The tracking of interplanetary spacecrafts is a crucial aspect in deep space missions. The signals coming from the spacecraft are distorted by various deep space noise sources and receiver imperfections, making the tracking critical. There are several methods used for spacecraft tracking, including the Delta Direct One-Way Ranging, or the Δ DOR, technique. In the past years, the European Space Agency (ESA) missions were based on Narrowband Δ DOR while, in more recent years, an innovative wideband approach has been proposed. This research work presents a new version of the ESA X/Ka Deep Space Transponder based on this new tracking technique named Wideband Δ DOR. The backward compatibility with Narrowband Δ DOR is guaranteed.