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A Trade Study for the Cosmic Explorer[1] SSOHRAB BORHANIAN, ANURADHA GUPTA, BANGALORE SATHYAPRAKASH, Pennsylvania State University — Gravitational wave astronomy has opened a new window to study astrophysical objects and phenomena, the early universe, and the fundamental physics of gravity. Compact binaries are among the most luminous gravitational-wave sources and present a great probe for a wide range of physical phenomena. Hence it is important to improve the accuracy with which we can determine the properties of these systems, increase the efficiency of multi-messenger follow-up observations, and expand the observable range to encompass most populations of binaries in our universe. Focusing on the needs of such compact binary observations, we examine in this trade study the capability of different configurations of the next generation US ground-based gravitational wave detector Cosmic Explorer embedded in the global network of KAGRA and LIGO-India detectors as well as the Einstein Telescope. Using Fisher analysis methods, we compare various network combinations with and without Cosmic Explorer in different configurations to determine the minimum setup necessary that would allow significant scientific progress in our understanding of the astrophysics of binary black holes and neutron stars.

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