(dĭj-dēa) – *Digital Living Opportunities empowered by Digital Media*

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DIGDIA is a strategic analysis company that specializes in Digital Home markets and technologies. DIGDIA provides strategic business development services for companies that target or invest in the Digital Home space.

DIGDIA looks for growth where Digital Living opportunities are empowered by Digital Media.

One of the problems inherent in reading about a market that brings together so many different industries is a deluge of new terms. This report will spell out the acronyms, but will not try to define each term in detail. For a slightly more detailed explanation the reader may wish to print out a 30+ page glossary of Digital Home terms that can be found at www.digdia.com.

1.01

Preface

The Intel Developer Forum (IDF) and the iHollywoodForum's Digital Living Room conferences were held back-to-back in the first part of March, 2005. IDF covered many areas, and this report focuses just on the Digital Home topics.

The intended audience for this report is a person in marketing, business development, management or investing that is interested in following the new Digital Home industry.

IDF

The Intel Developer Forum is held several times a year, and around the world (including Egypt this year). The Spring IDF was held in San Francisco and was attended by roughly 5,000 people – engineers, vendors, reporters and analysts.

IDF consists of several tracks of presentations, keynotes and a floor full of vender exhibits. This report covers only the elements that have to do with the Digital Home. We begin with a photo of products Intel had on display that showed off what they considered to be Digital Home products. Some of these products did not have Intel silicon in them, but were included because they were compliant with a standard that Intel championed, such as DLNA[1].

Figure 1 - Array of sample Digital Home products

New Organization

On January 17, 2005, Intel announced a new platform-oriented organization. Five platform groups now report to Paul Otellini, Intel's new CEO as Craig Barrett retires.

- Digital Enterprise
- Mobility
- Digital Home
- Digital Health
- Channel Platforms (local geographies)

Figure 2 - Barrett with Entertainment PCs during opening keynote.

The Digital Home (Consumer Electronics Group) used to be under the Desktop group and so this new organization represents an important elevation. The Digital Health organization is brand new, and an area that some in Intel (and other companies) feel is the next big thing.

The dust has not yet settled on the new organization. A couple of people that are in the Digital Home Group still described themselves as being in the Desktop group. Others are reportedly waiting to see what other changes will happen.

[1] Digital Living Network Alliance. Covered in a bit more detail later.

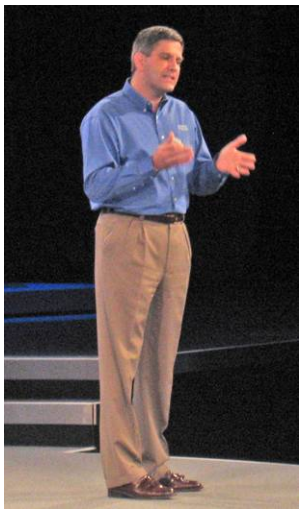

Figure 3 - Don MacDonald during his keynote

Figure 4 - Dell PC with Pentium D Extreme Edition

Making the Digital Home Group (DHG) its own platform will hopefully help Intel get out of the trap of making the Pentium the solution for everything. However, old habits are hard to change, as one Intel person vigorously defended the use of the Pentium in set top boxes, despite the fact that many companies are switching to SoC designs to lower cost.

More Pentium thinking - DHG is lead by Don MacDonald. During his keynote there was an emphasis on the new Pentium D, their dual core processor. Don explained how the Pentium D was going to be very important in the Digital Home.

One demonstration was meant to drive home the fact. While a person was watching a video in one room, another could be playing a video game in another room. Both applications could be running off the same Pentium D system. The two rooms would be connected via a network and a Digital Media Adapter. While this demonstration was conducted, a performance meter was displayed showing CPU usage running at about 80%.

Was this a realistic scenario? While there will certainly be some that will try this configuration, it is more likely that separate devices will be driving the experience in each room. It is, however, a valid demonstration for folks that have bought into the PC-is-the-center-of-the-universe vision.

And, if you are one of these people, you will soon be able to buy a Dell computer with Dual Core Hyper-threading Extreme Edition Pentium.

Not everything is about the Pentium. Intel announced a week before IDF that they are buying Oplus for a reported $100 million. This 100 person Israeli company is a fabless semiconductor company specializing in video display chips for HDTV. Initial products include:

- Rembrandt – Digital display processor
- Matisse – Digital Video De-interlacer
- Monet – Integrated Multimedia Digital Display processor

This acquisition is a significant move because display technology is hot. After dropping their earlier effort into LCOS[2], Intel has decided that the silicon video pipeline is closer to their core competency. However, it is still conceivable to see Intel move into light engines themselves again.

[2] LCOS – Liquid Crystal on Silicon: a form of LCD display technology where light is bounced off the substrate instead of shining through it. There are certain advantages that LCOS brings, but it has also proven elusive to many companies.

One of the questions Don was asked was about branding. He answered by saying that Intel did not currently have a brand program in mind at the moment. The audience was a bit skeptical because there has been persistent talk about their East Fork program. Reuters and other sources have been reporting on East Fork since late 2004. It is centered on Intel's vision for the Digital Home and includes hardware components (e.g. Dual Core) and a marketing program rumored to have a budget of more than $200K.

Another tidbit of news is that the MovieBeam folks are working with Intel to integrate their service into the Intel platform. MovieBeam is also moving to High Definition content. If you are not familiar with MovieBeam, it is a Disney backed venture that uses unused Digital TV bandwidth to load up a hard disk drive in a special Set Top Box with about a 100 movies. New movies keep cycling in each week. The consumer does not pay anything until they decide to watch one of the movies. The service has been in trials in three locations in the U.S.

DMA Challenges

The "Digital Media Adapter" is a device that lets content from one device be enjoyed on another device. A typical example is photos on the PC displayed on the TV via a DMA. The concept was hyped as the next big thing a few years ago, but has since hit a reality wall. DIGDIA has stated in the past that the standalone DMA is destined to be just a niche, as the function it serves gets integrated into other devices as a secondary feature.

One session drove these realities home. Tony Sciarrotta from Philips set the tone by admitting that they have so far sold less than 1,000 DMA devices. These products have been sold through their Internet channel, and each customer has been getting personal "MyPhilips.com" service and handholding. Smart move, because Paul Sorenson and Scott Lofgren from Intel then talked about how the return rate for DMAs has typically been between 25% to greater than 50%. Of these returns, the No Trouble Found rate has been 95%. Returns are so high that in some cases the channel is reacting by charging the manufacturer a premium on returns.

The session dwelled on how to make the DMA easier to set up, with a focus on the out of box experience (OOBE). A tool[3] was offered called the "Initial Experience Predictor" that quizzes you and the manager on product design attributes. A score of 90 or better is a start towards a better OOBE, but not a guarantee. The tool was created by the PC Quality Roundtable, which has about a dozen PC company members (and almost no Consumer Electronics company members).

Having such a tool will help, but the DMA faces a much more fundamental challenge – low value. Because the value of the DMA to the average consumer is low, the threshold of pain is also low. Therefore, the DMA will struggle even if it is free. As evidence – when Intel gathered consumers to try out several types of DMA products and then offered to let them keep the products, all of the consumers declined the offer.

[3] http://www.eouroundtable.com/initial_experience_predictor_too.htm

AV Networking

A key element of the Digital Home vision is the ability to route content, such as music and movies, around the home over the network. Current installations, even ones costing a quarter of a million dollars, resort to the good old fashion "Speedwrap[4]" or coax cable because the technology is just not there yet. Even if one had a Gigabit Ethernet layout to address quality of service issues, there are many other protocol issues to deal with. With these challenges in mind, Intel has embarked on a series of initiatives which are summarized here.

DLNA & NMPR

Intel has been a major promoter of the Digital Living Network Alliance (formerly the Digital Home Working Group). DLNA's objective is to make it easier for devices to interoperate with each other on the home's network. The purpose of these notes is not to be a DLNA tutorial, but to give the reader a sense of what is going on.

DLNA 1.0 was release last year and errata revisions (1.1) are coming mid-year. DLNA 2.0 is further down the road and its objectives are not yet fully defined. Version 2.0 will hopefully address content protection and better QoS[5], though version 1.1 might include link protection (e.g. DTCP-IP[6])

In the meantime, Intel decided to assert some leadership and address some people's impatience by defining their "Networked Media Products Requirements". NMPR[7] is now on version 2.1. It can be thought of as a leading edge superset of DLNA. Here is a simple comparison of what the two cover:

[4] In one common version Speedwrap consists of two coax cables and two CAT5 cables that can be used for Ethernet. Other configurations exist.
[5] QoS – Quality of Service – the issue is that Ethernet was not designed for streaming video reliably, so some work-around protocols have been created that attempt to address the problem.
[6] Digital Transmission Copy Protection over Internet Protocol
[7] See http://www.intel.com/technology/dhdevnet/

Function	DLNA 1.0	NMPR 2.1
Network connectivity	✓	✓
Device Discovery	✓	✓
Media Management	✓	✓
Media Formats	✓	✓
Media Transport	✓	✓
Ease of Use		✓
Remote UI/XRT 2.2[8]		✓
DTCP-IP[9]		✓

Table 1 - DLNA 1.0 vs. Intel's NMPR2.1

The not-so-subtle strategy that Intel is taking with DLNA and NMPR is to make it easier for designers to pick Intel hardware platforms over others. They do this by offering free software that designers can use that has been "optimized for Intel products".

Some products are beginning to come out with DLNA. The certification process won't be ready until this summer, so early products are designated "Designed to DLNA Guidelines." Meantime, there are quarterly plug-fests that are used to help assure proper design and interoperability. Some of the problems discovered in these plug-fests are being addressed in DLNA 1.1. Intel is also making available some simulators so that designers can connect their device to the simulator to see how it behaves.

For the reader that is not at all familiar with DLNA, here are a few highlights.

DLNA has over 200 member companies from the CE and PC industries, with promoter companies that include Sony, Samsung, Philips, Panasonic, Microsoft, HP, Intel, IBM and Nokia.

On the next page is a table that summarizes the network stack and the required and optional formats and protocols.

[8] XRT – eXtended PC Remote Transfer protocol is an Intel protocol for remote user interfaces. www.dhtools.org/members/documentation

[9] DTCP-IP – Digital Transmission Copy Protection over Internet Protocol. A link encryption technique, first used on IEEE-1394 and now applied to Ethernet.

Layer	Required	Optional
Media Format (summary)	Photo – JPEG • Large 4kx4k • Medium XGA • Small VGA • Thumb 160x160 Audio – LPCM • 16 bit, 1 or 2 ch. • 44.1 or 48 kHz Video – MPEG2 • MPEG PS o NTSC/PAL o 4:3/16:9 o CBR/VBR ≤10.08Mbps • MPEG TS o CBR/VBR ≤15Mbps, HD: 19.4Mbps o 188 byte + 4 byte timing, single stream	• GIF • PNG • TIFF • MP3 • WMA • AAC • AC3 • ATRAC3+ • MPEG4:2 • MPEG4:10 (H.264) • WMV9
Media Transport	HTTP 1.1 • Must support Chunked encoding • Adds new headers o Trick Modes o Seek o DLNA Identifiers	
Media Management	UPnP AV 1.0 • Must expose available formats • Adds tuner content	
Device Discovery & Control	UPnP 1.0 • SOAP requests up to 20,480 bytes • Specifies certain limitations to ease implementation	
Network Connectivity	10Base-T & 100Base-T 802.11 IPv4	1000Base-T

Table 2 - DLNA 1.0 requirements

To sort out the optional media formats a device must offer the required level format to devices that cannot work with an optional level format. In the future the issue gets a bit tricky for mobile phones and other low power devices because they probably won't accept MPEG2. For DLNA 2.0 the work around is likely to be a virtualization of the portable device so that MPEG2 is converted to another format such as MPEG4:10 via an intermediate device without the source device knowing about it.

Devices are classified as a Digital Media Source (DMS), Digital Media Player (DMP) or Controller. DLNA 1.0 focuses mostly on the DMS to DMP relationship.

One of the real world issues vendors must deal with is troubleshooting. A consumer that has trouble viewing a video that was sent from a distant DLNA device will blame the DMP device first. Therefore it has been advised that the DMP designer should put extra effort into the design to help the consumer have a good experience, and if there is a problems, a quick and easy diagnosis. For example, a DMP device that claims to support video needs to support all required video formats (i.e. not just MPEG2 PS).

Remote UI

Another element of Intel's design guidance is the Remote User Interface. UPnP[10] Remote UI is used as the foundation. Intel adds a set of guidelines for what a UI should look and behave like. Television screens (at least the older analog ones) have limited resolution and control (no mouse – just arrow keys), so a user interface designed for a PC does not translate well.

Intel has also enhanced the remote transfer protocol (XRT 2.2) to include display controls, ways to control and query media, and a way to protect personal information such as a credit card number entered remotely.

DTCP-IP

Digital Transmission Copy Protection over Internet Protocol is a method for encrypting content passing between devices via Ethernet. Without such protection the content owners (e.g. movie studios) won't release their content in a form that could be streamed between devices. In addition to encryption, DTCP-IP 1.1 limits the "distance" content can be sent by allowing only 3 router hops (TTL = 3) and a

[10] UPnP - Universal Plug and Play has been adopted by DLNA as a way for devices to discover each other and determine their service capabilities.

roundtrip time of only 7 milliseconds[11]. The objective is to make mass sharing of content (a la the old Napster) difficult.

As an original promoter of DTCP-IP, Intel has specified this protocol in their NMPR 2.1. It is almost certain to be part of DLNA 2.0, if not DLNA 1.1. Again, Intel is making it easy for designers to pick Intel hardware by providing free software[12]. They call it a "Sample Implementation Kit", or SIK. While the Intel software is free, the DTCP-IP license itself is handled through the DTLA[13], and must be obtained separately.

While DTCP-IP is DRM agnostic, during IDF it was announced that Intel and Microsoft will be working together to integrate Microsoft's Windows DRM with Intel's DTCP-IP.

QoS

A very tricky issue with many Digital Home visions is Quality of Service. Original efforts aimed at sending video content from one room to another were based on IEEE-1394 (AKA Firewire or iLink). IEEE-1394 can handle isochronous data, which means that video content can count on a fixed amount of bandwidth that other traffic can't steal. Ethernet does not handle isochronous data, so a video stream is easily interfered with by other traffic, such as a big print job. Further, since many people would like to avoid wires, the challenge is compounded if you go wireless because of Wi-Fi's notoriously poor QoS behavior.

Several related QoS schemes were presented. The first was based on Wi-Fi Multimedia (WMM[14]). WMM uses 2 bits in the packet header to specify priority[15]. Video, for example, has a higher priority over data. Therefore, a video stream gets a relatively consistent amount of bandwidth while a coincident data stream is only given "best effort" (i.e. it gets what is left).

A version of WMM is Microsoft's qWAVE – Quality Windows AV Experience. qWAVE monitors the link's bandwidth and health real-time and adjusts accordingly. Admission control is used to avoid congesting the network with too much traffic. If the network is reaching capacity, new traffic is allocated less bandwidth. This means that a new video stream might get a low priority, so qWAVE also has a way to notify the user what just happened. It could tell the user, for example, that the

[11] TTL – Time to Live. DTCP-IP 1.0 only specified TTL = 3. Version 1.1 added the 7 ms limit as lobbied by the Motion Picture Association of America (MPAA).
[12] http://www.dhtools.org/members/technologies#dtcp
[13] DTLA - Digital Transmission Licensing Authority. http://www.dtcp.com
[14] WMM is a subset of 802.11e
[15] based on 802.1p

reason the video resolution is low is because the network is being used for another video stream going to the living room.

Microsoft is shipping qWAVE with their 2004 and 2005 Media Center PCs, and will incorporate it into their next operating system (Longhorn).

UPnP QoS 1.0 is a DLNA compatible protocol started January 2003 by several companies (PC and CE types). It assumes that all devices on the home network are UPnP compliant. This protocol is based on admission control, and it sets up a procedure for granting a device permission to put its stream onto the network through a UPnP QoS Manager and UPnP Policy Holder. In addition to arbitrary levels of priority, such as AV over data, the user can specify that streams to the living room take priority over streams to the kid's room.

In the meantime, Intel and Microsoft have partnered on UPnP QoS 2.0. Enhancements include requiring devices to send a notification when starting and stopping an AV stream, and giving information that eventually lets the user know why a stream may not be performing as expected.

The bottom line is that QoS is still a topic in development, particularly for wireless situations. Most homes do not have many devices other than the PC that can source AV to a network, so worry about QoS non-conforming legacy device behavior can mostly be focused on Microsoft and Apple. However, there is a growing number of AV devices with Ethernet ports being introduced, and so some early adopter consumers may find they need to upgrade in the future.

The bottom line for AV Networking is the market is still not demanding it. The industry has at least a couple of years to sort things out before things heat up.

Entertainment PC

While Microsoft has their Media Center PC, Intel gives it the generic name Entertainment PC. It could be argued that the two are the same, particularly in the U.S. However, according to one Japanese vendor the picture in Japan is very different. While the vast majority of PCs in Japan have some kind of TV capability, according to this vendor, Microsoft has a very tiny market share. Therefore, Intel rightly stays neutral by calling it the Entertainment PC.

That said, Intel talked about an array of technologies designed to make the Entertainment PC better[16].

- Dual Core Processor to handle multiple applications for multiple rooms.
- 945G (with Graphics Media Accelerator 950) and ICH7DH (Digital Home variant of the South Bridge) chipsets for internal HDTV[17] graphics and high definition 7.1 audio, Dolby Digital/DTS[18].
- ADD2+ card for TV out, with support for HDCP[19]
- Digital/Analog Terrestrial/Cable TV input
- Balanced Technology Extended (BTX) form factor for 4" (or even 3") high chassis design. The new BTX style heat sink and fan are quite hefty. The smaller format one, shown to the left weighs over pound. The larger one (not shown) is about 50% bigger.
  Intel is even suggesting layout, rear panel, and other product design tips.

Figure 5 - Entertainment PCs

Figure 7 - BTX board with processor heat sink

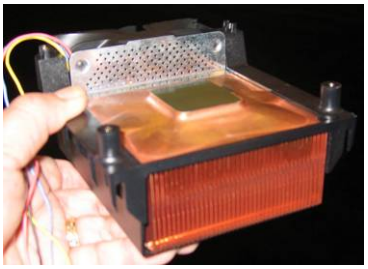

Figure 6 - BTX fan and heat sink, shown upside **down**

[16] See http://www.intel.com/platforms/desktop/vision/index.htm
[17] High Definition Television. 720 x 1280 progressive and 1080 x 1920 interlaced video is supported.
[18] Digital Theater System
[19] High Bandwidth Copy Protection, and essential link encryption standard for HDTV

Wireless

One of Intel's major initiatives is Wireless. They have tended to focus on three main areas – Wi-Fi, WUSB and WiMAX. These wireless systems and others tend to get confusing, so here is a chart that might help.

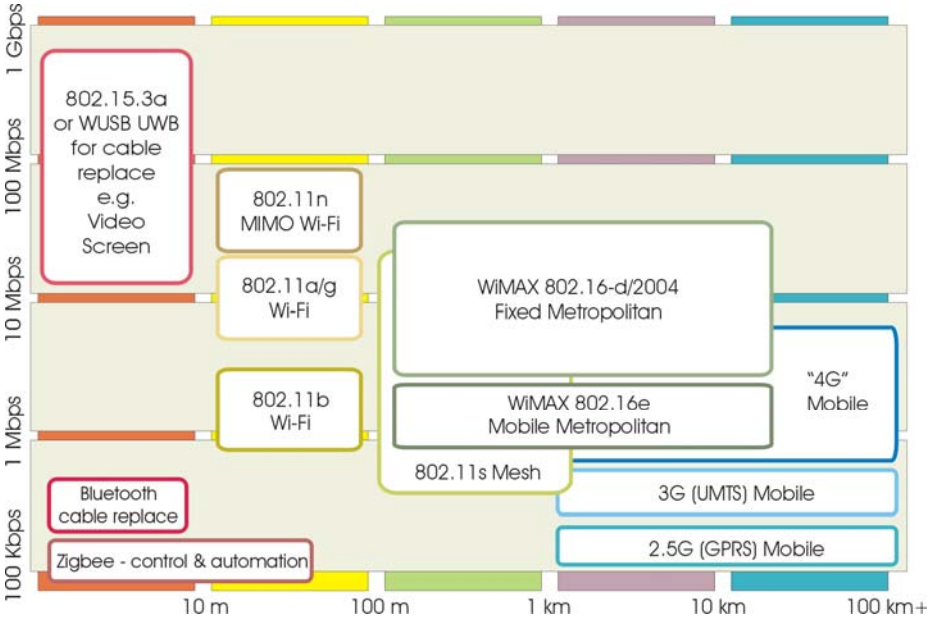

Table 3 - Wireless systems: Application, Data Rate vs. Range

- Zigbee – low data rate (~200 Kbps) automation, sensors, controllers (e.g. game controllers). IEEE 802.14.4.
- Bluetooth – modest data rate (~700 Kbps) for simple data and audio cable replacement (e.g. headphone)
- 802.15.3a – AV & high-speed data cable replacement. In contention between two camps. WUSB is Wireless Universal Serial Bus, aimed at 480 Mbps for very short ranges (<~2m). Uses Ultra-Wideband.
- 802.11 b/a/g – common Wi-Fi operating in unlicensed bands. 802.11g at 54 Mbps is seen as best choice.
- 802.11n – Multiple Input Multiple Output Wi-Fi employing redundancy to improve QoS and effective data rate. Seen as most viable in-home AV wireless.
- 802.11s – Mesh Wi-Fi. Multiple Wi-Fi units interact to cover a wider area. Only proprietary systems exist so far. Standard is expected in 2007.
- WiMAX 802.16 – Intel pushed metro-wireless for stationary clients. Licensed & unlicensed bands are used. Up to 75 Mbps & 50 km range.
- 802.16e – future mobile version of WiMAX, probably ready in 2007. Maybe up to 15 Mbps.
- 2.5G – General Packet Radio System. Mobile phone based, averaging about 25kbps (110kbps in theory)
- 3G – Universal Mobile Telecommunications System; also based on mobile phones, with a theoretical 2 Mbps data rate.
- 4G – Next thing after 3G, but not expected until after 2010. Data rates up to 1Gbps have been played with.

WiMAX

Intel has been heavily promoting WiMAX for some time as a way to address rural broadband and some metropolitan broadband applications, such as parks and industrial areas. Intel likes to use a little graphic that shows a map of what Wi-Fi covers vs. WiMAX that makes the latter look like the ultimate solution. Metropolitan broadband wireless has been around as a concept for some time, but has yet to take off – so there is still a bit of skepticism in some quarters.

Intel sees WiMAX and Mesh Wi-Fi/802.11s as complementary. Mesh is positioned as a solution for college and enterprise campuses, shopping malls and events. In other words, Mesh is for more casual or ad hoc situations, whereas WiMAX is for more permanent situations.

QoS is handled in different ways between the two. Wi-Fi uses a carrier sense mechanism and multiple users end up sharing the same bandwidth. It also uses only the unlicensed bands, so interference from other sources can be a problem. WiMAX can also work on an unlicensed band (5.8GHz), but there are also two available licensed bands. Therefore, if one wanted to pay for the spectrum, interference is less of a problem. WiMAX also uses a Grant and Service access method, so each client gets a more reliable bandwidth link.

WiMAX uses a more expense base station costing perhaps $13K. This cost is to be compared with the cost of multiple base stations if one used a Mesh approach. WiMAX can adjust the size of its "cell" if the density of users in a give area is high. This approach is similar to how cellular phone systems work.

When 802.16e comes out the system becomes attractive for other applications, such as emergency services. For example, an ambulance could rush high quality information to and from a doctor sitting in the hospital office.

WUSB

Intel and T.I. are going around the IEEE process to work on Wireless USB. They say that the IEEE process is too slow for them. They follow MBOA[20], or the Multi-band OFDM Alliance[21]. Meantime, Motorola promotes their CDMA[22]-based approach. Both are Ultra-Wideband (UWB) systems, but they are modulated in very different ways. The result has been a stalemate in the IEEE 802.15.3a votes, with MBOA

[20] http://www.multibandofdm.org/

[21] OFDM – Orthogonal Frequency Division Modulation.

[22] CDMA – Code Division Multiple Access. Motorola bought XtremeSpectrum some time ago, and base their proposal on this technology. It is a patterned pulse modulation technique that emits a spread spectrum signal across a single band.

consistently favored, but not enough to win approval. Attempts at interoperability have been made, but not agreed to.

Therefore, at IDF Intel simply ignored the issue and promoted their WUSB efforts. WUSB is intended to look like USB2.0, and software can treat WUSB connected devices as if they were cabled. While the maximum 480 Mbps rate is available only for short distances, longer distances can be accommodated at reduced data rates. So, for distances of about 10 meters the data rate is 110 Mbps. In the future the data rate may go to 1 Gbps (Motorola has demonstrated their version of 1 Gbps already).

Aside from the physical layer there is one other significant difference between WUSB and USB - security. Because the signal is wireless a person's data is exposed to anyone with an antenna. To avoid loss of security the devices using WUSB must find a way to exchange secret keys so that messages can be encrypted and decrypted properly. Easy and secure key exchange set-up is the tricky step. A few proposals have been made, including using a cable for initial set-up or some other physical intermediary device to physically pass the key between devices. A totally wireless approach is also proposed that uses a blinking LED indication of proper key exchange. Once the keys have been exchanged the rest can happen invisibly.

WUSB's specification is ready in March 2005[23]. There are now over 100 companies signed up as supporters. First products are expected at the end of 2005. Initial products are expected to be add-on type products, like dongles that plug into a USB2.0 connection. Later products will be more integrated.

MIMO

MIMO is seen as a way to make wireless sending of HDTV signals practical. A basic HDTV stream could take over 19 Mbps[24], and so 802.11a and g systems tend to be poor choices. The reason is that a fair amount of overhead eats into the 54 Mbps maximum data rate, and other forms of interference reduces effective throughput even further.

MIMO uses multiple transmitters and receivers to get around two problems. First, using multiple transmitters means you can split up the data amongst them to gain more throughput. Second, redundancy of multiple antennas and streams means

[23] www.usb.org/wusb

[24] …though more efficient codecs would probably be used to reduce the bandwidth requirements.

that corrections can be made for 3rd party interference and multipath.

MIMO will be known as 802.11n. There are already some "pre-n" products out in the market, but none are official. There are two main camps being voted on in the IEEE. One camp is WWiSE[25] (Worldwide Spectrum Efficiency) and the other is TGn Sync Alliance[26]. Intel subscribes to the latter. A vote is scheduled Q2 2005. If all goes well for Intel (TGn Sync Alliance appears to have more support), the final standard will be ready by the end of 2006.

Intel and TGn Sync Alliance expect certain attributes in 802.11n devices. These attributes include having at least 2 transmitters (preferably 4), the ability to handle both 20MHz and 40MHz channels[27], forward error correction, and a robust legacy coexistence.

How might WUSB an 802.11n be used in a home theater application? WUSB or some other form of UWB might be used for connecting a wall-mounted flat panel display to a video source such as a STB. 802.11n might be used for getting live streams of video from one room to another.

[25] http://www.wwise.org/
[26] http://www.tgnsync.org/home
[27] OFDM is used and the U.S. and Europe use 40 MHz channels while Japan uses 20 MHz channels. Therefore, it is necessary to seamlessly handle both.

'N Go

Intel talked about three related portable content technologies:

- Burn N Go – The ability to burn an optical disk with protected content while obeying digital rights.
- Download N Go – The ability to download protected content while obeying digital rights.
- Sync N Go – The ability to put a copy of the protected content onto a portable device while obeying digital rights.

Once again, Intel is trying to promote technologies that support their Digital Home vision. The following gives a rough idea how these technologies work.

Burn N Go

Burn N Go complies with CPRM[28]. It works roughly as follows:

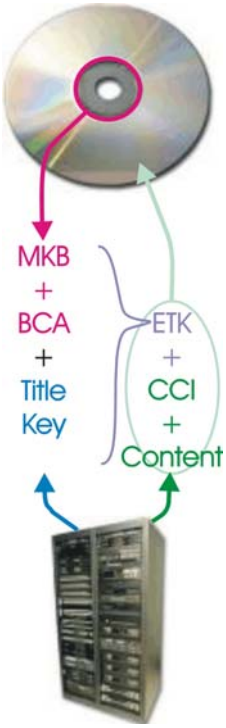

Figure 8 - Burn N Go

1. A Media Key Block (MKB) is read from the optical disk. The MKB is used to give the system a way to revoke the rights to a class of devices should they be hacked. The MKB is stored in the Burst Cutting Area (BCA), an area that burners can read but not write to.
2. The disk's unique Media ID code is also read from the BCA.
3. The protected content source sends a random key to the user. This key and the MKB and ID codes are combined with the content title key to create an Encrypted Title Key (ETK).
4. Copy Control Information (CCI) is sent from the content source to the user and burned onto the disk. CCI tells the system if the content can be duplicated again or not. CCI is burned in the clear, but cannot be hacked because it is also integrated into the main encrypted content file.
5. The ETK, CCI and the content itself are then scrambled together to form a scrambled file. The ETK, CCI and scrambled content are burned onto the disk.

[28] CPRM – Content Protection for Recordable Media (AKA "4C": IBM, Intel, Panasonic, Matsushita – www.4Centity.com).

Download N Go

Download N Go complies with Windows DRM, Helix and OMA[29]. It roughly works as follows:

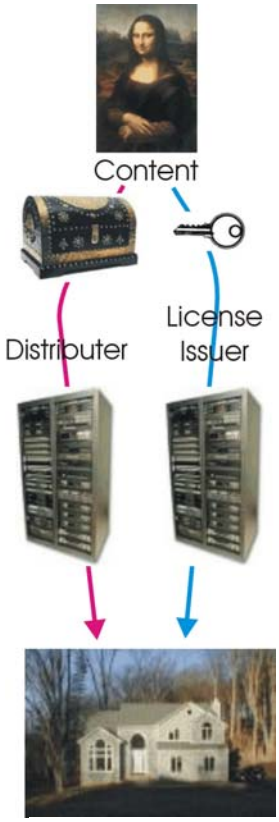

Figure 9 - Download N Go

1. The content owner encrypts the content with a key.
2. A resulting Content ID is sent to a neutral License Issuer company.
3. The encrypted content is given to various distribution companies that will market the product to consumers.
4. A consumer downloads the encrypted content and the consumer's system looks for the Content ID.
5. The consumer goes to the Licensing Company (they may not know they are doing this, and may instead think they are still talking to the distributor) and pays for the content.
6. Upon payment the Licensing Company sends the consumer a key that gives them the rights to enjoy the content within certain conditions set by the content owner.

It is important that the consumer's device is a trusted one that cannot be hacked into. Once the content is downloaded the device no longer needs to be connected to the Internet and is free to roam.

Sync N Go

Unlike the previous two systems, Sync n Go works only for personal content, and not for protected content. Sync N Go is a way to transfer personal content between one device and another. Because the content is personal, there is no need for elaborate encryption and key systems.

Sync N Go works through UPnP and HTTP Get and Put calls. Intel has proposed Sync N Go to be part of DLNA 1.1 in the future.

[29] DRM is Digital Right Management, and Microsoft has their own proprietary system that many content houses have begun to buy into. Helix 10 comes from Real Networks and is their form of proprietary DRM. OMA is the Open Mobile Alliance, and while it was originally aimed at phones the system is generally applicable to other types of devices.

Digital Living Room Conference

iHollywoodForum is an organization that creates conferences. They bought the rights to the "Digital Living Room" and have held conferences with this title in Southern California. In March 2005 they held this two-day conference near San Francisco for the first time, resulting in a new audience. About 450 people were reported to have attended.

The conference included panel sessions and talks on various topics, a "venture forum" that featured several start-ups and a live consumer focus group. We begin with the keynote…

Walt Mossberg

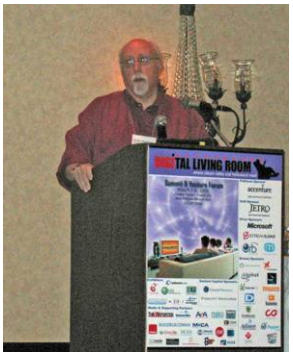

Figure 10 - Wall Street Journal's Walt Mossberg giving keynote

Walt says that he is now seeing the "**third era of convergence**". Twice before, he claims, the industries have declared some form of convergence between the PC and TV interests. Now, he says, the convergence finally looks like it is real. He looks at TiVo as a good example.

But, **certain things stand in the way** of the market. Ease of use was his first complaint.

Devices and services that stream content are just not that good yet. "Windows sucks at networking", he adds. He shared a rule of his, "if I see the word 'hexadecimal' in the instructions, the product test is dead. What is 'hex' to a consumer? Is it a curse or some kind of Amish symbol?"

Further, he feels that consumers don't think they have a "home network", even if they do. Rather, they may think they have "shared Internet". As far the technology is concerned, if it is not based on WiFi, forget it.

Walt has some complaints about user interfaces and remotes, too. For example, some music products use the TV screen for the UI, but he may be listening to that music in another room, so he can't use the remote. Some remotes have a built-in display, but they are too dim or small to read. He likes the Sonos product because it works and has a nice remote, but it is pricey ($1,200).

Who is in the living room? Certainly not the whole family at one time, so why present the product that way? Products need to be personalized and think of how they would be used by each individual.

Even if companies make the products properly, Walt thinks the next big problem is the **lawyers and copyright** issues. He observed that at least music now seems to have rules that businesses can follow.

Video is another matter. He thinks the studios are being overly cautious and nervous. "Studios should not treat all of

their customers as criminals." For example, he thinks the studio's number one issue with Blu-ray and HD-DVD is copy protection, not the experience, cost or performance.

The studios aren't alone. He chastised Microsoft for having a feature that "backed up user licenses." Why should a consumer care about licenses? They just want their content with no hassles attached.

The "**FCC is scary"**, too. He sees the Broadcast Flag as "an immense impediment to the user." He brought up a company called Sling Media. This is one of the companies that enables sending of video over the Internet, even if it might be a TV show. He asks them "how big is your legal defense fund?"

The day before the conference **Sony** had announced that Idei was stepping down, and Walt had a barb to throw at them, too. He says that "they don't get it". He related a story from a conversation he once had with Idei. Idei asked Walt "is the iPod a hardware or software product?" Walt said that Idei didn't seem to get that it was both.

Yair Landau from Sony Pictures was in a "fireside chat" with Walt during the conference, and he said that Howard Stringer (Sony's next CEO) had sent out an e-mail that day to tell Sony employees that a major focus will be "a need to better integrate" their operations.

Yair also countered an earlier comment of Walt's by saying that as far as he was concerned, Sony Pictures is very open to progressive and open DRM. In other words, he felt that studios should loosen up and make content more easily available. Many people expressed "shock" that his attitude was so open.

The VC View: Redpoint Ventures

Geoff Yang is a co-founder of Redpoint Ventures. Some of the companies they've invested in include MusicMatch, Idetic (MobiTV), Entropic and LivePlanet. Geoff shared his view of the industry, but the most interesting part of his talk was when he shared his "myth or true" views on the Digital Home market.

1. According to Geoff, the first myth is that the Digital Home market is a good place for VCs to invest. His view is that the market is not a place for small players.

   A more refined view is that small players might still have a chance, but they will need to work with a larger established player.

2. Are devices and associated software a good play for new ventures? No, according to Geoff. Instead he likes services and advertisement plays.
3. The Digital Home market is now hitting mainstream – myth. The market is far from mainstream today.
4. Everyone in the Digital Home industry is working on interoperability – Geoff thinks this is another myth. He feels that interoperability is being pushed mostly by the PC companies[30].
5. Will pre-packaged services controlled and sent down one pipe win? No. This means companies like those in the cable industry will be reduced to providing just the pipe. Consumers will buy their services from many different sources.
6. The best money can be found in the "long tail"? There was once an article in Wired magazine called The Long Tail[31]. Movie titles are an example. The most popular titles are the recently released ones, but there is also money to be had if you were able to rent the other 99% of the titles (i.e. in the long tail).

   Geoff feels that the opportunity in the long tail is a myth in the short run because there is not enough of a base of products through which to channel content to attract long tail content. In the future, however, he feels that there is an opportunity in the long tail.

In the end, Geoff feels that the best opportunities are in services. The reader may wish to take this advice with a bit of caution. There are many traps in service-based business models, too.

VC Panel

Following Geoff's talk, a panel of venture capital people was formed. The panel included Jeremy Levine (Partner in Bessemer Venture Partners), David Britts (Partner in ComVentures), Stanley Kim (Partner in Samsung Ventures), and Mike Buckley (Director in Intel Capital).

Stanley's view was interesting because it came from within a CE company. His interest was in some fundamental areas, not grand concept products or services. He is looking for things like light sources, material science, Linux software IP

[30] DIGDIA does not agree with this statement. Several key CE companies feel very strongly about the need for interoperability. The CE industry has recognized that as much as they'd like, a home will never consist of products from just one vendor. In contrast, a company like Microsoft wants interoperability as long as it all works with Microsoft. There are good and bad examples on both sides of the fence.

[31] http://www.wired.com/wired/archive/12.10/tail.html

and user interfaces. Embedded Linux seemed to be particularly important to him as his company faces more and more complex product development. Software, he says, is not one of Samsung's strengths. Stanley gave a lot of praise to MontaVista, makers of embedded Linux software. Features such as fast boot, power management, small footprint and ARM support were on his list.

Mike (Intel) was looking for technology that filled gaps in Intel's line, and for companies that can enrich the Digital Home ecosystem. Intel Capital has a fund of about $200 million that they've been investing in several small companies, or as they put it, in the "ecosystem". One of the specific topics Mike mentioned was systems for handling advertising.

The two VC partners looked for things like semiconductors, services, personalized content and media back-up. Since they were not tied down by any particular theme or company strategy, their targets tended to look a bit more random in purpose.

None of the panelists were currently interested in content or social networking, though some were thinking about it. Wireless technologies did not come up.

Music

While much of the attention now goes to video, music is still going through changes. It is worthwhile to follow how music is being handled because it might give clues on which way video may go. The panel discussion on music had Ted Cohen (SVP Digital Distribution, EMI Recorded Music), Robert Acker (VP Music Services, RealNeworks) and Neil Smith (GM Digital Media Services, AOL).

The industry is watching iTunes set the expectation for the 99¢ song. This frustrates some like Ted because now everything is expected to cost 99¢, no matter what it is. Ted's comment was (paraphrased) "how would they like it if every computer cost $500 no matter what it was?" The point being that the labels might wish to price some tracks higher or lower than others, but the consumer has now been conditioned by iTunes to look for one price fits all.

Another major issue running through the discussion was subscription music. RealNetwork's Rhapsody service is the most well known. The value proposition is all the music you want for $10 a month as long as you are a subscriber. A favorite argument they make is $120 gets you 121 iTunes songs at the end of the year, whereas you can have 10,000 songs with a music subscription.

A subtle element of a subscription service is freedom. The user feels the freedom to try out new songs because it doesn't cost an additional fee. This freedom is letting some labels (e.g. Universal) come up with a "farm team" approach to music. They put some artists into the subscription library and if they prove to be popular they cut a CD of that artist's work.

With the sudden choice of so many songs, the next issue is which one to pick? Here the feeling is that the user must be presented with packaging. There needs to be some kind of guide for people to follow, such as "Jazz essentials", so that a person can pick up a whole play list that an expert has assembled. In contrast, Ted gave the example of a music kiosk that simply listed songs alphabetically – no one could make up their minds what to buy.

The next issue is surprise. Some people want to be surprised, much like you might be when listening to the radio and a new song is played. This element of surprise needs to be integrated into the service somehow.

Do people object to the "less than perfect" music quality of MP3 or AAC? Some may, particularly for music purists with lots of money. So, one company called MusicGiants is getting set to introduce a service that makes lossless digital music available. They are aiming at the CEDIA[32] market.

What about the automobile? It was pointed out that the automotive electronics industry is very slow to respond, and several expressed frustration that it will be a while before your iPod or equivalent will easily plug into many car stereo systems. A number of well known outfits are working on such concepts, however, including the idea of removable hard disk drives.

Another automotive issue is satellite radio. Robert used to work at XM and he explained that when XM was introduced a whole different and older crowd started to come in to have their car outfitted with music systems. His point was that while the industry generally assumes music is for the youth market, there are lots of older (and richer) people out there that will buy music if presented in the right form. XM gives users a better experience – no commercials, better selections – and so it has appealed to older buyers.

[32] Custom Electronics Design and Installation Association – a market where $25,000 to $1,000,000 is spent of very nice home theater systems, etc.

Consumer Focus Group

An interesting event was a focus group of consumers sampled from the San Francisco Bay Area. Rob Enderle (Enderle Group) picked a group of 7 people that claimed to be users of technology. These people are not in the technology industry, and are not engineers.

Figure 11 – Rob (analyst, standing) and the focus group participants: Betty, Guy, Roshita, Mary, Franklin, Gina, Kenny

- Betty, age 23, Biotech research scientist at UCB
- Guy, age 46, Executive Search firm[33]
- Roshita, age 31, Singer
- Mary, age 19, College student
- Franklin, age ~60, Actor
- Gina, age 28, Store manager
- Kenny, age 25, College graduate

Home automation

Just before the focus group started, a company called ConvergeX showed a product of that allowed one to control all kinds of things in the house via a touch panel[34]. The group was asked what they thought of it. (The following are paraphrased comments that try to capture what they said.)

Kenny: I don't like all that automation.

Roshita: Looks useless to me. Maybe it might be useful for the disabled.

Betty: Love the idea. Love to be able to turn on the lights, etc. I thought only rich people can afford this. It is exciting. Just plug in normal appliances and it works. (The price for the ConvergeX product was not mentioned, so Betty is making some assumptions).

Guy: This can run your whole life. Start your car from your office. Turn on the heater – whole 9 yards. It looks like it is going to be very useful.

The other people were hesitant to comment and some looked like they were a bit puzzled by the product.

[33] Not his real name – he did not give it during the session
[34] http://www.convergex.co.uk/

Examples that work well

Next Rob asked the group what they thought worked well. What products did they like, and why?

Betty: I like the Sony Digital Camera. It uses the Memory Stick and it plugs right into everything that Sony makes. It is universal and it just works. I tried other products that used other memory cards and they were not so clean. They made you go through extra steps to make things work[35].

Guy: Plug and Play stuff seems to be user friendly. Also like the X-Box. However, I don't like it when you have a box with everything built in. If something breaks you have to send in the whole thing. Would rather have separate components.

Roshita: I like the iPod's convenience. It was a gift, but I was hinting to people that I wanted it. I like not having to deal with all the CDs. It is a place for all of my music. I'm addicted to music, and I always prefer Apple.

Mary: My cell phone – it is an LG. Actually, I don't like it as much as my older phone, but the LG came with the plan. The LG phone has shorter battery life. The previous phone was a Panasonic, and it was small and cool, and the battery lasted for a week. The LG has a camera built in. If I could get my old phone with my new plan I'd take it.

Franklin: I like my CD burner. You can record voices, music, etc. I download music (that I don't pay for) and make CDs. I've had it a number of years. It came with the HP Pavilion PC. It just seems to work. I like the reliability.

Gina: I have a Dazzle multimedia memory card reader. It takes all kinds of cards and lets me load things into the PC. It was the cheapest one I could find. All the card readers do the same thing, so I don't have any brand loyalty here.

Kenny: I like my Lexmark printer. It is cheap to use and it never has broken down on me. I didn't pick the HP printer because their PCs aren't the best. I don't have any personal experience with HP – it is just what my friends tell me.

[35] Sony's Memory Stick defines exactly how products are supposed to work when presented with photos, music, etc. In contrast, a Compact Flash card has very few rules and expectations, so you can put just about anything on it and devices don't know what to expect or how to behave. The SD card tries to address some this issue, but does not do as good a job as the Memory Stick.

Least Favorite Product

Next, Rob asked the group what was their least favorite product, and why?

Betty: Can you give me some time to think about that?

Kenny: I just don't want anything to go wrong. Wires bother me a lot. They are frustrating to sort out. They get tangled and in the way. They are a big hassle.

Betty: Cradles, like on my Palm Pilot. They are an extra thing to have on my desk. They take up room, or you have to hide it. Why can't you just plug it in?

Guy: Remote Controls! I have lots of remote controls. It takes four of them to do anything.

About Service

The others didn't seem to want to volunteer anything in front a room full of people, so Rob moved on to ask about Service.

Guy: Would like a toll-free 800 number without the phone tree. At the end of the day I just end up pressing buttons on the device randomly to see if I can get something to work.

Roshita: I won't pay extra for service. I will just go to a friend for help.

Kenny: There are other ways to find answers to problems without having to pay for them. I go to the web to find answers. If one product was $500 and another had better service for $550, I would buy the cheaper product.

Guy: It would be nice if every product came with a chip that I could just plug into the remote control and everything is programmed automatically for me.

Camera Phone

The audience asked "do you take pictures with your camera phone?"

Mary: At first I was excited about the camera in the phone. I took several pictures. I just kept them in the camera and had to delete them later when I ran out of space. I tried to e-mail some pictures, but stopped when I hit my pre-paid limit. I've never thought about printing the photos I took because the quality is not good.

Media Center

The audience asked "what do you think about the Media Center?"

All of the members of the focus group panel asked "what's a Media Center?"

Easy to Use?

The audience asked "how do you figure out if something is easy to use?"

Guy: I ask friends and look at websites like C-Net.

Betty: I ask friends which products they recommend, read reviews and Google the product to see what comes up. Then I use the Internet and Price Grabber to find the best price.

Roshita: I ask friends and use Google.

Locked to Sony?

The audience asked "how do you like being locked into buying only Sony products because of the Memory Stick?"

Kenny: It bothers me. It's a gimmick.

(Then Kenny went onto a different issue on his own) I don't like it when I don't know what else I have to buy to make something work the way you expected it to work. You buy something and find out that you need another accessory or something. I don't like that.

Pay for Music?

The audience asked "how do you get your music?"

Roshita: I download the music, but I don't pay for anything.

Betty: I use iTunes, buy CDs, etc. I think speed is an issue. I don't like waiting for the music. A faster cable would be nice.

2nd Room Video

The audience asked "do you want to be able to send video from one room to another electronically?"

Rob had to translate this question with illustrations because none of the focus group panelist understood what was being asked.

Roshita: No.

Betty: It might be nice.

Guy: I just need the video on the big screen. I don't need to send it to another room where I just have a small TV.

Venture Forum Start-ups

iHollywoodForum had a "premium" program for people that paid extra. The VC panel mentioned earlier was part of this premium program, and so was a series of 5 minute pitches given by 19 small companies. It was a test of the company's robustness and the CEO's ability to clearly and concisely communicate. The following section will give a sense of what each company is about, along with a quick strategic impression.

Cobalt Entertainment

www.cobalt3d.com 2002; angel funded, seeking funding $5M. Steve Schklair, Founder, 818-759-5551 steve@cobalt3d.com

Cobalt makes production and postproduction equipment for creating 3-D content for real-time TV, HDTV and digital cinema.

Cobalt takes advantage of HD digital video technology to make a more practical system. They feel they have patentable technology. The company has about 5 people and has performed services for the NFL, Disney, Toyota, DreamWorks and Paramount. They serve a niche market.

Impression: A cute company with a focused mission. By serving a niche and setting expectations accordingly, they seem to have a chance. They will not get big, but they might get absorbed into a Sony, Panasonic or similar company.

Destiny Networks

www.destinynetworks.com 2000; privately held, seeking funding $8M. Mark Stiving, CEO, 408-307-6800 mark@destinynetworks.com

Destiny makes a remote control system for controlling potentially everything in the home by using a controller box and special software.

Destiny positions themselves between professionally installed systems and simpler universal remote control products. While they can control a variety of things, they are focused on the home theater. Their Domain 3000 control box costs $1K, and it comes with their Ubiquity software for setup, automation and monitoring. Competitors include Meedio's HouseBot. The 16 person company is shipping their 2nd generation product. They are working on a lower cost solution and intend to get into consumer self-provisioned products.

Impression: Their current product is positioned at the CEDIA market. Home automation at the level of sophistication

Destiny is offering is usually not for the do-it-yourselfer. Neither is their price, so they have their work cut out for them. Home automation has been a modest market, so their stated market potential of $1 billion seems very optimistic.

Digenetics

www.digenetics.com 2000; NSF grant, seeking matching funds $1M. Douglas Johnson, CEO, 858-642-0668 drjohnson@digenetics.com. Affiliated with Natural Selection.

Digenetics makes neural network-based artificial intelligence software capable of learning and exhibiting physical, emotional and cognitive traits.

Digenetics hopes to tap into the electronic game industry by licensing their software. They point to their program's ability to learn to play checkers at the master's level without ever having been taught the rules. By using their program they feel that game AI will be easier and faster to develop, and produce better game play.

Impression: An interesting company with a highly specialized technology product. One could possibly see Electronic Arts buying this company, but they probably already went to them – one wonders what their reaction was.

Exent Technologies

www.exent.com 1992; Investors include AOL, Comcast. Raising 4th round. Yoav Tzruya, VP, +972-3-9243828 (Israel), yoav.tzruya@exent.com

Exent converts ordinary PC games into Games-on-Demand (GoD) in a practical secure manner that delivers a user experience similar to a shrink-wrapped game.

Exent enables GoD by converting a game into server, streamed and local components. They have 80% market share and 85 employees. Service providers are involved because GoD can help reduce churn and possibly provide new revenue streams. Customers include Comcast, Yahoo, Fujitsu and T-Online. Competition includes rental (e.g. Blockbuster) and retail.

Impression: Since they have 80% of the PC GoD market, their growth potential may be limited by moves that Sony and Microsoft make in console game systems (PS3 and X-Box).

Powergrid Fitness

www.pwgrid.com 2002; Angel funded, seeking funding $5M. Greg Merril, CEO, 301-498-9400x201, gmerril@pwgrid.com

Powergrid creates "effortless wellness" products with their first product being an exercise machine merged with a video game.

Powergrid's proposition is simple – make exercising fun by keeping your mind on the game. The 9 person company won an innovation award at CES 2005 with their Kilowatt product, a treadmill-like exercise machine with a game controller of your choice mounted in front of you. Their contribution is in the ergonomics, not in the game itself (which can be a PS, X-Box or Nintendo).

Impression: Exercise machines always show up at garage sales and this may be no exception. The value seems marginal and the barrier to entry is non-existent.

Sound Choice

www.soundchoicecontent.com 1985; privately held, seeking funding $10M. Tom Turner, GM, 704-583-1618x1122, tomt@soundchoice.com

Sound Choice repurposes a 35,000 (and growing) song library for ring tones, games, karaoke and other applications.

This 52 person company is relatively mature and seeking funding because they wish to expand. Their "Clonetones" is a high fidelity ring tone library for phones. They have $12 million in sales, are established in the U.S., England and Australia, and supply content to a variety of big name companies, such as Wal-Mart, HBO, DreamWorks and Mattel.

Impression: Their library is their strength and phones are getting more sophisticated each year. This family run business has a nice niche.

GalleryPlayer

www.galleryplayer.com 2003; funding series D $7M.
Craig Husa, CEO, 206-622-4500x612,
craig@galleryplayer.com

GalleryPlayer provides high quality renderings of artwork and photographs for your HDTV delivered via cable, Satellite or Internet.

While companies like Corbis may charge hundreds of dollars for high quality picture files, GalleryPlayer charges much less and delivers them to your HDTV. They are also working with some STB manufacturers to integrate supporting circuitry. The 25 person company has signed up over 20 content partners with non-exclusive deals.

Impression: The direct consumer market for this service is small, but they may have a chance if service providers pick it up to enhance their services. One of the most watched HD programs during Christmas was of a burning log in a fireplace.

EZTakes

www.eztakes.com 2003; Bootstrapped, seeking funding $5M.
Jim Flynn, CEO, 413-529-0870, jim.flynn@artiosystems.com

EZTakes offers movies securely downloaded via the Internet that can be burned onto a DVD and played anywhere while protecting the rights of the content owners.

EZTakes protects the content owner's rights by embedding a user visible and computer readable mark into the video stream. The mark identifies the person that ordered and burned the movie so pirating is discouraged. The 6 person company is now in Beta testing and has arranged two small content houses. Their competitors include DVD rentals, Movielink, CinemaNow, Netflix, etc.

Impression: Attracting mainstream studio content will be difficult because they do not burn with CSS[36]. Customers will miss the collateral material. They have many challenges.

[36] Content Scrambling System, the native DVD encryption technique used by all movies produced by the majors. A device may not burn a DVD with CSS due to current license restrictions.

ServiceCentral www.servicecentral.com 1992; funded, but seeking additional funding $3M. Steve Teel, EVP, 972-745-8835, steve.teel@servicecentral.com

ServiceCentral aims to expand beyond traditional product service management tools into remotely managed service of connected devices in the home.

ServiceCentral's vision is to make it possible for companies and retail channels to remotely service their IP connected products in the home. Service is performed via remote diagnostics, collaborative customer diagnostics and field service. The 20 person company enables this type of service with software tools.

Impressions: Setup and service is a major consumer issue with increasingly complex devices, so the need is clear. Their ability to fulfill this need was less clear, particularly with the diverse situations that one can't always anticipate in a consumer's home.

Convergex www.convergex.co.uk 2003; funded, seeking additional funds $10M. Jostein Svendsen, CEO, +44-777-050-5550 (UK), jostein@convergex.co.uk

Convergex sells home automation systems for integrators.

Convergex calls their architecture LivingROOMS. It is based on a collection of common home automation standards and products, including Microsoft products. They do not sell directly to the consumer, but to integrators that install home automation in new homes and buildings.

Impressions: Home automation has been around for a long time and has many players struggling to eek out a living from a modest market. Convergex seems to have at least one design win, but a clear winning strategy was not obvious from their 5 minute pitch.

Digital Silo

www.digitalsilo.com 2004; Angel funded, seeking funding $3M. Michael Wolf, President, 800-585-5825, mwolf@digitalsilo.com

Digital Silo's service converts home videos, securely stores them digitally, and enables anyone with permission to view them via Internet connected devices.

Digital Silo currently has over 17K hours of video stored on their servers. They charge $10/year to store and stream up to 240 hours of video with unlimited sharing. Their main revenue comes from fees for converting from tape or DVD into their format, which can range from $6 to $45 per hour of video. Original tapes and a backup DVD are returned. They have 4 employees.

Impressions: $10 does not pay for much bandwidth if someone were to abuse the service, but their service looks appealing to a segment of the consumer market. Because their service is somewhat labor intensive, it is a candidate for franchising.

Entetel

www.entetel.com 2003; currently at Seed/Round A funding $2M. Yakov Kamen, CEO, 408-250-6987, yakov@entetel.com

Entetel is an advertisement supported service that gives users a virtual DVR through a browser, enabling remote setup of program recording and viewing.

Entetel calls their product Pivo TV. If a DVR or PC with tuner is connected to the Internet, it can be setup via their browser interface. The recording device needs their embedded software module they call xPVR. They use Google to help search from programs. Recorded video can be watched remotely via a browser. They have 7 employees.

Impressions: This service will appeal to an extremely small audience. The apparent complexity involved will prevent others from trying, even if it looks interesting.

Hillcrest Communications

www.hillcrest.tv 2001; bootstrapped, seeking funding. Kit Goldfarb, President, 703-465-7990, kit.goldfarb@kgcom.com

Hillcrest intends to offer a way to navigate and find your TV, and network connected video, music, photo, game and shopping content via your TV screen.

Hillcrest calls their product HoME, for Home Multimedia Environment. Their UI is intended to be very visual and easy to use. They intend to sell to service providers a navigation system that works from the STB, but reaches out to other devices on the home's network. They are in discussions with service providers and consumer electronics companies. They have 30 employees and their first product is due in 2006. They will face competition from Microsoft, TiVo and others.

Impressions: Their approach of going to the service provider and embedding their product into the STB may be unique. It remains to be seen how attractive their function is in a market that is still very young.

Preclick

www.preclick.com or www.photowikic.om 2002; working on series B $0.5M. Brian Smiga, CEO, 917-270-1552, brian@preclick.com

Preclick makes photo organizing, viewing and archiving software, and they have a photo web hosting service for sharing photos online.

There are many photo organizing software packages in the market – what separates Preclick is their 3 year contract to supply HP with their products. They project that 30 million copies of their software will be shipped with HP products over the next two years. They estimate that 5% of these will be converted to sales of their full featured product. The 12 person company also ships their sample software through Photoworks, Intuit, Delkin and others. They are running at break-even with a $1.2 million run rate.

Impressions: Their success is tied to HP, and HP is known to switch vendors periodically. They need to find another big horse to carry them soon, and figure out what to do for an encore.

DARTdevices

www.dartdevices.com (not yet active) 2003; angel funded, seeking series A $10M. Richard Mirabella, CEO, 650-207-7438, rich.mirabella@dartdevices.com

DARTdevices appears to add a virtual machine layer on many types of operating systems to enable run-anywhere applications that can synchronize with each other.

Their demo showed a phone, a PDA and a laptop running their application. When the contents of the display on the laptop changed, the contents also changed on the other devices' display without any user action. They position their technology as a way to save development time and enabling a new class of "automagically" spread interoperable applications. This 7 person company hopes to find a vendor that embeds their technology within that vendor's product line.

Impressions: Neat trick – the question is what is it good for? Before dismissing this technology out of hand, it would be worth sitting down to learn more and think it through.

Inlet Technologies

www.inlethd.com 2003; Series A, seeking Series B $4M. Amber Link, Director of Marketing, 919-342-2906, amber.link@inlethd.com. Neal Page, CEO.

Inlet makes hardware-based VC-1[37] real-time encoders for production/postproduction.

Inlet is very focused on real-time high-definition encoding of VC-1. They have two products - "Ocean" and "Fathom". Ocean is a basic platform technology, and Fathom is its personification in a hardware/software product. They are shipping product now to a few small companies (e.g. Sonic Solutions, CinemaNow) and hope to turn a profit this year. They then hope to be acquired.

Impressions: They have a single bullet rifle-shot strategy, and if they hit the mark they can be a legitimate acquisition target. While encoding of VC-1 is said to be a little easier than the alternative AVC, real-time HD encoding is still a leading edge topic.

[37] A variant of Windows Media 9.

Majitek

www.majitek.com 2000; privately funded, now seeking partners and $10M funding. Steve Outtrim, CEO, 415-845-1047.

Majitek makes technology to tie devices in a smart home to a telco's suite of smart home services.

Majitek ties devices in a home automation system with EDGEsystem. These devices can then communicate to a telco via Majitek's CLOUDsystem. Their vision appears to be a totally connected home with services of all kinds provided and managed by the telco. Their product is in the form of software that they sell to developers and integrators.

Impressions: A very ambitious vision that is a little ahead of the market. The EDGEsystem is a little easier to swallow than their CLOUDsystem.

MX Entertainment

www.mxentertainment.com 2001; early stage funded, seeking $5M funding. Jeff Braun, CEO, 415-920-9237, jeff@mxentertainment.com.

MX makes a proprietary interactive multi-angle video technology applicable to DVD and other video streams.

Multi-angle choices can be displayed along the side of the screen and the viewer can choose amongst them, or the view can be switched by pressing the remote's OK button. The 12 person company has produced some special DVDs, including a Rolling Stones DVD marketed exclusively through Best Buy. The concept can be applied to IPTV streams as well.

Impressions: Multi-angle camera is built into the DVD standard, but is seldom used because of production expense and lack of interest, except perhaps for live events, sports and porn. Their UI approach is nice, but it may not be enough to generate a big market.

Neosonik Audio

www.neosonik.com (not up yet) 2002; Bootstrapped, seeking funding $7M. Ted Feldman, President, 415-665-7500, ted@neosonik.com

Neosonik replaces all of the AV equipment except the TV display with digital wirelessly connected components.

Neosonik calls their system DWAVES (Digital Wireless AV Entertainment System). A controller, receiver and wireless speakers are the main components. The company is just starting with 3 people, but hopes to expand to 12 if they get their series A funding. They target a debut at CES 2006. Systems cost between $1.5K and $25K.

Impressions: The wireless speakers appear to be their main contribution, but to make their system work one must buy everything but the display from Neosonik. Mainstream consumers will object to the price and premium/integrator buyers will pick established component brands.

Pepper Computer

www.pepper.com 2002; bootstrapped, seeking funding $12M. Mary Ellen Heinen, President, 781-862-2500x202, me.heinen@pepper.com

Pepper makes a 2.3 pound wireless pad that performs a variety of AV and Internet functions.

Pepper's pad lets the user wirelessly browse, e-mail, IM, listen to music, watch videos, share photos, and create journals. It is also a TV remote and can sync to the PC. The founders have invested $7M into their 25 person company to produce the prototypes, and they target an introduction in the middle of this year. Initial price is $1K.

Impressions: Notebook computers are now available under $1K, making a very tough and versatile alternative to the Pepper pad. A number of special purpose pads have been tried over the years and none have ever been successful.

Streamload

www.streamload.com 1998; B series funded August 2004.
Steve Iverson, CEO, partners@streamload.com

Streamload makes distribution of large files easy by giving unlimited storage and 1GB to 60GB of downloading for a modest monthly fee.

E-mail systems often have a limit on attachment file size, and sending large files are a hassle at a minimum. Streamload offers a choice of service levels from free to $40/month, with all but the free service with unlimited storage on their system. They have over 20K subscribers, and 3.2 billion files. A single file can be as large as 2GB, making modest video files possible.

Impressions: They have an interesting service that offers real value. The "unlimited" storage is a good catch phrase. Their weakness is a low barrier to entry, so just about any ISP or independent could offer similar services.