1394 Audio Market Analysis

Introduction

For the next 2 years, Digital Harmony will focus on two primary markets for its 1394 and wireless audio technologies: Professional Audio (including sound reinforcement systems and musical instruments) and Consumer Audio (which crosses over to automotive and PC markets). For each market, a Digital Harmony 1394 Reference System has been defined. Each System contains key 1394 product categories that a) can be designed in 2001, and b) create a system to highlight the benefits of both the 1394 bus and the Digital Harmony brand. These Systems are the Digital Harmony Studio™ (a production system for both the professional and home recording studios) and the Digital Harmony Home™ (a home entertainment network).

Digital Harmony's technologies are used to create interoperable networks of audio/video devices for these two primary markets. This business model is slightly different from companies that focus on creating point-to-point 1394 systems (e.g., DV camcorder-to-PC, SBP-2 peripherals-to-PC, DVHS-to-DTV, DSS receiver-to-DVHS, etc.). These represent the first 1394 products to launch over the last 2 years.

Digital Harmony's business model is based on the nonexclusive licensing of portfolio technologies to companies who (quite often) compete with each other, much like Dolby. To date, this nonexclusive licensing model has not been compromised. Primary sources of revenue include per-unit royalties, licensing fees (both from OEMs and semiconductor companies), and embeddable transceiver module sales (primarily for WireFree modules and DHIVA/1394 modules).

Digital Harmony's expertise mirrors the background of its primary engineers and founders: high-quality (as opposed to computer/Internet) digital audio. Although all of Digital Harmony's hardware and silicon design modules are engineered to support DV video and MPEG-2TS video, the company's technologies have not yet been used in a video product (e.g., DTV, DVHS).

Currently, the professional audio market has embraced 1394. This market is made up of many smaller (i.e., US$10-20 million) companies, each technically sophisticated and engineering driven. 1394 audio is a relatively easy sale to this market, as there is a well-understood value/benefit to 1394. The consumer electronics market will have a slower rate of adoption, but with a much bigger market potential. It is understood that consumers are largely uninterested in the underlying technology, always in favor of benefits and value, especially broadband sharing and distributed audio/video. The initial target market (early adopters, busy affluent households) sees value in efficient use of devices, easy control, and simultaneous use by all members of the family.

Digital Harmony Studio™

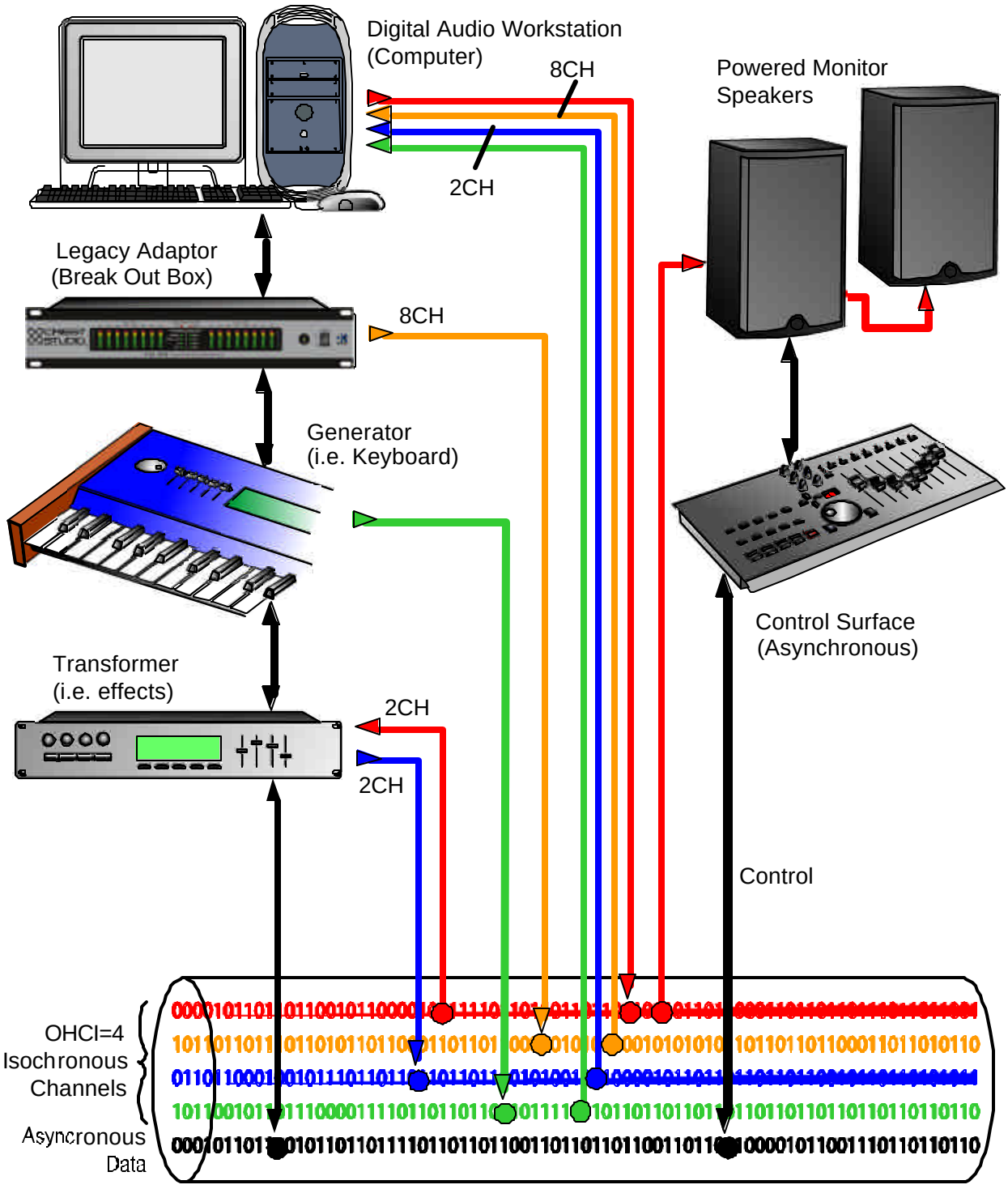
Market: Professional Audio and Musical Instruments
Main Trade Shows: AES (Sep) and NAMM (Jan)
Focus: Audio Recording Products, Sound Reinforcement Products, Musical Instruments
System: Project (Home) Studio, Professional Studios
Leading Competitor: Yamaha (mLAN licensing program)
US Market Size (1991 sales): US$3.93 billion (source: NAMM)
US Market Size (1999 sales): US$6.8 billion (source: NAMM)
Worldwide Market Size: approximately 2xUS market

US Sales of Potential Digital Harmony/1394 Products (1999 sales):

Category	US 1999 Units Sold	US 1999 Sales (US$)
Digital Keyboards	1,298,000	$650 million
Power Amplifiers	1,130,000	$583 million
Loudspeakers	N/A	$332 million
Mixers	325,000	$320 million
Karaoke and DJ	1,290,000	$205 million
Rack Signal Processors	508,000	$140 million
Non-PC Recorders	155,000	$140 million
Sound Modules	147,000	$112 million
Computer Interface Products	56,000	$28 million

Summary of Digital Harmony OEM Customers:

Category	Current Licensees	Targeted Licensees
Digital Keyboards	Peavey	Roland, Yamaha, Korg, Kurzweil/Young Chang, Novation
Power Amplifiers	Crown, Crest, QSC	Hafler, Yamaha, Camco
Loudspeakers	Dynaudio, JBL, Peavey	Genelec, Mackie, Roland, Hafler, Tannoy, EAW, Nexo
Mixers	Peavey, Soundcraft, Crest	Mackie, Tascam, Akai, Yamaha
Karaoke and DJ	Denon, Peavey	Roland
Rackmount Signal Processors	Peavey, TC Electronic, dbx, Digitech, Lexicon, JBL	Alesis, ART, Line6, Yamaha, Roland, Symetrix/Lucid, Presonus
Non-PC Recorders	N/A	Korg, Yamaha, Fostex, Tascam, Roland
Sound Modules	Peavey	Akai, Emu/Creative, Korg, Kurzweil/Young Chang, Roland
Computer Interface Products	Midiman, Crest	Tascam, Event, Roland, MOTU, Sonic Foundry, Digidesign, Terratec, Echo Digital, Frontier, Aardvark, Ego Systems, Digigram



Digital Harmony Studio™ Reference System

Important Industry Trends:

1) Active loudspeakers are replacing passive loudspeakers.
    - Improved audio quality (i.e., mfr matches amplifier/driver to speaker), efficiency.
    - Many mfrs such as Genelec are now making active speakers only.
    - Sweetwater Sound quote: "We're seeing a tenfold increase in sales of active speakers; the major brands selling are Mackie HR824s, Tannoy Reveals and the Event Electronics systems. It's getting very hard to sell any passive units." Sweetwater is the largest catalog/direct pro audio equipment retailers in the US.
    - Semiconductor companies such as Cirrus Logic and TI have recently bought PWM/Class D amp technology companies.
    - Active speakers are ideal candidate for 1394 interface (also WireFree).
2) The all-digital studio supports an arbitrary number of audio channels.
    - Results in higher active loudspeaker sales (i.e., one per channel).
    - Movement from stereo to 5.1, 6.1, 7.1 (Dolby, THX, and DTS), to 10.1 (Tomlinson Hulman, creator of THX).
    - For example, Disney mixes all audio content (including music CDs) for 40 audio channels (for use in Disney theme park attractions) and then down-mixes to other commercial formats: stereo for VHS, DTS for audio CDs, Dolby Digital for DVD, ProLogic (for broadcast television). Universal operates in a similar fashion.
    - Result: studios will have more and more monitor speakers.
3) Magnetic recording tape is being replaced with solid-state digital storage devices.
    - Represents a crossover 1394 product category from consumer electronics (e.g., Western Digital's 61883-6 streaming HDDs) and PC (SBP-2 HDDs).
    - 1394 HDDs are already the main choice for adding external storage to any PC-based studio, and use will grow exponentially due to greater demand for storage capacity for archiving and works-in-progress.
    - Trend will continue indefinitely as audio formats/bandwidth grows. Already at 192kHz, MLP/DVD-Audio, multichannel (Disney's 40-channel mixes, etc.)
4) 1394 gives project studios unlimited expandability.
    - Storage.
    - Expanding tracking capability (going from 8 to 16 to 32 tracks when recording).
    - Expanding mixdown format capability (adding 1394 monitor speakers to go from mixing in stereo to Dolby Digital, and so on).
5) PCI soundcards will be obsolete in the project studio environment.
    - Inability of proprietary PCI cards to keep up with audio quality (e.g., 192kHz).
    - Due to internal PC noise.
    - Due to limited number of channels of I/O (mechanical layout constraints).
    - 1394 audio interface boxes such as Digital Harmony/Crest FB-88 will dominate.
6) New 1394 product categories will emerge.
    - 1394 (digital) microphone. (One customer has already approached DHT).
    - Adapters that allow non-1394 devices to be connected to the 1394 system.
    - 1394 bus power conditioners. (Monster Cable is a Digital Harmony licensee.)
7) 1394, like MIDI, will allow many innovative small companies to compete.
    - Open standards allow small mfr to compete with the giants.
8) DJ market is surging.
    - Seemingly retro genre is actually technology driver; non-US market in particular.

Quick and Dirty Estimate of Market Potential (one approach)

1) There are an estimated 1-2 million project studios today. (Various sources.)
2) A typical project studio contains one PC-based recording system, one external multichannel audio interface, 3 rackmount signal processors, 2 digital keyboards/sound modules, one sampler module/keyboard, one audio mixer (to mix the multiple audio outputs of the sound sources), one preamplifier (for microphones and guitars), one amplifier, 2 speakers, and one backup device.
3) This represents 13 potential 1394 devices connected to a 1394-based PC workstation.
4) Each future 1394-based project studio will require at least one "legacy adapter" for non-1394 devices.
5) Overall market today thus represents 14-28 million devices in use.
6) Each device has an expected lifetime (due to advances in technology) of 2-3 years.
7) With expected market growth rates caused by ubiquitous digital connectivity via 1394, it is estimated (Cahners and others) that there may be as many as 5 million project studios in the next 3 years.
8) With the above product life expectancy, this represents new purchase potential of 65 million 1394 devices in the next 3 years.
9) This does not take into account multiple 1394 storage devices, movement to multichannel mixes (more 1394/WireFree active monitor speakers), professional recording studios (10% of the project studio market, but using 10x as much equipment per studio), live performance systems (keyboard networks, live sound networks, architectural acoustics).
10) Of these, the commercial installation market represents a fast growing market sector, one primed for 1394. (Reference: Peavey, QSC; Competition: Peak Audio's CobraNet)
11) Overall potential market is estimated to be 100 million 1394 units in the professional audio market total over the next 3 years.
12) Digital Harmony, as a world leader in 1394 audio for this marketplace, should assume high market share in terms of 1394 technologies embedded in these devices. With assumptions that only 25% of these 100 million units actually end up with 1394 ports, and a market share of 40%, a per-unit royalty of US$6/unit represents potential revenue of US$60 million over this 3-year period.

Estimate of Market Potential (second approach)

TAM=Total Available Market Worldwide
%1394=% of TAM that will have 1394 ports
%DH=% of 1394 TAM units with DH IP

Year	2001			2002			2003			2004		
	TAM	%1394	%DH	TAM	%1394	%DH	TAM	%1394	%DH	TAM	%1394	%DH
Digital Pianos	550	0%	15%	605	5%	15%	666	25%	15%	732	50%	15%
Multitrack Recorders	165	0%	15%	182	5%	15%	200	25%	15%	220	100%	15%
Rackmount DSP	1,155	0%	15%	1,271	5%	15%	1,398	15%	15%	1,537	25%	20%
Synths and Samplers	528	1%	15%	581	5%	15%	639	25%	15%	703	50%	15%
Amplifiers	2,520	1%	25%	2,646	5%	25%	2,778	15%	25%	2,917	30%	30%
Powered Speakers	260	1%	50%	338	10%	50%	439	55%	50%	571	100%	60%
Interfaces	165	5%	50%	182	30%	50%	200	75%	50%	220	100%	60%
Mixers	1,386	1%	25%	1,525	30%	25%	1,677	75%	25%	1,845	100%	35%
Total Units	**6,729**			**7,330**			**7,997**			**8,745**		

CEA, NAMM, CEDIA and internal Digital Harmony sources

SAM=Serviceable Market Worldwide=TAM%1394*
DHM=Digital Harmony Market=SAM%DH*
Revenue=DH royalty revenue

Year	2001			2002			2003			2004		
	SAM	DHM	Revenue	SAM	DHM	Revenue	SAM	DHM	Revenue	SAM	DHM	Revenue
Digital Pianos	0	0	$0	30	5	$27	166	25	$150	366	55	$329
Multitrack Recorders	0	0	$0	9	1	$8	50	7	$45	220	33	$198
Rackmount DSP	0	0	$0	64	10	$57	210	31	$189	384	77	$461
Synths and Samplers	5	1	$5	29	4	$26	160	24	$144	351	53	$316
Amplifiers	25	6	$38	132	33	$198	417	104	$625	875	263	$1,575
Powered Speakers	3	1	$8	34	17	$101	242	121	$725	571	343	$2,056
Interfaces	8	4	$25	54	27	$163	150	75	$449	220	132	$791
Mixers	14	3	$21	457	114	$686	1,258	314	$1,887	1,845	646	$3,874
Total Units	**55**	**15**	**$97**	**809**	**211**	**$1,266**	**2,653**	**701**	**$4,214**	**4,832**	**1,602**	**$9,600**

Notes:

(1) All TAM, SAM, and DHM units are 000s
(2) It is assumed that 1394 will become fairly ubiquitous in this market by 2004
(3) Digital Pianos are likely high-penetration products, since these are typically consumer, not pro, products, and can be connected to the home entertainment system via 1394 in the living room
(4) Powered speakers are quickly replacing passive speakers in the pro market (10-to-1 sales increase last year), but we do not have very accurate data yet, since active speakers are so new. We are working with our speaker licensees (JBL, Peavey, Infinity, Polk, Boston Acoustics, Meridian, Linn, Revel, etc.) to get better data for the projections.
(5) We expect high market share in pro audio amplifiers, since we already are working with the top 3 pro audio amp manufacturers (Crest, QSC, and Crown); we expect high market share in audio interfaces for PCs in the pro market, since we have a history of making these, and have products expected in 2001 by market leaders Peavey/Crest (largest pro audio/MI mfr in the US) and Midiman (market leader in USB audio interfaces)
(6) First rackmount DSP products are expected in early 2002 from market leaders TC Electronic, Lexicon, Digitech, and dbx, all licensees.
(7) A partnership with Texas Instruments or another leading 1394 semiconductor company could impact these projections significantly.

Rollout of Digital Harmony Studio™ Products:

2001

- Four models of Crest and Midiman 1394 audio interface products for PCs
- Driver support in Windows, MacOS, BeOS
- 10Ks quantities

2002

- Continue to dominate PC interface market with new products, licensees
- Add signal processors (TC Electronic, dbx, others)
- Add amplifiers (Crest, Crown, QSC)
- Add architectural acoustics products (Peavey, QSC)
- Add active speakers with 1394 and WireFree (JBL, Dynaudio, Peavey, others)
- Certification testing commences (interoperability in systems)
- 100Ks quantities

2003

- Add remaining devices in Reference System
- Expand in all product categories
- Quantities in the millions

Wildcards:
A close partnership with Yamaha could quickly create one de facto standard implementation of 1394 in this marketplace (i.e., by mating Yamaha's mLAN with Digital Harmony Studio).

Digital Harmony Home

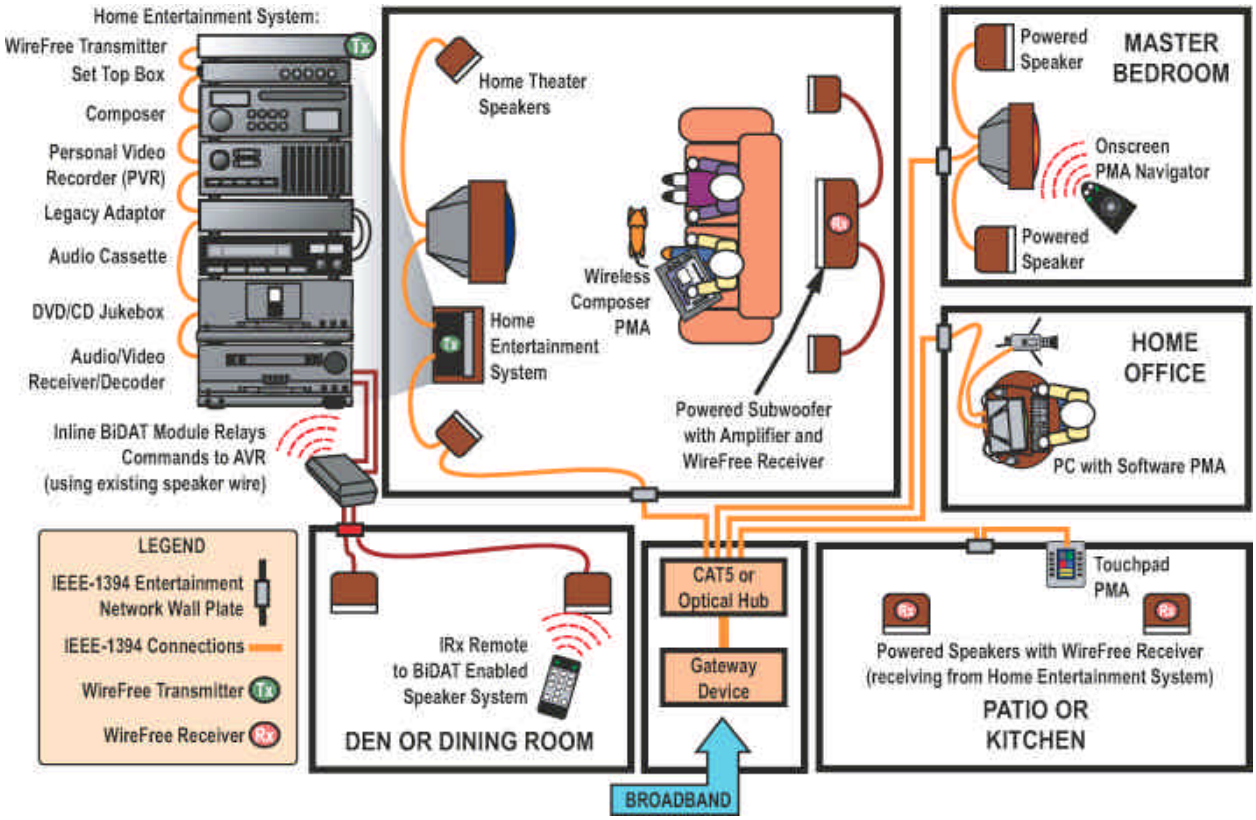
Market: Audio Consumer Electronics
Main Trade Shows: CEDIA (Sep) and CES (Jan)
Focus: Home Entertainment Products, Whole House Audio Products
System: Home Entertainment Network
Leading Competitors: Zayante (Kenwood), VividLogic (Mitsubishi), SoftAcoustik
US Market Size (1991 sales): US$7.63 billion (source: eBrain Market Research)
US Market Size (1999 sales): US$10.28 billion (source: eBrian Market Research)
Worldwide Market Size: approximately 2xUS market

US Sales of Potential Digital Harmony/1394 Products (1999 sales):

Category	US 1999 Units Sold	US 1999 Sales (US$)
Direct-to-Home Satellite	3,625,000	$957 million
Projection TV	1,232,000	$1,632 million
DVD Players	4,072,000	$1,099 million
Set-top Internet Devices	1,200,000	$192 million
Rack Audio Systems	1,290,000	$205 million
Separate Audio Components	N/A	$1,530 million
Home Theater-in-a-Box	N/A	$229 million
Home Radios	19,899,000	$348 million
Aftermarket Autosound	25,872,000	$2,070 million
Factory Installed Autosound	N/A	$2,610 million
Electronic Gaming Hardware	N/A	$2,250 million
Home Security Systems	N/A	$1,660 million

Summary of Digital Harmony OEM Customers:

Category	Current Licensees	Targeted Licensees
Direct-to-Home Satellite	N/A	Sony, Panasonic, et al.
Projection TV	Loewe (Sensory Science)	Mitsubishi, Sony
DVD Players	Sensory Science, Harman/Kardon, Proceed, Meridian, Linn, Mark Levinson, Denon, Onkyo	Pioneer, Panasonic, Toshiba, PowerFile, et al.
Set-top Internet Devices	Panja, Harman/Kardon (ZapStation)	WebTV, ZapStation, et al.
Rack Audio Systems	Denon, Onkyo, Harman/Kardon, JBL	Aiwa, Sharp, Sanyo, et al.
Separate Audio Components	Peavey, TC Electronic, dbx, Digitech, Lexicon, JBL, Linn, Meridian, Lexicon, Proceed, Mark Levinson	All
Home Theater-in-a-Box	Polk, Boston Acoustics, JBL, Harman/Kardon	Bose
Home Radios (also home MP3 players)	Harman/Kardon, JBL, Denon, Onkyo, Panja, iObjects, Sensory Science (SonicBlue)	Creative, Turtle Beach, SonicBlue
Aftermarket Autosound	Denon, Infinity, JBL, Boston Acoustics	Pioneer, Alpine, Clarion, Kenwood
Factory Installed Autosound	Boston Acoustics, Denon, Infinity	Pioneer, Alpine, Clarion, Kenwood
Electronic Gaming Hardware	N/A	Sony, Microsoft, Sega, Nintendo
Home Security Systems	Panja	Leviton, Home Director, RCS



Digital Harmony Home™ Reference System

Important Industry Trends:

1) Whole-house audio is the #1 "want" of Generation X/Y homeowners today, far ahead of whole-house video (most people watch movies in one location, but want to listen to music in every room of the house, the porch, the garage)
2) CEDIA is the fastest growing consumer electronics tradeshow, indicating a fast-growing market for installed home entertainment systems and home networking; key growth areas are home theater/surround sound, whole-house audio, and whole-house control.
3) Loudspeaker manufacturers embrace these trends, as they have evolved from selling each home 2 speakers (stereo), to selling them 5 speakers (DVD), to soon selling n speakers to each homeowner; in an all-digital system, there can be any number of (active digital) speakers in the house. 1394 and WireFree are ideal interfaces for this market.
4) 1394 will allow AVRs will evolve into multizone audio decoders (with 2-4 audio DSPs in each box), AM/FM/InternetRadio tuners, and legacy (non-1394 device) adapters for older sources/sinks such as phonographs, CD players, cassette decks, VCRs.
5) MP3 players need a "docking station" to listen to the same audio library through the home stereo system, in better-than-headphone quality. The popularity of portable MP3 players will ensure the development of the home MP3 jukebox. This will be a big new category for consumer electronics industry. 1394 is a logical connection for these, for both connecting to the AVR/decoder or 1394 speakers, and also for downloading files from gateways/PCs.
6) Convergence products (transitional products such as PVRs, Internet radios, ZapStation et al., CD burners, mobile storage gadgets, legacy adapters, video transcoders) will collectively sell well in the next 5 years before disappearing. Many of these will have 1394 so that they can also be considered PC peripherals.
7) Audio-as-product differentiator will be very prominent in devices that have 1394 for video (specifically MPEG-TS devices), as the added-value is "free" since the 1394 port is already present and needed for the video transport stream. Devices such as a "STB or DTV with superior audio" will appear; DTVs will be sold with "simply add 1394 speakers directly connected to and controlled by our DTV – no AVR or audio decoder needed".
8) DVD-Audio will appear and be accepted as new audio disk format. The high volumes of Universal DVD players will require custom 1394 audio/video chips to meet volumes and price points. 5C copy protection is required for audio as well. Lossless MLP audio format requires 1394 bandwidth and may require Digital Harmony audio expertise to be implemented properly.
9) "Home Theater in a Box" surround sound audio/speaker systems are the fastest growing segment of consumer electronics audio industry. With a 1394 port on (at least) the subwoofer/decoder, these systems can also connect to PCs.
10) Standard US retail speaker sales are flattening. The largest US speaker manufacturer and the largest Canadian speaker manufacturer are focusing on CEDIA market, and whole-house (additional, non-living-room) speaker market with new products and marketing dollars. Extra speakers for patio and other rooms (AC power is already there) – WireFree and 1394 are going to satisfy this need.

Other Market Research Supporting Interconnected Consumer Audio

(year 2000 sources: eBrain, CEA, others)

- A majority of American electronic consumers would find it useful to be able to listen to music in any room in the house from a single stereo.
- Four in 10 Americans of the Generation Y use their PC as much or more than a stereo to listen to music.
- 92% of Americans spend at least one hour a week listening to music at home, including 31% who listen for at least 11 hours per week.
- Among those Americans who own a stereo system, 75% report that sound quality was very important in their purchase decision. 33% of the group has connected extra speakers to the system.
- 60% of Americans admit to listening to music everyday.
- 80% of Americans claim that "sound quality is very important".
- DVD players will continue to grow beyond their current position as the fastest selling consumer electronics product in history, with 2001 sales of 12.5 million units, up from 8.2 million in 2000. Penetration will rise to 20%.
- US home theater component sales will grow 16% in 2001 to US$12.5 billion, as penetration of complete home theater systems rises to near 25%.
- MP3 players are expected to have a 54% sales growth rate in 2001.
- Nearly one-third of multimedia PC owners would like to connect their regular stereo speakers to their PC.
- Among all college students with a PC, 3 in 10 listen to MP3 files everyday.
- Nearly half of the homes in America will feature a DVD player by 2006.
- Over half of Americans age 15-54 have played an MP3 file.

Quick and Dirty Estimate of Market Potential (one approach)

1) There are an estimated 25 million US households with home theater systems today.
2) Each system has or has the capability of surround sound (5-channel) audio.
3) A typical DVD-centered home theater contains one TV, one CATV STB, one audio jukebox, one camcorder, one DVD player, one audio/video recording device, one audio/video receiver (AVR), 5 speakers, one universal remote control, and one powered subwoofer.
4) This represents 14 potential 1394 devices per home theater system.
5) Each future 1394-based home theater will require at least one "legacy adapter" for non-1394 devices (this may become a popular feature of a 1394 AVR).
6) Overall market today thus represents 350 million devices in use.
7) Each device has an expected lifetime (due to advances in technology) of 3-5 years, which (except for the TV/display) will likely be reduced further each year as the consumer electronics industry behaves more and more like the computer industry.
8) With expected market growth rates of DVD players and surround sound audio systems, it is estimated (CEA and others) that there may be as many as 50 million US home theaters in the next 3 years.
9) With the above product life expectancy, this represents new purchase potential of 700 million 1394 devices in the next 3 years. Overall potential market is estimated to be 700 million 1394 units in the consumer electronics market total over the next 3 years.
10) This does not take into account multiple 1394 storage devices, movement to whole-house audio/video, or Internet appliances.
11) Digital Harmony, as a world leader in 1394 audio for this marketplace, should assume high market share in terms of 1394 technologies embedded in devices made by second-tier manufacturers (Harman, Denon, Onkyo, Polk, etc.) With assumptions that a) the second tier represents only 20% of the entire market (but growing), b) that 350 million units of audio devices actually end up with 1394 ports, and c) a market share of 25% of those that do, a per-unit royalty of US$6/unit represents potential revenue of US$105 million over this 3-year period.

Quick Estimate of Market Potential (second approach)

TAM=Total Available Market Worldwide
%1394=% of TAM that will have 1394 ports
%DH=% of 1394 TAM units with DH IP

Year	2001			2002			2003			2004		
	TAM	%1394	%DH	TAM	%1394	%DH	TAM	%1394	%DH	TAM	%1394	%DH
All in One*	500	0%	10%	750	5%	50%	1,000	25%	50%	1,400	40%	50%
AVR	5,000	1%	50%	6,000	5%	25%	6,500	25%	25%	7,000	45%	25%
Digital TV	1,225	10%	0%	2,060	100%	0%	3,215	100%	2%	4,340	100%	2%
DTV Transcoders	500	25%	1%	2,500	40%	10%	6,000	70%	10%	10,000	100%	10%
Digital Cable STB	6,200	1%	0%	7,700	15%	0%	9,200	35%	2%	11,500	50%	2%
DBS STB	17,429	5%	0%	19,621	10%	0%	21,500	20%	2%	23,200	40%	2%
Games	24,000	50%	0%	33,000	75%	0%	42,000	100%	2%	50,000	100%	2%
DVD Players	15,200	5%	1%	22,100	20%	2%	28,000	100%	4%	35,000	100%	4%
VCR, PVR, DVHS	61,700	0%	0%	62,317	5%	0%	63,700	10%	3%	65,200	25%	3%
Camcorders	16,000	80%	0%	17,694	100%	0%	18,794	100%	0%	19,500	100%	0%
Total Units	**147,754**			**173,742**			**199,909**			**227,140**		

CEA, NAMM, CEDIA and internal Digital Harmony sources

SAM=Serviceable Market Worldwide=TAM%1394*
DHM=Digital Harmony Market=SAM%DH*
Revenue=DH royalty revenue

Year	2001			2002			2003			2004		
	SAM	DHM	Revenue	SAM	DHM	Revenue	SAM	DHM	Revenue	SAM	DHM	Revenue
All in One*	0	0	$0	38	19	$113	250	125	$750	560	280	$1,680
AVR	50	25	$150	300	75	$450	1,625	406	$2,438	3,150	788	$4,725
Digital TV	123	0	$0	2,060	0	$0	3,215	64	$386	4,340	87	$521
DTV Transcoders	125	1	$8	1,000	100	$600	4,200	420	$2,520	10,000	1,000	$6,000
Digital Cable STB	62	0	$0	1,155	0	$0	3,220	64	$386	5,750	115	$690
DBS STB	871	0	$0	1,962	0	$0	4,300	86	$516	9,280	186	$1,114
Games	12,000	0	$0	24,750	0	$0	42,000	840	$5,040	50,000	1,000	$6,000
DVD Players	760	8	$46	4,420	88	$530	28,000	1,120	$6,720	35,000	1,400	$8,400
VCR, PVR, DVHS	0	0	$0	3,116	0	$0	6,370	191	$1,147	16,300	489	$2,934
Camcorders	12,800	0	$0	17,694	0	$0	18,794	0	$0	19,500	0	$0
Total Units	**26,791**	**34**	**$204**	**56,495**	**282**	**$1,693**	**111,974**	**3,316**	**$19,903**	**153,880**	**5,345**	**$32,064**

* = "Home Theater in a Box" complete surround sound audio system

Notes:

- All TAM, SAM, and DHM units are 000s
- It is assumed that 1394 will become fairly ubiquitous in this market by 2004
- We are working with our home theater speaker licensees (JBL, Infinity, Polk, Boston Acoustics, Meridian, Linn, Revel, etc.) to get better data for the projections.
- We expect high market share in the higher-end AVRs due to our current plans with Denon, Onkyo, and Harman Kardon. In 2002 and beyond, these mfrs will bring Digital Harmony to lower cost, higher volume models. Harman Kardon's first Digital Harmony AVR is expected to sell 100,000 units in the first year, starting some time in 2002.
- A partnership with Texas Instruments or another leading 1394 semiconductor company could impact these projections significantly.

Rollout of Digital Harmony Home™ Products:

Assumptions:

- The boxes that will drive 1394 adoption are a) broadband audio/video gateways/STBs, b) digital TVs, and c) DVD players, including DVD-Audio
- Adoption of 1394 audio in the home entertainment system/network will proceed from the movement of portable MP3/music players from the pocket to the living room, the emergence of streaming audio in the home (Internet radios), and the resulting need for more audio decoders in more places/products. Audio jukeboxes (both hard drive-based and CD/DVD recorders and changers) will be important as well.
- 1394 DVD-Audio/Universal market will begin in 2002 (50 million unit forecast, as in one in every home theater)
- DVD-Audio music and DVD movies are only compelling with a digital audio surround sound system rendering the audio; 1394 is the likely digital interconnect, since there will already be a 1394 port on the DVD player
- 1394 DTVs will be available in US market in 2001 (Sony, Mitsubishi, Panasonic); three manufacturers have 1394 DTVs on the market today in Japan
- DTV is only compelling with a digital audio surround sound system rendering the audio; 1394 is the likely digital interconnect, since there will already be a 1394 port on the new DTVs made by Sony and Mitsubishi (market leaders in the US; Japanese DTVs from JVC, Panasonic, Sony, Hitachi, already have 1394 ports)
- The DVD market has exploded, already the fastest/best selling consumer electronics device of all time
- The DTV market is going to explode in three years, and will drag along with audio systems, as competition among DTV makers will leave them searching for additional value-added capabilities such as superior audio support
- The Audio-for-Video/DTV systems will likely be an A/V receiver with 1394, driving passive speakers, or a standalone audio decoder (may also be inside the DTV) with active 1394 speakers
- In the home, 1394 active loudspeakers will slowly take hold, as opposed to the pro audio market where they are already an established and fast-growing category of products

2001 (at risk due to availability of Crystal CS8510 chip)

- First 1394 AVR
- Complete 1394 audio/video system made by one manufacturer
- 1394 audio driver support in Windows, MacOS, Linux (for use in STBs, MP3 players)
- Reference design of 1394 home MP3/music player
- Reference design for 1394 audio adapter (for non-1394 audio devices)
- 10K quantities

2002 (full year of availability of Crystal CS8510, plus second controller chip available)

- AVRs from 4 licensees (3 projecting 10,000 units/month each, in first or second model)
- Companion DVD-Audio players from same 4 licensees
- Digital Harmony Composer PMA functionality built in to one STB (for system control, media library management)
- One standalone 1394 audio adapter
- 1394 MP3 jukebox for the home

- 1394 surround sound speaker system
- 1394 WireFree transmitter and matching speakers
- Certification testing commences (interoperability in systems)
- 100Ks quantities

2003

- Add remaining devices in Reference System
- Expand in all product categories
- Quantities in the millions

Wildcards:

- Automotive audio (partnership with TI, market will develop quickly)
- PC audio (i.e., how many PC-DVD players are used at home to watch movies, creating the need for an all-in-1 1394 surround sound decoder/subwoofer and satellites. A 1394 PC subwoofer/decoder with BiDAT-enabled satellites is incredibly cost effective and a compelling solution. Likely targets: Polk, Bose, Altec Lansing, JBL.
- Digital Harmony Composer (3 manufacturers are currently evaluating)
  The Composer PMA function (system control, media librarian) remains critical to demonstrating the ultimate value proposition of Digital Harmony to installers and consumers.
- HAVi (partnership with Philips Consumer Electronics and Philips Digital Networks)