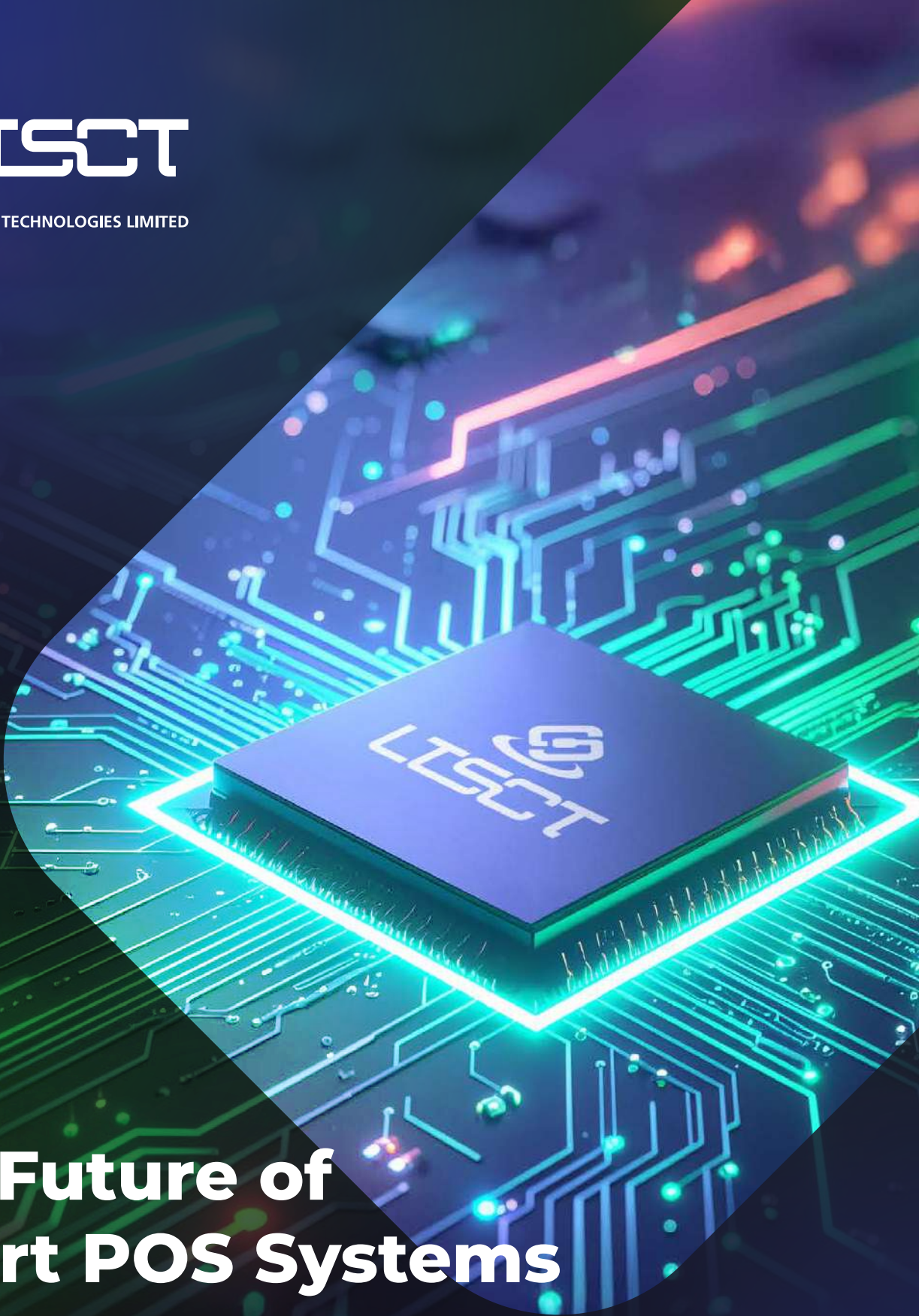




L&T SEMICONDUCTOR TECHNOLOGIES LIMITED



# The Future of Smart POS Systems

*A Global Market Whitepaper*  
Oct - 2025

*Future. Made Together.*



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# Executive Summary

This whitepaper provides an in-depth examination of the rapidly evolving global Point-of-Sale (POS) industry, driven by digital payments, AI automation, and smart module adoption. The LTSCT SAC20 and related modules are central to powering next-generation POS, vending, and autonomous retail ecosystems.

## Key highlights

- Global POS market projected to exceed US\$160B by 2030
- India leads the world in digital payments adoption
- Smart POS replacing traditional POS globally
- Smart vending to grow US\$9.33B during 2020–24
- Smart modules (LTE/5G) enabling secure & scalable retail infrastructure

# Global POS Market Trends

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The global POS industry is experiencing rapid modernization supported by NFC adoption, cloud commerce, biometric security, and AI-enabled retail innovations.

Point of Sale (POS) machines have traditionally been the anchor of retail industries, facilitating seamless transactions and business operations. These conventional POS systems, while reliable, often rely on limited connectivity and manual data handling, which can hinder the ability to gain real-time insights and achieve operational efficiency.

Smart POS devices bring a wealth of advanced functionalities, including wireless connectivity, real-time inventory management, enhanced

security protocols, and data analytics integration. Upgrading existing POS terminals with IoT capabilities and deploying fully integrated smart POS systems are vital strategies for today's dynamic market demands.

These innovations empower businesses to deliver faster, more personalized customer experiences, optimize resource management, and generate data-driven insights. Also, OEMs and ODMs benefit from faster time-to-market through pre-integrated solutions, thus reducing R&D costs and enabling customization for diverse retail environments.



## Global POS Market Growth 15.6% CAGR



Contactless, cloud commerce, and AI are rewriting the POS market pushing it toward a \$160B+ future.

Moving toward IoT-enabled POS solutions is essential for shaping a future where retail and service industries are more connected, agile, and customer-centric. Looking ahead, trends like AI automation and biometric authentication will further enhance POS ecosystems, fostering innovation for IoT enthusiasts. LTSCCT supports this evolution by offering tailored smart connectivity solutions that transform traditional POS machines into intelligent, networked devices ready for the modern commercial environment.

# Evolution of POS Technology

POS has evolved from magnetic stripe readers → PSTN terminals → Wi-Fi mPOS → Android smart POS → LTE/5G intelligent terminals.



Cloud-Connected POS



AI-Driven Checkout



Biometric Payments



Multi-Connectivity Terminals

POS Machines are devices that facilitate and record payments at the point of sale whether at a counter, table, curbside, or kiosk. They combine payment hardware with software to process cards, digital wallets, and sometimes cash, while easily syncing sales, inventory, and receipts. Different variations include Fixed countertop terminals, Mobile/handheld mPOS solutions, Smart Android POS systems (all-

in-one with printer/scanner) SoftPOS solutions (turning smartphones into payment terminals) Let's understand this evolution and how connectivity played a role in this. Tracing Five Decades of POS Evolution in Merchant Operations The story of point-of-sale evolution isn't just about technology each leap forward solved real problems that store owners faced every day, from long checkout lines to complex IT dependencies.

Cash Registers to Standalone EFTPOS Early standalone terminals operated in complete isolation with no real-time authorization capability.

Delays in batch processing resulted in fraud detection happening several hours after transactions, which increased the risk of chargebacks. Manual reconciliation consumed 2-3 hours daily as merchants had to match paper receipts against till totals. Magnetic stripe readers frequently failed, requiring multiple swipes and manual card imprinting fallbacks. Without integrated systems, inventory tracking remained disconnected from payment data, preventing real-time stock management.



Manual Cash  
POS



Automatic Cash  
POS



Digital Swipe  
POS



Digital Card  
Punch POS



NFC based POS



All-in-one POS



Smartphone  
as POS

**Wired PSTN Era** - The Dial-Up Revolution Dial-up modems finally brought real-time authorization, cutting chargebacks but creating new headaches. Every transaction cost a penny in phone charges. While the tech still remained simple, RS-232 connections to terminals with built-in modems running X.25 over phone lines, the telecommunication charges added up fast for busy stores. The constraints were that stores couldn't move registers without calling the phone company. Multiple terminals had to fight for the same phone lines during rush hours, and relocating often meant weeks of downtime. However, as the payments were routed over dedicated lines to known endpoints, security was straightforward, and compliance was easy, but scaling remained tough. This era proved real-time payments worked, while also showing why always on connections would be essential.

**The mPOS Revolution:** Wi-Fi & Bluetooth Era the convergence of Wi-Fi networks and Bluetooth-enabled smartphones created the modern mobile point-of-sale (mPOS) category. Suddenly, any smartphone or tablet could become a payment terminal when paired with a simple card reader. It democratized payment acceptance, enabling small merchants, food trucks, and service providers to process cards without significant upfront investments. This era established user experience expectations that persist today: intuitive interfaces, instant connectivity, and seamless integration with existing business workflows. Wi-Fi provided whole-store mobility without the range limitations of proprietary RF systems. 802.11 standards enabled interoperability across vendors and easy integration with existing network infrastructure. Bluetooth eliminated cable connections between devices and card readers, creating truly portable payment solutions. Queue-busting became standard practice in retail stores. Restaurants could process payments tableside. Pop-up retailers could accept cards in mall corridors or outdoor markets. Service professionals could collect payments on-site without the risk of handling cash. However, the network dependencies introduced new complexities.

Captive portals, SSID congestion, and WPA configuration requirements often slowed deployments. IT approval processes for new devices on corporate networks created bottlenecks. Different venue had varying Wi-Fi policies, making standardized rollouts challenging

**Cloud POS:** The Omnichannel Era The shift to cloud-based POS systems transformed point-of-sale terminals from standalone devices into thin clients connected to comprehensive retail management cloud platforms. Pricing, inventory, and customer data were synchronized across all channels in real time. Loyalty programs worked consistently whether customers shopped online, in-store, or through mobile apps. By updating all sales channels with a unified database, we significantly improved inventory accuracy dramatically. Customer service representatives could access complete purchase histories regardless of the transaction channel. Marketing campaigns could target customers based on comprehensive behavioral data aggregated from all touchpoints. However, cloud dependency introduced new reliability requirements. WAN connectivity became critical infrastructure, with disruptions capable of shutting down operations. Offline modes became essential for business continuity, requiring sophisticated synchronization mechanisms and conflict resolution algorithms. Security architecture evolved to support tokenization and end-to-end encryption while maintaining performance and user experience. PCI compliance shifted from physical device security to network-based data protection, demanding new expertise and operational procedures.

**Edge-AI POS:** Intelligent Retail The emerging integration of edge AI capabilities into POS systems promises to transform retail operations once again. Vision-assisted self-checkout systems can identify products, detect suspicious behaviors, and guide customers through the purchase process with minimal human intervention. On-device fraud detection enables real-time analysis of transaction patterns, without compromising customer privacy or requiring cloud connectivity for every decision. Systems can detect when items go missing during scanning, identify when customers need assistance, and flag unusual patterns that warrant human review—all while maintaining customer privacy and reducing false positives. The integration of AI capabilities into payment terminals represents a fundamental shift from reactive transaction processing to proactive business intelligence. Early implementations have focused on specific use cases such as self-checkout assistance and fraud prevention, but the architectural foundation can enable broader applications as the technology matures

# Need for Smart Modules Globally

Smart modules are increasingly becoming the backbone of next-generation connected devices particularly in retail, payments, vending, industrial automation, and mobility.

Global OEMs are moving away from fragmented hardware architectures toward **secure, certified, scalable, and long-lifecycle platforms** that reduce engineering overhead and accelerate time-to-market. This shift makes smart modules a strategic requirement rather than an optional convenience. As outlined earlier, smart modules consolidate multiple functions into a single, compact, production-ready unit. A modern IoT smart module can integrate **edge processing, cellular modems, Wi-Fi, Bluetooth® wireless technology, NFC, and GNSS or cell-based positioning**. Beyond connectivity, the module can also host **memory interfaces, SD cards, displays, cameras, sensors, audio components, touch interfaces, buzzers, and haptic systems**.

This dense integration allows OEMs to streamline product architecture while maintaining flexibility to support diverse use cases.

Because each application has its own set of priorities such as power

efficiency, ruggedization, processing capability, security, or multimedia the selection of the right module is a critical design decision. **LTSC** has engineered a **comprehensive modular portfolio** to help developers choose an optimal fit without compromising on reliability or performance. Despite the diversity, all LTSC modules deliver a set of core advantages:

- **Broad OS support** including Yocto Linux, and Android
- **Feature-rich platforms** optimized for scalability from entry-level to performance-grade applications
- **Global certifications** enabling seamless deployment across regions
- **Transparent longevity** with guaranteed lifecycle commitments suitable for regulated industries
- **Ease of integration** with standard interfaces, advanced security stacks, and pre-certified connectivity

## SAC20: The Flagship Smart Module Driving This Need

LTSCT's SAC20 smart module is a prime example of why global OEMs are rapidly standardizing their devices on modular computing platforms.

### Key strengths of the SAC20 include:

- **High-performance application processor**, suitable for POS, smart vending, kiosks, access control, and industrial HMI
- **Integrated LTE-ready design**, enabling seamless migration across product generations
- **Built-in security features**, including secure boot, crypto engines, and trusted execution environments
- **Support for Wi-Fi, Bluetooth, GNSS**, and multiple high-speed I/O interfaces
- **Rugged industrial design** with wide temperature and voltage tolerance
- **Rich multimedia capabilities**: multi-display support, camera interfaces, audio peripherals, and advanced graphics
- **Long-term availability**, a critical requirement for payment, retail, and industrial OEMs
- **Global certifications and compliance** to ease regulatory approvals across markets

SAC20 helps OEMs reduce engineering complexity, shorten development cycles, and accelerate certification timelines key demands in markets where product refresh cycles are shrinking and compliance burdens are increasing.

### Why Smart Modules Are Becoming Indispensable

In a world transitioning rapidly to connected commerce, autonomous retail, and cloud-connected operational systems, smart modules provide the **foundation of secure, scalable, future-proof devices**. LTSCT's smart module portfolio—anchored by SAC20—gives OEMs a unified platform approach to accelerate innovation, reduce cost, and deploy globally with confidence.



SAC20 delivers secure, high-performance modules that help OEMs launch faster globally.

# Smart Vending & Autonomous Retail



The smart vending market was projected to grow by US\$9.33 billion between 2020 and 2024, driven by rapid advancements in AI, computer vision, and autonomous retail technologies. Traditional vending machines are evolving into intelligent, connected systems capable of real-time inventory tracking, personalized recommendations, and fully cashless transactions. AI-powered vending machines use sensors, machine learning, and image recognition to monitor product interactions, prevent shrinkage, and optimize stock replenishment. Meanwhile, computer-vision

autonomous stores often container-sized, unmanned retail units allow customers to walk-in and pick-up products, and walk out, with billing handled automatically through sensor fusion and AI algorithms. These innovations reduce operational costs, enhance customer convenience, and enable retailers to deploy micro-stores in high-traffic locations without staff. As consumer demand for frictionless, 24/7 shopping grows, smart vending and autonomous retail are reshaping the global retail landscape and accelerating the shift toward intelligent, data-driven commerce.

# Connectivity Role (4G/5G)

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Connectivity serves as the critical control plane for modern Point-of-Sale systems. It enables real-time payment processing, operational management, and business intelligence across diverse deployment scenarios.

Primary backhaul for Mobile Deployments Cellular connectivity enables “install-and-go” deployments for temporary and mobile POS scenarios, including pop-up stores, outdoor markets, food trucks, delivery services, and event venues. LTE Cat 1bis provides sufficient bandwidth for basic payment processing in handheld devices, while LTE Cat 4 supports rich multimedia interfaces for interactive kiosks. The emerging 5G RedCap standard offers a balanced combination of performance and power efficiency. Always-On Resilience and Failover In fixed retail locations, cellular serves as a

critical backup connectivity option. When primary Ethernet or Wi-Fi connections experience outages, the POS system automatically switches to cellular connectivity to maintain payment processing capability. This fallback mechanism prevents transaction delays, reduces customer wait times, and maintains business continuity during network disruptions. Through Network Isolation Cellular connectivity enables improved security architecture through private Access Point Names (APNs) and Virtual Private Network (VPN) tunneling. By routing POS traffic through dedicated cellular networks rather than shared public internet connections, retailers can create isolated communication channels that reduce attack surfaces and streamline PCI DSS compliance audits.

# SAC20 Module Overview



The SAC20 is optimized for Android /Yocto Linux POS, vending, payment kiosks, and IoT gateways. Key features include LTE Cat 4, dual-band Wi-Fi, GNSS, secure boot, and rich interfaces for camera, LCM, USB, UART, and GPIO.

## Key Features



ARM Cortex-A53  
64-bit Processor  
(Quad-core)



Dual ISPs and  
up to 25MP  
camera @ 30fps



Bluetooth 5.0  
(BR/EDR + BLE)



Max. 150 Mbps (DL)  
Max. 50 Mbps (UL)



4G CAT 4



Qualcomm  
Adreno™ 702 GPU



LCC + LGA  
Package



GPS/BDS/  
GLONASS/  
Galileo/L1 Band



Wi-Fi - IEEE 802.11  
a/b/g/n/ac



2G Fallback



Android OS 13,  
up to 15



Integrated LCD  
Touchscreen  
Interface

## Typical Applications



POS Machines



Self Checkout



Industrial Handhelds



Vending Machines



Surveillance Displays

# Market Insights

## Market Size & Growth

- The global POS terminals market was estimated at **US \$113.38 billion in 2024** and is projected to reach **US \$181.47 billion by 2030**, representing a CAGR of about 8.1% from 2025 to 2030. [Grand View Research](#)
- Another source states the global POS terminals market valued at ~US \$110 billion in 2024, and forecast to ~US \$185 billion by 2032, at a CAGR of ~7.7%. [Data Bridge Market Research](#)
- For “POS machines” (which may include a narrower subset of hardware) a forecast places the market from US \$18,221.3 million (US \$18.22 billion) in 2022 to US \$49,365.2 million (US \$49.37 billion) by 2033 – a CAGR of ~9.6%. [Persistence Market Research](#)
- Some reports show even higher CAGR estimates (e.g., ~11.8% for 2025-2034) for POS machines in certain segments. [Claight](#)

## Regional & Segment Insights

- The Asia-Pacific (APAC) region is highlighted as the largest market in 2024. [Grand View Research](#)
- Within APAC, emerging economies such as India and China are expected to register higher growth rates, driven by digital payments adoption, smartphone penetration and cashless initiatives. [Claight](#)
- By product type: Fixed POS terminals (e.g., counters in retail stores) dominate (in some reports >58% of market share in 2024). [Grand View Research](#)
- By component: Hardware remains largest (e.g., >62% share in 2024) but software & services are growing faster. [Grand View Research](#)



The POS market is expanding rapidly, driven by strong hardware demand and rising digital payment adoption.

## What This Means For Your Business / Strategy

- There's a large and growing opportunity in POS hardware and terminal solutions globally, especially in APAC and emerging markets.
- While fixed-POS remains a major segment, mobile POS (mPOS), tablet-based terminals and self-service kiosks are seeing faster growth meaning flexibility matters.
- Given that hardware is still the largest revenue share, but software/services are accelerating, consider not only the device but the ecosystem (connectivity, analytics, integration) when designing or upgrading POS solutions.
- The adoption of digital payments, especially cashless modes, in areas like India gives a strong tailwind meaning localization, ease of use, low cost could be differentiators.
- Security, compliance, and reliability remain important (especially for enterprises) so next-gen features (contactless, biometric, AI analytics) will foster competitive advantage.



APAC is now the engine of POS growth, with hardware-led demand and rapid digital payment adoption reshaping the market.

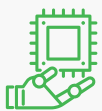
# Value Proposition

LTSCCT smart modules form the foundation of modern POS and vending ecosystems. With global digital payments accelerating, SAC20 and related LTSCCT modules provide the secure, scalable, high-performance infrastructure required for next-generation retail.

The SAC20 is a high-performance LTE CAT 4 Smart module equipped with Wi-Fi, Bluetooth and Multimedia capabilities. Powered by a Qualcomm® ARM Cortex-A53 64-bit Quad-core processor and an integrated Adreno 702 GPU, designed to meet the demands of both industrial and consumer applications, offering high data rates, multimedia support, and extended lifespan.



## LTSCCT At A Glance



**Largest Indian  
Semiconductor  
Product Company**



**60+**  
Patents



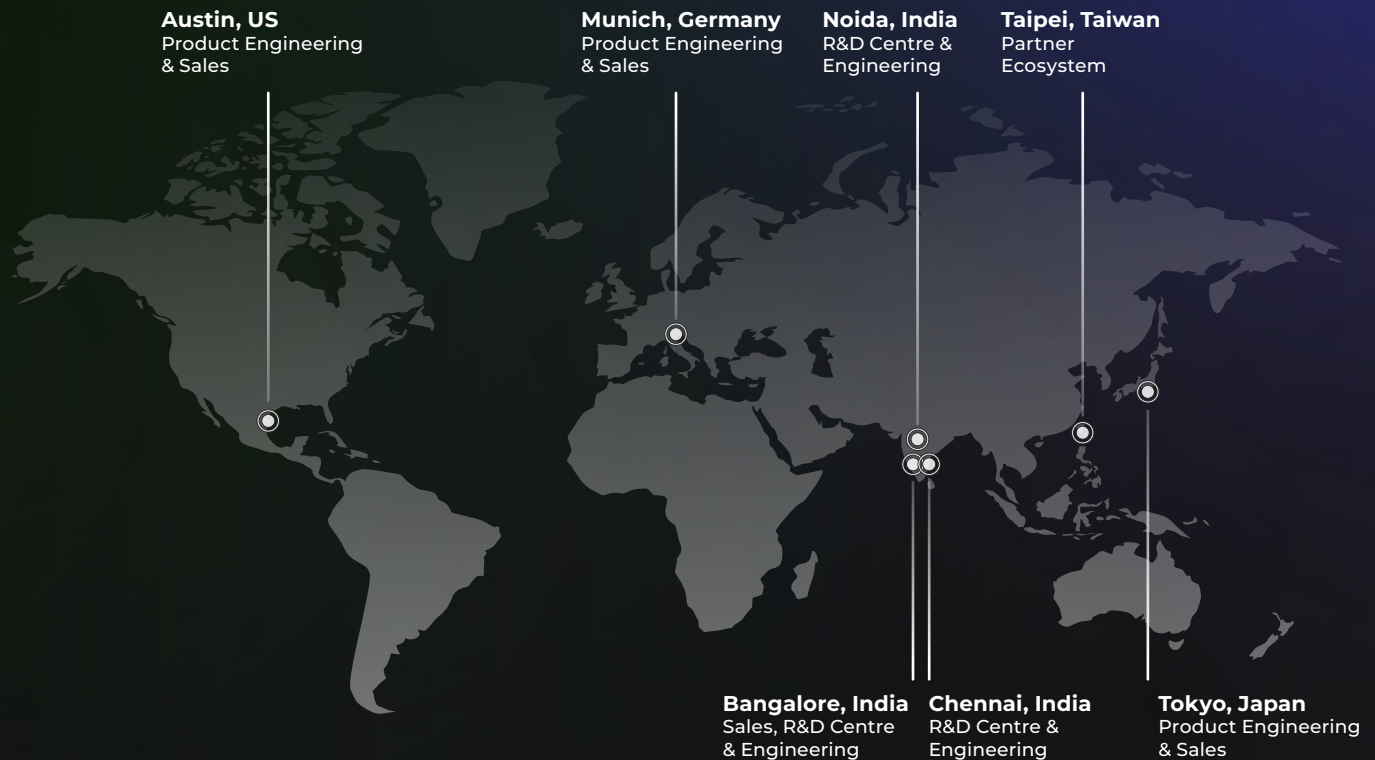
**400+**  
Employees  
Globally



**5**  
Geographies

# Our global footprint

LTSCT operates on a global scale with strategic locations in Asia, Europe, and North America. This footprint allows us to stay close to our customers, enabling rapid support, localized production, and seamless logistics.



## INDIA

S2 Building, 10th Floor,  
L&T Tech Park, Bellary Road,  
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View Layout, Byatarayanapura,  
Bengaluru 560092

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## Contact us today!

Ready to shape the future together?

Reach out via our website: [www.ltsct.com](http://www.ltsct.com)

to start a partnership that accelerates innovation.

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