From: A. van Ardenne

Date: 13/02/04, v2

Subject:
Hybrids; a combined concentrator for high frequency observing

Scope:
This is a brief description on an observing instrument that may serve the SKA for high frequency observing, say in the range >10 – 35 GHz.
This has particularly become more relevant because the version 7 of the SKA observing requirements indicates the desirability to increase the upper frequency limit.

Outline:
The proposal is an outline only and serves to suggest a potentially cost-effective solution to compensate for the decreasing field of view going to higher frequencies. As the concept relies on small dishes of order 2-3mΦ, it alleviates severe pointing requirements that otherwise would occur with a 12m paraboloid (as is presently suggested) as required for its use at the highest frequency. It can potentially rely on "simpler" mass produced high frequency-dish manufacturing technologies. Also, the need for an extremely wideband high performance low noise receiver system can be relaxed with the addition of "only" <4:1 BW high(est) band receiving system.

Description:
Herewith some suggestions of a concept in which 4 small dishes are mounted on a single azimuthal frame in two different possible realizations. I presume, that costing considerations will point the way to a preferred solution.
The picture show two different optical realizations; one with low and one with higher F/D in which the "low" F/D design uses on-axis parabaloids while the other with a higher focal length ratio (although not ultimately required for this purpose), uses slightly off-axis paraboloids in order to realize a more "concentrated" (single) focal-package




Discussion/Consequence:
Clearly, this suggestion, if implemented, would add another physically different system to the SKA. While it may result in a cost effective and optimal system, this may at first glance of course seems undesirable. Alternatively, a number of smaller dishes can be mounted on a single, larger paraboloidal system with similar benefits. The "concentrated" focal package as described above, may also be more cost effective and practical for the use of a focal plane array.