

# TYDACOMM Distributed Long Range Antenna Systems (dL-RAS) Solution for Urban Application

This document describes an application of **TYDACOMM's** dL-RAS solution for Victoria Garden City (VGC). The Area of interest (AOI) is a large, upscale, Urban Residential Area located along the Lekki-Epe Expressway in Lagos. VGC is a well-planned residential community, made up of single-storey fully detached and semi-detached duplexes with the google earth aerial-view depicted in *Figure 1*.

There were complaints from residents of sparse or no 3G coverage, which results in poor and unreliable data services. The Operator's attempt to acquire a site inside VGC was not possible due to lack of space and regulatory requirements within the Estate. The existing Palm tree sites in the Estate were also said to be very exorbitant, thus, presenting an unresolvable problem for the Operator. Figure 2 depicts the coverage, where more than 50% of the western part of the Estate is practically uncovered. To the Operator, having such poor client-experience in an area with High Net-Worth Individuals (HNI) is bad for business. The Operator's target was to improve coverage at Close 57 and 90% of VGC at RSCP  $\geq$  -85dBm.

**TYDACOMM** proffered solution required the deployment of distributed High Gain, Long Range Antenna Systems to replace the existing standard antennae at three or more strategically selected existing Sites. This was particularly difficult for VGC because of its geography. It is surrounded to the North and the West by Lagos Lagoon, thus making it difficult to find appropriate land-based existing Sites. Part of the design and deployment exercise is a thorough understanding of the pre-existing coverage, Received Signal Code Power (RSCP) footprint.

After extensive pre-drive testing within and outside VGC and heavy prediction and propagation simulation exercises, **TYDACOMM** implemented an outside the box dL-RAS optimized Coverage, Capacity & Quality solution. The resulting post-deployment drive test coverage footprint is depicted in Figure 3 on the next page. The new coverage greatly improved users' experience and resulted in more revenue for the Operator.

VGC & Sites Google Earth Map: (Site1, Site2 & Site3)



Targeting Close 57 and 90% of VGC at  $\geq$  -85dBm

*Figure 1: Victoria Garden City (VGC) Estate described as the target "Area of Interest" (AOI)*

Existing Sites Pre-Drive Test RSCP Result



Coverage at RSCP of -85/-90dBm of 59/77%

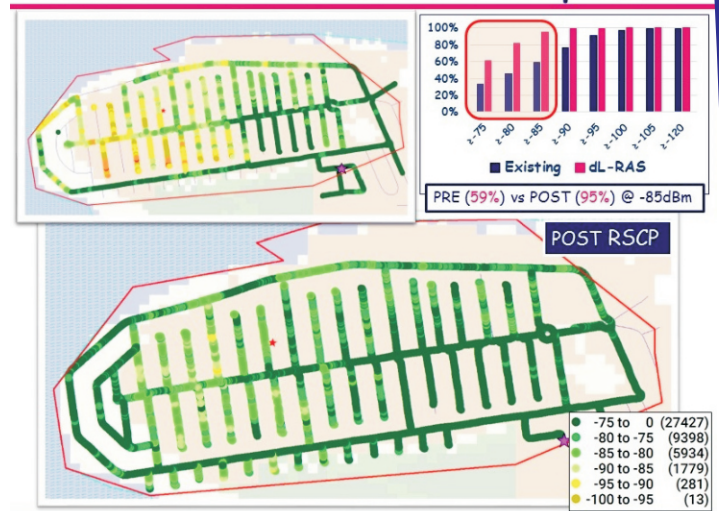
*Figure 2: Existing sites pre-drive test of the Received Signal Code Power (RSCP) Result.*

In Figure 3, VGC “Old Coverage Map” is plotted against the new **TYDACOMM dL-RAS** solution. The Figure represents the “Before” & “After” actual drive test results, respectively described as “PRE RSCP” & “POST RSCP”. The signal levels (RSCP) improved significantly in the Estate, and in the defined Area of Interest (AOI) in particular. The RSCP Coverage area at -85dBm increased from **59% to 94%**, which is virtually the whole Estate. A look at the inscribed plotted Histogram or the cumulative distribution function (CDF) of PRE- vs. POST-RSCP at stronger signal levels (i.e., better than -75dBm) is even more pronounced. While these are outdoor and street-level measurements, they also represent indoor measurements because of the interleaved nature of rows of buildings within the Estate.

The three main roads that run West-to-East are: Road 3, Road 5, and Road 2. The middle Road (Road 5), runs through the worst coverage area of the Estate. Figure 4 represents both Coverage Signal RSCP for **PRE-Drive Test & POST-Drive Test** on Road 5 going from East to the West (very good area to bad areas). In the Figure, there is an Average Coverage RSCP difference of **13dB (20X)** along the route. The farther to the West the bigger is the difference. The application of Shannon/Hartley Theorem suggests that the average data rate increase will be more than 10 times what was being experienced in the Estate. Indeed, this is borne out by measured data-throughput and the Residents' report after dL-RAS implementation. The Operator has since, rated VGC dL-RAS Sites as their premium and reference Sites for Quality & Coverage.

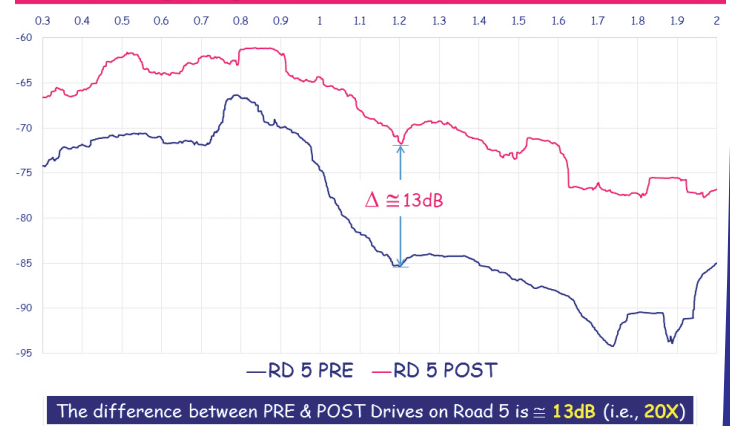
In summary, complaints from VGC residents vanished, the churn stopped, and the Operator saw an impressive increment in data usage, resulting in increased Revenue Market Share (RMS) and Customer Market Share (CMS) without the introduction of an additional site within the Estate. In addition, it saved the CAPEX and OPEX of a new site that would otherwise, must be installed. Based on the results the Operator came out with new locations where they have similar problems and they want to utilize **TYDACOMM** solution to remedy their situation.

### PRE/POST Drive Test RSCP Comparison



**Figure 3: dL-RAS Predicted post drive test of the Received Signal Code Power (RSCP) Result.**

### Coverage Signal RSCP (dBm) on Road 5 (Idle)



**Figure 4: Coverage signal of the Received Signal Code Power (RSCP) Result on Roads 5, with an average of 13dBm (20X) difference.**