

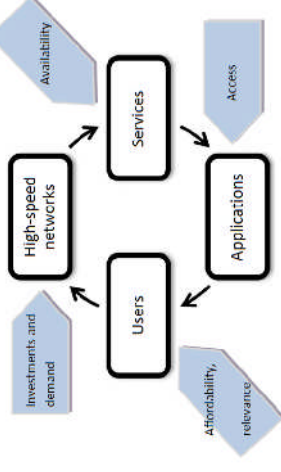
# Overcoming barriers to universal access to broadband in Nepal

Colin Oliver

## Key issues

- Big picture - broadband as a national priority
  - Networks, services, applications, users
- Actions to match the context - what are the priorities in the stage we are at right now
- How far will the market reach?
  - What is needed for a fully effective market?
  - Will some areas remain unserved by commercial services in a fully effective market?
  - If so, what incentives and strategies would best extend the reach of services to those areas?

Nygaard-Klein, Tina Kelle & Sahlström, Ulf. *Building broadband: Strategies and policies for the developing world*, January 2010



Big picture thinking - the 'broadband ecosystem'

## Telecoms & aid programs



- World Bank began operations in Nepal in 1969 with a telecommunications project credit
- Telecommunications now seen as a commercial business - but still some focus continues on enabling frameworks and digital literacy

## Communications density & growth in Nepal

	2009	2010	% population	% growth
Fixed telephone	818526	641688	3%	3%
Mobile telephone	6286642	9185562	31%	46%
Other telephony	240841	604,206	2%	150%
Data/internet	703,782	1,902,761	6%	170%

Source: Nepal Telecommunications Authority, Management Information System, January 2010 & January 2011

## Wireline and wireless broadband penetration

Region	Wireless broadband	Wireline broadband
East Asia & Pacific	9.7	8.1
Eastern Europe & Central Asia	5.3	7.1 %
European Union (EU-27)	36.5	24.0
Latin America & Caribbean	3.4	5.7
Middle East & North Africa	5.1	2.5
North America	34.0	28.5
South Asia	0.1	0.5 (0.6 %)
Sub-Saharan Africa	1.7	0.2
World	8.6	7.0

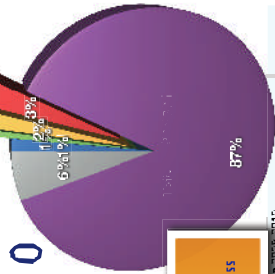
Source: World Bank, Building Broadband, 2010

- Wireless broadband usually more prevalent than wireline\*,
- but fibre optic networks moving closer to users
- Countries need to consider their strategic goals
- Regulators need to beware of counter-productive intervention, standards and rule-making

# Data/internet services

## Nepal 2010

- Dial-up (PSTN + ISDN)
- Wireless modem, Optical fibre, Ethernet
- Cable modem, Cable etc
- ADSL
- GPRS
- CDMA 1X

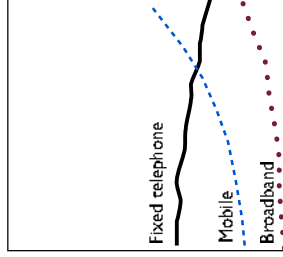


- About 6% of all data/internet services are broadband
- Opportunities for both wireline and wireless broadband growth

Services	MOCL	UTL	SNPL	ISPs	Total
Wireless modem, Optical fibre, Ethernet	-14.50%			3.17%	0.00%
Cable modem, Cable etc				3.17%	3.17%
ADSL	62.13%			3.17%	82.19%
GPRS	453.05%		190.01%		290.45%
CDMA 1X	27.51%	40.48%			31.60%
<b>Total</b>	<b>225.22%</b>	<b>40.48%</b>	<b>190.01%</b>	<b>3.17%</b>	<b>170.36%</b>

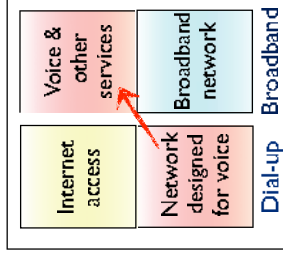
# The revenue base is changing

- Fixed telephone revenue is declining.
- Mobile revenue is growing (and has already overtaken fixed phone revenue in many markets).
- Broadband revenues are growing

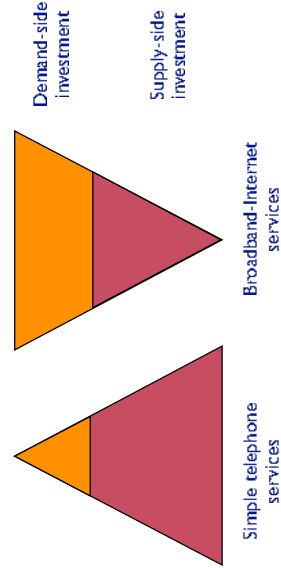


# The technology base is changing

- Dial-up internet: the internet rides on the fixed network.
- Mobile internet: the internet rides on the mobile network
- In a next generation/ broadband environment, telephony rides on the data network
- ... a commercial challenge for network operators



# The investment balance is changing



(Applies to business networks - and also to small remote users - question of sustainability)

# Doing Business

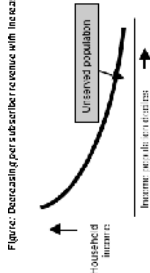
# Business networks

- Business users want diversity of supply
  - ★ Two contracted suppliers, but
  - ★ Two choices are not enough
- Business users want one supplier to cover multiple locations
  - ★ Too many suppliers are hard to manage
  - ★ Too many obstacles in one place means going somewhere else
- Fixed networks remain fundamental for enterprise networks
  - ★ Voice and video conferencing
  - ★ Common "look and feel" in each office
- Business users provide strong take-up centres
  - ★ Revenues in cities and regional or remote centres
  - ★ Household users follow



## Rural service revenues - lessons learned from mobile

- 3-5% spend of incomes
- Rural institutions
- Urban-based travellers
- Calls from relatives or friends after 'call me'
- Rural-based calls from pre-paid phones topped up by others
- What about broadband?



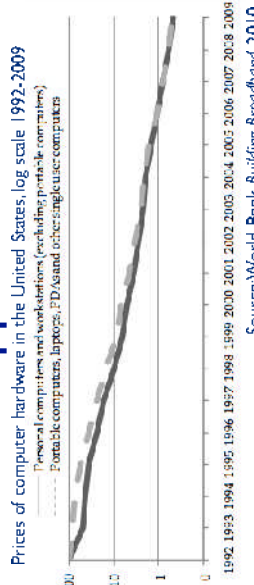
Source: ITU member ICT Regulation Toolkit. © Mobile

## Affordability of selected services per capita national income = USD 447 (ADB, 2010)

Service	Speed	Download limit (MB)	Computer price	Mobile phone price	Initial connection cost (\$)	Monthly fee (\$)	Regular connection over three months (\$)	Connection cost per year (USD)	Connection cost as % of per capita national income
Half-rate backhaul	8000	0	0	26	00	00	US\$2	0.47%	
Basic mobile phone	3000	0	12	00	00	00	US\$23	5.2%	
Basic computer	4,000	500	300	000	3,000	000	US\$3,600	80.0%	
Basic internet	50,000	50,000	61	000	1,000	000	US\$1,061	2.4%	
Basic computer and internet	50,000	50,000	226	000	1,000	000	US\$1,226	2.7%	
Basic mobile phone and internet	3,000	3,000	27	000	1,000	000	US\$1,027	2.3%	
Basic computer, mobile phone and internet	4,000	4,000	287	000	1,000	000	US\$1,287	2.9%	
Basic mobile phone and computer	3,000	3,000	326	000	1,000	000	US\$1,326	3.0%	
Basic computer and mobile phone	4,000	4,000	361	000	1,000	000	US\$1,361	3.0%	
Basic mobile phone, computer and internet	3,000	3,000	326	000	1,000	000	US\$1,326	3.0%	
Basic computer, mobile phone and internet	4,000	4,000	387	000	1,000	000	US\$1,387	3.1%	
Basic mobile phone, computer and internet	3,000	3,000	361	000	1,000	000	US\$1,361	3.0%	
Basic computer, mobile phone and internet	4,000	4,000	426	000	1,000	000	US\$1,426	3.2%	
Basic mobile phone, computer and internet	3,000	3,000	461	000	1,000	000	US\$1,461	3.3%	
Basic computer, mobile phone and internet	4,000	4,000	526	000	1,000	000	US\$1,526	3.4%	
Basic mobile phone, computer and internet	3,000	3,000	561	000	1,000	000	US\$1,561	3.5%	
Basic computer, mobile phone and internet	4,000	4,000	626	000	1,000	000	US\$1,626	3.6%	
Basic mobile phone, computer and internet	3,000	3,000	661	000	1,000	000	US\$1,661	3.7%	
Basic computer, mobile phone and internet	4,000	4,000	726	000	1,000	000	US\$1,726	3.9%	
Basic mobile phone, computer and internet	3,000	3,000	761	000	1,000	000	US\$1,761	3.9%	
Basic computer, mobile phone and internet	4,000	4,000	826	000	1,000	000	US\$1,826	4.1%	
Basic mobile phone, computer and internet	3,000	3,000	861	000	1,000	000	US\$1,861	4.2%	
Basic computer, mobile phone and internet	4,000	4,000	926	000	1,000	000	US\$1,926	4.3%	
Basic mobile phone, computer and internet	3,000	3,000	961	000	1,000	000	US\$1,961	4.4%	
Basic computer, mobile phone and internet	4,000	4,000	1,026	000	1,000	000	US\$2,026	4.5%	
Basic mobile phone, computer and internet	3,000	3,000	1,061	000	1,000	000	US\$2,061	4.6%	
Basic computer, mobile phone and internet	4,000	4,000	1,126	000	1,000	000	US\$2,126	4.7%	
Basic mobile phone, computer and internet	3,000	3,000	1,161	000	1,000	000	US\$2,161	4.8%	
Basic computer, mobile phone and internet	4,000	4,000	1,226	000	1,000	000	US\$2,226	5.0%	
Basic mobile phone, computer and internet	3,000	3,000	1,261	000	1,000	000	US\$2,261	5.1%	
Basic computer, mobile phone and internet	4,000	4,000	1,326	000	1,000	000	US\$2,326	5.2%	
Basic mobile phone, computer and internet	3,000	3,000	1,361	000	1,000	000	US\$2,361	5.3%	
Basic computer, mobile phone and internet	4,000	4,000	1,426	000	1,000	000	US\$2,426	5.4%	
Basic mobile phone, computer and internet	3,000	3,000	1,461	000	1,000	000	US\$2,461	5.5%	
Basic computer, mobile phone and internet	4,000	4,000	1,526	000	1,000	000	US\$2,526	5.6%	
Basic mobile phone, computer and internet	3,000	3,000	1,561	000	1,000	000	US\$2,561	5.7%	
Basic computer, mobile phone and internet	4,000	4,000	1,626	000	1,000	000	US\$2,626	5.9%	
Basic mobile phone, computer and internet	3,000	3,000	1,661	000	1,000	000	US\$2,661	6.0%	

Mobile only - 4-8% only

## User opportunities



Source: World Bank, Building Broadband, 2010

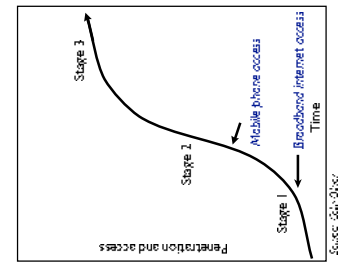
- Falling prices for user devices
- Innovative offerings from suppliers (e.g., bundling a \$1 notebook or smartphone with subscription)

## Users at large

- Price sensitive - especially first purchase (tax issue) - but consider the mobile phone example.
- Digital literacy and skills needed
- Users need technical support
- Is there unmet demand? (rapid take-up = yes)
- Choices - high speed / mobility - or both?
  - ➔ Wired, mobile or fixed wireless - or a mixture?
- Users create content - upload & download services
  - ➔ For example - remote health services

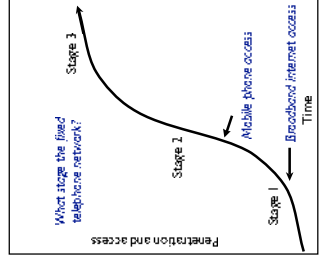
## Stage two has been reached for mobile ...

- ... build on that competitive market to accelerate broadband access
- ... and seek synergy with (wireless) broadband



## Policy options & the 'S curve'

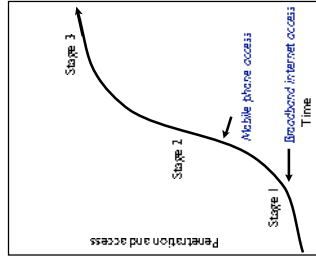
- Stage 1 - limited user capacity, slow take-up, high investment & low return
  - Policy focus - provide enabling environment encourage demand and investment
- Stage 2 - competitive market, rapid take-up
  - Policy focus - encourage strong competition, avoid market distortion
- Stage 3 - mature market, slower growth
  - Policy focus - identify unserved people and areas and consider incentives and special assistance measures



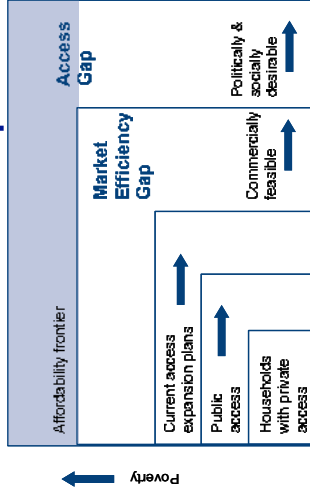
## For developing countries it is not that simple!

- need to get to stage 2 as fast as possible - and explore opportunities to accelerate wider access

- Stage 1 - limited user capacity, slow take-up, high investment & low return
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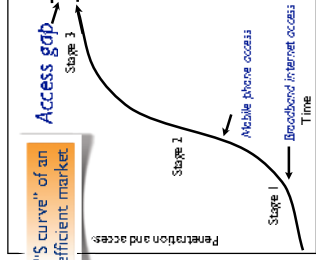


## Access Gap



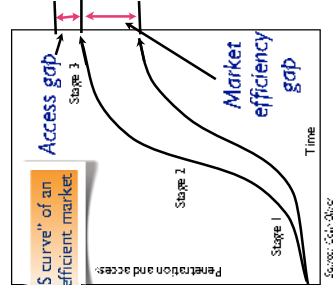
## How to get to stage 2 - and beyond - as soon as possible?

- Stage 1 - limited user capacity, slow take-up, high investment & low return
  - ☑ Policy focus - provide enabling environment, encourage demand and investment
- Stage 2 - competitive market, rapid take-up
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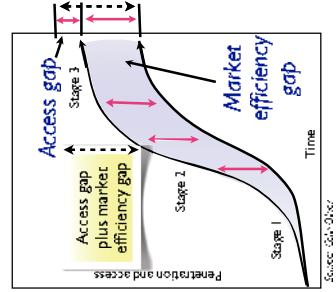
## If investment and demand are held back what is the consequence?

- Stage 1 - limited user capacity, slow take-up, high investment & low return
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## If investment and demand are held back what is the consequence?

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## Think of the gap as ...



- Reduced growth for the country and businesses (measured in economic terms).
- Lost opportunities for people to benefit from the jobs, education, health, social and other benefits that come from access to broadband.



The challenge - to avoid market distortion and other barriers to growth ...

... while building opportunities for people in unserved areas

In other words -

don't miss the chance to get the best out of 'stage two' when private sector investment is flowing and enabling increased access to services.

## Reform first

- Regulatory reform, especially competition, accelerates achievement of universal access
  - regulatory reform is key first step in universal access policy
- Implementing universal service/access policies in uncompetitive or badly regulated markets is highly ineffective (e.g., higher subsidy costs)
- Key elements include: ⇒
  - ✓ Modern regulatory framework (addressing convergence) & civil works
  - ✓ Effective regulator
  - ✓ Effective regulation of competition including unfair practices, market dominance & interconnection
  - ✓ Spectrum allocation reform
  - ✓ Technology & service neutral licensing
  - ✓ Open access to essential facilities and international gateways
  - ✓ Taxes, import duties & fees



## Building blocks

Which measures best suit the situation in Nepal?



## Stage One - Supply-side Policies

- Reduce entry regulations to facilitate competition
- Adopt radio spectrum policies to facilitate wireless service
- Government support for national backbone construction -
  - including international, domestic backbone and subscriber access network
- Take strong measures to reduce investment costs - especially civil works (around 70% of costs)
  - Require non-discriminatory access to passive infrastructure
  - Eliminate or streamline regulatory requirements to minimise costs & maximise competitive supply of consumer devices



## Stage One - Demand-side Policies

- Promote digital literacy
- Consider measures to make user equipment more affordable (tax reduction, removal of redundant regulatory burdens, financial assistance, subsidy for standardised equipment)
- Government to anchor online services and encourage creative developments
- Encourage business use of broadband and electronic commerce
- Encourage aggregation of demand in areas at the frontiers of commercial development (in stage one this requires consideration of risks and independent advisors)
- Building/development certification of 'broadband readiness' - for buildings, trenching etc.



## Stage 2 - facilitate competition and growth with consistent oversight

- ✓ Support effective competition from new market entrants.
- ✓ Support both facility and service-based competition - may include new backbones, competing technologies (wireless vs wireline), competing business models, competing service bundles.
- ✓ Regulate unfair practices.
- ✓ Continually update regulator's capacity to deal with issues arising from rapid change and convergence.
- ✓ Light-handed regulation to avoid market distortion.

### Stage 3 - focus on widespread diffusion as broadband market grows

- Expand universal service programs to include broadband
- Identify and maximise incentives for commercial coverage of under-served areas
- Review regulatory requirements on operators for commitments to coverage and service provision
- Consider financial support for network rollout in the most challenging rural and underserved areas
- Develop digital inclusion programs such as targeted subsidies for remote areas and schools, training programs for under-served people groups

### Progress of telephone and broadband access



- Penetration of fixed broadband in the developing world is already where it was with fixed telephony in the 1980s.
- Similar opportunities to benefit from wireless technologies

✓ Be encouraged !

### Rural development / universal access funds - roles & purposes

- Can be compatible with competition among suppliers - must not undermine competition.
- Can be used to stimulate demand (e.g., skills development, demand aggregation) as well as to support infrastructure investment
- Can be used to subsidise area-based or user-based development

### Advantages of well-run funds and least-cost subsidies

- Transparency and fairness
- Emphasis on least cost solutions
- Provide 'pay or play' in practice - no operator is forced to bid, but all contribute
- Public interest is explicitly served

### Public-private partnerships

- Can work in areas of particular government interest such as backbone development, health, education
- Can arise in cases needing ongoing public support
- Can distort the market - entrenching a particular technology or competitor
- How to minimise risk:
  - consult industry in advance
  - issue technology-neutral tenders
  - break project down into components
  - limit service contracts

### Backbone links & broadband access

- Backbone links are the "broadband highways" that connect cities, towns and rural areas to the wider world.
- Can be a crucial bottleneck for broadband access
- Access to competitive backbone infrastructure on an open access, equivalent basis allows retail broadband providers to expand further into regional areas.
- *Question:* build, duplicate or buy?

## Open access with equivalent treatment

- Many services can be supplied by competitive retailers over common broadband backbone and access networks.
- Key issue is access to the wholesale service on fair and equivalent terms.
- Remedies involve getting the right combination of
  - strong competition regulation and
  - structural or functional separation of the wholesale service
- The outcome should be transparent and equal treatment of all retail services.
- Examples: Britain, Singapore, Australia

## Backbone links & broadband access

- Australia's regional backbone blackspots program covered areas not served by commercial carriers and aims to improve regional broadband competition and services.
- Funding of \$250 million and competitive tender led to 2009 selection of Next-gen Networks to build & operate 6000 km additional backbone.
- The program will benefit about 400 000 people across six states and territories, in more than 100 regional locations
- The project is now two thirds complete (4000 km).

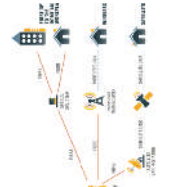


## April 2009 announcement

- The Australian Government to establish a company to invest up to \$43 billion over the next eight years to build and operate an open access wholesale National Broadband Network.
  - Initial investment \$4.7 billion in partnership with private sector
  - fibre optic to the home and workplace,
  - supplemented with next generation wireless and satellite technologies
- Consultation on regulatory change

## National Broadband Network

- The Australian Government established NBN Co to build and operate the National Broadband Network with the objective of providing up to 100 Mbps to 93% of homes schools & businesses.
  - Remaining premises to be served by wireless or satellite and peak speeds of at least 12 Mbps.



## Recent developments

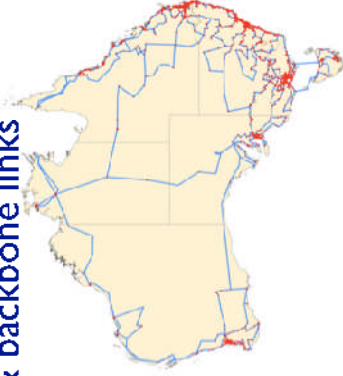
- Implementation Study, Business Case and Corporate Plan completed for National Broadband Network - summaries released.
- Backbone construction underway.
- Telstra-NBN Co agreement for Telstra to migrate its customers and give NBN Co access to its ducts, poles and other infrastructure.
- Legislation for supporting competition reforms - and to ensure NBN Co provides wholesale-only, open and equivalent access.
- New arrangements to accelerate fibre in new developments commenced January 2011.

## Key financials ...

- Estimated total capital expenditure \$35.9 billion
- Government expects to contribute \$27.5 billion in equity for the rollout
- NBN Co's expected internal rate of return is 7%
- Anticipated wholesale access pricing to start from \$24 monthly (fibre, wireless or satellite) for peak speed of 12 Mbps (download) and 1 Mbps (upload) - rising (fibre only) to \$150 per month for 1000/400 Mbps

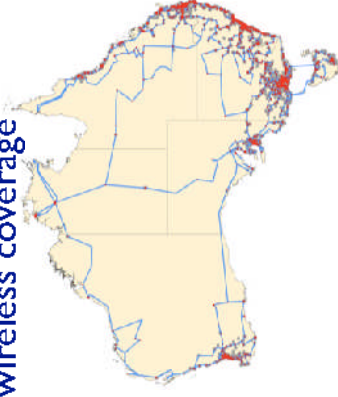
Source: Australian Government National Broadband Network Progress Update, December 2010

93% population fibre coverage  
& backbone links



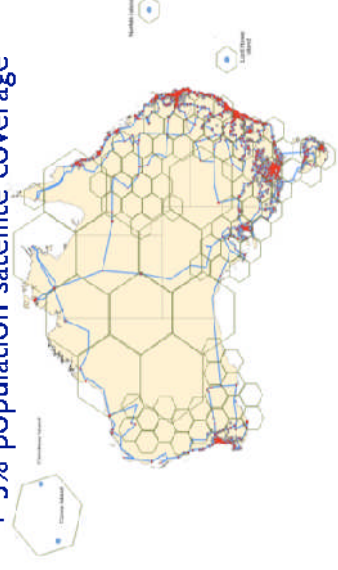
Source: NBN Co. Business Case Summary, November 2010

93% fibre + 4% population  
wireless coverage



Source: NBN Co. Business Case Summary, November 2010

93% fibre + 4% wireless  
+ 3% population satellite coverage



Source: NBN Co. Business Case Summary, November 2010

## Universal Service Obligation in a broadband environment

- With the June 2010 agreement between NBN Co Limited and Telstra the Government announced a new framework for the Universal Service Obligation and other public interest services.
- A new entity, USO Co, from July 2012 will provide funding for:
  - ensuring all Australians have reasonable access to a standard telephone service (the USO for voice telephony services) and to pay phones (the USO for pay phones)
  - emergency call handling ('000' & '112')
  - National Relay Service
  - migration of voice-only customers to a fibre-based service as Telstra's copper exchanges are decommissioned, and
  - ensuring public interest services continuity (such as public alarm systems, traffic lights).

## Future USO funding

- The USO Co will receive Commonwealth funding of \$50 million in 2012-13 and 2013-14, - \$100 million per annum after that.
- Additional funding will continue to be contributed by industry, with industry and stakeholder consultation on final details.
- Department now reviewing responses to discussion paper on 'Implementation of Universal Service Policy for the transition to the National Broadband Network environment'.

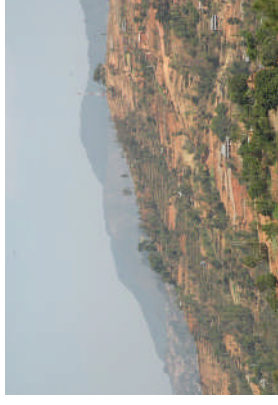
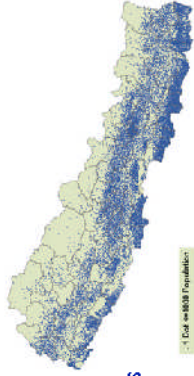
## Review of key issues

- Big picture - broadband as a national priority
  - Networks, services, applications, users
- Actions to match the context - what are the priorities in the stage we are at right now
- How far will the market reach?
  - What is needed for a fully effective market?
  - Will some areas remain unserved by commercial services in a fully effective market?
  - If so, what incentives and strategies would best extend the reach of services to those areas?



## Important note

- Useful lessons from others **BUT**
- No one-size fits all solutions
- Every country is unique
- Solutions need to be based on each country's circumstances, resources & goals
- The challenge is to be *visionary and realistic*.



Thank you for your attention