

Intel® High Definition Audio Specification

Document Change Notification

Date: December 8, 2005
Company: Intel Corporation
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Change Identification: **DCN No: HDA022-A**
Document Revision: Intel® High Definition Audio 1.0

This document discloses changes to the Intel® High Definition Audio Specification and all information contained herein is provided under the terms of the "AZALIA" SPECIFICATION DEVELOPMENT AGREEMENT" also known as Intel® High Definition Audio Specification Developer Agreement, and all the terms of such agreement, including the confidentiality provisions, shall apply to this disclosure.

Title: Clarification of Channel count specification language

Brief description of the functional changes:

The definition in the Intel® High Definition Audio specification has language to specify how channel counts are set and used, but is not clear and can be interpreted incorrectly. This DCN adds some clarity to that specification.

Current Definitions:

3.3.41 Offset 92: {IOB}SDnFMT – Input/Output/Bidirectional Stream Descriptor *n* Format

Length: 2 bytes

Table 1. Stream Descriptor *n* Format

Bit	Type	Reset	Description
15	RO	0	<i>Reserved</i>
14	RW	0	Sample Base Rate (BASE): 0 = 48 kHz 1 = 44.1 kHz
13:11	RW	000	Sample Base Rate Multiple (MULT): 000 = 48 kHz/44.1 kHz or less 001 = x2 (96 kHz, 88.2 kHz, 32 kHz) 010 = x3 (144 kHz) 011 = x4 (192 kHz, 176.4 kHz) 100-111 = <i>Reserved</i>

Bit	Type	Reset	Description
10:8	RW	000	Sample Base Rate Divisor (DIV): 000 = Divide by 1 (48 kHz, 44.1 kHz) 001 = Divide by 2 (24 kHz, 22.05 kHz) 010 = Divide by 3 (16 kHz, 32 kHz) 011 = Divide by 4 (11.025 kHz) 100 = Divide by 5 (9.6 kHz) 101 = Divide by 6 (8 kHz) 110 = Divide by 7 111 = Divide by 8 (6 kHz)
7	RsvP	0's	<i>Reserved</i>
6:4	RW	00	Bits per Sample (BITS): 000 = 8 bits. The data will be packed in memory in 8-bit containers on 16-bit boundaries. 001 = 16 bits. The data will be packed in memory in 16-bit containers on 16-bit boundaries. 010 = 20 bits. The data will be packed in memory in 32-bit containers on 32-bit boundaries. 011 = 24 bits. The data will be packed in memory in 32-bit containers on 32-bit boundaries. 100 = 32 bits. The data will be packed in memory in 32-bit containers on 32-bit boundaries. 101-111 = <i>Reserved</i>
3:0	RW	0000	Number of Channels (CHAN): Number of channels in each frame of the stream: 0000 = 1 0001 = 2 ... 1111 = 16

...

3.7.1 Stream Format Structure

Format is a standard structure used in the Stream Descriptors and sent to the codec. This structure does not directly appear any place in memory.

If the TYPE is set to Non-PCM, the controller just pushes data over the link and is not concerned with formatting. The base rate, data type, and number of Words (MULT) to send each valid frame are specified to control the rate at which the non-PCM data is sent.

Table 2. PCM Format Structure

Bit	Description
15	Stream Type (TYPE): If TYPE is non-zero, the other bits in the format structure have other meanings. 0: PCM 1: Non-PCM
14	Sample Base Rate (BASE): 0 = 48 kHz 1 = 44.1 kHz

Bit	Description
13:11	Sample Base Rate Multiple (MULT): 000 = 48 kHz/44.1 kHz or less 001 = x2 (96 kHz, 88.2 kHz, 32 kHz) 010 = x3 (144 kHz) 011 = x4 (192 kHz, 176.4 kHz) 100-111 = <i>Reserved</i>
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5.3.1 Basic Frame Components

Inbound and outbound frames are made up of three major components, specifically:

- (a) A single *Command/Response Field*
- (b) Zero or more *Stream Packets*
- (c) A *Null Field* to fill out the frame

All of these are shown in Figure 1 and described below.

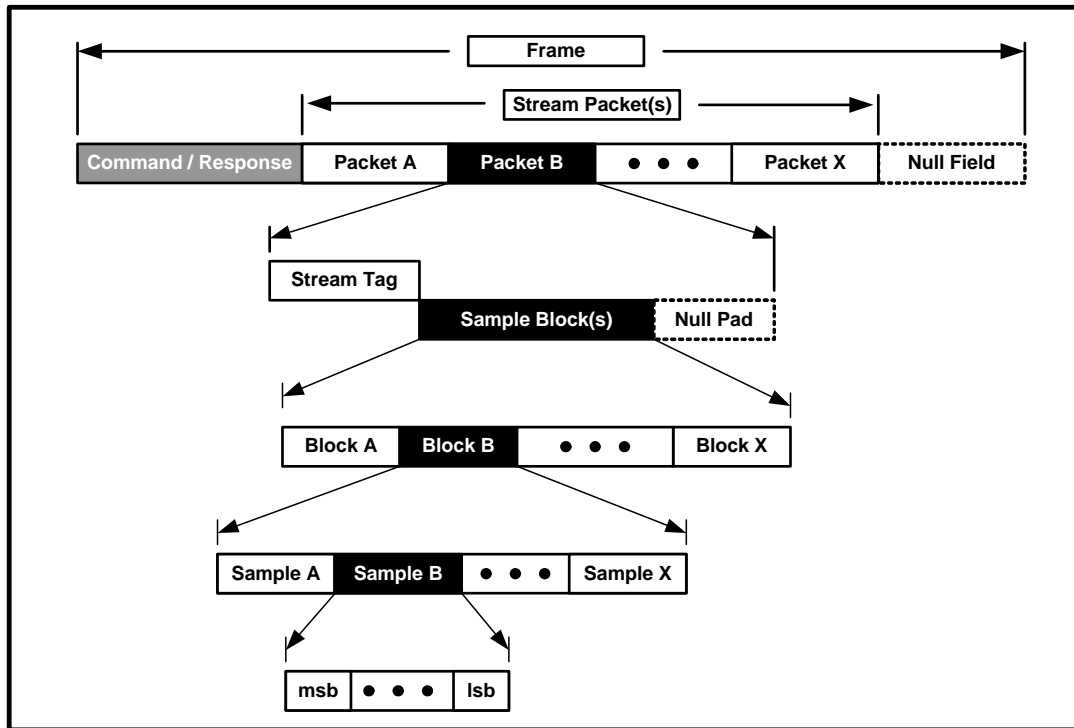


Figure 1. Frame Composition

Command/Response Field: Used for link and codec management. One of these fields appears exactly once per frame, most significant bit first, and is always the first field in the frame. It is composed of a 40-bit Command Field on each outbound frame and a 36-bit Response Field on each inbound frame. The primary component of each of these fields is the 32-bit Verb/Response structure. The remaining eight command bits in the outbound frame, and four response bits in the inbound frame, are either reserved or special purpose bits (see Sections **Error! Reference source not found.** and **Error! Reference source not found.**)

Stream Packet: The logical “envelop” in which data are transferred on the link, consists of one *stream tag* plus one or more *sample block(s)*, the number of which are specified by the “Block Multiple” field of the Stream Descriptor Format registers. (See Section **Error! Reference source not found.** for more information on the Stream Descriptor Format registers.) In addition, an inbound stream packet may include 4 bits of 0 padding (see Section **Error! Reference source not found.**) at the end of the packet only. No padding is allowed between stream packets nor between the Command/Response Field and the first stream packet (if there is one). With the exception of source synchronous input streams (see Section **Error! Reference source not found.**), no stream is allowed to generate more than one stream packet per frame.

Stream Tag: The label at the beginning of each stream packet that provides the associated stream ID. All data in one stream packet belongs to a single stream. The Tag format and method of transmission differ for inbound and outbound streams.

Sample Block: A set of one or more *samples*, the number of which is specified by the “Channels” field of the Stream Descriptor Format registers (see Section **Error! Reference source not found.**). Samples in a given sample block are associated with a single given stream, have the same length or sample size, and have the same time reference or sample point.

New Definition:**3.3.41 Offset 92: {IOB}SDnFMT – Input/Output/Bidirectional Stream Descriptor *n* Format**

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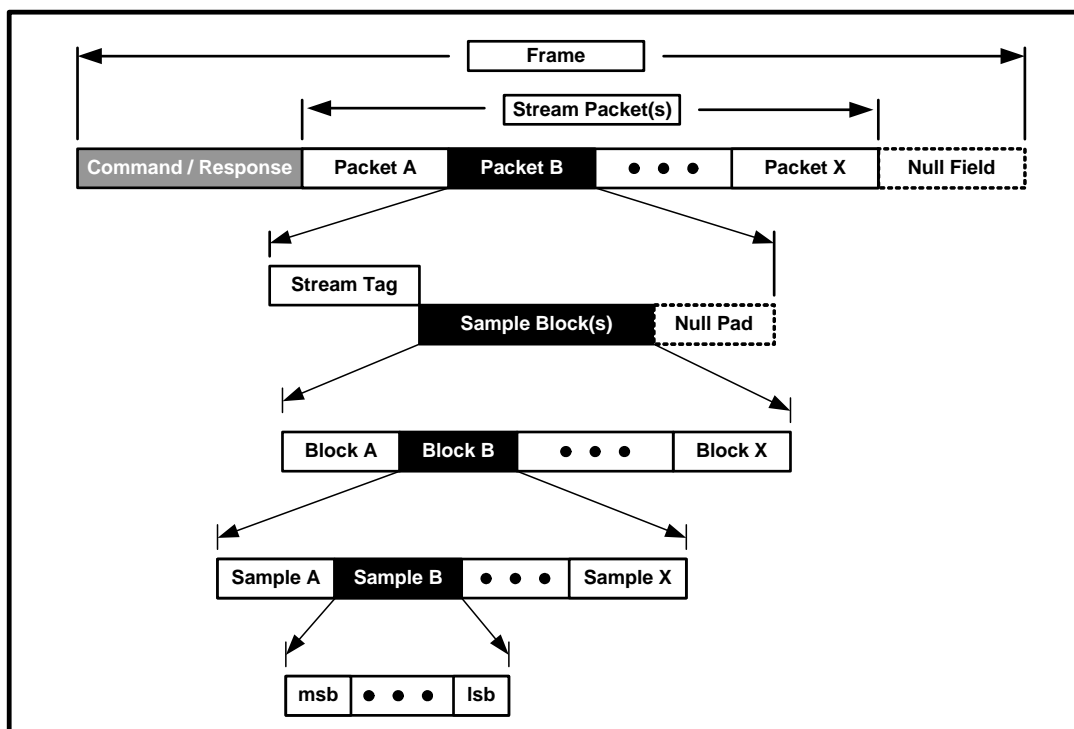


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