

BENCHMARKING STUDY OF REDUNDANCY PROTOCOLS IN A SIMULATED ENVIRONMENT

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First Hop Redundancy Protocols refers to a collection of protocols that enable a network router to immediately assume control in the event of a primary gateway router failure [1]. This work has focused on the distinguishing characteristics of the most frequently used FHRP protocols, including the Hot Standby Router Protocol (HSRP), the Virtual Router Redundancy Protocol (VRRP), and the Gateway Load Balancing Protocol (GLBP). Benchmarking experiments compared the suggested redundancy protocols (HSRP, VRRP, and GLBP) for various performance factors, including packet loss, convergence time, and CPU utilization. The evaluations are demonstrated through simulations using the GNS3 tool and network analyzer Wireshark. GLBP averages 0.13 percent in interpretation, while VRRP and HSRP average 0.11 and 0.15 percent, respectively. Generally, these percentages do not scale with the quantity of traffic passing through the switch or router. As a result, regardless of whether the switch is entirely idle or transmitting a large amount of traffic, the average CPU utilization percentages remain stable. Convergence times for FHRP protocols are compared to their default values. The timestamped data is post-measured to determine the changing receive rate in convergence. The actual convergence time depends on the timers configured for the group and possibly on routing protocol convergence. In conclusion, theoretical evaluations and laboratory experiments proved that the GLBP is the most potent and reliable protocol since it provides load balancing [2]. In addition, GLBP outperforms both the HSRP and VRRP. When the GLBP is applied, the available CPU capacity is utilized more efficiently, and the network is in the most stable state possible.

References: 1. *Lemeshko O.* Investigation of Enhanced Mathematical Model For Traffic Engineering Fault-Tolerant Routing / *O. Lemeshko, O. Yeremenko, A. Mersni* // International Conference on Engineering and Emerging Technologies (ICEET). Proceedings. Istanbul, Turkey, 2021, P. 1-6. DOI: 10.1109/ICEET53442.2021.9659606. 2. *Mersni A.* Complex criterion of load balance optimality for multipath routing in telecommunication networks of nonuniform topology / *A. Mersni, A.E. Ilyashenko* // Telecommunications and Radio Engineering, 76(7), 2017. P. 579-590. DOI: 10.1615/TelecomRadEng.v76.i7.20.