The ultimate Monoband-Yagi-Design: the reflector-driven Monoband-Yagi

There are many and partly „fancy“ monoband Yagi designs.
And the best things are promised.
However, the user of the antenna usually has no means of comparison and can therefore only rely on what is being proclaimed.
Often, however, more wish is the father of the thought!

The most common design used today is that of the OWA = Optimized Wideband Yagi.

All known design approaches have their advantages and disadvantages, but no design really achieves what is intended, namely:

-> highest gain on a given boom length

-> extremely high f/b ratio

-> very low SWR

-> stability of gain, f/b ratio, general radiation diagram and low SWR over the entire frequency range

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In cooperation with our consulting engineer, Dr. Christian Römer, DF4IAR, who has developed and written his own antenna design software with integrated automatic optimizer, a design has been found that is unique in the world.

All of the above parameters can be achieved without restriction and simultaneously on the following basis:

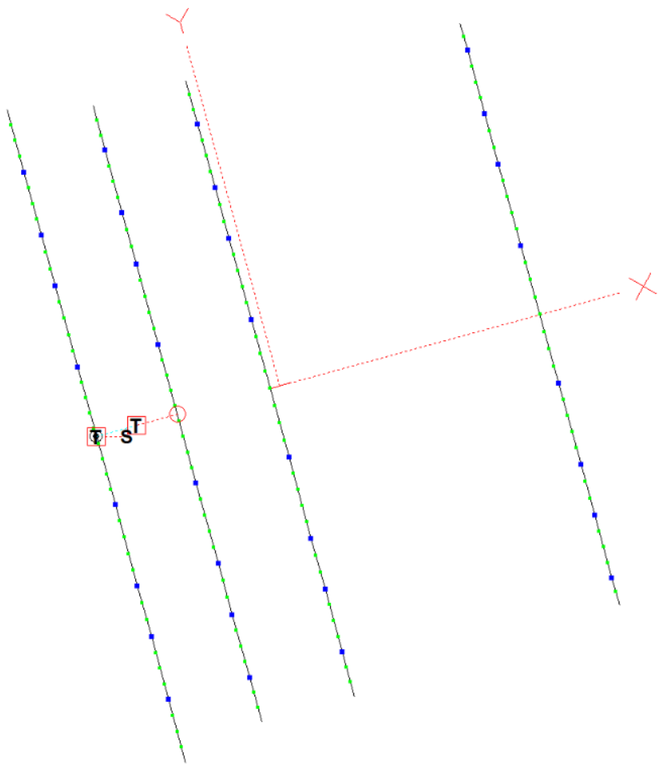
1. In addition to the actual driven element (second element seen from the rear), the reflector is fed as well!
   The reflector also has the real reflector length compared to the other elements of the Yagi, except that it is not a parasitic but a fed = driven reflector element.
2. The driven element and the fed reflector are connected by a lossless square tube phasing line with a certain wave resistance.
3. The phasing line is crossed so that an electrical phase shift of 180 degrees occurs between the driven element and the fed reflector.
4. The 50 Ohm feed point is located at the actual driven element.
5. It is of crucial importance that the fed reflector (split by means of an insulator) is quasi short-circuited in its center by a stub (short-circuit clip).
   The length of this stub is extremely critical; maximum gain, maximum f/b ratio and a flat SWR curve can only be achieved with absolutely correct length respectively absolutely correct scope of the stub-frame.
6. The first director is then located a little closer to the driven element, the second director respectively the other directors are wider spaced.

To make the difference to a conventional design clear, a 4el 20m OWA-Yagi on a boom length of 7.50 meters = 24 ½ feet -like our OB4-20OWA- will be compared with a 4el reflector-fed 20m monoband Yagi of same boom length, on the frequencies 14.000, 14.200 and 14.350.

We call the 4el reflector-fed 20m monoband Yagi OB4-20R.

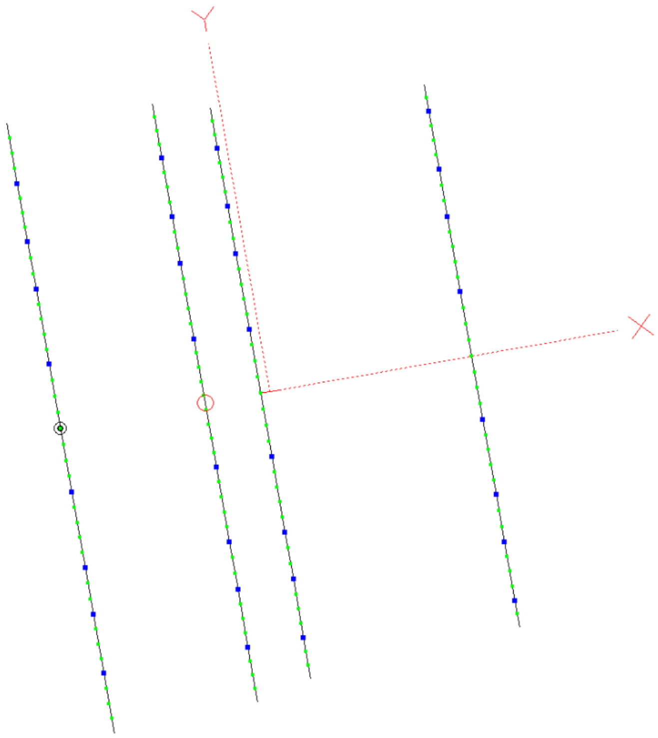
Scheme OB4-20R

EZNEC+

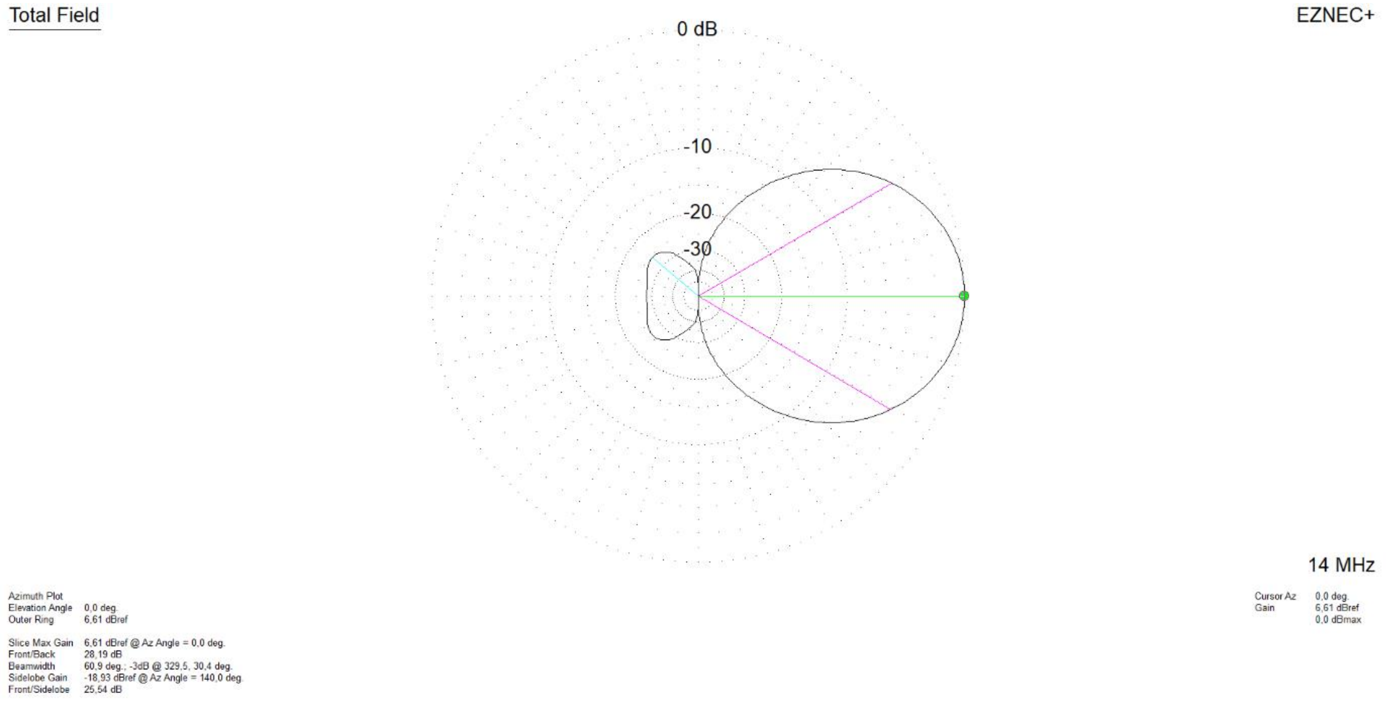


Scheme OB4-20OWA

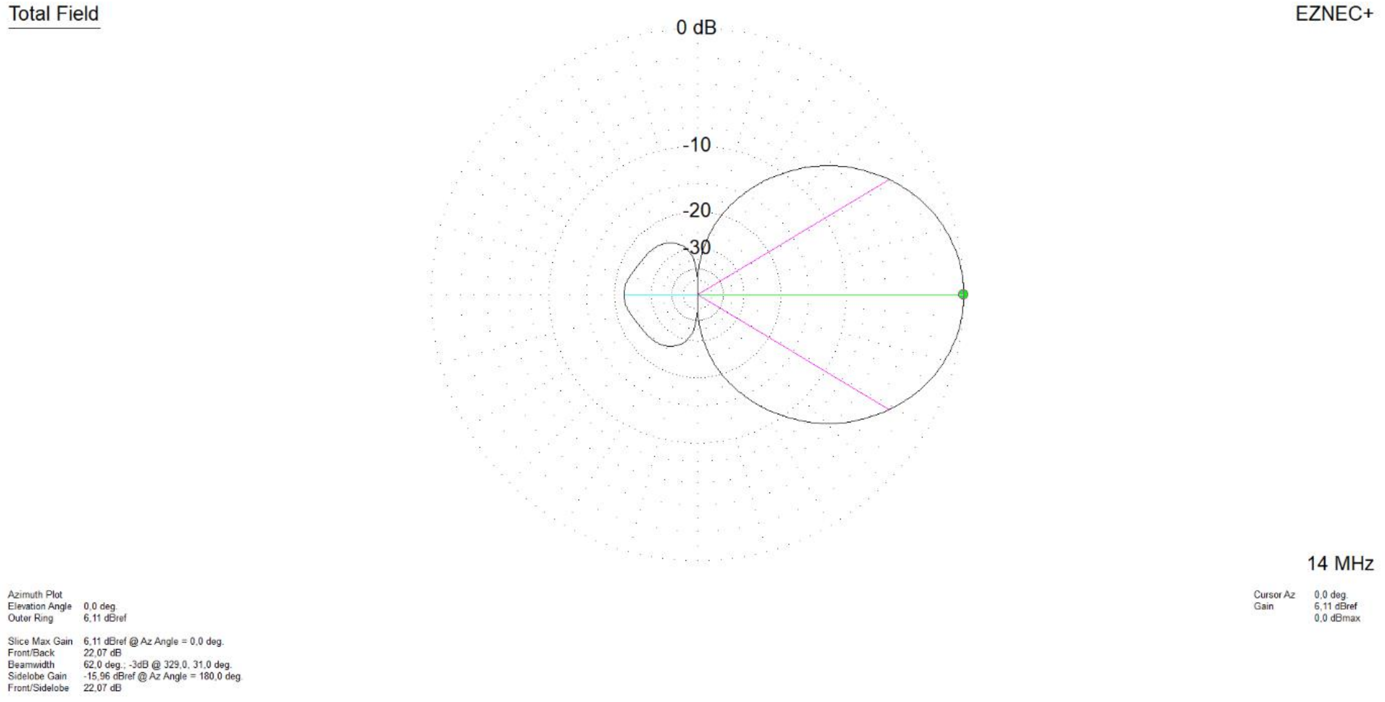
EZNEC+



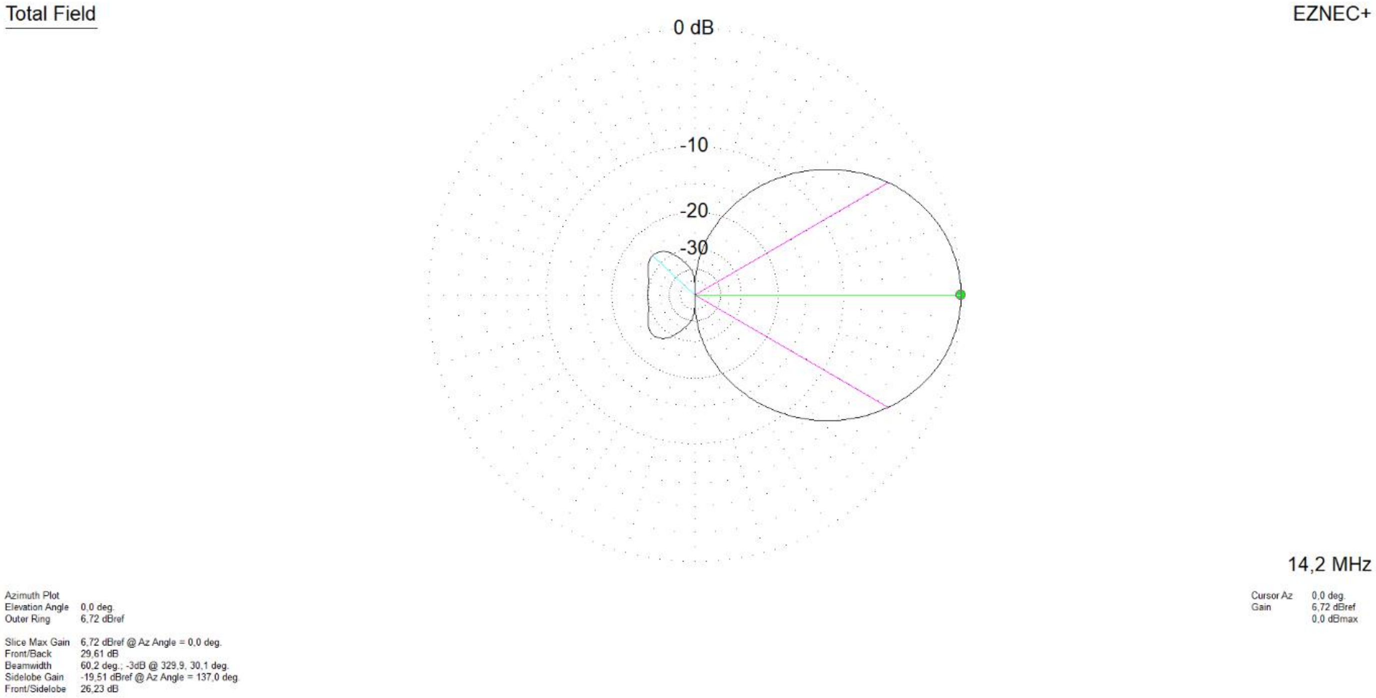
Free space radiation diagram OB4-20R at 14.000



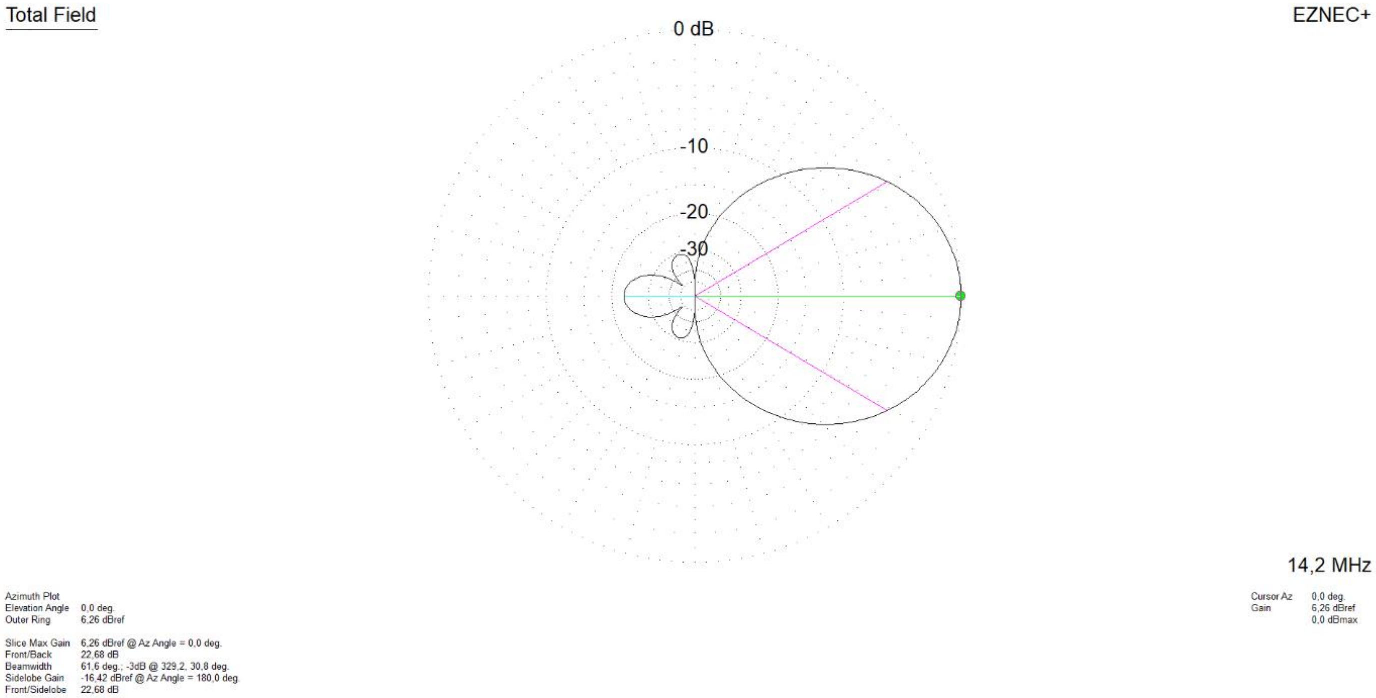
Free space radiation diagram OB4-20OWA at 14.000



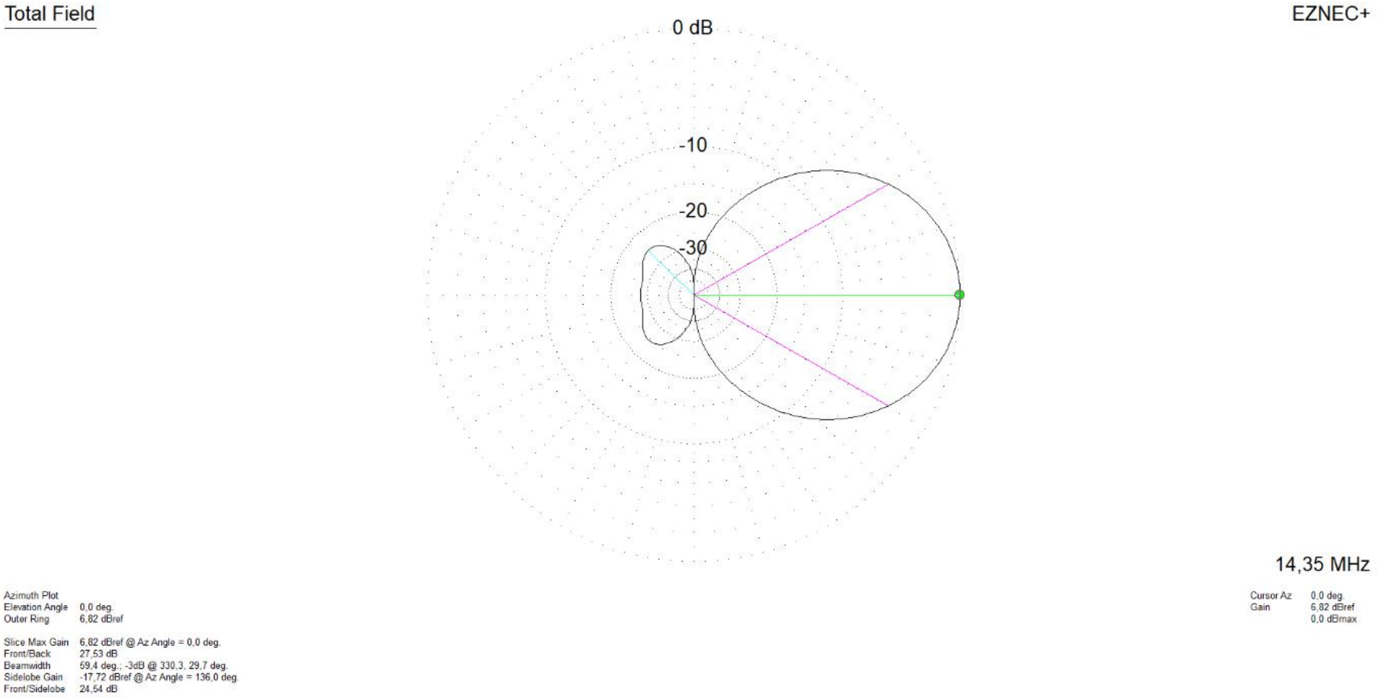
Free space radiation diagram OB4-20R at 14.200



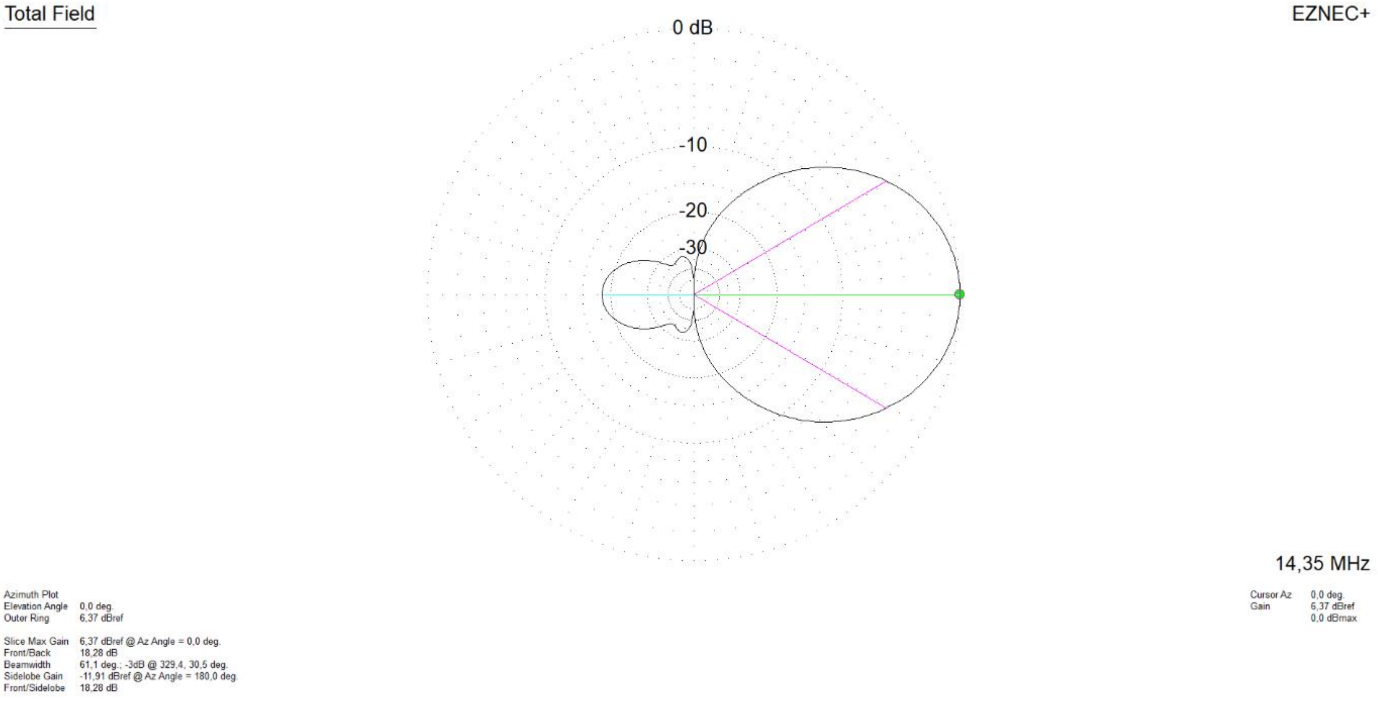
Free space radiation diagram OB4-20OWA at 14.200



Free space radiation diagram OB4-20R at 14.350



Free space radiation diagram OB4-20OWA at 14.350



The direct numerical comparison results in the following values:

frequency	gain (dBd)		f/b (dB)	
	OB4-20R	OB4-20OWA	OB4-20R	OB4-20OWA
14.000	6,61	6,11	28,2	22,1
14.200	6,72	6,26	29,6	22,7
14.350	6,82	6,37	27,5	18,3
average	6,72	6,25	28,4	21,0
difference	+0,47		+7,4	

In addition to the drastically higher f/b-ratio and the significantly better stability of gain and f/b-ratio, the 4el reflector-fed design (OB4-20R) delivers almost 0,5 dBd higher gain over the same boom length, this is unbelievable because it corresponds to an additional boom length of approx. 1,50 meters = almost 5 feet!!!
And mind you, we have already focused on maximum performance with our OB4-20OWA.

In addition, the reflector-fed monoband Yagis can be operated in a stack extremely well, with results even better than what conventional Yagi stacks offer.

By far, and it can only be emphasized by far, no other monoband design in the world represents these advantages.

In terms of practical experience.

For several months I (DF2BO) have been running a 6el version for the 20m band, the OB6-20R, on our tower at the OptiBeam factory.
The boom length is 16,10 meters.
The antenna system can be examined on the QRZ.COM page of DF2BO.
The OB6-20R has a free space gain of approx. 8.7 dBd and a f/b-ratio of about 35 dB.

The radio station at the OptiBeam factory exists since July 2007 (founding of OptiBeam in May 2001). Since then there have been a huge number of various antennas on the tower, which also covered 20m, including a double-fed 7el monoband Yagi with a boom length of 18.00 meters = 59 feet.

After having tested this new reflector-fed design, the OB6-20R, intensively for a few months in practical dx traffic, I can make the following statements with absolute certainty:

-> I've never had better signal strength reports before

-> the pile ups on my CQs have never been more intense

-> at winter time never before I was able to work North America in complete darkness so many hours past local sun set

-> no other antenna showed such a clean, sharp horizontal radiation pattern with an enormous side suppression and an extreme f/b-ratio

-> in terms of reception, it is the quietest antenna (there is a lot of man made noise at the location)

-> no other antenna did shine like this especially at very low radiation angles and regarding the more difficult path along the North Pole, i.e. concerning stations in W6/W7, VE6/VE7, KH6, KL7, E51 etc.

I am a very hands-on person and am extremely critical of my own designs that are up the tower.
The aforementioned findings are definitely not wishful thinking, these are clear facts!

OptiBeam Antenna Technologies will now develop a series of reflector-fed monoband Yagis respectively has already developed some corresponding antenna models, will integrate these into its "line of products" and thus replace the previous monoband Yagis.

We start with three different versions for the 20m band:

-> OB4-20R: 4el / boom length 7,50 meters = 24 ½ feet (already in production)

-> OB5-20R: 5el / boom length ca. 11,50 - 12,50 meters = 37 ¾ - 41 feet

-> OB6-20R: 6el / boom length ca. 16,00 - 17,00 meters = 52 ½ - 55 ¾ feet.

Corresponding designs for the 15m and 10m band will follow.

The extent to which such monoband Yagis are also implemented for 12m and 17m depends on the demand on the market.

We will also find out whether such a design also makes sense for 40m to replace a 4el OWA design.

OptiBeam Antenna Technologies is pleased and proud to be able to offer both the individual OM, who wishes the highest possible performance, as well as the demanding contester, with the reflector-fed designs by far the world's best monoband Yagis!