.0 gold release.</li> <li>Makefile_pvkit – Linux makefile using the toolchain: arm-linux-gcc 3.3.2.</li> <li>*.h – include files</li> <li>*.c – source code files</li> </ul>
~/ipp/5.0/pca_wmmx/examples/Filtering	Directory for sample code of filtering. <ul style="list-style-type: none"> <li>readme.txt – brief overview</li> <li>Makefile_mvlcee – Linux makefile using the toolchain from MontaVista CEE 3.0 gold release.</li> <li>Makefile_pvkit – Linux makefile using the toolchain: arm-linux-gcc 3.3.2.</li> <li>*.h – include files</li> <li>*.c – source code files</li> </ul>
~/ipp/5.0/pca_wmmx/examples/OSCRTimer	Directory for sample code of OSCR timer for Intel® PCA Processors with Intel® Wireless MMXTM Technology. <ul style="list-style-type: none"> <li>readme.txt - brief overview</li> <li>*.h – include files</li> <li>*.c – source code files</li> <li>*.o – object files</li> </ul>
~/ipp/5.0/pca_wmmx/examples/Reverb	Directory for sample code of artificial reverberation. <ul style="list-style-type: none"> <li>readme.txt – brief overview</li> <li>Makefile_mvlcee – Linux makefile using the toolchain from MontaVista CEE 3.0 gold release.</li> <li>Makefile_pvkit – Linux makefile using the toolchain: arm-linux-gcc 3.3.2.</li> </ul>

Directory	Description
	<ul style="list-style-type: none"> <li>*.h – include files</li> <li>*.c – source code files</li> </ul>
~/ipp/5.0/pca_wmmx/examples/SigGen	Directory for sample code of signal generation. <ul style="list-style-type: none"> <li>readme.txt – brief overview</li> <li>Makefile_mvlcee – Linux makefile using the toolchain from MontaVista CEE 3.0 gold release.</li> <li>Makefile_pvkit – Linux makefile using the toolchain: arm-linux-gcc 3.3.2.</li> <li>*.h – include files</li> <li>*.c – source code files</li> </ul>
~/ipp/5.0/pca_wmmx/examples/VectorManip	Directory for sample code of vector manipulation. <ul style="list-style-type: none"> <li>readme.txt – brief overview</li> <li>Makefile_mvlcee – Linux makefile using the toolchain from MontaVista CEE 3.0 gold release.</li> <li>Makefile_pvkit – Linux makefile using the toolchain: arm-linux-gcc 3.3.2.</li> <li>*.h – include files</li> <li>*.c – source code files</li> </ul>
~/doc/	Directory for supporting document <ul style="list-style-type: none"> <li>ippsupport.txt – License and Package information file</li> </ul>
~/tools/	Directory for tools
~/tools/env/	<ul style="list-style-type: none"> <li>ippenv.sh – Environment variables setting shell file</li> </ul>
~/tools/support/	<ul style="list-style-type: none"> <li>iplid.exe – Show up license and package information</li> </ul>

## 8. Known Problems

To use Intel® IPP .so libraries, the -fPIC option is required in your application code. Otherwise, calling the Intel® IPP functions may fail.

## 9. License Definitions

Refer to the Intel® IPP license file for the license agreement details.

MPEG-4, H.263, MP3, GSM/AMR, G.723.1/A, JPEG, JPEG 2000, and AAC are international standards promoted by ISO, IEC, ITU, ETSI and other organizations. Implementations of these standards, or the standard enabled platforms may require licenses from various entities, including Intel.

## 10. Technical Support and Feedback

Feedback on this product is very important and will assist Intel in improving the Intel® IPP for the Intel® PCA. To obtain technical support for this product, register at the Intel® Premier Support web site <https://premier.intel.com/>.

After creating an account, login to Intel® Premier Support and submit any questions.

Additional information regarding Intel® IPP technical support and troubleshooting can be

found at:

<http://support.intel.com/support/performancetools/libraries/ipp/index.htm>

For registration or account access problems, contact [developer.support@intel.com](mailto:developer.support@intel.com). Please do not email technical issues to [developer.support@intel.com](mailto:developer.support@intel.com) as it is not a secure medium.

To submit an issue via the Intel® Premier Support website please perform the following steps:

1. Ensure that Java\* and JavaScript\* are enabled in the browser.
2. Go to <https://premier.intel.com/>.
3. Type in the Login and Password. Both are case-sensitive.
4. Click the "Submit" button.
5. Read the Confidentiality Statement and click the "I Accept" button.
6. Click the "Go" button next to the Product Name drop-down list.
7. Click the "Submit Issue" link in the left navigation bar.
8. Choose "Development Environment (tools, SDV, EAP)" from the Product Name drop-down list.
9. If this is a software or license-related issue choose Intel IPP for Windows\* from the Product Name drop-down list.
10. Enter the question and complete the fields in the windows that follow to successfully submit the issue.

Follow these guidelines when forming the problem report or product suggestion:

1. Describe the difficulty or suggestion.  
For problem reports be as specific as possible, so that we may reproduce the problem. Please include a small test case, if possible.
2. Describe the system configuration information.  
Be sure to include specific information that may be applicable to the setup: operating system, name, and version number of installed applications, and anything else that may be relevant to helping us address the concern.

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MPEG is an international standard compression/decompression of digital audio and digital video promoted by ISO. Implementations of MPEG codecs, or MPEG enabled platforms may require licenses from various entities, including Intel Corporation.

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