Status and Future of TrigNet, South Africa's network of Continuously Operating Reference Stations

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SUMMARY

South Africa's Global Navigation Satellite System (GNSS) Continuously Operating Reference Station (CORS) network, known as TrigNet, remains the cornerstone of the nation's modern terrestrial geodetic infrastructure, providing real-time and post-processed positioning services that underpin surveying, mapping, and geospatial data integration across the country. Managed by the Chief Directorate: National Geo-spatial Information (NGI) of the Department of Land Reform and Rural Development (DLRRD), which is mandated by section 3A of the Land Survey Act 8 of 1997, TrigNet ensures the maintenance of the national reference frame, alignment with the International Terrestrial Reference Frame (ITRF), and supports diverse applications ranging from cadastral surveying, UAV, space weather prediction, geophysical applications to precision agriculture and infrastructure monitoring.

As of October 2025, TrigNet comprises over 70 operational CORS stations strategically distributed to achieve near-national coverage and includes three network real-time kinematic clusters utilising the virtual reference station (VRS) solution.

Network modernization efforts include the migration to multi-constellation, multi-frequency GNSS receivers capable of tracking GPS, Galileo, GLONASS, and BeiDou systems, alongside upgrades to communications infrastructure and data processing software. Enhanced data quality control, automated integrity monitoring, and improved latency have significantly increased reliability and service accessibility for professional users.

Despite these achievements, challenges remain, including aging equipment, communication and power disruptions in remote areas, and the need for sustainable funding to maintain and expand the network. In response, NGI is developing a TrigNet 2030 Strategy, which envisions a resilient,

user-centric, and interoperable CORS infrastructure integrated with regional and global geodetic frameworks.

The ongoing modernization of TrigNet is not merely a technical upgrade but a strategic national investment. It strengthens South Africa's spatial data infrastructure, supports the Committee for Spatial Information (CSI) objectives, and ensures alignment with the United Nations Global Geodetic Reference Frame (UN-GGRF) vision for a sustainable Global Geodetic Reference Frame (GGRF).

This paper presents the current status, recent upgrades, operational challenges, and forward-looking development plan for TrigNet—highlighting its significant role in advancing geospatial accuracy, national development, and regional geodesy collaboration.