

MPH[™] In-Band Mobile DTV Solutions:

Enabling Local Broadcasters to Deliver Mobile TV Services

As the technology for providing robust reception of television signals to cell phones, computers, and specialized display devices moves into commercial reality, a major question facing many traditional terrestrial television broadcasters is, "How does my station participate in this new audience segment?"

Some broadcasters have been working with cellular providers to establish a streaming video service that subscribers access through a fast cellular network connection (so-called "3G" networks). While such services have advantages — the local broadcaster controls the content and subscribers can access the service no matter where they are — there are also limitations to the streaming-of-video technology and content-rights issues when content is viewed outside the licensed service area of the TV station.

To overcome the technical limitations of pushing television content over a point-to-point cellular network, some network operators are starting to implement mobile broadcast television systems that use an efficient one-to-many network architecture to cost efficiently cover a large area with high-quality digital television signals. Using technologies such as DVB-H, MediaFLO, and T-DMB, these dedicated mobile TV systems provide five to 20 virtual TV channels in a typical broadcast TV channel.

While a limited number of consumer devices are available for these broadcast mobile TV services, and only a handful of commercial

networks are now in operation worldwide, the technology is proving to be useful for providing high-quality, robust signals to a moving or transportable display device, and some industry analysts are predicting rapid growth and acceptance of dedicated broadcast mobile TV services.

Today, if you look at the offerings on the new broadcast mobile TV services, you will find news, sports, comedy, business and childrens' programs. A few offer national broadcast television network programming and perhaps a music TV channel. But one major part of the broadcast programming universe is currently missing from broadcast mobile television: *the local TV station*.

Mobile TV Without Local Stations

To be certain, the technical capability exists to provide local television programming on most of the new broadcast mobile TV networks, and over time, there may be opportunities for some local television stations to be carried on the mobile TV network within their licensed service areas.

Today, national mobile TV network operators are focused on deploying national networks, and they are understandably more concerned with providing coverage than with supplementing their national content with local content. If the networks reach nearly ubiquitous service coverage, it will become more important to these operators to offer more local TV content, typically through local broadcast stations.

Even then, however, it will be difficult for local stations to achieve carriage on such mobile TV networks. First, content licensing concerns will have to be worked out. The mobile TV network is a different system, with different coverage areas, than the local TV broadcaster. For this reason, the network and syndicated content appearing on the local TV station might not be available for the mobile TV network without separate licensing and carriage agreements.

Second, the local TV station does not have a right to carriage on the mobile TV network and will have to compete with the national channels as well as the other local stations for a place on the mobile TV network service. In larger markets, it might be difficult for all local stations to receive carriage.

And third, there will not be sufficient channel capacity to accept more than a single channel from any one local broadcaster.

Mobile TV for Local Broadcasters

Fortunately, broadcast transmission technologies continue to evolve, and viable solutions are emerging that enable local broadcasters to provide their own mobile TV services. We call such services "In Band" mobile TV because the mobile service is provided as part of the local broadcasters' terrestrial transmission within the band or channel.

For broadcasters operating DVB-T or ISDB-T services, such in-band capability has been in place for a while. ISDB-T services are designed to support one robust channel suitable for mobile reception, while the DVB-H extension to the DVB-T standard is also designed to enable a mobile service along-side the terrestrial service.

At NAB2007, Harris Corporation, along with LG/Zenith Electronics, is pleased to announce a new, ATSC-compatible mobile TV solution, one which we call "MPH™ In-Band Mobile DTV" — where MPH represents the new reception environments that this backwards-compatible technology extension will allow: Mobile, Pedestrian, and Handheld.

With the MPH™ In-Band Mobile DTV solution, local ATSC broadcasters will be able to dedicate a portion of their 19.39 Mbps transport stream to mobile and/or handheld services.

The Elegance of the MPH™ In-Band Mobile DTV Solution

To enable robust mobile reception, the broadcaster allocates a portion of the ATSC transport stream for the mobile service and the MPH™ system processes the mobile channel(s) with additional forward error correction and data redundancy to help ensure successful reception.

Unlike some proposed in-band ATSC systems, MPH™ is completely compatible with standard ATSC receivers, causing no issues with the PSIP program guide and channel information. MPH™ is significantly more bit-efficient than a competing system, offering, for example, 1.1 Mbps of payload in a 4.4 Mbps channel, compared to the competing system's 0.5 Mbps payload in a 5.08 Mbps channel.

The MPH™ signal is compressed differently and encoded differently, but it is multiplexed with the ATSC programming in a way that does not interfere with the home receiver. In this way, the MPH™ component acts no differently than a datacasting service that is broadcast by an ATSC transmitter: it can only be detected and decoded by an MPH™-compatible receiver.



Field trials of the MPH system showed rock-solid reception in a moving vehicle with a single rooftop antenna.

Combining Mobile TV with the Main TV Service

Mobile TV systems typically use H.264 compression systems, at quarter VGA resolution (320x240 pixels), which provides a quality channel displaying 30 frames per second with a data rate between 300 and 500 kbps. In a typical application, the MPH™ service will offer two to three program channels.

The MPH™ data stream is multiplexed with the main ATSC program stream. If 4.4 Mbps is allocated for the MPH™ stream, then approximately 15 Mbps remains for the main ATSC programming. Using today's state-of-the-art MPEG-2 compression, 15 Mbps supports one HDTV channel at 1080i and one or two SDTV channels, or one HDTV channel at 720p and two or three SDTV channels.

Broadcasters considering delivering 1.1 Mbps of mobile TV programming typically consider having one of the channels be a more-robust simulcast of the primary HDTV or SDTV programming. A second channel might have programming especially tailored for mobile and handheld customers, such as local news, sports, traffic, and weather. A third channel might be a data carousel or other specialized programming.

Implementing a Minimum MPH™ Service

Harris anticipates that a broadcaster can initiate an MPH™ service with a total allocated bandwidth of no more than 3 Mbps, which would provide one quality mobile channel and one secondary channel of slightly less quality. MPH™ In-Band Mobile TV is designed to offer the broadcaster flexibility in how much bandwidth to allocate to mobile, and how many mobile channels to program.

The MPH™ system components are designed to allow future enhancements and upgrades to an MPH™ system, so a broadcaster can start with a 3 Mbps service, for example, and later expand to a 4.4 Mbps service, gaining another quality programming channel. A broadcaster might pursue this path as viewer support of the mobile service grows, or as MPEG-2 encoding efficiencies in the main services continue to improve, allowing more bandwidth to be allocated to the mobile service without sacrificing the quality level of the main service.

Flexible Service Offering

The MPH™ system has been designed to allow different allocations at different times. A broadcaster, for example, might wish to allocate less bandwidth to the MPH™ service during a major sporting event in order to allocate a high data rate to the HDTV service. Or the broadcaster could offer a dedicated traffic channel during the morning and evening commute times and offer fewer MPH™ channels at other times.

As a digital transmission system, MPH™ inherently supports subscription and conditional access business models. Some broadcasters might implement totally free-to-air MPH™ systems, relying upon advertising or contributors for support, while others might have only subscription channels. Still other broadcasters could offer both types of services.

Unlike some competitive mobility approaches, MPH™ is completely compatible with the ATSC A/110 standard, which means that MPH™ can be implemented in distributed transmitter environments.

MPH™ Consumer Devices

Harris anticipates that consumer device manufacturers will support MPH™ with a variety of devices, including integration into mobile phones, integration with in-vehicle LCD screens and with portable computers, as well as dedicated MPH™ receivers. The MPH™ receiver technology will be compact and easily integrated into a wide range of consumer devices.

Complementary to Dedicated Mobile TV Services

Harris sees the MPH™ In-Band Mobile DTV service as being complementary to dedicated broadcast mobile TV services, as well as to cellular streaming video services. With MPH™, local broadcasters can readily add a mobile service without any concerns about program licensing and rights. As devices become available with both MPH™ and dedicated mobile TV channels, local viewers can watch the programs they want to watch, wherever they are. In this manner, a viewer will be able to choose from a wide range of programs, just as that viewer can at home when using cable, satellite, or IPTV services.

MPH™ Upgrades for Existing ATSC Transmitters

Harris is developing an MPH™ transmission kit that makes it easy to implement an MPH™ service. At a minimum, the broadcaster would need to purchase an MPH™ program encoder, multiplexer and an MPH™-ready ATSC exciter for their DTV transmitter. The Harris MPH™ system will be available for installations with Harris transmitters as well as many other brands of DTV transmitters. Once the MPH™ systems are available, Harris will offer MPH™ as an option on new transmitters.

Harris Assured Designs™ for MPH™

Harris will offer a range of mobile TV solutions for broadcasters planning MPH™ services. Offered as "Harris Assured Designs™," these new solution sets are designed to be readily implemented at the local station, making it easy to get an MPH™ system up and running.

As noted, the basic MPH™ system can be implemented with an H.264 encoded signal, a Harris MPH™ Multiplexer, and a Harris MPH™ TV exciter. But broadcasters may wish to do more than just convert their normal broadcasts to the MPH™ format. At a minimum, they may wish to incorporate different graphics and branding, appropriate to the service and the smaller sizes of many receive devices. For mobile-specific programs, or mobile-specific ad insertions, broadcasters might wish to have a specialized playout to air system that makes it easy to manage a quality mobile TV programming channel.

For each of these deployment scenarios, Harris will offer a Harris Assured Design™:

- **HAD5001:** MPH Encoding, Multiplexing and ATSC Modulation Solution
- **HAD5002:** MPH Channel Branding, Encoding, Multiplexing and ATSC Modulation Solution
- **HAD5003:** MPH Channel ONE Play-to-Air, Encoding, Multiplexing and ATSC Modulation Solution

As the MPH™ services grow and further investment in MPH™ capabilities makes sense, broadcasters can expand their HAD5000 Series MPH™ solution to a greater range of capability, moving to a complete, end-to-end mobile TV solution, completely supported by the world's leading supplier of broadcast delivery systems.

MPH™ System Availability

Initial interest in the MPH™ system has been quite high, and Harris anticipates being able to start deliveries of MPH™ transmission systems in early 2008. Consumer devices could be available in the same timeframe. Actual availability of the transmission and receiver systems will depend upon a number of factors, including broadcaster support.

For more information about the MPH™ system and our other mobile TV solutions, please contact your Harris representative, or visit: www.broadcast.harris.com/television/mobile.

For more information please visit www.broadcast.harris.com.

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