Examining the impact of link failures and network performance on a 6to4, 6rd, CHANC and D4across6 tunneling-based networks using various routing protocols

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Aims and scope

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Abstract

The article discusses the importance of failure recovery in communication networks to ensure smooth and dependable service. It states that the performance of real-time applications has been negatively affected for years due to failed links, and thus it is crucial to address the issue to prevent collapse and cascading failures for both users and service providers. The paper then goes on to analyze the performance of a network by simulating

the failure and recovery of network links for different time periods using the 6rd, CHANC, D4across6 and 6to4 tunneling network. Different routing protocols and tunneling techniques are employed to evaluate the performance of the network for the specific type of applications (i.e. video streaming and real-time voice). It also looks at different metrics, including data transfer rate, dropped traffic, and network convergence. Furthermore, the study delves into the examination of the route table properties of various routers and the IPv4 backbone when links between them experience repeated failures and recoveries. The purpose of this analysis is to anticipate network performance and to ensure network availability and accessibility of traffic through forecasting the network's ability to survive and recover from link failures.

References

1. Bedi P, Dua A, Jindal V (2023) FIHIM: a framework for information hiding in IPv6 using micro-protocols. Int J Inf Technol. https://doi.org/10.1007/s41870-023-01511-4

Article Google Scholar

2. Hamarsheh A, Goossens M (2021) A review: breaking the deadlocks for A. Hamarsheh et al. Adv Sci Technol Eng Syst J 6(1):336–341. www.astesj.com 341 Transition to IPv6," IETE Technical Review, 31(6), 405–421, 2014, https://doi.org/10.1080/02564602.2014.950348

3. Hamarsheh A, Eleyat M (2017) Performance analysis of Ain-Pt, Ain-Slt and Siit Network-based translators. In: Advances on P2P, Parallel, Grid, Cloud and Internet Computing Proceedings of the 12th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2017), Lecture Notes on Data Engineering and Communications T. Springer, 10, Palau Macaya, Barcelona, Spain, 367–378. https://doi.org/10.1007/978-3-319-69835-9_35

4. Tomar SS, Rawat A, Vyavahare PD et al (2020) Conceptual model for comparison of IPv6 ISPs based on IPv4 traffic profiles. Int J Inf Technol 12:1171–1182. https://doi.org/10.1007/s41870-020-00453-5

Article Google Scholar

5. Hamarsheh A, Goossens M, Al-Qerem A (2012) Assuring interoperability between heterogeneous (IPv4/IPv6) networks without using protocol translation. IETE Tech Rev 29(2):114–132. https://doi.org/10.4103/0256-4602.95384

Article Google Scholar

6. Wang L and Li D (2011) Simulation analysis of IPv6 transition mechanisms. In: International Conference on Computer Science and Network Technology, pp 352–355

7. Hamarsheh A (2018) Deploying IPv4-only connectivity across local IPv6-only access networks. IETE Tech Rev 36(4):398–411. https://doi.org/10.1080/02564602.2018.1498031

Article Google Scholar

8. Paganraj D (2024) Dair-mlt: detection and avoidance of IoT routing attacks using machine learning techniques. Int J Inf Technol. https://doi.org/10.1007/s41870-024-01794-1

Article Google Scholar

9. Despres R (2010) IPv6 rapid deployment on IPv4 infrastructures (6rd). Internet Engineering Task Force RFC 5569

10. Hamarsheh A, Goossens M, Alasem R (2011) Configuring hosts to autodetect (IPv6, IPv6-in-IPv4, or IPv4) network connectivity. KSII Trans Internet Inf Syst 5(7):1230–1251. https://doi.org/10.3837/tiis.2011.07.002

Article Google Scholar

11. Lu Z, Yang H (2012) Unlocking the power of OPNET modeler. Cambridge University Press

Book Google Scholar

12. Sulthana SR, Kiran PS (2023) Designing a secure wide area network for multiple office connectivity. In: Bhateja V, Mohanty JR, Flores Fuentes W, Maharatna K (eds)

Communication, software and networks. Lecture notes in networks and systems, vol. 493. Springer, Singapore. https://doi.org/10.1007/978-981-19-4990-6_44

13. Ahmed MZ, AbdallahHashim AH, Khalifa OO et al (2017) Border Gateway Protocol to provide failover in multihoming environment. Int J Inf Technol 9:33–39. https://doi.org/10.1007/s41870-017-0003-1

Article Google Scholar

14. Hamarsheh A and Abdalaziz Y (2019) Transition to IPv6 protocol where we are?. In: Proceeding of IEEE International Conference of Computer Information Science (ICCIS)

15. Abdalaziz Y, Hamarsheh A (2020) Analyzing the Ipv6 deployment process in palestine. Int J Comput Netw Inf Secur 12(5):31–45. https://doi.org/10.5815/ijcnis.2020.05.03

Article Google Scholar

16. Adeniji OD, Ayomıde MO, Ajagbe SA (2023) A model for network virtualization with openflow protocol in software-defined network. In: Rajakumar G, Du KL, Vuppalapati C, Beligiannis GN (eds) Intelligent communication technologies and virtual mobile networks. Lecture notes on data engineering and communications technologies, vol. 131. Springer, Singapore. https://doi.org/10.1007/978-981-19-1844-5_57

17. Meng Y, Zhang H (2023) Recovery strategy of virtual power plant with resilience improvement under cascaded failure scenarios. Int J Electric Power Energy Syst 148:108918. https://doi.org/10.1016/j.ijepes.2022.108918. (**ISSN 0142-0615**)

Article Google Scholar

18. Tian Y-C, Gao J (2023) Network routing architecture. Springer Nature, Singapore, pp 221–273

Google Scholar

19. Ahmed MRA & Shaikhedris SSA (2020) Network migration and performance analysis of IPv4 and IPv6. In: 2020 International Conference on Computer, Control, Electrical, and Electronics Engineering (ICCCEEE) (pp 1–6). IEEE

20. Hamarsheh A, Goossens M (2012) Illustrating the impediments for widespread deployment of IPv6. In: Proceedings of the 11th international conference on Telecommunications and Informatics, Proceedings of the 11th international conference on Signal Processing

21. Hughes LE (2022) Transition mechanisms. In: Third generation internet revealed. Apress, Berkeley, CA. https://doi.org/10.1007/978-1-4842-8603-6_8

22. Pei J, Zhong K, Jan MA, Li J (2022) Personalized federated learning framework for network traffic anomaly detection. Comput Networks 209:108906

Article Google Scholar

23. Al-Qerem, Ahmad, Ali Mohd Ali, Shadi Nashwan, Ala Hamarsheh, Ahmad Nabot, and Issam Jibreen. "Transactional Services for Concurrent Mobile Agents over Edge/Cloud Computing-Assisted Social Internet of Things." ACM Journal of Data and Information Quality.

24. al-Qerem A, Hammarsheh A, Ali AM, Alslman Y and Alauthman M (2023) Using consensus algorithm for blockchain application of roaming services for mobile network. Int J Adv Soft Comput Appl 15(1):56–67

25. Ali AM, Hassan MR, Al-Qerem A, Hamarsheh A, Al-Qawasmi K, Aljaidi M, Abu-Khadrah A, Kaiwartya O, Lloret J (2023) Towards a smart environment: optimization of WLAN technologies to enable concurrent smart services. Sensors 23(5):2432

Article Google Scholar

26. Hamarsheh A, Abdalaziz Y, Nashwan S (2021) Recent impediments in deploying IPv6. Adv Sci Technol Eng Syst J 6(1):336–341

Article Google Scholar

27. Hamarsheh A and AbdAlaziz Y (2019) Transition to IPv6 protocol, Where we are? In: 2019 International Conference on Computer and Information Sciences (ICCIS), pp 1–6. IEEE

28. Hamarsheh A, Goossens M (2014) A review: breaking the deadlocks for transition to IPv6. IETE Tech Rev 31(6):405–421

Google Scholar

29. Hamarsheh A, Goossens M (2011) Exploiting local IPv4-only access networks to deliver IPv6 service to end-users. Int J Comput Commun 5(3):169–177

Google Scholar

30. Ullah A et al (2023) Performance evaluation of MANET routing protocols based on size and speed parameters. UCP J Eng Inf Technol 1(2):08–16

Google Scholar

31. Kurnaz C, Kola AF, Esenalp MO (2023) Performance analysis and modeling based on LTE-A field measurements: a city center example. Int J Inf Technol 15:1919–1925. https://doi.org/10.1007/s41870-023-01254-2

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Ethics declarations

Conflict of interest

The author claims no research, authorship, or publishing conflicts of interest.

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