



## Caring for the Last 3%

Telehealth Potential and Broadband Implications for Remote Australia


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### Overview

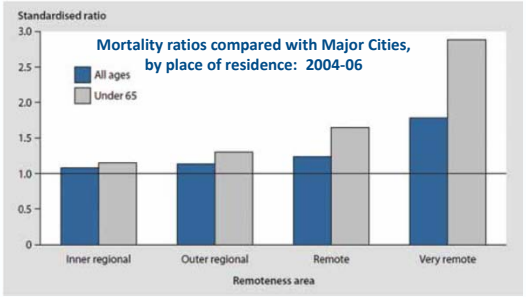
- Health Outcomes: urban vs remote Australia
- Broadband to remote Australia
  - Options & key features
- Telehealth Services over Broadband
  - What makes a telehealth service
  - What will work over satellite: a Framework
  - Examples



## The Health Gap between Urban and Remote Australia




### People in Rural Australia have higher mortality rates...



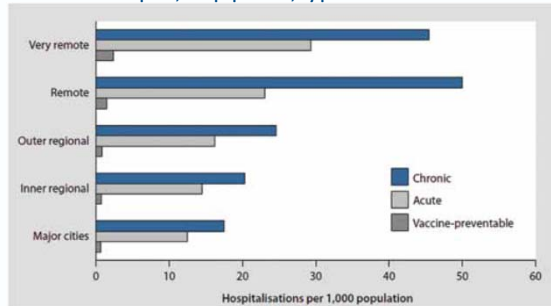
Remoteness area	All ages	Under 65
Inner regional	~1.1	~1.2
Outer regional	~1.2	~1.4
Remote	~1.3	~1.7
Very remote	~1.8	~2.9

Source: National Strategic Framework for Rural and Remote Health 2012, ARHW (2010), Australia's health 2010



more hospital admissions...

Admissions per 1,000 population, by place of residence 2007-8



Source: National Strategic Framework for Rural and Remote Health 2012, AIHW (2010b), Australia's Health 2010



and less access to Health Services (2006-7)

Health Care Professionals, per 100,000	Major Cities	Very remote areas
Generalist Medical Practitioners	58	196
Registered Nurses	589	978
Allied Health Workers	64	354

Services Received, by Place of Residence vs major cities (2006-7)

Service Type	Inner Regional	Outer Regional	Remote	Very Remote
MBS GP services	84%	79%	71%	54%
MBS Specialist services	74%	59%	38%	30%
MBS allied health services	75%	45%	24%	9%

Source: National Strategic Framework for Rural and Remote Health 2012, AIHW (2010b), National Rural Health Alliance Fact Sheet 23



Broadband to Remote Australia



National Broadband is Coming

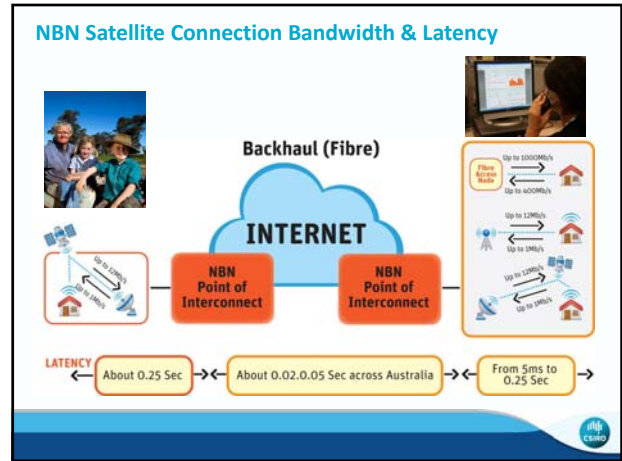
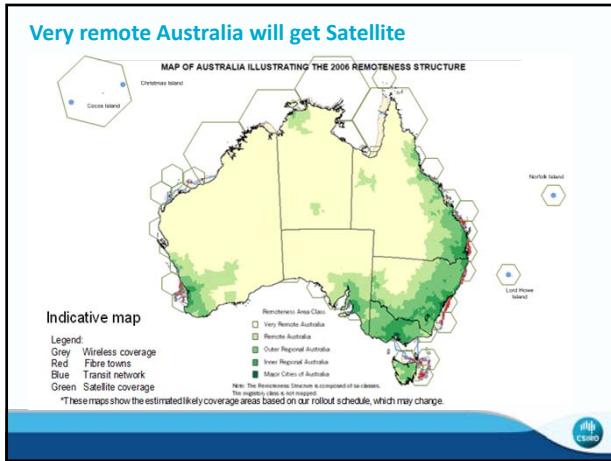
- NBN goal is for every Australian premises to have access to high speed Broadband
- 93% Optical Fibre, (most urban)
- 4% Fixed Wireless
- 3% Satellite

	Estimated Resident Population	Percentage
Major Cities (RA1)	15,449,335	69.20%
Inner Regional (RA2)	4,327,143	19.38%
Outer Regional (RA3)	2,028,317	9.08%
Remote (RA4)	326,764	1.46%
Very Remote (RA5)	192,374	0.86%



Source: Adapted from ABS (2011), Estimated Resident Population by Remoteness Structure







### What's the Impact?

- Bandwidth
  - How many lanes
  - Speed limit
- Latency
  - How long is the road
  - Getting on and off
- Architecture
  - Everything goes through cities

### Satellite Latency

- 3 elements of latency
  - Coding: Preparation for transmission
  - Travel to satellite & back
  - Decoding
  - 1 sec latency common, but improving
- Communications usually Geosynchronous
  - Orbit at 36,000 km to match rotation
  - Speed of light travel time ~0.25s
  - LEOS lower, but need multiple satellites
- Human reaction time is 250ms

### What happens when latency gets too high...



### Telehealth Services over Broadband




### What makes a Telehealth Service?


Communication elements combined for a purpose:

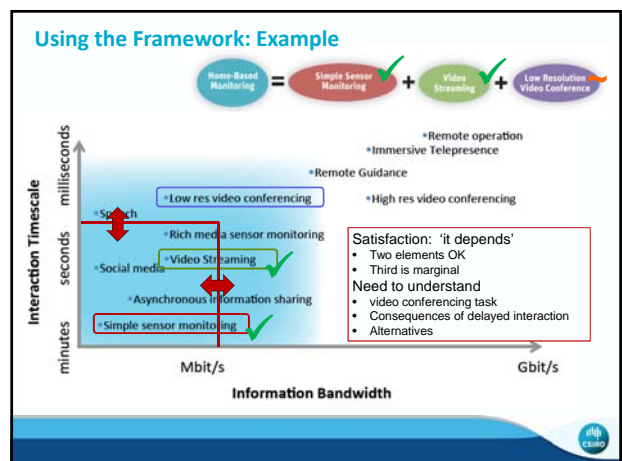
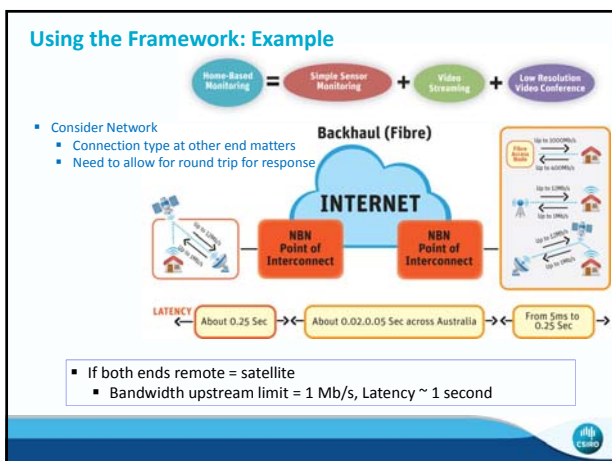
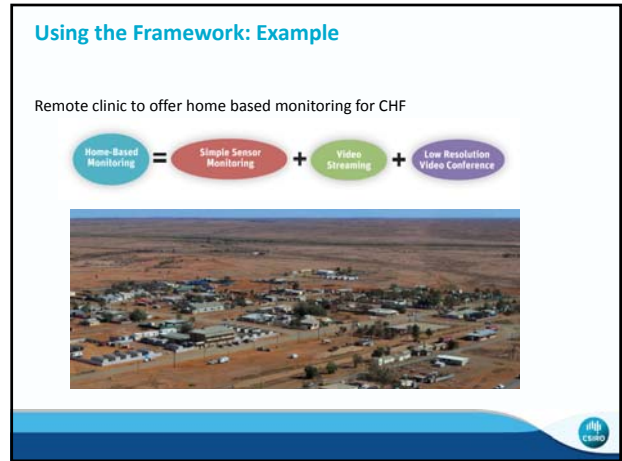
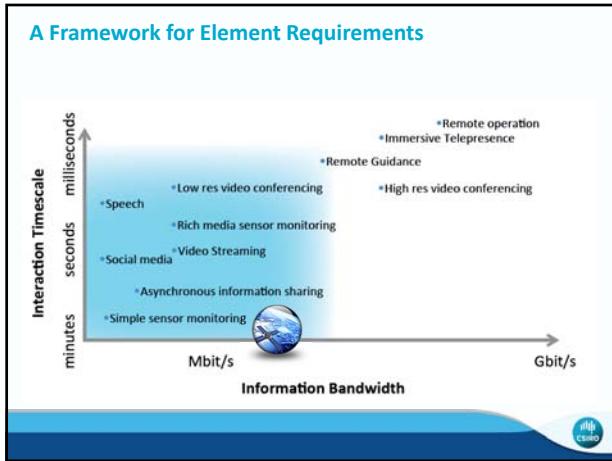
- Speech
- Social media
- Asynchronous information sharing (store & forward)
- Simple sensor monitoring
- Rich media sensor monitoring
- Video Streaming
- Video conferencing
  - Low resolution (standard)
  - High resolution
- Remote guidance
- Immersive telepresence
- Remote operation

### Telehealth Service Elements Examples

- Teleconsultation = Low Resolution Video Conferencing
- Home-Based Monitoring = Simple Sensor Monitoring + Video Streaming + Low Resolution Video Conference
- Offline Consultation = Asynchronous Information Sharing + Video Conferencing
- Remote Practical Training = Remote Guidance + Video Streaming + Low Resolution Video Conferencing
- Telesurgery = Remote Operation + Immersive Telepresence





*"More Like A Set of Guidelines..."*

- Limits not black & white → satisfaction
- Bandwidth will change over time
  - Technology is moving fast: more will be available
  - Elements will use more as available
- New elements will appear with innovation
- Interaction timescales will move less
  - The speed of light is not going to change
  - Neither is human reaction time



**Call to Action**

- Satellite is available now.
- There are satellite-proof services that could be rolled out now (store & forward): **address barriers to deployment**
- There are services near the edge: **explore through research and development**
- Some services challenge the laws of nature: **walk away**



**Thank you**

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