TENET
Report on the South African NREN

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TENET and SANReN

• Every NREN is both
  – an electronic communications network, and
  – an organisation

• In South Africa
  – there is one network, but
  – there are two organisations: SANReN and TENET
What is SANReN?
South African National Research Network

• Project of the CSIR (Council for Scientific and Industrial Research)
  – Fully funded by Government
  – Deploying high-speed network within South Africa
  – No charges to or funding required from Institutions

• Seen by Govt as one of 3 pillars of an emerging national research “Cyberinfrastructure”:
  – Research and education networking (SANReN)
  – High Performance Scientific Computing
  – Large scale data storage
What is TENET?

• Non-profit private company
  – **Members**: all 23 universities + 4 research councils
  – **Beneficiaries**: 110 campuses of 52 institutions
  – **Elected Board of Directors**

• Created in 2000 by the universities to:
  – be their vehicle for collaborative networking
  – be their specialised Internet service provider
  – own shared network assets (e.g. SEACOM capacity)

• Recovers costs from institutions
  – Around $15m per year
  – No donations or government grants
SANReN infrastructure

• 10 Gbps national backbone
  – Closed ring interconnecting PoPs in 7 major cities
  – Commissioned in Dec 2009
  – 10-year supply agreement with Telkom SA

• Multi-campus optical fibre rings in
  – Johannesburg
  – Durban
  – Pretoria
  – Cape Town

• 2012: Backbone to be extended into rural areas
TENET infrastructure

• High-speed fibre rings and spurs
  – connecting 8 city campuses to Backbone PoPs
  – Long-term IRUs of dark fibre pairs
  – Costs borne by benefitting institutions

• 100 mile backhaul from SEACOM Landing
  – Long-term IRU for dark fibre
  – Rented protection circuit on different route

• Rented access circuits
  – Still used by 21 campuses
  – All will be replaced by SANReN or TENET fibre

• ADSL access circuits from Telkom
  – Used by 40 smaller sites to reach Backbone
Rural Campus Connection Project

• $4m grant from Government
  – Steering Committee appointed by Vice-Chancellors
  – TENET is the Implementation Agent

• Project Plan
  – 36 rural campuses to get access circuits
  – Total budgeted cost: $6.5m
  – Contributions required from beneficiary institutions
  – Completed by end 2012
The “SANReN – TENET” network

- Uses SANReN and TENET infrastructures
  - Operated by TENET (MoU with CSIR)
  - 112 campuses of 52 beneficiary institutions

- Hosts significant content
  - Mirror server for scientific datasets and software
  - Google servers and caches
  - SourceForge mirror (1st one in Africa)

- Is the South African NREN
  - By far the largest African NREN
  - One of the largest ISP networks in SA
What is SEACOM?

- SEACOM Ltd
  - 50% South African owned
    - Venfin (25%), Convergence Partners, Shanduka
    - 25% Aga Khan Foundation, Nairobi
    - 25% Heracles Telecom, USA
- Note that no shareholder is an African telco!
- Incorporated in Mauritius
SEACOM map
SEACOM and TENET: 
Aug Sept 2007

• SEACOM offers TENET 10 Gb/s circuit for between Mtunzini Landing and Telecity, London
  – Indefeasible Right of Use for 20 years
  – Once-off capital charge: $20 million
    • Normal price to commercial entities: $94 million
  – Annual O & M charge of $600k

• Expected commissioning date: 30 June 2009
  – 20 months away
  – No deposit required
How do we find $20 million?

• Idea: Institutions are paying over $5m per year
  – This is enough to pay for SEACOM over 6 years

• SEACOM agrees to being paid over 6 years
  – 14% interest on outstanding balance

• Institutions invited to bid for “SEACOM Bid Units”

• Each “Bid Unit” entailed
  – 10 Mb/s of preferential ordering rights of SEACOM bandwidth
  – Obligation to pay (to TENET) six annual amounts of $6,918

• Breakeven point: 750 Units
Outcome of Bid Process

• A NO-BRAINER!
  – 950 CIR Units bid
  – $29 million raised
  – From 27 institutions

• SEACOM accepted the 27 Bids as sufficient guarantee

• SEACOM and TENET signed the IRU agreement on 2 November 2007
  – TENET may resell only to R & E customers
  – Cable commissioned on 31 July 2009
  – SANReN Backbone commissioned on 1 Dec 2009
## SEACOM’s impact

<table>
<thead>
<tr>
<th>Start Date</th>
<th>Platform</th>
<th>Charge per Mbps</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-03-01</td>
<td>Satellite</td>
<td>R 52,425</td>
</tr>
<tr>
<td>2003-08-25</td>
<td>SAT-3</td>
<td>R 60,545</td>
</tr>
<tr>
<td>2005-08-25</td>
<td>SAT-3</td>
<td>R 21,428</td>
</tr>
<tr>
<td>2006-08-10</td>
<td>SAT-3</td>
<td>R 20,184</td>
</tr>
<tr>
<td>2007-04-01</td>
<td>SAT-3</td>
<td>R 21,025</td>
</tr>
<tr>
<td>2008-01-01</td>
<td>SAT-3</td>
<td>R 15,045</td>
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<tr>
<td>2008-06-01</td>
<td>SAT-3</td>
<td>R 14,245</td>
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<tr>
<td>2009-10-01</td>
<td>SAT-3</td>
<td>R 13,375</td>
</tr>
<tr>
<td>2010-01-01</td>
<td>SEACOM</td>
<td>R 1,380</td>
</tr>
<tr>
<td>2011-01-01</td>
<td>SEACOM</td>
<td>R 1,380</td>
</tr>
</tbody>
</table>

Note: $1 = R7
# Order quantities and traffic flows

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Mbps ordered by institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before SEACOM: 2008 Q3</td>
<td>228</td>
</tr>
<tr>
<td>Before SEACOM: 2009 Q3</td>
<td>254</td>
</tr>
<tr>
<td>With SEACOM: 2010 Q3</td>
<td>2020</td>
</tr>
<tr>
<td>With SEACOM: 2011 Q3</td>
<td>2900</td>
</tr>
</tbody>
</table>

SEACOM traffic. Peak = 2.5Gbps
This is thanks to...

- 27 institutions daring in 2007 to commit themselves to financing TENET’s SEACOM capacity purchase

- The SANReN project
  - Provided national backhaul infrastructure

- TENET’s licensing as an operator in 2008
  - Following celebrated court case brought by a commercial ISP
  - Over 400 operators licensed

- Formation of UbuntuNet as a regional network
  - More on this is a later talk
West Africa Cable System (WACS)
Capacity on WACS

- TENET is negotiating for capacity
  - Redundancy
  - 10 Gbps “initial capacity” – Apr 2012
  - 40 Gbps “design capacity” over 5 years
- Upgrade capacity expressed as STM-1 kilometres
  - Can select upgrade routes later
  - E.g. An STM-4 to Accra Landing
- Will be configured as part of UbuntuNet
  - Terminate in Amsterdam (extend from London Landing)
Grants from US Foundations

• Internet Access Development Program (2001-4)
  – $2.2m from Andrew W Mellon and Atlantic Philanthropies

• Development of IT Capacity in Higher Education (DITCHE) 2002 - 8
  – $1m from Andrew W Mellon

• Fostering Research and Education Networking in Africa (FRENIA) 2007 - 11
  – $1m from Andrew W Mellon

• Google-Tides grant (2011 - 14)
  – $750k
- Thanks for listening!