



# A Network for Australian Education Training and Research

## Communications and the Digital Education Revolution

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## A little history

- A network linking Australian schools, VET institutions and universities was first proposed by the Federal Government in 1995 as part of the Education Network Australia initiative
    - in part motivated by a desire to extend the benefits AARNet already provided to universities to other education sectors
  - It did not proceed essentially because it coincided with the development of whole of State telecommunications arrangements
  - In 2002 the Government made a decision to invest \$42 million (later increased to over \$80 million) to create the Australian Research and Education Network (AREN)
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## Rationales

- In 1995 Government could see the potential importance of ICT in education and research and the importance of connectivity to deliver that potential
  - but right at the start of the widespread adoption of TCP/IP and the development of the web it was not a particularly high profile issue
- By 2002 it was clear the ICT was central to research and that Australian researchers must have access to high speed, affordable connections with each other, with remote data and instruments and with the world
- It was also apparent that ICT would become central to the processes of teaching and learning and the AREN funding was intended to provide a basis for the creation of a network supporting all education sectors
- But the latter issue was still not a high priority policy matter



## Which brings us to ...

- The Government's Digital Education Revolution (DER) represents a major change in policy priority
- The Government's overall education policy is based on the understanding that a high quality education system is crucial to macro-economic competitiveness
- And the DER policy is based on the understanding that there must be a step change in the availability and use of ICT in teaching and learning, as a key part of delivering that high quality system
- And within that general proposition, provision of high speed connectivity is essential





## Digital Education Revolution – Commonwealth Funding

- Investment of \$2.2 billion – for all secondary schools over six years (2008-2013) to improve student access to world class ICT.
- Five key policy elements:
  - National Secondary School Computer Fund - \$2.1 billion over five years;
  - \$10 million over three years to develop support mechanisms for schools.
  - Fibre Connections to Schools - \$100 million;
  - \$32.6 million over two years for online curriculum tools, resources and supporting technical frameworks; and
  - Professional Development for teachers on ICT.



## What the DER is about

- The DER represents a major new investment by the Commonwealth Government
  - It builds on investments made by the States and Territories and by the Catholic and Independent sectors
  - Through the Council of Australian Governments a strategic plan for implementation of the DER has been developed (<http://www.deewr.gov.au/Schooling/DigitalEducationRevolution/Documents/DER%20Strategic%20plan.pdf>)
  - This integrates the Commonwealth's new investment and existing activities into an overall vision for the DER
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## Where we want to get to

- All students have personal access to an appropriate information access and/or computing device in all areas of learning
- Teachers devise student centric programs of learning that address agreed curriculum standards and employ contemporary learning resources and activities.
- Students engaged in rigorous and stimulating programs of learning that meet their individual needs and prepare them for success in 21st Century
- Courses and resources are available anywhere, anytime
- Parents able to view student programs and progress at anytime online and communicate with teachers and school leaders
- Students and teachers routinely collaborate, build and share knowledge using digital technologies – blogs, file sharing, social networking, videoconferencing, etc.
- Students and teachers are able to innovate in their use of ICT to achieve learning outcomes.
- School leaders routinely plan at the school and system level for ongoing improvement enabled by ICTs



## Key contributions of the Commonwealth's investment

- The Commonwealth's \$2 billion investment is intended to ensure that
  - o All senior secondary students have access to powerful computing resources
  - o All schools are able to communicate with each other and with the world at true broadband speeds
  - o All current activities to make computers genuinely useful and powerful contributors to learning are developed within an agreed national framework and produce nationally beneficial results






## National Secondary School Computer Fund - Size of Task

- 2,900 secondary schools across Australia with Years 9 to 12
- 1,001,340 students
- \$2.1 billion distributed across the 2008 – 2013 financial years.



## National Secondary School Computer Fund

- The Commonwealth is providing funding, not provisioning computers.
  - To date the Australian Government has approved funding for over 290 000 computers in almost 2700 secondary schools.
  - All Australian secondary schools have been given the opportunity to apply for funding to reach a 1:2 ratio.
  - The overall aim of the Fund is reach a 1:1 student to computer ratio for Years 9 to 12 by 2011
  - Funds will from now on be distributed on a per capita basis
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## Funding for Effective Deployment

- The Government is providing \$807 million, as part of the \$2.1 billion for the NSSCF, explicitly to assist schools and school systems to effectively deploy computers purchased under the program
- The figure is based on a calculation that \$2,500 per unit is a reasonable Commonwealth contribution to the purchase, deployment and maintenance of a computer over a four year period
- The \$2,500 per unit figure is simply a basis for calculating overall funding
  - There is no expectation that it should drive funding decisions on computer purchase and support at the education authority level or the school level
- The Government recognises that education authorities can achieve significant efficiencies and cost savings through central purchasing arrangements and by offering system wide support services
- The Commonwealth actively encourages all education authorities to investigate such approaches



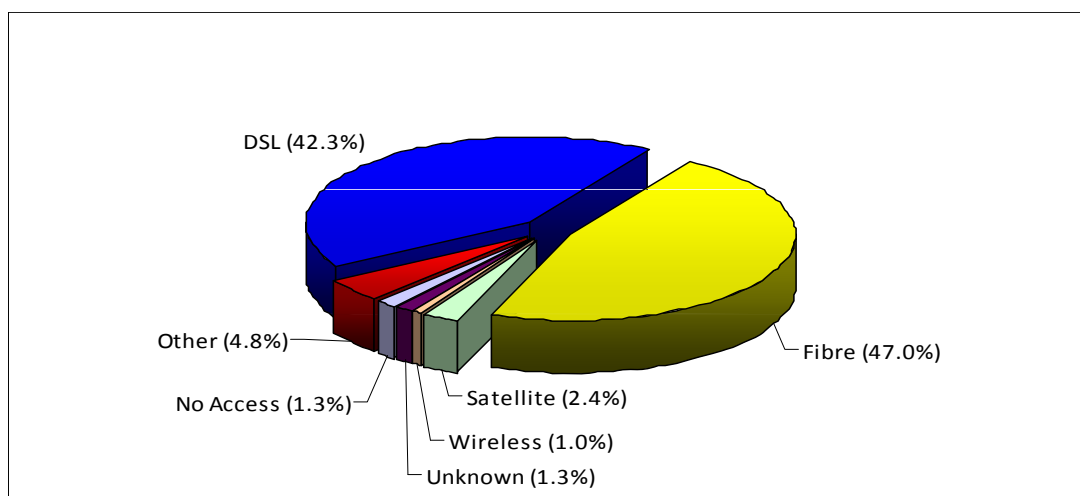
## An example of the impact

- In 2008 NSW Government schools had a ratio of computers less than four years old per student of 1 to 8
  - As a result of DER and NSW funding:
    - every year 9 to 12 student will be provided with a netbook which they will retain
    - the devices will run Windows/Office and a full Adobe suite
    - identity and services will be centrally managed
    - every school will be equipped with a wireless LAN
    - on-site technical support staff will be provided at every school
    - all teachers will be provided with lap tops
    - PD support will be provided
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## Key telecommunications issues

- Most Australian schools do not have connections which will allow them to do things like run class room to class room video conferences or live demonstrations of how a telescope works
- Even just attempting to use all the computers in a school for web browsing can saturate current links
- Even where schools do have fibre, they pay for their connections in a way which makes it impossible to afford to use the connections to the full

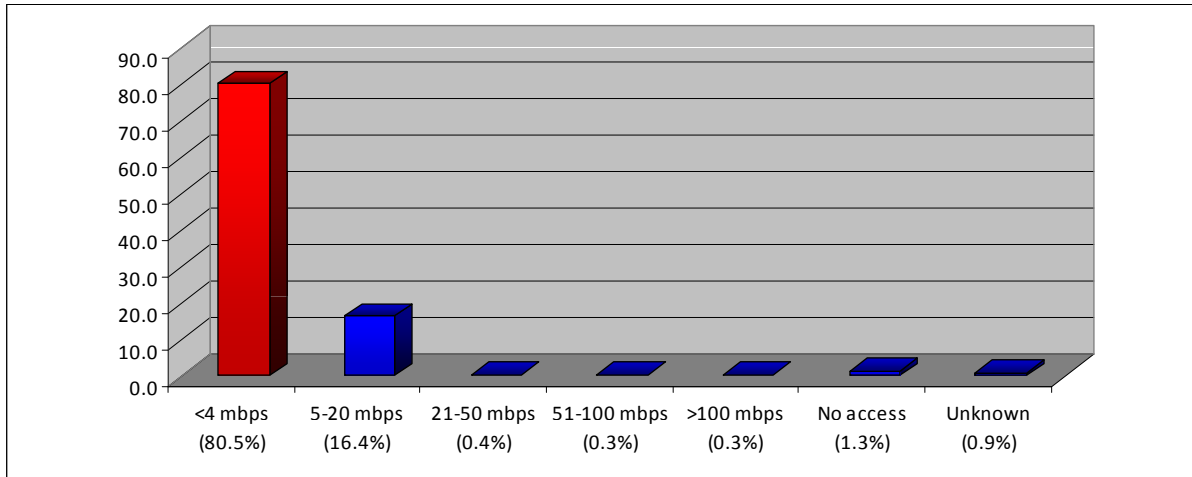
## Broadband technology used by Australian schools



School numbers based on DEEWR 2007 Annual School Census correlated with FCS Baseline Survey findings 2008



## Bandwidth used by Australian schools



School numbers based on DEEWR 2007 Annual School Census correlated with FCS Baseline Survey findings 2008



## Government commitments

- The Government committed to providing broadband to all schools as part of its DER election commitment and as part of its original National Broadband Network commitment
  - \$100 for fibre to schools was committed as part of the NBN/DER commitment
- The Government has now agreed to provide \$81.9 million for the Vocational Education Broadband Network
  - This initiative will provide the infrastructure that will allow TAFEs access to a high quality broadband network that is tailored to the specific requirements of the training sector
- The Government has announced a new approach to the implementation of the NBN with an expected Government and private sector investment of up to \$42 billion





## School Sector activities

- Schools already pay large amounts of money for connectivity
  - and have achieved some successes in using their buying power to secure fibre connections
- All Victorian Government schools are on fibre as part of a whole of Government deal
  - although there are issues of the level of recurrent costs
- Other State Governments are actively engaged in extending fibre connections
- The Catholic sector is engaged in negotiations to establish a national network using recurrent funds to significantly increase fibre



## Lessons from the AREN process

- The key elements of the AREN process were to develop an agreed high level vision of what we wanted to achieve at the outset
  - and then ensure that all incremental steps taken after that point built towards that vision
- The key elements of the vision were that actual connection capacity needed to be well beyond current and short term future projected levels of use
  - and had to be acquired on a price basis which encouraged the maximum use of that capacity
- This built on the existing capacity within the sector to understand the various components of the solution, to manage those components from the inside and to buy various components on a genuinely price effective basis, using real markets wherever they existed





## What this meant for universities

- For universities adequate connections meant direct access to fibre allowing deployment of genuinely high bandwidth solutions using technologies such as DWDM
  - acquired on a basis which, so far as possible, had no restrictions on types of use
  - and just about never buying managed services under a standard Telco offering
- For data costs this meant acquiring infrastructure access largely via long term IRUs, offshore termination of global cloud traffic, international peering and routing international research traffic via SX Transport
  - since then AARNet has been aggressively pursuing domestic peering to further reduce data cost issues



## What does this mean for schools?

- Schools need the kind of symmetrical scalable solutions provided by fibre
- But schools sizes vary and actual capacity needs vary
- The type and capacity of fibre connections will vary between schools and school systems
- Schools cannot deal with unpredictable costs
  - connections priced on data downloads are a major problem
  - Details of the connectivity vision for schools are at:  
[http://www.deewr.gov.au/Schooling/DigitalEducationRevolution/Documents/national\\_vision\\_aug\\_08.pdf](http://www.deewr.gov.au/Schooling/DigitalEducationRevolution/Documents/national_vision_aug_08.pdf)





## What schools will need to do

- Schools will need to be able to buy new fibre connections based on real market based prices
- Schools will need to be able to maintain/secure access to existing fibre, notably backhaul, at real market based prices
- Schools need to find ways to manage data so that traffic does not unnecessarily transit the domestic cloud and generate windfall costs
- All capacity will need to be acquired on a basis which does not inhibit the creation of a true national 'education on-net' linking all schools, and schools to the other education sectors



## The National Broadband Network

- The Government decisions on the NBN present a key opportunity
- The core element is a new company to build and operate the network which will be open-access, wholesale and fibre to the premises (up to 100 megabits per second (mbps)), connecting 90 percent of all Australian homes, schools and workplaces. The remainder are to be connected with wireless and satellite technology (12 mbps)
- The Minister has also set in train a process to review the current regulatory environment
- The education sector, via the Australian ICT in Education Committee (AICTEC), has provided a submission on regulatory matters
  - o also foreshadowing key NBN architecture issues
  - o [http://www.dbcde.gov.au/\\_\\_data/assets/pdf\\_file/0003/115356/Australian\\_ICT\\_in\\_Education\\_Committee\\_AICTEC.pdf](http://www.dbcde.gov.au/__data/assets/pdf_file/0003/115356/Australian_ICT_in_Education_Committee_AICTEC.pdf)





## Regulatory issues

- The AICTEC submission welcomes the decision to make the NBN wholesale, open access
- But points out that the education sector is a major user of fibre to the premises right now
- The submission argues that the key issue of vertical separation needs to be addressed now, not just when the NBN is rolled out
  - ACCC has a similar view
- Submission supports moves to prevent gaming and delay in providing competitive access to infrastructure/services layers
- There is already widespread deployment of fibre in Australia. If strong moves are made to ensure that access to that fibre, and to various service layers offered over that fibre, has to be made available under competitive market conditions, we can solve a large number of connectivity problems for education very quickly



## NBN architecture issues

- As it is rolled out, the NBN will obviously solve a number of 'tail' issues
  - fibre will be laid to most schools and TAFEs
- But the needs of almost all schools and all TAFEs will be very different from those of a single household
- The network architecture which will meet the needs of connecting individual households will not meet the needs of schools or TAFEs
  - let alone universities
- The submission summarises education needs: *"A single point to point connection would allow flexibility and scalability of network services to be provided to that education location, be it a private network connection as part of (say) the managed service of a school network, a private fibre link to schools or between two campuses of a single TAFE/university, or simply a high speed Internet connection for an independent school."*





## Where we want to get to

- All schools, TAFEs and universities are connected to fibre, except in those truly remote situations where a terrestrial connection is not feasible
- Institutions and systems are able to purchase the kind of connection and communications services suited to their needs in an open, competitive market
- There is a national network structure overlaying individual connections with agreed standards and protocols which ensure:
  - There is no technical barrier to national sharing of all education content and services
  - All traffic between all members of the network, and international education networks, is fully peered and does not attract download costs
  - All members of the network contribute appropriately to its recurrent costs
  - Members are able to create networks to meet the own needs (eg State school networks, a Catholic education network) provided that their structure does not derogate from or impede the national network



## Higher education and research contributions

- The sector via AREN has control over a network which could provide a vital component of a national education, training and research network
- In AARNet it has an expert body with vital skills to contribute
- But there will be differences with the role AARNet plays in the higher education sector
- A fully integrated solution, including domestic off net connectivity, is unlikely to result
- There will be major differences between the ways in which different education players relate to a national network
  - a large highly centralised education system such as NSW will manage many elements of its connectivity itself
  - a large decentralised system such as Victoria will need a different set of services
  - as will independent and Catholic schools





## Making it real

- One thing the sector can help with right now is to demonstrate the value proposition of a national network
- The Government's investment in the NBN, the VEN and in fibre to schools is based on the proposition that there are economically vital activities which can only occur if Australia has a sufficiently capable and accessible telecommunications infrastructure
- Particularly but not exclusively in research, the sector is able to show real things happening because of the investment in network infrastructure and the skill of the sector in running the network itself
- The sector is also supporting leading edge applications in schools and VET
  - many showcased at Questnet
- We look forward to continuing cooperation with the sector as the implementation of the DER continues



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**[www.digitaleducationrevolution.gov.au](http://www.digitaleducationrevolution.gov.au)**

# Thank you

