Welcome to AntennaSelect™ Volume 35 – December 2017

Welcome to Volume 35 of our newsletter, AntennaSelect™. Every two months we will be giving you an "under the radome" look at antenna and RF technology. If there are subjects you would like to see covered, please let us know what you would like to see by emailing us at: info@micronetixx.com

In this issue:

- **ATSC 3.0 and Transmitting Antennas**
- **PAPR (Peak to Average Power Ratio) and Antennas**
- **Slot-Style Pylon Antennas: End-Fed vs. Center-Fed**

MICRONETIXX COMMUNICATIONS

ATSC 3.0 and Transmitting Antennas

We get questions about antennas and the number one is "Are your antennas ATSC 3.0 compliant?" . So here is the answer, there are no standards for antennas in ATSC 3.0. Will your antennas work well on ATSC 3.0? Yes! All of our Broadcast Antennas will operate perfectly reliably a few years down the road, as ATSC 3.0 is fully implemented.

A number of visionaries are looking at future TV broadcasting as being everything, everywhere, and all the time. The big difference that's envisioned is: current consumers of broadcast content will be on the move, a completely different model than what we have today. So how do we optimize delivery of 3.0 ?. Let's review a few antenna topics.

Continued on next page

There are four main things that can be done to optimize ATSC 3.0 Antenna Systems to get the signal out to consumers' devices.

Number **ONE** is to use Elliptical Polarization. It is the best dollar for dollar upgrade you can make when selecting a transmitting antenna, for any of the 3 TV Bands.

The predictions are that with 3.0, and with many mobile consumers of programming and data, you will want your signal everywhere. Transmitting an H – Pol only signal, depending on the rotation of the receiving devices' antenna, and any Faraday rotation at a given location, can lower received signal level by up to 20 dB. So if you are a Class A station with 15 kW, the resulting ERP at a given location would, at most, be 150 Watts – and that is if the receiving location was in the main beam, and the transmitted signal was omni-directional. Being on the back side of a directional azimuth pattern and near the antenna's first null could drop that effective value down to just a few Watts.

The feedback we get from our customers is installing a new Elliptically-Polarized antenna greatly increases indoor reception and covers formerly poor receiving locations. We can not speak for other manufacturers about how they price the upgrade to Elliptical-Polarization. Ask us for a quote on an E-P Antenna – you will be surprised!

Number **TWO** is supplying the antenna with little to no differential group delay over the channel. Most UHF slot antennas we produce have less than 2.5 nS delay difference over the channel. Each one is tested and the test results are sent with the antenna. Digital mult-carrier systems work much better if all elements of the transmitted signal are delivered to the receiver without differential delay. With Elliptically-Polarized Antennas, the group delay should also be flat in both the vertical and horizontal planes.

Continued on next page

Number **THREE** is to use lower gain transmitting antennas. This is especially true on UHF. The old model of a pencil thin beam pointing at the horizon and an outdoor receive antenna with some gain. The forecast for TV and content consumption everywhere means ensuring a thick-blanketing signal over a wide area.

For Class A operators this is even more important, since there is only 15 kW to work with. We have been proposing a number of low bay count, (5 to 8 bay antennas), for Class A stations. A broad main signal beam, (and do not forget to add Elliptical Polarization), ensures the best reception. With next generation of transmitters on the market, an additional amplifier tray is not that expensive. Maximizing coverage is priceless.

These three points about antennas will help optimize the current and next generation of transmitting standards. Have a project coming up? Let us help you to design a cost effective and great performing antenna.

PAPR: (Peak to Average Power Ratio), and Antennas

MICRONETIXX COMMUNICATIONS

With ATSC 3.0 quickly approaching, the issue of PAPR (Peak to Average Power Ratio), comes up. Will a particular antenna be able to handle the higher peaks that ATSC 3.0 produces? With regard to antennas, (mainly slot-style antennas), the issue is not so much the average power handling ability, but rather the peak voltage rating. The average power between a 1.0 and 3.0 signal is very little. The main difference is the brief peak powers that are higher in value.

For slot antennas, the break over voltage, if properly designed, is much higher than the average power limitation. The main limitations are the average current flows on elements of the antenna like inner conductors, bullets and slot-coupling structures.

Continued on next page

There is also the design of the antenna and the technology it uses to produce its main beam. We use standing wave, (not traveling wave), pylon technology for all of our UHF antennas. Many of the older RCA and Andrew designs use traveling wave technology. The advantage with a standing wave pylon is an equal amount of energy is extracted at each slot. The older traveling wave designs extract differing levels of energy at each slot. So the slot with the highest extraction will see the highest voltage fields. Depending on the design, the couplers at each slot would need to be set closer to the inner conductor, limiting the peak voltage rating of the antenna (and its power rating as well).

Something we do in all of our slot-style antennas is we couple to both the electrical and magnetic fields in the pylon. We use a very low Q coupler system that is spaced further away from the inner conductor than older designs. Even in a higher power slot antenna, our antennas still maintain a very high break-over voltage tolerance. For elliptically polarized models, we use a pair of DC-grounded elements over each slot. Peak voltage is not a concern with this design. Each set of polarizers or elements are fed with the same energy level from slot to slot.

Another factor that is key to power handling capability is the physical size of the pylon. If you think of an antenna pylon as being a piece of transmission line, at UHF a 3” pylon would have an input power rating of about 12-1/2 kW. If a high power antenna was needed, the pylon diameter would easily be increased. For example, a 4-1/16” UHF Pylon would be rated at about 25 kW.

For branch-fed antennas (VHF batings, LB Lindenblad etc.) using a power divider and cables, properly sizing these elements to handle higher peak voltages is straight-forward engineering. These antennas are also designed to have equal power applied to each bay or element.

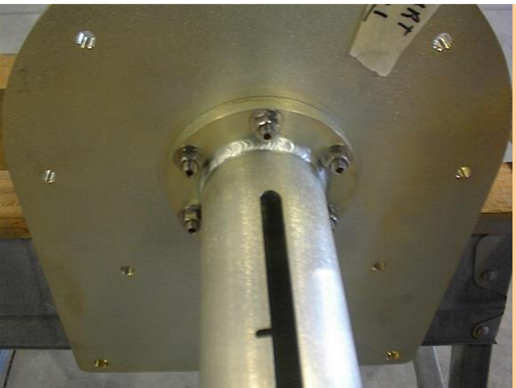
Slot Antennas; – End-Fed Versus Center-Fed

So which design is better? For smaller bay count antennas, there is really no difference. Properly designed, both do an excellent job. For higher bay count antennas (10 bays or more), feeding the antenna in the center has some advantages. First there are the mechanical aspects. An end fed antenna is a single pylon assembly. Even an 8-bay model needs close to a 20 foot long crate for shipment. The longer crate also reduces transportation options and increases the possibility of damage in transit.

A center-fed antenna does have a few electrical advantages as we go to higher bay counts. Being center-fed provides another tuning adjustment when setting beam tilt. Also the antenna is tuned in sections. A 14-bay antenna would consist of two 7-bay sections and a center input tee. We tune each section of the antenna, then join the two sections together to fine tune the final assembly.

Center-fed antennas do cost a bit more, due to the need to fabricate an input tee. However, that cost difference is fairly small. On larger center-fed antennas, the cost of the tee is mitigated by lower shipping costs. In many cases rigging costs are lower as well. Ask us about options for your next project; You'll be surprised!

Be on the lookout for the next volume of AntennaSelect™ coming out in February



MICRONETIXX COMMUNICATIONS

70 Commercial St. Lewiston ME 04240 U.S.A.
V 207-786-2000 www.micronetixxantennas.com

© 2013 - 2017 Micronetixx Communications