

# **India Power Line Communication Market Segmented By Offering (Hardware, Software and Services), By Frequency (Narrowband and Broadband), By Modulation Technique (Energy Management & Smart Grid and Indoor Networking), By Vertical (Industrial, Commercial and Residential), By Modulation Technique (Single Carrier Modulation, Multi Carrier Modulation and Spread Spectrum Modulation), By Region, and By Competition, 2019-2029F**

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## **Abstracts**

India Power Line Communication Market has valued at USD 615.82 million in 2023 and is anticipated to project robust growth in the forecast period with a CAGR of 13.57% through 2029. The proliferation of smart grids worldwide is a crucial driver for market expansion. Smart grids seamlessly integrate renewable energy resources into the electricity supply chain via PLCs. Furthermore, the growing adoption of these solutions for remote device communication significantly contributes to market growth.

### Key Market Drivers

Increasing Demand for Smart Grids and Advanced Metering Infrastructure (AMI)

The Indian Power Line Communication (PLC) market is witnessing significant growth driven by several key factors, with one of the most prominent being the increasing demand for smart grids and Advanced Metering Infrastructure (AMI). As India continues to urbanize and its population grows, the demand for reliable and efficient electricity distribution is on the rise. To address this, utilities and power distribution companies are

increasingly adopting smart grid technologies, with PLC playing a pivotal role in this transformation.

Smart grids, characterized by the integration of digital technologies into the traditional power grid, enable real-time monitoring and control of electricity distribution. They enhance grid efficiency, reduce losses, and facilitate the integration of renewable energy sources. In this context, PLC serves as a vital communication technology that enables data transmission over existing power lines. It allows utilities to remotely monitor and manage grid assets, including transformers and distribution lines, leading to more effective fault detection and quicker response times.

Moreover, the deployment of AMI systems, which includes smart meters, heavily relies on PLC for data collection and communication. These meters provide consumers with real-time information about their energy consumption, empowering them to make informed decisions to reduce energy consumption and costs. The Indian government's push for nationwide AMI implementation as part of its Ujwal DISCOM Assurance Yojana (UDAY) program further drives the demand for PLC technology.

Consequently, Indian PLC market players are witnessing a surge in demand for their products and services, which is expected to remain robust as more regions and utilities embrace smart grid technologies to enhance the reliability and efficiency of their power distribution systems.

### Growing Adoption of IoT Devices and Home Automation

One of the major driving factors behind the growth of the India Power Line Communication (PLC) market is the rising adoption of Internet of Things (IoT) devices and home automation systems. In recent years, IoT has gained significant popularity and relies heavily on robust communication networks to connect and control various devices and sensors. PLC offers a cost-effective and reliable communication solution for IoT devices, especially in residential and commercial settings.

In India, there is a growing adoption of smart home technologies and IoT devices. Consumers are increasingly investing in smart appliances, security systems, lighting, and HVAC controls. These devices require seamless communication to function effectively, and PLC provides a convenient means of connectivity by utilizing the existing electrical wiring infrastructure within homes and buildings.

PLC technology enables homeowners and businesses to remotely control and monitor

their devices through smartphone apps or web interfaces. This level of convenience and energy efficiency is driving the demand for PLC-enabled IoT solutions. Furthermore, the integration of IoT devices into a PLC network promotes interoperability and simplifies the management of diverse smart devices.

Moreover, the Indian government's focus on smart cities and digitalization initiatives further boosts the adoption of IoT devices and home automation. As more cities and municipalities implement smart infrastructure projects, the demand for PLC technology as a reliable communication medium for these projects is expected to grow significantly.

Overall, the increasing prevalence of IoT devices and home automation, combined with the convenience and efficiency offered by PLC, positions this technology as a key driver of growth in the Indian PLC market.

### Rural Electrification and Last-Mile Connectivity

Rural electrification and the imperative for last-mile connectivity in remote areas of India serve as significant drivers for the Power Line Communication (PLC) market. While urban centers in India boast relatively well-established electricity distribution infrastructure, rural areas often grapple with challenges related to limited access to reliable power and communication networks.

PLC technology holds the potential to efficiently and cost-effectively bridge this connectivity gap. In rural and remote areas where laying fresh communication infrastructure can prove excessively expensive and time-consuming, leveraging existing power lines for data transmission emerges as a practical solution.

Government initiatives like the Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya) aspire to provide electricity to all rural households. PLC technology can play a pivotal role in these electrification endeavors by enabling remote monitoring of power distribution and reducing operational costs for utilities. It facilitates real-time data transmission, thereby aiding in the swift identification and resolution of power outages and distribution challenges.

Furthermore, PLC can bolster rural development by facilitating the deployment of services such as telemedicine, e-learning, and agricultural automation in these underserved areas. These applications necessitate reliable and affordable communication infrastructure, rendering PLC an extremely compelling choice.

As India continues to prioritize the expansion of electrification efforts and enhancement of connectivity in rural regions, the demand for PLC technology is expected to witness substantial growth. The ability to exploit existing power infrastructure for both electricity distribution and communication renders PLC an indispensable driver in achieving last-mile connectivity and elevating the quality of life in remote areas across the nation.

In conclusion, the India Power Line Communication (PLC) market is propelled forward by several key drivers, including the demand for smart grids and AMI, the adoption of IoT devices and home automation, and the imperative for rural electrification and last-mile connectivity. These drivers underscore the versatility and relevance of PLC technology in addressing India's evolving energy and communication needs.

## Key Market Challenges

### Infrastructure Limitations and Aging Power Grids

One of the primary challenges confronting the India Power Line Communication (PLC) market is the nation's infrastructure limitations, particularly concerning its aging power grid. India's power distribution infrastructure has encountered difficulties in keeping pace with the rapid urbanization and escalating energy demands of its expanding population. A substantial portion of the existing infrastructure is outdated, resulting in inefficiencies and frequent power outages.

PLC relies on the existing power lines for data transmission; however, when these lines are old and inadequately maintained, they may not serve as a reliable and stable medium for communication. Insufficient infrastructure can lead to signal attenuation, interference, and data loss, thereby impeding the effectiveness of PLC systems.

To overcome this challenge, significant investments are required to modernize and upgrade the power grid infrastructure. This necessitates the replacement of outdated equipment, enhancement of transmission and distribution networks, and ensuring consistent power quality. Without these infrastructure improvements, the deployment and expansion of PLC technology will remain limited and encounter significant reliability issues.

### Regulatory and Standards Hurdles

Another significant challenge in the Indian PLC market is the regulatory and standards landscape. The effective and widespread deployment of PLC technology necessitates a

clear regulatory framework and adherence to international standards to ensure interoperability and reliability.

In India, concerns regarding regulatory clarity and consistency have arisen in the telecommunications and utility sectors. The absence of well-defined rules and regulations specific to PLC technology can lead to uncertainty for market players, discourage investment, and impede the development of a robust ecosystem.

Moreover, aligning Indian standards with international norms is crucial for facilitating the integration of PLC technology into the global smart grid and IoT landscape. Non-alignment with international standards may result in compatibility issues and limit interoperability with devices and systems from other countries.

To tackle this challenge, regulatory bodies need to collaborate closely with industry stakeholders to formulate comprehensive regulations covering aspects such as frequency allocation, interference management, and data security. Establishing a standardized framework will foster innovation, encourage investment, and drive the adoption of PLC technology in various applications, including smart grids, home automation, and industrial automation.

## Key Market Trends

### Integration of PLC in Smart Grids and AMI

One of the notable trends in the India Power Line Communication (PLC) market is the increasing integration of PLC technology into smart grids and Advanced Metering Infrastructure (AMI) systems. As India aims to modernize its power distribution networks and enhance energy efficiency, utilities and power distribution companies are turning to smart grid solutions, which heavily rely on robust communication networks.

PLC plays a crucial role in enabling real-time data communication over existing power lines. This trend allows utilities to remotely monitor and control grid assets, resulting in quicker fault detection and reduced downtime. It also facilitates the seamless integration of renewable energy sources, like solar and wind, into the grid by providing a reliable means of communication between distributed energy resources and central control systems.

Furthermore, the deployment of AMI systems, including smart meters, is on the rise in India to enhance consumer engagement and energy management. PLC technology

enables seamless data transmission between these smart meters and utility back-end systems. Consumers benefit from real-time insights into their energy consumption, while utilities can optimize their operations and provide more accurate billing.

As India continues its efforts to improve energy infrastructure and grid reliability, the integration of PLC into smart grids and AMI systems is expected to remain a significant trend in the PLC market.

### Expansion of PLC in Home Automation and IoT

Another noteworthy trend in the Indian PLC market is the expansion of PLC technology into the domains of home automation and the Internet of Things (IoT). With the increasing adoption of smart homes and IoT devices, there is a growing demand for reliable and cost-effective communication solutions, and PLC perfectly fits the bill.

PLC utilizes existing electrical wiring within homes and buildings to transmit data, making it an appealing choice for connecting and controlling a wide range of devices, including lighting, HVAC systems, security cameras, and appliances. Homeowners can conveniently manage these devices through smartphone apps or voice assistants, enhancing convenience, comfort, and energy efficiency.

In addition to residential applications, PLC is finding applications in commercial and industrial settings for building automation, enabling efficient energy management, equipment monitoring, and predictive maintenance.

As the adoption of IoT devices and home automation continues to expand in India, the PLC market is experiencing increased demand, and this trend is expected to persist as consumers and businesses seek innovative ways to enhance their living and working environments.

### Segmental Insights

#### Frequency Insights

The Narrowband segment emerged as the dominant player in the global market in 2023. Narrowband PLC refers to a subset of PLC technology that operates at lower frequencies and primarily focuses on low data rate communication. It is commonly utilized in applications where high-speed data transmission is not necessary, but reliability and long-range communication are paramount.



Narrowband PLC is extensively employed in AMI systems for smart metering, enabling utilities to collect data from electricity, water, and gas meters for billing, monitoring, and load management purposes. While the data rates may be modest, the coverage and reliability are of utmost importance. In urban areas, narrowband PLC plays a significant role in streetlight automation and control systems. This technology facilitates remote management of streetlights, including dimming, scheduling, and fault detection, leading to energy savings and improved maintenance.

As India continues its efforts in modernizing its power grid infrastructure, there is a growing demand for narrowband PLC in smart grid applications. It can prove to be instrumental in AMI deployments, distribution automation, and grid monitoring, particularly in regions where high-speed communication is not required.

In conclusion, the narrowband segment of the Power Line Communication market in India presents specific opportunities in smart grid expansion, energy efficiency, and rural electrification.

### Vertical Insights

The Industrial segment is projected to experience rapid growth during the forecast period. The industrial segment of the PLC market in India encompasses a diverse range of applications and industries, including manufacturing, process automation, utilities, and infrastructure. PLC technology is primarily used in the industrial context for data communication, control, and equipment/process monitoring. It finds application in various industries such as manufacturing, chemicals, and food processing, enabling real-time monitoring and optimization of machinery and processes for enhanced efficiency and quality.

Industries in India heavily rely on PLC for remote monitoring and control of critical infrastructure like power plants, substations, and water treatment facilities. PLC systems enable operators to receive real-time data and promptly respond to anomalies. They also facilitate data collection from sensors and equipment for predictive maintenance, enabling proactive scheduling of maintenance activities and reducing downtime and costs.

The adoption of Industry 4.0 principles, including automation, data exchange, and smart manufacturing, is witnessing significant growth in India. PLC technology forms the core of Industry 4.0 implementations, presenting substantial growth opportunities in the

industrial sector. With India's manufacturing sector experiencing remarkable growth, PLC technology plays a vital role in achieving operational excellence. Opportunities abound in deploying PLC solutions for manufacturing automation, quality control, and supply chain management.

## Regional Insights

West India emerged as the dominant region in the India Power Line Communication market in 2023. West India boasts a thriving industrial and commercial landscape, encompassing manufacturing hubs, special economic zones (SEZs), and technology parks. Within these sectors, PLC technology finds extensive applications for automation, equipment monitoring, and energy management. The demand for PLC-based solutions is projected to surge as businesses seek avenues to augment operational efficiency.

Several cities in West India, such as Mumbai, Pune, and Ahmedabad, are witnessing rapid urbanization and are integral to the government's Smart Cities mission. Here, PLC technology assumes a pivotal role in smart grid deployments, streetlight automation, and building management systems. The development of smart infrastructure presents lucrative opportunities for PLC solution providers.

West India holds substantial prominence in the renewable energy sector, particularly in Gujarat. As solar and wind power continue to gain traction, PLC technology facilitates their seamless integration into the existing power grid. Crucially, monitoring, control, and grid optimization represent vital aspects where PLC can contribute significantly.

The region's infrastructure, including power distribution networks, is in a constant state of evolution. By upgrading the existing infrastructure and integrating digital communication through PLC, losses can be reduced, reliability can be improved, and energy management can be enhanced. Infrastructure development projects emerge as a promising growth area for the PLC market.

The Power Line Communication market in West India is poised for growth, driven by the region's robust industrial and commercial activities, ongoing urbanization, and government initiatives. Strategic investments and collaborations tailored to the specific needs of West India will undoubtedly foster the thriving of PLC technology in this dynamic market.

## Key Market Players



Bajaj Electricals Ltd.

TP-Link India Pvt. Ltd.

Zyxel Communications

Mitsumi Distribution Pvt. Ltd.

Siemens Ltd.

Schneider Electric India Pvt. Ltd.

Microchip Technology Inc.

Cypress Semiconductor Corporation

STMicroelectronics

Texas Instruments India Pvt. Ltd.

Report Scope:

In this report, the Power Line Communication Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Power Line Communication Market, By Offering:

Hardware

Software

Services

Power Line Communication Market, By Frequency:

Narrowband

Broadband

Power Line Communication Market, By Application:

Industrial

Commercial

Residential

Power Line Communication Market, By Vertical:

Energy Management & Smart Grid

Indoor Networking

Power Line Communication Market, By Modulation Technique:

Single Carrier Modulation

Multi Carrier Modulation

Spread Spectrum Modulation

India Power Line Communication Market, By Region:

North India

South India

East India

West India

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the India Power Line Communication Market.

### Available Customizations:

India Power Line Communication Market report with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

#### Company Information

Detailed analysis and profiling of additional market players (up to five).

## Contents

### **1. PRODUCT OVERVIEW**

- 1.1. Market Definition
- 1.2. Scope of the Market
  - 1.2.1. Markets Covered
  - 1.2.2. Years Considered for Study
  - 1.2.3. Key Market Segmentations

### **2. RESEARCH METHODOLOGY**

- 2.1. Objective of the Study
- 2.2. Baseline Methodology
- 2.3. Formulation of the Scope
- 2.4. Assumptions and Limitations
- 2.5. Sources of Research
  - 2.5.1. Secondary Research
  - 2.5.2. Primary Research
- 2.6. Approach for the Market Study
  - 2.6.1. The Bottom-Up Approach
  - 2.6.2. The Top-Down Approach
- 2.7. Methodology Followed for Calculation of Market Size & Market Shares
- 2.8. Forecasting Methodology
  - 2.8.1. Data Triangulation & Validation

### **3. EXECUTIVE SUMMARY**

### **4. IMPACT OF COVID-19 ON INDIA POWER LINE COMMUNICATION MARKET**

### **5. VOICE OF CUSTOMER**

### **6. INDIA POWER LINE COMMUNICATION MARKET OVERVIEW**

### **7. INDIA POWER LINE COMMUNICATION MARKET OUTLOOK**

## 7.1. Market Size & Forecast

### 7.1.1. By Value

## 7.2. Market Share & Forecast

### 7.2.1. By Offering (Hardware, Software and Services)

### 7.2.2. By Frequency (Narrowband and Broadband)

### 7.2.3. By Application (Energy Management & Smart Grid and Indoor Networking)

### 7.2.4. By Vertical (Industrial, Commercial and Residential)

### 7.2.5. By Modulation Technique (Single Carrier Modulation, Multi Carrier Modulation and Spread Spectrum Modulation)

### 7.2.6. By Region (North India, South India, East India, West India)

## 7.3. By Company (2023)

## 7.4. Market Map

# 8. NORTH INDIA POWER LINE COMMUNICATION MARKET OUTLOOK

## 8.1. Market Size & Forecast

### 8.1.1. By Value

## 8.2. Market Share & Forecast

### 8.2.1. By Offering

### 8.2.2. By Frequency

### 8.2.3. By Application

### 8.2.4. By Vertical

### 8.2.5. By Modulation Technique

# 9. SOUTH INDIA POWER LINE COMMUNICATION MARKET OUTLOOK

## 9.1. Market Size & Forecast

### 9.1.1. By Value

## 9.2. Market Share & Forecast

### 9.2.1. By Offering

### 9.2.2. By Frequency

### 9.2.3. By Application

### 9.2.4. By Vertical

### 9.2.5. By Modulation Technique

# 10. EAST INDIA POWER LINE COMMUNICATION MARKET OUTLOOK

## 10.1. Market Size & Forecast

- 10.1.1. By Value
- 10.2. Market Share & Forecast
  - 10.2.1. By Offering
  - 10.2.2. By Frequency
  - 10.2.3. By Application
  - 10.2.4. By Vertical
  - 10.2.5. By Modulation Technique

## **11. WEST INDIA POWER LINE COMMUNICATION MARKET OUTLOOK**

- 11.1. Market Size & Forecast
  - 11.1.1. By Offering
  - 11.1.2. By Frequency
  - 11.1.3. By Application
  - 11.1.4. By Vertical
- 11.2. Market Share & Forecast
  - 11.2.1. By Offering
  - 11.2.2. By Frequency
  - 11.2.3. By Application
  - 11.2.4. By Vertical
  - 11.2.5. By Modulation Technique

## **12. MARKET DYNAMICS**

- 12.1. Drivers
- 12.2. Challenges

## **13. MARKET TRENDS AND DEVELOPMENTS**

## **14. COMPANY PROFILES**

- 14.1. Bajaj Electricals Ltd.
  - 14.1.1. Business Overview
  - 14.1.2. Key Revenue and Financials
  - 14.1.3. Recent Developments
  - 14.1.4. Key Personnel/Key Contact Person
  - 14.1.5. Key Product/Services Offered
- 14.2. TP-Link India Pvt. Ltd.



- 14.2.1. Business Overview
- 14.2.2. Key Revenue and Financials
- 14.2.3. Recent Developments
- 14.2.4. Key Personnel/Key Contact Person
- 14.2.5. Key Product/Services Offered
- 14.3. Zyxel Communications
  - 14.3.1. Business Overview
  - 14.3.2. Key Revenue and Financials
  - 14.3.3. Recent Developments
  - 14.3.4. Key Personnel/Key Contact Person
  - 14.3.5. Key Product/Services Offered
- 14.4. Mitsumi Distribution Pvt. Ltd.
  - 14.4.1. Business Overview
  - 14.4.2. Key Revenue and Financials
  - 14.4.3. Recent Developments
  - 14.4.4. Key Personnel/Key Contact Person
  - 14.4.5. Key Product/Services Offered
- 14.5. Siemens Ltd.
  - 14.5.1. Business Overview
  - 14.5.2. Key Revenue and Financials
  - 14.5.3. Recent Developments
  - 14.5.4. Key Personnel/Key Contact Person
  - 14.5.5. Key Product/Services Offered
- 14.6. Schneider Electric India Pvt. Ltd.
  - 14.6.1. Business Overview
  - 14.6.2. Key Revenue and Financials
  - 14.6.3. Recent Developments
  - 14.6.4. Key Personnel/Key Contact Person
  - 14.6.5. Key Product/Services Offered
- 14.7. Microchip Technology Inc.
  - 14.7.1. Business Overview
  - 14.7.2. Key Revenue and Financials
  - 14.7.3. Recent Developments
  - 14.7.4. Key Personnel/Key Contact Person
  - 14.7.5. Key Product/Services Offered
- 14.8. Cypress Semiconductor Corporation
  - 14.8.1. Business Overview
  - 14.8.2. Key Revenue and Financials
  - 14.8.3. Recent Developments

- 14.8.4. Key Personnel/Key Contact Person
- 14.8.5. Key Product/Services Offered
- 14.9. STMicroelectronics
  - 14.9.1. Business Overview
  - 14.9.2. Key Revenue and Financials
  - 14.9.3. Recent Developments
  - 14.9.4. Key Personnel/Key Contact Person
  - 14.9.5. Key Product/Services Offered
- 14.10. Texas Instruments India Pvt. Ltd.
  - 14.10.1. Business Overview
  - 14.10.2. Key Revenue and Financials
  - 14.10.3. Recent Developments
  - 14.10.4. Key Personnel/Key Contact Person
  - 14.10.5. Key Product/Services Offered

## **15. STRATEGIC RECOMMENDATIONS**

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