



Low Level Design Specification Document

Vocoder Interface Design

Department:	WTBU - Cellular Systems		
Creation Date:	2004-11-15		
Last Modified:	2004-11-15 by Karthik Gurumurthy		
ID:	8462.746.04.001	Version:	001
Status:	Draft	ECCN:	Not Applicable

© 2004 Texas Instruments Incorporated. All rights reserved.

Texas Instruments Proprietary Information

Internal Data

0 Document Control

© 2004 Texas Instruments Incorporated. All rights reserved.

Texas Instruments Incorporated and / or its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products, software and services at any time and to discontinue any product, software or service without notice. Customers should obtain the latest relevant information during product design and before placing orders and should verify that such information is current and complete.

All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment. TI warrants performance of its products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI products, software and / or services. To minimize the risks associated with customer products and applications, customers should provide adequate design, testing and operating safeguards.

Any access to and / or use of TI software described in this document is subject to Customers entering into formal license agreements and payment of associated license fees. TI software may solely be used and / or copied subject to and strictly in accordance with all the terms of such license agreements.

Customer acknowledges and agrees that TI products and / or software may be based on or implement industry recognized standards and that certain third parties may claim intellectual property rights therein. The supply of products and / or the licensing of software do not convey a license from TI to any third party intellectual property rights and TI expressly disclaims liability for infringement of third party intellectual property rights.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products, software or services are used.

Information published by TI regarding third-party products, software or services does not constitute a license from TI to use such products, software or services or a warranty, endorsement thereof or statement regarding their availability. Use of such information, products, software or services may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, for any purpose without the express written permission of TI.

0.1 Export Control Statement

Recipient agrees that it will not knowingly export or re-export, directly or indirectly, any product or technical data (as defined by the U.S, EU and other Export Administration Regulations) including software, or any controlled product restricted by other applicable national regulations, received from Disclosing party under this Agreement, or any direct product of such technology, to any destination to which such export or re-export is restricted or prohibited by U.S or other applicable laws, without obtaining prior authorization from U.S. Department of Commerce and other competent Government authorities to the extent required by those laws. This provision shall survive termination or expiration of this Agreement.

According to our best knowledge of the state and end-use of this product or technology, and in compliance with the export control regulations of dual-use goods in force in the origin and exporting countries, this

technology is classified as given on the front page.

This product or technology may require export or re-export license for shipping it in compliance with certain countries regulations.

0.2 Document History

Date	Version	Status	Author
2004-11-15	001	Draft	Karthik Gurumurthy
Initial version.			

0.3 References

- [1] LIM_GS_TM008 (Vocoder Interface Change)
- [2] 3GPP TS 24.007: “3rd Generation Partnership Project; Technical Specification Group Core Network; Mobile radio interface signalling layer 3; General aspects”
- [3] 3GPP TS 24.008: “3rd Generation Partnership Project; Technical Specification Group Core Network; Mobile radio interface Layer 3 specification; Core network protocols”

Table of Contents

1 Introduction.....5

2 Current ACI vocoder interface6

3 Proposed Interface Change7

 3.1 Vocoder interface for TCS2.1 program.....8

 3.2 Vocoder interface for TCS3.1 program.....9

4 Impact.....10

5 Message Sequence charts for Vocoder enabling in case of MO/MT calls11

 5.1 For an MO call with early assignment11

 5.2 For MO call with late assignment12

 5.3 For MT call with early channel assignment13

 5.4 MT call with late channel assignment14

1 Introduction

This document introduces the new entity High Level Vocoder driver that is added to provide the interface between ACI and Layer 1 for enabling and disabling the vocoder. It also indicates the interfaces provided by this entity to Layer 1 and ACI.

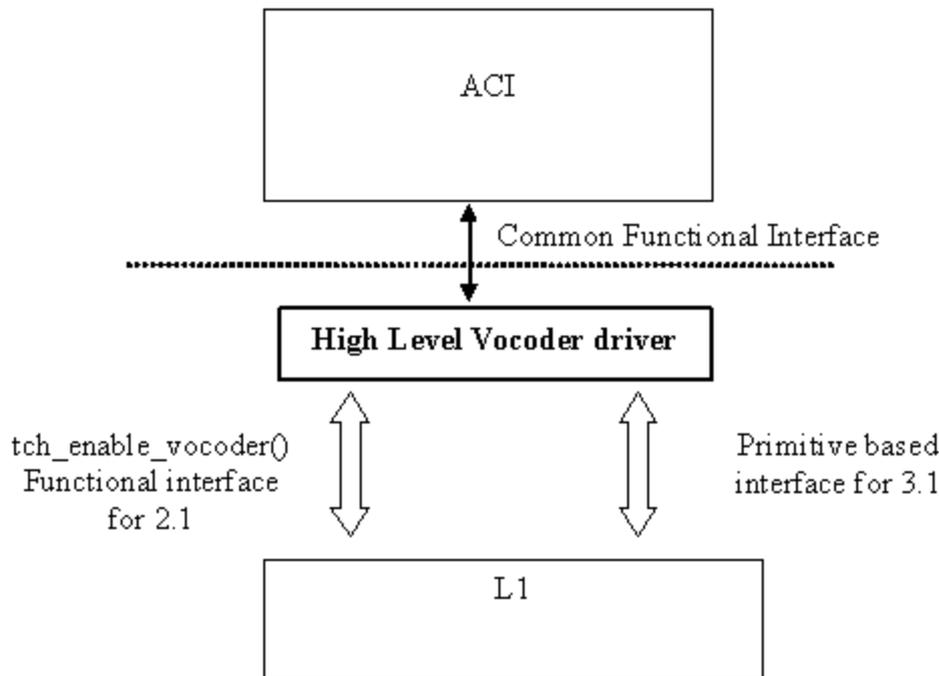
2 Current ACI vocoder interface

Presently the ACI interfaces with the Layer 1 through a function call *enable_tch_vocoder* () to enable and disable the vocoder. The interface between ACI and Layer 1 is proposed to change to a primitive based interface for the TCS3.1 release to enable the dynamic download feature and retain the old function based interface for TCS2.1

For more information on the reasons for change refer LIM_GS_TM008 (VOCODER INTERFACE CHANGE).

3 Proposed Interface Change

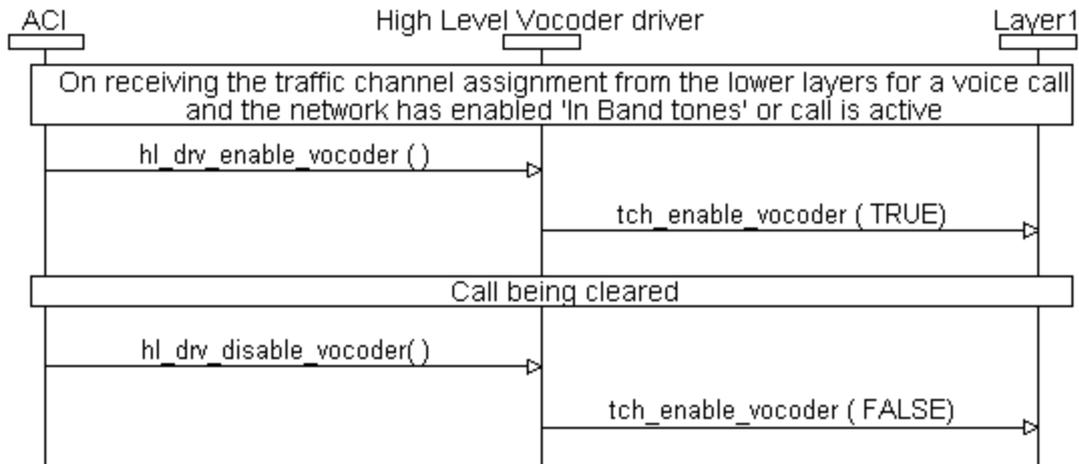
The interface between Layer 1 and ACI is different for different programs, being functional interface for TCS2.1 and primitive based for TCS3.1. In order to maintain uniformity in throughout ACI, abstract the interface with Layer 1 and provide for a framework to add and remove further changes in the interface, it is proposed that a new entity be created exclusively to handle the vocoder functionality between the ACI and Layer 1 entities. The new entity will be part of the MMI/ACI task.



The High Level Vocoder driver provides a common functional interface to the ACI to use, which remains unchanged for all the programs.

- hl_drv_enable_vocoder() : The function call used to enable the vocoder functionality
- hl_drv_disable_vocoder() : The function call used to disable the vocoder functionality

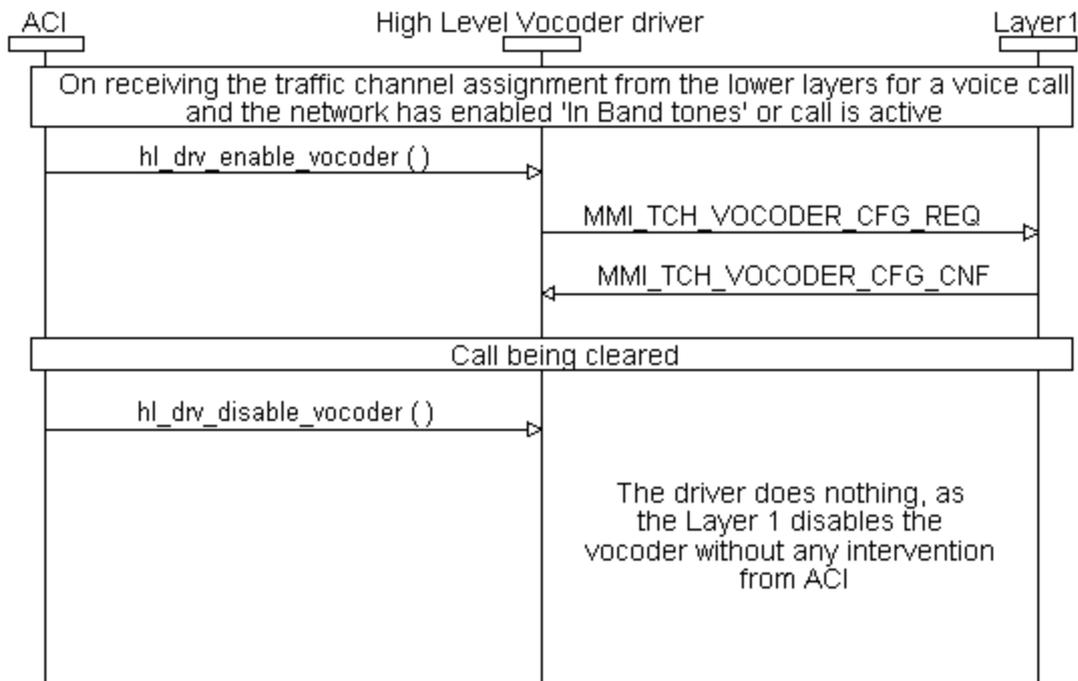
3.1 Vocoder interface for TCS2.1 program



In case of the TCS2.1 program, the driver uses the already available functional interface *tch_enable_vocoder* provided by Layer 1 to enable and disable the vocoder.

The High Layer Vocoder driver as seen from the message sequence chart above just encapsulates the Layer 1 function call in case of TCS2.1. The working remains unchanged compared to the present implementation, where ACI can enable and disable the vocoder functionality.

3.2 Vocoder interface for TCS3.1 program



In case of the TCS3.1 program, new primitives will be added to communicate with the Layer1 which will be used to enable and disable the vocoder.

When ACI invokes the `psa_enable_vocoder` function, the High Layer Vocoder driver indicates the same to the Layer 1 through the primitive `MMI_TCH_VOCODER_CFG_REQ`. With the current implementation, the `MMI_TCH_VOCODER_CFG_CON` is ignored and the ACI assumes that the vocoder was enabled successfully. When the ACI invokes the `psa_disable_vocoder` function, the High Layer Vocoder driver does nothing, as the Layer 1 has been modified to disable the vocoder at the proper instant, without any request being explicitly sent from the ACI.

The High Level Vocoder driver can in one of the following three states and handles the requests to enable or disable the vocoder depending on its current state.

- `HL_VOCODER_DISABLED`: This state indicates that the vocoder is disabled. The vocoder enable received in this state is forwarded to Layer 1.
- `HL_VOCODER_ENABLE_REQ`: This state indicates that the High Level Vocoder driver has sent a request to Layer 1 to enable the vocoder and is waiting for a confirmation. Any requests to enable vocoder in this state result in error.
- `HL_VOCODER_ENABLED`: This state indicates that the High Level Vocoder driver has successfully brokered with the Layer 1 to enable the vocoder. All requests to enable the vocoder in this state are ignored and success is indicated to the invoking entity.

Requests to disable the vocoder in any of the above states are ignored by High Level Vocoder driver.

4 Impact

The proposed changes will impact ACI and will involve the adding of the new entity High Level Vocoder driver to provide the necessary vocoder interfaces to Layer 1.

The changes required in ACI will be very minimal, replacing the Layer 1 vocoder related function calls by the High Level Vocoder driver function calls.

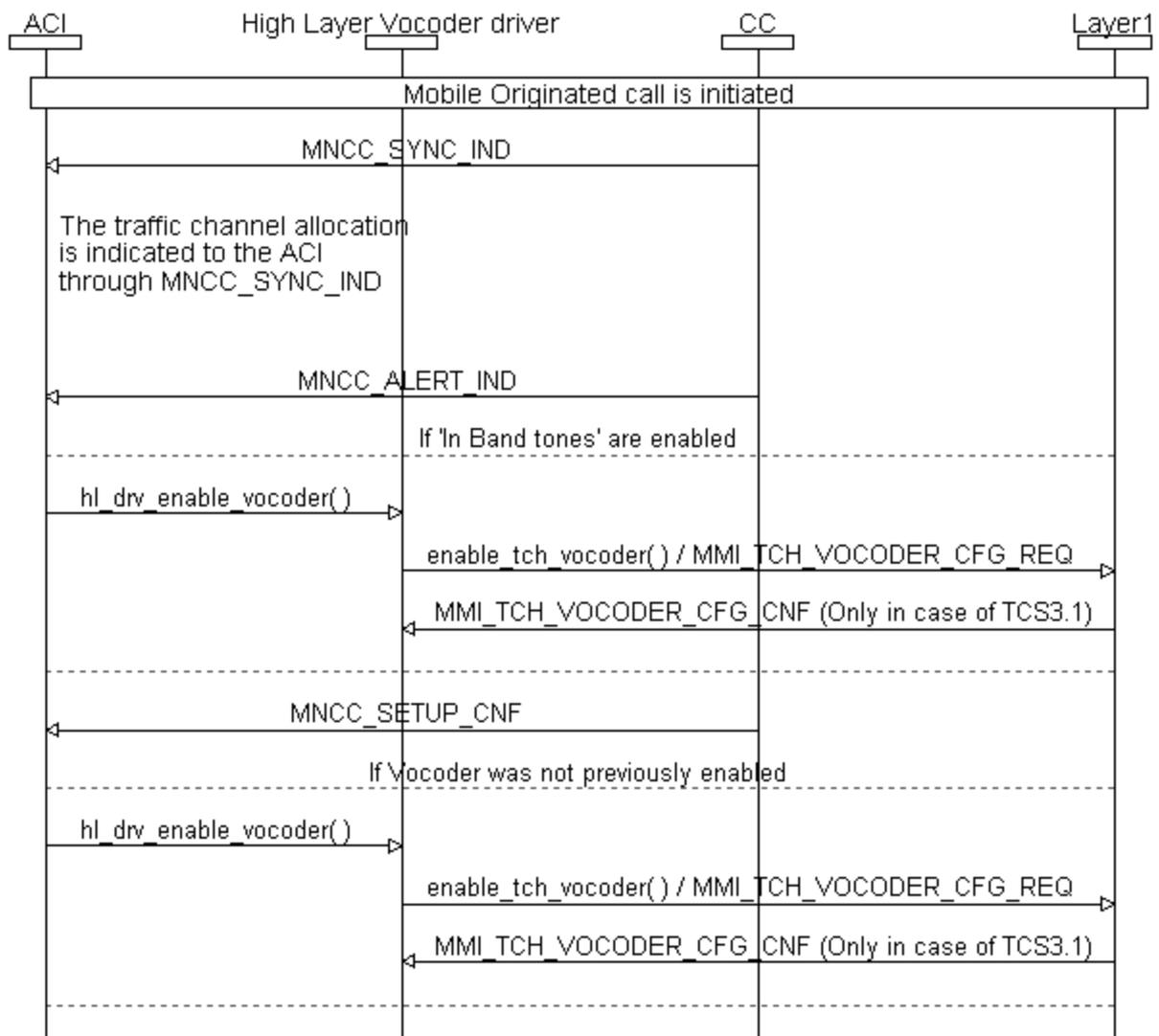
The High Level Vocoder driver will have to be implemented from scratch and the primitives necessary to communicate with Layer 1 will have to be included on the relevant SAP.

5 Message Sequence charts for Vocoder enabling in case of MO/MT calls

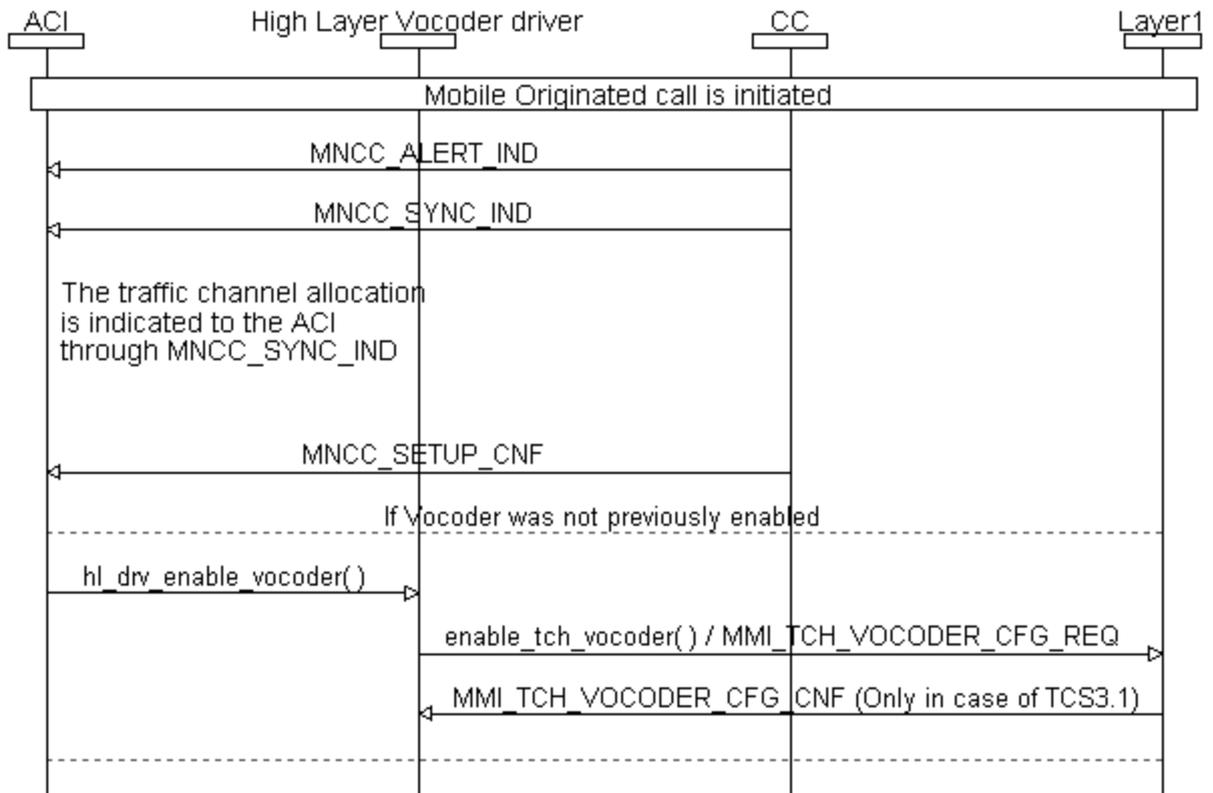
The ACI on receiving the traffic channel (TCH) assignment activates the vocoder if, the 'In Band tones' are enabled by the network or latest when the call enters the active state.

In the current implementation, it is possible that the ACI sends more than one request to the Layer 1 to enable the vocoder. With the introduction of the High Level Vocoder driver, it is proposed to ensure that the request to enable the vocoder will be sent only once to the Layer 1. The driver will maintain the context of vocoder state and will forward the requests, to enable/disable the vocoder, to Layer 1 based on this.

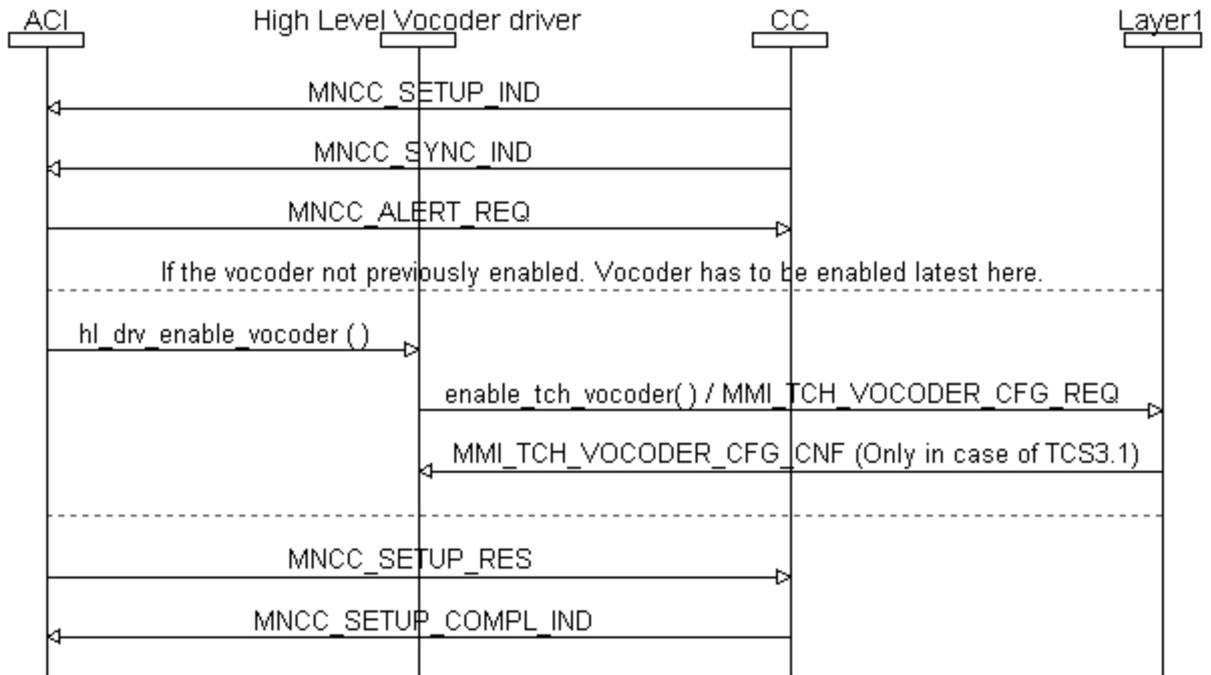
5.1 For an MO call with early assignment



5.2 For MO call with late assignment



5.3 For MT call with early channel assignment



5.4 MT call with late channel assignment

