

# EVALUATION OF NETWORK RTK PERFORMANCE AND ELEMENTS OF CERTIFICATION— A SOUTHERN ONTARIO CASE STUDY

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*Over the past decade, network RTK technology has become popular as an efficient method of precise, real-time positioning. Its relatively low-cost and single receiver ease-of-use has allowed it to mostly replace static relative GPS and single baseline RTK in urban areas where such networks are economically viable (e.g., cadastral and construction survey). The Ministry of Transportation of Ontario (MTO) and York University have investigated the performance of commercial network RTK services in Southern Ontario, where performance is defined by a set of developed metrics. It was found that the user horizontal solution had an overall precision of ~2.5 cm (95%), though there were cases of solution biases, drifts and gaps. A follow-up study is developing criteria and pathways for the certification of such commercial network RTK services, focusing on: reference station integration, reference station maintenance, and user solution monitoring. A set of recommendations for network certification is in preparation.*

*Au cours de la dernière décennie, la technologie RTK (positionnement GPS cinématique en temps réel) en réseau est devenue populaire comme méthode efficace de positionnement précis en temps réel. Son coût relativement faible et son récepteur unique facile à utiliser ont permis de remplacer en grande partie le positionnement GPS relatif en mode statique et le RTK à ligne de base unique dans des secteurs urbains où de tels réseaux sont économiquement viables (p. ex., les levés cadastraux et les levés de construction). Le ministère des Transports de l'Ontario (MTO) et l'Université York ont examiné la performance des services commerciaux du réseau RTK dans le sud de l'Ontario où la performance est définie par un ensemble d'outils de mesure élaborés à cette fin. On a conclu que la solution horizontale de l'utilisateur avait une précision globale de ~2,5 cm (95 %), même s'il y avait des cas de biais, de dérives et de « trous » de la solution. Une étude de suivi élabore des critères et des voies pour la certification de tels services commerciaux du RTK en réseau en mettant l'accent sur l'intégration de la station de référence, la maintenance de la station de référence et le contrôle de la solution de l'utilisateur. Une série de recommandations pour la certification du réseau est en préparation.*



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## Introduction

Network RTK (Real-Time Kinematic) refers to GPS and now GNSS (Global Navigation Satellite Systems) technology, where a network of continuously operating reference stations (CORS) provides raw measurements and error corrections to a user's geodetic-quality GPS / GNSS receiver, allowing for few centimetre-level horizontal positioning in real-time. Such networks are viable in areas with high concentrations of economic activities. In Southern Ontario, network RTK services have been established, maintained and operated by a number of private companies with limited government involvement. Unlike many provincial / state or federal governments in other countries, neither

Ontario nor Canada maintains a CORS at a density necessary for network RTK.

This situation and limited existing studies led the Ministry of Transportation of Ontario (MTO) to work with York University in order to evaluate the performance of network RTK in Southern Ontario for use in its surveys and for use by the broader surveying community. This work has been followed by a second partnership to study approaches to certify such commercial network RTK services for government and public use. The results and ongoing work from these studies is presented here.