

A DoS Attack by Exploiting a Weakness of Solutions to Defeat IMSI-Catchers

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Abstract—Pseudonym based solutions to defeat IMSI-catchers have recently been published. The idea of these solutions have been on the table of the 3GPP community for a couple of years as a potential candidate solution to defeat IMSI-catchers. However, for some technical reasons, none of the pseudonym based solutions has yet been accepted as a 3GPP standard, even though there has not been any known fatal weakness in these solutions. We have found a vulnerability of the pseudonym based solutions. This vulnerability has also been reported in another publication (cite?) in the last month, July, 2017. Using this vulnerability, we show that a novel DDoS attack can be mounted against an entire mobile network. We analytically estimate the expected success rate of the DDoS attack. According to our analysis, we can send 50 percent of the subscribers of the mobile network out of service using a reasonably large (maybe mention the size?) botnet. We run a simple simulation of the attack and show that our analytical estimation is fairly accurate. We present a solution to remove the vulnerability that led to the DDoS attack. We present a detail analysis and show that, in our solution, there does not remain any vulnerability that could lead to a DoS attack of the kind we have presented in this paper.

I. INTRODUCTION

Kimmo will write it

II. PSEUDONYM BASED SOLUTIONS

Mohsin will write the summary of all the proposed pseudonym based solutions

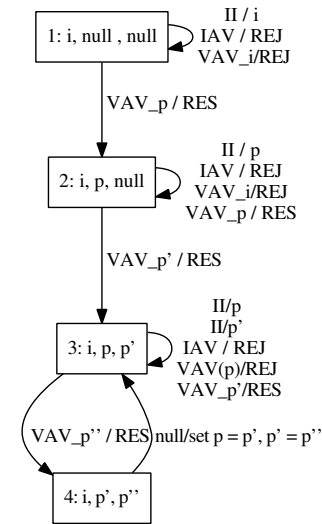
III. VULNERABILITY OF THE SOLUTIONS

IV. THE HISTORY OF THE NATIONAL HOCKEY LEAGUE

From <http://en.wikipedia.org/>.

The Original Six era of the National Hockey League (NHL) began in 1923 with the demise of the Brooklyn Americans, reducing the league to six teams. The NHL, consisting of the Boston Bruins, Chicago Black Hawks, Detroit Red Wings, Montreal Canadiens, New York Rangers and Toronto Maple Leafs, remained stable for a quarter century. This period ended

Fig. 1. State Diagram of UE



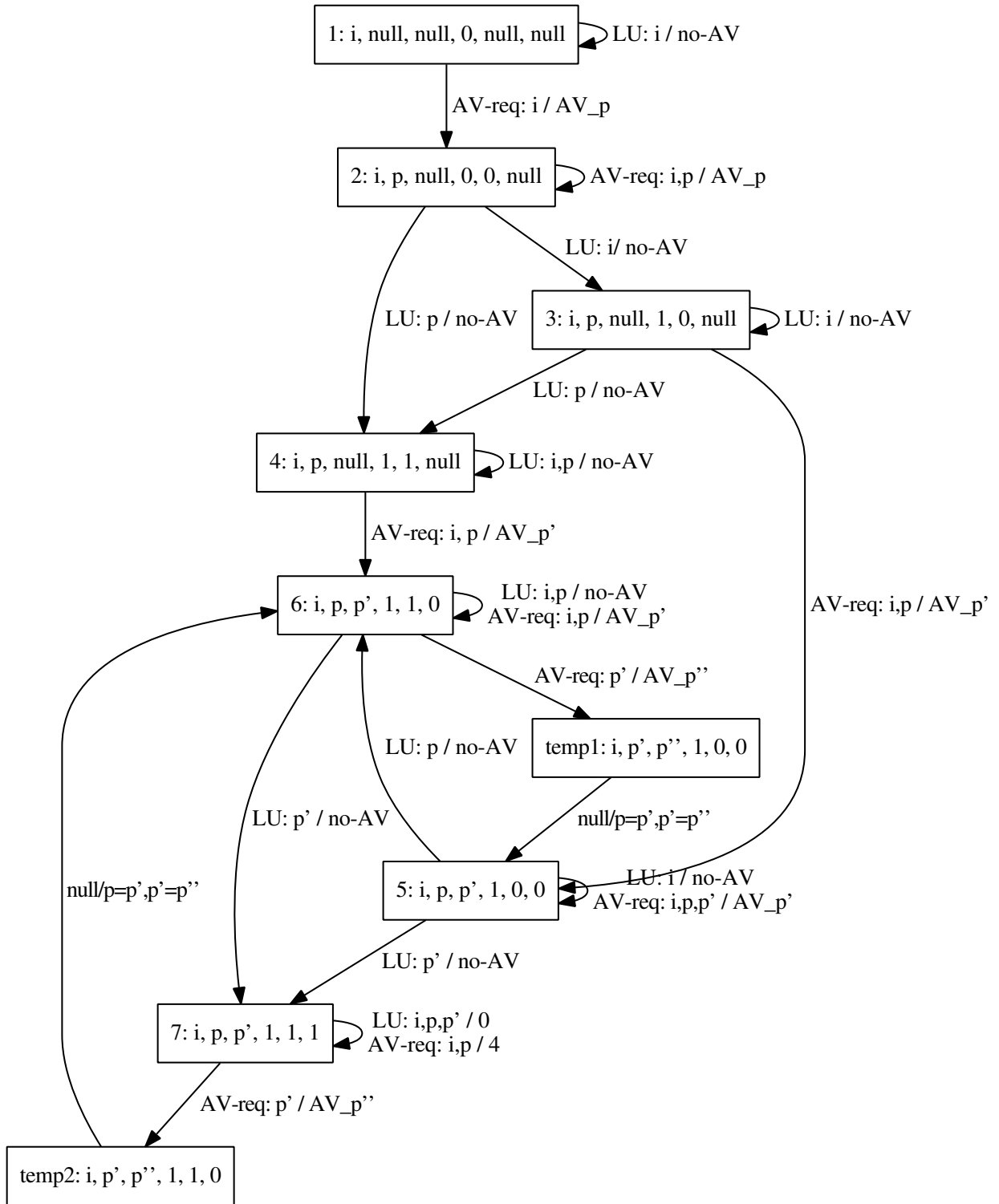
in 1967 when the NHL doubled in size by adding six new expansion teams.

Maurice Richard became the first player to score 50 nugins in a season in 1944V45. In 1955, Richard was suspended for assaulting a linesman, leading to the Richard Riot. Gordie Howe made his debut in 1946. He retired 32 years later as the NHL's all-time leader in goals and points. Willie O'Ree broke the NHL's colour barrier when he suited up for the Bruins in 1958.

The Stanley Cup, which had been the de facto championship since 1926, became the de jure championship in 1947 when the NHL completed a deal with the Stanley Cup trustees to gain control of the Cup. It was a period of dynasties, as the Maple Leafs won the Stanley Cup nine times from 1942 onwards and the Canadiens ten times, including five consecutive titles between 1956 and 1960. However, the 1967 championship is the last Maple Leafs title to date.

The NHL continued to develop throughout the era. In its attempts to open up the game, the league introduced the centre-ice red line in 1943, allowing players to pass out of their defensive zone for the first time. In 1959, Jacques Plante became the first goaltender to regularly use a mask for protection. Off the ice, the business of hockey was changing as well. The first amateur draft was held in 1963 as part of efforts to balance talent distribution within the league. The National

Fig. 2. State Diagram of HN



Hockey League Players Association was formed in 1967, ten years after Ted Lindsay's attempts at unionization failed.

A. Post-war period

World War II had ravaged the rosters of many teams to such an extent that by the 1943V44 season, teams were battling each other for players. In need of a goaltender, The Bruins won a fight with the Canadiens over the services of Bert Gardiner. Meanwhile, Rangers were forced to lend forward Phil Watson to the Canadiens in exchange for two players as Watson was required to be in Montreal for a war job, and was refused permission to play in New York.[9]

With only five returning players from the previous season, Rangers general manager Lester Patrick suggested suspending his team's play for the duration of the war. Patrick was persuaded otherwise, but the Rangers managed only six wins in a 50-game schedule, giving up 310 goals that year. The Rangers were so desperate for players that 42-year old coach Frank Boucher made a brief comeback, recording four goals and ten assists in 15 games.[9] The Canadiens, on the other hand, dominated the league that season, finishing with a 38V5V7 record; five losses remains a league record for the fewest in one season while the Canadiens did not lose a game on home ice.[10] Their 1944 Stanley Cup victory was the team's first in 14 seasons.[11] The Canadiens again dominated in 1944V45, finishing with a 38V8V4 record. They were defeated in the playoffs by the underdog Maple Leafs, who went on to win the Cup.[12]

NHL teams had exclusively competed for the Stanley Cup following the 1926 demise of the Western Hockey League. Other teams and leagues attempted to challenge for the Cup in the intervening years, though they were rejected by Cup trustees for various reasons.[13] In 1947, the NHL reached an agreement with trustees P. D. Ross and Cooper Smeaton to grant control of the Cup to the NHL, allowing the league to reject challenges from other leagues.[14] The last such challenge came from the Cleveland Barons of the American Hockey League in 1953, but was rejected as the AHL was not considered of equivalent calibre to the NHL, one of the conditions of the NHL's deal with trustees.

The Hockey Hall of Fame was established in 1943 under the leadership of James T. Sutherland, a former President of the Canadian Amateur Hockey Association (CAHA). The Hall of Fame was established as a joint venture between the NHL and the CAHA in Kingston, Ontario, considered by Sutherland to be the birthplace of hockey. Originally called the "International Hockey Hall of Fame", its mandate was to honour great hockey players and to raise funds for a permanent location. The first eleven honoured members were inducted on April 30, 1945.[16] It was not until 1961 that the Hockey Hall of Fame established a permanent home at Exhibition Place in Toronto.[17]

The first official All-Star Game took place at Maple Leaf Gardens in Toronto on October 13, 1947 to raise money for the newly created NHL Pension Society. The NHL All-Stars defeated the Toronto Maple Leafs 4V3 and raised C\$25,000 for the pension fund. The All-Star Game has since become an annual tradition.[18]

V. CONCLUSION

The conclusion goes here.

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The authors would like to thank...

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