UTCAL REPORT

Private LTE Networks for Utilities in Brazil

Modernizing mission-critical communications for electricity networks

250 MHz | 410 MHz | 450 MHz | 700 MHz | 3.7GHz

Focus Areas

- Remote metering and distribution automation
- Hybrid telecommunications architectures
- Spectrum predictability for mission critical networks

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Utilities Telecom & Technology Council América Latina™

Research | Regulation | Network modernization

Private LTE Networks for Utilities in Brazil

1 Executive Summary

1.1 Objective

This report consolidates the results of research conducted by UTCAL with its member companies on initiatives to modernize their telecommunications networks, focusing on the deployment of private LTE networks to support operations in the Brazilian electricity sector.

1.2 Scope

The research focused on Brazilian electricity distribution companies associated with UTCAL and sought to:

- Characterize the current situation of private LTE networks already deployed;
- Provide updated information on plans for deployment and expansion of private LTE networks over the next two years;
- Identify frequency bands in use and intended for use;
- Survey suppliers of network equipment (eNodeB – evolved NodeB, EPC – Evolved Packet Core and CPE – Customer Premises Equipment) and network architecture models;
- Understand network coverage, primary supported applications, and adopted business models.

In addition to the research results, this document presents:

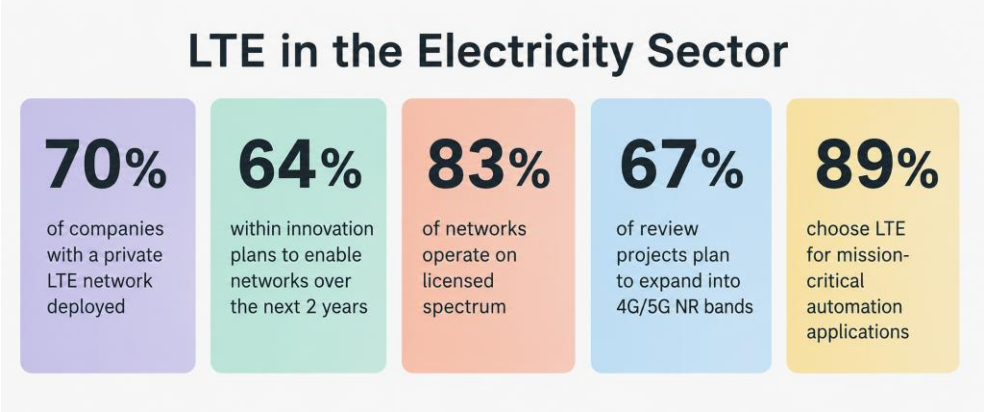
- The sectoral and regulatory context, with emphasis on MME[1] Normative Ordinances No. 111/2025 and No. 126/2026, Anatel[2] Resolution No. 772/2025 (PDFF), and Act No. 915/2024;
- The methodology applied and sample representativeness;
- Action proposals for public policy and regulatory bodies
- Recommendations for electricity companies, and manufacturers/suppliers.

1.3 Key Highlights

- 70% of responding companies already have private LTE networks deployed and integrated into their telecommunications infrastructure.
- 64% of companies plan to invest in private LTE networks over the next two years, either implementing their first network or expanding existing networks.
- 83% of deployed LTE networks use licensed spectrum, obtained through Anatel authorization.
- The 250 MHz, 450 MHz, and 700 MHz bands are used in operational networks, while 410 MHz and 3.7 GHz appear in pilot initiatives.

[1] MME – Ministry of Mines and Energy
[2] ANATEL - National Telecommunications Agency

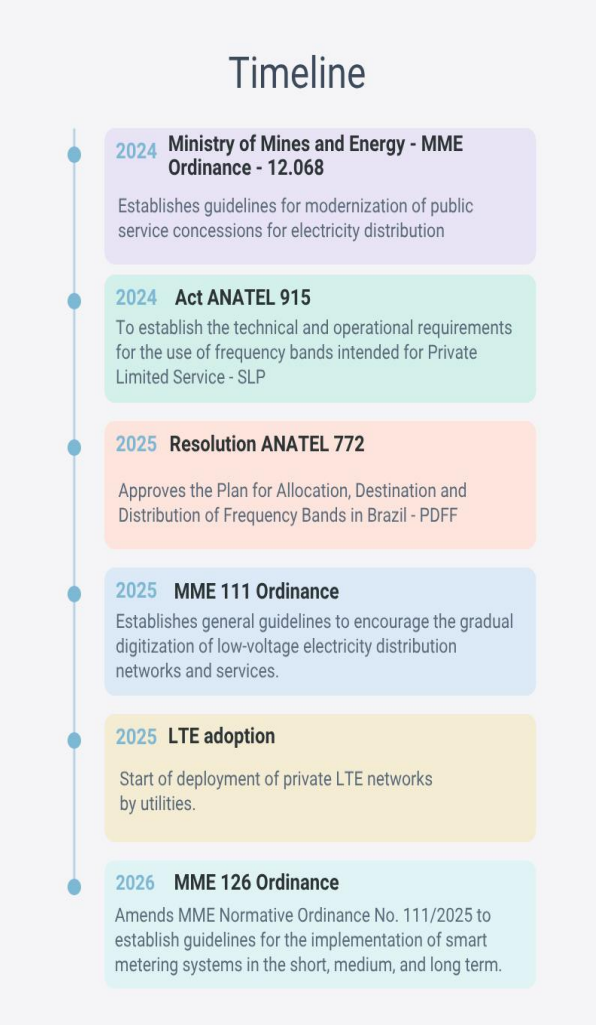
- For new projects, 67% of companies consider the 450 MHz band as the primary option, and 11% opt for 410 MHz; 22% are still evaluating between 410 MHz and 450 MHz.
- 100% of operational LTE networks are used for remote metering, and 67% are also used for distribution automation.
- For planned networks, the key applications being considered are distribution automation (89%), remote metering (78%), mobile workforce communication (78%), and substation automation (56%).
- 56% of companies plan to integrate LTE networks with other technologies (fiber optics, operator networks, LoRaWAN, Wi-SUN, satellite, radio, MPLS).
- 67% of companies with plans for new projects have contracted or intend to contract external consulting services to support planning and deployment.



2 Sectoral and Regulatory Context

2.1 MME Normative Ordinances No. 111/2025 and No. 126/2026

The Normative Ordinances of the Ministry of Mines and Energy (MME) No. 111, dated June 23, 2025 and No. 126, dated January 28, 2026, establish guidelines to stimulate the gradual digitalization of low-voltage electricity distribution networks and services in Brazil.



These Ordinances aim to modernize the electricity sector by 2035, with a focus on:

- Greater operational and economic efficiency;
- Network resilience and security;
- Transparency in operations and service quality;
- Innovation and provision of new services to consumers;
- Creation of customized solutions and products that favor the opening of the low-voltage market.

The Ordinances were issued in compliance with Decree No. 12.068/2024 and provide for the implementation of mechanisms for measuring independent performance indicators, ensuring greater impartiality and reliability in assessing the evolution of digitalization.

2.2 Regulatory Framework for Private Networks – ANATEL

2.2.1 Act No. 915/2024

Published in February 2024, Anatel's – National Telecommunication Agency- Act No. 915 establishes technical and operational requirements for the use of radiofrequency bands designated for the Private Limited Service (SLP), consolidating previous standards and aligning them with the Plan for Allocation[3], Destination and Distribution of Frequency Bands (PDFF).

[3] In the **ITU Radio Regulations (RR)**, an **allocation** is the designation of a frequency band for use by one or more radiocommunication services under specified conditions. Allocation refers to frequencies being designated to a radiocommunications *service* (such as mobile, fixed, broadcasting, amateur, or satellite services

For the utilities sector — including electricity, gas, water, and other critical infrastructure companies — Act No. 915/2024 is a significant regulatory milestone because it:

- Defines clear conditions for the use of bands designated for SLP;
- Prioritize, among others, the 410–415 MHz and 420–425 MHz bands for dedicated private network applications;
- Facilitates the deployment of mission-critical networks used in automation, telemetry, IoT, and operational communications.

By modernizing the rules for spectrum use, Act No. 915/2024 provides greater regulatory predictability and reduces uncertainties for investments in dedicated private networks.

2.2.2 Resolution No. 772/2025 (PDFF) and Bands Designated for SLP

Anatel Resolution No. 772, dated January 16, 2025, approves the new Plan for Allocation, Destination, and Distribution of Frequency Bands in Brazil (PDFF) and revokes the previous Resolution No. 759. Among other aspects, that Resolution:

- Establishes the general conditions for the use of radiofrequency bands in the country;
- Defines, in its Annex III, the specific rules applicable to the use of bands designated for SLP;
- Ensures that systems providing services of collective interest (services offered to the public in general) cannot cause harmful interference, nor request protection, in relation to stations of the Private Limited Service (SLP) in the 410–415/420–425 MHz bands.

In practice, this reinforces the priority of using the 410–415/420–425 MHz bands by electricity, gas, and water companies throughout the national territory for mission-critical applications.

For the deployment of a private network using LTE technology, companies must obtain:

- A license to provide the Private Limited Service (SLP);
- Authorization to use the required radio frequencies in the network; and
- Licenses for the corresponding radiocommunication stations.

SLP frequency authorizations are generally granted on a secondary basis and are entitled to protection against harmful interference, except where such interference originates from radiocommunication systems operating on a primary basis.

2.3 Modernization of the Electricity Sector and the Role of Private Networks

Electricity sector companies have been making significant efforts to comply with MME guidelines, which reinforce:

- The need for network modernization;
- Expanded digitalization of assets;
- Adoption of advanced communication solutions to ensure greater efficiency, reliability, and operational security.

Private telecommunications infrastructure, in this context, is the "nervous system" of operations, as it:

- Provides fast, secure and bidirectional communication for measurement, automation, and real-time supervision;
- Allows monitoring, controlling and optimizing assets across the entire generation, transmission and distribution chain;
- Ensures availability, latency and security requirements compatible with mission-critical applications.

Despite recent advances, especially with the designation of specific bands for SLP, there are still challenges to be addressed:

- The limited number of technically suitable bands for mission-critical applications (low latency, high availability, interference immunity and wide coverage) restricts, in some scenarios, the capacity for expanding private networks;
- Legal uncertainty regarding the designation of the 450 MHz band for SLP;
- The complexity of integrating private LTE networks with other technologies (fiber, operator networks, LoRaWAN, Wi-SUN, satellite, radio, MPLS) requires long-term planning and technical expertise.

3 Research Methodology

3.1 Questionnaire Structure

The methodology adopted was based on objective questionnaires, sent via electronic form to representatives of participating electricity distribution companies.

Two distinct questionnaires were developed:

3.1.1 Current Situation – Private LTE networks already deployed

- Basic network characteristics (frequency bands, bandwidth, number of eNodeBs, suppliers, coverage);
- Planning and deployment process;
- Supported applications;
- Backhaul technologies and integration with other networks.

3.1.2 Future Perspectives – Private LTE networks planned or under deployment

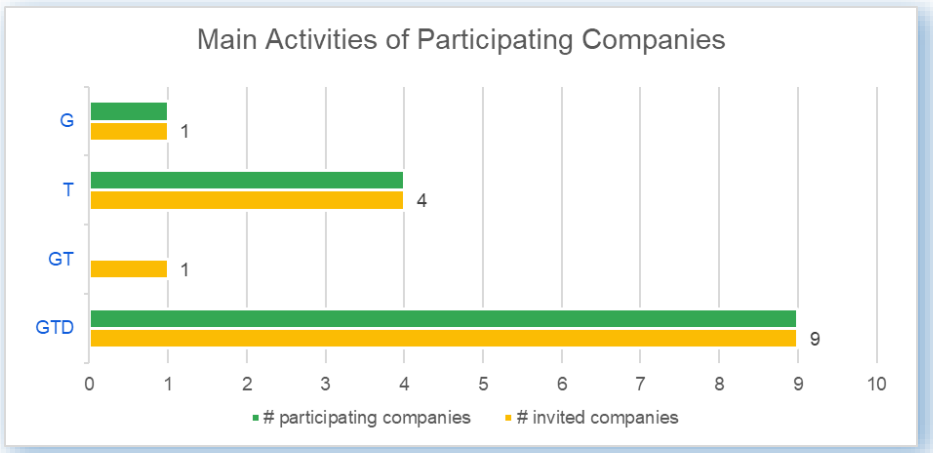
- Investment intention and project stage;
- Intended frequency bands;
- Planned network dimensions (number of eNodeBs);
- Foreseen future applications;
- Integration with other technologies and use of specialized consulting services.

The results presented in this report consolidate the responses obtained to provide a comprehensive view of the implementation stage of private LTE networks in electricity companies and the movements planned for the coming years.

3.2 Universe and Representativeness

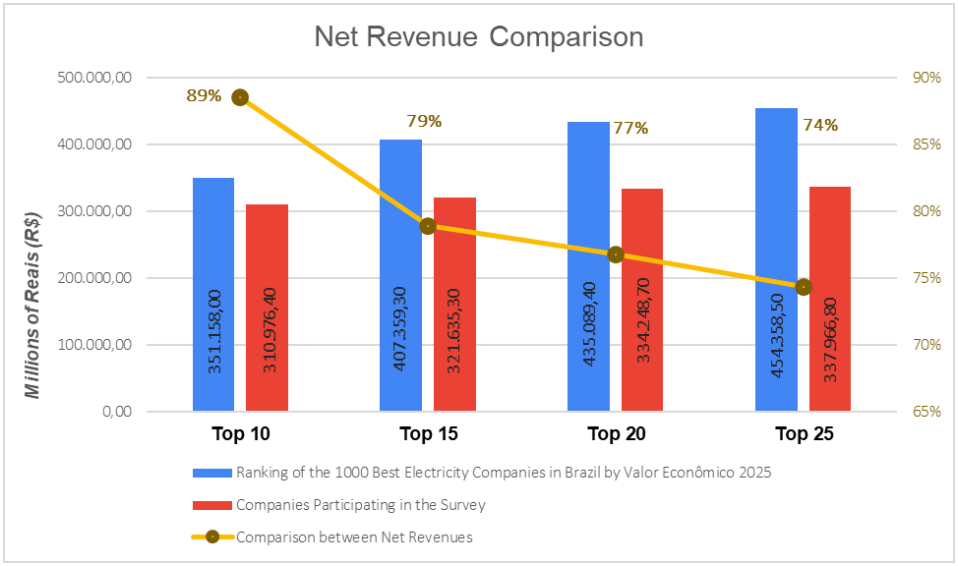
Fifteen companies were invited to participate, mostly associated with UTCAL, as follows:

- Fourteen responded to the questionnaire, corresponding to a 93% response rate.
- Among survey respondents:
  - Nine companies operate across Generation, Transmission, and Distribution (GTD);
  - One company operates in Generation (G);
  - One company operates across Generation and Transmission (GT);
- Four companies operate exclusively in Transmission (T).



The companies participating in the survey have a combined net revenue exceeding R$ 337 billion, representing approximately 74% of the combined net revenue of Top 25 largest companies in the sector listed in Valor Econômico's Ranking 1000 (2025 edition), whose combined revenue is R$ 454 billion.

When compared with the combined revenue of Top 10 largest electricity companies listed in the Ranking 1000, exceeding R$ 351 billion, the net revenue of the companies participating in this research represents 89%.



This sample provides the research with high representativeness, both in terms of the number of companies and in terms of economic relevance in the Brazilian electricity sector.

3.3 Digital Transformation Context

In recent years, the utilities sector has advanced the digital transformation of its operational assets through:

- Digitalization of processes;
- Automation of Network and substation;
- Implementation of advanced metering systems;
- Integration of renewable sources (solar, wind) and distributed energy resources.

The digitalization of electricity networks tends to generate significant benefits:

- Acceleration of the energy transition, with greater participation of renewable sources;
- Increased network security through early fault detection and voltage spike prevention;
- Reduction of accident risks, equipment damage and supply interruptions;
- Improved service quality for end consumers.

Private telecommunications infrastructure is the foundation of this transformation, as it offers:

- Priority access and full control of the communication network;
- Wide coverage, including urban and rural areas;
- Capacity to integrate large volumes of IoT devices and automation equipment.

4 Consolidated Results

4.1 Deployed Private LTE Networks

4.1.1 Adoption by Segment

Among participating companies, 50% reported that they already have private LTE networks deployed and operational. All these companies operate in the GTD segment.

Among companies that have not yet deployed LTE networks:

- 37.5% operate in the GTD segment;
- 25% operate exclusively in Generation;
- 37.5% operate exclusively in Transmission.

This profile indicates that companies with integrated generation, transmission, and distribution operations have a greater need for private LTE networks, reflecting the complexity of their operations and the pursuit of more robust and secure communication solutions for mission-critical demands.

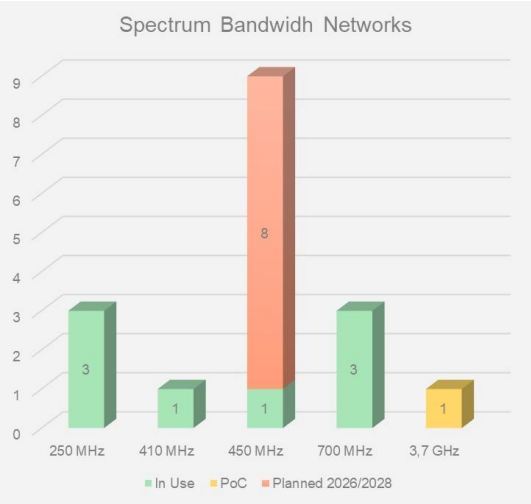
4.1.2 Frequency Bands Used

Regarding the frequency spectrum used in deployed private LTE networks:

- 83% of networks use licensed spectrum, through radiofrequency use authorization granted by Anatel;
- 17% operate with temporary authorizations, on a trial or pilot project basis.

Licensed and operational networks are distributed as follows:

- Three networks at 250 MHz;
- One network at 410 MHz;
- One network at 450 MHz;
- Three networks at 700 MHz;
- One network at 3.7 GHz.



Only one of the networks is in testing with temporary authorization, operating in the following band:

- 3.7 GHz.

This landscape reflects a diversified use of spectrum bands to date, with the 250 MHz and 700 MHz bands currently predominant. At the same time, a rapid and progressive migration toward bands designated for SLP is underway, particularly the 450 MHz band, due to its broader ecosystem availability and more favorable CAPEX and OPEX economics.

4.1.3 Geographic Coverage

The coverage of private LTE networks currently in operation is distributed as follows:

- 50% of networks provide coverage exclusively in urban areas;
- 33% provide coverage in both urban and rural areas;
- 17% provide coverage exclusively in rural areas.

Therefore, the initial focus is on urban areas, with gradual expansion into rural environments, where transmission lines, substations, and other critical assets are often located.

4.1.4 Equipment Suppliers and Network Architecture

All private LTE networks in operation have their assets (eNodeBs, EPCs, and CPEs) owned by electricity companies, which operate and directly manage these infrastructures.

The private networks currently in operations and under testing comprise a total of 70 LTE eNodeBs, distributed across frequency bands and equipment vendors. In terms of architecture:

- 70% of networks use the same vendor for eNodeBs and EPCs;
- 30% use different vendors for eNodeBs and EPCs;

- 50% of companies selected CPEs from vendors different from those supplying the eNodeBs and/or EPCs, driven by technical and/or economic considerations and reflecting a preference for interoperability and flexibility.

Table – Consolidated Supplier Overview by Frequency Band

Frequency Band	Status	eNodeBs	EPCs	CPEs
250 MHz	In Service	Trópico/Huawei*/ Furukawa	Capgemini/Huawei*/ Furukawa	Trópico/Huawei*/ Furukawa
410 MHz	In Service	Nokia	Nokia	Nokia
450 MHz	In Service	Nokia / Huawei	Huawei/GE Vernova/Tecsys	Nokia/ Tecsys/ GE Vernova /TD Tech
700 MHz	In Service	Nokia / Huawei	GE Vernova /Tecsys/HP/ Nokia	Nokia/GE Vernova/Tecsys
3.7 GHz	PoC	Nokia	Nokia	Nokia

Note: The information above summarizes the data provided by participating DSOs.

**Discontinued equipment*

4.1.5 Applications and Backhaul

In private LTE networks already deployed:

- 100% of companies use the network for remote metering;
- 67% also use it for distribution automation;
- Other reported applications include field team communications, substation automation, and IoT device connectivity.

Regarding backhaul technologies used to interconnect eNodeBs to the network core and corporate systems:

- 100% of companies use fiber optic and/or radio-based backhaul solutions.

4.2 Private LTE Networks in Planning

4.2.1 Investment Intention and Project Stage

Over the next two years:

- 64% of participating companies plan to invest in private LTE networks;
- Of these, 56% already have an LTE network installed and intend to expand it;
- 44% are in the process of acquiring and installing their first LTE network.
- The remaining 36% have no plans for LTE investments in the period, and none of these companies operate in the distribution segment.

Among companies with deployment or expansion plans:

- Only one intends to start the process with a PoC (Proof of Concept), indicating a relatively high degree of maturity regarding technology.

Projects are currently at different stages of implementation:

- Planning – Companies defining requirements, conducting coverage studies, and developing the network architecture;
- Acquisition – Companies with procurement processes in progress;
- Deployment – Companies undergoing network installation and commissioning.

Among companies in the Acquisition phase:

- 60% do not yet operate an LTE network and are acquiring the first solution;
- 40% are expanding existing LTE networks.

All companies in this group reported financing these investments with their own resources.

Additionally, 67% of companies with investment plans over the next two years reported that they have engaged, or intend to engage external consulting services for:

- Planning;
- Preliminary coverage studies;
- Detailed engineering design;
- Technical specifications;
- Deployment support.

4.2.2 Intended Frequencies

When selecting frequency bands for new networks:

- 67% of companies are considering the 450 MHz band (3GPP Band 31);
- 11% selected the 410 MHz band (3GPP Band 87) for technical and/or strategic reasons;
- 22% have not yet decided, evaluating both the 410 MHz and 450 MHz bands;
- One company is also considering the 250 MHz band;
- One company is also considering the 700 MHz band as a complementary alternative.

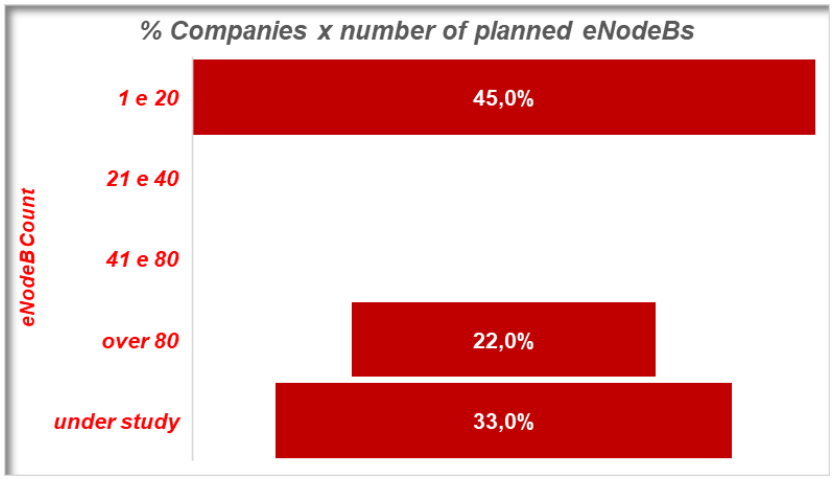
In all cases, companies intend to use the maximum bandwidth of 5+5 MHz established under Act No. 915/2024.

The data shows a clear shift toward the 450 MHz band as the primary choice for new private LTE utility network projects, with the 410 MHz band remaining relevant for certain specialized applications.

4.2.3 Planned Networks.

The estimated number of eNodeBs for LTE networks currently being planned varies among the responding companies. Grouping the projects according to the projected number of eNodeBs reveals the following:

- 45% of the responding companies estimate deploying between 1 and 20 eNodeBs in their new networks;
- 22% estimate deploying more than 80 eNodeBs, indicating larger scale networks with broader geographic coverage;
- 33% of the companies have not yet determined the number of eNodeBs to be deployed.



These results suggest that most projects currently in the planning phase are focused on priority or critical service areas, while a smaller share of initiatives are designed to provide extensive territorial coverage.

4.2.4 Future Applications and Integration with Other Networks

The primary applications planned for the new private LTE networks are:

- Distribution automation – 89%;
- Remote metering – 78%;
- Field crew communications – 78%;
- Substation automation – 56%;
- Other applications – 22%.

Within the "Other applications" category, respondents identified the following use cases:

- Communication with smart metering mesh network concentrators – 50% of these respondents;
- Partnerships with public entities to support additional communication requirements – 50%.

Regarding integration with other networks:

- 56% of the responding companies plan to integrate their private LTE networks with other telecommunications infrastructures, including
- Fiber optic networks;
- Mobile Network Operators (MNOs) networks;
- LoRaWAN networks;
- Wi-SUN networks;
- Satellite communication systems;
- Radio communication networks;
- MPLS networks.

These results indicate that private LTE networks will be central elements of hybrid architectures, leveraging complementary technologies to support different coverage, capacity, and operational requirements.

5 Conclusion

5.1 Summary of Main Conclusions

The research highlights a strong commitment across the Brazilian electricity sector to the deployment of private LTE networks as critical infrastructure supporting grid digitalization. The main findings include:

- High Maturity in Private LTE Adoption
  - 70% of responding companies have already deployed private LTE networks, with most planning to expand both network coverage and supported applications.
  - Companies that have not deployed LTE networks are actively progressing toward implementation in the short term, with procurement and acquisition processes already underway.
- Favorable Regulatory Framework and Extensive Use of Licensed Spectrum
  - Regulatory instruments, including Resolution No. 772/2025 and Act No. 915/2024, have established conditions that facilitate the use of the 410 MHz and 450 MHz bands for Private Limited Service (SLP) applications, enabling the deployment of robust private LTE networks.
  - 83% of deployed networks operate in licensed spectrum, demonstrating a strong preference for regulated frequency bands and reflecting industry confidence in the regulatory framework.

- Consolidation of the 450 MHz band and Relevance of 410 MHz band
  - The clear trend in future utility communications projects is toward the consolidation of the 450 MHz band as the primary band, while the 410 MHz band remains as a relevant alternative for specific use cases and deployment scenarios.
  - Discussions with Anatel are ongoing to secure the use of the 450 MHz band under conditions that ensure robust protection against harmful interference from any source.
- Focus on Mission-Critical Applications
  - Existing and planned private LTE networks prioritize essential applications such as remote metering, distribution automation, substation automation, field crew communications and IoT connectivity.
- Hybrid Architectures and Use of Specialized Consulting
  - The integration of Private LTE with technologies such as fiber, operator networks, LoRaWAN, Wi-SUN, satellite, radio, MPLS reflects a growing preference for hybrid resilient telecommunications networks.
  - The participation of external consultants in 67% of new projects underscores the value of specialized expertise and disciplined planning throughout the project lifecycle.

5.2 Implications for the Electricity Sector

The deployment of private LTE networks is a key enabler for the electricity sector to achieve the objectives established by the MME by 2035, particularly with respect to:

- The digitalization of distribution networks;
- The implementation of smart grids;
- The improvement of service quality, reliability, and continuity of supply;
- The integration of distributed generation and renewable sources;
- The development of new services, operational capabilities and business models.

Telecommunications infrastructure is no longer merely a supporting component; it has become a strategic platform that enables:

- Real-time operations;
- Rapid response to events and contingencies;
- Optimization of assets, resources and operational processes;
- Enhanced resilience, reliability and operational security.

6 Proposals for government entities

6.1 MME, ANEEL[4], ANATEL

- Consolidate Spectrum Use Predictability for Utilities
  - Maintain and, where appropriate, strengthen the designation of 410 MHz and 450 MHz bands for the SLP, with a particular focus on supporting mission-critical utility applications.
  - Ensure long-term spectrum access predictability and regulatory stability to support strategic planning and enable sustained, multi-year investments in private telecommunications networks.
- Improve Guidelines for Mission-Critical Networks
  - Evaluate and establish minimum requirements for QoS, availability, resilience and security for networks supporting utility applications such as distribution automation, teleprotection, and advanced metering.
- Promote Interoperability and Open Standards
  - Encourage open standards and interoperable solutions, to reduce vendor lock-in and enable integration among diverse technologies and equipment suppliers.

7 Recommendations

7.1 For Electricity Companies

- Integrated Planning of Telecommunications and Electrical Operations
  - Incorporate private LTE network planning into electricity grid modernization strategies, ensuring alignment among operations, IT, and telecom teams.
- Hybrid, Resilient, and Scalable Architectures
  - Design architectures that combine private LTE with complementary technologies such as fiber, LoRaWAN, Wi-SUN, satellite, radio, MPLS) to optimize both cost and performance.
- Technology and Supplier Risk Management
  - Adopt multi-vendor strategies and ensure interoperability among eNodeBs, EPCs, and CPEs, to mitigate risks associated with overreliance on a single supplier.
  - Leverage industry benchmarks, including the findings of this research, and engage specialized advisors or consultants to support technology selection and investment decisions.

7.2 For Manufacturers and Suppliers

- Solutions Optimized for 450 MHz and 410 MHz

[4] ANEEL - National Electric Energy Agency

  - Develop and offer a robust ecosystem of LTE equipment and solutions as well as compatible technology evolutions specifically designed for the 450 MHz and 410 MHz bands, and capable of meeting mission-critical utility requirements.

- Interoperable and Modular Models
  - Provide architectures that allow flexible combinations of eNodeBs, EPCs, and CPEs, aligned with utilities' interoperability requirements.
- Integration into Hybrid Ecosystems
  - Provide solutions that facilitate seamless integration with IP/MPLS networks, LoRaWAN, Wi-SUN, satellite, and other technologies relevant to the electricity sector.

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8 Current status and future outlook of utility private LTE networks in Brazil

Company	Frequency Band (MHz)	Deployed		*Planned 2026/2027		
		Status	# eNodeB	*Planned 2026/2027	eNodeB	# Terminals
Copel	450	No	5	Yes	**ND	500
EDP	230	Yes	12	No	0	–
	450	No	0	Yes	**ND	–
Neoenergia	450	Yes	4	Yes	9	5,000
	700	Yes	6	No	0	80,000
Cemig	450	No	0	Yes	86	6,400
CPFL	250	Yes	17	No	0	–
	450	No	0	Yes	102	2,643
Celesc	700	PoC	1	No	0	–
	410	Yes	1	No	0	–
	410/450	No	0	Yes	20	–
	3,800	PoC	1	No	0	–
Equatorial	410/450	No	0	Yes	4	150,000/ 390,000
Enel	700	Yes	23	No	0	–
	450	No	0	Yes	4	–
Energisa	250	Yes	2	No	–	–

Ref.: UTCAL Research Aug 2025 and updated Apr 2026

**In process of specification/acquisition. As reported by EDP recently, completion of 450 MHz network deployment was replanned to 2028*

**ND: Not Defined