ABSTRACT

This Chebyshev Unidirectional Caturcula Antenna (SN.MT 0924-CCU-0709) is designed and implemented with two purposes:

- 1. To make very wideband unidirectional antenna available, in order can be used by several operators jointly to economize tower and area.
- 2. To prove the hypothesis from first advisor's which is told antenna is matching device between propagation space and radio transmission lines.

Specification that must be fulfilled is: working frequency 0.3~GHz-3.0~GHz in $VSWR \leq 1.5$ with 50Ω unbalance; gain $\geq 2.14~dBi$, unidirectional pattern, and with linear polarization. This antenna must be built with parallel twin conductor, and with chebyshev transformator to be used in air or vacuum; use England triangular type balun to produce wideband frequency.

With parallel twin strip principle, constructions—material composition and each dimension—are obtained, they are: $N=3.574\approx 4$ grade, $\epsilon_{r1}=2.217$ (puzzle rubber) $l_1=30.52$ mm, $\epsilon_{r2}=1.908$ (ITT calendar) $l_2=32.90$ mm, $\epsilon_{r3}=1.643$ (cardboard) $l_3=35.45$ mm, $\epsilon_{r4}=1.025$ (Styrofoam and air) $l_4=44.88$ mm. Use parallel copper strip with width (w) 3.44mm x length (l) 170mm, space (s) 20mm (chosen). Triangle monopole balun is built from copper with 90° angle, height (s) = 20mm, and with 50Ω unbalance terminal impedance.

From measurement of these specification in IT Telkom yard, some results are obtained, they are: VSWR \leq 1.5:1 with operation frequency from 901.2 MHz - 2476.2 MHz and at VSWR \leq 2:1 with operation frequency from 664.4 MHz – 2893.5 MHz at unbalance 50Ω terminal, gain = 7.85 dBi at 1650 MHz and gain = 8.03 dBi at 2082 MHz, with unidirectional radiation pattern, and ellipse polarization.

To set the operational frequency from 0.3 GHz – 3.0 GHz at VSWR \leq 1.5:1 is suggested to make the space h \approx s = $(\lambda_{min}$ / 2) = 5 cm or between strip and its monotriangular also be matched to be capacitive coupling.

Keyword: Antenna, Chebyshev transformer, unidirectional