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1.1

Release Notes for G.711 Decoder and Encoder

ABSTRACT:

Release Notes for G.711 Decoder and Encoder

KEYWORDS:

Multimedia codecs, speech, G.711

APPROVED:

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Revision History

VERSION	DATE	AUTHOR	CHANGE DESCRIPTION
1.0-D01	8-June-2007	Sunil Ramaswamy	Initial Draft
1.1	7-May-2008	Qiu Cunshou	Update document

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Introduction

1.1 Purpose

The purpose of this document is to provide information on the package contents, instructions on building library and test applications and test execution on ELINUX, RVDS and Linux x86.

1.2 Scope

The scope is restricted to information on the package contents and instructions for building and testing. This document does not provide architecture or details about the APIs provided in the package. Performance data will be provided in another document as detailed in the Requirements Book.

1.3 Audience Description

The reader is expected to have basic understanding of Speech Signal processing and G.711 codec.

1.4 References

1.4.1 Standards

- **ITU-T Recommendation G.711**

1.4.2 Freescale Multimedia References

- G.711 Codec Application Programming Interface – g711_codec_api.doc
- G.711 Codec Requirements Book – g711_codec_reqb.doc
- G.711 Codec Test Plan - g711_codec_test_plan.doc
- G.711 Codec Release notes - g711_codec_release_notes.doc
- G.711 Codec Test Results – g711_codec_test_results.doc
- G.711 performance Result – g711_codec_perf_results.doc
- G.711 Interface Decoder Header – g711_dec_api.h
- G.711 Interface Encoder Header – g711_enc_api.h
- G.711 Decoder Application Code – g711_decoder_test.c
- G.711 Encoder Application Code – g711_encoder_test.c

1.5 Definitions and Abbreviations

TERM/ACRONYM	DEFINITION
API	Application Programming Interface

ARM	Advanced RISC Machine
CNG	Comfort Noise Generation
DTX	Discontinuous Transmission
FSL	Freescale
ITU	International Telecommunication Union
MIPS	Million Instructions per Second
OS	Operating System
PCM	Pulse Code Modulation
SID	Silence Insertion Descriptor
RVDS	ARM RealView Development Suite
TBD	To Be Determined
UNIX	Linux PC x/86 C-reference binaries
VAD	Voice Activity Detection

1.6 Document Location

docs/G.711

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2 Release History

RELEASE NUMBER	DELIVERABLES	FEATURES
0.1	• Documentation • Interface header file for encoder and decoder • ELINUX and RVDS libraries and test applications for decoder and encoder • UNIX/Linux x/86 Reference library and test application • Makefiles and Source code for library and test application including optimized assembler for the ELINUX and RVDS libraries. • Test vectors	• Initial Release • Contains prototypes of interface function and data types • Details of feature and interface function can be found in these docs • Optimized C and assembly files • Contains ITU-T standard test vectors. Sample application can be used to build executables
1.1	Same	Same

Table 1. Details of the release

2.1 Assumptions and Known Problems

None

2.2 Contacts

Please report any problems to the following email address: mmsw@freescale.com

3 List of Deliverables

3.1 Documentation

Base directory: /multimedia_codecs/

Subdirectory	Files
docs/G.711	g711_codec_api.doc g711_codec_reqb.doc g711_codec_test_plan.doc g711_codec_test_results.doc g732_codec _release_notes.doc

3.2 Public Headers

Base directory: / multimedia_codecs/

Sibdirectory	Files	Description
ghdr	g711_enc_api.h g711_dec_api.h	G.711 encoder and decoder header file

3.3 Test Application Source

Base directory: / multimedia_codecs/

Subdirectory	Files
test/G.711	"Makefile" makefile for building RVDS, UNIX and ELINUX board executables.
test/G.711/hdr	*.h, application headers.
test/G.711/c_src	*.c, application code.
utils/G.711	Batch files to be run on the board and RVDS

3.4 Library Source

Base directory: /multimedia_codecs/

Subdirectory	Files
src/G.711	Makefile "Makefile" for building RVDS, UNIX, and ELINUX libraries. lib_G.711_dec _arm9_elinux.a: static library for MX21 lib_G.711_dec _arm11_bervds.a: ARM11 BE RVDS library lib_G.711_dec _arm9_bervds.a: ARM9 BE RVDS library lib_G.711_dec _arm11_elinux.a: static library for MX31 lib_G.711_dec _arm11_elinux.so: dynamic library for MX31 lib_G.711_dec _arm11_lervds.a: ARM11 LE RVDS library lib_G.711_dec _arm9_lervds.a: ARM9 LE RVDS library

	lib_G.711_dec _x86_unix.a : library for Linux x/86 – c reference code lib_G.711_enc _arm9_elinux.a: static library for MX21 lib_G.711_enc _arm11_bervds.a: ARM11 BE RVDS library lib_G.711_enc _arm9_bervds.a: ARM9 BE RVDS library lib_G.711_enc _arm11_elinux.a: static library for MX31 lib_G.711_enc _arm11_elinux.so: dynamic library for MX31 lib_G.711_enc _arm11_lervds.a: ARM11 LE RVDS library lib_G.711_enc _arm9_lervds.a: ARM9 LE RVDS library lib_G.711_enc _x86_unix.a : library for Linux x/86 – c reference code
src/G.711/c_src	*.c, G.711 source code
src/G.711/hdr	*.h G.711 library header files

3.5 Common Makefiles

Base Directory: / multimedia_codecs/

Makefile	**Description**
build/Makefile.init	This is a common makefile. To build libraries, it is included in the codec library makefile. This file includes common options used by all codecs.
build/ Makefile_test.init	This is the common makefile included in the codec test makefile for building the test application. This file includes the common options used by the all the codecs.

3.6 Test Vectors

Base Directory: /vobs/multimedia_vectors/test_vectors

The test vectors are provided in another location from the library and test source.

Subdirectory	**Description**
G.711/test_vectors	All ITU-T test vectors, including a-law, mu-law test vectors

4 Software Setup & Tools used

- ARM RVDS 3.0 (build 441) should be installed in the PC.
- Freescale Linux OS Release L26.1.17 must be running on the evaluation board.
- Intel based Red Hat Linux Machine must have the devtek toolchain installed on it.
    - devtek Toolchain   gcc 4.1.1 glibc 2.4 nptl 6
- ‘Cygwin’ **Version** CYGWIN_NT-5.1, a freely downloadable linux emulator is installed in PC - **http://www.cygwin.com/**.
- ‘make’ utility available for targeted platforms

5 Build Procedure

All the required makefiles are provided under individual directories. The library can be built for windows / target processor (ARM1136J-S/ ARM926EJ-S). The details for the build procedure are described below.

Note: The build procedure is explained with decoder as an example. To build library for the encoder applies the same procedure given below, with the makefile 'Makefile'.

5.1 Library

To build the library, run 'make' on 'Makefile' from src/G.711 directory. This makefile can create libraries for testing on ARM board, RVDS, Linux and UNIX. The makefile shall create the required directory to hold the object files. The makefile can be used if you want to build the library only. The following options can be invoked so as to build the library

Options

a) **BUILD options**:

- **BUILD= ARM11ELINUX** : It builds both static as well as dynamic libraries, 'lib_G.711_dec_arm11_elinux.a ' and shared library 'lib_ G.711_dec_arm11_elinux.so' , for testing on the board.

- **BUILD=ARM11LERVDS**: This option builds the static library 'lib_G.711_ dec_arm11_lervds.a', for testing on ARM11 LE RVDS (Armulator).

- **BUILD=ARM11BERVDS**: This option builds the static library 'lib_G.711_ dec_arm11_bervds.a', for testing on ARM11 BE RVDS (Armulator).

- **BUILD= ARM9ELINUX:** It builds both static as well as dynamic libraries, 'lib_G.711_ dec_arm9_elinux.a' and shared library 'lib_G.711_dec_arm9_elinux.so' for testing on the board.

- **BUILD=ARM9LERVDS**: This option builds the static library 'lib_G.711_ dec_arm9_lervds.a', for testing on ARM9 LE RVDS (Armulator).

- **BUILD=ARM9BERVDS**: This option builds the static library 'lib_ dec_G.711_arm9_bervds.a', for testing on ARM9 BE RVDS (Armulator).

- **BUILD=UNIX**: This option builds the static library 'lib_G.711_ dec_x86_unix.a', for testing on UNIX/Linux machine.

b) **clean options**:

- **clean**: Deletes all the object files and the library for specified BUILD option.

Note: Make appropriate changes in file 'Makefile.init' for the location of toolchains.

The libraries are saved in the current directory, src/G.711.

Target	**Compilation Environment**	**Build Options**	**Library Name**
Board (MX31)	PC/ Linux/Unix machine	BUILD=ARM11ELINUX	lib_G.711_dec_arm11_elinux.a lib_G.711_enc_arm11_elinux.a lib_G.711_dec_arm11_elinux so lib_G.711_enc_arm11_elinux.so

RVDS	PC(Using Cygwin)	BUILD=ARM11LERVDS
		BUILD=ARM11BERVDS
		BUILD=ARM9LERVDS
		BUILD=ARM9BERVDS
			lib_G.711_dec_arm11_lervds.a
			lib_G.711_enc_arm11_lervds.a
			lib_G.711_dec_arm11_bervds.a
			lib_G.711_enc_arm11_bervds.a
			lib_G.711_dec_arm9_lervds.a
			lib_G.711_enc_arm9_lervds.a
			lib_G.711_dec_arm9_bervds.a
			lib_G.711_enc_arm9_bervds.a

Unix/ Linux	Unix/Linux machine	BUILD=UNIX	lib_G.711_enc_x86_unix.a lib_G.711_dec_x86_unix.a
Board (MX27)	Linux/Unix machine	BUILD= ARM9ELINUX	lib_G.711_dec_arm9_elinux.a lib_G.711_enc_arm9_elinux.a

5.2 Test Application

To build the test application, run ‘make’ from the test/G.711 directory. This makefile can create executables for testing on Linux x86, the ARM11/ARM9 board and RVDS for ARM11. The following commands should be invoked so as to build the executables.

Note: The build procedure is explained with decoder as an example. To build library for the encoder applies the same procedure given below, with the makefile ‘Makefile’.

Options

1) **BUILD options**:
   - **BUILD=ARM11ELINUX**: This option builds the executable ‘test_G.711_ dec_arm11_elinux’, for MX31 board.

   - **BUILD=ARM11LERVDS**: This option builds the executable ‘test_G.711_ dec_arm11_lervds’ for the ARM11 LE RVDS (Armulator).

   - **BUILD=ARM11BERVDS**: This option builds the executable ‘test_G.711_ dec_arm11_bervds’ for the ARM11 BE RVDS (Armulator).

   - **BUILD=ARM9ELINUX**: This option builds the executable ‘test_G.711_ dec_arm9_elinux’, for MX27 board.

   - **BUILD=ARM9LERVDS**: This option builds the executable ‘test_G.711_ dec_arm9_lervds’ for the ARM9 LERVDS (Armulator).

- **BUILD=ARM9BERVDS**: This option builds the executable 'test_G.711_ dec_arm9_bervds' for the ARM9 BE RVDS (Armulator).
- **BUILD=UNIX**: This option builds the executable 'test_G.711_ dec_x86_unix' for the Unix/Linux machine.

2) **LIBRARY options**:
   - **LIB_TYPE= STATIC**: This option builds the ELINUX test application linked with the ELINUX static library 'lib_G.711_ dec_arm11_elinux.a'.If nothing is specified ,the executable links with shared library 'lib_ G.711_ dec_arm11_elinux.so'

     Eg: make BUILD=ARM11ELINUX LIB_TYPE=STATIC

3) **clean options**:
   - **clean:** Deletes all the object files and executable for the specified BUILD option

Note:
In 'Makefile_test.init', the paths for the compiling and linking tools are hard coded for the current set-up. These paths may not be the same in the user's directory set up. Hence, it should be modified to point to the directories where the linking and compilation tools are present before building the application for board.

The following table summarises the build options,

Target	Compilation Environment	Build Options	Executable Name

Board (MX31)	Redhat Linux Machine	BUILD=ARM11ELINUX
		LIB_TYPE = STATIC
			test_G.711_dec_arm11_elinux
			test_G.711_enc_arm11_ elinux

RVDS	PC (Using Cygwin)	BUILD=LERVDS
		BUILD=BERVDS
			test_G.711_dec_arm11_lervds
			test_g711.1_enc_arm11_ lervds
			test_G.711_dec_arm11_bervds
			test_g711.1_enc_arm11_ bervds
			test_G.711_dec_arm9_lervds
			test_g711.1_enc_arm9_ lervds
			test_G.711_dec_arm9_bervds
			test_g711.1_enc_arm9_ bervds

UNIX/ Linux	Unix/Linux machine	BUILD=UNIX	test_G.711_dec_x86_unix test_G.711_enc_x86_unix
Board (MX27)	Redhat Linux Machine	BUILD=ARM9ELINUX	test_G.711_dec_arm9_elinux test_G.711_enc_arm9_elinux

6 Test Application Execution

6.1 Scripts

In the utils/G.711/ directory, a script file exists for doing

a) Regression, Performance on MX31 and MX27 (G.711_run_linux.sh)

b) Sanity on LERVDS (G.711_run_rvds.sh)

6.2 ELINUX

For ARM 11 G.711 encoder: ***test_g711_enc_arm11_elinux <Options> <InpFile> <OutFile>***

Where:

InpFile	is the name of the file to be processed.
OutFile	is the name with the processed data.

Options:

- A – A-law
- M – Mu-Law
- A2M – convert A-law to Mu-Law
- M2A – convert Mu-Law to A-law

For ARM 11 G.711 decoder: ***test_g711_dec_arm11_elinux <Options> <InpFile> <OutFile>***

Where:

InpFile	is the name of the file to be processed.
OutFile	is the name with the processed data.

Options:

- A – A-law
- M – Mu-Law

The user is expected to be aware of the settings to be done for the hardware and to get Linux running on ARM11/ARM9

a) Go to the directory utils/G.711" and edit scripts verify that paths are correct.
b) Make sure the scripts are changed according to current test setup.
c) create a working directory on the board and copy the executables from test/G.711 to the current directory
d) copy the required script file (.sh) from utils/G.711into the working directory on the board
e) Compare output of encoder and decoder using diff script provided in utils/G.711.

6.3 RVDS

The batch files to test encoder and decoder on RVDS are provided in utils/G.711. Run the script from PC (DOS) command prompt.
Note: Please verify the input, output and image path before running the script.

6.4 UNIX Reference

The script described in ELINUX execution can be used for C reference. Modify the script or pass in the parameter for ENCODER_EXE and DECODER_EXE which will be test_G.711_x86_enc_unix and test_G.711_dec_x86_UNIX respectively.

7 Pre compilation Options

7.1 Test application

The following C options need to be set

C Defines	Description	Remarks
ENDIAN_BIG	To run the code as big endian	
TIME_PROFILE	To run the code for profiling	ELINUX build only

7.2 Library

C Defines	Description	Remarks
G711_C_VERSION	To compile C only code	