

AMD HDA Verbs

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1. Audio Descriptor Set and Get

Audio Descriptor Set and Get (pin vendor defined verb 776, F76)

Allows accessing the Short audio descriptor for each format in an indirect way. Only the Audio Format Code (bits [6:3] of Byte 0) is RW, the other formats are RO. After the Audio format Code is written using the Set function, the Get function will give the audio descriptor corresponding to the Audio Format Code written.

Byte#	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0	0	Audio format code (1 to 14) 0: reserved 1:LPCM 2: AC-3 3: MPEG1 (Layers 1 and 2) 4: MP3 (MPEG1 Layer 3) 5: MPEG2 (Multichannel) 6: AAC 7: DTS 8: ATRAC 9: Reserved 10: Dolby Digital + 11: DTS-HD 12: MAT/MLP (Dolby True HD) 13: Reserved 14: WMA Pro				Max Num of channels – 1		
1 Rates supported. In the LPCM case, these are the rates supported for multi-channel	Reserved	192khz	176.4 kHz	96 kHz	88.2 kHz	48 kHz	44.1 kHz	32 kHz
2	BPS capability for LPCM: <ul style="list-style-type: none"> • Bit0: 16 bit capable • Bit1: 20 bit capable • Bit 2: 24 bit capable • Bits[7:3] reserved. Format specific for other formats							
3 Rates supported for stereo. Only applicable in the LPCM case.	Reserved	192khz	176.4khz	96khz	88.2 khz	48khz	44.1khz	32khz

2. Speaker Allocation Get

Speaker Allocation Get (pin vendor defined verb F70)

Byte 0 of the response contains the speaker allocation of the DTV according to its Short Audio Descriptor.
All fields are RO.

Byte #	Bit 7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0	0	RLC/RR C Rear left Center and Rear Right center speakers present	FLC/FR C Front left Center and Front Right center speakers present	RC Rear center speake r present	RL/RR Rear left and rear right speaker s present	FC Front center speake r present	LFE Low frequency speaker present	FL/FR Front left and Front right speakers present
1	Reserved						DP_CONNECTIO N (Only for parts supporting DP Audio, for GUI labeling)	HDMI_CONNECTIO N (Only for parts supporting DP Audio, for GUI labeling)
2	0							
3	0							

3. Multi-Channel Enable Set and Get

Multi-Channel Enable 01 Set and Get (pin vendor defined verb 777, F77)

Multi-Channel Enable 23 Set and Get (pin vendor defined verb 778, F78)

Multi-Channel Enable 45 Set and Get (pin vendor defined verb 779, F79)

Multi-Channel Enable 67 Set and Get (pin vendor defined verb 77A, F7A)

Allows the audio driver to enable sending multi-channel audio through the pin. OUT_ENABLE enables the corresponding channel pair of the HDMI/DP multichannel audio data stream. The channel pair selected are CHANNEL_ID and CHANNEL_ID+1 channels of the controller audio stream.

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
CHANNEL_ID				Rsvd		MUTE	OUT_ENABLE
Channels CHANNEL_ID and CHANNEL_ID+1 of the audio stream are sent to the corresponding channel pair of the HDMI/DP.				Rsvd		(Only for Codec Rev 3 and higher) Zeroes the audio in the channel pair	Enables sending the stream channels selected by CHANNEL_ID to the corresponding channel pair of the HDMI/DP.

4. Channel Allocation Set and Get

Channel Allocation Set and Get (pin vendor defined verb 771 and F71)

Defines the value to be sent in the Audio InfoFrame data byte 4. Intended to determine how various speaker location are allocated to transmission channels.

All fields are RW.

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
CA7	CA6	CA5	CA4	CA3	CA2	CA1	CA0
Channel Allocation 0: Channel 0 is Front Left, Channel 1 is Front Right, Other channels not used 1: Channel 0 is Front Left, Channel 1 is Front Right, Channel 2 is Low Freq speaker, Other channels not used ... 0x1F: Channel 0 is Front Left, Channel 1 is Front Right, Channel 2 is Low Freq speaker, Channel 3 is Front Center, Channel 4 is Rear Left, Channel 5 is Rear Right, Channel 6 is Front Left Center, Channel 7 is Front Right Center. 0x20 to 0xFF: Reserved							

5. Down-Mix Information Set and Get

Down-Mix Information Set and Get (pin vendor defined verb 772 and F72)

Defines the value to be sent in the Audio InfoFrame data byte 5. Intended to communicate to the DTV the total attenuation that the source applied to the audio and if down-mixing is permitted. Also note that the Codec hardware will swap FC, LFE in order to meet the HDMI/DP requirement. This requires no programming on the audio driver side. All fields are RW.

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
DM_INH	LSV3	LSV2	LSV1	LSV0	Rsvd	Rsvd	Rsvd
0: Down-mix permitted or no information. 1: Down-mix prohibited.	0: 0dB level shift 1: 1dB Level Shift ... 15: 15 dB level Shift						

Multi-channel audio Format	Channel allocation in system memory				Corresponding Channel Allocation value to program	Required channel allocation in HDMI/DP packets				Codec channel crossbar programming							
	0,1	2,3	4,5	6,7		0, 1	2, 3	4, 5	6, 7	Multi-Channel Enable 01		Multi-Channel Enable 23		Multi-Channel Enable 45		Multi-Channel Enable 67	
										OUT_ENAB	CHANNEL_	OUT_ENAB	CHANNEL_	OUT_ENAB	CHANNEL_	OUT_ENAB	CHANNEL_
2.0	FL,F R	-	-	-	00	FL,F R	-, -	-, -	-, -	1	0	0	x	0	x	0	x
3.0	FL,F R	FC,-	-	-	02	FL,F R	-, FC	-, -	-, -	1	0	1	2	0	x	0	x
4.0	FL,F R	SL,SR	-	-	08	FL,F R	-, -	SL,S R	-, -	1	0	0	x	1	2	0	x
5.1	FL,F R	FC, LFE	SL,S R	-	0B	FL,F R	LFE, FC	SL,S R	-, -	1	0	1	2	1	4	0	x
6.1	FL,F R	FC, LFE	SL,S R	BC, -	0F	FL,F R	LFE, FC	SL,S R	BC,-	1	0	1	2	1	4	1	6
7.1	FL,F R	FC, LFE	BL,B R	SL,S R	13	FL,F R	LFE, FC	SL,S R	BL, BR	1	0	1	2	1	6	1	4

6. Multi-Channel Mode Set and Get

Multi-Channel Mode Set and Get (pin vendor defined verb 789, F89)

Revision ID 3 and newer only.

Allows use of the single-channel-wise Multi-Channel Enable verbs, which provide higher channel routing flexibility for single-sink and DDM Audio multi-sink surround sound.

bit7:1	bit0
Rsvd	MULTICHANNEL_MODE
Rsvd	0: channel pair mode (uses only the channel-pair-wise Multi-channel Enable verbs) 1: single channel mode (uses the single-channel-wise Multi-channel Enable verbs)

7. Multi-Channel Enable Set and Get

Multi-Channel Enable 1 Set and Get (pin vendor verb 785, F85)

Multi-Channel Enable 3 Set and Get (pin vendor verb 786, F86)

Multi-Channel Enable 5 Set and Get (pin vendor verb 787, F87)

Multi-Channel Enable 7 Set and Get (pin vendor verb 788, F88)

Multi-Channel Enable 01 Set and Get (pin vendor verb 777, F77) (applies to ch 0 in single channel mode)

Multi-Channel Enable 23 Set and Get (pin vendor verb 778, F78) (applies to ch 2 in single channel mode)

Multi-Channel Enable 45 Set and Get (pin vendor verb 779, F79) (applies to ch 4 in single channel mode)

Multi-Channel Enable 67 Set and Get (pin vendor verb 77A, F7A) (applies to ch 6 in single channel mode)

When in “Single Channel Mode”, the channel-pair-wise Multi-channel Enable verbs (01, 23, 45 and 67) apply only to the even channels (0, 2, 4 and 6) and these verbs apply to the odd channels. Besides that, the format is the same, and the C/LFE swapping is not automatic anymore and has to be explicitly programmed in these controls.

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
CHANNEL_ID				Rsvd		MUTE	OUT_ENABLE
Channel of the audio stream sent to the corresponding channel of the HDMI/DP.				Rsvd		Zeroes the audio in the channel	Enables sending the stream channels selected by CHANNEL_ID to the corresponding channel of the HDMI/DP.