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Moirangthem Tiken Singh and **Surajit Borkotokey*** (surajitbor@yahoo.com), Department of Mathematics, Dibrugarh University, India, Dibrugarh, Assam 786004, India, and **Rachid Lahcen** and **Ram N Mohapatra**. *A Generic Scheme for Cyber Security in Resource Constraint Network Using Incomplete Information Game.*

We propose a model that efficiently activates the defending mechanism of a resource constraint network where activation of the defending system otherwise consumes a significant amount of resource. Our model is designed so that it executes the activation of the defending system only when it is needed. It is a standard practice in this literature that the defender has incomplete information about the attacker's strategy. As the resource is scarce and precious for the defender, she needs to learn the behavior of the attacker to identify the malicious network agents. Triggered by the lack of unavailability of the information about the attacker's action, the attacker leverage the information asymmetry to misinform and mislead any defense system. Thus, we model the interaction between the defender and the attacker as an incomplete stochastic game. We develop a learning algorithm for incomplete information game to update the strategy for playing the game. The results show that it converges and leads to a Nash equilibrium. (Received August 16, 2020)