



DATACENTER

A Patent Landscape Report



उत्तिष्ठत जाग्रत प्राप्य वरान्निबोधत।

Arise, Awake, and Seek Knowledge from the Wise.

~Swami Vivekananda

डॉ. परिमल कुमार

उत्कृष्ट वैज्ञानिक

एवं

मुख्य एकीकृत रक्षा स्टाफ
के वैज्ञानिक सलाहकार

Dr. Parimal Kumar

Outstanding Scientist

&

Scientific Advisor to

Chief of Integrated Defence Staff
(SA to CISC)



सत्यमेव जयते



एक कदम स्वच्छता की ओर

रक्षा मंत्रालय

MINISTRY OF DEFENCE

मुख्यालय एकीकृत रक्षा स्टाफ

HQ INTEGRATED DEFENCE STAFF



FOREWORD

1. For much of the last century, National strength was measured by what a Nation could build, defend and hold on the ground. In this century, an equally decisive contest is unfolding over something less visible but no less strategic, the infrastructure on which data is stored, processed, secured and turned into intelligence. Data centres, once regarded as back-office facilities, have become critical National infrastructure, as consequential to our security and prosperity as ports, power grids and the networks that connect them.
2. Based on this requirement, Centre for Joint Warfare Studies (CENJOWS), a think tank conducted a Tech Talk titled 'From Borders to Bandwidth: Reimagining India through sovereign Data Centres' on 09 Jul 26 with their MoU Partner IP Bazaar.
3. This report arrives at an important moment as today India generates one of the largest volumes of digital data in the world and our digital economy is close to contribute close to a fifth of National output by the end of this decade. Yet, as the report rightly observes, generating data is not the same as owning the infrastructure, intelligence and intellectual property that capture its value. Much of the high-value layers, like advanced computer, specialised semiconductors, cooling systems, the softwares and the patents above them, still depends on sources beyond our shores.
4. From the vantage point of National security, this distinction between hosting and control is not academic. For defence and space applications, sovereignty is not conferred by the location of a building alone. It rests on assured control over the compute, encryption keys, firmware, operations and supply chain behind them. Classified data, mission logs, satellite imagery and the AI models trained on them must remain under trusted, auditable national control. Limited control over any one layer can translates directly into strategic vulnerability.
5. Encouragingly, India's challenge is no longer one of demand or ambition since both are abundant. The task is to convert scale into sovereign capability: to build not only more capacity, but indigenous capacity with Indian design, Indian IP and Indian control over the layers that matter most.
6. I commend CENJOWS and IP Bazaar for a timely, clear-eyed assessment that frames data-centre infrastructure not merely as a commercial opportunity, but as a pillar of National security, space capability and technological Self-Reliance. Realising it will demand a coordinated effort across government, the armed forces, industry and research. This report is a valuable contribution to that endeavour.

Jai Hind !

Parimal Kumar

(Dr. Parimal Kumar)
OS & SA to CISC

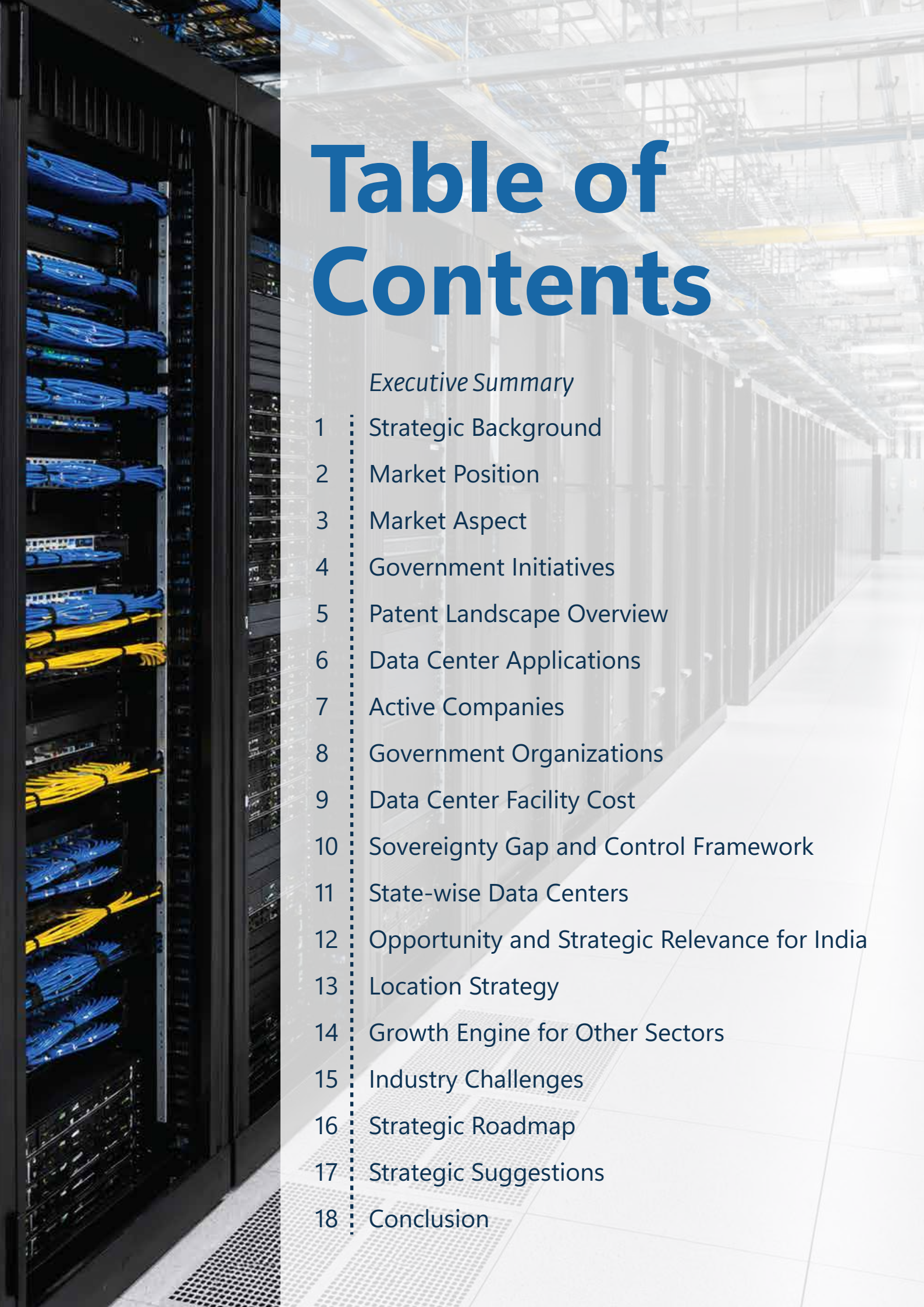


Table of Contents

Executive Summary

- 1 Strategic Background
- 2 Market Position
- 3 Market Aspect
- 4 Government Initiatives
- 5 Patent Landscape Overview
- 6 Data Center Applications
- 7 Active Companies
- 8 Government Organizations
- 9 Data Center Facility Cost
- 10 Sovereignty Gap and Control Framework
- 11 State-wise Data Centers
- 12 Opportunity and Strategic Relevance for India
- 13 Location Strategy
- 14 Growth Engine for Other Sectors
- 15 Industry Challenges
- 16 Strategic Roadmap
- 17 Strategic Suggestions
- 18 Conclusion

Executive Summary

Data centers have become a critical part of today's digital economy, providing the infrastructure needed to store, process, and transfer vast amounts of information. They support a broad range of services and industries, including cloud computing, artificial intelligence (AI), telecommunications, banking and financial services, healthcare, government platforms, cybersecurity, digital media, and enterprise operations. As organizations and governments continue to digitize their activities, data centers are increasingly viewed as essential infrastructure that underpins economic growth, innovation, and business continuity.

The sector has evolved considerably over the past decade. Traditionally, data centers were primarily used for hosting applications and storing data. Today, they are expected to support far more demanding workloads, including AI training and inference, machine learning, real-time analytics, automation, Internet of Things (IoT) applications, and cloud-based services. To meet these requirements, operators are investing in more advanced infrastructure, such as high-performance computing systems, reliable power networks, faster connectivity, efficient cooling technologies, and intelligent management tools that can support large-scale operations.

At the same time, the rapid increase in data consumption and computing demand presents several challenges. Data centers require significant amounts of electricity and generate substantial heat, making energy efficiency and thermal management major operational priorities. Operators must also address concerns related to sustainability, regulatory compliance, cybersecurity, data privacy, and system reliability. In response, the industry is increasingly adopting renewable energy sources, modular designs, edge computing solutions, automation, and other technologies that improve efficiency while reducing environmental impact.

Beyond commercial use, data centers are becoming increasingly important in areas where secure and large-scale data processing



is critical. In the defense sector, they support intelligence gathering and analysis, secure communications, cyber defense activities, surveillance systems, simulation platforms, and command-and-control functions. In the space sector, they play a key role in processing satellite data, supporting Earth observation and remote sensing programs, enabling mission planning, and managing ground-based operations. They are also expected to support emerging concepts such as distributed computing and future in-orbit data processing capabilities.

Looking ahead, advances in AI, quantum computing, autonomous technologies, next-generation communications, and space-based systems are likely to drive even greater demand for digital infrastructure. As these technologies continue to develop, data centers will remain central to technological progress, helping countries and organizations strengthen digital capabilities, improve resilience, support national security objectives, and sustain long-term economic development.

1. Strategic Background

Data centres are now essential to national digital capability. Beyond storage and cloud services, they enable secure computing, artificial intelligence, real-time analytics, digital governance, financial systems, communication networks, and mission-critical operations across strategic sectors such as defence, space, and critical infrastructure.

Globally, major economies are treating data infrastructure as a strategic asset. The United States has built strong cloud and computing ecosystems to support government, defense, and advanced technology sectors. China has emphasized domestic control of data, large-scale digital infrastructure, and data governance. Other advanced economies are similarly investing in secure, resilient, and energy-efficient data center systems to strengthen digital sovereignty.

India is also advancing rapidly in this area. With a large digital economy, strong public digital platforms, increasing cloud adoption, growing AI usage, and expanding capabilities in defense and space technologies, the country's needs extend beyond conventional commercial hosting. Sensitive sectors such as defense, space, cybersecurity, and critical infrastructure require trusted and sovereign data center capabilities that ensure security, resilience, and national control.

This need is especially significant because defense and space operations generate highly sensitive and time-critical data. Defense

applications rely on secure infrastructure for communications, intelligence analysis, surveillance, simulation, logistics, autonomous systems, and command support. Space programs depend on reliable computing environments for satellite data processing, Earth observation, navigation, telemetry, mission planning, and ground-station operations. Limited control over such infrastructure can create operational, legal, and strategic vulnerabilities.

Developing indigenous data center capabilities can help India reduce these risks while strengthening technological self-reliance. Such infrastructure can support secure cloud services, AI model training, high-performance computing, defense workloads, space-data analytics, and emerging edge-computing applications. It also enables greater control over the storage, processing, and management of sensitive information.

Building this ecosystem will require investments in advanced cooling technologies, energy-efficient designs, cybersecurity frameworks, cloud platforms, secure storage, modular infrastructure, edge facilities, and resilient network architecture. Strengthening these foundations can foster innovation, support critical sectors, and drive long-term economic growth. Indigenous data centers are therefore important not only for digital development but also for national security, space capability, technological self-reliance, and a sustainable digital economy.



2. Market Position

The global data centre industry is entering a strong growth phase. Demand is being driven by cloud computing, artificial intelligence (AI), digital services, financial technology, cybersecurity, streaming platforms, e-governance, and enterprise digitisation. Data centres are no longer viewed only as real estate or IT facilities; they are now strategic infrastructure supporting digital trade, AI adoption, national security, and economic competitiveness.

Globally, investment in data centres is increasing at a rapid pace. According to JLL, the global data centre sector may require up to USD 3 trillion in investment by 2030, with nearly 100 GW of additional capacity expected between 2026 and 2030. Total global data centre capacity is projected to reach approximately 200 GW by 2030.

Large markets such as the United States, China, Europe, Singapore, Japan, and the Middle East are expanding their data centre capacity to support cloud platforms, AI workloads, and secure digital infrastructure. The Americas currently account for around 50% of global data centre capacity, with the United States representing nearly 90% of capacity within the Americas. China remains the second-largest market and continues to expand aggressively through state-supported infrastructure programmes and domestic technology ecosystems.

The global market is also facing a new infrastructure challenge. The first is AI-ready data centres require high-density servers, reliable power supply, advanced cooling, strong network connectivity, and continuous energy availability. According to the International Energy Agency (IEA), global data center electricity consumption could increase from approximately 460 TWh in 2022 to nearly 945 TWh by 2030, largely driven by AI and cloud computing demand. As a result, power access, land availability, sustainability, water use, and grid reliability are becoming major decision factors for future data center locations. Countries that can provide stable energy, policy certainty, skilled talent, and secure digital infrastructure are likely to

attract higher global investment.

India is becoming an important data center market within the Asia-Pacific region. The country has strong demand drivers, including over 950 million internet users, rapid cloud adoption, digital public infrastructure, fintech growth, e-commerce expansion, 5G deployment, AI adoption, and increasing data localisation requirements. According to CBRE, India's operational data centre stock reached approximately 1,530 MW and 23 million square feet by 2025, with an additional 260 MW added during the first nine months of the year. The market is expected to continue expanding as global cloud providers, colocation operators, telecom companies, and enterprises increase their infrastructure footprint.

However, India is still at a developing stage when compared with leading global markets. The United States and China have significantly larger hyperscale capacity, deeper AI-compute ecosystems, stronger domestic technology ownership, and more mature cloud infrastructure. While India's operational capacity is around 1.5 GW, the United States alone has more than 40 GW of installed data centre capacity. India's current growth is strong, but it remains concentrated in a few cities such as Mumbai, Chennai, Hyderabad, Bengaluru, and Delhi-NCR, which together account for the majority of the country's data centre capacity. This concentration creates pressure on land, power, water, connectivity, and urban infrastructure.

India's key gap is not demand; demand is clearly growing. India's digital economy contributed approximately USD 402 billion (around 11.7% of GDP) in 2022–23 and is expected to contribute nearly 20% of GDP by 2030. The larger challenge is to build secure, energy-efficient, indigenous, and mission-ready data centre capability. For commercial use, India needs more hyperscale and AI-ready infrastructure. For defence and space applications, India needs a stronger sovereign data centre ecosystem that can support sensitive data processing, secure cloud services, high-performance computing,



satellite data analytics, cyber resilience, and real-time mission operations.

Global investment trends show that data centers are becoming one of the most attractive infrastructure asset classes. UNCTAD reported that announced foreign direct investment (FDI) in data centers exceeded USD 270 billion in 2025, accounting for more than 20% of global greenfield project values. India can benefit from this trend by improving policy clarity, faster approvals, reliable power access, renewable energy integration, domestic equipment manufacturing, advanced cooling technology,

skilled manpower, and stronger cybersecurity standards. These steps will help India move from being only a high-demand market to becoming a globally competitive and trusted data center hub.

From an IP and innovation perspective, India has a major opportunity to create proprietary technologies in cooling systems, energy management, secure cloud architecture, AI workload optimisation, encrypted storage, modular data centres, edge computing, disaster recovery, and defence-grade cybersecurity. Sustainability will also be critical. Studies estimate that Indian data

centres currently account for around 0.5% of national electricity consumption and consume nearly 150 billion litres of water annually, both of which are expected to more than double by 2030. If India builds this ecosystem strategically, data centres can become a platform for digital sovereignty, national security, space capability, and long-term technology leadership.

3. Market Aspect

The data center industry is a critical pillar of the digital economy, providing the infrastructure required to store, process, manage, secure, and transmit data. Modern data centers are no longer limited to data storage but they also serve as integrated facilities that support cloud computing, artificial intelligence (AI), high-performance computing (HPC), enterprise applications, cybersecurity operations, disaster recovery, and digital services.

The data center sector is experiencing one of the fastest growth cycles within the broader infrastructure landscape. Global internet users have surpassed 5.5 billion, cloud adoption continues to expand at double-digit rates, and AI-driven computing demand is accelerating rapidly. Global data center capacity is expected to reach approximately 200 GW by 2030, compared with an estimated 103 GW in 2025, implying the addition of nearly 97 GW of new capacity over five years. This represents an annual growth rate of approximately 14%–15%, highlighting the rapid pace at which digital infrastructure is expanding worldwide.

The evolution of the industry can also be observed through the increasing scale of investments. Global spending on cloud infrastructure has been growing at annual rates of 15%–20% in recent years, while AI-related infrastructure investments are expanding even faster. Large-scale cloud service providers and digital platform companies continue to invest substantial capital in new data center developments and capacity expansion projects.



India's Growth Drivers

India has emerged as one of the fastest-growing data center markets in the Asia-Pacific region, driven by the rapid expansion of its digital economy and the increasing adoption of digital technologies across sectors. India's digital economy is expected to contribute nearly 20% of GDP by 2029–30, reflecting the growing importance of digital infrastructure in supporting economic growth. The country's large and expanding internet user base, rapid digitalization of businesses, and increasing use of online services are generating unprecedented volumes of data that require secure storage, processing, and transmission.

India is one of the fastest-growing data center markets in Asia-Pacific, driven by a rapidly expanding digital economy, rising internet usage, enterprise digitalization, and growing adoption of cloud, AI, fintech, e-commerce, OTT, and other digital services.

The market is expected to witness significant expansion over the coming years, with operational capacity projected to grow by approximately 3.5 GW by 2030. This growth is supported by increasing cloud adoption, enterprise transformation, AI-driven

workloads, and substantial investments from domestic and global data center operators, technology companies, and infrastructure investors.

Key growth drivers include data localization requirements, supportive government policies, strong digital public infrastructure, rising cloud adoption, and ongoing investments in digital infrastructure. The rollout of 5G, growth in IoT devices, and increasing AI adoption are further accelerating demand for data processing, storage, and computing capacity.

India's Digital Public Infrastructure (DPI), including Aadhaar, UPI, and DigiLocker, has significantly boosted digital transactions and data generation, creating sustained demand for data center infrastructure.

With strong demand fundamentals, supportive regulations, and continued capital investment, India is expected to remain one of the world's fastest-growing data center markets, offering significant opportunities for operators, developers, technology providers, and investors





4. Government Initiatives

The Government of India has introduced policies and initiatives to strengthen the country's data center ecosystem and position India as a global digital infrastructure hub. Growing investments in AI, digital public infrastructure, and advanced computing are expected to further increase demand for data center.

1. Digital India Programme

Digital India promotes e-governance, digital payments, online services, and internet access. Growing digital adoption is increasing demand for secure and scalable data center infrastructure.

2. IndiaAI Mission

The IndiaAI Mission, with an estimated outlay of approximately ₹10,372 crore, aims to build a comprehensive AI ecosystem in India. It supports computing infrastructure, datasets, innovation, startups, and AI-based applications. The mission also includes access to high-end GPUs and shared computing resources, which is expected to increase demand for AI-ready data centers and high-performance computing facilities.

3. National Broadband Mission

The National Broadband Mission expands broadband and fiber connectivity, improving access to cloud services, supporting edge computing, and increasing data generation across sectors.

4. Semicon India Programme

The Semicon India Programme, backed by ₹76,000 crore, supports semiconductor manufacturing and electronics ecosystem development, strengthening the broader technology infrastructure that underpins long-term digital growth.

5. Production Linked Incentive (PLI) Schemes

PLI schemes for electronics, IT hardware, telecom, and networking products encourage domestic manufacturing and strengthen supply chains, indirectly supporting demand for data centers and cloud infrastructure.

6. Data Localization and Digital Governance Initiatives

Regulations such as the Digital Personal Data Protection (DPDP) Act and broader data governance measures are encouraging local data storage and processing, supporting domestic data center demand.

7. AI Infrastructure and Compute Capacity Expansion

Government-backed AI compute initiatives and shared GPU infrastructure are expected to drive investment in hyperscale, AI-focused, and high-performance data centers.

State-Level Policies

Several Indian states, including Maharashtra, Tamil Nadu, Uttar Pradesh, Telangana, Karnataka, and Andhra Pradesh, have introduced dedicated policies and incentive frameworks to attract data center investments. These policies are aimed at reducing project costs, improving ease of doing business, and enabling faster project implementation.

State-level incentives typically include capital subsidies, stamp duty exemptions, electricity duty exemptions, land-related benefits, infrastructure support, and single-window clearance mechanisms. These measures are helping create a more investment-friendly

environment for domestic and foreign data center developers, hyperscalers, cloud service providers, and infrastructure investors.

Overall, India's policy environment is becoming increasingly supportive of data center growth. National digital initiatives are creating demand for secure and scalable infrastructure, while state-level incentives are improving project viability. Together, these measures are expected to strengthen India's position as a major data center market and support the country's broader goals of digital transformation, AI adoption, and technology self-reliance.



5. Patent Landscape Overview

Technology Clusters in Data Centres

Data center technologies can be organized into key patent clusters based on their technical function and strategic importance. These clusters include cooling, power infrastructure, rack and modular systems, AI-driven workload management, networking, cybersecurity, safety systems, and edge data center infrastructure. While these technologies are important for commercial cloud and AI data centers, they are also becoming critical for defence and space applications. Secure data centers support classified cloud systems, satellite data processing, command centers, tactical edge computing, and sovereign digital infrastructure.

This patent landscape is important for defence and space data centers because it supports secure, reliable, and mission-critical computing infrastructure. In defence applications, it can support classified cloud systems, command-and-control centers, tactical edge data centers, cyber defence platforms, and remote military operations. In space applications, it can support satellite ground stations, satellite imagery processing, space mission data management, and space situational awareness systems. Patent opportunities may arise in technologies that improve security, reliability, rapid deployment, autonomous operation, and resilience in remote or harsh environments.

Therefore, this patent landscape should be studied not only from a commercial perspective, but also from a national security and mission-critical infrastructure perspective.

Key technology clusters in data centers include:

A. Cooling and thermal management

Focus on rugged cooling, liquid cooling, thermal monitoring, and harsh-environment operation.

B. Power Resilience and Energy Infrastructure

Focus on microgrids, battery backup, renewable power, off-grid operation, and



energy resilience.

C. Rack, server, and modular infrastructure

Focus on rugged racks, modular deployment, mobile command units, and satellite ground stations.

D. AI-Driven Data Center Management and Workload Optimization

Focus on mission workload prioritization, secure resource allocation, satellite data processing, and autonomous operation.

E. Data Center Network Fabric and Interconnect Technologies

Focus on secure low-latency communication, satellite-ground links, tactical networks, and resilient connectivity.

F. Cybersecurity and sovereign data center systems

Focus on classified cloud, encryption, zero trust, secure data localization, and sovereign control.

G. Fire safety, monitoring, and resilience systems

Focus on uninterrupted operation, disaster recovery, fault isolation, and mission continuity.



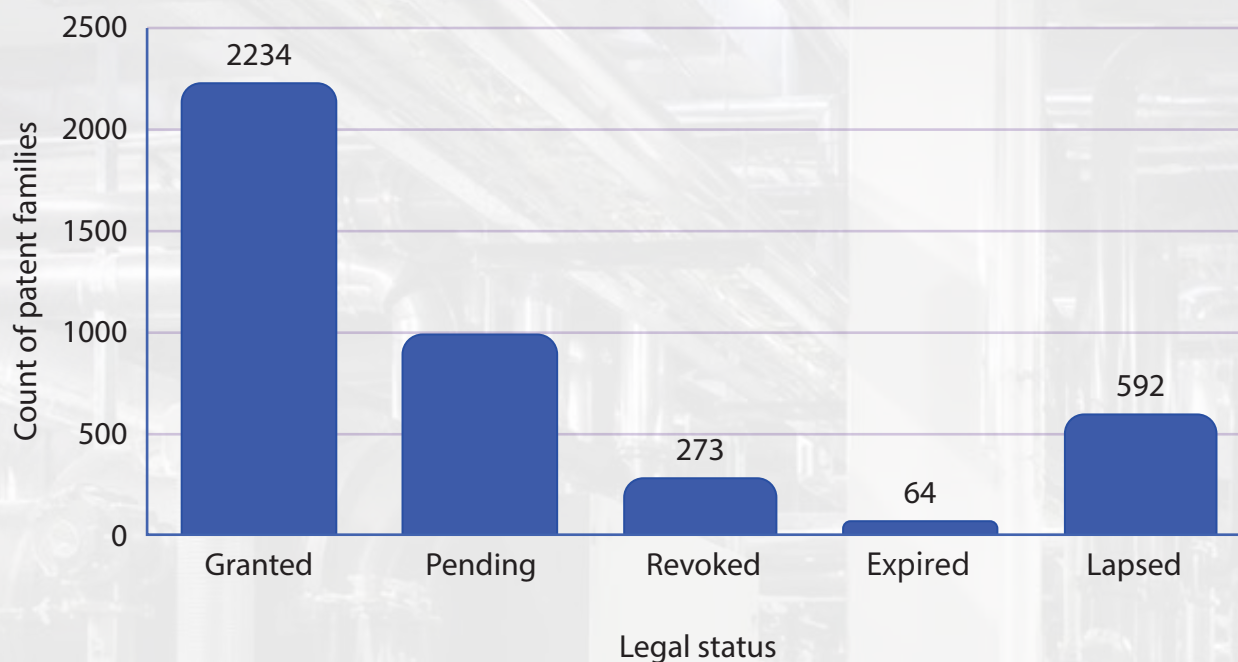
A. Cooling and Thermal Management

Cooling and thermal management is a key technology area in data centers because servers, storage systems, networking equipment, and AI processors generate significant heat during operation. Effective cooling is essential to maintain performance, reliability, and energy efficiency. While traditional data centers relied mainly on-air cooling, increasing AI and high-performance computing workloads have driven the adoption of advanced solutions such as liquid cooling, immersion cooling, direct-to-chip cooling, heat exchangers, and AI-based thermal management systems.

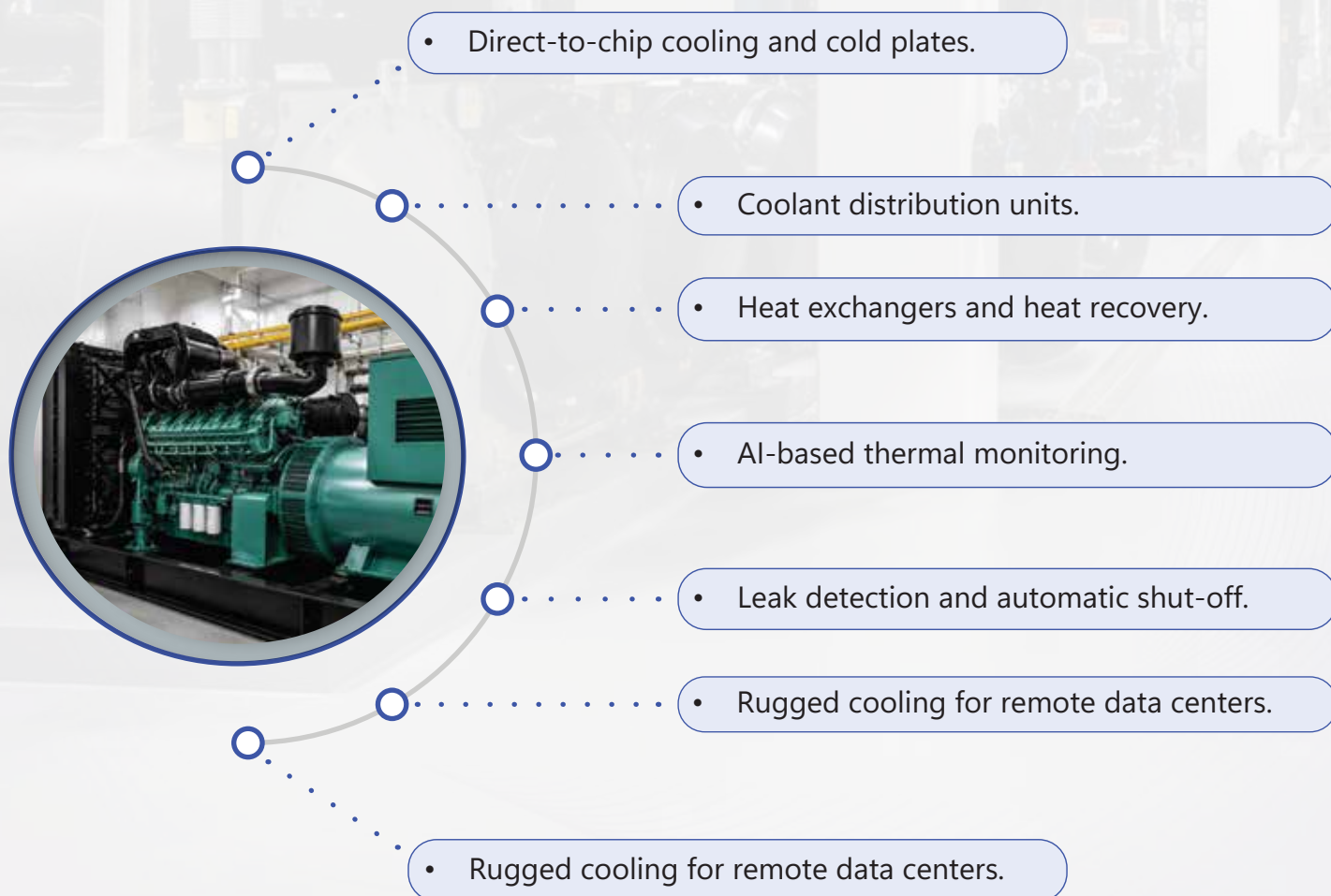
In defence and space data centers, cooling is critical not only for efficiency but also for mission reliability, supporting applications such as satellite imagery processing, radar data analysis, AI surveillance, command systems, and secure high-performance computing.

As a result, technologies such as rugged and liquid cooling, leak detection, thermal monitoring, and autonomous cooling control are increasingly important for mission-critical operations.

Legal Status



Patent Focus Areas



Top Assignees

118 BAIDU

112 HEBEI QINHUI
DATA

82 SUZHOU METABRAIN
INTELLIGENT TECHNOLOGY

81 BEIJING BAIDU NETCOM
SCIENCE & TECHNOLOGY

74 ZHENGZHOU YUNHAI
INFORMATION TECHNOLOGY

66 NVIDIA

56 XIAN POLYTECHNIC UNIVERSITY

51 GUANGDONG SHENLING
ENVIRONMENT SYSTEM

48 IBM

45 BEIJING FULLLINK OREITH
TECHNOLOGY

42 GOOGLE

36 HUAWEI DIGITAL POWER
TECHNOLOGIES

36 OVH

30 CHINA UNICOM

30 INTEL

30 HEWLETT PACKARD
ENTERPRISE DEVELOPMENT

29 NANJING UNIVERSITY
OF TECHNOLOGY

27 VERTIV

26 BEIJING NAYUANFENG SCIENCE &
TECHNOLOGY DEVELOPMENT

26 SHENZHEN ESIN
TECHNOLOGY

Notable Inventions – Global

Application No.	Priority Date	Title	Assignee
US6374627	2001-01-09	Data center cooling system	Schumacher Donald J Beckman William C
US6672955	2001-09-07	Air flow management system for an internet data center	Kyndryl
US9392733	2002-03-28	Data center cooling	Schneider Electric It
US8483996	2002-05-31	Data center cooling system	Hewlett Packard Enterprise et.al;
US7266964	2004-03-04	Data center room cold aisle deflector	Oracle

Notable Inventions – India (Priority - 17)

Application No.	Priority Date	Title	Assignee
IN299820 B	2011-03-09	Method and system for thermal management by quantitative determination of cooling characteristics of data centre	Tata Consultancy Services
IN509491 B	2012-03-01	Method and system for efficient real time thermal management of a data centre	Tata Consultancy Services
IN344788 B	2011-09-16	Method and system for real time monitoring, prediction, analysis and display of temperatures for effective thermal management in a data centre	Tata Consultancy Services
IN528100	2022-02-08	Air-cooling system for data center	Graphic Era University; Graphicera Hill University
IN202621007083	2026-01-23	A system and method for a modular scalable rear door heat exchanger for adaptive data center cooling	KUHLTHERM PRIVATE

Protection Countries



CN	US	EP	DE	KR	GB	JP	TW	FR	WO
2534	786	365	221	198	178	127	113	106	104
IN	CA	IE	SG	NL	CH	AU	HK	IT	SE
88	81	61	52	51	49	40	37	36	36

White Space Opportunities

- Rugged cooling for remote data centers
- AI-based autonomous thermal control for mission-critical systems
- Compact cooling for tactical edge data centers.
- Thermal management for satellite ground stations.
- Hybrid cooling for high-density AI workloads.
- Leak detection and fail-safe cooling systems.
- Low-water cooling for remote and harsh environments



B. Power Resilience and Energy Infrastructure

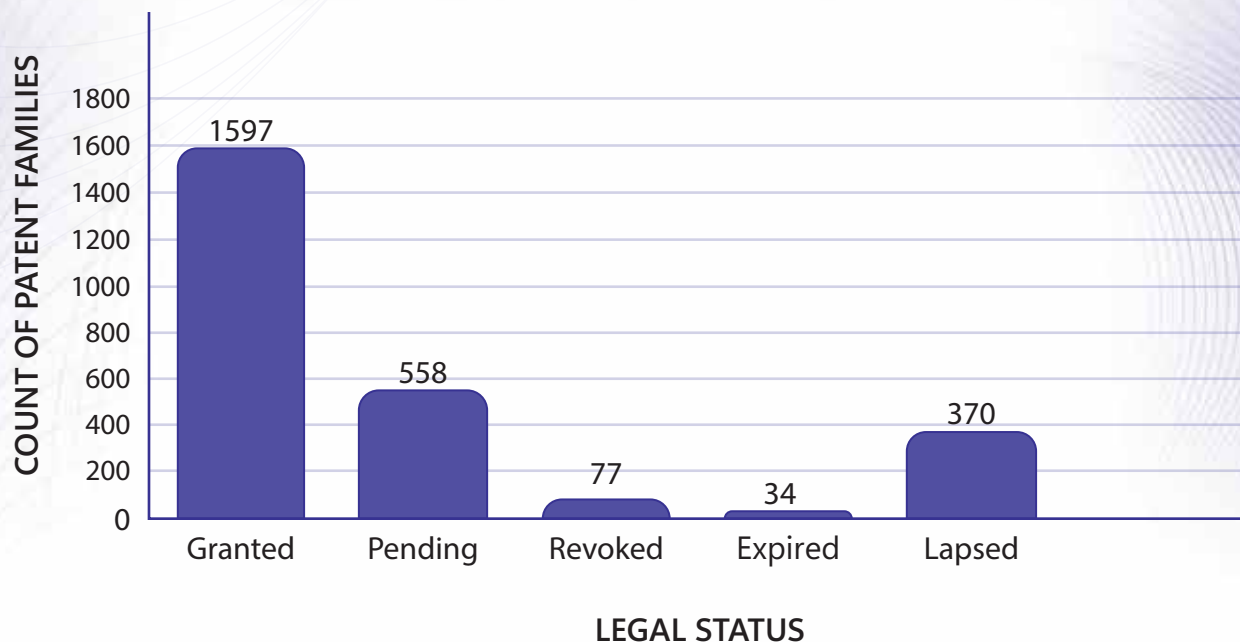
A data center is only as strong as its power backbone. Even the most advanced servers, cooling systems, and security platforms become useless if power supply is unstable. Power resilience therefore sits at the center of data center reliability, cost control, and mission continuity.

It supports servers, storage systems, networking equipment, cooling systems, and security infrastructure. This cluster includes power distribution, UPS systems, backup

generators, battery storage, renewable energy integration, microgrids, and intelligent energy management platforms.

As AI, cloud, and high-performance computing workloads grow, reliable and efficient power systems are becoming a strategic requirement. In defence and space data centers, resilient power is critical for classified cloud systems, command centers, tactical edge sites, satellite ground stations, and remote or off-grid operations.

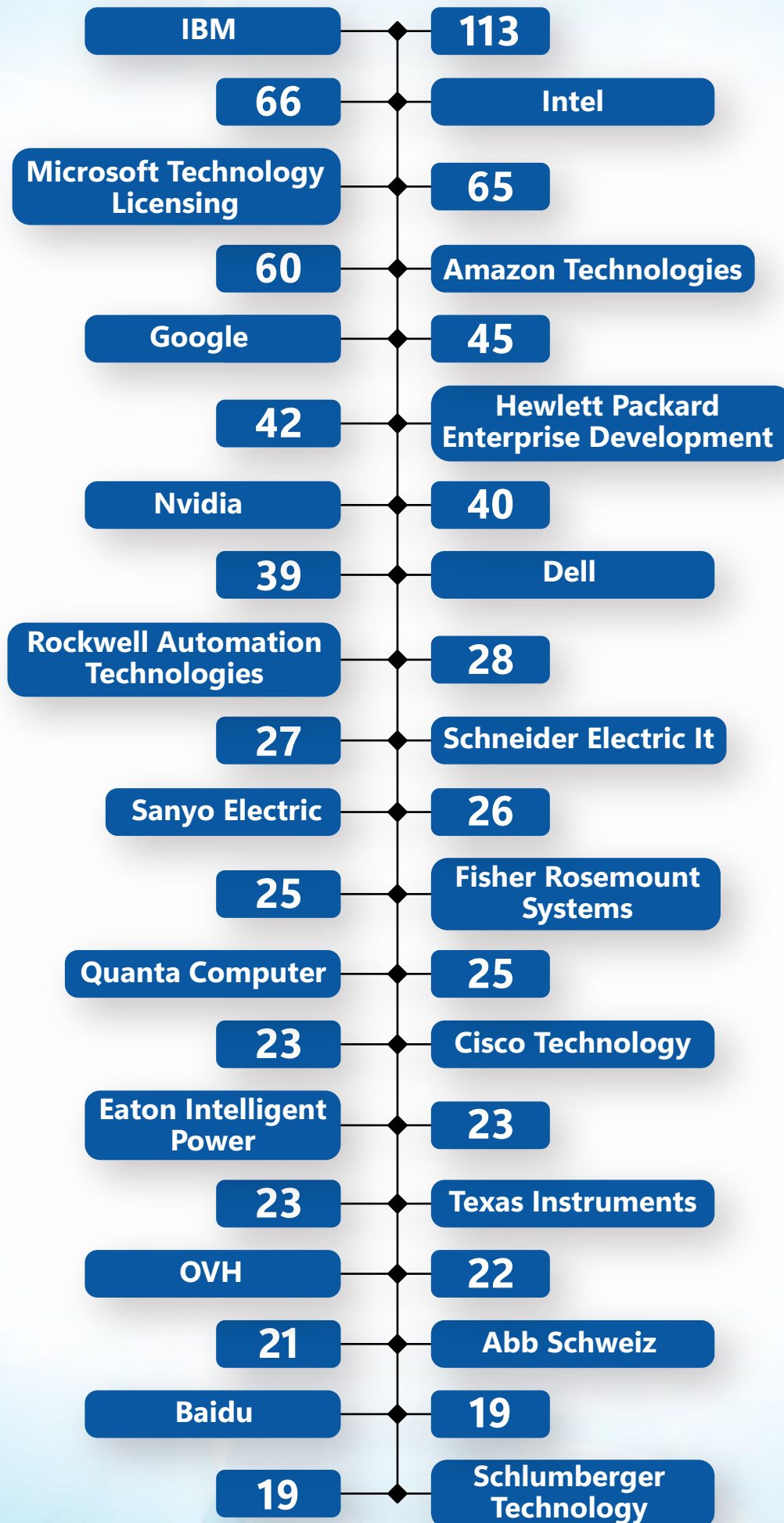
Legal Status



Patent Focus Areas

- UPS and backup power systems.
- Intelligent power distribution units.
- Battery energy storage systems.
- Microgrid control systems.
- Renewable-hybrid power architecture.
- Fuel cell and hydrogen backup systems.
- AI-based energy optimization.
- Rack-level power monitoring

Top Assignees



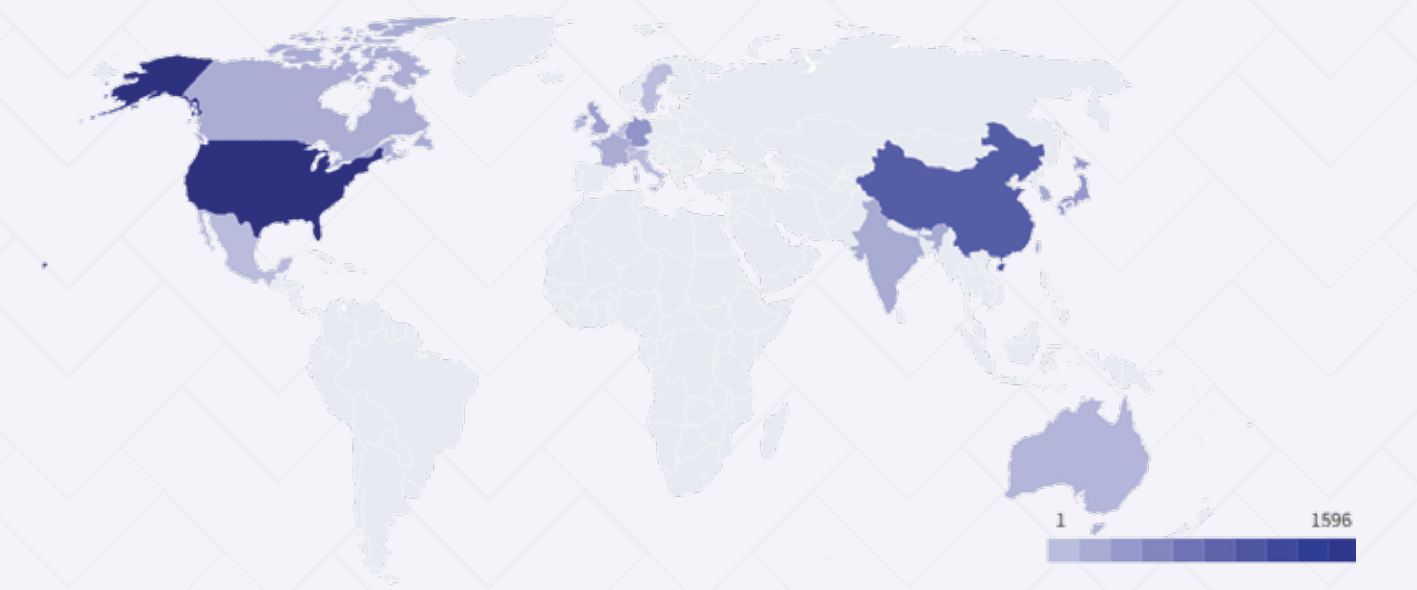
Notable Inventions – Global

Application No.	Priority Date	Title	Assignee
US8867193	2001-03-20	Adjustable scalable rack power system and method	Schneider Electric It
US8624433	2006-06-01	Data center uninterruptible power distribution architecture	Google
US10642299	2007-12-28	Power distribution, management, and monitoring systems and methods	Legrand DPC
US8723362	2009-07-24	Direct tie-in of a backup power source to motherboards in a server system	Meta Platforms
US8832476	2010-09-28	Power allotment distribution in a data center	Google
US9519878	2011-10-03	Power regulation of power grid via datacenter	Microsoft Technology Licensing
US10429921	2013-05-31	Datacenter power management optimizations	Amazon Technologies

Notable Inventions – India (Priority - 57)

Application No.	Priority Date	Title	Assignee
IN452400	2021-07-28	System and method of automatic rack wise power measurement in a data centre	Jio Platforms
IN202321083309 A	2023-12-06	Method and system for predicting backup power time of at least one network component	Jio Platforms
IN202444069685	2024-09-14	High performance computing (hpc) server chassis/rack dynamically adaptable to different applications running on a dc/cloud	Applied Intelligence Semiconductors Private

Protection Countries



US	CN	EP	DE	JP	GB	IN	KR	FR	CA
1581	901	648	405	363	295	216	209	199	197
TW	WO	AU	IE	NL	CH	MX	IT	BE	SE
138	123	121	101	90	84	70	69	58	55

White Space Opportunities

- Microgrid-powered defence data centres
- Battery backup for satellite ground stations
- Renewable-hybrid power for remote edge sites
- AI-based energy optimization systems
- Intelligent power distribution for high-density racks
- Fuel cell backup for mission-critical facilities
- Off-grid power systems for tactical data centres

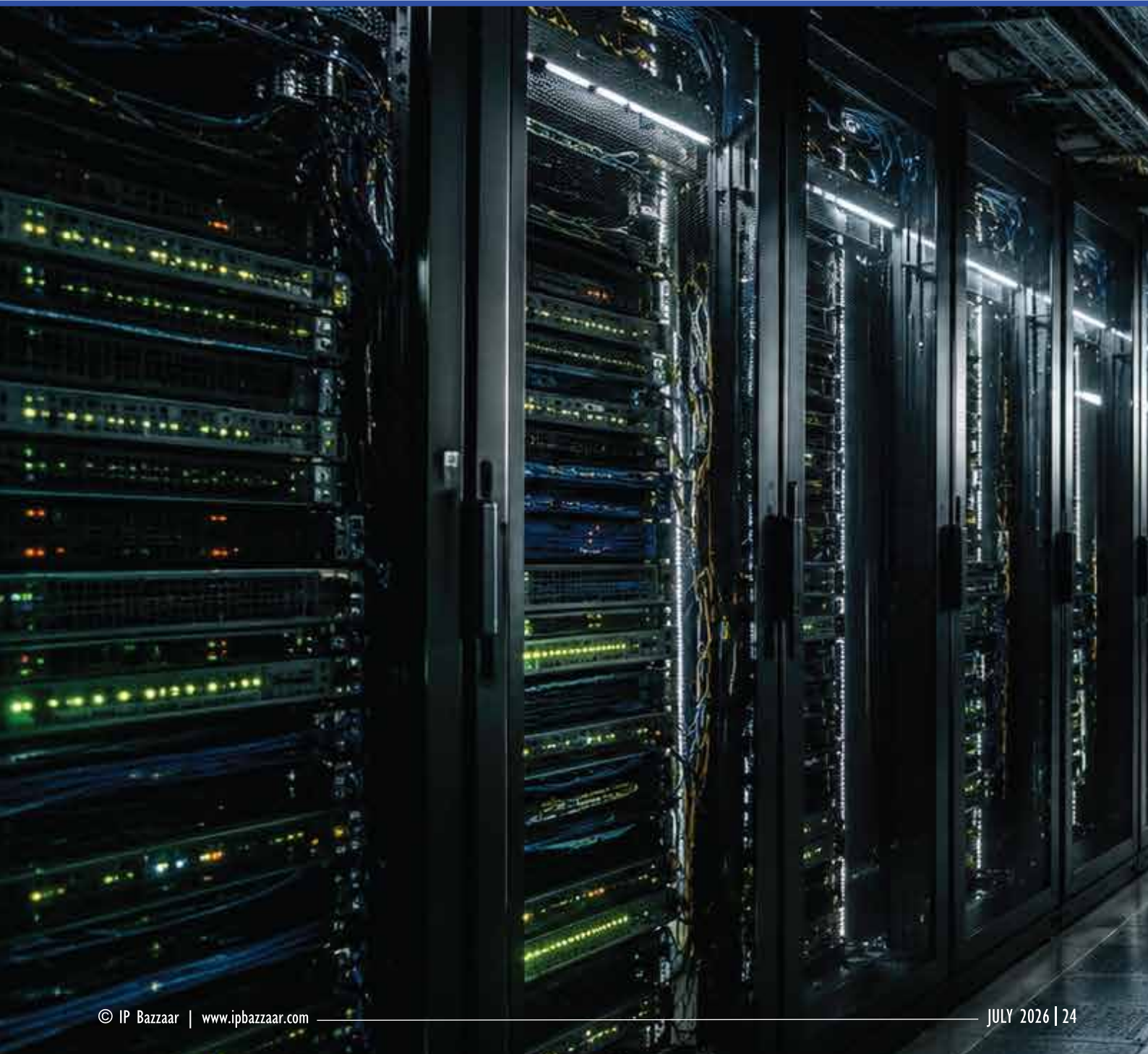
C. Rack, Server, and Modular Infrastructure In Data Centres

In a mission-critical data center, physical infrastructure must do more than hold equipment. It must support fast deployment, high-density computing, efficient cooling and power delivery, easy maintenance, and reliable operation under demanding conditions.

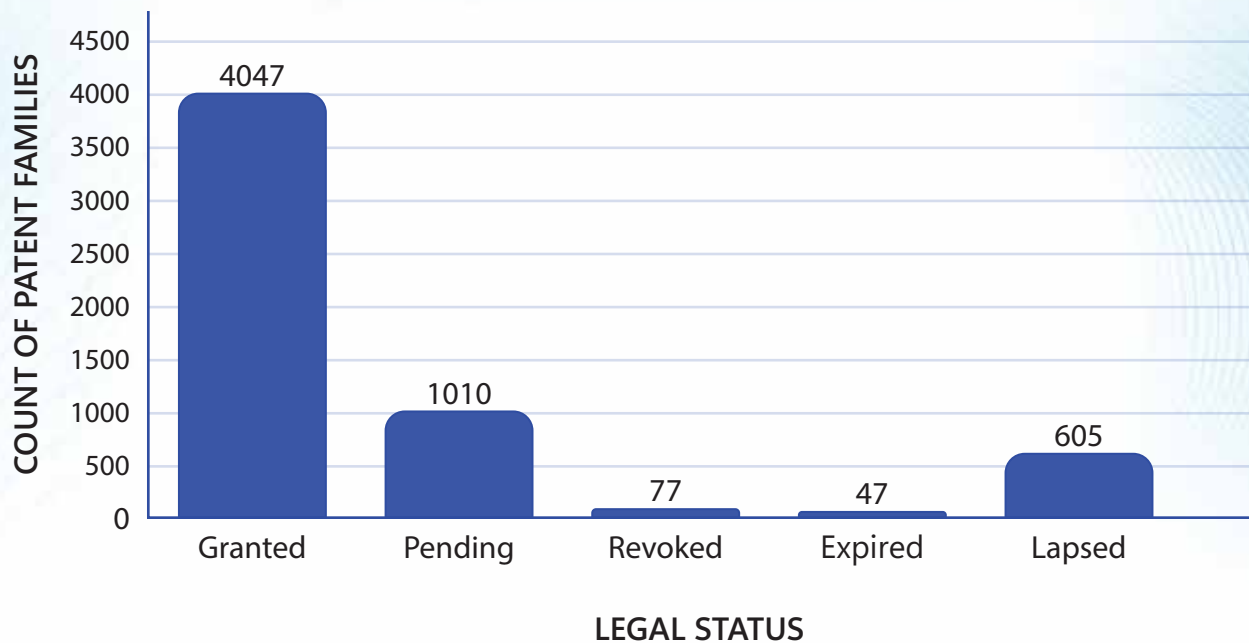
This cluster covers server racks, cabinets, chassis, enclosures, modular data center units, containerized systems, cable management, hot-swappable modules, rack-level

monitoring, and integrated cooling-power interfaces. For AI and high-performance computing facilities, rack design directly affects density, airflow, serviceability, and uptime.

For defence and space applications, modular infrastructure is especially valuable because computing systems may need to operate in remote bases, command centers, mobile units, satellite ground stations, and tactical edge locations.



Legal Status

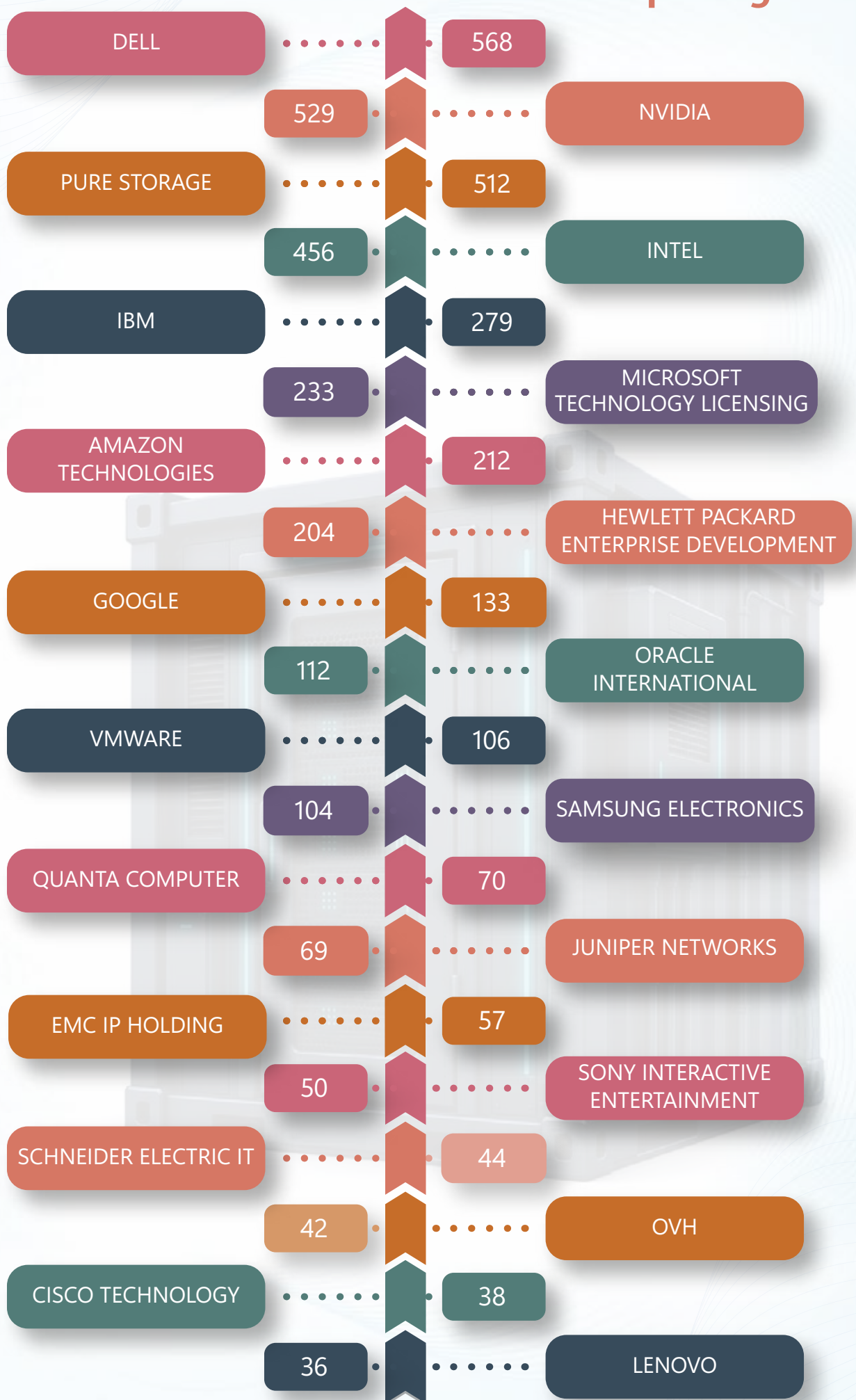


Patent Focus Areas

- High-density server racks.
- Modular and containerized data centers.
- Rack-level cooling and power interfaces.
- Cable routing and management systems.
- Hot-swappable server modules.
- Rugged cabinets and enclosures.
- Shock and vibration-resistant rack systems.



Top Assignees



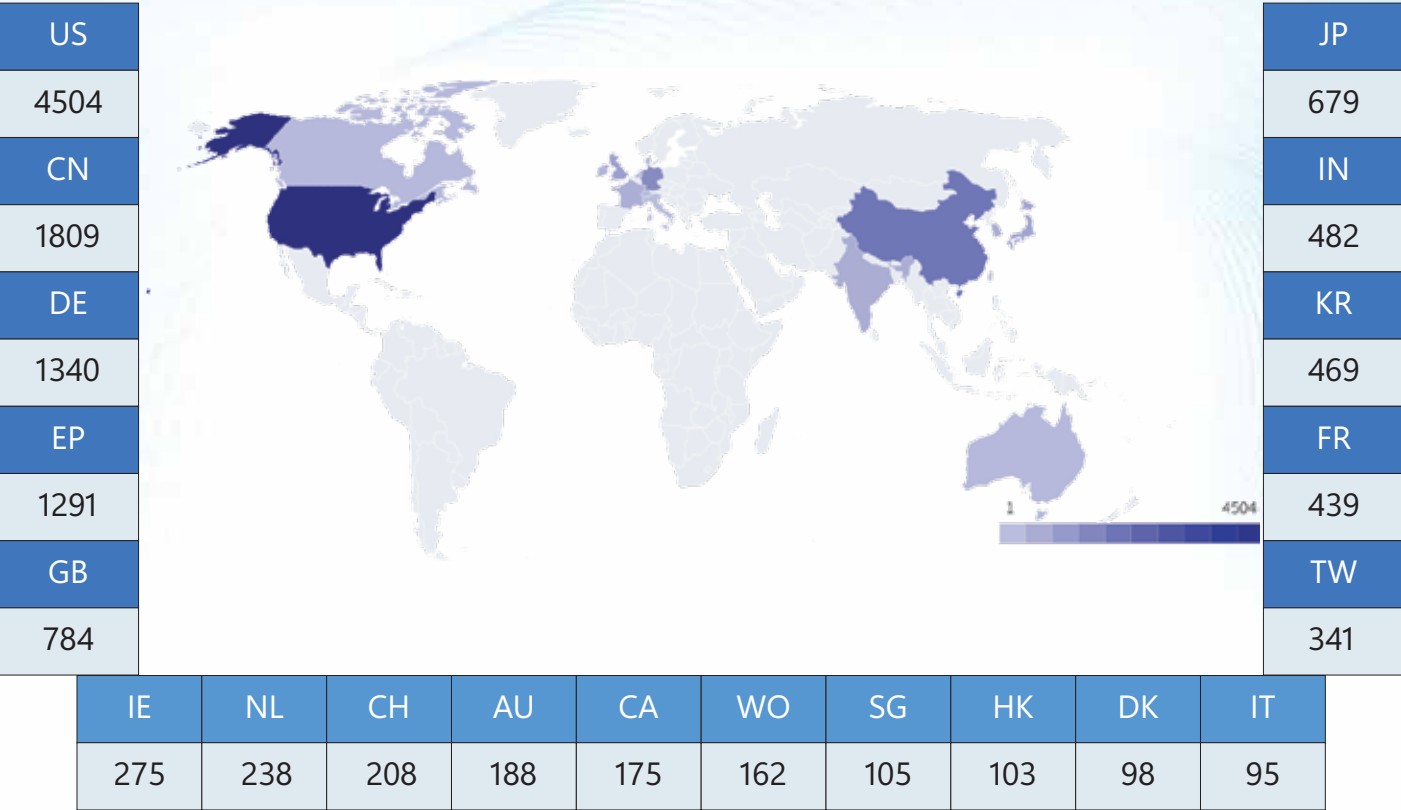
Notable Inventions – Global

Application No.	Priority Date	Title	Assignee
US7116558	2001-05-11	Server rack	Layer Seven; Mugen; Infinity Saitama Prefecture Asaka Shi Knee Fort 2 Chome 1 5 No 1 1; Layer Seven C0; Sikki;
US8867193	2001-03-20	Adjustable scalable rack power system and method	Schneider Electric It
US7715207	2003-08-27	Rack architecture and management system	Chatsworth Products, Epi Center et al.
US8601053	2004-02-13	Multi-chassis fabric-backplane enterprise servers	Oracle International

Notable Inventions – India (Priority - 104)

Application No.	Priority Date	Title	Assignee
IN335088	2012-05-18	Method and system for determining and implementing a viable containment design of a data centre	Tata Consultancy Services
IN3530/CHE/2015 A	2015-07-10	Micro data center (mdc) in a box system and method thereof	Kochukunju Prasad Lalathuputhanpura

Protection countries



White Space Opportunities

- Rugged server racks for defence deployments.
- Modular data centers for rapid field deployment.
- Compact edge infrastructure for remote locations.
- Integrated cooling and power rack systems.
- Shock-resistant and vibration-resistant enclosures.
- Hot-swappable server modules for mission continuity.
- Modular infrastructure for satellite ground stations.

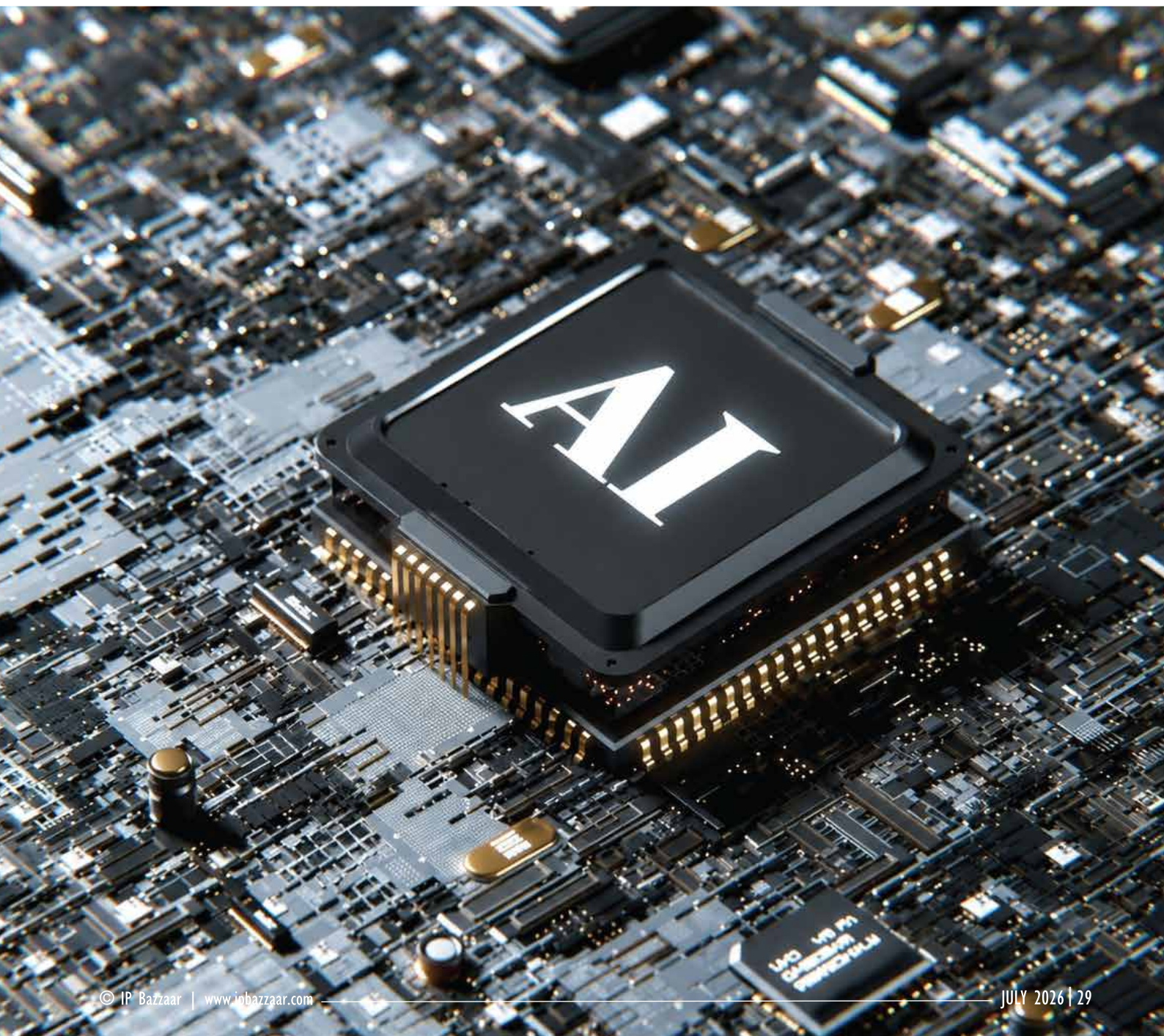
D. AI-Driven Data Centre Management and Workload Optimization

AI-driven management acts as the intelligence layer of a modern data center. It helps decide how servers, storage, networking, cooling, and power resources should be used in real time.

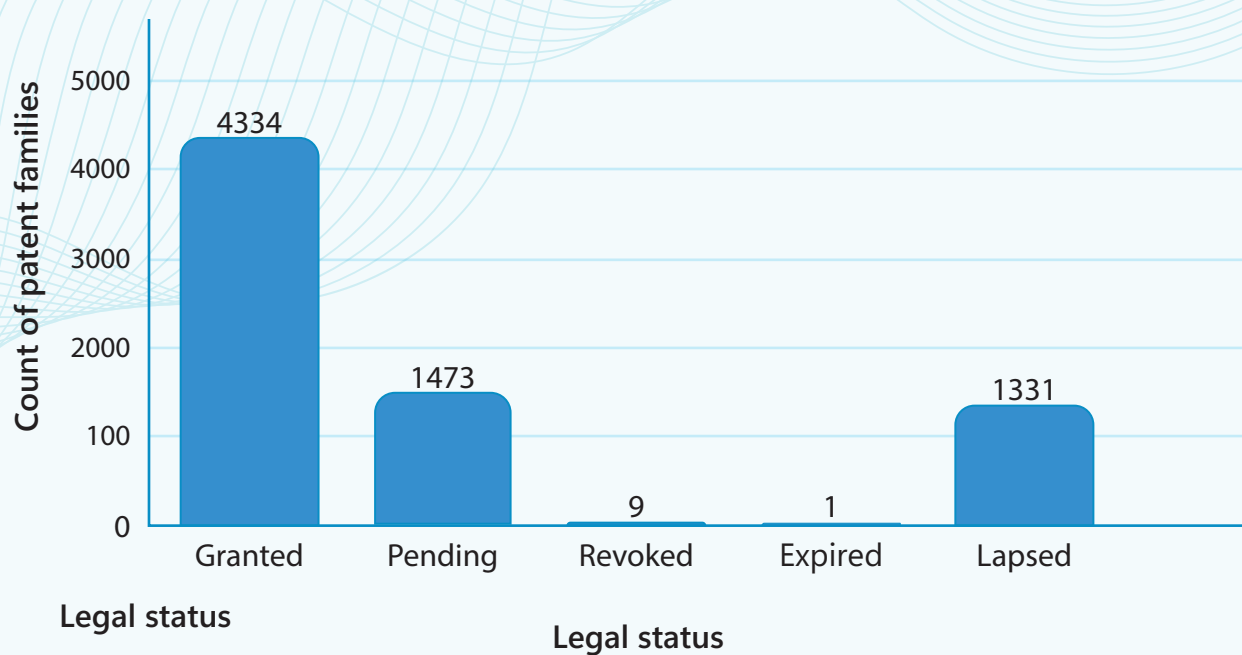
This cluster covers workload scheduling, resource allocation, predictive maintenance, anomaly detection, digital twin modelling, energy-aware computing, thermal-aware workload placement, and autonomous data center operations. For AI and

high-performance computing facilities, these systems help improve utilization, reduce downtime, and optimize energy use.

For defence and space applications, AI-driven management is important because mission workloads must be processed securely, quickly, and reliably. This includes satellite imagery processing, radar data analysis, cyber defence workloads, command systems, classified data center operations, and tactical edge computing.



Legal Status



Patent Focus Areas

AI-based workload scheduling

Resource allocation across servers and racks

Predictive maintenance and anomaly detection

Digital twin models for data center operation

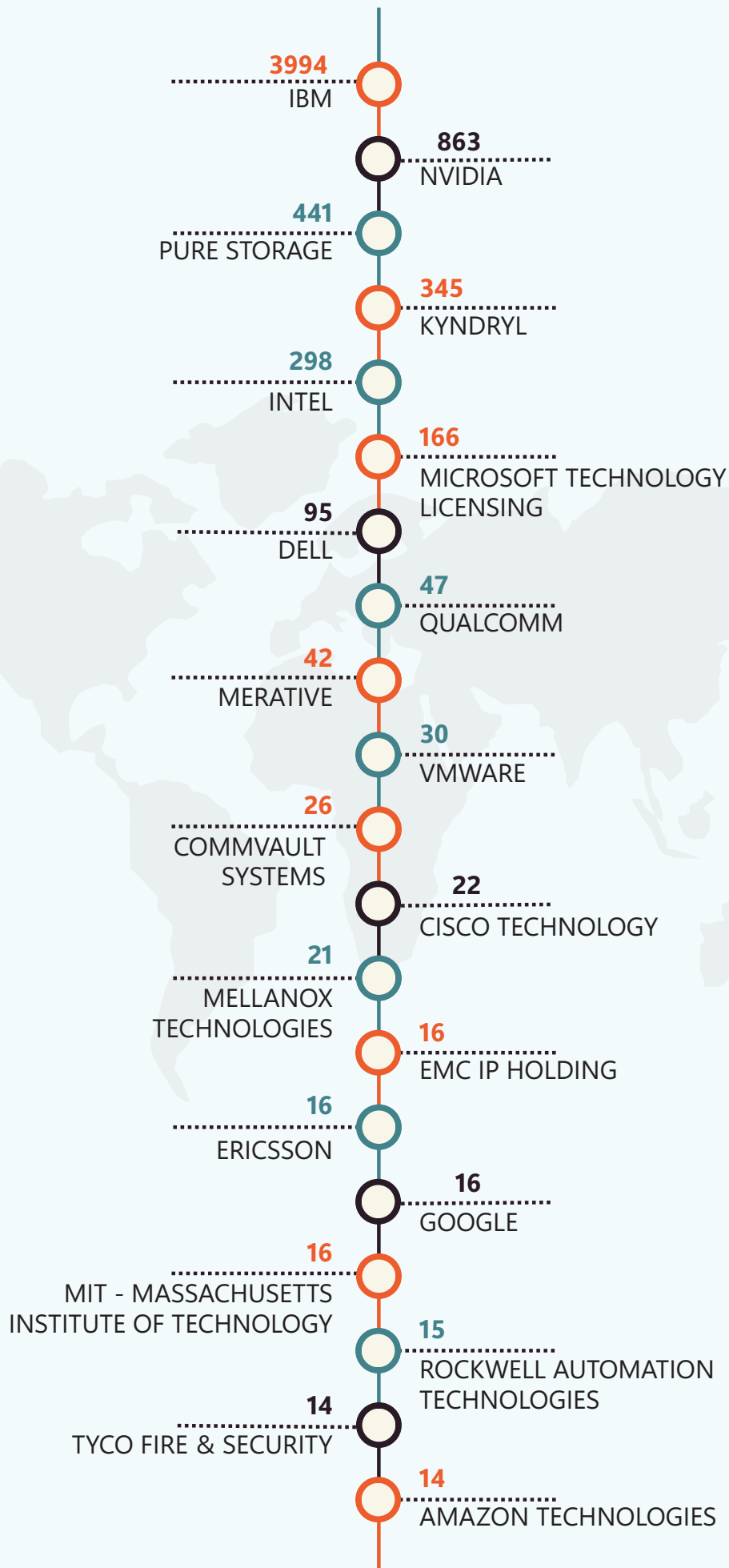
Energy-aware workload placement

Thermal-aware workload placement

Autonomous data center control systems



Top Assignees



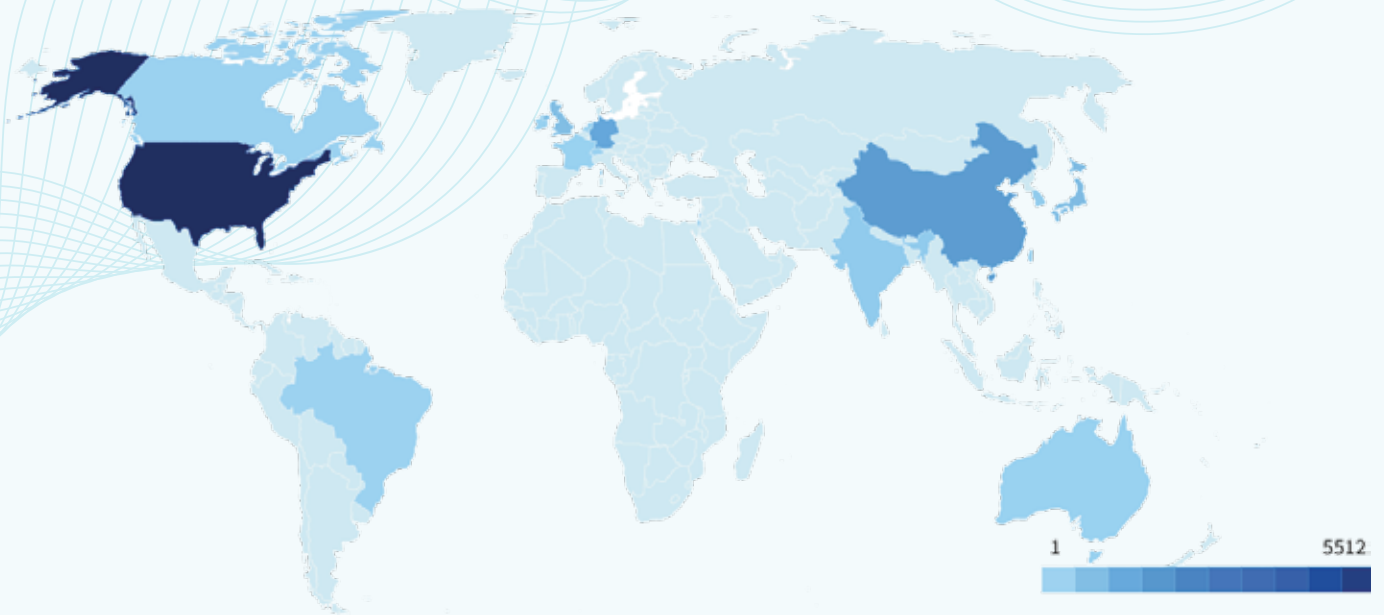
Notable Inventions – Global

Application No.	Priority Date	Title	Assignee
US20110154327	2009-09-11	Method and apparatus for data center automation	Ntt Docomo
US10429921	2013-05-31	Datacenter power management optimizations	Amazon Technologies
US10404547	2014-02-27	Workload optimization, scheduling, and placement for rack-scale architecture computing systems	Intel
US11423327	2018-10-10	Out of band server utilization estimation and server workload characterization for datacenter resource optimization and forecasting	Oracle International

Notable Inventions – India (Priority - 93)

Application No.	Priority Date	Title	Assignee
IN202311057157	2023-08-25	A system and method for optimizing performance of batch jobs in a datacentre environment	Bluest Mettle Solutions Private; Chitkara University
IN202641030722	2026-03-13	A scalable and resilient architecture for distributed cloud-based data processing systems	Kalae Uday Kumar

Protection Countries



US	CN	DE	EP	JP	GB	IN	KR	WO	AU
5512	1470	1136	664	626	571	249	230	199	113
IE	FR	NL	TW	CH	CA	SG	BR	HK	IL
113	99	82	81	76	68	67	36	35	31

White Space Opportunities

- Mission-critical workload prioritization
- Secure resource allocation for classified cloud
- AI-based fault prediction for remote data centers
- satellite data processing optimization
- Autonomous management for tactical edge sites
- Energy-aware workload scheduling
- Digital twins for mission-critical data centers



E. Data Centre Network Fabric and Interconnect Technologies

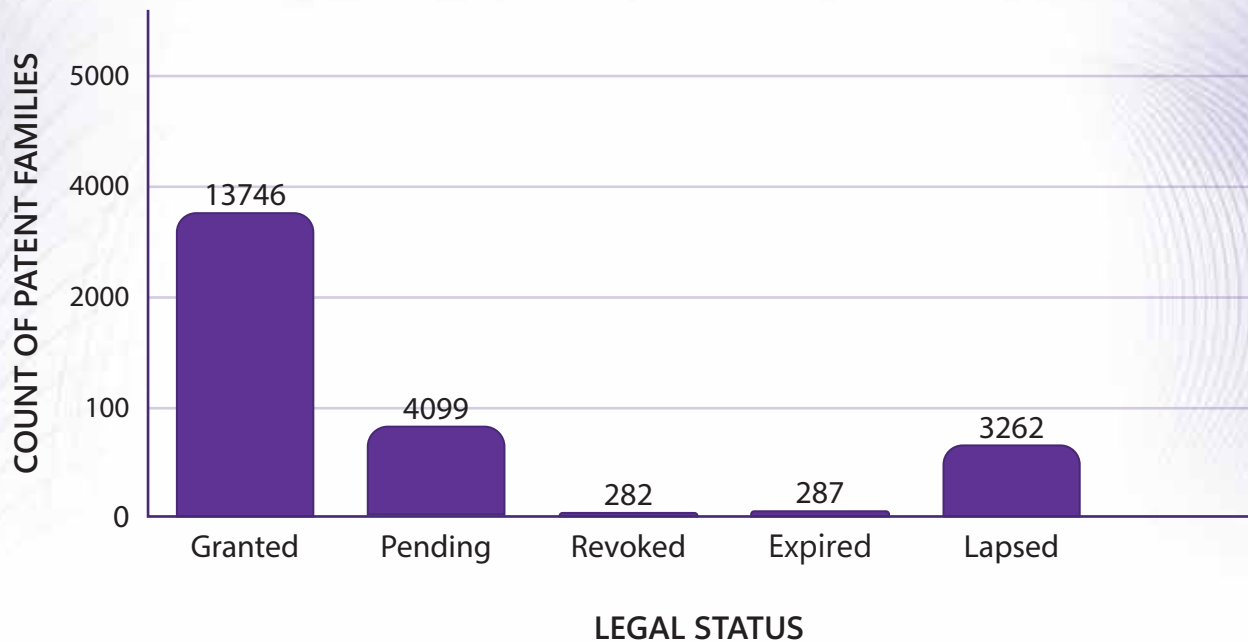
Networking and interconnect technologies form the backbone of modern data center infrastructure, enabling high-speed, secure, and reliable data exchange within and across facilities. This cluster encompasses optical interconnects, high-performance switches and routers, software-defined networking (SDN), network load balancing, low-latency communication architectures, and edge-to-cloud connectivity solutions.

With the rapid expansion of artificial intelligence, cloud computing, and high-performance computing workloads, data centers increasingly depend on advanced

networking capabilities to support efficient communication among servers, storage systems, GPUs, and distributed edge resources.

In defence and space environments, robust networking infrastructure is essential for secure command-and-control systems, satellite ground operations, tactical edge computing platforms, unmanned systems data processing, cyber defence operations, and other mission-critical applications requiring real-time performance and resilience.

Legal Status



Patent Focus Areas

Low-latency networks for AI data centers

Secure edge-to-cloud communication

Satellite-to-data center data routing

Optical interconnects for high-density racks

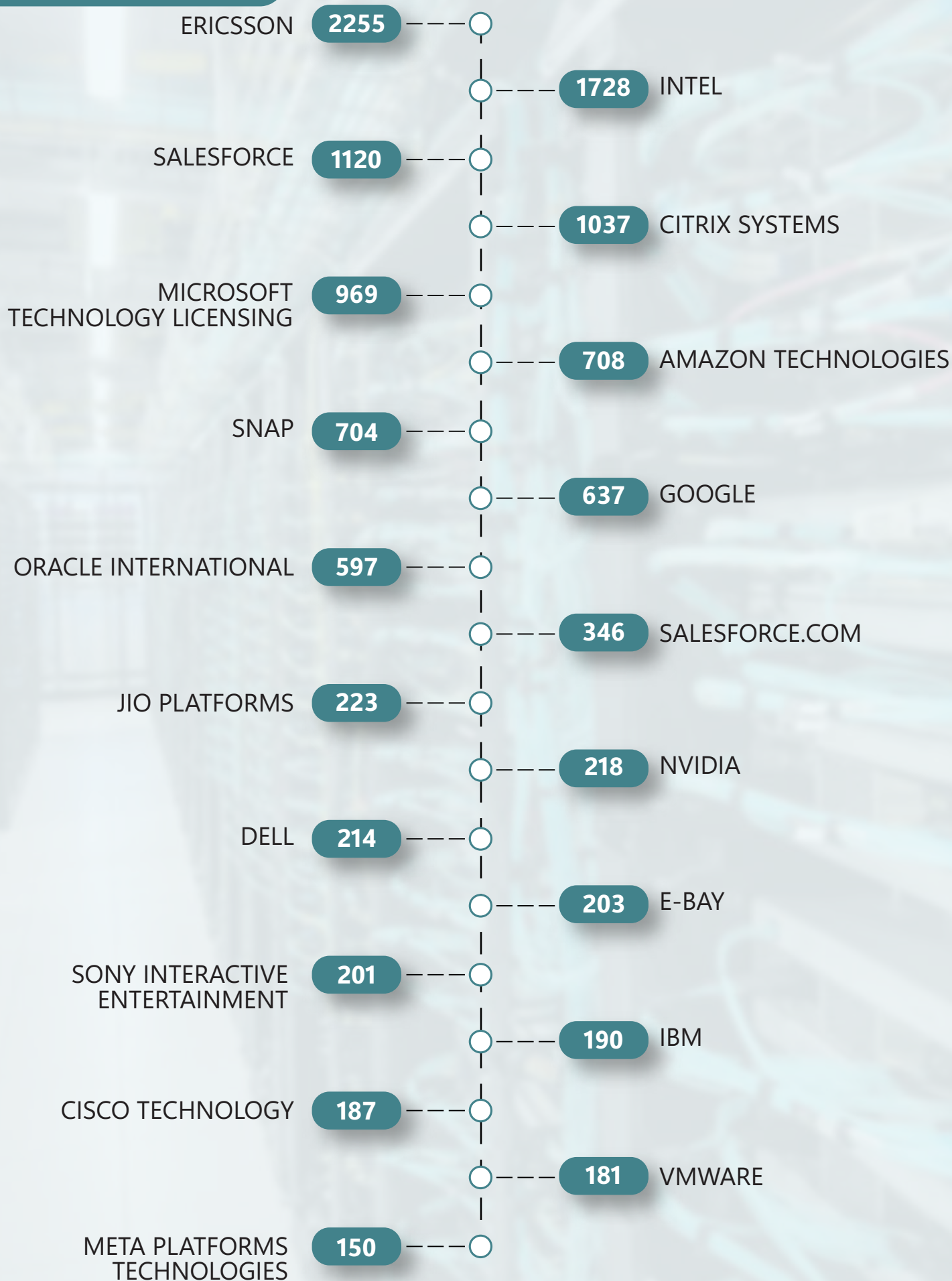
Resilient networking for defence cloud

Tactical network orchestration for edge sites

AI-based network traffic optimization



Top Assignees



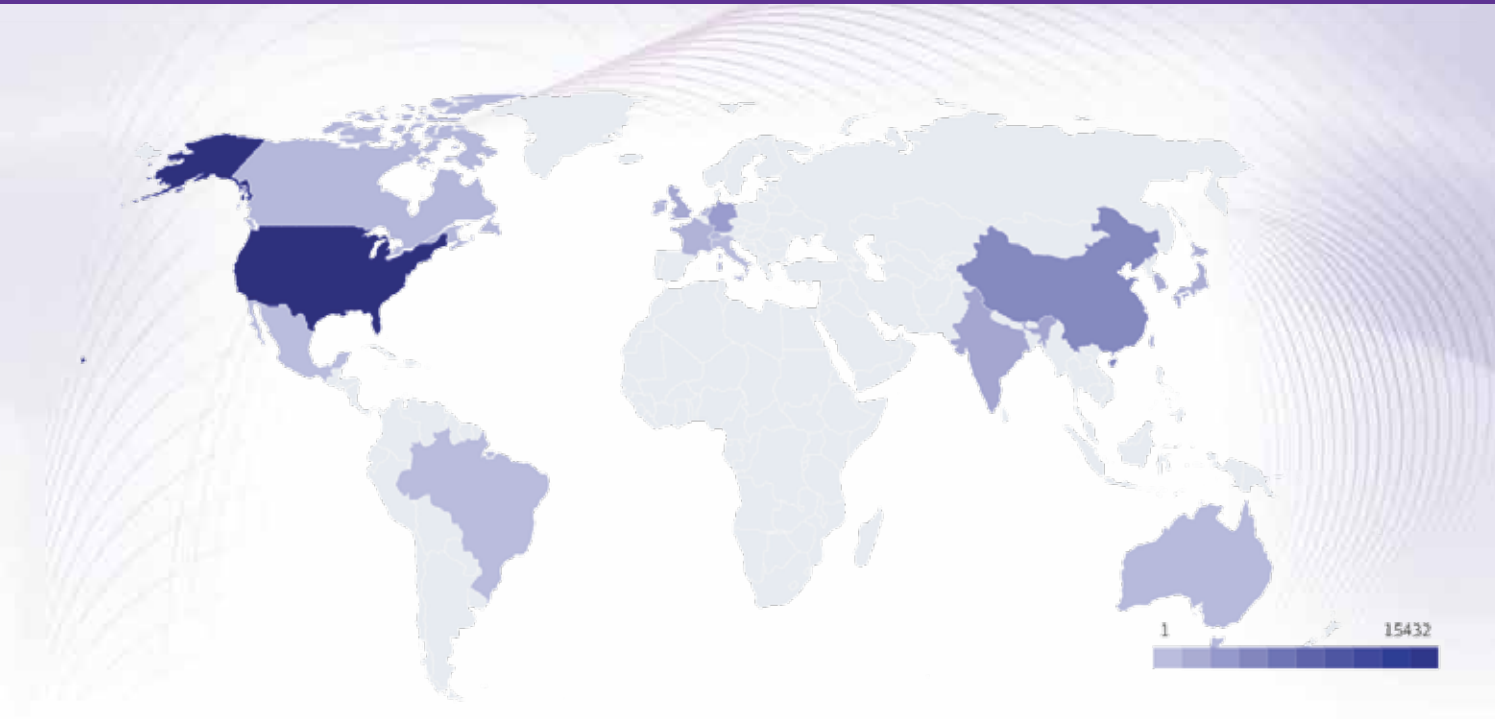
Notable Inventions – Global

Application No.	Priority Date	Title	Assignee
US6182139	1996-08-05	Workload optimization, scheduling, and placement for rack-scale architecture computing systems	Resonate
US12068978	2008-09-11	Methods and apparatus related to a flexible data center security architecture	Juniper Networks
US8433547	2009-12-03	System and method for analyzing nonstandard facility operations within a data center	Schneider Electric It
US9497039	2009-05-28	Agile data center network architecture	Microsoft Technology Licensing
US9942935	2015-11-17	System and method for providing a wireless failover of a management connection in a server rack of a data center	Dell; Wyse Technology
US20250181129	2022-05-11	Satellite internet constellation content delivery network and data center	Armada Systems

Notable Inventions – India (Priority - 800)

Application No.	Priority Date	Title	Assignee
IN562850	2021-04-28	Method and system for managing electronic design automation on cloud	Tata Consultancy Services
IN202121039244	2021-08-30	System and method of enabling mobility load balancing of a self-organizing network	Jio Platforms
IN202341077143	2023-11-11	Multi-access edge computing server rack	Jio Platforms

Protection Countries



US	EP	CN	DE	IN	GB	KR	JP	WO	FR
15432	5237	4583	2926	2141	1986	1772	1591	1275	1173
CA	IE	NL	CH	TW	AU	BR	HK	MX	IT
730	714	691	642	590	522	395	352	327	296

White Space Opportunities

- Optical interconnects
- High-speed data center switches
- Low-latency routing
- Network load balancing
- Software-defined networking
- Data center traffic control
- Edge-to-data center connectivity

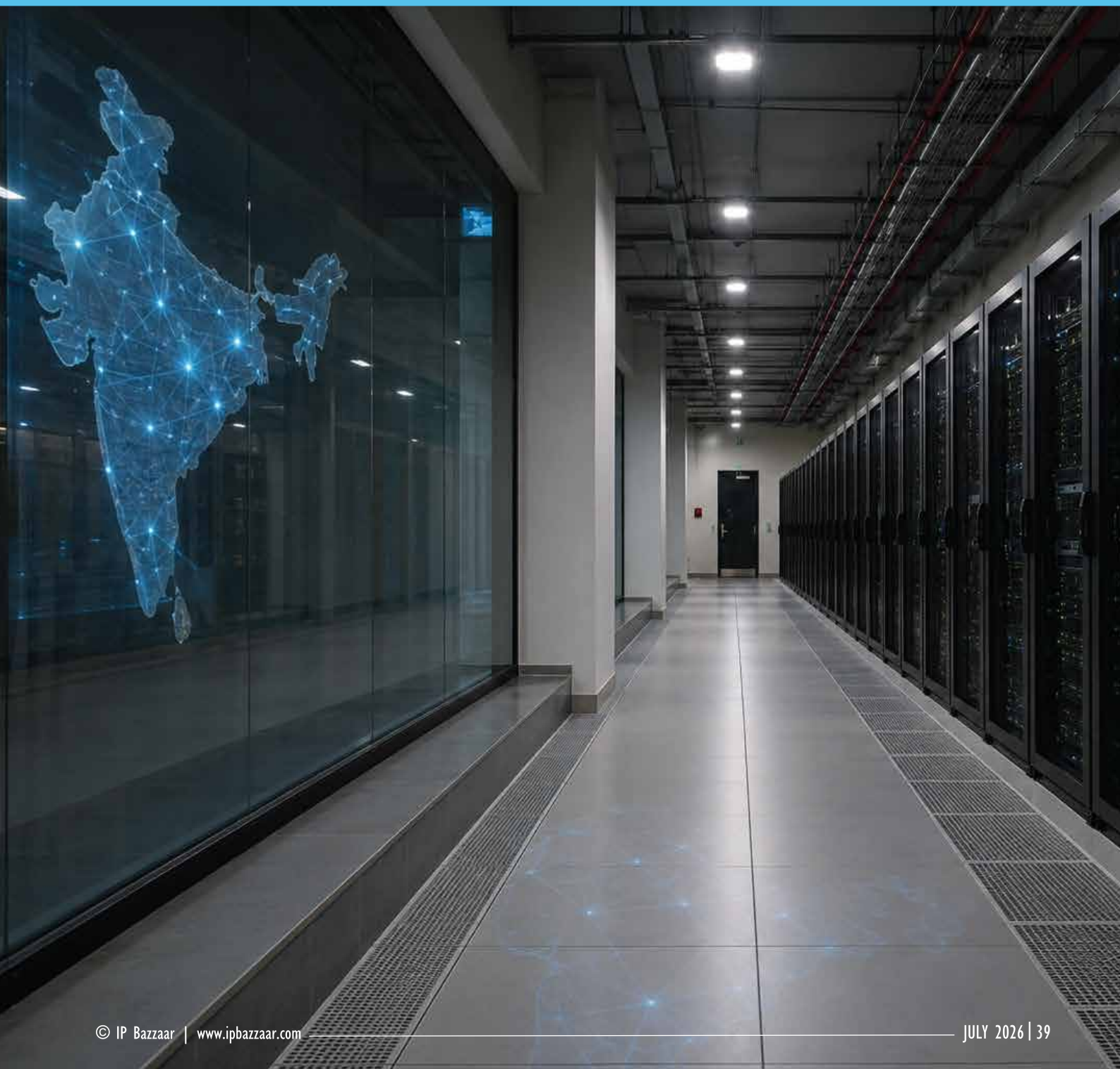
F. Cybersecurity and Sovereign Data Centre Systems

Cybersecurity is the trust layer of a data center. It protects the data, workloads, users, infrastructure, and communication paths inside secure data center environments.

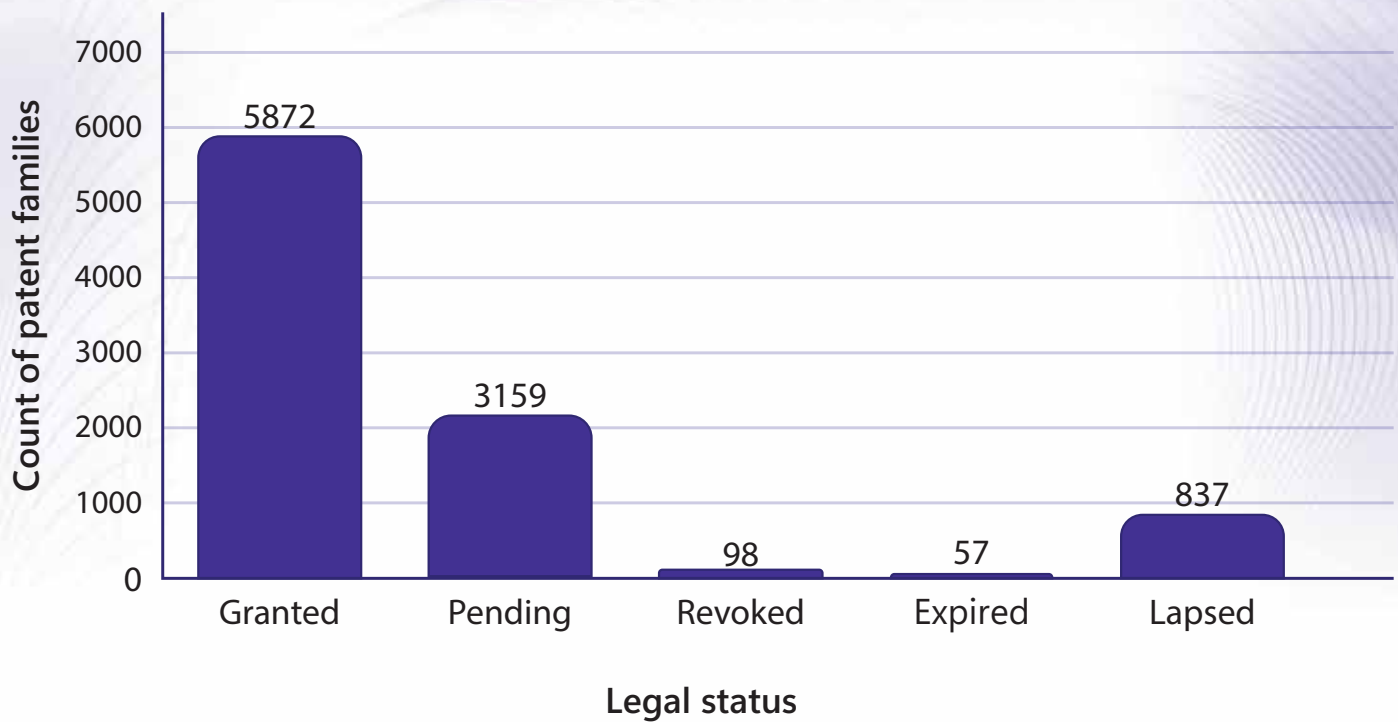
This cluster covers encryption, access control, zero-trust security, identity management, key management, secure workload isolation, threat detection, data localization, and sovereign data control. For modern data

centers, cybersecurity is not only an IT function; it is part of infrastructure reliability and customer trust.

For defence and space applications, secure data center systems are critical for classified workloads, satellite mission data, command-and-control systems, cyber defence operations, and sovereign digital infrastructure.



Legal Status

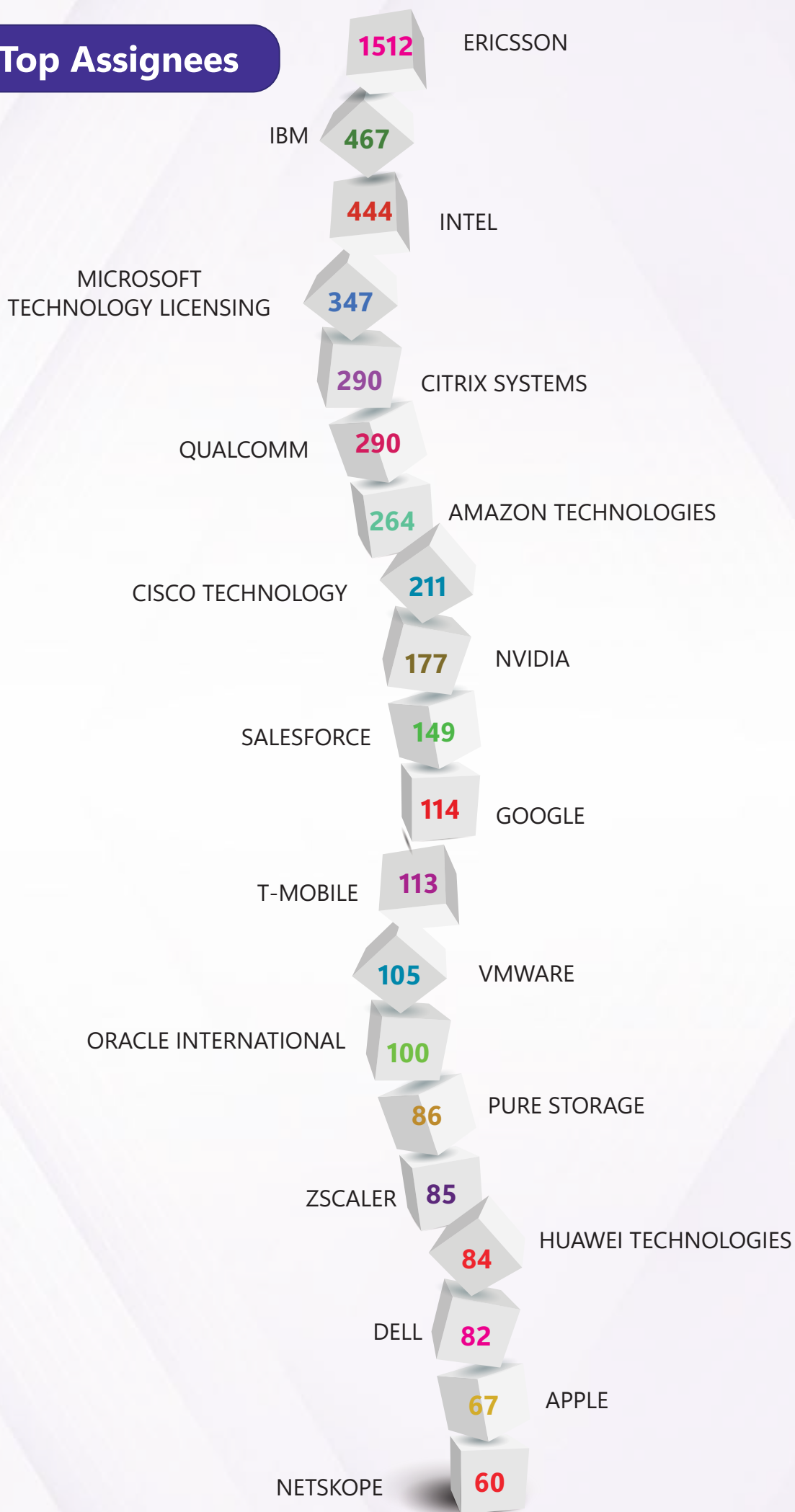


Patent Focus Areas

- Data center security architecture and trust frameworks
- Encryption and key management
- Secure workload isolation
- Identity and access control
- AI-based threat detection
- Sovereign data routing and storage control
- Post-quantum security for data centers



Top Assignees



Notable Inventions – Global

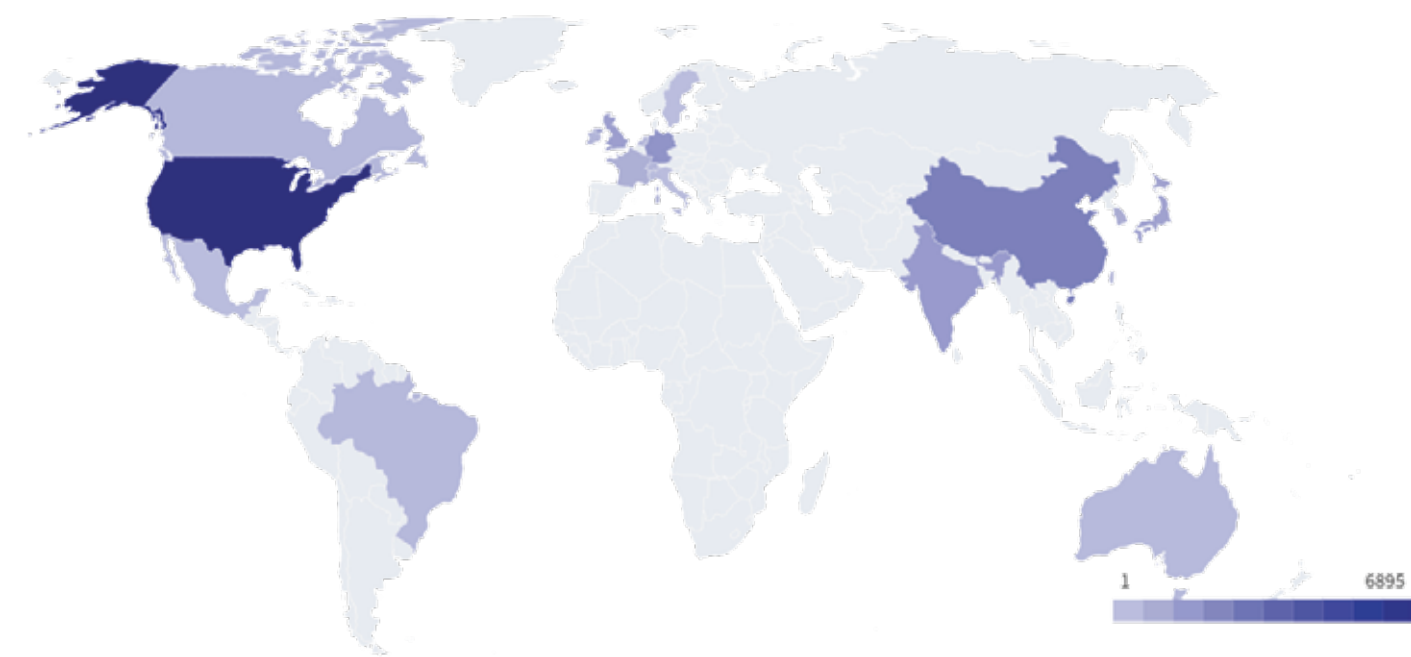
Application No.	Priority Date	Title	Assignee
US6064993	1997-12-18	Closed system virtual postage meter	Pitney Bowes
US6678639	2000-08-04	Automated problem identification system	Oracle
US7836498	2000-09-07	Device to protect victim sites during denial of service attacks	Riverbed Technology
US7058807	2002-04-15	Validation of inclusion of a platform within a data center	Tahoe Research

Notable Inventions – India (Priority - 337)

Application No.	Priority Date	Title	Assignee
IN202011013432	2020-03-27	Data-exchange in data-center networked-security using deep- learning and ai programming	Singh Teekam; Banik Barnali Gupta; Sarwe Deepak Umrao; Khari Manju; Pandey Priyank; Narwal Abhikrit.
IN202111033913	2021-07-28	A system of framework to mitigate insider attacks in cloud environment	Kumar Rajneesh Mittal Sumit Oberoi Priya



Protection Countries



US	EP	CN	DE	IN	GB	JP	KR	WO	FR
6895	3123	2475	1738	1426	1299	1196	828	753	712
IE	CA	CH	NL	BR	AU	TW	IT	MX	SE
487	451	445	438	388	332	264	256	255	228

White Space Opportunities

- Classified workload isolation systems
- Secure satellite mission data processing
- AI-based cyber threat detection in data centers
- Sovereign data storage and routing control
- Post-quantum security for defence data centers
- Tamper-resistant access control systems
- Zero-trust architecture for mission facilities

G. Fire Safety, Monitoring and Operational Resilience

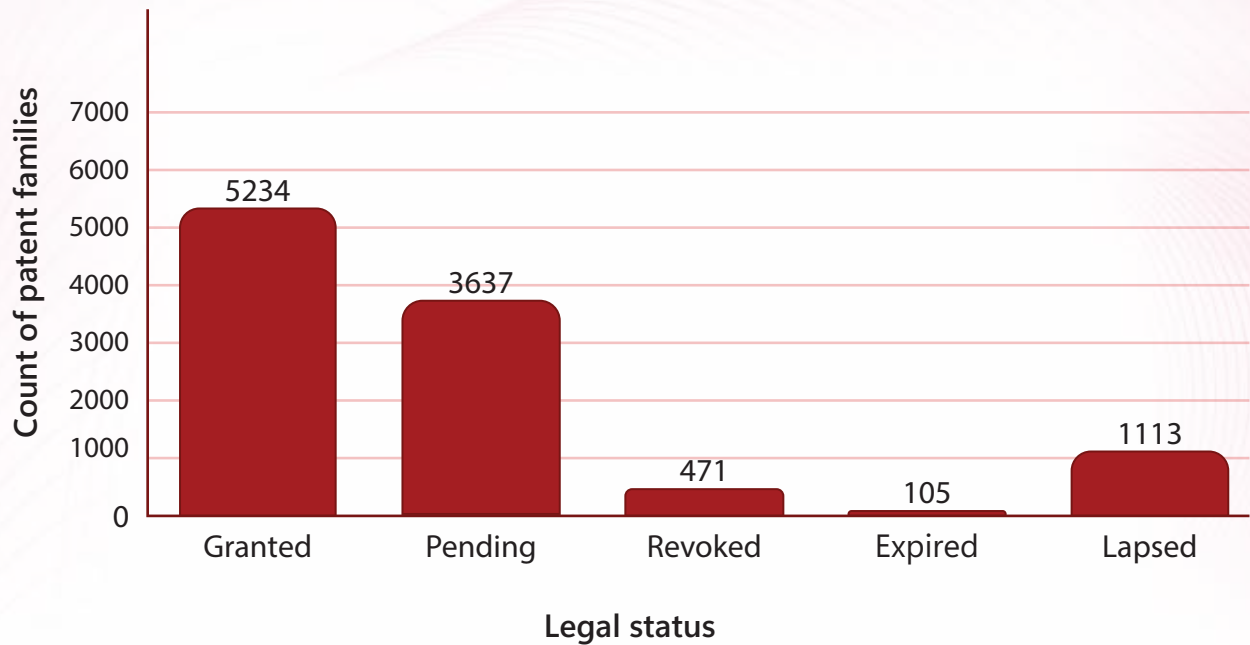
Fire safety, monitoring and operational resilience forms the protection layer of a data center. It focuses on detecting risks early, preventing infrastructure damage, isolating failures, and maintaining continuity during faults, emergencies, or environmental events.

This cluster covers fire detection, clean-agent suppression, smoke and gas sensors, coolant leak detection, environmental monitoring, fault isolation, disaster recovery systems, automated failover, and resilience orchestration platforms. As data centers become larger, denser, and more AI-driven, safety and resilience systems must operate with greater speed, accuracy, and automation.

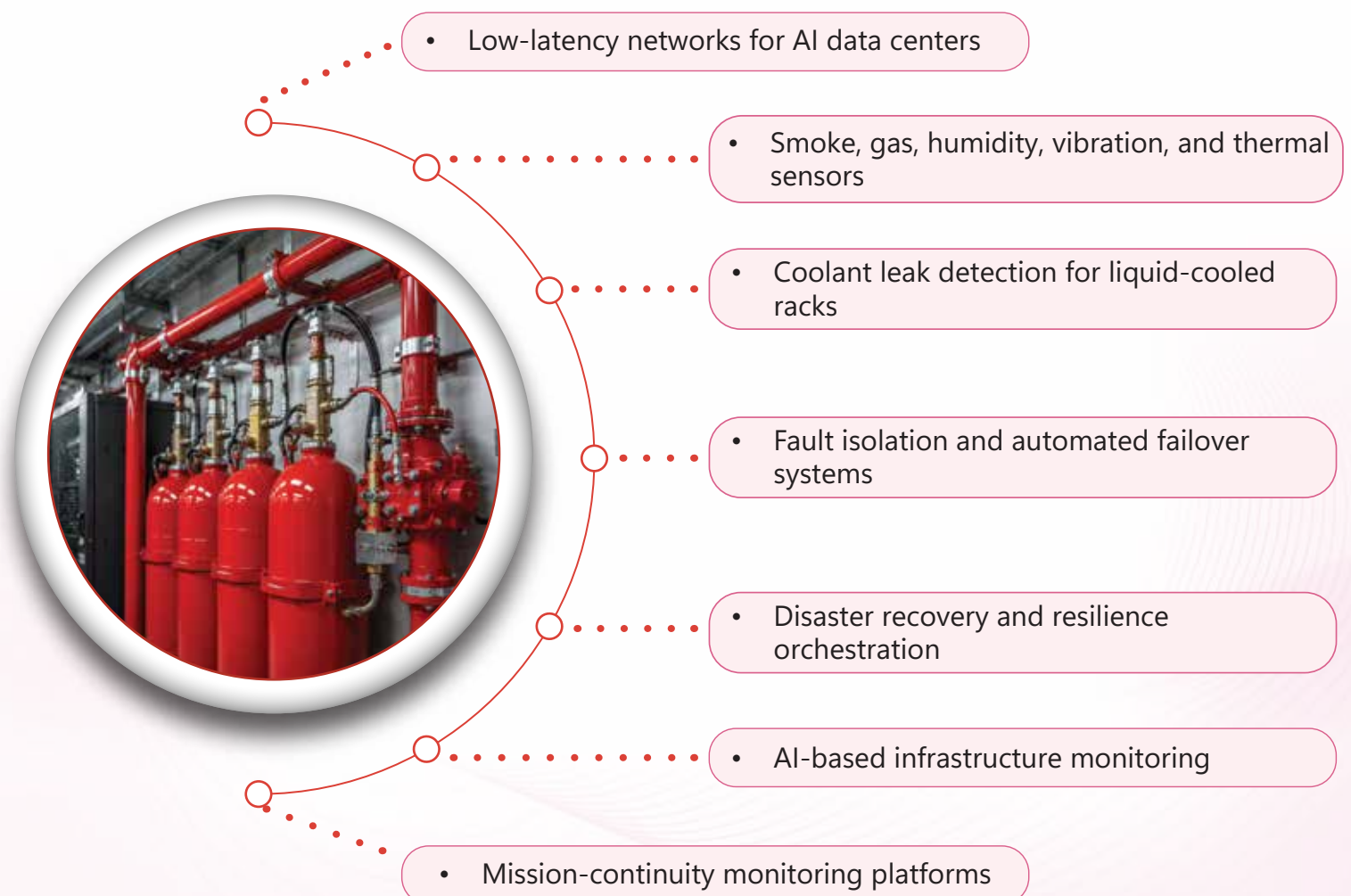
For defence and space data centers, this cluster is critical because mission infrastructure cannot afford avoidable downtime. Facilities supporting command centers, satellite ground stations, classified workloads, cyber defence operations, and remote tactical sites require early-warning systems, automated recovery, secure monitoring, and continuity planning.



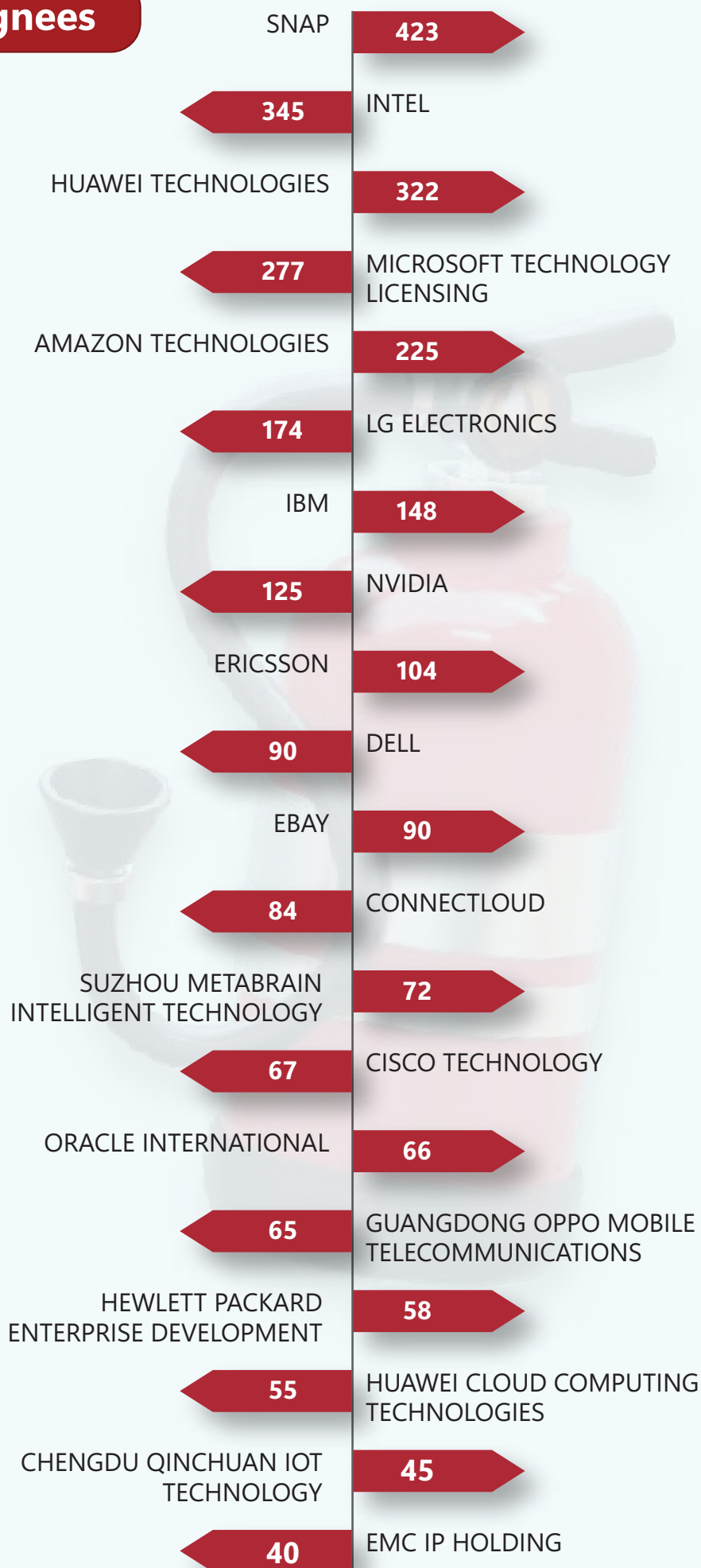
Legal Status



Patent Focus Areas



Top Assignees



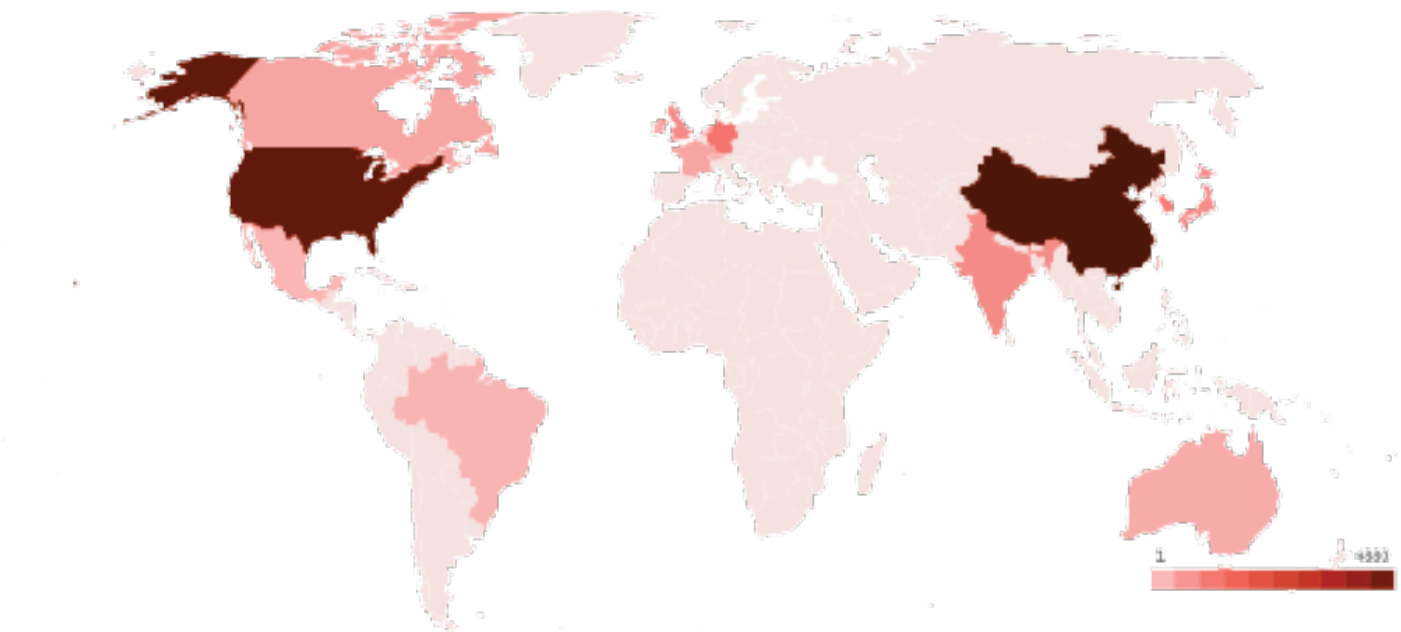
Notable Inventions – Global

Application No.	Priority Date	Title	Assignee
US4749987	1985-04-09	Analog fire detector and analog fire alarm system using the same	Hochiki
US20040132398	2002-10-25	Integrated cabinet for containing electronic equipment	Sanmina
JP4795702	2005-02-25	Fire Detection System in Variable Oxygen Space	Hochiki Takenaka
US7796047	2005-11-04	Apparatus for fire detection in an electrical equipment rack	Amrona
AU2013200742	2010-06-21	Method, Apparatus and System for cooling containerised datacentres	Datapod Australia

Notable Inventions – India (Priority - 333)

Application No.	Priority Date	Title	Assignee
IN585682 B	2021-09-28	System and method for detecting and handling machine emergencies in a network	Jio Platforms Limited
IN202541065943	2025-07-10	System and method for real-time emergency incident detection and alert generation	Vellore Institute Of Technology Chennai
IN202541078678	2025-08-19	Integrated environmental monitoring and control system and method for indoor environments	Vellore Institute Of Technology Chennai

Protection Countries



CN	US	EP	DE	KR	WO	GB	IN	JP	CA
4880	4624	2314	1127	1026	842	772	771	746	394
FR	IE	AU	NL	CH	TW	BR	MX	HK	SG
385	303	301	264	263	248	168	151	150	140

White Space Opportunities

- AI-based fire and hazard detection
- Coolant leak and fire-risk integration
- Autonomous recovery for mission data centers
- Predictive resilience monitoring
- Fault isolation for high-density AI racks
- Secure monitoring for classified facilities
- Disaster recovery systems for satellite ground stations



6. Applications

Data centers support a wide range of sectors by providing secure computing, storage, networking, and data processing capabilities.

1. Cloud Computing Services

Data centers power cloud platforms that provide computing, storage, and software services on demand.

Examples: Enterprise cloud, government cloud, SaaS platforms.

2. Data Storage and Management

They securely store, organize, and manage large volumes of digital information.

Examples: Banking records, medical records, enterprise databases.

3. Artificial Intelligence and Machine Learning

Data centers provide the computing power needed for AI training and data analytics.

Examples: AI models, predictive analytics, image recognition.

4. High-Performance Computing

They support complex calculations and simulations for research and engineering.

Examples: Weather forecasting, climate modeling, aerospace simulations.

5. Commercial, Digital Services, Media, Entertainment, and Streaming

Data centers support secure financial transactions, digital commerce, customer data management, content hosting, and large-scale content delivery with high availability and low latency.

Examples: Online banking, UPI payments, stock trading platforms, e-commerce websites, food delivery apps, travel portals, OTT platforms, online gaming, and live streaming services.

6. Telecommunications and 5G Networks

Data centers handle network traffic, billing

systems, and low-latency services.

Examples: Mobile networks, edge computing, content delivery networks.

7. Cybersecurity Operations

They support threat detection, encryption, and secure access management.

Examples: Security operation centers, threat intelligence platforms.

8. Disaster Recovery and Business Continuity

Data centers provide backup systems to ensure uninterrupted operations during disruptions.

Examples: Recovery sites, backup servers, redundant storage.

9. Defence and National Security Applications

Data centers support secure communications, intelligence processing, and mission-critical systems.

Examples: C4ISR systems, military cloud, defence communication networks.

10. Space and Satellite Applications

They process and store satellite, telemetry, and geospatial data.

Examples: Satellite imagery analysis, mission monitoring, ground station data.

Data centers are the backbone of the digital economy, supporting cloud computing, AI, cybersecurity, finance, healthcare, defence, space, media, entertainment, and commercial digital services. They enable secure data storage, high-performance computing, and reliable digital service delivery across industries.

7. Active Companies

The global data center industry includes three major types of companies: data center operators provide colocation and hosting facilities, cloud and hyperscale companies use large data center networks to deliver computing and digital services and infrastructure technology suppliers provide critical systems such as power, cooling, racks, monitoring, and security.

Active Global Data Center Operators and Developers

Data Center Operators and Developers are companies that own, develop, operate, or manage data center facilities and provide colocation, hyperscale, interconnection, or digital infrastructure services

Country	Companies
United States	Equinix, Digital Realty, Vantage Data Centers, CyrusOne, QTS Data Centers, Iron Mountain Data Centers, CoreSite, DataBank, Flexential, STACK Infrastructure, Aligned Data Centers, Compass Datacenter, EdgeConneX
Japan	NTT Global Data Centres, Telehouse / KDDI
United kingdom	Global Switch
Singapore	CapitaLand Data Centre, Princeton Digital Group, ST Telemedia Global Data Centres,
India	CtrlS Datacenters, Yotta Data Services, Nxtra by Airtel, Sify Technologies / Sify Infinit Spaces, Pi Datacenters, Tata Communications, RailTel Corporation of India, Cyfuture, NetForChoice

Active Global Cloud and Hyperscale Infrastructure Companies

Cloud and Hyperscale Infrastructure Companies are organizations that build and operate large-scale cloud infrastructure and data center networks to deliver cloud computing, storage, AI, networking, and digital platform services.

Country	Companies
United States	Amazon Web Services (AWS), Microsoft Azure, Google Cloud, Oracle Cloud Infrastructure (OCI), Meta, IBM Cloud
China	Alibaba Cloud, Tencent Cloud
India	ESDS Software Solution, Anant Raj Cloud / Anant Raj Limited, Reliance Industries / Jio Platforms

Active Data Center Infrastructure and Technology Suppliers

Data Center Infrastructure and Technology Suppliers are companies that provide hardware, software, power systems, cooling systems, networking equipment, servers, storage, engineering services, and other technologies required for building and operating data centers,

Country	Companies
France	Schneider Electric, Legrand
United States	Vertiv, NVIDIA, AMD, Intel, Cisco, Arista Networks, Dell Technologies, HPE
Ireland	Eaton
Germany	Rittal
Switzerland	ABB
China	Lenovo Infrastructure Solutions Group
Taiwan	Delta Electronics
India	L&T Data Centers / L&T Digital, Sterling and Wilson, Blue Star, Kirloskar



8. Government Organizations

Organization	Role in Data Center Ecosystem
Ministry of Electronics and Information Technology (MeitY)	Policy / Nodal Ministry
National Informatics Centre (NIC)	Core Government Data Center Operator
National Informatics Centre Services Inc. (NICSI)	Government Cloud and Implementation Support
Software Technology Parks of India (STPI)	Government Data Center / Cloud Service Provider
RailTel Corporation of India Ltd.	Public Sector Undertaking (PSU) Data Center and Connectivity Provider
Bharat Sanchar Nigam Limited (BSNL) / Bharat Telecom Cloud Ltd. (BTCL)	PSU Telecom and Data Center Infrastructure Provider
State Data Centres (SDCs) under State Governments (e.g., Maharashtra SDC, Tamil Nadu SDC, Karnataka SDC, Gujarat SDC)	State-Level Government Data Center Infrastructure
Centre for Development of Advanced Computing (C-DAC)	Strategic Compute / High-Performance Computing (HPC) Infrastructure
Indian Computer Emergency Response Team (CERT-In)	Cybersecurity and Incident Response Authority
Indian Space Research Organisation – Indian Space Science Data Centre (ISRO-ISSDC)	Space Data Center Infrastructure
National Remote Sensing Centre (NRSC), Indian Space Research Organisation (ISRO)	Satellite Data Processing and Dissemination Infrastructure
National Knowledge Network (NKN)	National Connectivity Infrastructure

9. Data Centre Facility Cost (Tentative)

Cost Methodology

Step	Calculation	Result
Step 1: Base facility benchmark	JLL forecasts average global data center shell/core construction cost at USD 11.3 million per MW for 2026. This covers construction shell/core, not tenant technology fit-out.	Source benchmark
Step 2: Apply to 5 MW	USD 11.3 million/MW × 5 MW	USD 56.5 million
Step 3: Convert to INR	USD 56.5 million × ₹90/USD planning assumption	₹508.5 crore
Step 4: India planning range	Adjust for land, city, power availability, redundancy, cooling design and security level	₹400–740 crore
Step 5: AI/GPU fit-out benchmark	JLL notes tenant tech fit-out can cost as much as USD 25 million per MW for AI infrastructure	Source benchmark
Step 6: Apply AI fit-out to 5 MW	USD 25 million/MW × 5 MW × ₹90/USD	₹1,125 crore
Step 7: Combined AI-ready project cost	Base facility ₹400–740 crore + AI tech fit-out up to ₹1,125 crore	₹1,525–1,865 crore

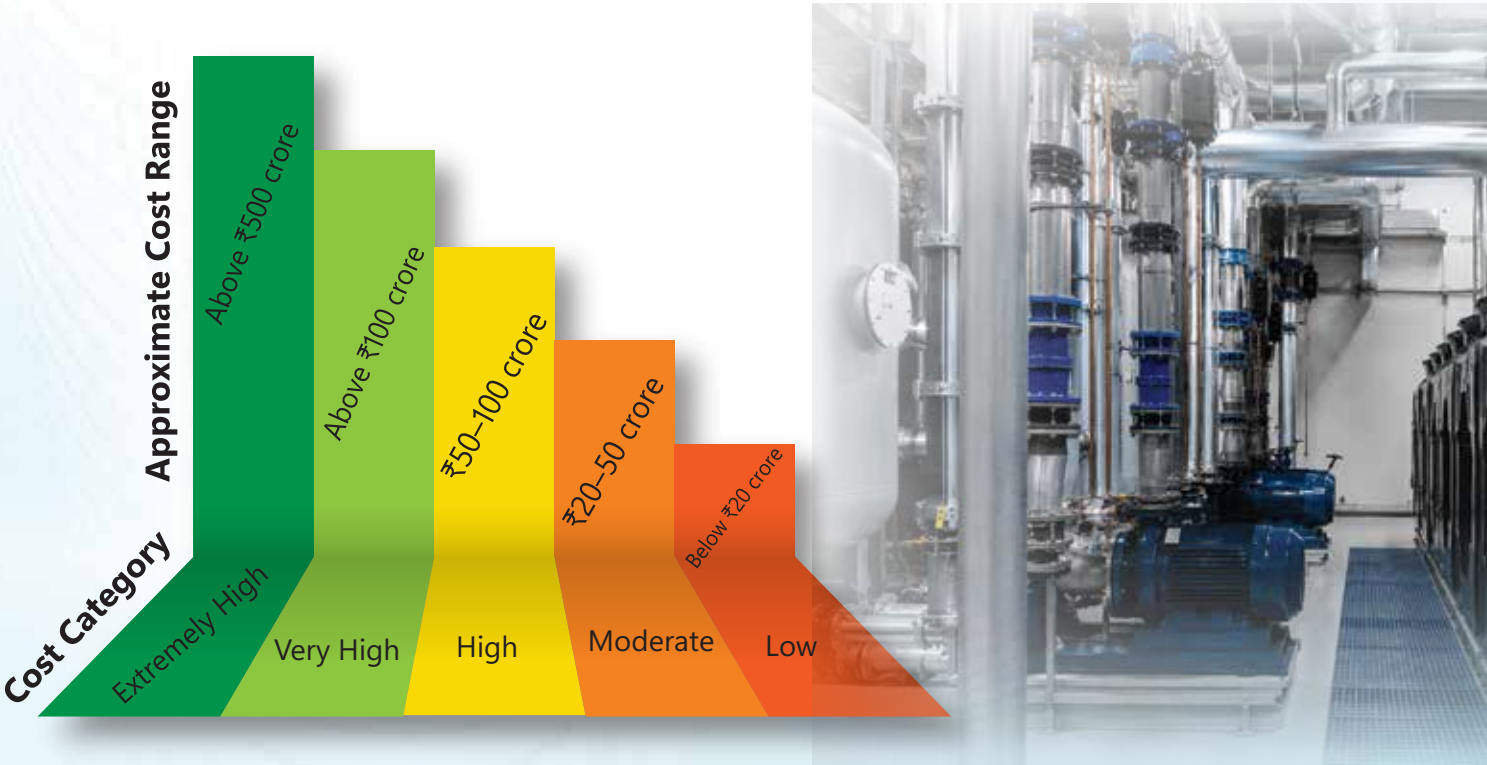


Table 1: The estimate is for a 5 MW Tier III-style data center in India. Excluding servers, GPUs, storage arrays, and tenant-owned IT hardware.

Requirement Area	Key Components	Cost Category for 5 MW Data Center
Site & Civil Infrastructure	Land acquisition, site preparation, building shell, data halls, utility yard, internal roads, drainage systems and support facilities	Very High ₹100–165 crore/
Design, Approvals & Project Management	Architecture, Mechanical Electrical and Plumbing (MEP) design, structural design, statutory approvals, project management, tendering and commissioning planning	Low to Moderate ₹12–30 crore
Power Intake & Electrical System	Electrical substation, transformers, High Tension/Low Tension (HT/LT) panels, switchgear, cabling, grounding, metering and surge protection systems	Moderate to High ₹30–60 crore
Uninterruptible Power Supply (UPS), Battery & Power Distribution	Uninterruptible Power Supply (UPS) systems, Battery Energy Storage System (BESS), Power Distribution Units (PDUs), busways, static transfer switches and dual power distribution paths	High ₹55–95 crore
Backup Power System	Diesel or gas generators, fuel storage tanks, synchronization panels, exhaust systems and acoustic enclosures	Moderate to High ₹30–55 crore
Cooling & Thermal Management	Chillers, Computer Room Air Handler (CRAH) units, Computer Room Air Conditioner (CRAC) units, cooling towers, pumps, piping, hot/cold aisle containment, humidity control and liquid-cooling readiness	Very High ₹100–140 crore
White Space & Connectivity Fit-out	Server racks, containment systems, cable trays, lighting, telecommunications carrier rooms, cross-connect infrastructure, structured cabling and fiber-optic entry paths	Moderate to High ₹30–70 crore

Requirement Area	Key Components	Cost Category for 5 MW Data Center
Fire, Safety & Physical Security	Fire detection systems, fire suppression systems, hydrants, Closed-Circuit Television (CCTV), access control systems, biometric authentication, mantrap security doors and perimeter security	Low to Moderate ₹12–35 crore
Building Management System (BMS), Data Center Infrastructure Management (DCIM) & Monitoring Systems	Building Management System (BMS), Data Center Infrastructure Management (DCIM), Electrical Power Monitoring System (EPMS), sensors, alarms, dashboards, Network Operations Center/Security Operations Center (NOC/SOC) readiness and monitoring tools	Low to Moderate ₹10–30 crore
Testing, Operations Readiness & Contingency	Load testing, failover testing, certification readiness, Standard Operating Procedures (SOPs), initial manpower, spare parts, insurance and contingency buffer	High ₹45–100 crore
Total Base Facility Cost	Complete facility infrastructure excluding servers, Graphics Processing Units (GPUs), storage arrays and tenant-owned Information Technology (IT) hardware	Very High to Extremely High ₹400–740 crore



Table 2: Data Center Setup Cost in India Including Servers, GPUs, Storage and IT Hardware. This table provides an indicative estimate of the total investment required for a 5 MW data center when all major IT infrastructure components are included, such as enterprise servers, storage systems, networking equipment, software platforms, and AI/GPU computing resources, in addition to the core facility infrastructure.

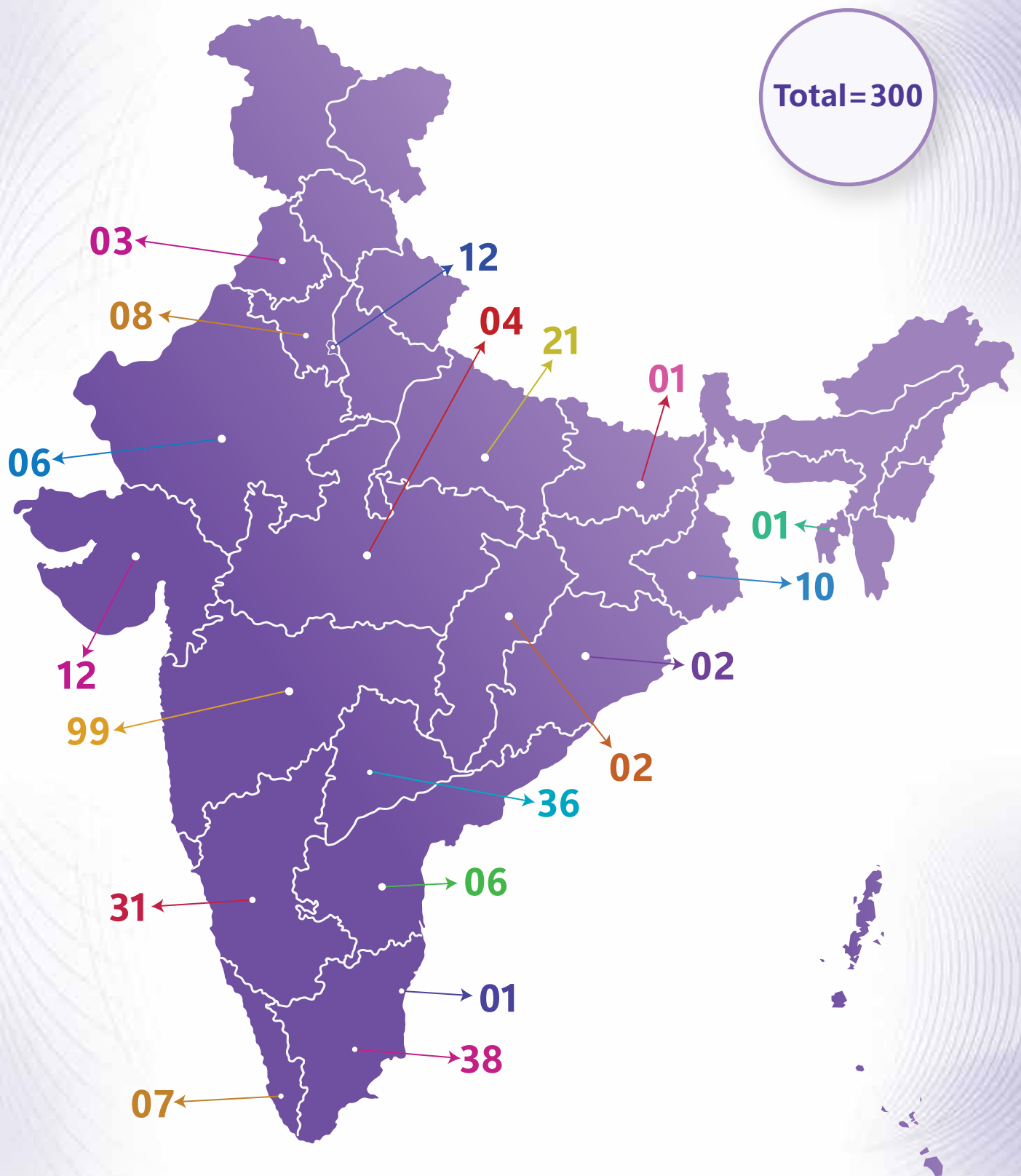
Requirement Area	Key Components	Cost Category for 5 MW Data Center
Base Facility Infrastructure	Land acquisition, site preparation, building shell, data halls, utility yard, internal roads, drainage systems, power infrastructure, cooling systems, security systems, monitoring systems and commissioning	Very High to Extremely High ₹400–740 crore Reference Table 1
Enterprise Server Layer	Central Processing Unit (CPU) servers, compute nodes, virtualization hosts, management servers and enterprise workload servers	Very High ₹150–350 crore
Storage Infrastructure	Storage Area Network (SAN), Network Attached Storage (NAS), object storage platforms, backup storage systems, archival storage and disaster recovery storage	High to Very High ₹75–200 crore
Information Technology (IT) Network Equipment	Core switches, routers, firewalls, load balancers, optical networking equipment and internal switching fabric	High to Very High ₹50–150 crore
Software & Platform Layer	Virtualization software, orchestration platforms, backup software, monitoring tools, cloud management platforms and cybersecurity software	Moderate to high ₹30–100 crore
Artificial Intelligence (AI) / Graphics Processing Unit (GPU) Compute Layer	Graphics Processing Unit (GPU) servers, Artificial Intelligence (AI) accelerators, high-speed networking fabric, AI storage systems and AI cluster management software	Extremely High Up to ₹1,125 crore+
Total Cost Including General IT Hardware	Complete facility infrastructure plus enterprise servers, storage systems, networking equipment and software platforms	Extremely High ₹700–1,440 crore
Total Cost Including AI/GPU Infrastructure	Complete facility infrastructure plus AI/GPU computing systems, AI storage platforms and high-performance networking infrastructure	Extremely High ₹1,525–1,865 crore+

10. Sovereignty Gap and Control Framework

For commercial data centers, excluding servers, GPUs and storage from the facility cost is common because customers often bring their own IT hardware. However, for defense and space applications, this approach should be assessed carefully because sovereignty is not created by facility ownership alone. True sovereignty depends on control over the facility, compute infrastructure, data, storage, network, encryption keys, firmware, operations and supply chain.

Project Type	Can Facility Exclude Servers, GPUs and Storage?	Sovereignty Exposure	Recommended Control Model	Strategic Insight
Commercial Colocation	Yes	Low	Tenants may bring and manage their own servers, storage and network equipment.	Suitable for private enterprises where cost flexibility and tenant choice are more important than national control.
Government Cloud	Partly	Medium	Facility may be operated by a private provider, but compute, storage, identity management, encryption keys and access controls should be government approved.	A government cloud should not rely only on local hosting; it should also ensure trusted ownership, auditability and local operational control.
Defence Cloud	Only with strict controls	High	Servers, GPUs, storage, firmware, encryption keys and administrative access should be owned, approved or tightly controlled by Indian defence/ government entities.	Defense workloads require more than physical security. Classified data, AI models, mission logs and command systems must remain under sovereign control
Space-Data Processing Center	Risky if uncontrolled	High	Satellite imagery, payload data, ground-station data, storage, AI analytics and backup systems should remain in a trusted Indian-controlled environment.	Space data has strategic value. Processing and storing it on externally controlled hardware can create operational and intelligence risks.
Sovereign AI / GPU Compute	Not recommended to fully outsource	Very High	GPU clusters, AI storage, training datasets, model weights, key management and admin access should be sovereign-controlled and independently auditable.	For defence AI, ISR analytics, simulation and satellite image processing, GPUs are not just hardware; they are strategic compute capability.

11. State-wise Data Centres



12. Opportunity and Strategic Relevance for India

India is rapidly expanding data center deployment, but the domestic position differs by component. India is stronger in facility development, electrical infrastructure, integration, operations, and energy-management deployment, while several high-value components such as advanced GPUs, servers, storage, high-end networking, immersion cooling systems, and specialized semiconductor hardware still depend significantly on global supply chains. Government policy also indicates a push to progressively develop domestic manufacturing for data-center equipment and components, supported by the IndiaAI compute initiative and the India Semiconductor Mission.

While data center growth is often measured through capacity expansion and infrastructure deployment, long-term strategic value is concentrated in critical components, proprietary architectures, control software, semiconductor-dependent subsystems, and patent-protected technologies. From an intellectual property (IP) and technological sovereignty perspective, India's competitive advantage will depend on building ownership in high-value technology layers where patents, standards, software platforms, and system architectures create sustainable differentiation and reduce dependence on foreign technology providers.



Technology Cluster	Components Used in the Cluster	Critical Components	Patentable Components	India Positions
Cooling and Mission Thermal Management	Air Cooling, Chillers, Computer Room Air Handler (Crah) Units, Computer Room Air Conditioner (Crac) Units, Liquid Cooling Systems, Immersion Cooling Systems, Cold Plates, Heat Exchangers, Coolant Distribution Units, Leak Sensors	Cold Plates, Immersion Cooling Systems, Coolant Distribution Units, Thermal Control Algorithms, Thermal Sensors, Dielectric Fluids	Artificial Intelligence-Driven Thermal Orchestration, Adaptive Liquid Cooling, Immersion Cooling Architectures, Coolant-Flow Optimization, Predictive Leak Detection, Low-Water Cooling Systems, Thermal Digital Twins	India has developed strong capabilities in the deployment, integration, and operation of large-scale cooling infrastructure. From an IP perspective, the next phase of value creation lies in developing proprietary thermal-management software, immersion cooling technologies, advanced coolant formulations, and integrated cooling architectures. Strategic investments in applied research, pilot deployments, and industry-academia collaboration can enable India to build differentiated patent portfolios and strengthen its position in next-generation thermal management technologies.
Power Resilience and Energy Infrastructure	Uninterruptible Power Supply (Ups) Systems, Batteries, Power Distribution Units (Pdus), Switchgear, Transformers, Diesel Generators, Renewable Energy Systems, Microgrids, Fuel Cells, Energy Management Systems	Battery Management Systems (Bms) Intelligent Power Distribution Units, Microgrid Controllers, Power Electronics, Energy Orchestration Software	Artificial Intelligence-Based Energy Optimization, Autonomous Microgrid Control, Battery-Health Prediction, Renewable-Grid Integration, Fuel-Cell Redundancy Systems, Resilient Power Architectures Renewable Energy	India possesses a strong industrial base in power infrastructure manufacturing, deployment, and grid integration. Significant IP opportunities exist in advanced power electronics, intelligent battery systems, microgrid control platforms, and energy-management software. Continued innovation in AI-enabled energy optimization, renewable integration, and resilient power architectures can support the creation of globally competitive intellectual property and strengthen India's leadership in sustainable infrastructure technologies.

Technology Cluster	Components Used in the Cluster	Critical Components	Patentable Components	India Positions
Rugged Rack, Server and Modular Infrastructure	Server Racks, Cabinets, Chassis, Modular Enclosures, Containerized Units, Cable Management Systems Hot-Swappable Modules Rack Sensors	High-Density Artificial Intelligence Racks, Modular Compute Pods, Integrated Cooling And Power Racks, Server Chassis Architectures	Modular Tactical Data Centers, Integrated Rack Cooling Systems, Shock-Resistant Enclosures, Autonomous Deployment Systems, High-Density Artificial Intelligence Infrastructure Designs	India has established manufacturing strengths in physical infrastructure and modular systems. To capture greater value from an IP standpoint, focus should shift toward proprietary rack architectures, integrated cooling-power designs, modular compute platforms, and specialized deployment systems. Opportunities are particularly attractive in defence-grade, ruggedized, rapidly deployable, and edge-computing infrastructure solutions designed for both domestic and international markets.
Artificial Intelligence-Driven Data Center Management and Workload Optimization	Data Center Infrastructure Management (Dcim) Platforms, Workload Scheduling Software, Predictive Maintenance Tools, Anomaly Detection Systems, Digital Twins, Telemetry Platforms	Workload Orchestration Engines, Digital Twins, Predictive Maintenance Models, Autonomous Operations Platforms	Mission-Aware Workload Scheduling, Artificial Intelligence-Based Fault Prediction, Autonomous Data Center Operations, Energy-Aware Workload Placement, Satellite-Data Processing Optimization	This represents one of India's most compelling IP opportunities. India's strong software engineering talent pool, AI ecosystem, and systems integration capabilities provide a solid foundation for leadership in orchestration platforms, optimization engines, digital twins, and autonomous operations. Continued investment in product innovation, patent generation, and commercialization can position India as a global provider of intelligent infrastructure management solutions.

Technology Cluster	Components Used in the Cluster	Critical Components	Patentable Components	India Positions
Data Center Network Fabric and Interconnect Technologies	Network Switches, Routers, Optical Interconnects, Fiber-Optic Links, Software-Defined Networking (Sdn) Controllers, Load Balancers, Traffic Monitoring Systems	Optical Transceivers, Network Fabric Controllers, Low-Latency Switching Architectures, Routing Intelligence Engines	Artificial Intelligence-Based Traffic Optimization, Software-Defined Networking, Secure Routing, Optical Network Optimization, Satellite-To-Data-Center Networking	While foundational networking hardware IP remains concentrated among established global technology leaders, India has meaningful opportunities in software-defined networking, AI-assisted routing, secure networking architectures, and network-management platforms. Strengthening domestic capabilities in optical networking research, telecom software, standards participation, and advanced networking algorithms can enhance India's competitiveness and IP ownership in this strategically important domain.
Cybersecurity and Sovereign Data Center Systems	Encryption Systems, Identity Management Systems, Access Control Systems, Zero-Trust Frameworks, Key Management Systems, Threat Detection Platforms	Encryption Engines, Key-Management Systems, Workload Isolation Frameworks, Sovereign Routing Controls, Post-Quantum Security Mechanisms	Sovereign Cloud Controls, Classified Workload Isolation, Artificial Intelligence-Driven Cyber Defence, Post-Quantum Cryptography, Secure Mission-Data Processing	Cybersecurity is one of India's strongest opportunities for indigenous IP creation and global differentiation. The country is well positioned to develop proprietary technologies in sovereign cloud security, zero-trust architectures, post-quantum cryptography, secure workload isolation, and critical infrastructure protection. Expanding advanced cybersecurity research, fostering domestic product companies, and strengthening commercialization pathways can accelerate India's emergence as a leader in secure digital infrastructure technologies.

Technology Cluster	Components Used in the Cluster	Critical Components	Patentable Components	India Positions
Fire Safety, Monitoring and Operational Resilience	Fire Detection Systems, Clean-Agent Suppression Systems, Gas Sensors, Smoke Detection Systems, Environmental Monitoring System, Disaster Recovery Systems	Early-Warning Detection Systems, Automated Failover Mechanisms, Fault Isolation Systems, Resilience Orchestration Platforms	Artificial Intelligence-Based Hazard Detection, Predictive Resilience Systems, Autonomous Recovery Platforms, Coolant-Fire Safety Integration, Mission Continuity Monitoring	India has demonstrated strong operational capabilities in facility management and resilience implementation. Future IP opportunities are concentrated in predictive monitoring platforms, resilience analytics, autonomous recovery systems, advanced sensing technologies, and integrated continuity-management solutions. Developing software-centric and analytics-driven offerings can create differentiated products with both domestic and export potential.
Computer Hardware, Accelerators and Semiconductor Systems	Central Processing Units (Cpus), Graphics Processing Units (Gpus), Ai Accelerators, Memory Modules, Storage Controllers, Networking Application-Specific Integrated Circuits (Asics), Chiplets, Advanced Packaging Technologies	Ai Accelerators, Gpus, Networking Asics, Memory Controllers, Advanced Semiconductor Packaging, Chiplet Architectures	Domain-Specific Ai Accelerators, Energy-Efficient Inference Chips Chiplet Integration Accelerator Interconnects, Secure Processors, Edge Ai Silicon	This represents the highest-value layer of the data center technology stack and is central to long-term technological sovereignty. India currently possesses emerging strengths in semiconductor design, supported by initiatives such as the India Semiconductor Mission and the growing RISC-V ecosystem. To enhance its strategic position, India should continue investing in chip design, accelerator architectures, advanced packaging technologies, semiconductor research, fabrication ecosystems, and IP creation across the semiconductor value chain.

Technology Cluster	Components Used in the Cluster	Critical Components	Patentable Components	India Positions
Data Center Operating Systems, Middleware and Platform Software	Virtualization Platforms, Container Orchestration Systems, Middleware, Resource Schedulers, Storage Management Software	Resource Orchestration Engines, Virtualization Layers, Distributed Storage Controllers, Platform Management Systems	Autonomous Infrastructure Software Ai-Native Orchestration Distributed Resource Optimization, Sovereign Cloud Middleware, Mission-Critical Platform Software	India's globally recognized software capabilities provide a strong foundation for leadership in platform software, orchestration systems, middleware, and infrastructure management solutions. Building proprietary platforms, driving open-source leadership, and developing patent-backed software innovations can create strategic technology assets while strengthening India's influence across the global digital infrastructure ecosystem.

The analysis shows that the highest long-term value in the data center ecosystem comes from technology-heavy areas such as software, semiconductors, and advanced system designs rather than physical infrastructure alone. Competitive advantage increasingly depends on proprietary software, chip designs, intelligent networking, automation platforms, and cybersecurity solutions. Key growth areas include AI accelerators, networking ASICs, advanced semiconductor packaging, smart cooling and power management, digital twins, predictive maintenance, and energy optimization systems. India already has strengths in software, AI, and systems integration, giving it a strong foundation to compete in these areas. To fully realize this opportunity, India will need continued investment in research and development, IP creation, deep-tech startups, and collaboration between industry and academia. A national data center strategy should therefore focus not only on building infrastructure but also on creating and owning advanced technologies.





13. Location Strategy

The geographical location of a data center is very important because it affects power supply, internet connectivity, speed, cooling costs, future expansion and protection from natural disasters. Around the world, major data center hubs such as Northern Virginia in the United States, Dublin in Ireland, Singapore, Frankfurt in Germany and the Nordic countries have grown because they offer strong infrastructure, reliable power and excellent network connections.

China has also built large data center clusters across different regions through its “Eastern Data, Western Computing” strategy, which helps balance computing demand and energy resources. Today, many countries use multiple data center locations to improve reliability and ensure that critical services remain available at all times. Therefore, selecting the right geographical location and adopting a distributed infrastructure strategy are essential for building resilient, efficient and future-ready data center ecosystems.

In India, several cities have strong advantages for data center development. Mumbai and Chennai are important because they are connected to international submarine cables, which support global internet traffic. Bengaluru and Hyderabad benefit from strong technology ecosystems, growing AI capabilities and expanding aerospace and space sectors. Noida and the Delhi-NCR region are valuable because they are close to government and defence organizations. For defence and space applications, it is better to use a network of data centers across different locations rather than relying on a single facility. This approach improves security, reduces risks and ensures that important operations can continue even if one site faces a disruption.

A geographically distributed data center network would strengthen India’s digital sovereignty, enhance operational resilience and provide a robust foundation for future defence, space and strategic technology initiatives

14. Growth Engine for Other Sectors

Digital Infrastructure Backbone: Provides the foundational compute, storage and connectivity required by all digital industries.

AI Ecosystem Enablement: Supports AI startups, research institutions and enterprises through scalable computing resources.

Defence and National Security Support: Enables secure data processing, command-and-control systems and cyber resilience capabilities.

Space and Satellite Applications: Facilitates satellite data analytics, mission planning and geospatial intelligence services.

Employment Generation: Creates direct jobs in operations, engineering and cybersecurity, while supporting indirect employment across construction, power and telecom sectors.

Manufacturing Development: Stimulates demand for servers, cooling systems, power equipment, batteries, networking hardware and related components.

Innovation and IP Creation: Encourages development of indigenous technologies, software platforms and patentable solutions.

Regional Development: Drives infrastructure growth in emerging cities through investments in power, fibre connectivity and industrial ecosystems.

Data and Compute Sovereignty: Strengthens national control over critical digital infrastructure, supporting long-term technological and strategic independence.

Cloud Services Growth: Enables expansion of cloud computing, SaaS platforms and digital service providers across industries.

Fintech and Digital Economy Support: Powers banking, digital payments, e-commerce and financial technology platforms that require secure and scalable infrastructure.

Industry 4.0 and Smart Manufacturing: Supports IoT, automation, digital twins and real-time analytics for advanced manufacturing operations.

Healthcare and Life Sciences Enablement: Facilitates electronic health records, telemedicine, medical imaging, genomics research and AI-driven healthcare applications.

Education and Research Advancement: Provides computing infrastructure for universities, research institutions, online learning platforms and scientific simulations.

Telecommunications and 5G Ecosystem: Supports telecom operators, edge computing deployments and low-latency applications enabled by 5G networks.

Media, Entertainment and Gaming: Enables content streaming, digital media processing, animation, gaming platforms and immersive technologies.

Smart Cities and Public Services: Supports urban management systems, digital governance, surveillance, traffic management and citizen service platforms.

Agriculture and Agri-Tech Applications: Supports precision farming, satellite-based crop monitoring, weather analytics and agricultural data platforms.

Startup Ecosystem Development: Provides scalable infrastructure that lowers entry barriers for technology startups and innovation-driven enterprises.

Export of Digital Services: Strengthens India's ability to export IT, cloud, AI and digital services by providing reliable domestic infrastructure.

Supply Chain and Logistics Modernisation: Enables real-time tracking, warehouse automation, route optimisation and logistics analytics.

Green Technology Adoption: Encourages investments in renewable energy integration, energy-efficient cooling and sustainable infrastructure solutions.

National Competitiveness: Enhances India's attractiveness as a global destination for digital investments, technology development and innovation-led growth.

15. Industry Challenges

The data center industry is experiencing rapid growth, driven by AI, cloud computing, digital infrastructure, defense modernization, and space-data applications. However, sustained growth depends on addressing several critical challenges.

Power Availability: AI-ready data centers require significant computing capacity, resulting in high energy consumption and increased pressure on power grids. Reliable power supply, renewable integration, and resilient backup systems are essential for operational continuity.

Cooling Requirements: High-density AI workloads demand advanced cooling solutions such as liquid and immersion cooling. While these technologies improve efficiency, they increase capital costs and operational complexity.

Location and Resilience: Data centre capacity remains concentrated in major connectivity hubs. Defence and space applications require geographically distributed infrastructure with strong disaster recovery capabilities and resilience against natural and strategic risks.

Cybersecurity and Data Sovereignty: Hosting data domestically does not guarantee sovereignty. Secure control over infrastructure, software, encryption, and operational access is critical, particularly for defence and strategic workloads.

Technology Dependence: Many critical components, including servers, GPUs, networking equipment, and cybersecurity tools, rely on global supply chains. Strengthening indigenous capabilities remains a strategic priority.

Capital Intensity: Data centres require substantial investment in land, power, cooling, connectivity, security, and IT infrastructure. Defence-grade and AI-ready facilities involve even higher costs due to enhanced redundancy and security requirements.

Regulatory Complexity: Multiple approvals related to land, power, environmental compliance, and safety can delay project execution. Streamlined regulations and standardised frameworks are needed to accelerate deployment.

Skilled Workforce: The sector requires expertise in power systems, cooling, cloud architecture, cybersecurity, AI infrastructure, and facility operations. Talent shortages can affect efficiency, security, and reliability.

For defence and space applications, the challenge extends beyond capacity creation to building trusted, resilient, and sovereign digital infrastructure capable of supporting mission-critical operations. Addressing these challenges will be essential for India's next phase of data centre growth and strategic digital capability.



16. Strategic Roadmap

A. Immediate Roadmap: 3–5 Years

Objective: Expand capacity and strengthen the ecosystem

- Increase capacity in major hubs such as Mumbai, Chennai, Hyderabad, Bengaluru, Noida and emerging clusters.
- Ensure access to reliable power, fibre connectivity, suitable land, efficient cooling and renewable energy.
- Deploy AI-ready infrastructure with GPUs, high-density racks and advanced cooling technologies.
- Establish secure cloud infrastructure for government and defence workloads.
- Enable satellite-data processing, Earth observation analytics and intelligence applications.
- Attract investment through streamlined approvals, incentives and dedicated data centre parks.
- Support domestic production of racks, cooling equipment, UPS systems, batteries and security solutions.

B. Medium-Term Roadmap: 5–7 Years

Objective: Strengthen technological self-reliance

- Develop indigenous compute, storage, cloud and data management capabilities.
- Reduce reliance on imported hardware, software and encryption technologies.
- Establish sovereign cloud environments for strategic sectors.
- Enhance cybersecurity, access control, encryption and recovery capabilities.
- Deploy edge facilities near defence, industrial and space infrastructure.
- Promote innovation and patent creation in cooling, energy efficiency and resilient architectures.
- Build a skilled workforce for operations, cybersecurity and AI infrastructure management.

C. Long-Term Roadmap: 7–10 Years

Objective: Achieve leadership in sovereign digital infrastructure

- Position India as a regional hub for secure and AI-enabled data centre services.
- Develop specialised facilities for defence, space and national security applications.
- Export Indian expertise in data centre engineering, cooling and secure cloud solutions.
- Build indigenous intellectual property in advanced computing and sustainable infrastructure.
- Integrate data centres with defence, space and cyber-resilience systems.
- Establish national standards for secure and energy-efficient facilities.
- Achieve full compute, data and operational sovereignty.

D. Enablers for Industry Growth

- Policy Framework: Implement stable policies, faster clearances and infrastructure incentives.
- Power Infrastructure: Ensure reliable supply, renewable integration and energy storage.
- Data Centre Parks: Develop integrated facilities with connectivity, utilities and resilient design.
- Technology Localisation: Encourage domestic manufacturing of critical equipment and systems.
- Sovereign Cloud: Build secure national cloud platforms for strategic users.
- Skill Development: Train professionals in operations, cybersecurity, AI infrastructure and thermal management.
- Innovation Support: Promote R&D and patent generation in efficiency, security and automation.
- Anchor Demand: Leverage defence, ISRO, government AI programmes and critical infrastructure projects.
- Sustainability: Encourage low-PUE designs, advanced cooling and renewable energy adoption.
- Security Standards: Strengthen physical security, cyber protection and disaster recovery requirements.

India should focus on building a sovereign digital infrastructure ecosystem rather than only expanding data centre capacity. Success will depend on combining infrastructure, cloud capabilities, cybersecurity, energy efficiency and indigenous technologies to support AI, defence and space applications.



17. Strategic Suggestions

1. National Digital Strategic Infrastructure (DSI) Mission

Launch a national mission to complement India's Digital Public Infrastructure by strengthening sovereign capabilities across compute, cloud, AI, networking, cybersecurity, and critical digital infrastructure.

2. Trusted Compute & AI Ecosystem

Accelerate domestic capability in CPUs, GPUs, AI accelerators, high-performance computing, and secure virtualization to support defence, critical infrastructure, and emerging digital industries.

3. Indigenous Digital IP & Standards Leadership

Promote patent creation, source code ownership, firmware development, and active participation in global technology standards to enhance India's long-term innovation competitiveness.

4. Mission-Ready & Resilient Data Centres

Develop a Mission-Readiness Rating Framework covering cyber resilience, operational continuity, disaster recovery, energy security, and critical infrastructure protection for strategic data centres.

5. Trusted Digital Supply Chains & Component Traceability

Establish end-to-end traceability of critical hardware, firmware, software, and security updates to improve transparency, lifecycle management, and supply chain resilience.

6. National Technology Testbeds & Certification

Create integrated testbeds where government, industry, startups, academia, and defence organisations can validate cloud platforms, AI systems, cybersecurity solutions, and digital infrastructure before large-scale deployment.

7. Secure & Interoperable Digital Ecosystem

Develop trusted data exchange corridors, interoperable cloud frameworks, and open standards to enable secure collaboration across government, defence, research institutions, and industry.

8. Strategic Digital Manufacturing Clusters

Promote co-location of data centres with semiconductor facilities, renewable energy, networking infrastructure, research institutions, and advanced manufacturing ecosystems to strengthen domestic capability.

9. Outcome-Based Public Procurement

Shift procurement towards measurable outcomes such as resilience, security, interoperability, lifecycle cost, energy efficiency, recovery capability, and technology maturity rather than only capital expenditure.

10. National Digital Capability Index

Establish a periodic national assessment framework to monitor India's progress across critical technology layers—including compute, AI, cloud, cybersecurity, digital infrastructure, IP ownership, standards participation, and supply chain resilience—to guide strategic investments and policy decisions.

18. Conclusion

India has successfully established itself as a global leader in Digital Public Infrastructure (DPI) through transformative initiatives such as Aadhaar, UPI, DigiLocker, ONDC, BharatNet, and the India Stack. These platforms have demonstrated how public digital infrastructure can accelerate financial inclusion, improve governance, strengthen service delivery, and support one of the world's largest digital economies. Today, India generates an unprecedented volume of digital transactions, public data, industrial information, and strategic intelligence, creating a strong foundation for the country's next phase of digital growth.

However, the future of digital leadership will not be determined solely by the volume of data generated or the number of data centres established. It will increasingly depend on the nation's ability to build, secure, and continuously evolve the critical technology layers that transform data into strategic capability, economic value, and national resilience. Compute infrastructure, artificial intelligence, semiconductor technologies, networking, cybersecurity, firmware, cloud orchestration, standards, intellectual property, and trusted digital supply chains have emerged as equally important pillars of the digital ecosystem.

The study highlights that while India has achieved remarkable progress in creating digital public platforms, significant opportunities remain to strengthen domestic capabilities across these higher-value technology layers. Data residency alone does not guarantee digital sovereignty. Long-term strategic resilience requires a balanced ecosystem where trusted infrastructure, indigenous innovation, intellectual property creation, open standards, resilient supply chains, and globally competitive manufacturing evolve together. Such an approach strengthens national capability while continuing to leverage global technology partnerships and innovation. Data centres should therefore be viewed not merely as physical facilities for storing information, but as strategic digital infrastructure integrating power systems, networking, compute, cooling, software, cybersecurity, and advanced manufacturing. Their true national value lies in enabling secure digital services, supporting mission-critical applications, fostering innovation ecosystems, and acting as platforms for future technologies including artificial intelligence, high-performance computing, quantum technologies, defence systems, healthcare, smart manufacturing, and scientific research.

Moving forward, India's next digital mission should focus on transitioning from Digital Public Infrastructure (DPI) to Digital Strategic Infrastructure (DSI). This transition should emphasize trusted compute, resilient cloud infrastructure, indigenous digital intellectual property, standards leadership, secure and interoperable digital ecosystems, technology testbeds, mission-ready data centres, and trusted supply chains. Together, these capabilities will strengthen national security, improve economic competitiveness, enhance technological self-reliance, and position India as a trusted global leader in the next generation of digital infrastructure.

Ultimately, digital sovereignty is not defined solely by where data is stored, but by a nation's ability to design, build, secure, govern, and continuously innovate across every critical technology layer that converts data into knowledge, knowledge into capability, and capability into sustainable national power. By strengthening these foundational capabilities, India can move beyond being a large digital market to becoming a leading creator, owner, and exporter of trusted digital technologies for the world.

References

1. 2026 Global Data Center Outlook - <https://www.jll.com/en-in/insights/market-outlook/data-center-outlook>
2. Energy demand from AI - <https://www.iea.org/reports/energy-and-ai/energy-demand-from-ai>
3. CBRE India – India’s Data Centre Market: In a New Era
<https://www.cbre.co.in/insights/reports/india-s-data-centre-market-in-a-new-era>
4. PIB - <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2095260> and
<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2239616®=3&lang=1>
5. National Data Centre Policy 2025 -
https://www.digitalindia.gov.in/photo_gallery/industry-consultation-meeting-of-national-data-centre-policy-2025/
6. TRAI - <https://www.trai.gov.in>
7. NASA - <https://www.earthdata.nasa.gov/>
8. DISA Hybrid Cloud - <https://hybridcloud.disa.mil/>
9. MEITY - <https://www.meity.gov.in/>
10. NIC - <https://www.nic.gov.in/>
11. ISRO - <https://www.isro.gov.in/ISSDC.html>
12. Data centre map - <https://www.datacentermap.com/india/>
13. National Development and Reform Commission (NRDC) People Republic of China -
https://en.ndrc.gov.cn/news/mediarsources/202202/t20220218_1315947.html
14. India Mission Semiconductor - <https://ism.gov.in/>
15. Patent Database - <https://www.questel.com/patent/ip-intelligence-software/orbit-intelligence/>

Disclaimer

This report has been prepared by IP Bazaar for information and educational purpose only. The content presented herein is based on publicly available sources and discussions conducted during various technical events and forums. While every effort has been made to ensure accuracy and relevance, IP Bazaar does not guarantee the completeness, accuracy, or timeliness of the information contained in this report. Some data, specifications, and technical inputs may be outdated, interpreted differently, or may contain inadvertent errors.

No liability shall be accepted by IP Bazaar or its contributors for any direct or indirect loss or damage that may arise from reliance on, or use of the information provided herein. Readers are encouraged to verify facts independently and consult qualified professionals or authorities before acting on any information provided.

This report may include logos, images, or content that are the property of third parties. These are used solely for academic, illustrative, or informational purposes without intent of infringement. IP Bazaar does not claim any ownership over such third-party content.

The copyright of this report, in its structure, compilation, and original content, remains with IP Bazaar. Unauthorized reproduction or distribution of this report in whole or in part is prohibited without prior written consent.

For suggestions, corrections, or requests for deletion of any part of the report, please write to us at: tech@ipbazaar.co.in

Concept By



Lalit Ambastha



Shruthi Kaushik



Dr. Medha Kaushik

Analyst



Rishabh Kaushik

Designed by





IP BAZZAAR TECHNOLOGY CONSULTANTS PVT. LTD.

716, Seventh Floor, DLF Prime Towers,
Okhla Phase I, New Delhi-110020, India

Contact: +91 7065911755, +91 11 44785897

www.ipbazaar.com