1. How is ATSC 3.0 addressing the Emergency notifications for fire, flooding or terrorist attacks?

A: Advanced Emergency Alerts (AEA) are made possible with 3.0. They allow broadcasters to send targeted alerts to very specific geographies, and send rich media and additional emergency information. They also allow the broadcast network to send a “wake-up” signal to devices that aren’t turned on, warning the public of imminent danger, like a fast moving forest fire. In the past using the current 1.0 system’s emergence alert system, or even wireless alerts, authorities have hesitated to broadcast an alert to a broad geography for fear of hitting the wrong population with an alert that might do more harm than good.

The Broadcaster community is working with the AWARN Alliance to define how AEAs should work. (http://awarn.org/) The U.S. Department of Homeland Security’s Science and Technology Directorate (DHS S&T), Federal Emergency Management Agency (FEMA), the National Center of Missing and Exploited Children (NCMEC), the National Weather Service, and the Association of Public-Safety Communications Officials (APCO) are contributing to this process, as the primary emergency alert originators, through an Advisory Committee. You will be able to see their work in action at the NAB Show, or by attending one of their open meetings in Washington DC.

2. Isn’t it true that the real advertiser value is to deliver varying messages to separate buyers in real time, varied by actual product features, prices or deadlines?

A: Advertiser value varies based on brand, sales and campaign goals. Prevailing belief is that brand recognition – and most importantly, sales behavior – is definitely higher when the message is targeted to the consumer. Thus, the more targeted the ad can be to the consumer — the higher the “value” to the advertiser. This generally means that the media seller can increase the price of the ad placement.

It’s unfair to state that the “real advertiser value” is only in targeting. There are multiple cases where broad reach and frequency still matter to advertisers. The power that media sellers have is the ability to marry the two different models. This is a competitive advantage over other media and marketing tools.
3. Are handset manufacturers going to add TV antennas into smartphones?

A: Eventually. We expect some models to include 3.0 tuners and antennas. Initially, there will be dongles and smartphone cases to add to your phone to receive 3.0 signals. There are currently in-vehicle prototypes, and sample dongles, and we’ll be looking for these at this year’s 2018 CES Show next month. With the migration of mobile systems moving to lower frequencies, including some that will be vacated by broadcasters in the spectrum repack, mobile devices will have antennas designed to work at UHF frequencies. In addition to the inclusion of ATSC 3.0 receiver chips, the standard allows for flexible usage in a way that multiple different modulations would be able to be transmitted from the same transmitter, allowing certain data to be broadcast to ATSC 3.0 devices and other data transmitted to LTE-enabled devices, for example.

4. To what degree will 3.0 deployments require local broadcasters’ collaboration? Are there options for deployment without that collaboration besides a flash cut?

A: Many broadcast TV stations already operate as sister stations in a single market, or share an operating agreement with other stations in the same overlapping coverage area. In those cases it will be easier to form lighthouse arrangements for simulcasting 1.0 while activating 3.0. In other cases, low-power translators and gap-fillers are used to extend coverage areas. Low-power stations do not have a 1.0 simulcasting requirement, so they could be used to launch 3.0 services first. The use of vacant channels and adjacent channels, or even white spaces, is being explored as a way to do this without more formal main-station sharing agreements or flash cuts.

5. This webinar is doing a great job of covering the key enabling technologies and highest-level benefits of ATSC 3.0 for the Broadcaster. I’m equally or more interested in the building blocks of these potential deployments and what these systems really look like: (IE - encoders, modulators, transmitters, transcoding and how to leverage existing systems (gateways to 3.0, etc.)? Can you show us some of the key new products and building blocks that will be a part of these deployments? What is the time frame for initial deployment?

A: Many of the building blocks on the broadcaster side are currently available for deployment. Transmitters, exciters, gateways, signaling & EPG servers, and encoders specifically designed for ATSC 3.0 are currently available from multiple suppliers. In addition there is a wide array of 4K-capable equipment to support production and playout. Consumer equipment is available today in Korea, and more launches are expected at the CES show next month.

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**Distributing ATSC 3.0**

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Legend: Existing usable components, May need upgrade, New components.
The reality is that ATSC 3.0 will have an impact on nearly every building block of the broadcast ecosystem, spanning both the business model and technology platform. Some of the key impacts to consider:

- **Airtime Sales** – must be updated to enable new selling models for localization/hyperlocal and impression-based selling
- **Traffic** – will need to be handled across multiple delivery platforms, including broadcast, localized/SFN, IP/OTT and nonlinear (for VOD and time-shifted viewing)
- **Playout** – must be capable of generating multiple feeds to source hyperlocal and SFN transmissions, as well as creating new ad placement opportunities
- **Master Control** – operations will become more complex, but also offer opportunities for additional automation or virtualization
- **OTT and VOD** – a new element for most stations, IP video distribution will need to be provisioned to support IP end point devices
- **Multiplexers** – to combine signals for downstream delivery
- **Schedulers** – to manage bandwidth and generate streams that feed transmission site
- **Exciters** – to support the new STL formats
- **Transmitters** – will need to be upgraded or replaced to accommodate new modulation

6. **Is ATSC 3.0 only applicable in the US?**

   A: Several countries are looking at making the migration, not just the US, Korea is in the process of a ATSC 3.0 deployment in advance of the 2018 Winter Olympics in Seoul. This deployment includes multiple sites of coverage, and multiple SFNs in each city to provide complete coverage. It is expected that additional coverage expansion will continue in the next few years. ATSC 3.0 is also being considered by other countries, especially in Asia Pacific and the Americas.

7. **What are the various ways that viewers at home can communicate back to the ATSC 3.0 signal to choose content or data services?**

   A: There will be a few primary ways for viewers, consumer and end-users to interact back with the TV programmer, or datacasting service provider. One will be through apps running on connected TVs and home-gateway devices, like gaming consoles. Another major driver for consumers to engage with their programming is through mobile apps provided by broadcasters and paired with ATSC 3.0 TV apps. This becomes a particularly compelling use case for automotive and other transport (trains, mass transit, etc). A third that is likely to emerge is more automated running in the background, such as in commercial IoT applications. Here the end-point device is connected wirelessly and is regularly sending monitoring data and requests for updates, back to the cloud.

8. **Does the end user have to have an Internet connection to receive ATSC 3.0? If they do not have two-way communication, how would targeted ads work?**

   A: No, there is no need for an Internet connection to receive higher-quality 3.0 programming. Targeted geo-zones can work without an Internet connection, targeting the coverage area of each transmitting antenna. When SFNs are in use the audience can be segmented for each transmitter. Even without an SFN or an internet connection, the public can register the location of their TVs’ to opt-in for personalized geo-targeted content. With a connected TV, personalization becomes possible.

9. **Is there synergy or relevance of IoT with ATSC 3.0, or is IoT too small in data and too large in users to be relevant?**

   A: Many broadcast groups and LPTV affiliate groups are exploring datacasting business models. ATSC 3.0 provides the ability to add multiple Physical Layer Pipes (PLPs) to the radio frequency transmission. These PLPs can be set up to distribute multicast data to a variety of device-type endpoints and segmented user-groups, using very diverse applications. A multiple PLP configuration will lend itself very nicely to low-bandwidth IoT applications. With SFNs this capability can be extended to large enterprises and campus-wide commercial users. The large number of endpoints, in hard-to-wire and/or mobile locations, makes IoT ideal for ATSC 3.0 and very relevant for broadcasters. One current application that is similar to this approach is the use of HD Radio stations in the US to deliver real time traffic data to navigation systems. Broadcast is exceptionally well suited to this type of one-to-many delivery of data to very small mobile devices.
10. What do you need to replace or add in master control for ATSC 3.0?
A: Your existing master control environment is likely sufficient to support an ATSC 3.0 deployment if you want to stick to a traditional broadcast model. However, in doing so you would miss out on the significant benefits.

With ATSC 3.0, the broadcast business model can expand in both linear and nonlinear programming. The advantage of doing this is to better communicate and better connect with your viewing audience. Enabling this for both linear and nonlinear will require changes to the master control environment.

For linear channels, you will want to take advantage of the ability to create localized feeds for delivery over IP, possibly in conjunction with an SFN model. This will enable you to better target content in a city or region that was previously served by a single broadcast signal. In order to accommodate these multiple feeds, the master control environment must be expanded to handle playout, commercial insertion, graphics and branding, trigger injection, and other necessary functions.

Clearly, doing this with a traditional "big iron" approach to master control would be an expensive endeavor. However, given significant advancements in IP-based playout and master control, as well as leveraging virtualization technology, there are now cost-effective alternatives. In addition, using a software-defined approach to master control will provide the flexibility to spin up and spin down instance of channels as they are needed. For example, during daytime blocks a broadcaster may wish to have a half-dozen variants of a channel but then consolidate these back to a single feed overnight.

The nonlinear side of the model provides a broadcaster with the ability to repurpose its broadcast streams as VoD assets, to create specific assets just for VoD playback, to create segments for time-shifted viewing (for example with new ad insertions) and to develop playlists that viewers can access and consume.

These features will also require changes to master control. Systems will have to be enabled to store both assets and playlist as they are being created. Master control operators will likely need to monitor the operations of the VoD and time-shifting platforms. And ad operations will certainly need to be able to deal with scenarios that arise from changes in the traffic plans or DAI systems that control ad insertion.

Each station and station group will need to look at the ways in which they want to leverage ATSC 3.0 to expand their business model. It’s already clear in the early prototypes and trials that with practical upgrades to master control there is considerable upside to leveraging the new capabilities of this next-gen broadcast platform.

11. Does reception of ATSC 3.0 signals require unique hardware/chips in phones/STBs/TVs, etc.?
A: Yes, ATSC 3.0 receiver and tuner chips are needed to view Next-Gen TV signals. All TVs now being sold in Korea already have them. It should be noted that proactive efforts are already being undertaken to foster adoption, such as the program launched by Sinclair Broadcast Group (http://www.tvnewscheck.com/article/104413/sinclair-free-chips-offer-key-to-mobile-future).

12. How viable is mobile on VHF channels?
A: Mobile testing on VHF and UHF channels has been very successful. There are trade-offs in coverage and quality, but we are not aware of major limitations across either end of the spectrum bands. The limiting factor for mobile usage will not be a transmission limitation, but rather the receive antenna size. Both UHF and high band VHF (Ch 7-13 in the US) have been used successfully around the globe to deliver mobile broadcast content. Broadcasters in many parts of Asia and Europe currently run systems using COFDM modulation similar to ATSC 3.0 and reliably deliver content on high band VHF and there are consumer devices, including mobile phones that have this capability built in. Using ATSC 3.0 on low band VHF channels is also possible, with no limitations on the transmission side. On the consumer side it is likely to be most useful for in home or office reception, and not particle in mobile devices due to the size of the antennas.
13. What will the building penetration be like, say in NYC, where I have no luck getting good ATSC 1 reception inside midtown and uptown high-rises, how robust an SFN will there need to be? In a low-slung city like Phoenix, I am guessing far fewer towers are needed?

A: SFNs are not necessary for getting deep in-building reception. ATSC 3.0, unlike ATSC 1.0 has several adjustments that can be made to impact the robustness of the received signal, including a mode that allows for reception below the noise floor. We demonstrated this during the Cleveland test where we had solid reception in a downtown build basement where there was no other signal present. These modes can be set up using multiple PLPs to allow various modes of robustness to target different user types, including rooftop, mobile, and deep indoor reception. Turning on ATSC 3.0 on a single transmitter gains an order-of-magnitude improvement on in-building reception on day-one of transmission. Remember that ATSC 3.0 uses a more robust modulation technique – OFDM instead of 8-VSB – so you cannot base 3.0 performance on results achieved with 1.0. Outdoor antennas and large indoor “rabbit ears” are no longer needed to see the much higher quality signal. Adding transmission configurations and additional SFN sites can be done later for hard-to-reach areas. This is why deep indoor reception is one of the game changers of ATSC 3.0, along with mobility.

14. How many HD streams will ATSC 3.0 allow?

A: The number of HD and UHD streams a broadcaster might carry on a single VHF/UHF channel is highly dependent on the configurations the TV station selects. ATSC 3.0 offers physical layer modulation modes that can support up to 60mbps of payload that needs to be balanced with the robustness of the signal. Operating in a mode that would provide similar or better coverage as found in ATSC 1.0, a station could expect to see ~35mbps of payload as compared to todays 19.38mbps in ATSC 1.0. ATSC 3.0 adds the ability of using a High Efficiency Video Coding (HEVC), also known as H.265, and to do scalable-HEVC (SHVC), which requires much less bandwidth for HD or UHD video streaming. It also allows for Dynamic Adaptive Streaming (DASH). At the 2017 NAB Show we demonstrated virtual-channel-bonding of two 6 MHz broadcast channels sending over 20 HD streams simultaneously, with some available capacity to add even more. Each channel in that demonstration had a traditional 4 carrier HD program, emulating HD diginets, plus we added a 12-HD channel subscription skinny-bundle on top of the traditional free over-the-air broadcast.

15. Cable operators currently carry a single copy of the broadcast throughout the entire DMA. As broadcasters move to this “cell” architecture do they expect MSOs to collect back and forward and distribute these individual transmissions to the targeted areas? Essentially this converts a broadcaster from a single channel to multiple channels with bounded distribution over the cable network.

A: There is no mandate for cable operators to carry any signals associated with ATSC 3.0.

16. How does 3.0 help VHF?

A: ATSC 3.0 provides not only the opportunity for increased payload on a station’s 6 MHz of spectrum, it provides the opportunity to tailor the operating modes to increase a station’s robustness. The system allows for very robust modes that can be received below the noise floor up to more complex modes that support nearly 60mbps of payload but require stronger signal strength. In addition to the more robust transmission from the existing transmitter site, ATSC 3.0 is designed from the ground up to provide seamless SFN operation in order to increase received signal strength and improve coverage, especially in areas that may have geographic obstacles and terrain shielding, as well as in cities with large buildings. ATSC 3.0 provide a full suite of tools to help all broadcasters, including VHF broadcasters, to improve coverage and signal usability in the most demanding environments. This is a major improvement over the current ATSC 1.0 system.

17. Any comment on when the ATSC 3.0 standard’s essential patents will be identified and if MPEG-LA will administer the pool? And, at what royalty cost to manufacturers?

A: There are likely to be multiple patent pools related to ATSC 3.0 intellectual property. MPEG-LA has already started their process, and we have been involved in that from the outset. Lokita Solutions owns a patent related to ATSC 3.0 so we have been following these developments closely. There are over 1,000 related patents, but only a small fraction of them are likely to be deemed essential for the first wave of patent pooling, so it’s too early for estimating OEM licensing and royalty costs at this stage. We expect to see clarity on the formation of the first patent pools during 2018.
18. How important are the distributors, cable, satellite, etc., to take the signal to their subs? And are the distributors all-in?

A: Broadcasters can begin transmitting 3.0 now, targeting the 15%+ and growing portion of the audience that already receives over-the-air television. The MVPDs will add the distribution capabilities on their own time-tables. At some point there will be an inflection curve in consumer adoption when cable and satellite distributors may choose to add 3.0 to retain subscribers. We may also see some MVPDs start rolling out 3.0 services to gain a competitive advantage against one another.

19. If mobile smartphones won’t or don’t have an ATSC 3.0 receiver/decoder, what options are there to enable mobile viewers the ability to “see” all the content and features the local station is offering via their 3.0 transmission? In other words, how can we still capture mobile users if they don’t contain an ATSC 3.0 receiver?

A: Higher-quality 3.0 video and its interactive features can be relayed to mobile devices in the home from a fixed-location receiver using Wi-Fi. We demonstrated this capability at this year’s NAB Show this past April.

20. What about the FCC/licensing aspect of having multiple small transmitters?

A: The FCC has rules in place today that allow for stations to license SFN boosters. The limiting factor has not been the ability to license, rather the technology of how these transmitters on a single frequency interacted and created a seamless user experience. In addition to the rules that are already in place, there has been several proposals submitted to the FCC to allow increased flexibility in placement of these booster transmitters to maximize station coverage, while at the same time protecting other stations from unwanted interference.

21. Are additional sites/transmitters and antennas needed for extending coverage?

A: Additional sites are not really necessary for initial deployments, but transmitter upgrades are. In some cases, these upgrades are simply adding a new exciter or making a software upgrade to the existing unit, provided there is enough transmitter system headroom. ATSC 3.0 offers improved coverage even with single sites due to the OFDM nature of the modulation, and by the modes one can operate in that allow a trade-off of signal robustness and payload. For example, operating in a mode with similar payload as in ATSC 1.0 provide a more robust signal in ATSC 3.0, even at great payload the signal can still be more robust than today. Much of the transmitter upgrade activity is already being driven by the FCC’s spectrum repack, which will result in roughly 1,000 sites/transmitters through 2020. There are over 5,000 low-power TV stations that can upgrade faster than the repack and don’t carry the same 1.0 simulcast obligations. There are already about the same number of new station construction permits for locations that have already sited.

22. IP is typically thought of as “bi-directional.” How does the content provider receive info about the end user?

A: The channel by which this information is received is over the consumer’s IP connection, most likely through mobile or fixed broadband. This does mean that the receiver device must be connected to an IP network, but this is virtually de facto in 2018.

The specific information that will be collected would be determined by the application, for example through an app installed to provide access to a local TV station.

23. I keep hearing SFN hyped in ATSC 3.0 discussions like it is something new. My station has been using it for years. Can you clarify what is DIFFERENT and BETTER about SFN under ATSC 3.0 vs. the current ATSC 1.0 version?

A: The main difference is that ATSC 3.0 uses a OFDM modulation (multicarrier) while ATSC 1.0 uses a single carrier system. The OFDM system supports certain timing intervals that allows all signals arriving within a certain widow to be constructively added together, regardless of source to create solid reception (constructive interference). Similarly, any signal received outside of that window (Multipath) is rejected. ATSC 1.0 relies heavily on the receiver equalizer to reject these unwanted signals, since there is no similar “window of reception” capability. In a properly timed ATSC 3.0 system (and frankly all the other global TV standards) one would not notice reception reduction in the overlap zone of multiple SFN transmitter sites. This is an area where ATSC 1.0 has been severely behind other global standards.
24. When will receivers be available?

A: ATSC 3.0 receivers are already available for OEMs and TV manufacturers. In Korea, all TVs now being sold already have ATSC 3.0 receivers built in. Once broadcasters start transmitting, those TVs will be brought to market in the US. Most of the field activity in the US is now using professional grade receivers. By fall 2018 consumer devices here will start to be more widely available, and we expect nationwide availability by holiday season 2019.

25. If I want to provide a quality signal to the home that will take a majority of the 30 Mb signal, that doesn’t leave much for additional data, maybe some advertising-specific content – it’s still a one to many push, isn’t it?

A: With the advancements in the core modulation and encoding technology you will be able to deliver very high-quality signal to the home in much less than 30Mb. While the main ATSC 3.0 transmitter, or SFN network is a one to many efficient forward link, it does have the capability to both push content to the edge device for user consumption such as target content, but also can support geo-locational content insertion in the SFN network using the LDM (Layer Division Multiplex) capability. These technologies, coupled with the native IP backbone, allow for simple integration with other existing IP networks to create a connected bidirectional user experience.

26. Based on what was said, the current broadcast model used in the US would need to change in order to utilize the SFN model with ATSC 3.0. Smaller transmitters, lower power. Why not just utilize more transmitters to accomplish the same coverage areas?

A: The US broadcast model is expected to evolve over time to take advantage of the advanced capabilities of ATSC 3.0. However the network topology does not need to change to launch 3.0 services – although the transmitters will have to be upgraded to the new standard. Once they are operational, broadcasters will have every incentive to broaden their coverage with signals that reach deeper into where people want to receive them. For example, a station may continue to operate its main transmitter, but operate several “fill-in” booster SFN sites to provide improved coverage in areas of interest in a city center, or in some areas that have previously had signal blockage but are within the station’s protected coverage area. This mixed mode of operation using both high- and low-power transmitters is the most effective way to cover a geographic area vs a complete switch to low power cell-like topologies.

27. Will the technology allow for multiple targeted simultaneous ads within a show to target different demographics?

A: This is certainly one of the applications that could be enabled by ATSC 3.0, in both linear and nonlinear content. This will be enabled using Dynamic Ad Insertion (DAI) capabilities that can be implemented on both network side and client side. Network side DAI has been broadly deployed in OTT platforms with fragmented content delivery and has been proven to work at immense scale for VOD content. These technologies are now being expanded into linear delivery.

Client side DAI has mainly been deployed in stream-switching applications (aka Linear Addressable), which can be greatly simplified as the industry migrates to an IP delivery approach. We have also implemented client side DAI using playback from a local source – such as the disk in a DVR device. This does require some form of storage in the receiver to enable prepositioning of content, so any such design would also need to accommodate devices with no storage.
28. How does a current ATSC 1.0 broadcaster transition to ATSC 3.0?

A: The best place to get started is to understand the new standards and how each of them may impact your operations. The NAB has an excellent series of material under Next Gen TV that will help you understand the fundamentals. (http://www.nab.org/innovation/nextGenTV.asp)

Next, you may want to get engaged in the various trial projects — such as the one being sponsored by Pearl (http://www.tvnewscheck.com/article/108879/pearl-group-to-demo-30-in-phoenix-in-2018). These projects will give broadcasters an excellent view into the new technology, how well it is working, and what the impacts are.

You’ll also want to make a technical plan for the migration, because this is almost certainly a multiyear effort of budgeting, construction and technology refresh. Many stations are already engaged in this discussion because of the impact of the spectrum repack. A number of excellent papers have been presented on this topic at NAB and other shows — for example the paper from Joe Seccia at GatesAir (http://www.gatesair.com/documents/slides/2017-04-seccia-planning-for-tv-spectrum-repacking-transition-atsc-3.0.pdf), as well as the following Imagine Communications Power Session at NAB’17 “Broadcasters and ATSC 3.0 - New Revenue from the New Localism” https://www.youtube.com/watch?v=b8TZ1j1f6GA.

In the end, the answer will be that there is no one-size-fits-all solution. But by engaging with the standards, other stations and the technical vendor community you will have the best insight and opportunity to make the transition in the way that best suits your station’s mandate, budget and business model.

29. How do you see this benefitting program-oriented broadcasters who don’t advertise, like PBS member stations?

A: ATSC 3.0 connected devices and interactive programming will provide PBS member stations a whole host of new ways to connect with, engage with, and interact with their audiences for membership and pledge drives. By way of example of just a few; two program streams can be sent out for members and non-members. During pledge drives, once a pledge is made, the viewer can have access to non-pledge-drive interrupted programming in real-time. PBS stations and other broadcasters will be able to add dynamic sub-channels for affiliated fund drives, such as in the days right after a natural disaster.

30. What are the transmission standards?

A: ATSC 3.0 is really a suite of standards that one can use to deploy next generation television. The ATSC has an overview document at the following like that covers the suite https://www.atsc.org/atsc-3-0-standard/a3002017-atsc-3-0-system/ The physical layer standard is A/322 along with signaling in A/321. Complete information is available at ATSC.org

31. How will the reporting of audience work? How do I know the sex, age and number of viewers get reported back to the station?

A: Most media companies have to balance information about the audience — such as demographic profiles and viewing preferences — with the regulations to protect privacy of consumers. Therefore, the media companies leverage data that they have about their audiences with third-party data sources to create profiles that enable targeted advertising, but do not reveal individual’s information. Nielsen, comScore, Experian, and other measurement companies all provide such reports but require subscriptions to access their data; many media companies do their own proprietary research to understand their brand and viewers better. This proprietary research could include subscription and other specific programming and viewing trend data to create differentiated campaign packages for advertisers.

32. Since ATSC 3.0 envisions bi-directional communications, how is the reverse channel implemented?

A: Connected TVs and home-gateway devices can provide the back-channel. Over 60% of US households already use a streaming device, so adoption should be rapid. We also believe mobile apps paired with broadcaster TV apps will be a major driver for consumers to connect to the reverse internet channel.
33. The mechanics and technology are coming, but the implementation is daunting.

A: The technology is already here, and it is working well in our production deployments in Korea. There are a lot of implementation parameters to consider, but once an approach is selected for a geography to start in, such as the model market in Phoenix, implementation becomes fairly straightforward. We’re now able to upgrade and turn-on US stations in a half-day of on-site activity, after the transmitter has been updated.

34. Much of what is being proposed here requires a backchannel. How does this work when no backchannel exists?

A: Even without a backchannel there will be substantial benefits to both the viewer and the broadcaster. The viewer will have access to a wider range of content, at better quality, and with better availability due to the improved modulation and transmission characteristics of the ATSC 3.0. In addition, those services will be available across a wider range of devices, both in-home and on the go.

For the broadcaster, there are many new capabilities that do not require back channel. Creating local and hyperlocal feeds, utilizing the SFN for delivery, and moving towards an impression-based model for selling advertising are all key benefits. This last point is probably the most misunderstood, since many people equate impression-based with Internet. However, in many advertising markets outside the US, television advertising is already sold on the basis of audience and impressions, based on sophisticated data analytics that have been proven to work in both broadcast and two-way environments.

35. What is the benefit of ATSC 3.0 over general Internet connectivity in homes and mobile devices?

A: More bandwidth and faster download speeds, which means better content and more of it, especially for events like live sports and news. Plus, broadcast/multicast Internet does not suffer congestion during high traffic events, like emergencies or natural disasters, and is more resilient than the cellular network. Broadcast ATSC 3.0 offers much deeper and broader coverage to close the digital-divide in urban and rural settings, with better availability across the entire footprint.