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Mobile Television Everywhere . . . Broadcast Mobile DTV vs. 4G Wireless TV

Posted on [December 12, 2011](#) by [Tore Nordahl](#)

(Is local content, news, weather, traffic the Mobile DTV advantage?)

Mobile Television competition is brewing, between local TV broadcasters starting to deliver Mobile DTV as a part of their ATSC OTA transmission and the 4G wireless providers (AT&T, Sprint, T-Mobile and Verizon) offering both free and subscription-based television service to display on smartphones and tablets. This article explores the current competitive landscape and whether local news, weather and traffic, and local content, may be material in achieving Mobile DTV long term existence by the broadcasters. There are 3 primary launch issues for Mobile DTV as it attempts to compete with 4G TV.

The Dumb and the Smart

<p>RCA DTV/Mobile DTV Receiver</p> <ul style="list-style-type: none"> ▪ A "Dumb TV Set" w/ some smarts ▪ NO OS - NO Browser - NO WiFi ▪ One Program to many delivery 	<p>HTC Sensation 4G</p> <ul style="list-style-type: none"> ▪ A "Personal Computer" ▪ Android OS w/ Browser ▪ Wireless Broadband Transceiver ▪ WiFi Transceiver ▪ A Very Smart Phone  <p style="text-align: center; font-size: small;">T-Mobile TV display shown</p>
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Briefly, the basic ATSC M/H (Mobile DTV) standard was finalized in 2009, after about two years of committee work following successful concept demonstrations at the CES and NAB in 2007. Several key manufacturers provided substantial support in the process, working with the OMVC (Open Mobile Video Coalition) which membership consists of group station owners covering about 800 full power TV stations across the U.S. By October 2009, about 30 TV stations were on the air with Mobile DTV. Two years

later, as of November 9, 2011, surprisingly, only 83 TV stations seem to be on the air with Mobile DTV according to RabbitEars.info. Earlier this year, the Author projected that over 160 TV stations would be on the air with Mobile DTV based upon about 110 TV stations stating that they planned such services by the end of 2011, adding to the 50 or so TV stations already transmitting Mobile DTV back then. But now it seems that only about 30 to 40 of the 110 actually will be on-Mobile DTV-air by end 2011. With the OMVC members controlling more than 800 TV stations, what is the problem?

Mobile Television over broadband wireless has experienced substantial growth with the emergence of 3G several years ago, but particularly over the past year with the building out of the 4G wireless network capabilities by the major wireless providers AT&T, Sprint, T-Mobile and Verizon. 4G service delivers download speeds exceeding 3 Mbps and upload speeds exceeding 1 Mbps, sometimes significantly higher, supporting relatively good quality full motion video with audio as required by live streaming of TV programs. Most new models of 4G smartphones now feature a display of about 4 inches (diagonal). The Author's T-Mobile HTC Sensation 4G pictured in this article features a 4.3-inch display with quarter HD resolution (960x540) providing a convenient and satisfying personal on-the-go high resolution viewing experience. Is Mobile DTV serious competition for broadband wireless mobile television? Read on for Author's opinion.

Issue 1 – A Start-up Audience Problem: Millions of Smartphones vs. Thousands of Mobile DTV Receivers

A major initial problem facing the TV broadcasters in this competitive start-up phase is that the wireless service providers already operate with an installed U.S. base of 4G smartphones counted in the millions, and growing at an exponential rate, and adding millions more for existing 3G devices (including Apple iPhones) also capable of receiving streaming TV programs, while the U.S. installed base of Mobile DTV capable receiver/displays is currently estimated to be only in the thousands and limited to portable single purpose (DTV/Mobile DTV) use only.

Will the public at large accept the proposition that they need to buy and to carry with them not only their (essential) smartphone, but also a second (Mobile DTV) receiver/display for enjoying their favorite local TV station while on the go? Not likely.

And this point of view seems accepted by the major consumer electronics manufacturers and the CE retailers. The Best Buy website offers only one Mobile DTV device in November 2011, which is the year-old LG DVD player with 7-inch display and Mobile DTV tuner. Only available on-line, not stocked in the stores. The RCA-branded DTV/Mobile DTV receiver with 7-inch display pictured above is offered by an independent Korean-

based supplier together with several additional portable DTV/Mobile DTV products, sold on-line through a California-based distributor.

Issue 2 – The Missing Link: 4G Smartphones with integrated Mobile DTV Receiver?

Logic says that most consumers will NOT carry more than one (pocket-size) smartphone/display device, although a laptop, netbook or tablet may also be carried in the briefcase. The “missing link” to accomplish fast and wide distribution and potential substantial viewing of local Mobile DTV transmissions is the smartphone when fitted with a built-in Mobile DTV receiver. LG Electronics has been active in showing Mobile DTV enabled smartphone and receiver prototypes, but it takes a major broadband wireless provider to offer such “dual service” smartphones to the public before any manufacturer makes it available.



Will AT&T, Sprint, T-Mobile and Verizon offer Smartphones with built-in Mobile DTV tuner/receiver?

Mobile DTV OTA reception requires an RF tuner section capable of tuning in all current DTV OTA channels, with a current frequency range covering VHF and UHF bands from 54 MHz to 698 MHz. The 698 MHz upper end will be lowered to an estimated 578 MHz if the FCC is successful in their “spectrum grab” efforts over the next several years, which will remove the 578 – 698 MHz spectrum from TV broadcasting and auction it off for broadband wireless purposes. It is generally agreed that a built-in non-protruding antenna will not work for the VHF TV broadcast bands (54 – 216 MHz), and it is not likely that future smartphones will be fitted with pull-out whip antennas as this would still be an uncertain fix for a difficult VHF signal acquisition. Even Mobile DTV UHF OTA signal acquisition by a built-in non-protruding antenna will likely be difficult.

Mobile DTV is generally talked about as a free-over-the-air service, just like TV broadcasting has been for years, although fee-based Mobile DTV services are being explored. Remember Qualcomm’s FLO TV, which shut down in early 2011 for lack of consumer support. FLO TV was transmitted over a nationwide network of local transmitters, all on UHF TV channel 55 with a Qualcomm proprietary modulation scheme

delivering 16 (lower resolution) TV channels (largely major cable channels) within a standard 6 MHz TV channel (Ch.55). FLO TV was distributed through agreements with Verizon and AT&T where those wireless carriers offered several models of cell phones with color video displays and with built-in FLO TV Ch.55 tuner/receiver. Verizon's FLO TV offering was named V-Cast with a monthly subscription fee in the range of \$15, which, presumably was shared with Qualcomm. FLO TV was also offered directly to consumers over-the-air (bypassing Verizon and AT&T subscription), then requiring the consumer to buy a dedicated FLO TV receiver/display (and a monthly subscription directly from Qualcomm), just like the need to buy a single purpose Mobile DTV receiver/display in order to enjoy Mobile DTV today. FLO TV service lasted from late 2007 to early 2011 (3+ years), before the plug was pulled by Qualcomm reportedly aided by AT&T and Verizon not wanting to renew, partly because such would require the wireless providers to continue to offer "dual service" smartphones (with the additional FLO TV Ch.55 tuner/receiver built-in) in an uncertain consumer demand and coverage environment..

Another issue is the difficulty for the broadband wireless providers to justify to charge for streaming data consumption of Mobile DTV as it is received OTA through the separate built-in Mobile DTV tuner which does not tax the 4G broadband wireless pipe. To compensate for the lack of data consumption revenues, monthly subscription to Mobile DTV service through the wireless providers' smartphones may require a monthly fee higher than the "customary" \$10 to \$15, which may not support to develop a mass market demand. The wireless providers may worry about that Mobile DTV-over-built-in-receiver may siphon off TV watching over 4G, reducing billable streaming data consumption. There may be no sufficiently attractive business plan for Mobile DTV over smartphones in the minds of the broadband wireless providers. In other words, Mobile DTV broadcasters may need the 4G wireless providers to succeed, while the 4G wireless providers may be of the opinion that they don't need or want the Mobile DTV broadcasting to be received by their smartphones. But there may be one essential area of interest: To deliver comprehensive local news, weather, traffic and local content to their 4G TV subscribers in a managed data-billable approach.

Congress have the ability to mandate that smartphones must have built-in Mobile DTV receiver capability, as they did back in the 1960s directing that all TV sets sold in the U.S. must have built-in UHF tuner. This is not likely to happen to the Mobile DTV issue, for several reasons.

CE manufacturers are prepared to invest in trial programs, but if the consumers don't respond (directly or indirectly), the manufacturers will fast lose interest. This seems to be the case with Mobile DTV. The Author believes that the failing of FLO TV and the slow rate by which TV stations are actually going on air with Mobile DTV have caused most CE manufacturers to question whether Mobile DTV is a profitable mass market business opportunity for them, and taken a wait-and-see attitude before bringing Mobile DTV products to market.

Issue 3 – Local and Regional Coverage: One "Big Stick" DTV Antenna vs. Hundreds of Local Cell Towers:

A TV station on the air with Mobile DTV is obviously only addressing the local DMA audiences with its OTA transmission, to the extent Mobile DTV enabled receivers are able to reliably acquire the signal. The TV station covers the local DMA through one "big stick" full power ATSC transmitter/antenna strategically located to yield the best possible OTA coverage of the DMA. Remember that less than 20% of all TV households rely on OTA

reception, with about half of those (~10% of all TV households) exclusively. Many of these viewers may require much more than the old “bow tie antenna” to enjoy OTA reception of DTV (not Mobile DTV) in their homes. Mobile DTV is not intended for in-home use. Although a case can be made for such use, any Mobile DTV business plan must be based on outside-the-home use, viewing while being on-the-go.

Also remember: the Mobile DTV signal is an integral part of the ATSC DTV OTA channel transmission, and NOT transmitted on a separate carrier, thus you need to acquire the DTV channel carrier in order to extract the Mobile DTV program. That’s why if you’re on-the-go but stationary (i.e. sitting at the airport lounge), if Mobile DTV OTA is available, then the primary DTV program is generally also available but with less reliability. (The RCA-branded Mobile DTV receiver/display pictured in here offers dual mode Mobile DTV and DTV.)

So, then, how reliable is Mobile DTV acquisition within the DMA/DTV coverage map?

But first, a few words about 4G wireless service, which is based on cellular architecture, meaning that hundreds of cells are scattered throughout the metropolitan area (the DMA in broadcast terms) where each (relatively small) cell area has its own transceiver base station, rather than one “big stick” DTV antenna approach requiring hundreds of kW of effective radiated power. While the single “big stick” antenna serves the entire DMA comprising thousands of square miles (a 60-mile radius circle covers over 11,000 square miles), each cell base station only serves several square miles, less in urban settings but more in rural areas. Remember, DTV broadcasting is a one-way transmission, while cell phone communication is by definition a two-way process. With extremely limited power available in any portable cell phone, the coverage area of each cell is limited to make sure that the cell phone’s limited transmit power is sufficient to reach and reliably communicate with the closest base station.

The Author is based in Los Angeles, but has had the opportunity to spend significant time in the greater NYC area over the past two months, temporarily based in the Danbury, Connecticut area which is part of the New York DMA. Danbury is about 50 air miles north-north-east from the Empire State Building in Manhattan, the “antenna farm” for DMA #1. Driving and commuting options to the business areas of Stamford/Greenwich, Westchester County and Manhattan include interstate highways, parkways, buses, subways and Metro North railroad, with sufficient commuting time for commuters to take advantage of desirable mobile television offerings.



The Author has conducted mobile television field tests in the New York DMA over the past two months using his RCA DTV/Mobile DTV receiver with pull-out antenna and his T-Mobile HTC Sensation 4G smartphone, recently mounted on the dashboard of his SUV (see picture above), with the following results:

- Mobile DTV receiver scanned (when located at the northern tip of Manhattan) and found three (3) Mobile DTV channels OTA: WNBC on Ch.28, ION on Ch.31, WNJU on Ch.36
- Driving north from Manhattan through Riverdale and Yonkers (10+ miles from Empire State Building), Mobile DTV reception was lost when driving through low ground, becoming very spotty and unreliable approaching White Plains (15+ miles from Empire State Building). Once past White Plains, Mobile DTV reception was nearly non-existent. The HTC Sensation 4G was selected to stream Fox News (cable channel) through the T-Mobile TV service, which stayed connected from Riverdale back to Danbury except for several shorter interruptions (indicated by “buffering”) when transitioning from a 4G cell to a 2G cell and then back to a 4G cell driving north on the parkway. 2G does not have the download speed to support live TV streaming. T-Mobile does not have 3G, which would have supported live TV streaming. However, the good news for T-Mobile smartphone users is that the 2G cell locations are likely to be upgraded to 4G soon throughout larger metropolitan areas. That’s the great advantage of cell-based architecture over the single “big stick” transmitter antenna approach: upgrading a cell from 2G to 4G service is technically generally easy, and, of course, as is adding new cells to cure dead areas and isolated suburban communities where service is desirable. The TV station’s “big stick” antenna may alter propagation pattern a bit (and increase ERP if permitted by the FCC), but such may not materially improve the Mobile DTV coverage within the DMA’s dead spots.
- Starting from Danbury driving south to White Plains on I-684 (see DMA map below), the Mobile DTV receiver was set to search for and lock on WNBC Mobile as soon as available. The HTC Sensation 4G was set to streaming Netflix movie leaving Danbury. WNBC Mobile did show up on the Mobile DTV receiver entering White Plains (about 20 air miles from the Empire State Building), although spotty. The HTC 4G kept on streaming the Netflix movie all the way from Danbury to White Plains, with three relatively short interruptions (again indicated by “buffering”) when the HTC smartphone transitioned from a 4G cell to a 2G cell, and then back to the 4G cell.

- Earlier tests in Northern New Jersey (Wayne area, about 18 air miles from Empire State Building) indicated difficult Mobile DTV receiving conditions, while good Mobile DTV receiving conditions exist on Staten Island (relatively flat and line of sight to the Empire State Building about 10 to 15 air miles away).
- No Mobile DTV reception sitting inside American Airlines Admirals Club at the JFK Airport. HTC Sensation 4G delivered Netflix movie as well as T-Mobile TV (Fox News selected) without any problem.

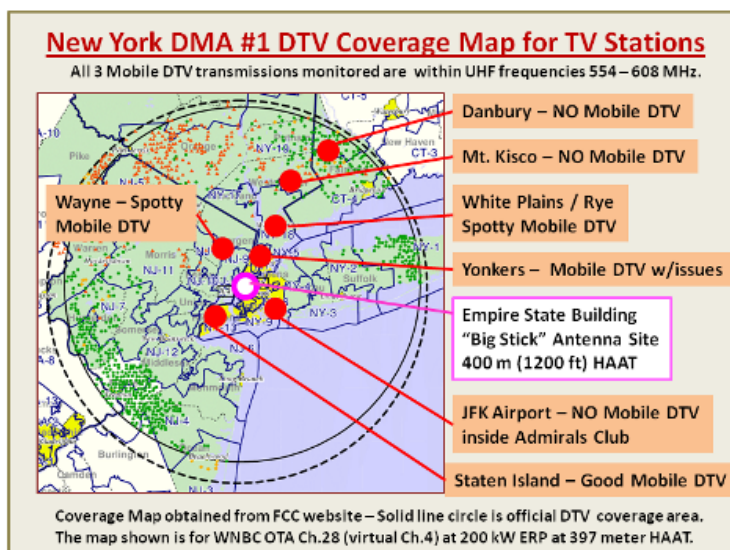
So, we ask again, how reliable is Mobile DTV acquisition within the DMA/DTV coverage map?

Regrettably, the Author's New York field tests are not very encouraging in supporting reliable Mobile DTV service for "street level" on-the-go consumers, at least not in the New York DMA where the topography is challenging, although the hills and valleys are far from extreme. It appears that, unless you have reasonable line of sight to the "big stick" antenna (or major reflections), the Mobile DTV service beyond 15 miles or so from the TV transmitter may be less than acceptable or non-existent.

4G wireless broadband TV program delivery seems superior in reliability and availability in large area DMAs where there are topographic challenges.

It is interesting to note, however, that the Author's Mobile DTV experience from his home town of Los Angeles is better than the New York experience reported in here. But even in DMA #2, the 4G seems superior in reliability and availability overall.

Bear in mind that the Author's test facility was limited by using a pull out whip antenna on the RCA DTV/Mobile DTV receiver mounted on the dashboard of the SUV, although the HTC smartphone was quite happy to perform nearly flawlessly with the built-in antenna also located on top of the dashboard. It is possible that a properly designed car-roof-mounted Mobile DTV antenna may improve the reception reliability. The RCA DTV/Mobile DTV receiver was not tested for RF input sensitivity. The Author did not explore mobile television service in and around Manhattan.



4G Wireless Providers deliver a wide variety of TV programs right now, but no local news!

AT&T, Sprint, T-Mobile and Verizon are all offering a subscription-based streaming TV

service delivering live TV and on-demand. Their live TV often includes typical cable channels like Fox News, CNBC, MSNBC, ESPN, ABC Mobile, Disney, NBC Sports and many more. On-demand offers movies and reruns. But no one has mastered the delivery of local news, weather, traffic and local content over 4G wireless, as typically delivered by major local TV stations. Of course, any 3G/4G wireless subscriber with a smartphone (with internet service) can access your TV station's website and stream whatever is available whether live simulcast or replays. There is definitely an opportunity here to become the leading local TV station over all of the 4G wireless providers' networks, by offering the appropriate apps to make it very easy for the local audience to access the most powerful local news, weather, traffic and content. And this does not necessarily require any Mobile DTV OTA transmissions, but it may make sense for local TV stations to offer "duopoly-style" service between Mobile DTV and broadband wireless service at the DMA level.

The Data-rate Limitations of 4G Wireless TV

The data-rate capabilities of 4G wireless networks are NOT unlimited. One 4G cell's current LTE implementation is likely to have a maximum downlink bandwidth capacity (transmit) of about 75 to 100 Mbps with (electrically) single antenna using 20 MHz of spectrum. This is the total concurrent bitrate capacity covering all smartphones communicating with this one cell. Using emerging LTE technologies, the 20 MHz bandwidth may provide up to 300 Mbps in the future.

Thus most current 4G cell implementations with 20 MHz base station transmit bandwidth can supply up to 200 unique TV program streams of 0.5 Mbps (500 Kbps) each, providing a high resolution viewing experience on a HTC Sensation 4G 4.3-inch screen. A Netflix stream to a smartphone may approach 500 Kbps, however, TV cable channels provided over 4G TV service (i.e. T-Mobile TV) may consume significantly less than 500 Kbps and still look very good. (A net Mobile DTV program stream of 500 Kbps is also sufficient to provide a high resolution viewing experience on the 7-inch RCA Mobile DTV screen.) Obviously, if thousands of viewers assembled within one cell area (i.e. sports stadium) are all requesting TV streams at the same time, such will cause 4G service interruptions. This is where broadcasters' Mobile DTV one-to-many one way transmission is superior, as all viewers are receiving the same Mobile DTV stream, and where 50,000 spectators at Yankee Stadium, each with a Mobile DTV receiver/display unit, can receive the Mobile DTV OTA channel they each tune in (if there is ATSC OTA coverage at Yankee Stadium).

However, the 4G LTE standard includes a transmission mode with support for MBSFN (Multicast-Broadcast Single Frequency Network). This feature can deliver efficient one-to-many services such as Mobile TV using the LTE infrastructure, and is a competitor for Mobile DTV and DVB-H-based TV broadcast, and expected to be implemented selectively within the next 3 to 5 years as commercial applications demand.

HD News and live HD ENG make your local TV station highly competitive . . . and ready to tackle Mobile DTV and 4G local news

The Author believes it to be essential for any TV station, with or without a mobile television business model component in its future, to transition to full HD news including live HD-ENG at the earliest time, and to accomplish such in the most cost effective way while maintaining local news leadership with options open for the future. The ProHD family of camera/recorders is one source of highly cost effective HD news acquisition tools. With nearly everything now coming up progressive, shooting and producing in 720p60 for HD

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