INTISARI

STUDI LITERATUR EFISIENSI *BEAM FORMING* PADA ANTENA *METASURFACE WAVEGUIDE-FED* DAN *PHASED ARRAY* PROFIL RENDAH DI PERANGKAT SELULER

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Implementasi jaringan 5G gelombang milimeter (*mmWave*) memberikan kecepatan transfer data hingga rentang Gb/s dengan frekuensi sinyal di atas 20 GHz. Sayangnya pancaran sinyal jaringan 5G dilaporkan memiliki performa buruk. Suatu terobosan teknologi antena yaitu *Waveguide-fed Metasurface* muncul menjadi opsi pengganti terhadap antena *phased array* profil rendah yang banyak digunakan dalam implementasi jaringan 5G. Dalam antena tersebut, proses *beamforming* sangat menentukan kualitas hasil pancaran sinyal. *Beamforming* adalah teknik penguatan pancaran sinyal pada suatu sudut melalui interferensi konstruktif dan destruktif yang didapatkan dengan pengaturan fase tiap elemen antena. Penelitian ini bertujuan untuk mengetahui efisiensi *beamforming* dari antena *Waveguide-fed Metasurface* beserta efisiensi *beamforming* antena *phased array* profil rendah. Dengan metode studi literatur, didapatkan perbedaan utama kedua antena yaitu pada proses pembentukan fase lanjutan. Pada antena *phased array* profil rendah pembentukan fase secara aktif, sedang pada *metasurface waveguide fed* secara pasif. Atenuasi pancaran yang terjadi pada antena profil rendah 28 GHz disebabkan sifat asli dari gelombang milimeter dan akan tetap terjadi lagi pada antena *metasurface Waveguide-fed* meskipun terbantu oleh *loss* yang lebih kecil. Implementasi *metasurface Waveguide-fed* harus terus dikaji terutama responsnya terhadap sifat atenuasi gelombang milimeter.

ABSTRACT

A LITERATURE REVIEW ON BEAM FORMING EFFICIENCY OF THE WAVEGUIDE-FED METASURFACE AND LOW-PROFILE PHASED ARRAY ANTENNA FOR MOBILE DEVICES

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The implementation of the 5G millimeter wave (mmWave) network provides data transfer rates up to the Gb/s range with signal frequencies above 20 GHz. Unfortunately, the 5G network signal transmission is reported to have poor performance. A variety of antenna technology, namely the Waveguide-fed Metasurface, appears to be a replacement option for the low-profile phased array antennas which are widely used in 5G network implementations. In these antennas, the beamforming process greatly determines the quality of the output signal. Beamforming is a technique of amplifying signal emission at an angle through constructive and destructive interference obtained by setting the phase of each antenna element. This study aims to determine the beamforming efficiency of the Waveguide-fed Metasurface antenna along with the beamforming efficiency of the low-profile phased array antenna. Using the literature study method, the main difference between the two antennas is found in the formation process of the advanced phase. The phased array antenna require active phase shifter, while in the waveguide-fed metasurface architecture is passive. The beam attenuation that occurs in the 28 GHz low profile antenna is due to the original nature of the millimeter wave and will still occur again in the waveguide-fed metasurface antenna although it is assisted by a smaller loss. The implementation of the waveguide-fed metasurface must continue to be studied, especially its response to the attenuation properties of millimeter waves.