Distributed Trust-Guided DDoS Defense for Information-Centric Networking Using a Name Resolution Service

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***Abstract*—Information-centric networking (ICN) uses name-based forwarding and in-network caching to reduce latency and backbone traffic and is therefore a key candidate for future networks. ICN architectures using a Name Resolution Service (NRS) improve scalability and flexibility, but also create new distributed denial-of-service (DDoS) threats against resolution and forwarding resources, such as cache pollution and forwarding exhaustion. We propose a trust-based defense for NRS-based ICN that binds entities to decentralized identifiers, derives multi-factor credit scores from resolution and caching behaviors, and uses lightweight credentials to steer rate limiting, caching, and forwarding policies. A federated-learning-based detector uses local observations to identify low-rate attacks that span multiple resolution domains without sharing raw traffic and with only modest extra coordination traffic. ns-3-based simulations under cache pollution, forwarding exhaustion, and hybrid attacks show that our scheme improves detection F1-score by up to about 10 percentage points and maintains request success and cache hit ratios around 88--90% and 70% during attacks, whereas representative ICN/NDN defenses can drop below 80% and 65%.**

***Keyword*—Information-centric networking, DDoS, distributed trust, decentralized identifier, federated learning**

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