GRAND DUCHY OF LUXEMBOURG
Ministry of Foreign Affairs

Directorate for Development Cooperation

European Union Africa
Infrastructure Trust Fund

Hosting Infrastructure

Overview and Benefits of Hosting Infrastructure

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Data Centre definition

- In it's simplest form, a data centre is a facility that houses IT equipment – Servers, and networking kit.

- The concept of a “computer room” originates from the complexity of early systems, such as mainframes, which had specialised housing, cooling and security requirements.

- With the explosion of online systems, and the need to be “always-on”, purpose built data centres have become critical, specialised building blocks of the ecosystem.

- Designing and building modern data centres is now a highly specialised and complex task, with many important considerations.

Types of Data Centres

For the purpose of this presentation, we have identified the following data centre types, with an explanation of each;

- ✓**Server/Computer Room**
- ✓**Private Data Centre**
- ✓**Managed Services/Vendor Owned**
- ✓**Vendor/Carrier Neutral Colocation**

Types of Data Centres

Server/Computer Room

- These are usually small scale “rooms” within an existing building, mostly used for an organisation's internal IT requirements such as file storage, e-mail servers, shared application hosting.

- In most cases, these rooms have been retro-fitted with inefficient cooling systems, and are reliant on the building's power supply, which may or may not be redundant.

- These facilities usually have one point of small capacity internet breakout via an ISP.

- In house server rooms typically conform to Tier I standards

Types of Data Centres

Server/Computer Room

Benefits

✓Small initial building cost
✓Full control of design and deployment

Disadvantages

✓Inefficient cooling and power – bad PUE
✓No redundancy or failover
✓High security risk
✓Limited expansion capacity
✓Limited choice of internet provider

Types of Data Centres

Private Data Centre

- This type of facility is typical for enterprises that have larger hosting requirements, have grown out of their computer room, or need centralisation and protection of business critical systems/applications.

- Large enterprises will likely have have larger capacity redundant internet breakout via one or more network providers.

- The organisation owns the infrastructure as well as all IT equipment, and is responsible for management, operation and maintenance.

- These facilities typically conform to Tier I – II standards.

Types of Data Centres

Private Data Centre

Benefits

✓Full control of design and build-out
✓Increased security compared to in house computer room

Disadvantages

✓Very high initial cost – Property, specialised build-out and redundancy
✓Very high recurring costs – Maintenance, upgrades and expansion
✓Increased staffing costs – IT equipment technicians as well as dedicated facilities professionals
✓Potentially inefficient utilisation of space. i.e. Designs are usually based on 100% population from day 1
✓Difficult to attract multiple carriers – High interconnect costs
✓Not core business – Increased risk, less focus

Types of Data Centres

Managed Services/Vendor Owned

- These facilities are typically owned and operated by large ISPs or carriers, and offer customers the option of renting or leasing services.

- The available services usually fall into the following categories:
  - Full turnkey solution – Includes facilities (space, power, cooling security) managed IT hardware and network capacity (Either shared or dedicated). Customers are usually only responsible for layer 7.
  - Facilities, and network services. Customers would be responsible for procurement, management and maintenance of IT equipment.

- These facilities typically conform to Tier II – III standards.

Types of Data Centres

Managed Services/Vendor Owned

Benefits

✓No initial infrastructure cost
✓If using leased IT equipment – no recurring maintenance and operational cost
✓Operator is responsible for management of facility and uptime
✓Operator is responsible for the costs of expansion
✓Reduced downtime risk

Disadvantages

✓Not core business – Not absolute focus
✓Restrictive interconnect policies - Operators usually require that customers use their network, or charge elevated costs for physical interconnection
✓No control over design and maintenance of facility
✓Vendor lock-in

Types of Data Centres

Vendor/Carrier Neutral Colocation

- These facilities are owned and operated by specialists whose absolute focus is datacentre infrastructure – Space, power, cooling, security, interconnection.

- Neutral facility operators do not offer IT/Network services – they do not compete with their customer's core business.

- A neutral facility will have open-access interconnect policies, as it is in their best interest to foster interconnections between customers.

- Neutral facilities typically operate according to Tiers III – IV.

Types of Data Centres

Vendor/Carrier Neutral Colocation

Benefits

✓No initial infrastructure cost
✓Aggregation of connectivity
✓Flexible deployment options (Leasing entire floor, building cages)
✓Choice – connect to anybody in the facility at the same cost
✓Flexible expansion options
✓Economies of scale - Efficient utilisation of utilities
✓Absolute focus of operator allows customers to focus on core business
✓Predictable long-term opex
✓Minimal risk of downtime
✓Intra-datacentre marketplace facilitates competitive pricing of services
✓Everybody in one place makes IXP deployment feasible

Disadvantages

✓Commercial Colocation facilities need to ensure that standards are met for cooling, power and security

Vendor Neutral Proposition

Data Centre Type	Access to Multi Carrier	Access to on Demand Power	Open & Cost Effective Interconnection Policies	Open Access to IXP
Inhouse	✗	✗	✗	✗
Service Provider	✗	✓	✗	✗
Neutral Facilities	✓	✓	✓	✓

- Neutral SLA based facilities are key for African ecosystem growth
- Low cost Interconnect key
- Easy access to a carrier of choice to improve pricing and service levels
- Neutral, peering exchange availability
- Extensive opportunities for ecosystem growth in all sectors e.g. financial, ISP, Carrier, Content etc.
- On-demand access to the space, power and network connectivity needed to scale all services

Data Centre Standards

TIA-942
This Standard specifies the minimum requirements for telecommunications infrastructure of data centres and computer rooms, including single tenant enterprise data centres and multi-tenant Internet hosting data centres.

Uptime Institute Tier Certification
The data centre tier standards are a standardised methodology used to determine availability in a facility, offering companies a way to measure return on investment and performance. There are two forms of Tier Certifications:

- Tier Certification of design documents
- Tier Certification of constructed facility

Uptime Institute Operational Sustainability Certification
Establishes the behaviours and risks beyond the Tier Classification System (I, II, III, IV) that impact long-term data center performance.

- Management and Operations
- Building Characteristics
- Site Location

Data Centre Standards - Redundancy

N - Base requirement
System meets base requirements and has no redundancy.

N+1 redundancy
Provides one additional unit, module, path, or system in addition to the minimum required to satisfy the base requirement. Failure or maintenance of any single unit, module, or path will not disrupt operations.

N+2 redundancy
Provides two additional units, modules, paths, or systems in addition to the minimum required to satisfy the base requirement. Failure or maintenance of any two single units, modules, or paths will not disrupt operations.

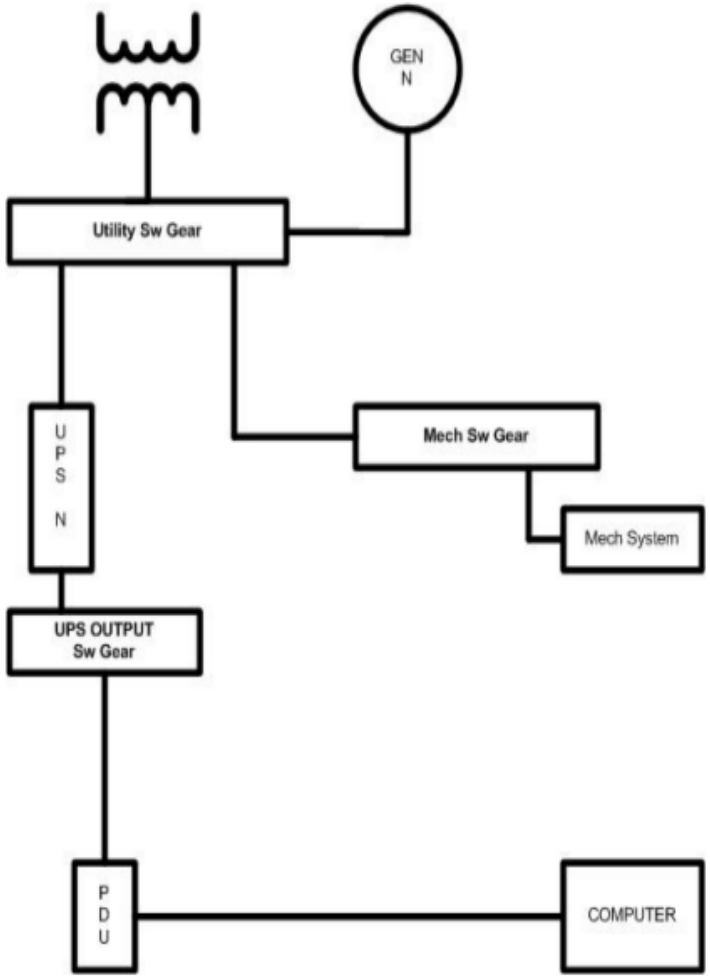
2N redundancy
Provides two complete units, modules, paths, or systems for every one required for a base system. Failure or maintenance of one entire unit, module, path, or system will not disrupt operations.

2(N+1) redundancy
Provides two complete (N+1) units, modules, paths, or systems. Even in the event of failure or maintenance of one unit, module, path, or system, some redundancy will be provided and operations will not be disrupted.

Data Centre Standards – Tier I

Tier I – Basic Site Infrastructure

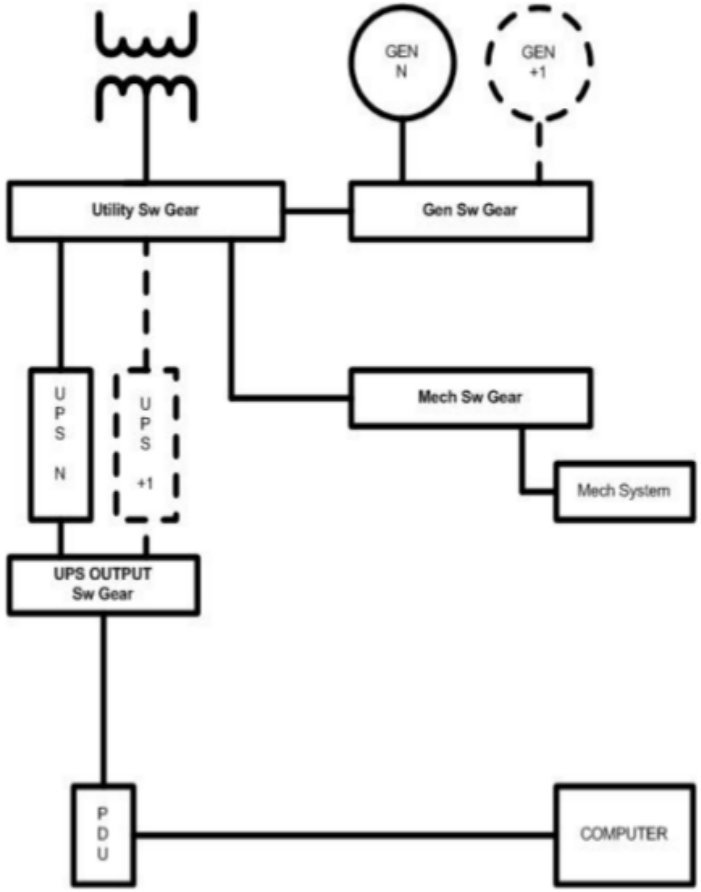
- Non-redundant capacity components and a single, non-redundant distribution path serving equipment
- Planned work will require most or all of the infrastructure systems to be shut down, affecting IT equipment
- Unplanned outages or failure of any component or distribution element will impact IT equipment
- The infrastructure should be completely shut down on an annual basis to perform preventive maintenance and repair work
- N – 99.571% Availability



Data Centre Standards – Tier II

Tier II – Redundant Capacity Components Site Infrastructure

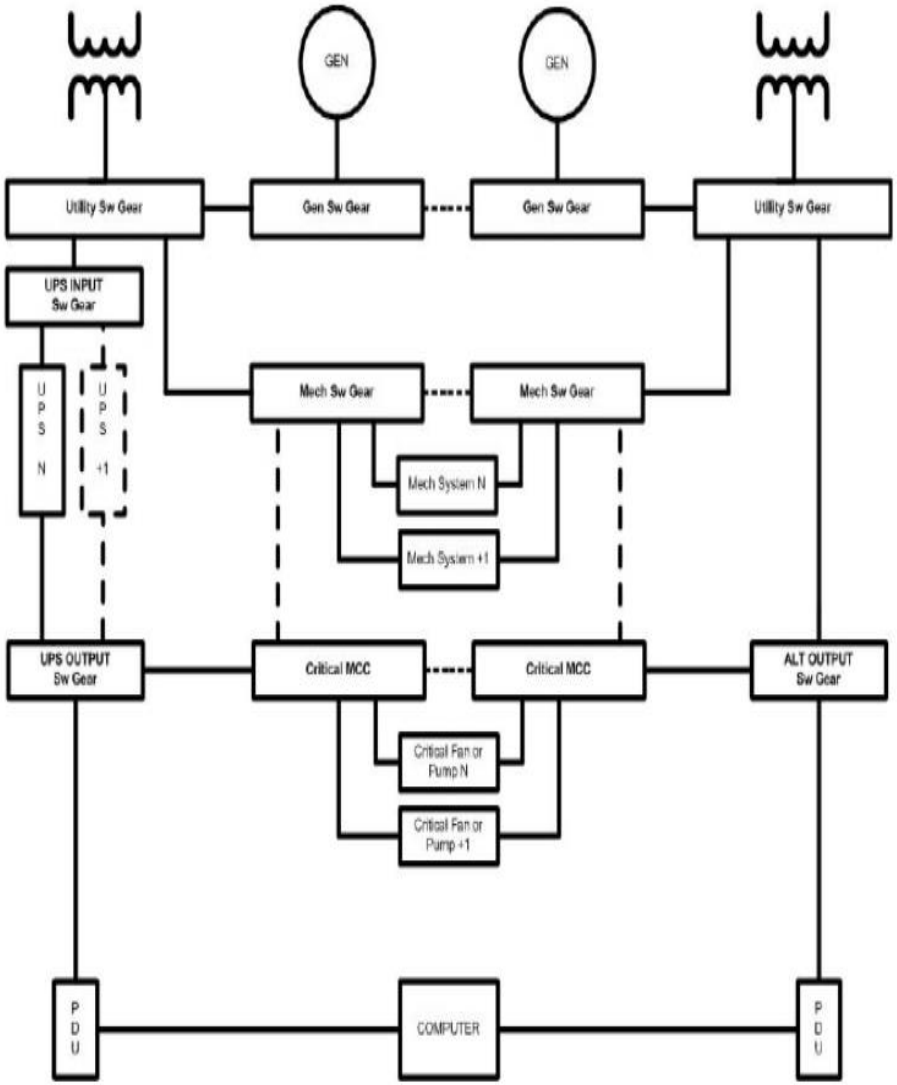
- Redundant capacity components and a single, non-redundant distribution path serving IT equipment
- Redundant capacity components can be removed from service on a planned basis without causing any IT equipment to be shut down
- Removing distribution paths from service for maintenance or other activity requires shut down of IT equipment
- Unplanned outage or failure of any capacity system or distribution element will impact IT equipment. An unplanned capacity component failure may impact IT equipment
- The site infrastructure must be completely shut down on an annual basis to safely perform preventive maintenance and repair work
- N + Partial Redundancy – 99.749% Availability



Data Centre Standards – Tier III

Tier III – Concurrently Maintainable Site Infrastructure

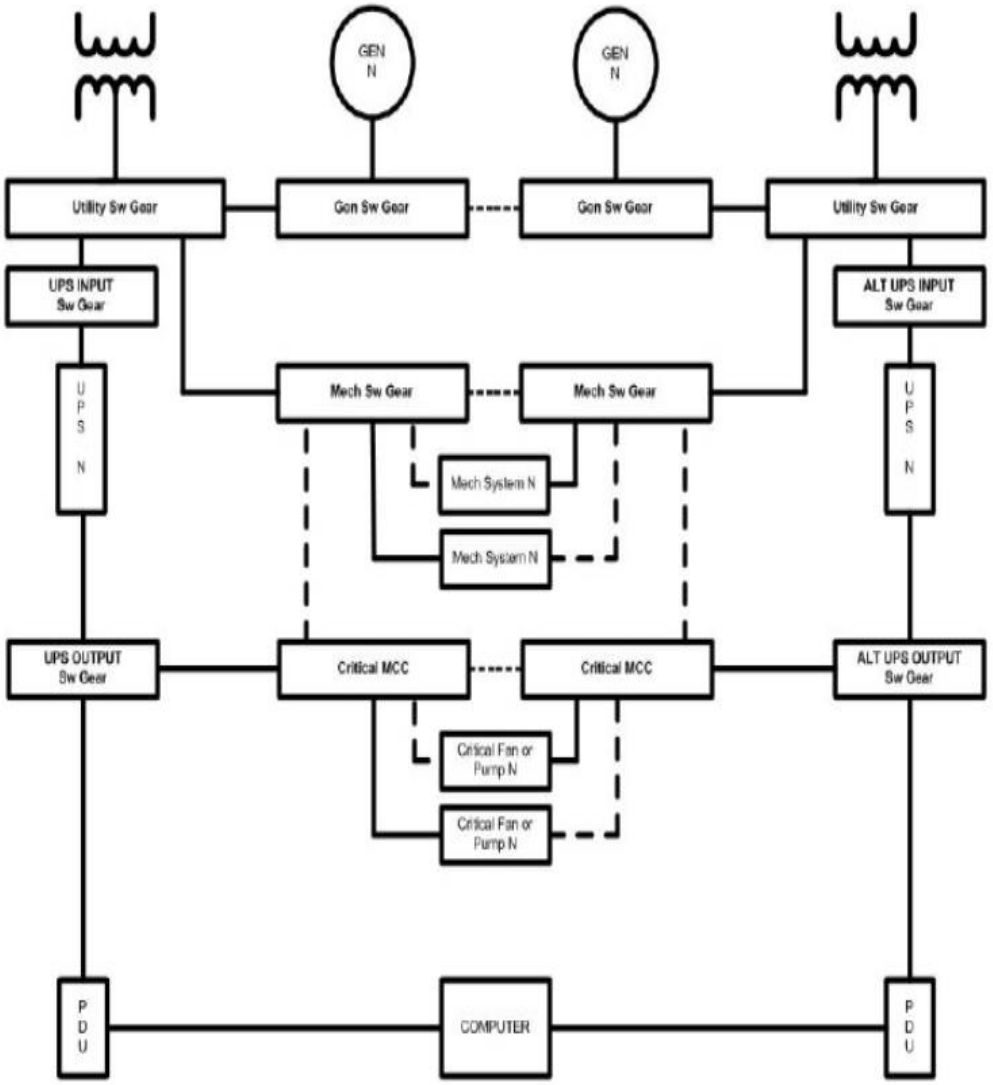
- Redundant capacity components and multiple independent distribution paths serving IT equipment
- All IT equipment should be dual powered
- Each and every capacity component and element in the distribution paths can be removed from service on a planned basis without impacting any of IT equipment
- Unplanned outage or failure of any capacity system will impact IT equipment
- Unplanned outage or failure of a capacity component or distribution element may impact IT equipment
- Planned site infrastructure maintenance can be performed by using the redundant capacity components and distribution paths to safely work on the remaining equipment



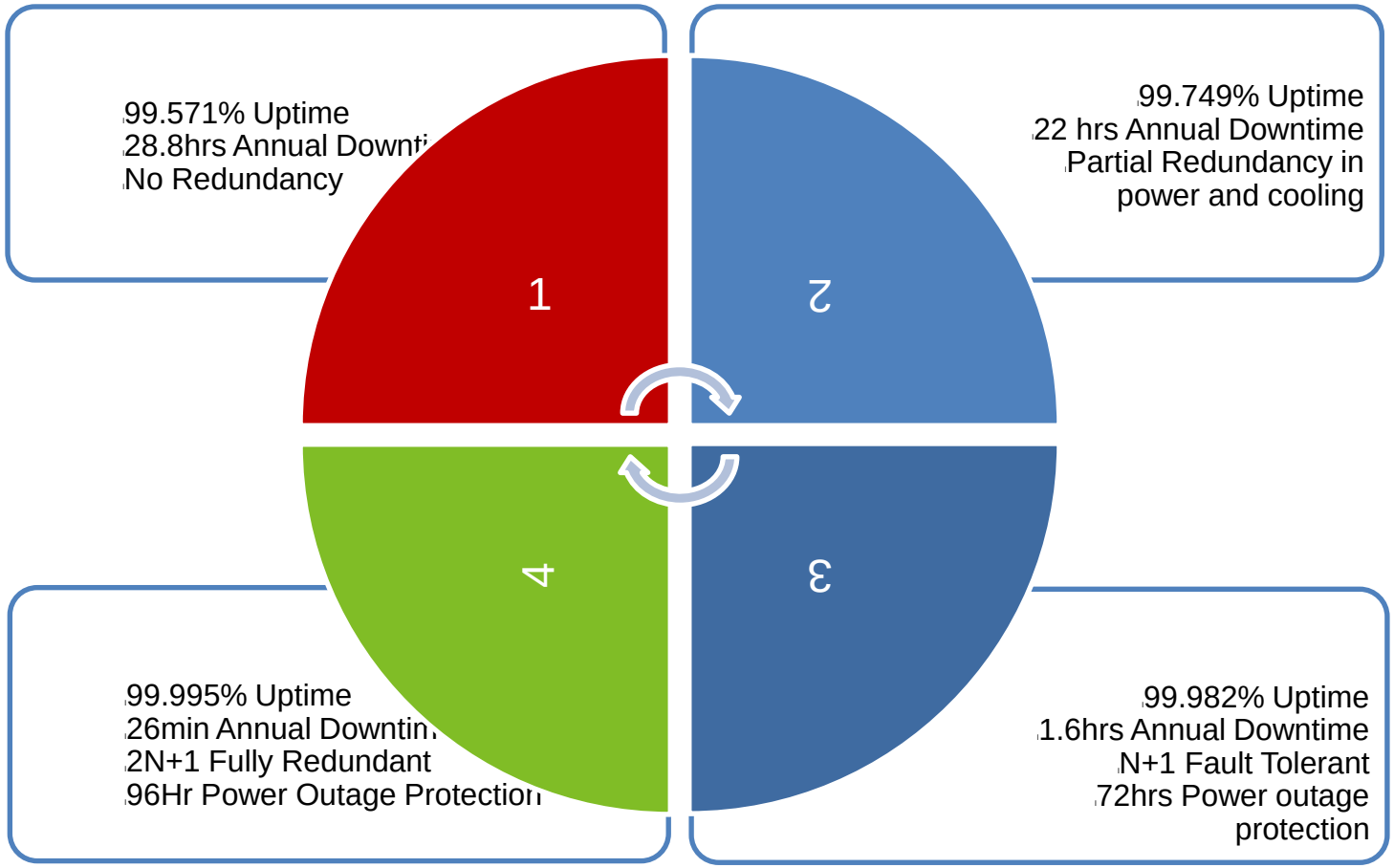
Data Centre Standards – Tier IV

Tier IV – Fault Tolerant Site Infrastructure

- Multiple, independent, physically isolated systems that each have redundant capacity components and multiple, independent, diverse, active distribution paths simultaneously serving IT equipment
- Site is not susceptible to disruption from a single unplanned event
- Site is not susceptible to disruption from any planned work activities
- 2N – 99.995% Availability
- All IT equipment is dual powered and continuously cooled
- Single failure of any capacity system, capacity component, or distribution element will not impact IT equipment
- Each and every capacity component and element in the distribution paths can be removed from service on a planned basis without impacting any IT equipment



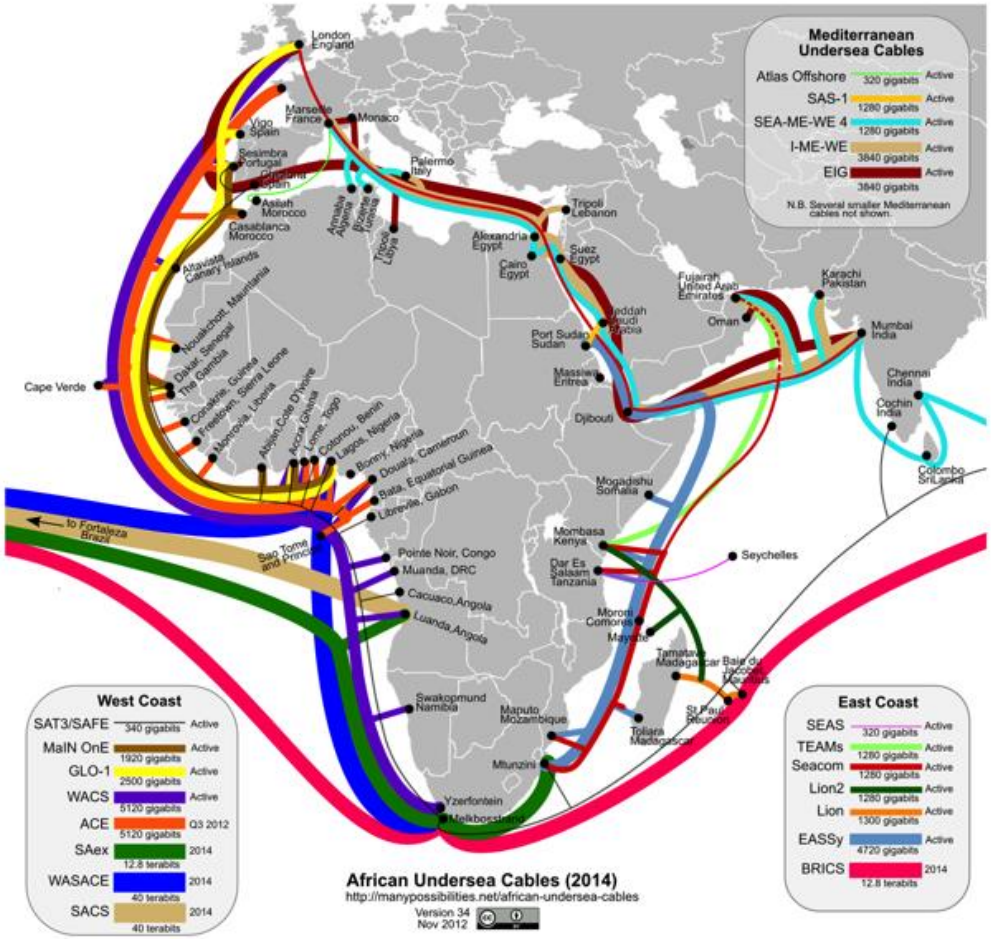
The Tier Difference



Connecting Africa to the World

Total Truly Neutral Facility Operators

- South Africa (1) 3 Facilities
- Egypt (1) 2 Facilities
- Nigeria (1) 1 Facility



Current African Infrastructure

- Carrier choice to access 55 African countries via fibre
- Inter Data Centre Interconnection with Global Operators e.g. BT, AT&T, Level 3, Liquid, CMC etc.
- Open access to key content e.g. Banking, Google, Akamai etc.
- No Terrestrial Infrastructure restraints:
  - Africa's total inventory of terrestrial transmission networks reached 732,662-km
  - 313m people are within reach of a fibre node

Data Centre Benefits

Optimising performance, cost and user experience for all services

- Power – A well designed data centre will have sufficient capacity for expansion
- Reliability – Redundancy systems ensure that customers are "always-on"
- Security – High levels of physical security and access control
- Connectivity – Carrier aggregation allows faster, low latency connectivity and greater competitiveness
- Credibility – Hosting infrastructure in a professional, purpose-built facility lends credibility
- Market-place – Having everyone in one place fosters growth, and creates the ideal location for exchange of data
- Promotion of IXP Services to drive content into Africa;

Summary: Data Centre Defined

Guaranteed Power, Space and Cooling matching Global Standards

Open Interconnection Policies to multi carrier environments at a single location

Open and Neutral access to peering exchange

Extensive opportunities for revenue and infrastructure savings within a single location across all sectors e.g. Government, Financial, ISP, Carrier, Content etc.

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Teraco Background

Teraco offers a fully managed, outsourced data centre to cater for Primary/DR/Network Aggregation requirements

- Cabinet, cage, satellite and wireless colocation

- Environmental management
  - Power availability and resilience
  - Cooling
  - Cabling
  - Security
  - Fire suppression
  - Remote hands
  - 99.999% SLA
  - PCI & ISO certified

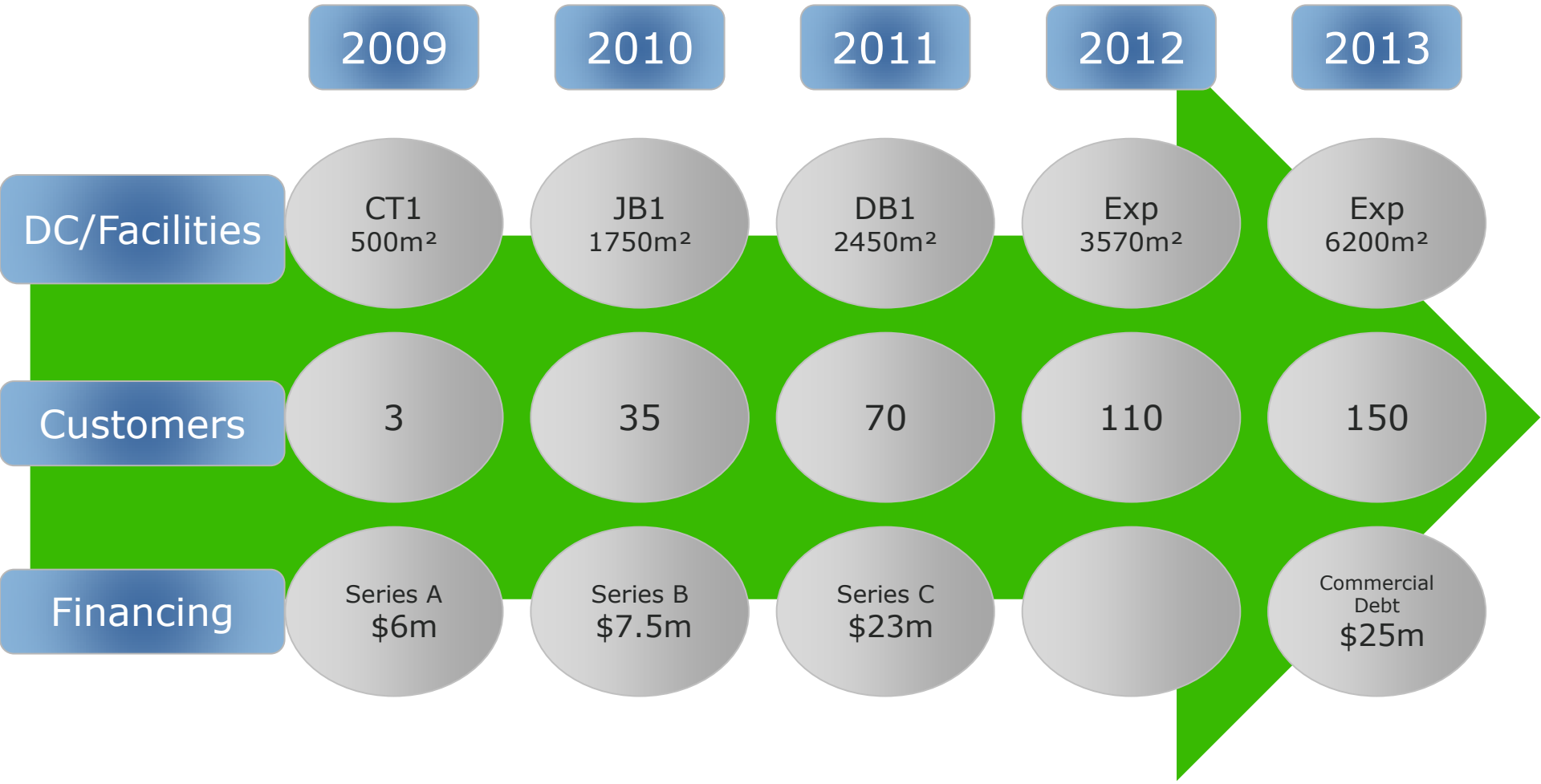
- Launched in 2008 Teraco is South Africa's first vendor neutral data centre built on Global Practices

- Teraco provider access to more than 150+ networks, and free access to the NAPAfrica IXP, maximising choice, performance and reducing latency

Teraco Facilities

- CT1 (Feb 2009)
  - 2000sqm, 3mVA
- DB1 (Sept 2011)
  - 1000sqm, 1.6mVA
- JB1 (Jan 2010)
  - 4000sqm, 6 mVA power
  - Satellite Teleport hub
  - Largest DC in Africa by
    - number of carriers
    - density of fibre

Teraco Timeline



Teraco – South Africa

- Key to success has been liberalisation of Telco market
- SA Telco deregulated in 2008
- Dark Fibre introduced by DFA in 2009
- Several new Telco's launched 2009 – 2012
- Teraco first neutral facility in Africa established 2009
- ISP's begin to build own fibre networks
- Submarine cables (SAT3/SAFE 2005, SEACOM 2009, EASSY 2010)
- NAPAfrica officially launched in 2012 – Now over 100 peered networks
- International bandwidth pricing drop (2008 – 2013)
- Global Telco's entering SA (BT, Level3, AT & T, Level 3 etc.)
- Global CDNs using Teraco to distribute to Africa. Keeping international traffic local (e.g. Google, Akamai).
- Global CDNs also using Teraco to pick up Africa content to distribute internationally

Challenges

- Market regulation
- Viable sites
- Power!
- Initial resistance from ISPs and carriers operating datacentres believing that we will compete with them.
- Scepticism from market. “Why do you want to build a datacentre without offering connectivity? How will you make money?”
- Misunderstanding of a diverse marketplace
- Educating the market on the concept, and definition of neutrality - Continuous
- Getting the first bite

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