From: Anoop Gupta (RESEARCH)
Sent: Friday, December 28, 2001 11:38 AM
To: Bill Gates
Cc: Anoop Gupta (RESEARCH)
Subject: RE: DMD Marketing Update - December

Bill,

We talked to the DMD folks about pause removal, but they decided to pass this time. Many reasons:

-- They decided to look into time compression very late into their current product cycle, when only few weeks of dev time was left. Pause removal would have required more work (next bullet).

-- The Hercules Windows Media server will supports functionality to stream content to client a constant factor faster than nominal rate. This works nicely for time-compression; e.g. if time-compression factor is 1.5 you simply ask the server to send at 1.5 times encoded bit rate. With pause removal the stream consumption rate is variable (e.g. if I encounter a 2 second pause, I consume the data for that duration in 0 seconds), and given the current server this will cause buffering problems on the client. They need a flow-control based protocol between client and server where the target buffer size is maintained on client even when client consumption rate is variable.

-- With pause removal, when we decide to skip a segment of audio, we skip the corresponding segment of video too -- this is done to maintain lip-sync. This makes the video jerky and can be somewhat disconcerting. Since not much user testing has been done for pause removal, they had concerns about user reaction.

I am glad that they are at least taking the initial step of supporting base time compression.

-- Anoop.

P.S. BTW, they have pause removal available in their offline encoder product, but not for dynamic use from client side. It is hidden quite well in encoder menus, so it's not getting much use.

> ----Original Message----
> **From:** Bill Gates
> **Sent:** Thursday, December 27, 2001 9:23 PM
> **To:** Mike Beckerman; Amir Majidimehr; Will Poole
> **Cc:** Anoop Gupta (RESEARCH)
> **Subject:** RE: DMD Marketing Update - December
>
> What happened to Pause removal?
>
> I love Pause removal.
>
> > ----Original Message----
> > **From:** Mike Beckerman
> > **Sent:** Wednesday, December 26, 2001 7:18 PM
> > **To:** Amir Majidimehr; Will Poole; Bill Gates
> > **Cc:** Jim Allchin; Chris Jones (WINDOWS); Rick Rashid; Anoop Gupta (RESEARCH); Craig Mundie; Sam Furukawa
> > **Subject:** RE: DMD Marketing Update - December
> >
> > More answers below.

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-----Original Message-----
From: Amir Majidimehr
Sent: Tuesday, December 25, 2001 11:40 PM
To: Will Poole; Bill Gates; Mike Beckerman
Cc: Jim Allchin; Chris Jones (WINDOWS); Rick Rashid; Anoop Gupta (RESEARCH); Craig Mundie; Sam Furukawa
Subject: RE: DMD Marketing Update - December

Answers below.

Amir

-----Original Message-----
From: Will Poole
Sent: Monday, December 24, 2001 11:03 AM
To: Bill Gates; Mike Beckerman; Amir Majidimehr
Cc: Jim Allchin; Chris Jones (WINDOWS); Rick Rashid; Anoop Gupta (RESEARCH); Craig Mundie; Sam Furukawa
Subject: RE: DMD Marketing Update - December

Answers below. Mike and Amir, a few questions for you also.

Bill, we're planning to fully announce Corona, including Beta shipment of player and encoder, and a bunch more deals, at NAB in April. I'm sending you a separate email to see if you could keynote there and highlight the importance of Microsoft's efforts for the broadcast industry which is increasingly looking our way for leadership.

> -----Original Message-----
> **From:** Bill Gates
> **Sent:** Sunday, December 23, 2001 12:00 PM
> **To:** Will Poole
> **Cc:** Jim Allchin; Chris Jones (WINDOWS); Rick Rashid; Anoop Gupta (RESEARCH); Craig Mundie; Sam Furukawa
> **Subject:** RE: DMD Marketing Update - December
>
> I need to understand Corona better.
>
> I looked at the slides and some of the keynote speech and all of the press stuff including the articles but I am still confused about Corona.
>
> It seems strange to me that we are release two new Codecs right AFTER we shipped Windows XP.
> [WPoole]
> [WPoole] These are in preview now, go to beta in April, ship early summer. We have traditionally been on a 9-12 month release cycle with codecs to keep up w/ and ahead of Real, apple, etc.
> - [WPoole] 2 channel audio WMA v9 codecs will are fully backwards compatible to Xp, v7, etc.
> - [WPoole] The new 5.1 WMA will work on XP only, requiring a new Corona player.
> - [WPoole] v9 Video is backwards compatible after a codec auto-install (same as we've done since 6.4).

[mike] Meaning that the bitstream is different from our v8 and earlier video codecs, but the players going back to 6.4 all know how to request a new codec from our codec server when they encounter content that was encoded using the new codec.

- [WPoole] Other new codecs are also part of Corona, but are not announced yet. They include a low-bitrate voice codec for spoken word, news, and future VTC use; a perceptually-lossless mode of WMA (basically peak-constrained variable bitrate audio), and a mathmatically lossless audio codec (for pro archival use, and next generation "disk space does not matter, give me the best" consumer use).

Will these Codecs be part of the feature portion of SP1?
[WPoole] Everything in Corona will be in SP1, including codecs. The Corona player is required to take full advantage of the Corona server in Windows.Net, and we have to update the client to address consent decree issues. [not that the server will work with downlevel players, but will not have all the new protocols available, etc.] Mike, pls confirm.
[mike] The server, Hercules, is in Windows.NET. The client and the encoder will not be part of SP1 as they have significant feature improvements and thus do not fit the definition of a service pack. Also, the Corona client schedule does not complete early enough to make the SP1 schedule, regardless.

Will they be part of MSN 8?
[WPoole] Bigtime. Texas depends on Corona for a variety of new capabilities (which we are fully in sync with and supportive of), including "buddy boogie" and others.
[mike] Correct. We work very closely with the Texas team.

I don't understand Faststream – is it just optimistically assuming the network works ok for the first part of the video?
[WPoole] Correct. This makes a huge difference in the startup experience, and nobody else has done it. Current systems (ours, apple, real) do not opportunistically use excess bandwidth for startup or pre-caching. Corona [server, in Windows.Net] will do both, meaning that startups can be nearly instantaneous on a cable modem, and congestion induced re-buffering during stream playback will be reduced. Users love this feature.
[mike] There are been two instances that I'm aware of where others have tried some form of taking advantage of excess bandwidth: Real, and Burst. Real has pumped data out at stream start-up in rates in excess of the stated bandwidth for the stream since the release of Real Video (v5), but the experience isn't really much better than our currently shipping WMT components; they really haven't done much in this area for 3 years now. Burst was a company that copied our protocols and used a proprietary means to take advantage of excess bandwidth such that the experience was improved over our out-of-the-box performance. They have since gone out of business.

FastStream is an umbrella term for four functions that are designed to provide a superior user experience for broadband connections. Users connected at as low of a rate as 56K could see some improvement as well, though that will be highly dependent upon the bandwidth of the stream they're playing and on the activities they're attempting in parallel that consume network bandwidth. We believe we have innovated here in ways that are significantly different than either Real or Burst, and are far more effective.

With our current shipping server, we always deliver content metered at the authored rate. The first function of FastStream is that we push down content faster than the authored rate (actual rate configurable at the server.) This gets the stream going on the client very quickly. We have demoed over the internet the experience of switching between multiple content streams (such as preview clips from Intertainer) and it is incredibly compelling – when it's working well it's like switching channels on a TV; instantaneous.

The second function is that we monitor network throughput over the course of the

stream and we adjust as appropriate to try to always keep a on the client a certain delta ahead of the current time. Obviously, this helps clean up typically network jitter.

The third function is that we have improved our UDP packet resend mechanism to greatly increase the chances of still having a requested packet on the server at the time the client requests a resend. Essentially, we greatly increased the server-side stream buffer for UDP-based streams. This helps clean up much of the typical UDP network packet loss we've measured and observed over the years.

The fourth function is client-side disk caching of the stream. In conjunction with the previous three and given sufficient local disk space, we try to build up a cache of the content such that if you're say 3/4ths through a movie and you lose the network connection all together, you still get to see the complete movie w/o interruption.

Together these FastStream functions deliver a superior broadband experience over any current shipping streaming media delivery system.

I don't understand the new audio codec. Who gets a benefit from it? Will people encode in it?
[WPoole] Per above, the audio codecs will be broadly distributed and used. We have had good pickup by ICPs of each new generation of audio codec since they have been bitstream-compatible going back 2+ years, and are compatible with 80+ models of existing PDs and pocket PCs, old media players, etc. The 5.1 audio will be used by aggregators [such as movielly, intertainer, movies.com] doing VOD applications, and by studios for next-generation movie products that will include 3+ high quality movies on a singe DVD for playback on a media center PC and/or individual downloaded movies saved on a CD/R (we can get a VHS+ quality movie w/ 5.1 surround in <700MB).

I don't understand the new video codec. How does it relate to Mpeg4? It is better because it is proprietary but I don't understand the rest of it.
[WPoole] This is another generation the video encoding technology we've been working on in the past. At this time it is long diverged from MPEG4. (We do still support ISP MEG4 encode and decode). We're now getting really good at high quality encoding, and we're blowing away the studios and broadcasters with our ability to deliver near-DVD quality at fast DSL speeds (< 1mbit), and deliver HD quality at < 1/3 the datarate/size of MPEG2 (and better than 50% improvement over ISO MPEG4). The key thing that grabs studios is that we can get a highdef movie on a current generation DVD. The Japanese are pushing blue laser technology to go to ~30GB DVDs to store mpeg2 highdef. If we play our cards right, and figure out how to apply studio-acceptable security (be it ours or CSS or other) to the media for non-PC as well as PC use, and continue to get DVD player manufacturers behind us, we can potentially move WMV into the position of being the standard format for highdef DVD distribution. There are a lot of moving parts that need to be aligned to make this work, but we're laying the foundation and have a chance based on the video quality we're showing in Corona.

[WPoole] We will be announcing at CES that the #2,3,4, and 5 DVD player manufacturers [as measured by US market share – Sony is #1] will all be including WMA playback in their next generation players. We've licensed them for video also, but don't have commitments yet b/c of the need for new silico. Once we have the video decode in silicon problem licked, we should be able to start to deliver on the idea above, hopefully by CES 03.

There is even another standard besides MPEG2 people talk about.[WPoole] There is a new video encoding std making its way through the bodies, but it is a long ways off, from both the standardization process and the CPU required to

support it. Amir, pls explain the ITU/MPEG4 effort

[Amir] ITU 26L is a next generation video compression standard that improves substantially on existing standards such as MEPG-4. MPEG has adopted this activity and will basically be rubber stamping 26L as "MPEG-4 part 10". This compression scheme however, is 100% *incompatible* with current MPEG-4 standard. While 26L provides very good quality, it does so by using considerably more CPU horsepower on both encode and decode. Our new "Corona" Windows Media Video codec achieves similar efficiency to 26L but uses substantially lower amount of CPU cycles. We do not expect 26L to become a factor in the marketplace for another 2 to 3 years due to licensing and CPU overhead issues.

Do we want people like Echostar to use these new formats or will they just stick to Mpeg2?
[WPoole] The satellite guys are going to be very hard to move off of MPEG2 for all the obvious reasons. Before we can even take a run at them, we need to have affordable WMV decode in silicon, in ASTBs that are ready for deployment reasonably soon. I have a number of meetings at CES to push this initiative forward, with Thompson and others. We have 3 silicon providers actively engaged, as well as Equator, who has a high performance media co-processor that does mpeg2 and other decoding in software, and would be much quicker than the full silicon spins required for others. We probably also need to figure out a standards play with WMV to get that kind of adoption. I will set up a review for February to get together with you and the CC line (and jonde, mikelout, etc.) and go over our long term plans around video encoding and standards and get some feedback on how to best position ourselves for success.

I need to understand the encode/decode overhead for the various things.
[WPoole] Without knowing exactly what you're looking for, here are a few datapoints:

- 640x480 30fps WMV9 encode takes about 90% a 2GHZ P4 to do in real time.
- Decoding the highdef video we showed in NY took a dual proc ~1.8 plus a very fast graphics card.

[Amir] Actually, we can do this on a "single CPU" 1.8Ghz AMD CPU. The current Tech Preview code is not fully optimized and hence the need for dual-processor configuration for the show.

- All of this will get MUCH cheaper once we have hardware encode and/or decode. For eHome Slalom, we're looking at a hybrid two-pass encode, where a cheap pre-processor does a partial real-time encode, CPU copies to disk for immediate use in trickplay, and then does a full encode in the background to save disk. This gives the best of both: cheap and immediate high res capture, and storage of high quality with limited disk space, which will be a great selling feature over dedicated PVRs with mpeg2 only and big expensive disk packs (compare to the recently announced Replay 4000/320 that costs $2,000 and has 320GB of disk -- we'd be able to go the same quality & quantity on a Slalom-era media center PC with 80GB of disk.)

How does any of this relate to MSR China stuff?
[WPoole] Amir should address what exactly we've taken in from MSR for this release.

[Amir] We did not use any technology from MSR (China or otherwise) in this area. MSR China's work is currently focused in other areas such as fine grain scalability. They do not work on our own audio and video compression technologies.

I thought the next generation included fast viewing and I don't see that at all

(speed up).
[WPoole] Corona includes time compression at encode time. I don't recall how much of the speed-up / playback-time compression made the release. Mike/Amir?
[Amir] Mike has to answer since this is really a player feature. But yes, we have had the encoder side features for quite a while.
[mike] The Corona client will include pitch-corrected variable speed playback (but not pause removal.) We haven't announced anything yet related to the encoder or the new client, so that's why you haven't seen anything about this in the materials we've published.

-----Original Message-----
From: Will Poole
Sent: Friday, December 21, 2001 1:53 PM
To: Jim Allchin; Steve Ballmer; Bill Gates
Cc: Jeff Raikes; Brian Valentine; Chris Jones (WINDOWS); Bill Veghte; Todd Warren; Will Poole's Direct Reports
Subject: FW: DMD Marketing Update - December

FYI -- DMD is rockin' with consumers, enterprise, press, and industry. Dave's team is kicking ass promoting all the new technologies DMD has out this fall, and the customers are eating them up, world-wide.

A few highlights from below:
* Corona (v9) announced -- we cleaned up in the press
* DVD penetration -- we have licensed WMA (and in some cases WMV) playback to suppliers to 90% of current DVD players
* Plus: 346,000 units at retail, 10% over plan
* Media Player is #1 in US MediaMetrix reach, home & work; internationally it is ahead or tied in 9 of 10 countries surveyed (behind in France).
* Making more progress than ever on content supply on top sites; leading Real on top-10 US sites
* Produces: 142,000 downloads in under a month!
* Sable solution shipped and off to a great start