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Infrastructure Collaborative



# Introduction EDGE, CLOUD and MICRO DATA CENTERS

Exploring the next generation of data Centre technologies and  
sustainable infrastructure solutions.





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### What we are going to talk about

- Edge
- Micro Data Centre's
- Role of Edge in PNG
- Operational Efficiency - ROI
- Business Opportunities

### What we are not going to talk about

- High Performance Compute (HPC)
- Hyperscale Data Centres
- Cloud Options (Public, Private, Colo ETC)
- I.T Infrastructure
- Technical Design



Exploring the next generation of data Centre technologies and sustainable infrastructure solutions.



# Terms and Definitions

## Term

Kilowatt (kW)

## Definition

A unit of power equal to 1,000 watts. In a data Centre context, it measures the rate of electrical consumption or capacity — for example, a server rack with a 6 kW load draws 6,000 watts when operating at full capacity.

Power Use Effectiveness (PuE)

A standard metric used to measure the energy efficiency of a data Centre.

$\text{PUE} = \frac{\text{Total Facility Energy}}{\text{I.T Equipment Energy}}$

A PUE of 1.0 means all energy is used for IT equipment with no overhead (cooling, lighting, etc.). Lower PUE values indicate greater efficiency.

Rack Unit

A standard measurement for the height of equipment in a server rack, where 1U = 44.45 mm. Equipment like servers, switches, and storage arrays are designed in multiples of U (e.g., 2U, 4U).

Micro Data Centre

A self-contained, modular data Centre that integrates racks, power, cooling, security, and monitoring into a compact footprint — often as small as a single rack. Designed for rapid deployment close to where data is generated and used (the “edge”), MDCs reduce latency, improve resilience, and can operate independently or as part of a hybrid/cloud environment.





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# Terms and Definitions

## What Is a Kilowatts - kW

A unit of power equal to 1,000 watts. In a data Centre context, it measures the rate of electrical consumption or capacity — for example, a server rack with a 6 kW load draws 6,000 watts when operating at full capacity.

Your Oven at home is generally about 6kW (6000w)

## Operational Efficiency (PuE)

A traditional data centre facility with a total load of 60kW:

PuE 1.6 = PGK 413,542.00 per annum

Micro Data Centre with the same 60kW load

PuE 1.2 = PGK 310,156.00 per annum

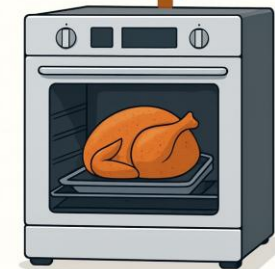
PGK 103,386.00 per annum

A server rack with 6 kW of IT load could cook a chicken in the same time as an oven

6 kW



6 kW



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# What is a Micro Data Centre

All Required Data Centre Infrastructure

- Dynamically Expandable & Scalable
- Racks
- Cooling
- Power
- UPS
- Fire
- Security
- Monitoring



*A well-designed MDC delivers faster returns, ongoing operational savings, and energy efficiency advantages, while improving service resilience and compliance making it a financially and strategically superior choice for PNG.*





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# Technology Shift

## Est. Daily Usage per Person (Conservative Figures)

**3G - 0.05–0.1 GB/day (1–3 GB/month)**

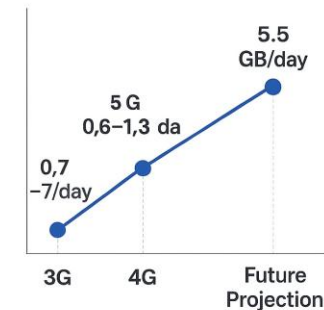
**4G - 0.5–0.7 GB/day (15–21 GB/month)**

**5G - 0.6–1.3 GB/day (17–38 GB/month)**

**Future Projection - Up to 4.7 GB/day by 2027**

### Estimated Daily Data Usage

Per Person - General Use



### Critical Infrastructure Sectors

Typical Daily Usage per Site or Facility



**Healthcare**  
Hospitals & Clinics  
100–500+ GB/day



**Banking & Financial**  
100–300+ GB/day



**Utilities & Energy**  
15–100+ GB/day



**Government Services**  
50–150+ GB/day

- I.T hardware becoming more dense, higher kW loads in a smaller foot print
- Rack loads increasing with the average now 5-7kW
- Migration to Cloud reversal in Europe with critical services returning to on-prem





# What is the Edge??

Edge computing is a distributed IT architecture that brings computation, storage, and networking resources physically closer to end users, devices, and sensors, enabling faster response times, improved reliability, and reduced dependency on long-haul network connections.

An Edge Data Centre is a small, distributed facility that provides local compute, storage, and networking capabilities. It sits physically nearer to end users, devices, and applications often within the same city, campus, or even building to reduce latency, improve reliability, and optimise bandwidth (Use and Reduced Latency)





# EDGE

| Sector                         | Definition                                                                                                                                                                                       | Purpose                                                                                                                                                                                                                     | Example                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Banking &amp; Financial</b> | Localised computing, storage, and networking infrastructure positioned within the country or region to run core banking applications and services close to the point of use                      | Maintain continuous service during network or subsea cable outages by hosting local instances of critical banking systems<br>Provide low-latency transaction processing for ATMs, POS and Branch Services                   | Local core banking instance in PNG with real-time replication to the main DC, allowing uninterrupted operations during an network outages                                                                                                                                                                                                        |
| <b>Power &amp; Utilities</b>   | Decentralised computing platforms deployed close to field operations for real-time monitoring, control, and analysis of generation, transmission, and distribution systems                       | Enable local processing of sensor, SCADA, and IoT data to detect faults instantly.<br>Maintain grid control functions during backhaul or control centre outages.<br>Support AI-driven maintenance and inspection workflows. | PNG Power's new drones capture high-resolution imagery of transmission lines. Edge servers at regional depots process drone imagery locally to identify faults immediately without needing to send large image files over slow or unreliable WAN links. Only prioritised fault data is sent to HQ for centralised planning and asset management. |
| <b>Telecommunications</b>      | Local compute and storage nodes positioned within regional exchanges, cell tower clusters, road side to deliver faster services, reduce backhaul congestion, and enable low-latency applications | Cache frequently accessed content closer to users to improve customer experience<br>Enable local processing for 5G services, IoT, and mobile applications                                                                   | Edge nodes at provincial telecom hubs handle local voice routing, content caching, and cell tower management, keeping services active even when international capacity is degraded                                                                                                                                                               |





# Use Case & Business Benefit's

- Financial Services (faster ATM response, mobile banking backhaul)
- Healthcare (remote diagnostics, local records hosting)
- Education (low-latency digital classrooms)
- Content Delivery (local caching of streaming platforms)
- Telecommunications (5G future readiness, bandwidth offloading)
- Government (e-Government services closer to communities)





# Why is Edge Critical In PNG

- **Geographic Challenges & Service Reach** – In an island nation with widely dispersed and remote communities, Edge enables local processing and services without relying on long-haul connections, improving customer experience and service delivery.
- **Local Data Sovereignty & Compliance** – Keeping sensitive data within PNG supports financial, healthcare, and government compliance requirements, while strengthening trust with customers and regulators.
- **Business Continuity & Resilience** – Localised compute and storage allow critical services to continue operating during network disruptions, natural disasters, or power instability.
- **Economic Growth & Skills Development** – Edge deployments create opportunities for local ISPs, enterprises, and public services, driving job creation, technology skills, and digital economy growth.
- **Performance for New Services** – Low-latency local processing enables modern applications like real-time analytics, telemedicine, smart grids, and digital banking.





# Digital Transformation in PNG

| TRENDS                                                                                                  | CHALLENGES                                                                                                      | OPPORTUNITIES                                                                                                        |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Rising Data Consumption</b><br><br>Rapid growth from 3G to 4G and early adoption of 5G               | <b>Geographic Barriers</b><br><br>Difficulty and costly connecting rural island communities                     | <b>Cost Savings &amp; Efficiency</b><br><br>Local hosting reduces international bandwidth costs and improves perform |
| <b>Mobile-First Economy</b><br><br>Over 90% of internet access in PNG is via mobile devices             | <b>Infrastructure Gaps</b><br><br>Limited fibre reach; high reliance on costly subsea cable and satellite links | <b>New Revenue Streams</b><br><br>E-commerce, fintech and digital content platforms designed for PNG markets         |
| <b>Shift to Cloud &amp; Hybrid IT</b><br><br>Banking, Retail, Education, Health, Mining services moving | <b>Power Reliability</b><br><br>Outages impact service uptime and productivity                                  | <b>Improved Services</b><br><br>Telehealth, e-learning, and digital government services accessible nationwide        |
| <b>Sector Digitalisation</b><br><br>Data Demand is surging, the emergence of 5G will accelerate         | <b>Skills Shortage</b><br><br>World Wide Skills shortage across all aspects of Data Centre Management           | <b>Public-Private Partnerships</b><br><br>Leverage joint investment to accelerate infrastructure rollout             |

## Why Now

Market Timing  
Data demand is surging, 5G is emerging

Neighbour Pacific Nations are investing heavily in digital infrastructure





# Why This Matters for PNG

- **Bandwidth capacity & cost:** As mobile usage rises especially with 5G the need for efficient infrastructure, like Edge Data Centres, becomes critical to manage local traffic and reduce reliance on international links and reduce latency.
- **Planning growth:** PNG should anticipate these rising usage trends in planning investments, ensuring its networks are ready for the coming data explosion.





# Business Outcomes

## Business & Economic Opportunities with Edge Data Centres

### Operational Efficiency

Process and store data locally to reduce reliance on costly international bandwidth.

Faster access to critical systems means reduced downtime and improved staff productivity.

### Customer Experience

Improve service speed and reliability for online banking, e-commerce, and digital services.

Reduce latency for mobile apps, ATMs, and customer support platforms.

### Compliance & Risk Management

Host sensitive data within PNG to meet regulatory requirements and data sovereignty laws.

Reduce exposure to cybersecurity risks by controlling where and how data is stored.

### Innovation Enablement

Provide the infrastructure foundation for IoT, AI analytics, and real-time monitoring solutions

Enable rapid deployment of new digital services without waiting for offshore provisioning

### New Revenue Streams

Create opportunities for local content delivery networks, SaaS hosting, and digital marketplaces

Attract regional business by offering PNG-based hosting solutions

Monetise unused infrastructure capacity through colocation services





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# Business Benefit's

- Improved Uptime & Service Continuity
- Critical systems remain operational during outages, protecting revenue and customer trust.
- Reduced Brand and Reputational Risk
- Faster recovery and consistent service performance strengthen brand credibility.
- Stronger Regulatory & Compliance Position
- Local hosting ensures adherence to PNG data sovereignty laws and industry regulations, reducing the risk of penalties or licence issues.
- Better Return on Infrastructure Investment
- Lower operational costs and faster ROI free up capital for strategic growth initiatives.

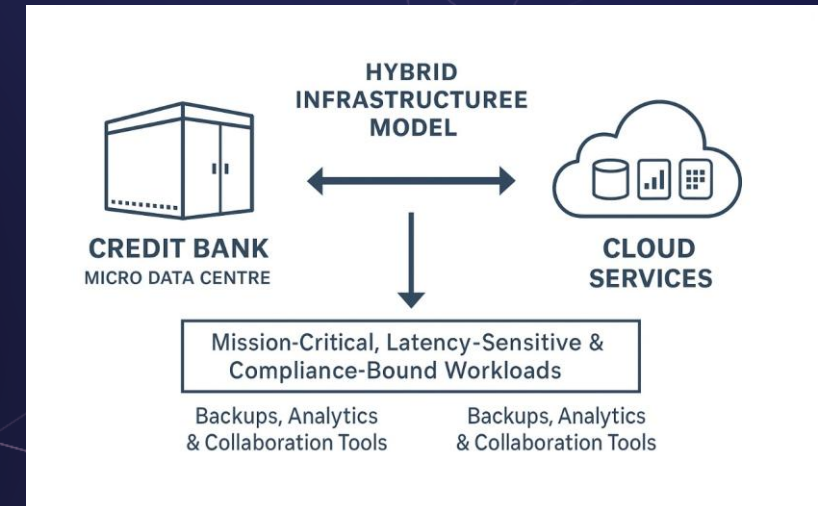




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# Micro Data Centre Use Case

- Enhanced Resilience
- Local DR site ensures critical systems stay operational during outages at the primary data Centre.
- Faster recovery times with on-site compute and storage capacity.
- Improved Compliance & Data Sovereignty
- DR systems hosted within PNG meet regulatory and internal compliance requirements.
- Sensitive financial data stays onshore.
- Reduced Latency for Critical Applications
- Key banking systems run locally, improving speed for transaction processing and customer services.
- Operational Control
- Credit Bank retains full operational oversight of hardware, security, and maintenance.



*Credit Bank's MDC shows how a PNG business can combine local infrastructure, resources and cloud services to achieve resilience, compliance, and performance — setting a model for other enterprises in the country.*





# Micro Data Centre Use Case CCTV System

A 40+ site CCTV network across the South Pacific utilising a tiered storage and analytics model to optimise performance, compliance, and cost.

## On-Device Analytics (at each site)

- AI-powered analytics processed locally on the camera or NVR.
  - Reduces the need for centralised servers for video analysis.
- ## 2. On-Site Storage (Edge)
- Video retained locally for immediate access and compliance retention periods.
  - Allows live and recorded footage to be viewed instantly at the site or from the Security Operations Centre (SOC).

## 3. Data Centre Storage (Central)

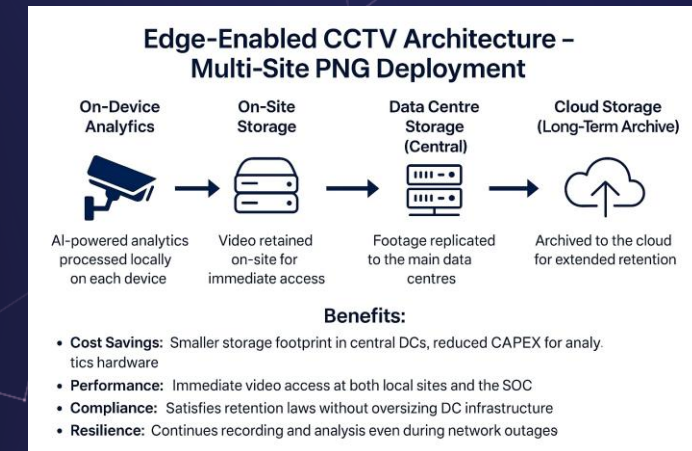
- Footage replicated to the main data centres for secondary retention.
- Optimised storage pools for centralised investigations.

## 4. Cloud Storage (Long-Term Archive)

- Archived to the cloud for extended retention.
- Meets regulatory requirements without maintaining 3+ PB of on-premise DC storage.

## Benefits:

- **Cost Savings** – Smaller storage footprint in central DCs, reduced CAPEX for analytics hardware.
- **Performance** – Immediate video access at both local sites and the SOC.
- **Compliance** – Satisfies retention laws without oversizing DC infrastructure.
- **Resilience** – Continues recording and analysis even during network outages.





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# Key Takeaways

## 1. One Size Does Not Fit All

No two organisations — and often no two business units within the same organisation — have identical operational, compliance, and performance needs. Data Centre and edge infrastructure must be designed around these unique requirements rather than forcing a generic model.

## 2. Scalable, Flexible, and Right-Sized Infrastructure

The foundation of any successful deployment is infrastructure that can grow and adapt with the business. Over-engineering wastes capital, while under-engineering creates bottlenecks and risk. The goal is to build *just enough* capacity today, with a clear path to scale tomorrow.

## 3. Edge is Not a Single Technology

Edge is a design principle, not a single product. It's a collection of capabilities — local compute, local storage, high-speed networking — positioned close to where data is generated and consumed.

## 4. Edge Complements, Not Replaces, Cloud

Edge handles time-sensitive, high-bandwidth, or compliance-critical workloads locally, while the cloud continues to serve as the powerhouse for large-scale processing, global access, and long-term storage. The future is *hybrid*, where edge and cloud work in concert.

## 5. Early Engagement is Critical

Engaging all stakeholders — business leaders, technical teams, and compliance officers — from the very start of a project is key to aligning requirements, reducing rework, and ensuring the solution delivers real business value from day one.





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# Final Thought

Investing in the right balance of edge, cloud, and core infrastructure is not just a technology decision, it's a business strategy that impacts performance, resilience, compliance, and cost for years to come. The organisations that succeed will be those who design with flexibility, scalability, and collaboration at the core.





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# Pacific Critical Infrastructure Collaborative PCIC.IO

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## Strengthening Pacific resilience through professional **collaboration** and **shared expertise**.

The Pacific Critical Infrastructure Collaborative (PCIC) is a vendor-neutral, community-driven initiative established to advance the knowledge, skills, and resilience of professionals working in data centres and critical infrastructure across Papua New Guinea and the South Pacific.

Our mission is to create a platform for sharing experience, promoting best practices, and upskilling local talent through expert-led forums, collaborative learning, and open discussion. From data centres and edge computing to critical systems in banking, healthcare, and utilities — PCIC connects people, ideas, and opportunities across the region.

Together, we're building the future of infrastructure — powered by local expertise.



### Community Driven

PCIC is an independent, community-led initiative created by and for professionals working in data centres and critical infrastructure environments.



### Vendor Neutral

PCIC is proudly vendor neutral. We are not driven by sales, product promotion, or commercial agendas. Our focus is on open, unbiased knowledge-sharing that supports the professional development of those working in data centres and critical infrastructure.



### Global Perspective

While PCIC is rooted in the South Pacific, our outlook is global. We recognise that advancements across technology sectors including cloud computing, AI, energy systems, automation, and cybersecurity are rapidly evolving and reshaping the critical infrastructure landscape.



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**Specialised Building Services (SBS)**



**OPER8 GLOBAL GROUP**



**LIGHT SPEED PNG**





## Keynote Speaker



**Simon Gardner**

Global CTO & EVP Data Centre Solutions, Oper8 Global

Simon Gardner is a globally recognised expert in data Centre engineering and critical infrastructure strategy, with over 35 years of experience delivering high-performance, resilient solutions. As Global CTO and EVP Data Centre Solutions at Oper8 Global, he leads the development of modular and edge infrastructure with a focus on performance, adaptability, and sustainability.

- ✓ 37+ Years In Global Data Centre Design And High-performance Computing
- ✓ Founder Of Oper8 Global Group (UK), TSI, And EPI
- ✓ Lead Auditor, Designer, And Instructor For ANSI/TIA-942
- ✓ Member Of ASHRAE, Green Data Centre Alliance, DC Engineering Group
- ✓ Advisor To Oxford And Imperial On Future HPC Strategies

**37+**

Years in Data Centre & HPC

**3+**

Companies Founded

**5+**

Global Memberships & Roles





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Since 1988, SBS has been delivering specialised building services across Papua New Guinea, with operational bases in Port Moresby and Lae. Our multidisciplinary expertise spans electrical, mechanical, data, and safety systems—enabling us to provide complete, end-to-end solutions from consultancy and design through to installation, commissioning, and ongoing maintenance.

In addition to our core building services, SBS has extensive experience in Data Centre design, installation, support, and management, delivering resilient, high-performance infrastructure tailored to meet the needs of modern businesses. Our capabilities cover every stage of the data Centre lifecycle, including capacity planning, critical systems integration, and 24/7 operational support, ensuring maximum uptime and efficiency for our clients.

We proudly serve a diverse client base, including government agencies, multinational corporations, property developers, healthcare providers, and educational institutions. Over the decades, we have built a strong reputation for technical excellence, reliable project delivery, and a personalised approach that ensures every solution is fit for purpose and future-ready.

