

DVB-H mobile digital TV for the U.S.

Overview

In the last sixty years we've evolved from radio, to black and white TV, to color TV, to cable TV and the satellite TV universe. Now that opportunity is expanding even further with TV on mobile phones, representing the ability to reach millions of consumers in new ways. Mobile digital broadcast TV combines the two best-selling consumer products in history—TVs and mobile phones. Indeed, TV will be the ingredient that drives demand for the next generation of wireless mobile phones because consumers want both communications and entertainment—all in one place.

Mobile digital TV (DTV) is already becoming a delivery mechanism for TV broadcasts, bringing new interactive content to a new generation of savvy on-the-go consumers. Mobile DTV is taking many forms from region to region and will vary by carrier on how TV content will be delivered to and received by consumers' mobile phones.

At every level of the mobile DTV value-chain carriers, handset providers, infrastructure owners, content providers, broadcasters and semiconductor suppliers are putting increased efforts behind their mobile DTV plans. And for good reason—according to Vision Gain, the mobile DTV handset market is expected to grow to over 105 million units by 2009 from the expected five million units in 2005.

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Standards landscape worldwide

Like all new technologies, there are several different standards for mobile DTV around the world. These include three primary open standards developed by industry associations with contributions from multiple players in the mobile DTV marketplace:

- DMB (digital media broadcast) has deployed today in Korea with several handsets already in-market to support the standard and is expanding to Europe and other parts of Asia.
- DVB-H (digital video broadcast-handheld) is quickly gaining ground with trials in Europe, the U.S. and parts of Asia.
- ISDB-T (integrated services digital broadcast-terrestrial) is the standard in Japan and will be in trials later in 2005.

There are other technologies that have been developed for mobile DTV that do not fall within the open standards category. MediaFLO™ is an example in the U.S. market today, and China is looking at open standards similar to DVB-H and DMB as well as proprietary technologies to be the China mobile DTV standard.



The 3G and upcoming HSDPA networks will have a role in the mobile DTV market as well. While the economics and bandwidth requirements of streaming live broadcasts over the cellular network would impact voice services, using 3G or HSDPA networks to download clips or full television shows to memory is more practical. Users would watch live events using the broadcast link on their phone and could download news or sports clips like they do today on the Internet using their PC. And as personal video recording (PVR) capabilities and user preference programming becomes available on mobile phones, carriers will be able to provide overnight download programming or clips to a user's mobile phone while cellular network utilization is extremely low.

	DVB-H	MediaFLO™	ISDB-T	DMB	3G
Standard	Open	Proprietary	Open	Open	Open
Regions	US, Europe, parts of Asia	US	Japan	Korea, expanding to other countries	Worldwide
Air Interface	OFDM	OFDM	OFDM (sub-banded)	OFDM	
Service Availability	Mid 2005, open US spectrum nationwide today	2006 (locally through analog TV channels)	Early 2006	Today	Today expanding rollout
Handset Availability	Today from several OEMs	2006	2006	Today from several OEMs	Today from several vendors

Mobile DTV in the U.S.

In the U.S. there are two mobile DTV technologies vying for the millions of mobile phone users in this TV-centric country. DVB-H, which originated in Europe, has taken the lead with a trial underway in Pittsburgh from Crown Castle Mobile Media. Several prototype DVB-H phones have been developed by major handset manufacturers. It is expected that there will be larger trials in the U.S. launching in 2006, with full-scale deployments starting in 2007 into 2008.

Mobile DTV holds tremendous opportunity for the entire wireless market—operators, handset OEMs, infrastructure and semiconductor providers alike. But for the DTV market in the U.S. to really take off, open standards must be at the core.

Open standards offer advantages over proprietary technologies and networks controlled by one company. With an open mobile DTV market, all layers of the value-chain benefit from additional revenue opportunities from an untapped TV market. Consumers benefit from the innovation and less expensive devices.

DVB-H is an open standard and is currently supported by many industry players throughout the wireless market worldwide. It is a proven standard in trials today and has many advantages, including clear spectrum for nationwide deployment and broad industry support. The advantages of DVB-H include:

- **Openness** - Working in an open ecosystem built on open standards is ultimately better for the industry and consumers than working in a proprietary environment, where a few players dominate the majority of the value chain and limit other players in their ability to participate in and generate revenue from that value chain.
- **Spectrum Availability** - In the U.S., DVB-H will be deployed using clear and "ready-for-use" spectrum available today, without interfering with existing analog TV stations or other TV or wireless services.
- **Trials** - DVB-H is in trials today in Europe (Germany, France, UK, Finland, etc.) and the U.S. (Pittsburg), with additional trials set to launch later in 2005. These trials are proving the technology and discovering that consumers are willing to pay \$15 per month for mobile DTV services. DVB-H is ahead of proprietary networks in trials and network roll-out in the U.S. and around the world.
- **Proven Technology** - DVB-H comes from the proven DVB standard used in Europe for terrestrial and satellite DTV transmission with a low power mode for battery-powered devices.
- **OFDM** - DVB-H uses an Orthogonal Frequency Division Multiplexing (OFDM) air interface technology, and includes a technique for power reduction in the tuner. In laymen's terms, DVB-H uses time-slicing so that the tuner can be switched off most of the time and is only on during short transmission bursts. This allows the tuner to operate over a reduced input bandwidth and also conserves power. OFDM is a very good choice for a mobile TV air interface. It offers good spectral efficiency, immunity to multi-path, good mobile performance, and it works well in single-frequency networks such as those planned for mobile TV.

DVB-H value chain

Because DVB-H is an open standard, it is available to everyone throughout the market to use, develop and deploy mobile DTV products and services. It also offers flexibility of business models, additional revenue opportunities and lower costs for consumers, which moves the technology to mass market faster.

If you look at the DVB-H value chain it is what you would expect at first with content providers, broadcasters, infrastructure companies, carriers, handset OEMs, silicon vendors and software third parties. But digging deeper it is not that simple. Viewed further you will find cross-pollination within these player categories—again a benefit of the openness of DVB-H as a whole.

- **Carriers** are the main interface to the consumer and provide the service to the mobile phone. DVB-H also allows them to:
 - Increase ARPU (average revenue per user) with new service to current customers.
 - Reduce churn rate by offering a compelling application that will help retain consumers.
 - Attract new customers with competitive services and channel offerings through mobile DTV.
 - Gain additional revenues from interactive TV programming and advertising such as SMS for voting for a favorite contestant directly from the view screen; specific audience for advertising means that you can customize links so that you can create a teenager focused ad for a new game or ring tone where they would click to download immediately.
 - Use any additional spectrum that they might own for DVB-H broadcasting and become an infrastructure player as well.
 - Make deals with content providers or aggregators on their own to deliver content to their subscribers.
- **Content providers/broadcasters** deliver the programming for the mobile phone. DVB-H also allows them to:
 - Gain additional viewers for their content with no or low investment into converting their content for the mobile phone. They can also choose to create new content, tailored to the mobile audience.
 - Gain additional revenues from advertising and content, as well as drive more traffic to their websites.
 - Play in multiple areas of the value chain as desired, including the possibility of purchasing spectrum and deploying their own broadcast network if desired.
- **Infrastructure companies** provide the towers and transmitting equipment. DVB-H also allows them to:
 - Gain additional revenues from renting equipment and infrastructure use to carriers
 - Negotiate for content or aggregate content for carriers
- **Handset OEMs** develop handsets for consumers. DVB-H also allows them to:
 - Gain revenue with phone upgrades as mobile DTV increases in popularity
 - Develop new mobile phone designs that are small, but also deliver the performance and screen resolution to deliver crisp, clear images.
- **Silicon vendors** develop silicon and software for mobile phones. DVB-H also allows them to:
 - Gain additional revenue from more content per mobile phone
 - Innovate in order to deliver lower power, smaller chips and chipsets to handset OEMs
- **Software third parties** deliver additional software and applications for mobile phones. DVB-H also allows them to:
 - Work with more companies on mobile DTV since there is a broad group of companies supporting DVB-H

The consumer is ultimately the one who wins with DVB-H. Since it is an open standard there is more competition at every level of the value chain. This creates competition and innovation which drives the cost of mobile phones with more options, features and service packages lower.

Texas Instruments' (TI's) role in mobile DTV

In October 2004, TI introduced "Hollywood," a single-chip tuner, receiver and processor for mobile DTV supporting the DVB-H and ISDB-T standards.

"Hollywood" uses TI's innovative DRPTM (Digital RF Processor) technology to achieve the lowest power, smallest size and lowest cost mobile DTV solution in the industry -- key to driving DTV into mobile phones. This will deliver up to eight hours of TV time on one standard battery charge, more than enough to meet the believed usage model throughout the industry. It is believed that consumers will only watch 15-20 minutes at a time or "snack" on their favorite sports teams, news, and catch-up on events such as the Olympics or the World Cup using the mobile DTV broadcast network.

While "Hollywood" marked TI's entry into mobile DTV receiver technology, the company has been involved for some time in DTV and video on mobile phones with its OMAP™ platform. Today, TI's OMAP processors can be found in phones supporting DMB and DVB-H as well as the current high-end phones that handle video streaming capabilities. With a dedicated video processing engine, TI's OMAP 2 processors will deliver even higher performance and use of additional phone applications while a user is watching TV, without degrading the performance or user experience.

TI's mobile DTV efforts are also backed by the company's expertise in OFDM, consumer electronics (CE) and digital TV. With a portfolio of OFDM technologies, CE technologies for digital set-top boxes, portable media players, digital still cameras, and DLP™ TVs, TI is well-versed in the industry and how to merge wireless and CE into one pocket-sized device.

Conclusion

Mobile DTV is coming to a phone near you. It's true that the technology will likely first take off in urban centers with heavy commuters and with teenagers and the younger population. But merging a mobile phone with a TV is something that everyone can understand. And with our universal hunger for information and connectivity, mobile DTV presents the perfect opportunity for users to stay informed and up to date on what is happening in the news, with their favorite sports team and even their favorite reality TV show or soap opera.

With strong industry support around the world, and with trials and prototype phones in use today, it is likely that mobile phones in the U.S. will be based on the DVB-H standard. The opportunities for the value chain and the expected lower costs for consumers will help propel DVB-H to the mass market and deliver even more entertainment to consumer mobile phones and users anywhere and anytime.

For more information

For more information on TI's "Hollywood" single-chip, please visit:

www.ti.com/wirelessdtv

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