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Broadband for All
Closing the infrastructure gap

Kobus Roux

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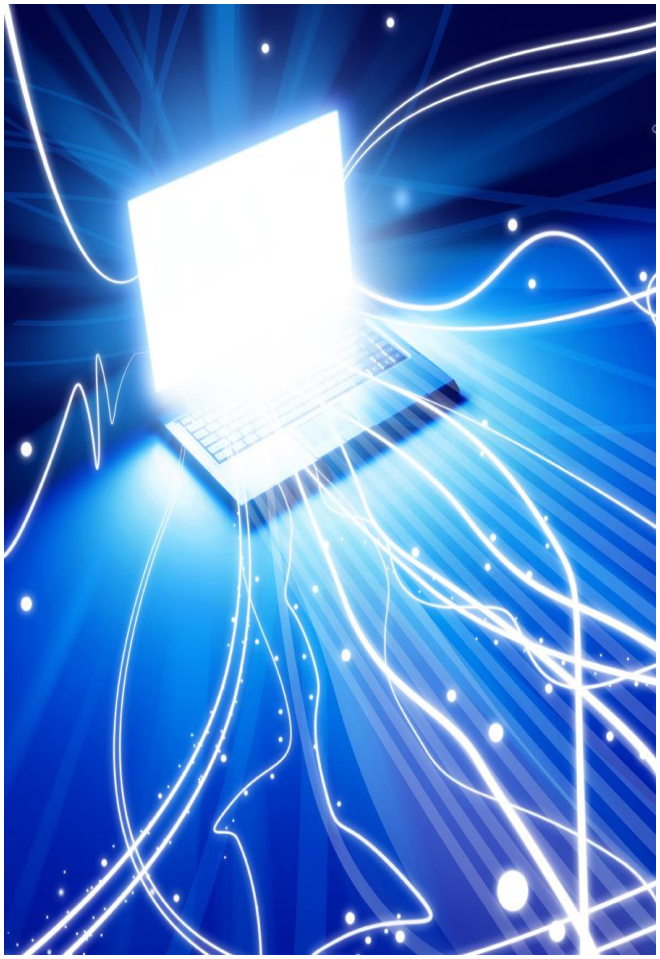
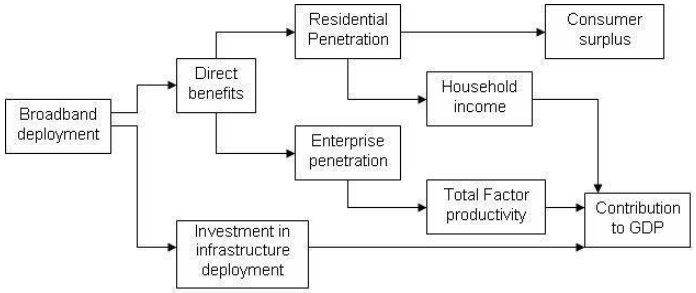
Overview



Presentation outline:

- Why broadband?
- What gaps?
- Can it be quantified?
- Gap analysis
- Closing the gap: Fibre reach
- Where to start?
- How much to do?
- Summary

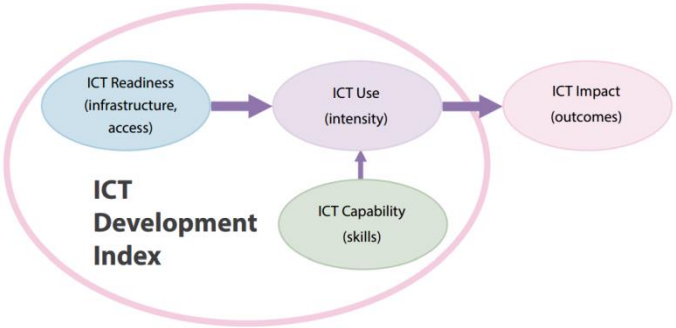
Why broadband?

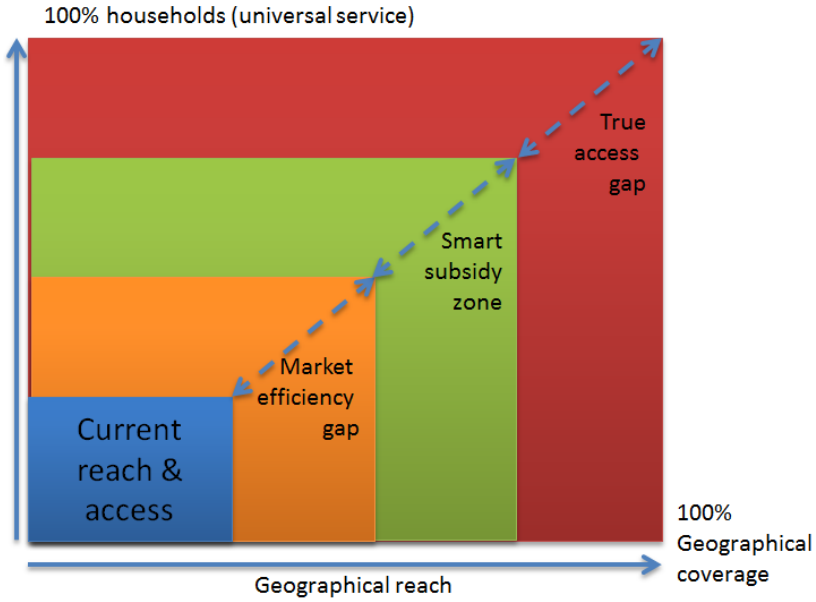


"Broadband for All"

- World Bank on economic impact of broadband: The "1.38% factor" in GDP growth
- "The impact of South Africa Connect on jobs and the economy", Dr R Katz, 2013
  - Investment in network construction
  - Economic "spill-overs"
  - Multifactor productivity gain
  - Household income
  - Enhanced access to information and services
- Broadband alone has impact, but significantly more so as an enabler

What gaps?





Source: ITU

"Universal Service, Universal Access"

- ITU's 3-element model in evolution to information society
  - ICT Readiness (infrastructure, access)
  - ICT Use (intensity)
  - ICT Capability (skills)
- Market gaps – supply and demand
  - Geographical reach (supply side)
  - Affordability and uptake (demand site)
- Geographical reach gap = infrastructure investment

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Gap analysis

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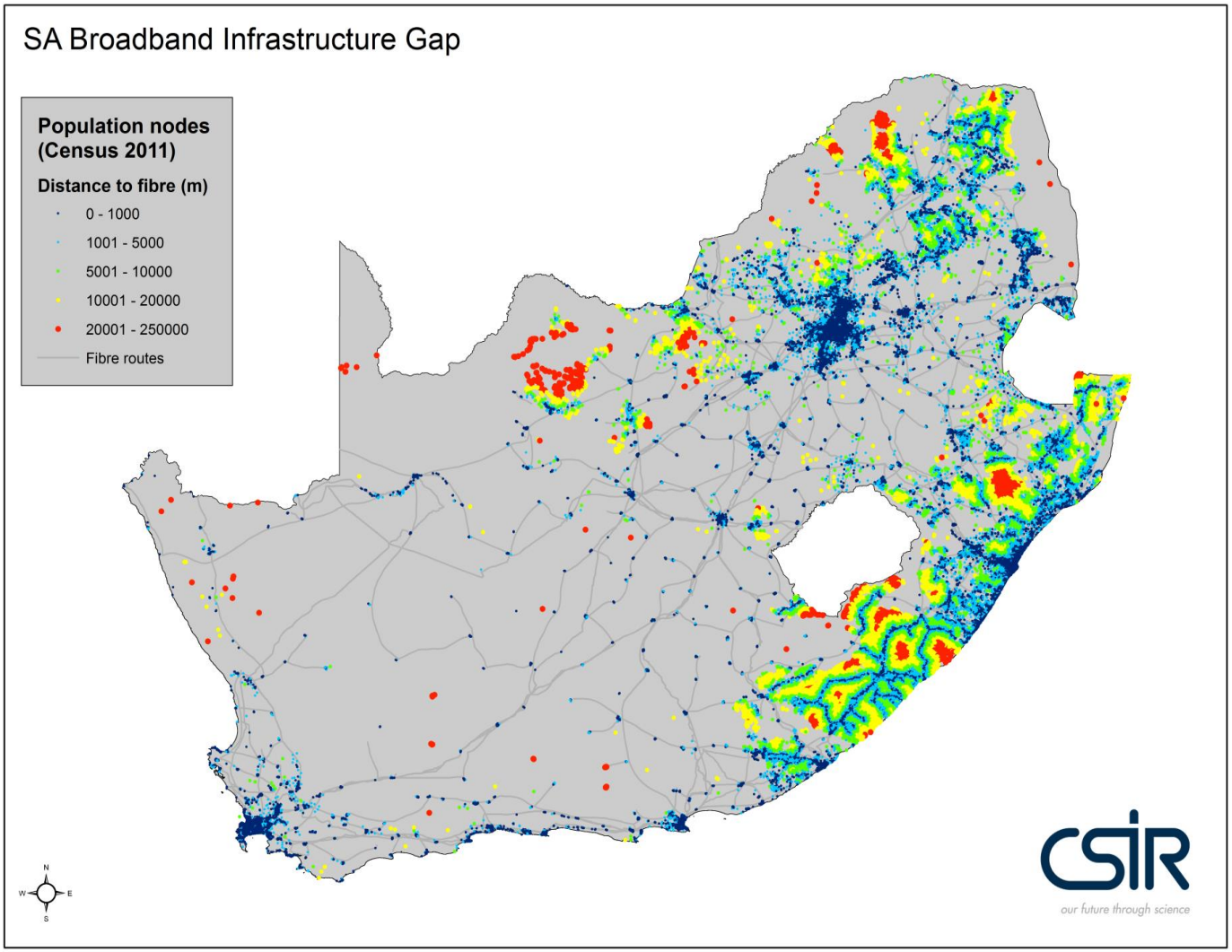
Broadband Infrastructure Gap



Population to fibre lines and nodes:

- 67% in <1km
- 89% in <5km
- 95% in <10km
- 99% in <20km

Fibre nodes only:

- 46% in <1km
- 82% in <5km
- 90% in <10km
- 97% in <20km

How is the infrastructure gap quantified?

- Distance measurement:
  - Gap between geographical points of demand and supply
  - A school with 1000 learners and a roadside farm stall – are they equally important in terms of broadband gap?
- Relative gap:
  - Surveys to determine % of people covered or connected
  - Benchmark areas compared to each other and to the average
  - Costly to conduct

Introducing a new indicator

- Weighted gap: Distance multiplied by number of people affected
  - Unit of “Kilo-people kilometre” or k-people.km
  - “Work to be done” – For every person how many km of connection?
  - Normalised by total number of people, gives average gap distance
- Examples
  - A village at 4 km from fibre with 8 000 people in village, will have 32 k-people.km “work to be done”, average gap of 4 km
  - Two villages – 8 000 people at 4 km and 1 000 people at 32 km, 64 k-people.km “work to be done”, average gap of 7 km
- Combines census data and infrastructure data

Provincial gaps

Province	Weighted Gap (k-people.km)	%	Average Gap
Eastern Cape	25 714	25%	3.92 km
KwaZulu-Natal	23 393	23%	2.28 km
Limpopo	17 265	17%	3.19 km
North West	11 513	11%	3.28 km
Gauteng	5 880	6%	0.48 km
Northern Cape	5 497	5%	4.80 km
Mpumalanga	4 921	5%	1.22 km
Western Cape	3 784	4%	0.65 km
Free State	3 587	4%	1.31 km
South Africa	**101 554**	**100%**	**1.96 km**

Top 10: District Municipality Gap

District Municipality	Largest gap (km)	Weighted Gap (k-people.km)	%	Average gap (km)
1. O.R.Tambo, Eastern Cape	35 656	7 204	7.09%	5.28
2. Alfred Nzo, Eastern Cape	39 789	5 864	5.77%	7.32
3. Capricorn, Limpopo	95 868	5 210	5.13%	4.13
4. Chris Hani, Eastern Cape	35 486	4 203	4.14%	5.29
5. Vhembe, Limpopo	14 588	4 185	4.12%	3.23
6. Ngaka Modiri Molema, North West	40 345	4 093	4.03%	4.86
7. Amathole, Eastern Cape	31 380	4 035	3.97%	4.52
8. Uthungulu, KwaZulu-Natal	72 459	3 735	3.68%	4.12
9. Dr Ruth Segomotsi Mompati, North West	4 758	3 376	3.32%	7.28
10. Mopani, Limpopo	27 412	3 267	3.22%	2.99
Subtotal:			44.48%	
South Africa		**101 554**	**100%**	

Top 10: Local Municipality Gap

Local municipality	Largest gap (km)	Weighted gap (k-people.km)	%	Average Gap (km)
EC: O.R.Tambo - Ngquza Hill	35 656	2 435	2.40%	8.75
LIM: Capricorn – Blouberg	39 789	2 407	2.37%	14.8
NC: John Taolo Gaetsewe - Joe Morolong	95 868	2 318	2.28%	25.9
KZN: Uthungulu – Nkandla	35 486	2 076	2.04%	18.14
KZN: eThekwini – eThekwini	14 588	2 054	2.02%	0.6
LIM: Vhembe – Thulamela	40 345	2 004	1.97%	3.24
EC: Alfred Nzo – Matatiele	31 380	1 977	1.95%	9.7
NW: Dr Ruth Segomotsi Mompati - Kagisano/Molopo	72 459	1 852	1.82%	17.51
GT: Ekurhuleni – Ekurhuleni	4 758	1 750	1.72%	0.55
EC: O.R.Tambo – Mhlontlo	27 412	1 664	1.64%	8.85
Subtotal:			20.22%	
South Africa		**101 554**	**100%**	

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Fibre reach

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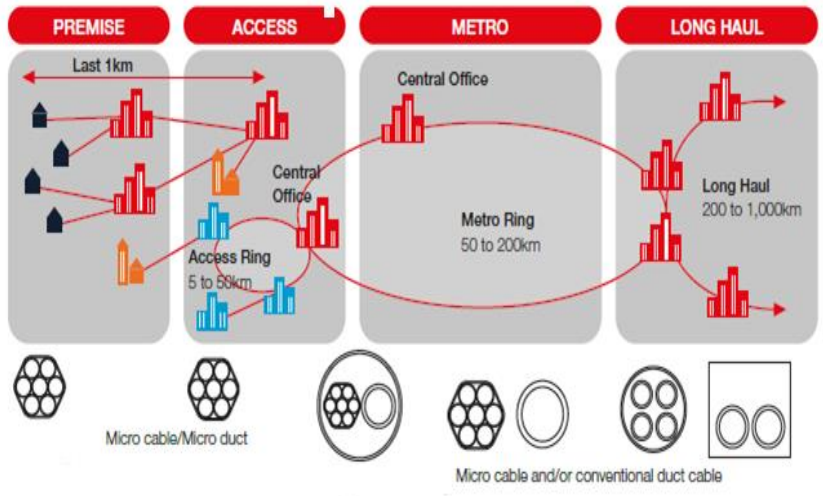
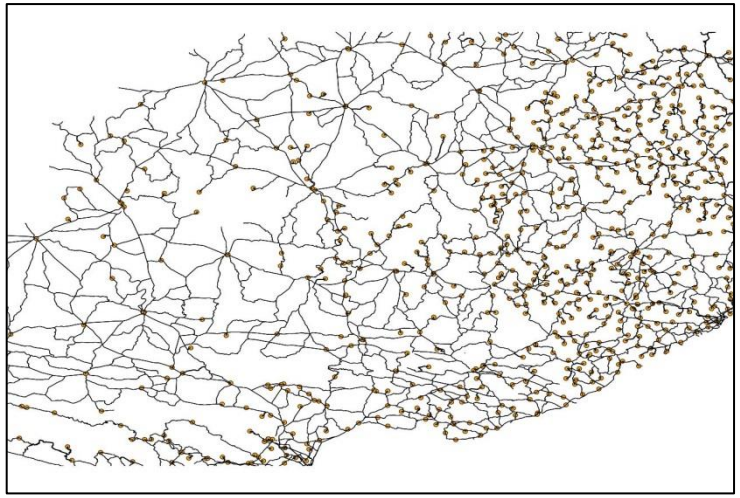
Broadband = Fibre?



- Cost of fibre deployment
  - More than 70% of cost in civil works
  - Cost can vary from R80/m to R800/m
- Core network
  - Long haul / Metro fibre
  - Sometimes microwave and free-space optical links
- Access network
  - Fibre-to-the-Home (FTTH)
  - Fiber-to-the-Curb/Cabinet (FTTC)
  - Digital subscriber line (xDSL)
  - Fibre-to-the-Tower (FttT)
  - Broadband wireless

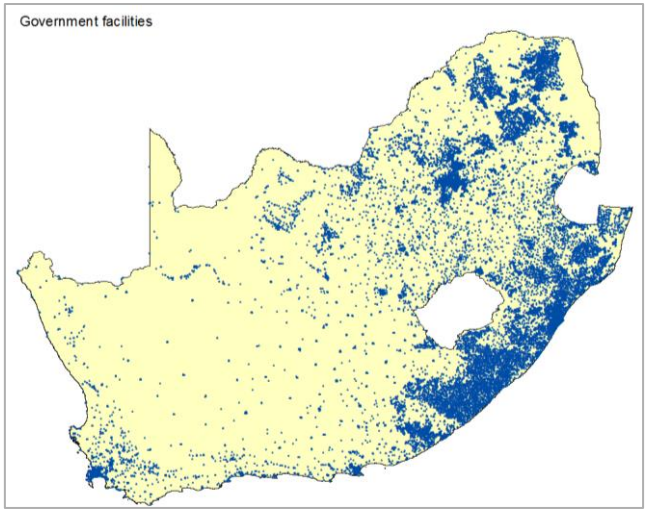
Fibre route planning

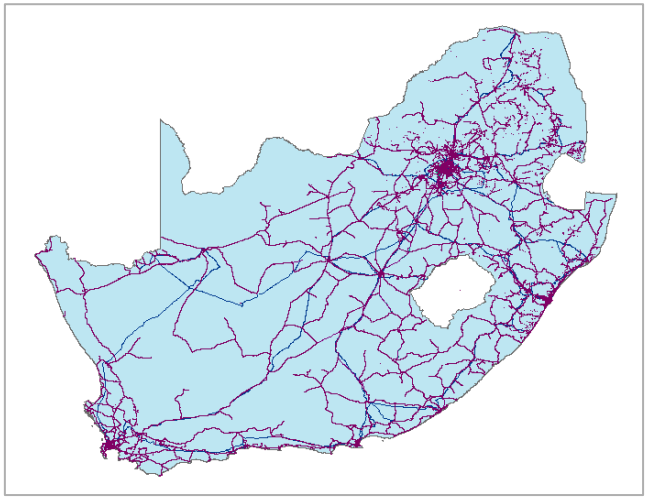


How many kilometres of fibre to close the gap?

- Starting point(s)
  - Clean sheet; or
  - Existing fibre footprint – lines or nodes
- End point(s)
  - District / Local Municipality Point-of-Presence (PoP); or
  - Mesozone or Census area (centroids); or
  - Dwelling?
- Include-along-the-way
  - Anchor users; and/or
  - Key distribution sites, e.g. broadband wireless towers
- Routing
  - Straight line; or
  - Follow-the-road / rail / power line / servitudes

Input data

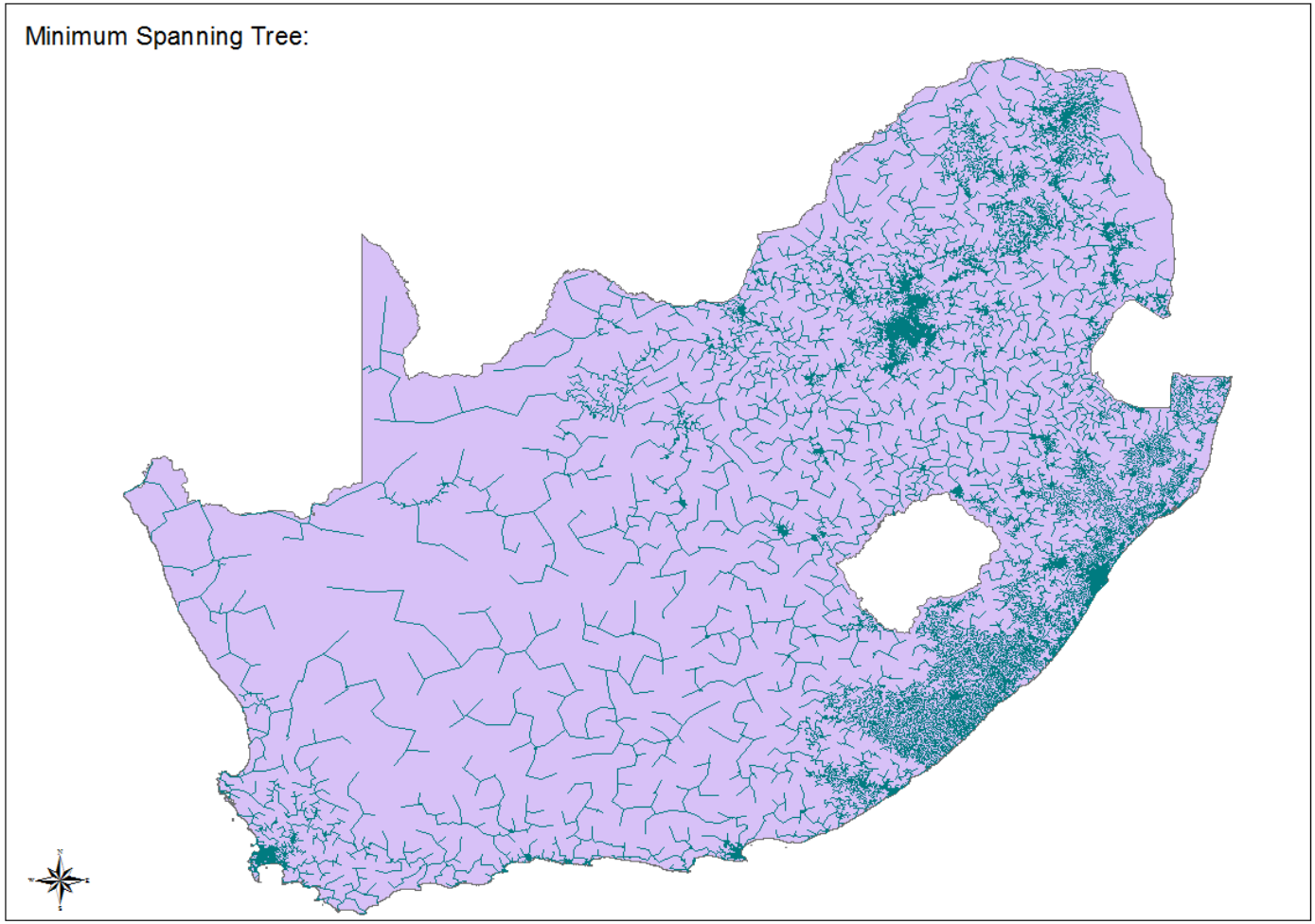




Quality of plans dependent on input data

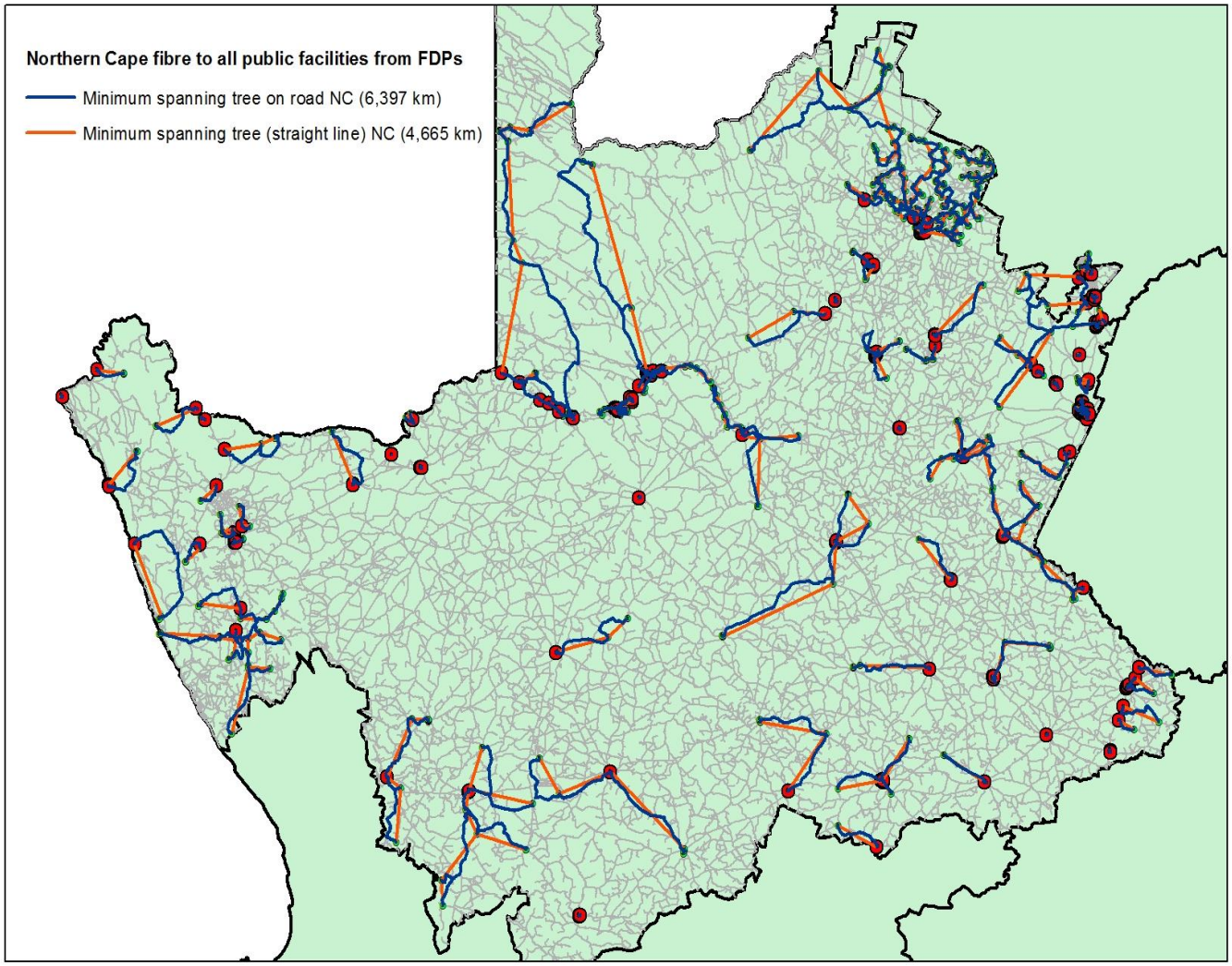
- Census (2011) data
  - Population and statistics per enumeration area
  - Centroid
- Anchor user sites
  - Universities, Further Education and Training sites
  - Schools, Clinics, Government facilities
- Existing infrastructures and servitudes
  - Roads, railway, power lines, pipe lines
- Operator data
  - Covered under non-disclosure agreements (NDA)
  - Fibre routes and nodes

Clean-sheet Minimum-spanning-tree



Total of 159 000 km of fibre routes to connect all settlements, i.e. if we had nothing in place

Straight line versus road



Extensions from existing fibre nodes

Straight line vs road factor (for NC) = 1.37

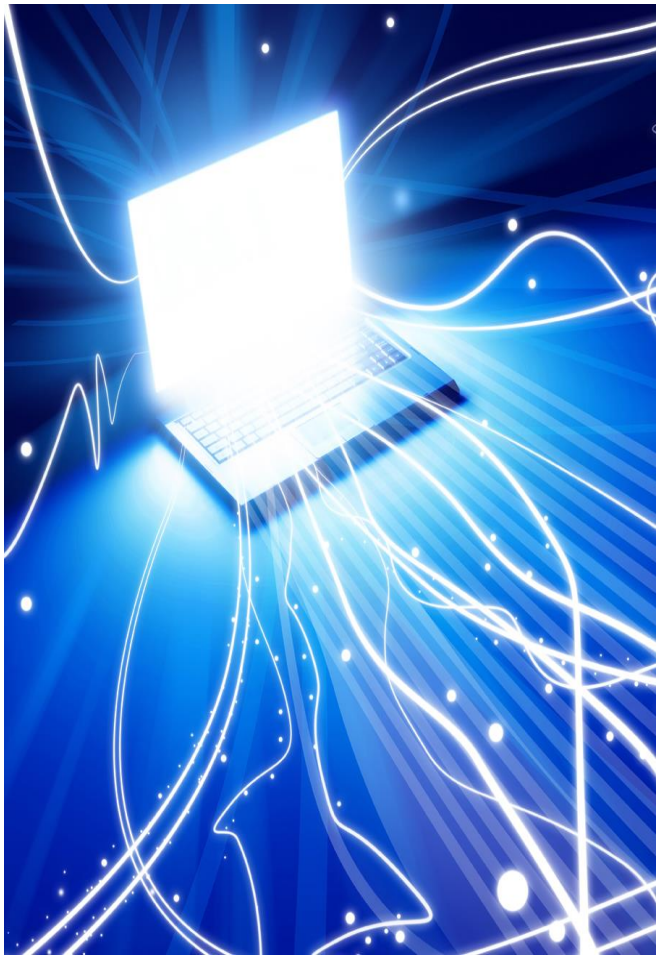
Nationally:

Straight line minimum spanning tree to all facilities from fibre nodes = 61 754 km, or 84 600 km at 1.37 factor

Fibre estimates: Local

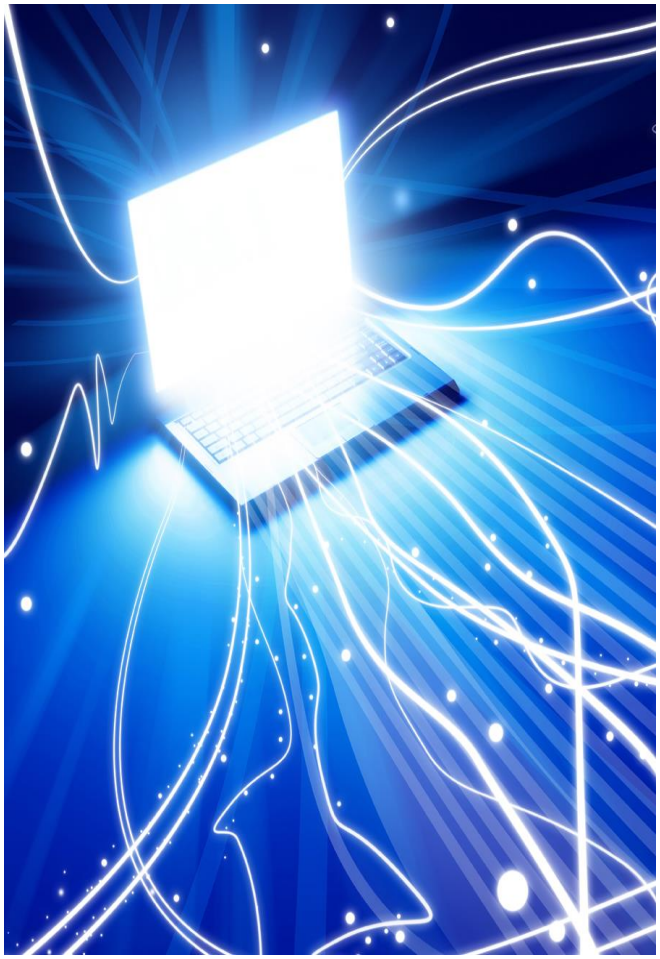
Local Municipality	Minimum Fibre Need (km)	Fibre Present	Weighted Gap (k-people.km)
Ngquza Hill, O.R.Tambo, Eastern Cape	788	9%	2 435
Blouberg, Capricorn, Limpopo	698	10%	2 407
Joe Morolong, John Taolo Gaetsewe, Northern Cape	989	12%	2 318
Nkandla, uThungulu, KwaZulu-Natal	471	1%	2 076
eThekwini, KwaZulu-Natal	1 888	185%	2 054
Thulamela, Vhembe, Limpopo	957	29%	2 004
Matatiele, Alfred Nzo, Eastern Cape	682	13%	1 977
Kagisano/Molopo, Dr Ruth Segomotsi Mompati, North West	1 065	7%	1 852
Ekurhuleni, Gauteng	1 551	271%	1 750
Mhlontlo, O.R. Tambo, Eastern Cape	756	21%	1 664

Summary



- Broadband is important
- Infrastructure gap maps
- Introduced “k-people.km” gap indicator
  - SA’s current gap = 101 544 k-people.km
- Gap analysis – provincial, local
- Closing the gap – fibre routes
  - SA’s fibre footprint requirement = 159 000 km
  - SA’s fibre footprint gap estimate = 84 600 km
- Way forward
  - Continuously update data
  - Review and improve models
  - Roll out broadband!

Acknowledgements



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Thank you

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