



# WIT Technology Offering

## Terahertz - Integrated Terahertz Communications with Reflectors for 5G

**This is a terahertz-enabled communication technology proposed using high spectrum availability and providing high data rate transmission for 5G networks supporting the next generation of services and applications for the future internet.**

### Background

As cellular networks continue to evolve between generations, the expectations are for 5G systems which are planned to enable high capacity communication links that can provide users access to numerous types of applications. The demand for higher bandwidth has led the research community to investigate unexplored frequency spectrum, such as the terahertz-band for 5G. However, this particular spectrum holds numerous challenges, including the need for Line-of-Sight (LoS) links as reflections will deflect the waves as well as molecular absorption that can affect the signal strength. This is further amplified when high Quality-of-Service (QoS) has to be maintained over infrastructure that supports mobility as users (or groups of users) migrate between locations, requiring frequent handover for roaming.

### The Technology

The terahertz technology looks at the concept of mirror-assisted wireless coverage, where smart antennas are utilised with dielectric mirrors that act as reflectors for the terahertz waves. The objective is to utilise information such as the user's location, and to direct the antenna beam towards the highest concentration of users. The smart antennas and mirrors will have motion motors attached to their structures to enable their movement. Due to the need for LoS links, the mirrors will increase the probability of users having direct link to the antenna.

**More information at:** M. T. Barros, S. Balasubramaniam and R. Mullins. Integrated Terahertz Communication with Reflectors for 5G Small Cell Networks. Accepted in the IEEE Transactions on Vehicular Technology. 2017.

### Benefits

The results from the simulation work shows an improvement with the usage of mirror-assisted wireless coverage, improving the overall capacity, received power, path loss and probability of line of sight. The terahertz connections reached a peak of  $10^{11}$  bits per second. Network users now will be able to experience high data transmission and access a wide range of high quality-of-services applications, including: self-driving cars, home-care, 4K video streaming, holographic multimedia streaming, and more.

### Technology Status

Terahertz IP is Patented by WIT.

### Researcher Contact

Dr. Michael Barros - mbarros@tssg.org  
Dr. Robert Mullins - rmullins@tssg.org  
Dr. Sasi Balasubramaniam - sasib@tssg.org

### TTO Contact

Dr. James O'Sullivan  
Technology Transfer Manager  
josullivan@wit.ie  
+353 51 845592

