



PNG'S DIGITAL INFRASTRUCTURE and DATA CO'S 15-YEAR DIGITAL INFRASTRUCTURE PLANS

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Final Version

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PNG Communications Market Snapshot



The PNG internet and mobile penetration lags similar nations in the region. The GoPNG Medium-Term Development Plan IV together with DataCo building urgently needed shared digital infrastructure will support a more competitive market which is expected to close the gap

| Country | Pop. | Fixed BB | Mobiles | Internet | Comments |
|------------------------|-------|----------|---------|----------|---|
| PNG | 11M | 0.35% | 40% | 25% | Expanded coverage, competitive environment, 4G increasing |
| Fiji | 0.9M | 2% | 107% | 88% | 4G ubiquitous, increasing mobile services |
| Solomon Islands | 0.7M | 0.16% | 67% | 36% | Infrastructure project continuing, expanded 4G coverage |
| Malaysia | 32.7M | 13% | 148% | 97% | Wholesale 5G network operational, improving service |

Impact of DataCo Entering the Market:

- **DataCo has built broadband and ICT assets critical to PNG's economy costing over PGK1,000M (US\$380M)**
 - Highlands Fibre Cable
 - LNG Fibre Cable (with Exxon Mobile)
 - Kumul Submarine Cable Network (KSCN)
 - Coral Sea Cable System (CS2; Sydney to Port Moresby, Honiara)
 - Two data centres (Port Moresby and Madang)
- **Wholesale Data prices** have fallen from K1,600/Mbps/mth in 2016 to K192/Mbps/mth in 2022; a reduction of 88%
- **Data volumes** have increased 860 times in five years from 0.37Gbps in 2017, to 319 Gbps in 2022 driven largely by point-to-point metro services
- **DataCo offers wholesale backhaul fibre connection** to 21 of the 22 Provincial Capitals and 44 of the 96 Districts

Industry Players Include:

- **Mobile Operators:** Digicel, Vodafone, Telikom
- **Fixed Operators & ISPs:** Telikom, Daltron, Digitec, Datec etc
- **Government Policy:** Dept of Information and Communications Technology (DICT)
- **Industry Regulation:** National Information and Communications Technology Authority (NICTA)

Market Developments:

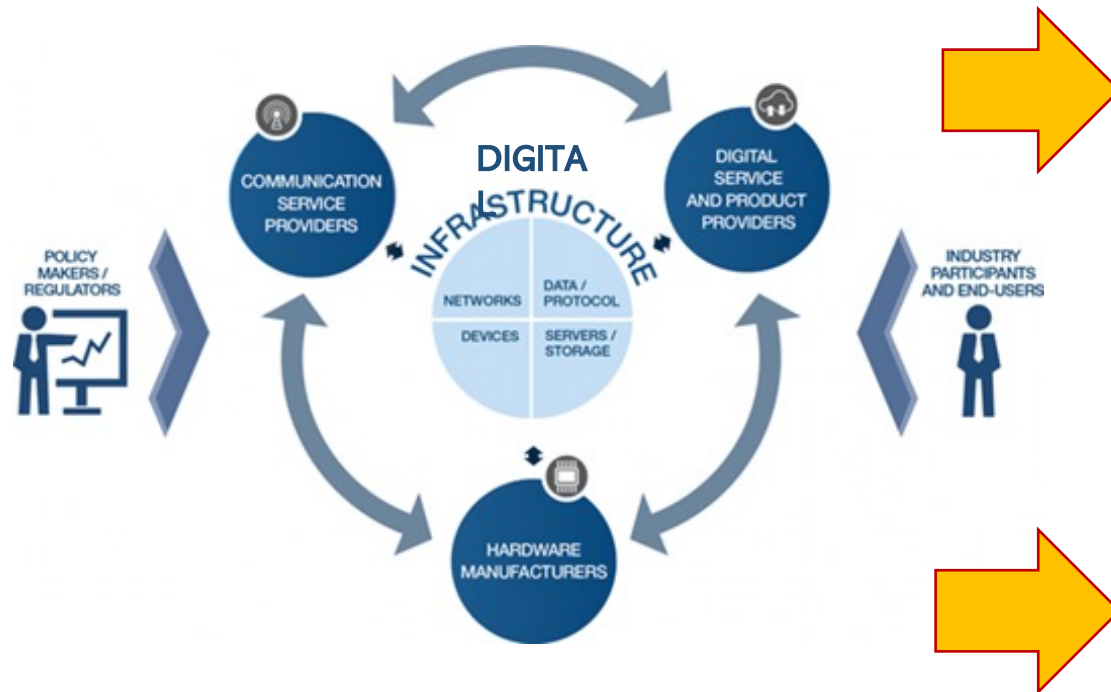
- **PNG Vodafone** launched in 2022 and continues rollout of 4G network
- **Digicel** continued roll out of 4G services and increasing footprint
- **Telikom** includes Bmobile and Citifone
- **Starlink:** consultation by NICTA on possible availability of retail services in PNG

Statistical data sourced from NICTA, Paul Budde, and the International Telecommunications Union Digital Development Dashboard: <https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx>

DataCo is a SOE that us tasked to Support PNG's Digital Ecosystem



Digital infrastructure is at the centre of the digital ecosystem



DataCo is building Digital Infrastructure and driving digital innovation in PNG through:

- Terrestrial and submarine fibre cable expansion
- New Datacentres and a Technology Park SEZ
- Cloud solutions and services based on major global technology suppliers such as Oracle, AWS and VMWare
- Network infrastructure sharing
- National Digital Capability e.g. IXP, DNS, Payments Gateways
- New satellite solutions such as Starlink, O3b mPOWER
- Cyber Security capability

Benefits to PNG

- Supporting GoPNG's Medium Term Development Plan (IV) 2023-2027 by providing Digital infrastructure for improved fixed and mobile broadband internet
- **Increase PNG's GDP growth rate:** The World Bank estimates that a 10% growth in internet penetration results in 1.36% increase in a developing country's GDP

Alignment of DataCo's 15-Year Digital Infrastructure Plan with the Medium-Term Development Plan (MTDP-IV)



DataCo is one of the nominated agencies for the delivery of the MTDP-IV and has developed a 15-Year Digital Infrastructure Plan 2024-2038 to align with the MTDP's ICT Key Result Areas

Key Programs in DataCo 15-Year Digital Infrastructure Plan 2024-2038

1. Expansion of existing terrestrial and submarine fibre networks. To include all Districts and to improve network resilience

2. Expansion of Data Centre/Cloud Services in POM and Madang and new Data Centres in Highlands and NGI

**DataCo
15-Year
Plan**

3. New Communal (Neutral Host) Wireless Towers. Support for multiple MNOs and ISPs to reduce total cost of ownership on towers

4. New Wholesale GPON Fibre Access Network. Provide 100Mbps+ to up to 500,000 households and businesses

Example of MTDP-IV ICT Key Result Areas

Table 2 Key Result Areas

| No. | Key Performance Indicator | 2023 | 2024 | 2025 | 2026 | 2027 | Responsible Agency(ies) |
|-----|--|------|------|------|------|------|-------------------------|
| 1 | Number of Provinces connected to optic fibre NTN | 12 | 15 | 18 | 20 | 22 | DICT/NICTA/UAS |
| 2 | Number of Provinces connected onto the Government Private Network (GPN) and National Data Centre | 10 | 13 | 15 | 18 | 22 | DICT |
| 3 | Total number of Districts having access to voice and data communication services | 40 | 50 | 60 | 70 | 96 | DICT/NICTA/UAS |
| 4 | Total number of Districts having access to internet connectivity | 60 | 65 | 70 | 87 | 96 | DICT/NICTA/UAS |
| 5 | Total number of Districts having access to television and radio broadcasting services | 60 | 70 | 80 | 90 | 96 | DICT/NBC |
| 6 | Number of Provinces having access to Government's Digital Services | 3 | 6 | 9 | 12 | 16 | DICT |

DataCo Fibre and Satellite Connectivity to Provinces and Districts

- DataCo has already established NTN fibre Points of Presence (POPs) in 21 of 22 Provincial Capitals and has NTN fibre POPs in 44 of the 96 Districts in PNG. The remainder are planned to be connected in DataCo's 15-Year Plan 2024-2038.

Future Plans

- DataCo has an agreement with the Connect PNG Roads and PNG Power expansion programs to use roads and power pole routes to install fibre where possible
- DataCo will also support access to GoPNG's digital services through the expansion of Data Centre and Cloud facilities.
- DataCo will improve access to voice and data services (including internet) through the delivery of up to 500 Communal (Neutral Host) Towers and the wholesale available to up to 500,000 households and businesses using GPON fibre.

| | |
|--|-----|
| Percentage of Districts Connected by DataCo Fibre and/or Satellite | 67% |
| Percentage of Districts connected by Fibre | 46% |
| Percentage of Districts Connected by Satellite | 21% |
| Percentage of Districts connected by both Fibre and Satellite | 24% |

Kumul Submarine Cable Network Expansion (KSCN-2)



KSCN-2 is planned for implementation during the next three years. The project will extend the existing KSCN network with about 2,000km of new domestic and 1,800km of new international submarine fibre



KSCN-2 Routes

- The map (left) shows indicative routes with new cable landing points at: Lae, Aitape, Lihir, Arawa, Namatanai, Taro, and islands near Alotau.
- New international destinations to Guam or Davao are also under consideration.
- These routes will also provide redundancy and minimise the impact of future earthquakes.
- Final route selection and delivery dates are to be advised.

Datacentre Expansion

- Indicative locations new Datacentres are shown in the map (left)

Datacentre Services



DataCo currently operates two Data Centres: one in POM and a back up site in Madang with a total capacity of about 1.5MW

Architecture

- DataCo offers Hybrid Datacentre services including colocation, hosting and a range of cloud services.
- Multi-Scaler Hybrid-Cloud Infrastructure is provided in partnership with VMware Cloud Foundation, HPE and Amazon Web Services.
- DataCo can provide an in-country solution to support PNG data sovereignty.

Services

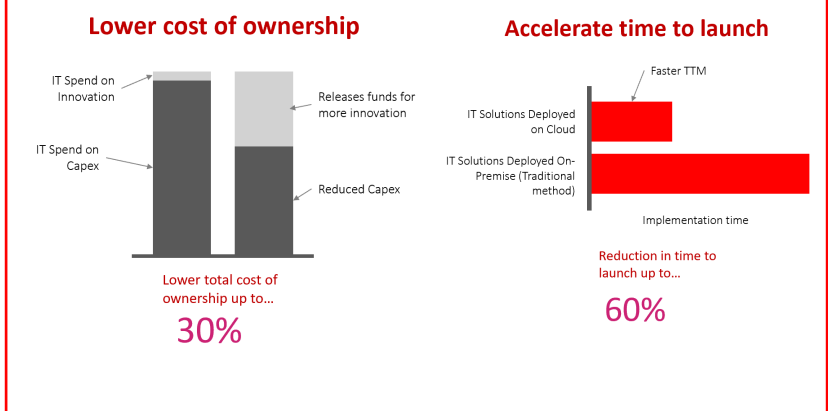
- Email Exchange Setup, Apps and Website Hosting
- Email, Anti-Virus & End-point Security Services
- SSL Certificate Services
- Cybersecurity Implementation Solutions (Bundle Services)
- Data Migration, Back-up, Disaster Recovery and Business Continuity Solutions
- IaaS (Infrastructure as a Service) & Wholesale Internet Services
- VMware Reseller Partner on Multi-Cloud Edge Solutions
- Direct Hybrid Integration Solutions with AWS, Microsoft, Salesforce, VMware, etc
- WiFi, CCTV, ICT System Audit, Vulnerability Testing (VAPT) Services
- Information Security Management System (ISO 27001) Implementation and Certification

Experience the low latency connections to your favourite platforms or applications:

PARTNERS

Customer Benefits

- DataCo's growing customer base includes PNG Government as well a range of Enterprises.
- DataCo's Datacentre and Cloud Services enable its customers to accelerate ICT product development and reduce the cost of ownership.



Planning for Additional Datacentre Capacity and Services in PNG

- DataCo estimates that there is 5-10MW of unmet demand for neutral host Datacentre capacity in PNG.
- DataCo is planning additional Datacentre capacity for Port Moresby (likely to be located in the proposed DataCo-led ICT Park SEZ), and Madang.
- DataCo is also developing plans for new Datacentres and Cloud Services. These are expected to be in locations in the Highlands, New Guinea Islands and Momase Regions. See KSCN-2 map.

Shared Communal (Neutral Host) Towers



DataCo proposes to work with the 96 District Development Authorities and the three PNG MNOs to build shared Communal (Neutral Host) Towers to improve mobile services access and performance

PNG Mobile Industry Snapshot

| 2023 Est. | Active Subs | Market Share | Claimed Pop. Coverage |
|--------------|------------------|--------------|-----------------------|
| Digicel | 2,850,000 | 74% | 90% |
| Telikom | 315,000 | 8% | 70% |
| Vodafone | 690,000 | 18% | 50% |
| Total | 3,855,000 | 100% | |

- The estimated mobile penetration in PNG is currently about 35%-40% of population. This is low compared with other countries which are typically around 100%
- The MTDP-IV target for population covered with telecommunications services in 2023 is 57%.

Demand for Mobile Towers in PNG

- The total number of mobile towers in PNG is estimated over 2,000 with over 50% operated by Digicel.
- Telikom and Vodafone would need to build many new towers to match Digicel's coverage. In addition, Digicel would need to build additional towers as PNG still has many areas where there no mobile coverage.
- DataCo research indicates that currently there is almost no tower sharing indicating that there is market for a Neutral Host Tower provider. This would make network expansion by Vodafone and Telikom more economical and thus enable them to better compete with Digicel as well as make it more economical for all mobile operators (incl. Digicel) to deliver mobile services into areas of poor or no coverage. Operators would also benefit by adding mobile sites to improve 4G coverage and performance.
- Other users of these shared towers would include fixed wireless internet ISPs, community wireless operators, broadcasters and other approved users such as Government agencies.

Communal (Neutral Host) Towers

- DataCo has prepared a business case for delivering 500 new Communal (Neutral Host) Towers over the next 3-6 years subject to technical and commercial feasibility of individual sites, and the finalization of contracts and funding.
- 250 sites are estimated to be built in remote areas and 250 in urban/regional areas.
- DataCo has signed MOUs with several District Development Authorities (DDAs) and is in discussion with all three mobile operators on several candidate sites for tower sharing.
- DataCo will provide for the tenants shared site and Tower and, optionally
 - Green Solar Power;
 - Fibre or Satellite backhaul;
- Towers may cover wide, medium, or local areas, (see pictures at right).
- An average of two tenants are expected to use each site.
- Proof-of-Concept candidate sites are being evaluated and are expected to be built in 2024.

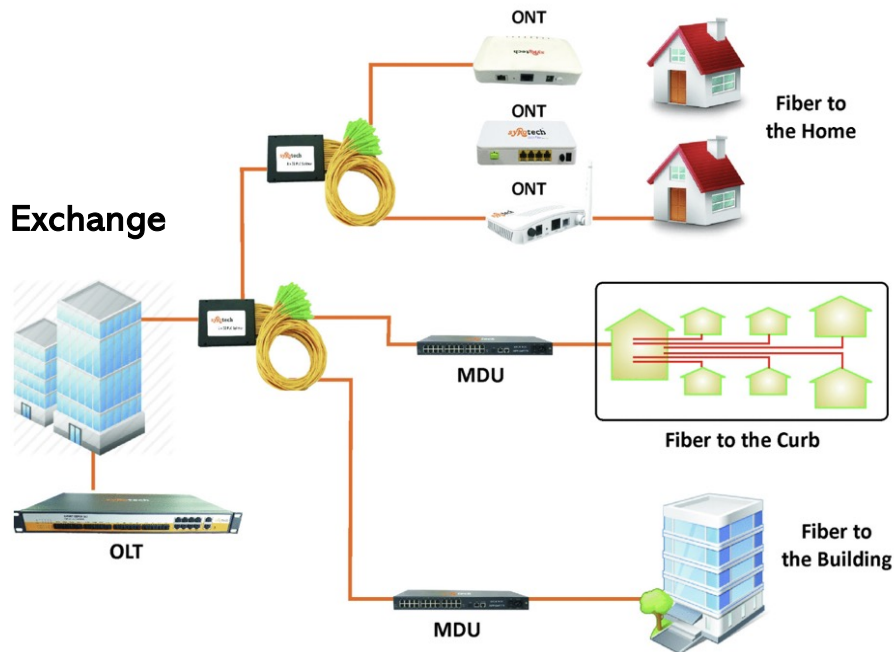


Wholesale GPON* Access Network



DataCo proposes to extend the (backhaul) NTN by building a shared wholesale Fibre Broadband Access Network offering high-speed, reliable broadband to up to 500,000 premises across PNG

GPON* Architecture



* GPON = Gigabit Passive Optical Network

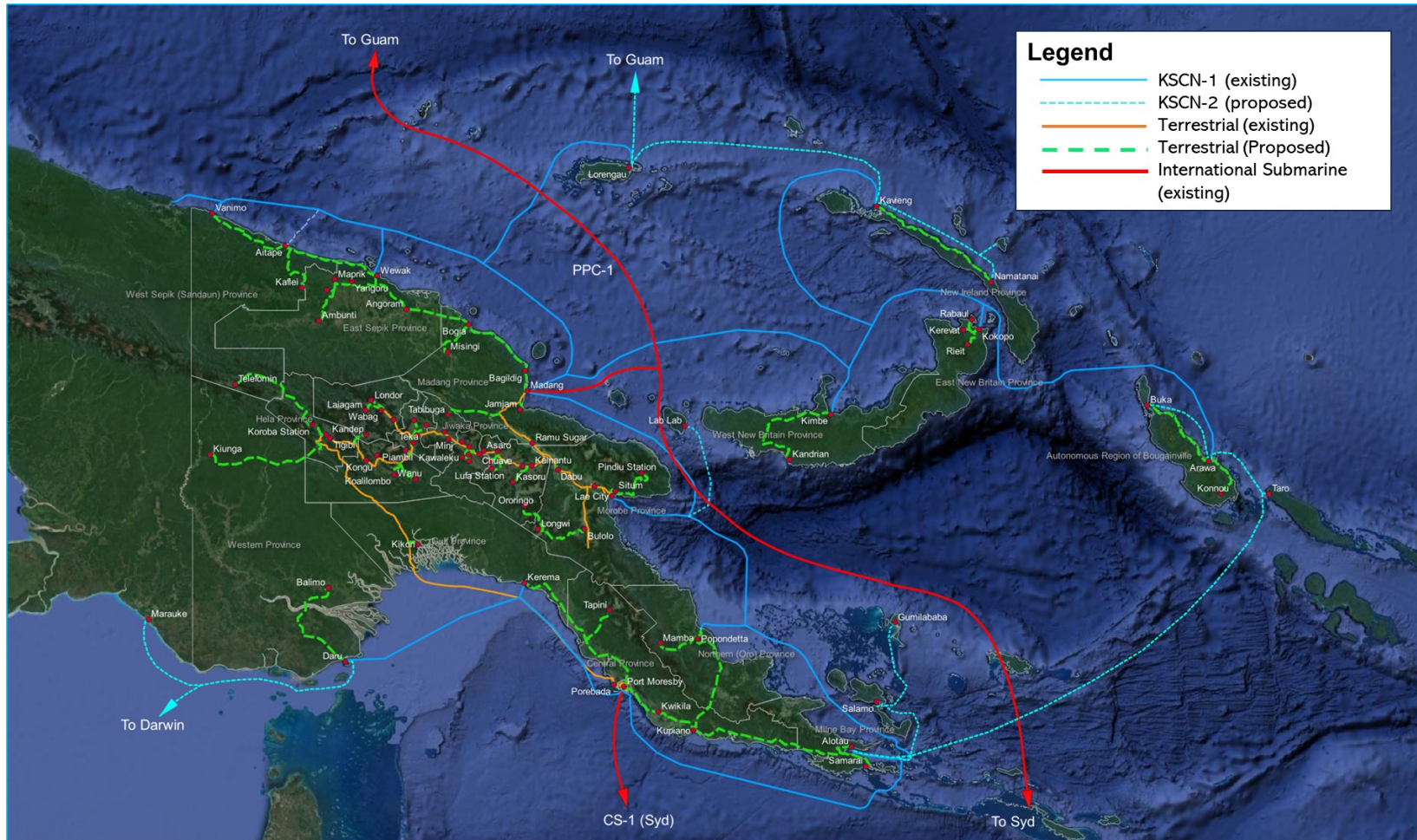
The Need for Fibre-based Fixed Broadband

- Fixed broadband penetration in PNG is currently <1% of the population; mobile broadband is used to provide most of the internet connections to an estimated 25%.
- The proposed GPON fibre access network is planned to pass 500,000 premises. These premises are estimated to represent about 15% of the premises forecast to be connected to the national electricity grid in 2037.
- Fibre to the Home, Kerb or Building provides the fastest, most reliable broadband service, and GPON technology is a proven costs effective technology to deploy fibre in broadband access networks (last mile)
- DataCo's proposed GPON Coverage will be focussed initially on government, industrial, commercial and tourist areas as well as new residential developments that require enhanced broadband access
- DataCo proposes to provide wholesale-only broadband access services to licensed ICT service operators and ISPs. The licensed ICT service operators and ISPs would then provide retail services to end-users
- The proposed GPON network will provide the capability for internet services of speeds of 100Mbps to 1Gbps. These would complement the mobile broadband services provided by mobile operators in PNG.

Summary of Proposed Future NTN Connectivity



DataCo has an ambitious digital infrastructure investment program that is aligned to the Medium-Term Development Plan and that supports the digitisation of PNG's economy and society



Existing DataCo Connections for PNG Districts

| Connectivity | No. | Perc. |
|---|-----|-------|
| Provinces in PNG | 22 | - |
| Districts in PNG | 96 | - |
| Districts with Fibre | 44 | 46% |
| Districts with Hub Satellite | 27 | 28% |
| Districts with Satellite | 17 | 18% |
| Both Fibre and Satellite | 23 | 24% |
| Total Districts Connected (Fibre & Satellite) | 64 | 67% |
| Districts Connected with Satellite Alone | 20 | 21% |

- A key driver for expansion of the NTN to meet the MTDP-IV targets is to provide fibre connection to all Districts where possible
- The map (left) provides a view of DataCo's 15-year plan future terrestrial fibre and submarine cable network. The proposed terrestrial routes are indicative only and generally follow currently know Connect PNG Road routes and PNG Power power-pole routes.
- Some Districts may remain on satellite due to their remote location.

Other DataCo Digital Innovation Programs



DataCo is supporting several other programs that are critical to developing sustainable Digital capability in PNG

Upgrade of PNG Internet Gateways

- DataCo is responsible for the provision and operation of the National Internet Gateways which are currently located in POM and Madang with international terminations in Sydney and other locations.
- DataCo has recently upgraded these facilities to provide addition capability and bandwidth

Cyber Security Capability development

- DataCo is accredited to ISO/IEC 27001 international standard to manage information security
- DataCo has recently completed a cybersecurity readiness assessment and is implementing the recommendations of the review

PNG National IXP requirements

- DataCo is developing plans to provide IXP capabilities in POM as well as regional locations

National DNS management (.pg)

- DataCo has been requested by the current provider of the .pg DNS domain service to takeover this responsibility. DataCo is in discussion with stakeholders on the proposed restructure of these functions in PNG

Provision of Green power for telecommunications

- DataCo is exploring the development of clean power solutions for its infrastructure and services including for Communal (Neutral Host) Towers

Software as a service platforms for Government and Industry

- ISP management capability
- School internet access management
- POC in a gaming platform

Questions/Thank You