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← 500+ TV Stations will be broadcasting Local News in HD Mobile Television Everywhere . . . Broadcast Mobile DTV by end 2011

To Multicast or not to Multicast ... is that the (TV News) Question? (Or guess which DMA offers 100 TV Channels OTA?)

Posted on [October 19, 2011](#) by [Tore Nordahl](#)

DTV Multicast is the inclusion of one or more TV sub-channels in the ATSC Over-the-Air (OTA) 6MHz channel transmission bandwidth, in addition to the main DTV channel which generally is HD quality in 720p60 or in 1080i60. The Big 4 Networks have differing sub-channel policies up to now, and the recent activities in "Diginet Multicast Channels" by smaller independent low cost networks and group TV station owners are certain to test out the several Diginet business models to establish success or failure over the next couple of years. And can TV news stations expand local audience reach by multicasting local news and content?

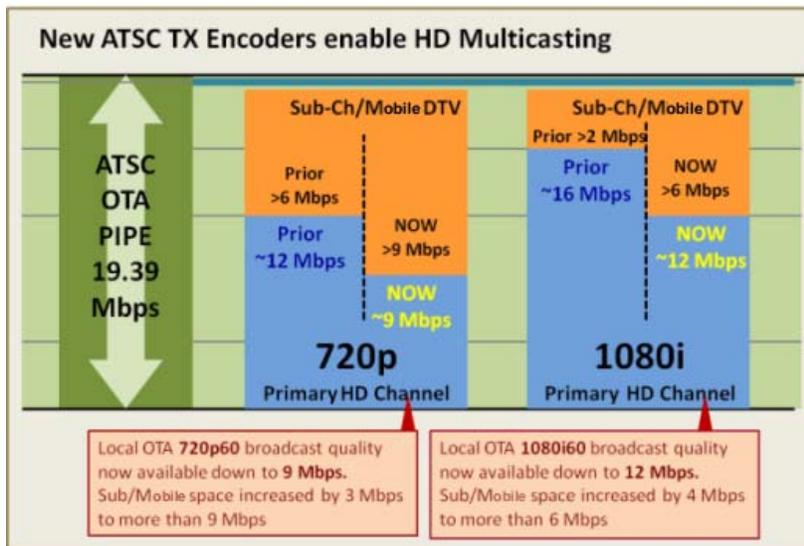


Revisiting the ATSC OTA Transmission Pipe

The ATSC OTA digital standard provides for a net payload bitrate of about 19.4 Mbps, relying on the (by now) outdated MPEG-2 compression developed through the 1990s. The 19.4 Mbps is the maximum user bitrate to be accommodated within a 6 MHz TV channel using the mature (but robust) 8-VSB modulation scheme.

But hold your horses! The leading encoder manufacturers have seen the significant sales potential in "new technology" ATSC MPEG-2 compression products due to the demand from TV broadcasters driven by sub-channel and Mobile DTV implementation, requiring "bit-space" within the ATSC pipe, squeezing the bandwidth available for the main HD OTA

program which will reduce the main HD OTA video quality. So, the leading encoder manufacturers have solved the problem by recently bringing to market new and improved efficiency ATSC MPEG-2 encoders significantly reducing the bitrate required for HD OTA broadcast quality, for both 720p60 and 1080i60.



The ABC and FOX Networks have standardized their HD OTA transmissions on 720p60, which (progressive) compression process is significantly more efficient than for interlaced 1080i60 (the CBS and NBC standard), up to recently requiring 1080i TV stations to assign a minimum of 16 Mbps for the primary HD channel, as compared with a minimum of 12 Mbps for the 720p stations, out of the 19 Mbps total pipe bandwidth. See above illustration.

Thus, under the prior state-of-the-art ATSC MPEG-2 compression technology, 720p TV stations had significantly more bandwidth available (and flexibility) for sub-channels and/or Mobile DTV than the 1080i TV stations, in general about 6 Mbps vs. 2 Mbps, leaving 1080i stations with few choices if the priority was to assure broadcast quality ATSC OTA.

Again look at above illustration. With the latest MPEG-2 compression developments (and current state-of-the-art ATSC HD encoders installed), 1080i TV stations may now drop the primary HD channel bitrate to about 12 Mbps (a saving of 4 Mbps) making more than 6 Mbps available for sub-channels and/or Mobile DTV. 720p60 TV stations may now drop their bitrate to about 9 Mbps for the primary HD channel, making a whopping 9+ Mbps available for sub-channels and/or Mobile DTV.

Independent TV stations (non-affiliated with the Big 4) may decide that their primary channel be SD and not transmit any HD channel. A primary SD 480i channel requires a minimum of about 4 Mbps ATSC encoding to be SD broadcast quality. However, those stations choosing to transmit the maximum number of ten (10) TV programs over their DTV channels, the average bitrate for each program is 1.9 Mbps producing some rather soft images on a 50-inch HDTV! It is fair to say that “old VHS quality” presentations are not serious competition for the DMAs major TV stations. (Note that in TV broadcast context in here, 60 frames or fields actually refer to 59.94.)

Big 4 Network Multicasting Examples:

ABC’s Live Well Network with Sub-channel in HD!

The Disney-ABC Television Group launched its (sub-channel-based) Live Well HD Network in April 2009 and is by now featured on all of ABC’s ten O&O stations in HD, plus on numerous affiliate stations in SD. The “HD” was removed from the network branding after affiliate stations were allowed to carry the Live Well channel only in SD. Sources reported earlier that WABC-TV in New York divided up the 19 Mbps payload bitrate to the 3-channel multicast as follows:

Primary HD for ABC TV Network (7.1)	10 Mbps (Main ABC Network program)
Live Well Network HD Sub-channel (7.2)	5 Mbps
Live Well Network SD Sub-channel (7.3)	3 Mbps

This breakdown is interesting, and confirms that the progressive 720p60 can produce “in-home OTA broadcast quality” in HD at 10 Mbps MPEG-2 compression. Presumably, all of ABC’s O&O stations use substantially the same bitrate assignment. The Author resides in Los Angeles and often watches KABC-TV (7.1), including OTA although a Time Warner subscriber. The Live Well HD channel (OTA KABC-TV 7.2) is reported also to be a p60 (rather than p30). The Author is surprised by the good HD presentation quality at 5 Mbps OTA (but remember that the programming is not fast-moving sports), quite acceptable for home viewers as a secondary HD program feed.

Incidentally, Netflix’s top HD streaming 720p30 delivery bitrate is 4.8 Mbps, but, Netflix states that very few if any can attain such a delivery bitrate from start to finish of a movie. The Author’s ISP is Time Warner, and Netflix rates TW at 2.5 Mbps average for Netflix streaming delivery. But Netflix uses H.264 (MPEG-4) compression, which is now about 1.5x as efficient as the new MPEG-2 ATSC encoders, and Netflix uses half the frame rate (p30). Thus Live Well Network OTA at 5 Mbps will have less in-home HD presentation quality than a Netflix movie over Author’s TW broadband internet service. (But still acceptable to the vast majority of home viewers from a video quality perspective.)

Live Well SD looks relatively soft, making the Author speculate that KABC’s statistical multiplexing system favors (naturally) the primary HD, then the HD sub-channel, and whatever bits are left over are assigned to the SD sub-channel. But, all in all, a seemingly well-performing well-balanced implementation of a 3-channel (dual HD) OTA multicasting operation, and one which may be duplicated by others in the future. Kudos to ABC.

It is interesting to note that ABC TV Station Group seemingly does not yet believe in Mobile DTV (ATSC M/H Mobile Television), as we have not seen any public effort to

discuss their Mobile DTV strategy indicating that the sub-channel spectrum is worth more to ABC through its Live Well Network “monetization” than what Mobile DTV could possibly do. And we all know that there is no significant audience currently for Mobile DTV because receiver/monitors have not yet been purchased by the public in any mass quantity. On the other hand, ABC could very easily convert the Live Well SD sub-channel to a Mobile DTV sub-channel, if and when Mobile DTV becomes a profitable business opportunity.

NBC’s impressive 1080i HD with 2 sub-channels + Mobile DTV

The NBC Station Group is completing a multicasting infrastructure for its NBC (English language) O&Os offering a total of four (4) program streams over each station’s DTV channel. Initially obtained technical information indicates the following approximate sharing of the available 19 Mbps (and the Author reporting viewing experience with the KNBC O&O in Los Angeles):

Primary HD for NBC TV Network (4.1)	11.5 Mbps (Main NBC Network program)
California Non-stop SD Sub-channel (4.2)	3 Mbps
NBC Universal Sports SD Sub-channel (4.4)	2.5 Mbps (probably “leftover” bits?)
Mobile DTV (simulcast Calif. Non-stop)	1.8 Mbps (fixed for chosen performance)

This adds up to nearly 19 Mbps. The main 1080i60 HD program must get priority over the sub-channels through the statistical multiplex bitrate manager, if and when it needs additional bits due to highly detailed, fast moving images.

Kudos to NBC as well. KNBC’s OTA 1080i60 quality at only 11.5 Mbps is impressive, after the Author visually compared the local HD studio newscasts between KCBS and KNBC OTA direct on the Author’s 52-inch 1080p60 HDTV at normal home viewing distance. KCBS is reportedly running their OTA 1080i60 at around 17 Mbps, as KCBS has no sub- or mobile channel addition (as of September 22, 2011). The Author cannot visually detect any material difference in HD picture quality, both looking very good, with KNBC’s main HD bitrate believed to be around 5 Mbps lower than the KCBS HD bitrate.

Recall that the only video compression permitted within the Mobile DTV (ATSC M/H) is AVC (MPEG-4), and not the ATSC MPEG-2, at first glance significantly reducing the Mobile DTV bitrate share required within the pipe. However, the bad news is that the very robust forward error correction overhead required for mobile reception reliability consumes from 2x to as much as 5x the net program bitrate. Thus KNBC’s specified 1.8 Mbps embedded Mobile DTV stream can support a net Mobile DTV program data rate of maximum 629 Kbps (34% of 1.8 Mbps, maximum available efficiency) down to a minimum of 312 Kbps (17% of 1.8 Mbps, minimum available efficiency). KNBC engineering management has obviously chosen an efficiency level (robustness) believed to be optimum for KNBC purposes for the Los Angeles area topography. The Author may guess that a middle of the road 26% may be reasonable, yielding a net maximum payload of 484 Kbps (out of the total Mobile DTV 1.8 Mbps).

What video resolution can 484 Kbps payload support? This is compressed video and audio. Let's assume that the video-only share of the bitrate is 400 Kbps.

In this case of KNBC, the Mobile DTV program is a simulcast of SD sub-channel 4.2 California Non-stop, which sub-channel we can assume is in 480i60 (as NBC is an "i60 network") although a good case can be made for converting the program to progressive 480p30 prior to MPEG-2 compression (for the sub-channel), as progressive encoding is more efficient than interlaced. Such is also supported by the fact that the three (3) Mobile DTV format standards are progressive (interlaced is not permitted). Although the M/H standard permits frame rates down to 12 fps, the simulcast of California Non-stop sub-channel must presumably be at least 30 fps. So, AVC compressed, can this 400 Kbps video-only bitrate support the enhanced Mobile DTV format of 624x360p30 with the minimum image quality necessary for "enjoyable" viewing on tablets and netbooks, or just the basic 416x240p30 for smartphones and smaller displays? On a 10-inch iPad, such less-than-SD-quality at 400 Kbps may not be sufficient, in the Author's opinion. The Author's 7-inch DTV/Mobile DTV portable receiver/display does display the current KNBC Mobile DTV signal (416x240p30) with reasonable quality for its intended "moving around" use. The iPad is for stationary use while on-the-go, like sitting at the Admirals Club at LAX waiting for your flight, requiring a higher level of program resolution to be satisfying. In the Author's opinion, Mobile DTV really needs to be minimum 624x360p30, for "mass mobility appeal", if not the maximum of 832x480p30 (wide SD).

Multicasting in Los Angeles (DMA 2): Would you believe about 100 TV Channels Over-the-Air!

The Author resides in Los Angeles, where there are 26 licensed full power TV stations on the air, and these 26 full power stations are transmitting around 70 sub-channels as well as 5 Mobile DTV channels, delivering a total of around 100 TV channels OTA.

The listing below covers the 22 licensed full power TV stations transmitting from the Mt. Wilson area, which collectively also broadcast a total of 58 sub-channels exclusive of the 5 Mobile DTV channels. The listing was assembled by the Author on September 20, 2011 by actually receiving these TV stations off the air on a newer 1080p flat screen HDTV set at the Author's home with a directional antenna pointed with line of sight to Mt. Wilson. The Mobile DTV reception was achieved on a 7-inch DTV-Mobile DTV portable receiver/monitor.

CH.	Call	Owner/Affiliation	Sub-channels/Multicasting
2 (43)	KCBS	CBS	None
4 (36)	KNBC	NBC	2 Sub-channels (CA-NSTP + UniSports) + MDTV
5 (31)	KTLA	Tribune/CW	2 Sub-channels (Antenna TV + This TV)
7 (7)	KABC	ABC	2 Sub-channels (Live Well HD & SD)
9 (9)	KCAL	CBS/Independent	None
11 (11)	KTTV	FOX	1 Sub-channel (SD simulcast of primary HD)
13 (13)	KCOP	FOX/My TV	None
18 (18)	KSCI	KSLS/Ind	Primary DTV is SD + 9 SD sub-channels
22 (42)	KWHY	NBC/Telemundo	None
28 (28)	KCET	CommuTV/ex-PBS	3 Sub-channels
30 (38)	KPXN	ION	2 Sub-channels (Qubo + ION Life) + 2x MDTV
34 (34)	KMEX	Univision	None + MDTV
40 (33)	KTBN	Trinity	4 Sub-channels
44 (51)	KXLA	Local/Ind	Primary DTV is SD + 9 SD sub-channels
46 (29)	KFTR	Telefutura	1 Sub-channel + MDTV
50 (48)	KOCE	Local/PBS (main)	3 Sub-channels
52 (39)	KVEA	NBC/Telemundo	None + MDTV
54 (47)	KAZA	Azteca	3 Sub-channels
56 (32)	KDOC	Ellis/ Ind	3 Sub-channels
58 (41)	KLCS	LA School/PBS	3 Sub-channels
62 (45)	KRCA	Ind	4 Sub-channels
63 (24)	KBEH	Hero/	7 Sub-channels

The following is a breakdown of the 80 TV channels (excluding the 5 Mobile DTV channels):

14 HD Main DTV Channels

8 SD Main DTV Channels

Of which

- 14 Main Channels are English language (10 are HD)
- 8 Main Channels are Spanish language (4 are HD)
- 7 Main Channels deliver local news in English (all in HD)
- 4 Main Channels deliver local news in Spanish (all in HD)

58 Sub-channels

Of which

- >20 Sub-channels are English language
- >20 Sub-channels are Spanish language
- >10 Sub-channels are Asian/other languages
- >10 Sub-channels are fair-to-good quality SD
- >30 Sub-channels are lower quality SD
- 1 Sub-channel is fair quality HD

Recognizing that the Hispanic population in the U.S. is a substantial portion of the total audience, TV stations are generally catering to either the English speaking or the Spanish speaking population, not to both on the same major channel. In this article, we are concentrating on the English speaking audience. Many of the LA sub-channels are

addressing ethnic audiences, including Hispanic, Chinese, Japanese, Korean, Vietnamese and Armenian, while other sub-channels are religious. At any given time, there are infomercial programs on several of the sub-channels. The “major main-stream” English language commercial sub-channels in the Los Angeles DMA which may enjoy some ongoing audience support are:

- 4.2 California Non-stop (KNBC)
- 4.4 NBC Universal Sports (KNBC)
- 5.2 Antenna TV (KTLA-Tribune)
- 5.3 This TV (KTLA-Tribune)
- 7.2/3 Live Well HD/SD (KABC)
- 30.2 Qubo (KPXN-ION)
- 30.3 ION Life (KPXN-ION)
- 56.3 MeTV (KDOC-Ellis)

In addition to the above eight (8) “major main-stream” English language sub-channel TV program sources, there are eleven (11) main-stream English language primary TV channels, for a total of nineteen (19) TV program sources OTA for the main-stream English speaking audience, which includes the main DTV channel of ex-PBS KCET and new-PBS KOCE (but not their sub-channels). But, look, only three (3) full service news stations are on the list: KNBC, KTLA and KABC, and local news may not be a major part of their sub-channel programming activity, as of yet.

WBAL-TV makes sense: Adds an hour of local news at 7AM ... On the sub-channel !

Yes, on the sub-channel, concurrent with their NBC network “Today” morning show on the main HD channel. A Hearst Television flagship station, WBAL Baltimore (DMA 27) boldly just announced that their morning local news, weather and traffic would add an hour from 7AM to 8AM but on their sub-channel 11.2 (WBAL Plus). This makes a lot of sense as many commuters get ready to leave their homes for work during the time period 7AM to 8AM, and would rather get ready while watching local news, weather and traffic than the more entertainment oriented network morning shows where local weather and traffic appear only briefly, every half hour.

Local Sub-channel News is not really new

In January 2009, nearly three years ago, in the middle of the recession, local Chambers Communications owned market leader Ch.9 KEZI, ABC affiliate in Eugene, Oregon (DMA 121), launched a 24/7 local non-stop news channel on sub-channel 9.2 which is still going strong as KEZI 9+ Nonstop News.

Monetizing the Sub-channel asset is the key

Referred to as Diginets, the “Sub-channel National Network” activity is heating up. The latest major venture seems to be Bounce TV soon to launch with an initial 30%+ national audience coverage by affiliates, addressing the African American audience. There are now over 20 Diginets, of which 16 are English language, vying for attractive sub-channel placement in many DMAs. The basic deal seems to be that the Diginet gives up significant ad inventory to the local affiliate to sell. Is any Diginet making money yet? The experts say not yet. And what about the Big 4 affiliates owned by the station groups “renting out” their sub-channels? Are they able to sell the local sub-channel spots on old movies and reruns for real money or are they “bonus packaged” with main channel ad contracts? Monetizing the sub-channel requires significant audience support. Will they come?

And what kind of sub-channel programming will improve the TV station's bottom line the most in the longer term: Old movies and reruns, or local news and content, or perhaps a combination of old entertainment and fresh news?

Expanding & Time Shifting Local News vs. Perry Mason & The Maltese Falcon?

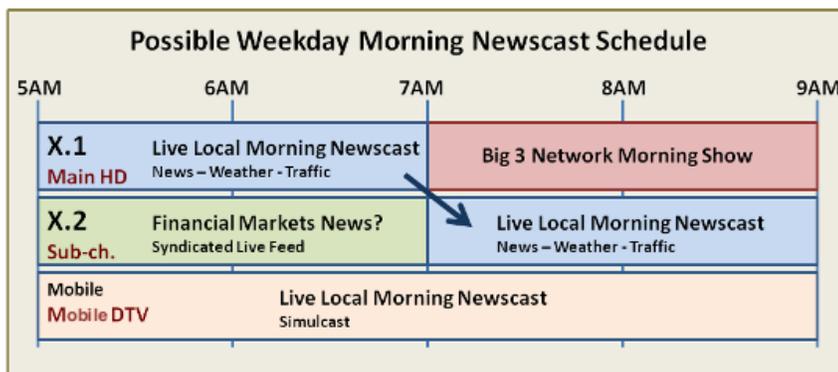
The first priority for any TV station already producing or just airing local news should be for its sub-channel to carry local content and local news, weather and traffic, and only after establishing the optimum times for the local content coverage should Diginet programming be allowed to fill the open slots. Choose local control, flexibility and preserve future options.

However, the easy approach may be to join a Diginet. They deliver the feed to the TV station, and, except for adding some hardware and providing master control, the Diginet sub-channel is more or less on autopilot. Except, there are two additional very important required activities: (i) selling the spots and (ii) promoting the sub-channel on the main HD channel and on the website, to assure some audience following.

But ... Promoting the sub-channel seems difficult

Your Diginet sub-channel attempts to compete with all TV programs available to the local audience at home, including your main HD program. And, presumably, you don't want to tell your main HD program audience (while they are watching your main HD program) to switch to your sub-channel. It's like a local McDonalds opening a different flavor fast food joint (i.e. McGees) across the street, and have promotional signage at the McDonalds encouraging their customers to go across the street to McGees to eat. You get the drift. You want to take audience away from your local competitors, to add viewers to both your main HD and your sub-channel programs resulting from your sub-channel activity. The Diginet Network really needs to contribute significantly to the local start-up promotions of their new sub-channel affiliate, at the minimum.

Remember, local audiences are all potential viewers of local content, news, weather and traffic, while they are NOT necessarily all potential viewers of the original Perry Mason or The Maltese Falcon! From a favorable audience point of view, the highly desirable 18 to 49 age demographics may indeed refuse to watch any B/W program, getting your TV station stuck with the less valuable 60+ demographics, all fans of Raymond Burr and Humphrey Bogart. Many advertisers may not be impressed.



The Morning "Stickiness Factor"

The objective is to attract maximum audience in the early morning and have them stick to

your channel for the longest possible time. In addition, you want to attract new audiences, as a result of adding sub-channel and Mobile DTV programs. As your TV station is already a local news leader (or contender), you recognize that the average age of a TV viewer is now over 50, and that the 18 – 29 demographics don't watch a lot of traditional weekday morning news. So, your most desirable age group is likely to be the 30 – 59 demo, which are generally out of the home from before 9AM to after 5PM. Attract them to tune in your TV station early in the morning, and make them stick until they walk out their front door. And, if they happened to carry a Mobile DTV receiver/display, make them tune in to your Mobile DTV program in the car, on the bus or on the train. That's a tall order, but it is your goal.

Local News OR Raymond Burr?

It seems obvious to the Author that few if any (in the 30 – 59 age group) will elect to watch Perry Mason at 7AM over a live local newscast giving necessary weather and traffic information for the day and the commute.

No Duplication between Main HD and Sub-channel

The sub-channel should not concurrently duplicate the main HD channel, unless there is a good reason to provide a separate SD feed of the main HD. Thus in the illustration above, sub-channel X.2 may (for example) deliver live morning news of financial markets by syndicated live feed, switching to the live (continuing) local morning newscast at 7AM when the main HD program is the live Big 3 Network morning show.

Big 3 Network Morning Show OR Local News?

And OTA vs. MVPD program competition

Across the U.S., 12 million TV households (about 10% of all TV households) rely exclusively on OTA television. These are the households which may benefit the most from the sub-channel programming, and which may positively seek to find OTA program offerings to their liking. But this is only 10% of your local audience.

The balance of 90% are subscribing to MVPD service, whether cable, satellite or telco TV. Cable and telco TV systems generally have channel capacity to add "major main-stream" sub-channels, while satellite TV may not have capacity. So the 35% of MVPD TV households served by satellite may only have access to the local sub-channels if they also receive OTA. Only a small percentage does. And then, once available on the local cable or telco TV systems, the competition is fierce for the Diginet(s) on your sub-channel(s) as there are dozens of cable channels offering old sitcoms, reruns and old movies at any given time.

The local OTA news competition may also be tough, but the direct competitors are limited to the other local news stations, and you know the local news competition well. The choice seems obvious. The sub-channel priority should be on local content, news, weather and traffic in order to build value for your TV station in the longer term. And the viewers wanting local news, weather and traffic past 7AM, electing NOT to watch your main HD with a Big 3 Network morning show, should be able to switch to your sub-channel for satisfaction rather than to the local competition.

And, as to program schedule, your TV station is already being largely controlled by a Big 4 Network, so would it not make sense that the sub-channel control should largely remain with the TV station? The bottom line is that a local-news-prioritized sub-channel is certain to have a significantly better ratings opportunity than a Diginet-only sub-channel.