

Mitigating Denial of Service Attacks in Information Centric Networking

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Abstract : Information-centric networking (ICN) using architectures such as Publish-Subscribe Internet Routing Paradigm (PSIRP) is one of the promising candidates for a future Internet, has recently been under the spotlight by the research community to investigate the possibility of redesigning the current Internet architecture to solve many issues such as routing scalability, security, and quality of services issues.. The Bloom filter-based forwarding is a source-routing approach that is used in the PSIRP architecture. This mechanism is vulnerable to brute force attacks which may lead to denial-of-service (DoS) attacks. In this work, we present a new forwarding approach that keeps the advantages of Bloom filter-based forwarding while mitigates attacks on the forwarding mechanism. In practice, we introduce a special type of forwarding nodes called Edge-FW to be placed at the edge of the network. The role of these node is to add an extra security layer by validating and inspecting packets at the edge of the network against brute-force attacks and check whether the packet contains a legitimate forwarding identifier (FId) or not. We leverage Certificateless Aggregate Signature (CLAS) scheme with a small size of 64-bit which is used to sign the FId. Hence, this signature becomes bound to a specific FId. Therefore, malicious nodes that inject packets with random FIDs will be easily detected and dropped at the Edge-FW node when the signature verification fails. Our preliminary security analysis suggests that with the proposed approach, the forwarding plane is able to resist attacks such as DoS with very high probability.

Keywords : bloom filter, certificateless aggregate signature, denial-of-service, information centric network

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