

## Summary :

Global navigation satellite system applications based on high sensitivity and weak-signal acquisition is a difficult task and has become an important research area. Algorithms and techniques are proposed, principally those associated to cases of limited global navigation satellite system signal availability. Collective detection is a new technique that seems to offer better solutions in a such situation. This paper presents a performance analysis of GPS  $L_1$  noncoherent acquisition via collective detection based on the systematic and efficient collective acquisition algorithm in the Rayleigh fading channel, firstly in the case of a fixed threshold detection and secondly in the case of adaptive threshold detection based on a constant false alarm rate. To compare these methods with traditional acquisition schemes, we develop detection and false alarm probability analytic expressions.