INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Named Data Networking (NDN) is a clean-slate Internet Architecture where the central focus has been shifted from hosts to contents. Contents are made location-independent, and they have a unique identi er. NDN is primarily designed to address long-standing problems faced by the current Internet such as scalable content distribution, security, mobility support etc. Communication in NDN takes place with the help of two types of packets: Interest (request) and Data (response). Consumers issue Interests with the desired content name, and routers forward these Interests towards potential producers. NDN packets do not carry any information related to consumers or producers. Therefore, a data structure (table) is designed to keep track of the forwarded Interests. Later, each node in NDN forwards the corresponding Data packets by looking at entries in the table. This table is named as `Pending Interest Table' as it carries the information of unsatis ed (pending) Interests. PIT's unique design provides various advantages to NDN, such as anonymity, immediate loop detection, multipath forwarding, and multicast. Network Forwarder Daemon (NFD) implements the NDN protocol. Though the current NFD has not xed PIT size, overallocation of memory to PIT does not provide any bene t. Even if we allocate more memory to PIT, in case there is insu cient bandwidth in the outgoing link, in that case, the outgoing bu er size may increase. This leads to more content retrieval delay and impacts delay-sensitive applications. So, PIT needs to have a xed size. However, we have to face other challenges due to its fixed size. We can not deny the occurrence of bursty tra c in a network. Bursty tra c creates network congestion. Due to which PIT entries are satis ed slowly, this leads to more entries in PIT, and gradually, PIT may become full. It leads to degradation of Quality of Service (QoS) of the premium consumers (pays more for better service). Moreover, the attackers can also exploit the presence of PIT to degrade QoS of the targeted legitimate consumers. In both scenarios (bursty tra c or attack), the network gets congested. So, the objective of this thesis is to study the impact of PIT size on network performance from three perspectives: QoS, Security and Congestion control. The rst contribution of this thesis enhances the QoS of NDN using PIT replacement and PIT reservation policy. In the following contribution, we propose a smart collaborative attack model to target legitimate consumers, which exploits PIT's of the intermediate routers. Our nal contribution o ers a congestion control scheme that leverages PIT per outgoing face placement and explicit marking. To evaluate the performance, we implement the proposed schemes in ndnSIM simulator. We compare them with state-of-the works from literature, and based on the simulation results, we found that our proposed schemes outperform the existing approaches.