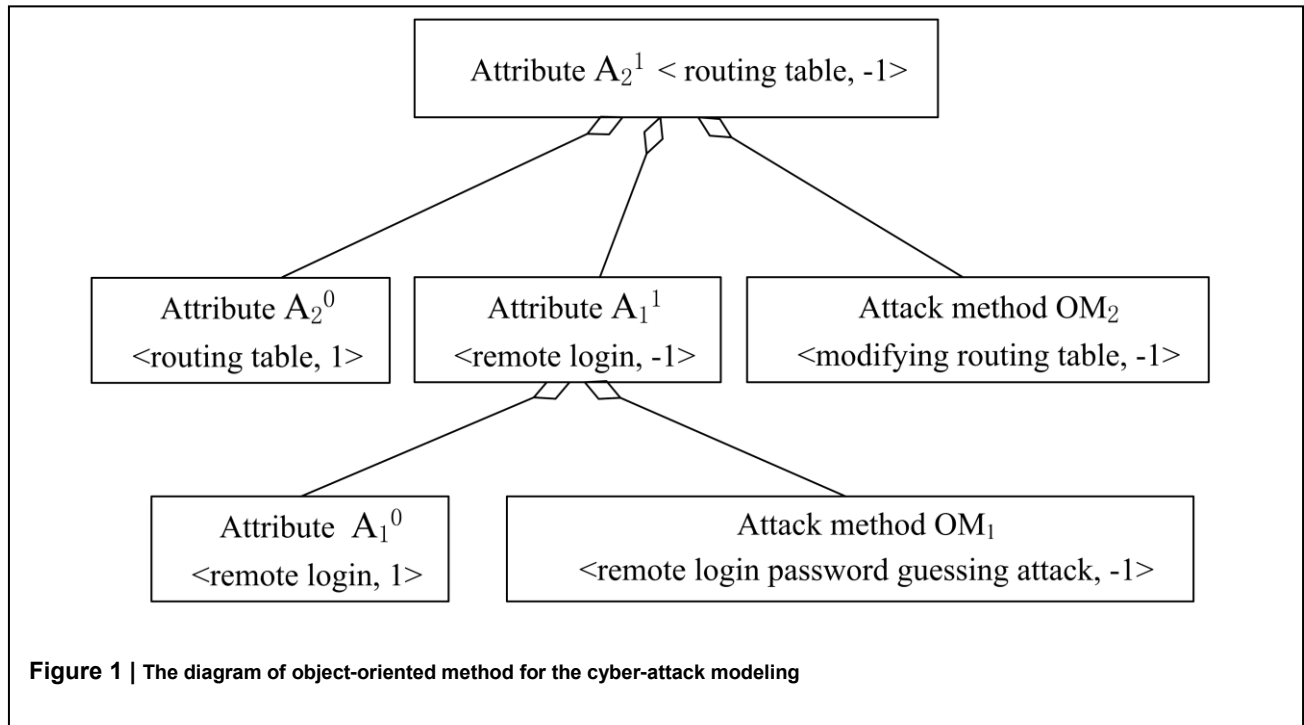


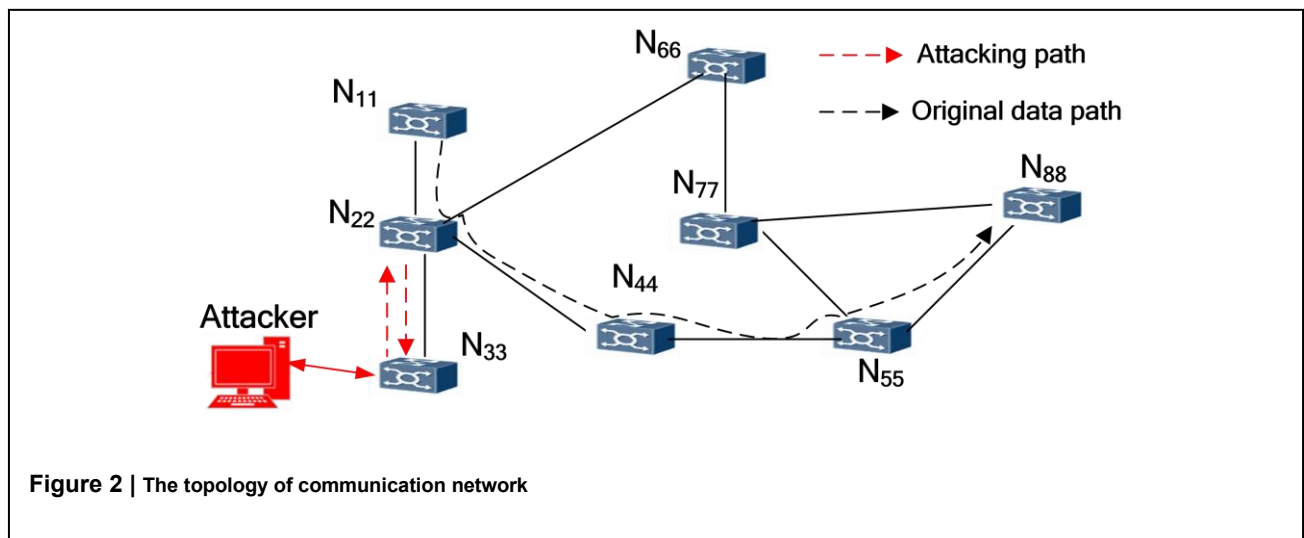
Supplementary Material

1 Supplementary Figures and Tables

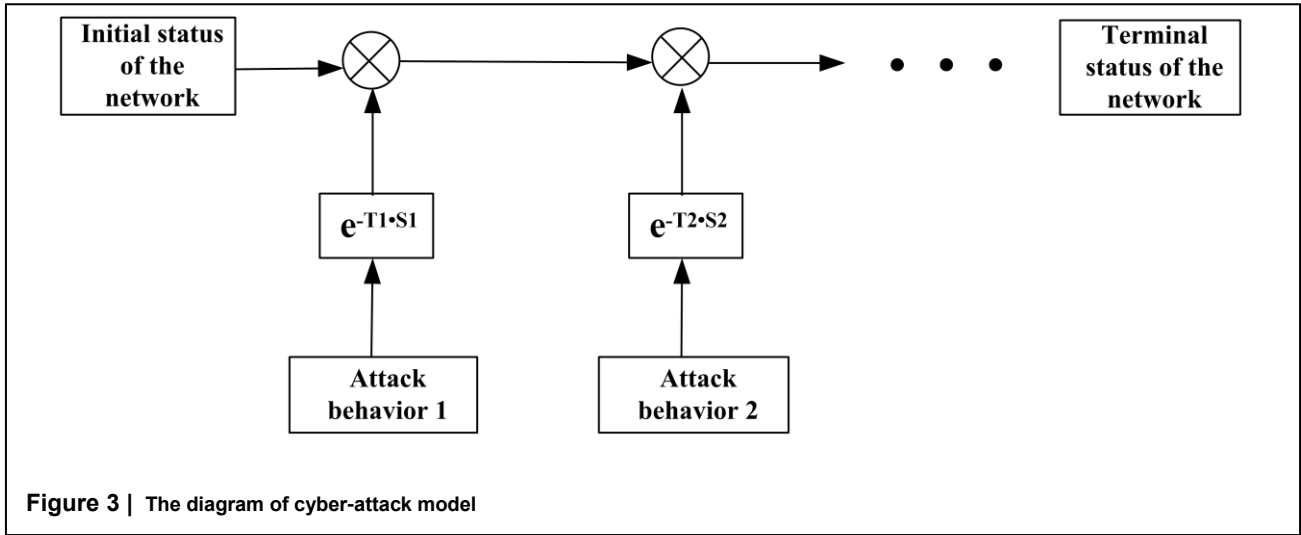
1.1 Supplementary Figures 1. The diagram of object-oriented method for the cyber-attack modeling



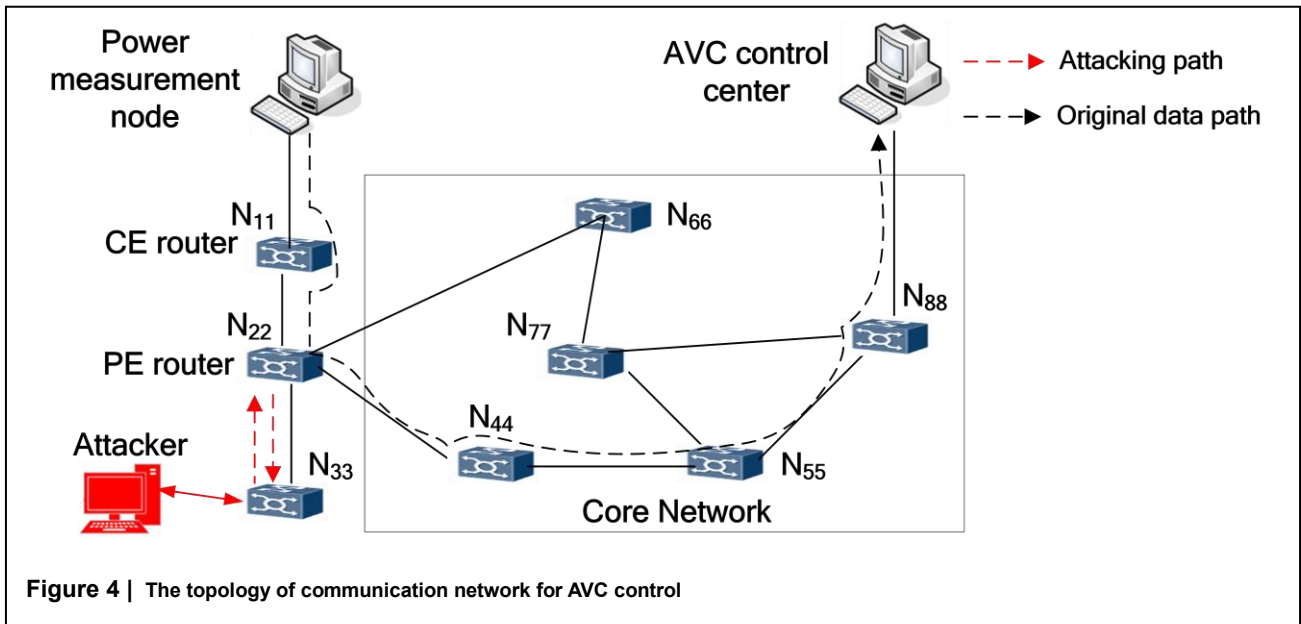
1.2 Supplementary Figures 2. The topology of communication network



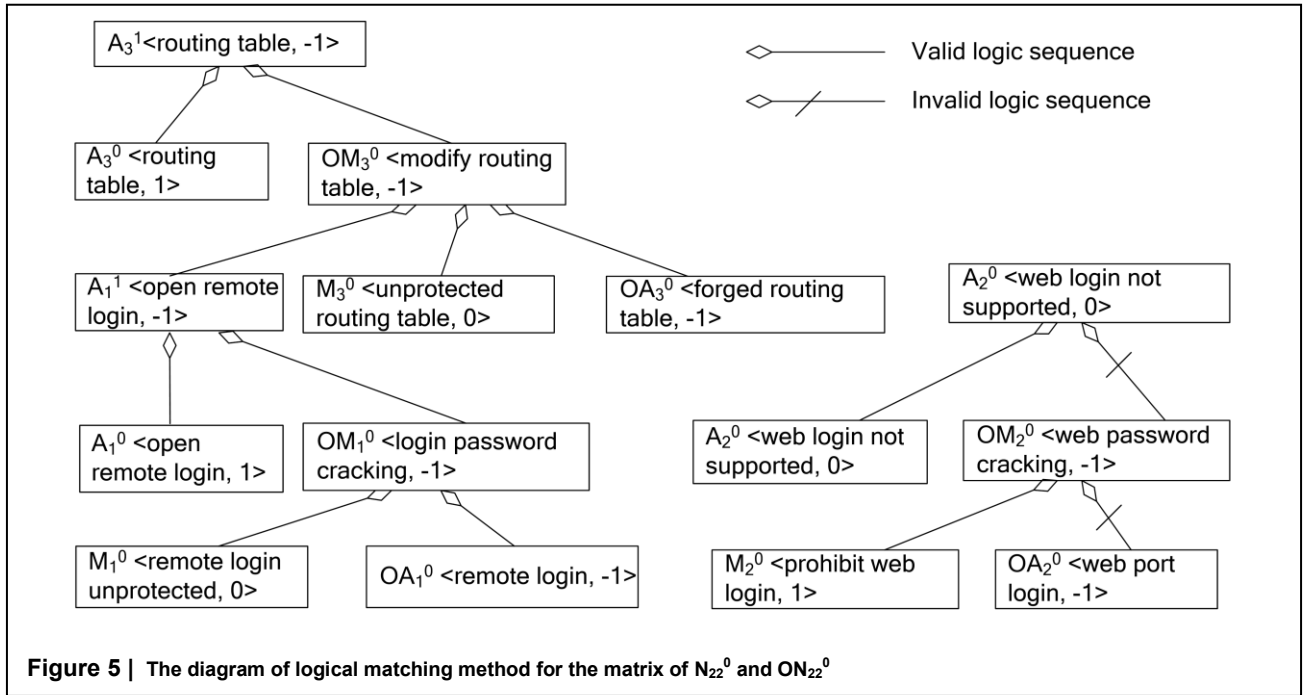
1.3 Supplementary Figures 3. The diagram of cyber-attack model



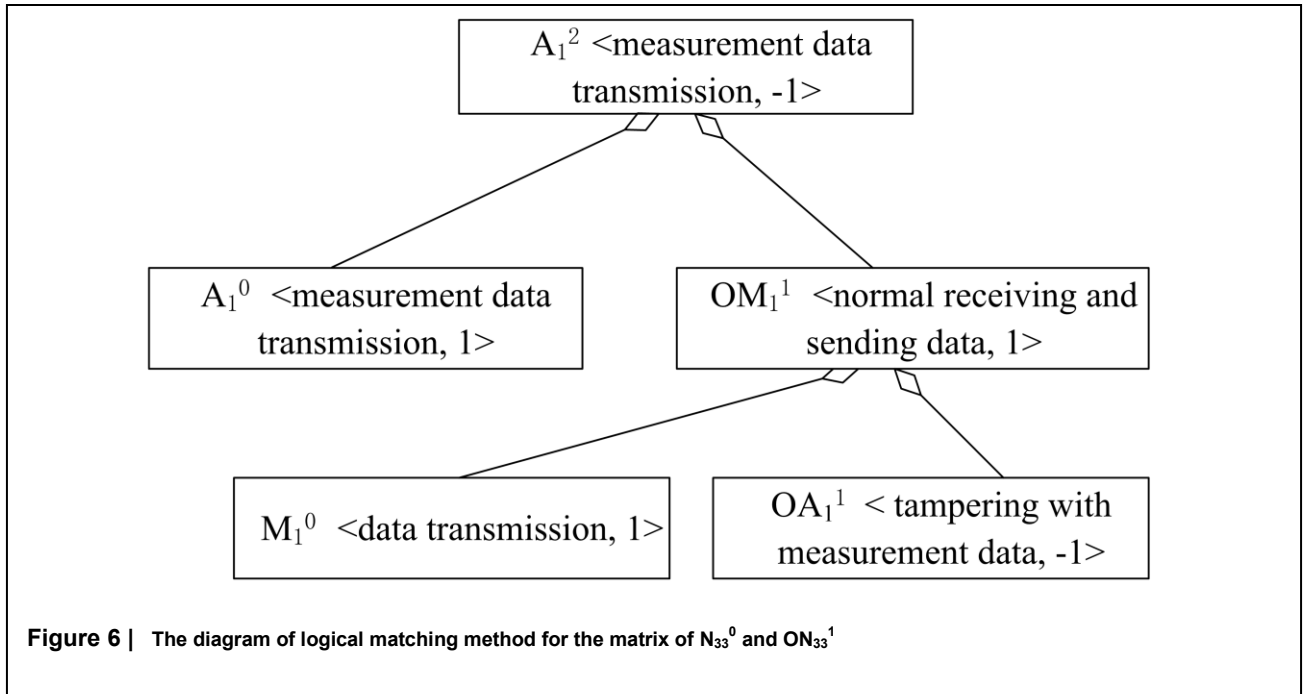
1.4 Supplementary Figures 4. The topology of communication network for AVC control



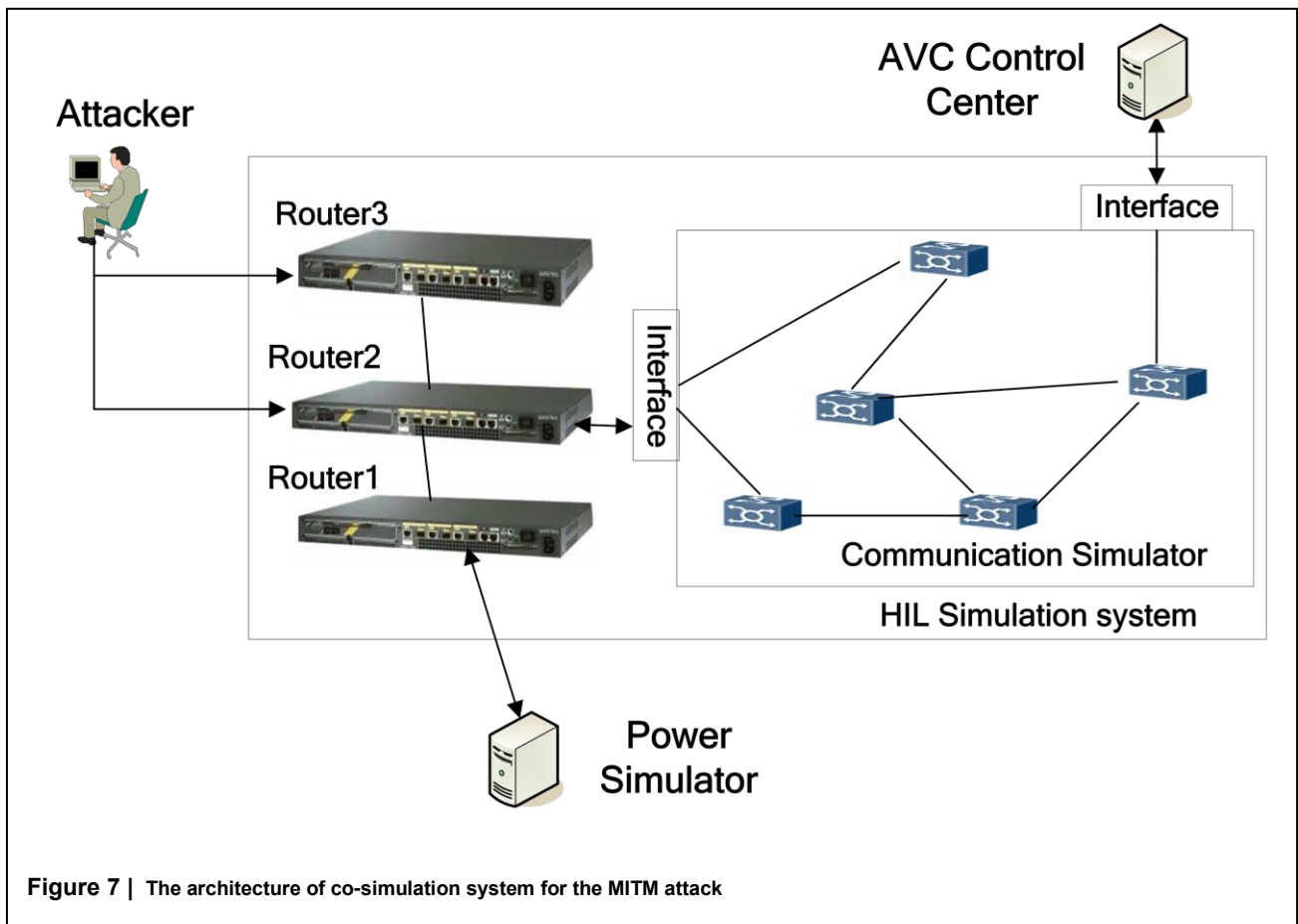
1.5 Supplementary Figures 5. The diagram of logical matching method for the matrix of N_{22}^0 and ON_{22}^0



1.6 Supplementary Figures 6. The diagram of logical matching method for the matrix of N_{33}^0 and ON_{33}^1



1.7 Supplementary Figures 7. The architecture of co-simulation system for the MITM attack



1.8 Supplementary Figures 8. Topology of IEEE 39-bus system

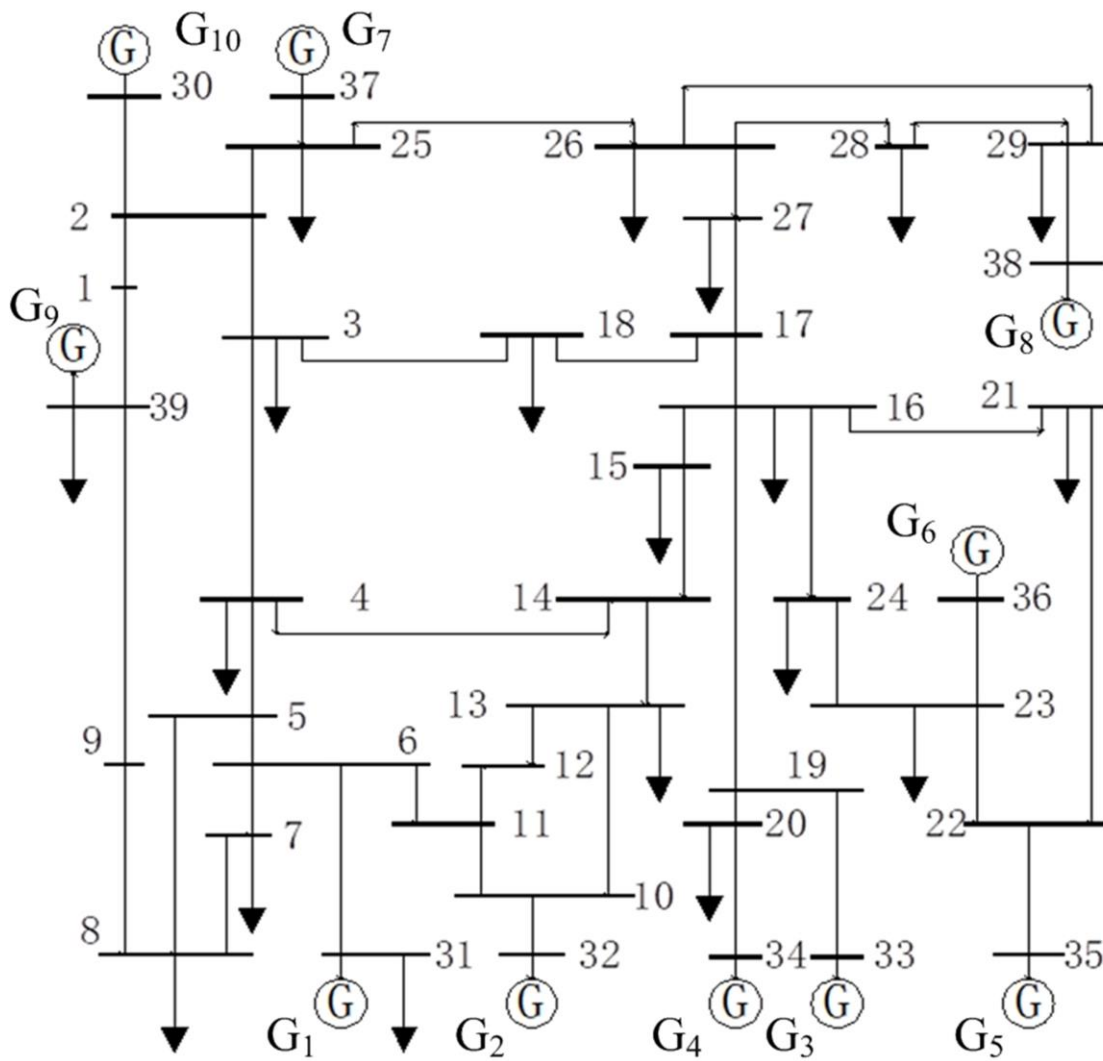
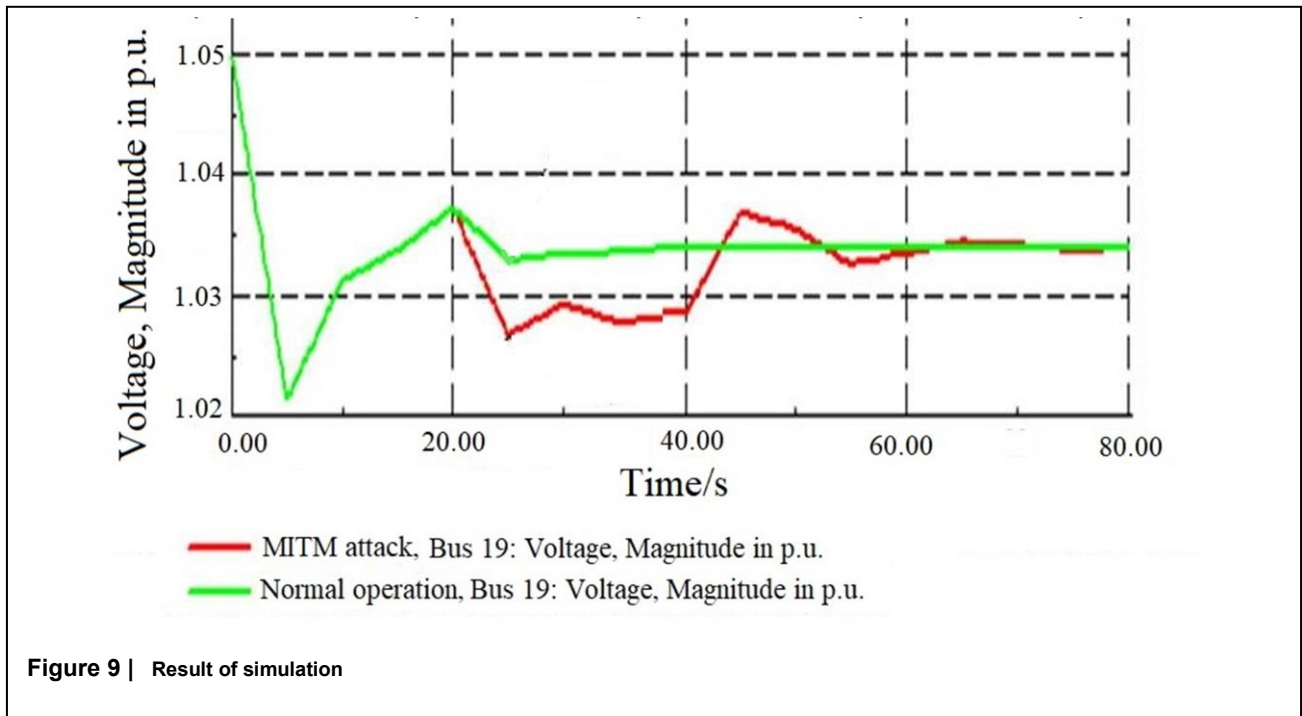


Figure 8 | Topology of IEEE 39-bus system

1.9 Supplementary Figures 9. Result of simulation



1.10 Supplementary Table 1. Comparison of modeling method

Modeling method	Description of network topology	Description of changes of nodes status	Description of nodes weakness	Description of attack dynamic behavior	Description of attack propagation path
<i>Attack tree model</i>	None	None	None	None	None
<i>Attack graph model</i>	None	None	None	None	None
<i>Attack network model based on Petri Net</i>	Partial	None	None	Yes	No Partial
<i>Network Attack Language</i>	None	Partial	Partial	Partial	None
<i>State transition graph modeling</i>	None	Yes	Partial	Yes	Yes Partial
<i>Correlated matrix based object-oriented model</i>	Yes	Yes	Yes	Yes	Fully displayed