

DAFTAR PUSTAKA

- [1] X. Chen, Z. Xu, and L. Shang, "Satellite Internet of Things: Challenges, Solutions, and Development Trends," *Front. Inf. Technol. Electron. Eng.*, vol. 24, no. 7, pp. 935–944, Jul. 2023, doi: 10.1631/FITEE.2200648.
- [2] M. A. Arifin, N. M. N. Khamsah, N. Najati, W. Suryanto, and I. E. Prabowo, "Data Collection Platform Design using LEO Satellite-based LoRa for Disaster Management in Indonesia," in *2023 IEEE International Conference on Aerospace Electronics and Remote Sensing Technology (ICARES)*, Bali, Indonesia: IEEE, Oct. 2023, pp. 1–7. doi: 10.1109/ICARES60489.2023.10329893.
- [3] J. A. Fraire, O. Iova, and F. Valois, "Space-Terrestrial Integrated Internet of Things: Challenges and Opportunities," *IEEE Commun. Mag.*, vol. 60, no. 12, pp. 64–70, Dec. 2022, doi: 10.1109/MCOM.008.2200215.
- [4] D. A. Rahayu *et al.*, "An Integrated Ground Segment Framework for NEO-1: Automated Data Pipelines to Maritime Intelligence," in *2025 IEEE International Conference on Aerospace Electronics and Remote Sensing Technology (ICARES)*, Oct. 2025, pp. 1–7. doi: 10.1109/ICARES67579.2025.11371560.
- [5] H. Andre, R. Fernandez, and Baharuddin, "Dipole planar bowtie printed antenna for ism application," in *IOP Conference Series: Materials Science and Engineering*, IOP Publishing, 2019, p. 012022. Accessed: Jul. 04, 2026. [Online]. Available: <https://iopscience.iop.org/article/10.1088/1757-899X/602/1/012022/meta>
- [6] H. Andre, B. A. Sugara, B. Baharuddin, R. Fernandez, and R. W. Pratama, "Analisis Komunikasi Data Jaringan Nirkabel Berdaya Rendah Menggunakan Teknologi Long Range (LoRa) di Daerah Hijau Universitas Andalas: Analysis of Low Power Wireless Network Data Communication Using Long Range (LoRa) Technology in the Green Area of Andalas University," *J. Ecotipe Electron. Control Telecommun. Inf. Power Eng.*, vol. 9, no. 1, pp. 1–7, 2022.
- [7] M. Asad Ullah, G. Pasolini, K. Mikhaylov, and H. Alves, "Understanding the Limits of LoRa Direct-to-Satellite: The Doppler Perspectives," *IEEE Open J. Commun. Soc.*, vol. 5, pp. 51–63, 2024, doi: 10.1109/OJCOMS.2023.3337004.
- [8] Q. Bader, H. Salem, H. Elghamrawy, and A. Nouredin, "Doppler-Based Positioning with LEO Satellites: A Survey of Techniques, Challenges, and Opportunities," Jun. 15, 2025, *Preprints*. doi: 10.36227/techrxiv.175001088.84355523/v1.
- [9] L. M. Pires and J. Martins, "Experimental Study on the Importance of Interference in the Spreading Factor and Effects of Collisions for the LoRaWAN Radio Interface," *Preprints.org*, Jun. 2024, doi: 10.20944/preprints202406.0538.v1.
- [10] M. A. Ullah *et al.*, "Extending the LoRa Direct-to-Satellite Limits: Doppler Shift Pre-Compensation," *IEEE Open J. Commun. Soc.*, vol. 6, pp. 2256–2273, 2025, doi: 10.1109/OJCOMS.2025.3554077.
- [11] A. Vizzarri, "LORA-to-LEO Satellite—A Review with Performance Analysis," *Electronics*, vol. 15, no. 1, Dec. 2025, Accessed: May 18, 2026. [Online]. Available: <https://www.mdpi.com/2079-9292/15/1/46>

- [12] G. Álvarez, J. A. Fraire, K. A. Hassan, S. Céspedes, and D. Pesch, "Uplink Transmission Policies for LoRa-Based Direct-to-Satellite IoT," *IEEE Access*, vol. 10, pp. 72687–72701, 2022, doi: 10.1109/ACCESS.2022.3189647.
- [13] LoRa Alliance, "LoRaWAN Regional Parameters RP2-1.0.3." LoRa Alliance Technical Committee, 2021. [Online]. Available: https://loralliance.org/resource_hub/lorawan-regional-parameters-rp2-1-0-3/
- [14] R. Taqwa, H. A. D. Rimbawa, A. Miptahudin, B. N. K. Hasibuan, A. K. Sastradinata, and A. M. Bangun, "Analysis and design of an inset-feed microstrip antenna for a LEO satellite IoT ground station at 921 MHz," *J. Mandiri IT*, vol. 14, no. 2, 2025.
- [15] M. S. Yahya *et al.*, "A Compact Dual Band Microstrip Patch Antenna for LoRa IoT Applications," in *2022 IEEE International RF and Microwave Conference (RFM)*, Dec. 2022, pp. 1–4, doi: 10.1109/RFM56185.2022.10065043.
- [16] Mayank *et al.*, "LEO-PNT Feasibility Aspects: Satellite Navigation Payload Size, Weight, and Power Analysis," *IEEE Access*, vol. 13, pp. 110069–110089, 2025, doi: 10.1109/ACCESS.2025.3583080.
- [17] M. S. Yahya, S. Soeung, S. K. A. Rahim, U. Musa, S. S. Ba Hashwan, and Md. A. Haque, "Machine Learning-Optimized Compact Frequency Reconfigurable Antenna With RSSI Enhancement for Long-Range Applications," *IEEE Access*, vol. 12, pp. 10970–10987, 2024, doi: 10.1109/ACCESS.2024.3355145.
- [18] C. A. Balanis, *Antenna theory: analysis and design*, Fourth edition. Hoboken, New Jersey: Wiley, 2016.
- [19] R. Garg, *Microstrip Antenna Design Handbook*. Artech House, 2001.
- [20] F.-Z. Bennioui *et al.*, "Genetic Algorithm Optimization of a Wideband Rectangular Patch Antenna with an Asymmetric U-Slot and Partial Ground for Ku-Band Satellite Communication.," *Prog. Electromagn. Res. M*, vol. 133, p. 51, Mar. 2025, doi: 10.2528/PIERM25020802.
- [21] O. Puspitorini, A. Wijayanti, N. A. Siswandari, P. E. W. Lestari, and R. H. Wananda, "Reconfigurable Dual-Band Circular Patch Antenna Using Capacitive Tuning and DGS for MSSR," in *2025 IEEE International Conference on Aerospace Electronics and Remote Sensing Technology (ICARES)*, Oct. 2025, pp. 1–5. doi: 10.1109/ICARES67579.2025.11371570.
- [22] W. J. Lee, W.-S. Yoon, D. Ahn, and S.-M. Han, "Compact Design Method for Planar Antennas with Defected Ground Structures," *Electronics*, vol. 12, no. 10, p. 2226, Jan. 2023, doi: 10.3390/electronics12102226.
- [23] A. S. Vasu and T. K. Sreeja, "A compact flexible dual band coplanar waveguide fed antenna for 5 G applications," *Analog Integr. Circuits Signal Process.*, vol. 123, no. 3, p. 47, Apr. 2025, doi: 10.1007/s10470-025-02393-1.
- [24] M. Zahid, M. M. Taqdeer, and Y. Amin, "A Compact Dual-Band Microstrip Patch Antenna for C- and X- and Ku-Band Applications," *Eng. Proc.*, vol. 46, no. 1, p. 16, 2023, doi: 10.3390/engproc2023046016.
- [25] R. N. Simons, *Coplanar Waveguide Circuits, Components, and Systems*. New York, NY: John Wiley & Sons, 2001.

- [26] M. Shokri, C. Ghobadi, and J. Nourinia, "Dual-band circularly polarized asymmetric dipole array antenna for GPS L1 and L2 bands," *AEU - Int. J. Electron. Commun.*, vol. 169, p. 154753, Sep. 2023, doi: 10.1016/j.aeue.2023.154753.
- [27] S. Alam *et al.*, "High Stability Single-Port Dual Band Microwave Sensor Based on Interdigital Capacitor Structure With Asymmetry Branch Feedline," *IEEE Access*, vol. 13, pp. 24576–24586, 2025, doi: 10.1109/ACCESS.2025.3538042.
- [28] T. Sarkar, R. P. Ghosh, and R. R. Pal, "Closed form expression to predict the resonant frequencies of a dual band asymmetric double-sided printed dipole antenna," *Int. J. Electron.*, vol. 113, no. 1, pp. 24–38, Jan. 2026, doi: 10.1080/00207217.2025.2493122.
- [29] D. M. Pozar, *Microwave engineering*, 4th ed. Hoboken, NJ: Wiley, 2012.
- [30] S. Z. A. Mehdi, A. Mohd Ali, and S. Zulkifli, "LoRaWAN CubeSat with an Adaptive Data Rate: An Experimental Analysis of Path Loss Link Margin," *Aerospace*, vol. 10, no. 1, p. 53, Jan. 2023, doi: 10.3390/aerospace10010053.
- [31] F. Rolland, Z. Zhou, N. Accettura, and P. Berthou, "Achieving reduced latency and energy efficiency in Direct-to-Satellite LoRaWAN communications," in *2025 IEEE 21st International Conference on Factory Communication Systems (WFCS)*, Jun. 2025, pp. 1–4. doi: 10.1109/WFCS63373.2025.11077617.
- [32] F. Ferrero, M. T. Nguyen, and T. L. Huy, "Dual-Band Integrated Antenna for 433 and 868 MHz IoT Communication," in *2025 IEEE International Symposium on Antennas and Propagation and North American Radio Science Meeting (AP-S/CNC-USNC-URSI)*, Ottawa, ON, Canada: IEEE, Jul. 2025, pp. 1287–1289. doi: 10.1109/AP-S/CNC-USNC-URSI55537.2025.11266737.
- [33] T. Darwish, G. K. Kurt, H. Yanikomeroğlu, M. Bellemare, and G. Lamontagne, "LEO Satellites in 5G and Beyond Networks: A Review From a Standardization Perspective," *IEEE Access*, vol. 10, pp. 35040–35060, 2022, doi: 10.1109/ACCESS.2022.3162243.
- [34] C. P. Wen, "Coplanar Waveguide: A Surface Strip Transmission Line Suitable for Nonreciprocal Gyromagnetic Device Applications," *IEEE Trans. Microw. Theory Tech.*, vol. 17, no. 12, pp. 1087–1090, Dec. 1969, doi: 10.1109/TMTT.1969.1127105.
- [35] I. Ahmad *et al.*, "Highly Compact GCPW-Fed Multi-Branch Structure Multi-Band Antenna for Wireless Applications," *Int. J. Antennas Propag.*, vol. 2022, no. 1, p. 1917807, 2022, doi: 10.1155/2022/1917807.
- [36] Chemandy Electronics, "Coplanar Waveguide with Ground Calculator." [Online]. Available: <https://chemandy.com/calculators/coplanar-waveguide-with-ground-calculator.htm>. [Diakses: 8 Agustus 2026].