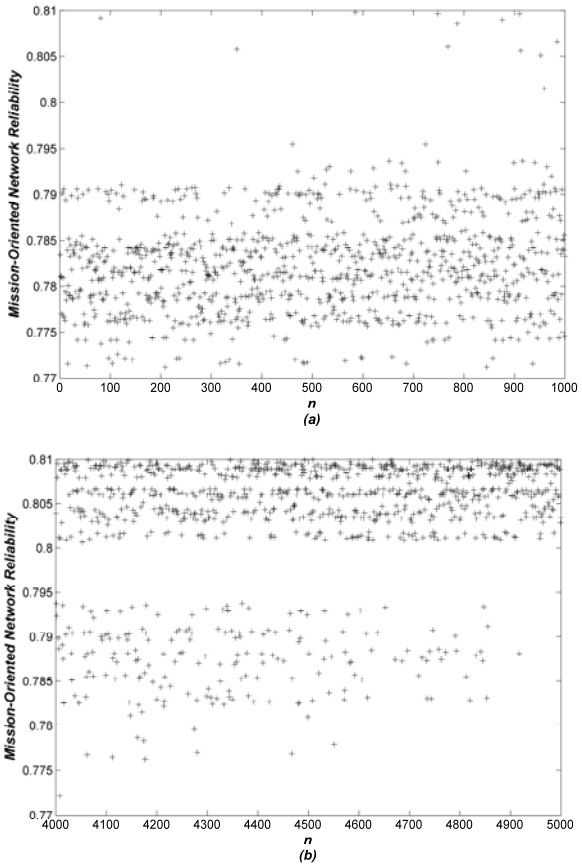

Figure 5. Scatter plot of sample number against the sample reliability $R_n^{M_k}$ based on variant capability model where $n \in [1,1000]$ in (a) and $n \in [4001,5000]$ in (b).

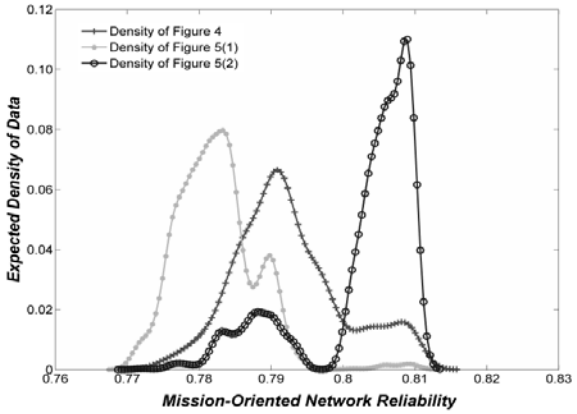

Figure 6. Density plot of mission-oriented network reliability against the samples' probability density.

Differ from Fig. 5(a), samples in Fig. 5(b) showed relatively high mission reliability. When n belong to interval $[4001,5000]$,the sample mean was 0.8026, sample median was 0.8060 and sample mode was 0.8038. As a result of improving capability of *I* and *L* entities in community A, nodes sampling tended to within the community other than between communities which led to a high mission-oriented network reliability.

Fig. 6 showed the samples' probability density of Fig. 4, Fig. 5(a) and Fig. 5(b). Under different capability assumption, the same network topology showed a statistical disparity of mission-oriented reliability. In summary, topological connectivity is only one aspect of the network reliability. Mission-oriented network reliability can be improved by adequate consideration of entities' capability.

V. CONCLUSION

Along with the increasing of scale and complexity, the integrated network systems are becoming more and more universal. Evaluating multi-function system's reliability quickly and accurately has become an important project. In this paper, we proposed a simulation testing method to evaluate mission-oriented network reliability via a three-layer network model which composed by physical-layer, sample-layer and mission-layer. We defined a capacity model serving for mission-oriented nodes sampling. We further defined a mission model serving for mission-oriented links mapping. Based on the hierarchical model we calculated the mission-oriented network using ST reliability. The statistic result of simulation testing indicated that this method can distinctly reflect mission-oriented system reliability. Corresponding to the expected result, centralized sampling lead to a high reliability while decentralized sampling lead to a low reliability according to various capacity model. The method we proposed is applicable to various networks, for instance, communication networks, computer networks. It is also a valid instrument in both network reliability designing and improving.

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