Abstract: We propose a novel method of network detection that is robust against any complex dependence structure. Our goal is to conduct exploratory network detection; we attempt to detect a network composed of ``connectable'' edges that are worth investigating in detail for further modelling or precise network analysis. For reproducibility, we pursue high power whilst controlling the false discovery rate (FDR). In particular, we formalise the problem as a multiple testing, and propose new p-variables that are used in the Benjamini-Hochberg procedure. We show that the proposed method controls the FDR under arbitrary dependence structure with any sample size, and has an asymptotic power one. The validity is also confirmed by simulations and a real data example. (This article is co-authored with Masaki Toyoda)