



RFS Variable Polarization Technology

Research and Development, RFS





Background

The North American model for broadcasting had traditionally been one in which individual stations own their own tower, transmitter and antenna. A recent trend has been the use of shared sites and shared antennas, allowing broadcasters to reduce infrastructure and operational costs.

Another recent trend has been the move away from horizontally polarized antennas to elliptically polarized antennas, to improve both coverage and in-building penetration. Additional benefits arise when elliptically polarized antennas are used with ATSC3.0. When replacing an antenna due to the current FCC re-pack, many stations are adopting “future proof” elliptically polarized replacement antennas in preparation for ATSC3.0.

Variable Polarization Technology

When defining an elliptically polarized antenna, it is necessary to decide the amount of effective radiated power (ERP) to radiate in the vertical polarization component relative to the ERP radiated in the horizontal component of polarization. For example, a broadcaster may elect to transmit 1000kW in the horizontal component and 500kW in the vertical. Another broadcaster may elect to radiate 1000kW in the horizontal and 200kW in the vertical. A third broadcaster may elect to have no radiation in the vertical component (Horizontal only polarization). In a shared antenna, this would cause a dilemma, since traditional antennas have the ratio of vertical to horizontal polarization hard wired into the antenna design and must therefore be the same for all broadcasters sharing the antenna.

To overcome this problem and to leverage technology to enjoy the greatest benefit for both today and tomorrow, RFS uses a technology known as “Variable Polarization Technology” (VPT). The same technology is sometimes referred to as “Adaptive Polarization Technology (APT)”, “Dynamic Polarization” or “Adjustable Elliptical Polarization” in the broadcast industry.

US patent US8494465 granted by the USPO in the name of Nokia (which is the ultimate parent company of RFS) covers all of the implementations mentioned above and further described below.

A number of RFS Variable Polarization Technology shared antenna systems have now been deployed globally. Probably the highest profile VPT systems being the ones deployed at the 1 World Trade Center in Manhattan.

How is Variable Polarization achieved?

Variable Polarization Technology utilizes dual input antenna systems in which the polarization ratio can be changed by either changing the relative phase of the signals applied to each input, or the relative amplitude of the signals applied to each input, depending on the antenna topology selected. The adjustable phase method is most commonly adopted.

In a multi-user VPT system dual channel combiners are incorporated into the system. Each broadcaster can set the relative phase between the inputs at either the channel combiner inputs, or at the low level outputs of the transmitter exciters prior to the high power PA's. Figures 1 and 2 illustrate two of the methods described in patent US8494465.

How is Variable Polarization achieved?

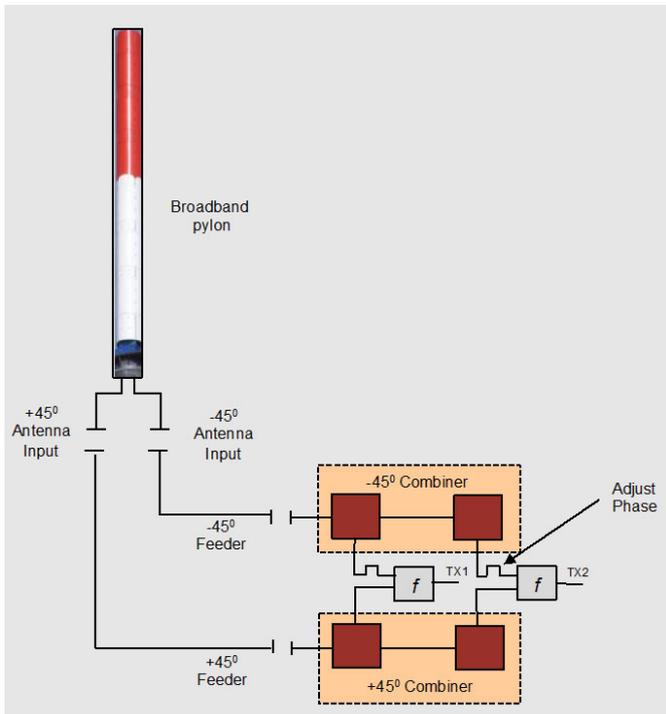


Figure 1: A two channel VPT system with phase adjustment at the channel combiner.

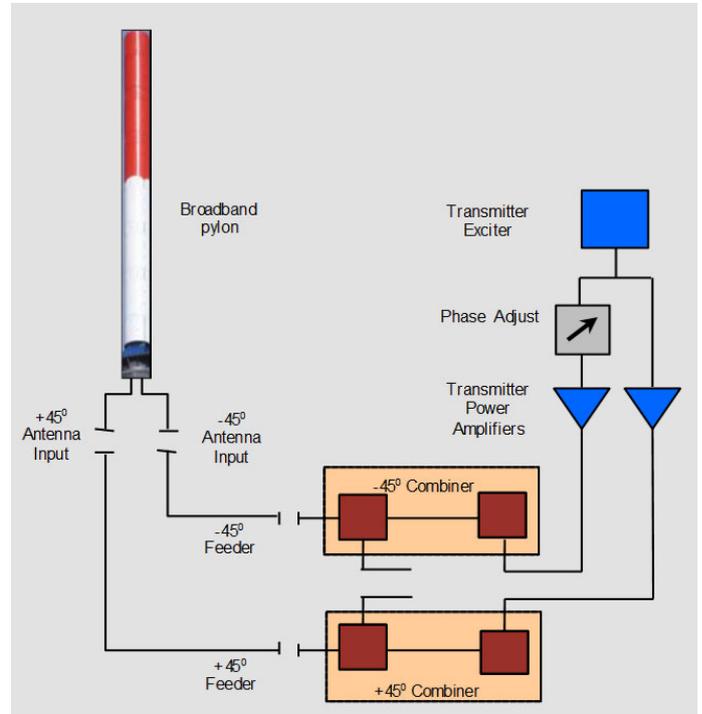


Figure 2: A two channel VPT system with phase adjustment at the transmitter.

Conclusion

Today the broadcasting environment is extremely competitive. Not only is there competition between peers but competition with other delivery methods (cable, satellite, cellular networks). The latest broadcasting standards will support the delivery of high definition signals to fixed receivers as well as robust delivery to portable receivers - enabling new business models. This can be a game changer for the broadcaster, particularly if coupled with a flexible and future proof antenna system platform that can capitalize on the advanced standards.

The patented Variable Polarization Technology provides this future proof technology today. With so many unknowns in the market, why not upgrade your system today with one that is truly future proof - one that allows for future changes in polarization ratios as the business models change.



ABOUT RFS

Radio Frequency Systems (RFS) is a global designer and manufacturer of cable, antenna and tower systems, plus active and passive RF conditioning modules, providing total-package solutions for wireless infrastructure.

RFS serves OEMs, distributors, system integrators, operators and installers in the broadcast, wireless communications, land-mobile and microwave market sectors. As an ISO compliant organization with manufacturing and customer service facilities that span the globe, RFS offers cutting-edge engineering capabilities, superior field support and innovative product design. RFS is a leader in wireless infrastructure.

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