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# Networking Technologies for the Information Economy

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# E-commerce

**E-commerce**  
paying bills online  
buying books, clothes  
groceries etc  
on the Internet

- Here now !
- By 2004 - \$2 trillion in US
- Consumer only needs dial up modems and a good ISP
- Servers need to be fast and have good connections
- “Broadband” will help – always on



## What next ?


### Information Economy

**E-commerce**  
paying bills online  
buying books, clothes  
groceries etc  
on the Internet

Virtual Enterprises  
Point of Sale Manufacture  
Banking - Finance - Insurance  
Legal and Accounting Services  
To be invented !

**“Investment, job creation and export within the information economy make a growing impact on the Australian economy, generating revenue, jobs and economic efficiencies ...”**

*A Strategic Framework for the Information Economy -  
Senator Alston’s vision of Australia in the information age*




## Start of the next revolution

### Changes the way we

- work
- play
- socialise & values
- are educated
- receive health care
- kill people



- virtual enterprise, tele-travel
- entertainment, games
- chat rooms
- distance education
- tele-medicine
- push button wars



## Virtual enterprises

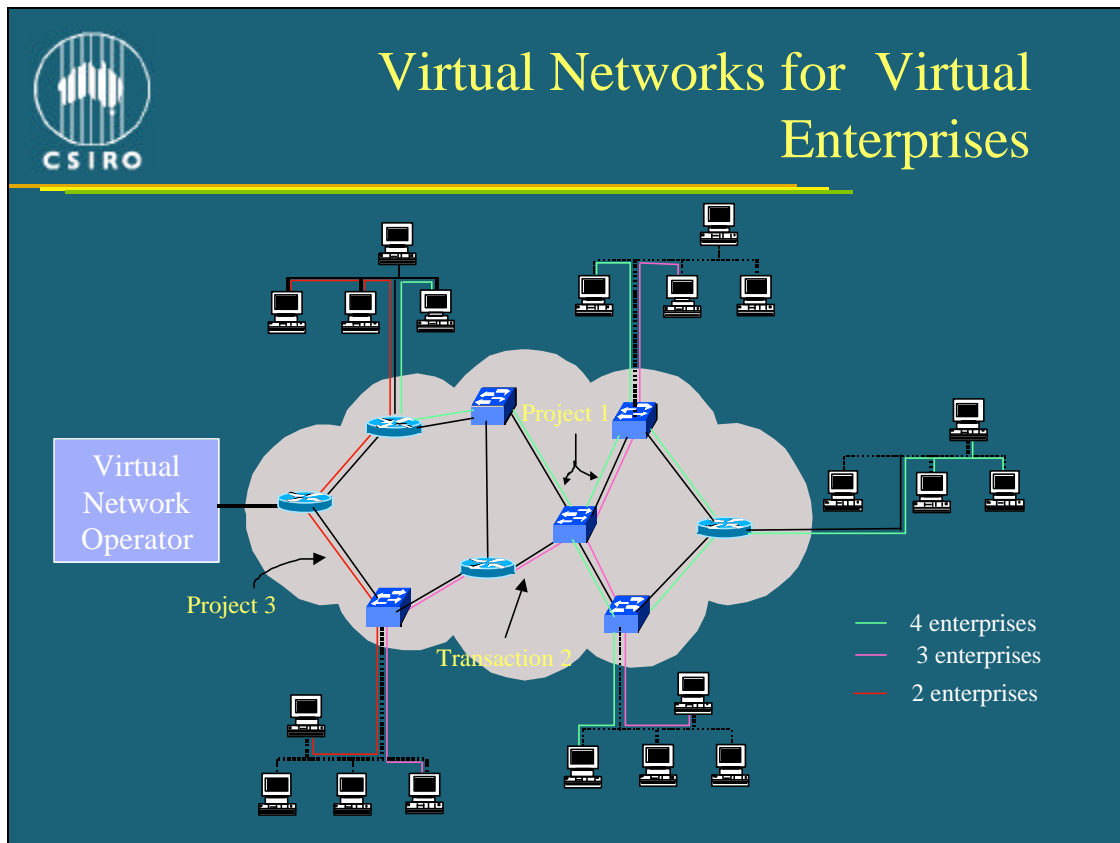
How the world will do business in 21C:

- aerospace & automotive industries – now
- film PPI industry - starting now
- health – coming soon
- transport & tourism industry
  - » (e.g. Fedex) needs mobile connections
- perishable goods industries,
  - » fruit & veges, flowers, fish markets
- finance industry



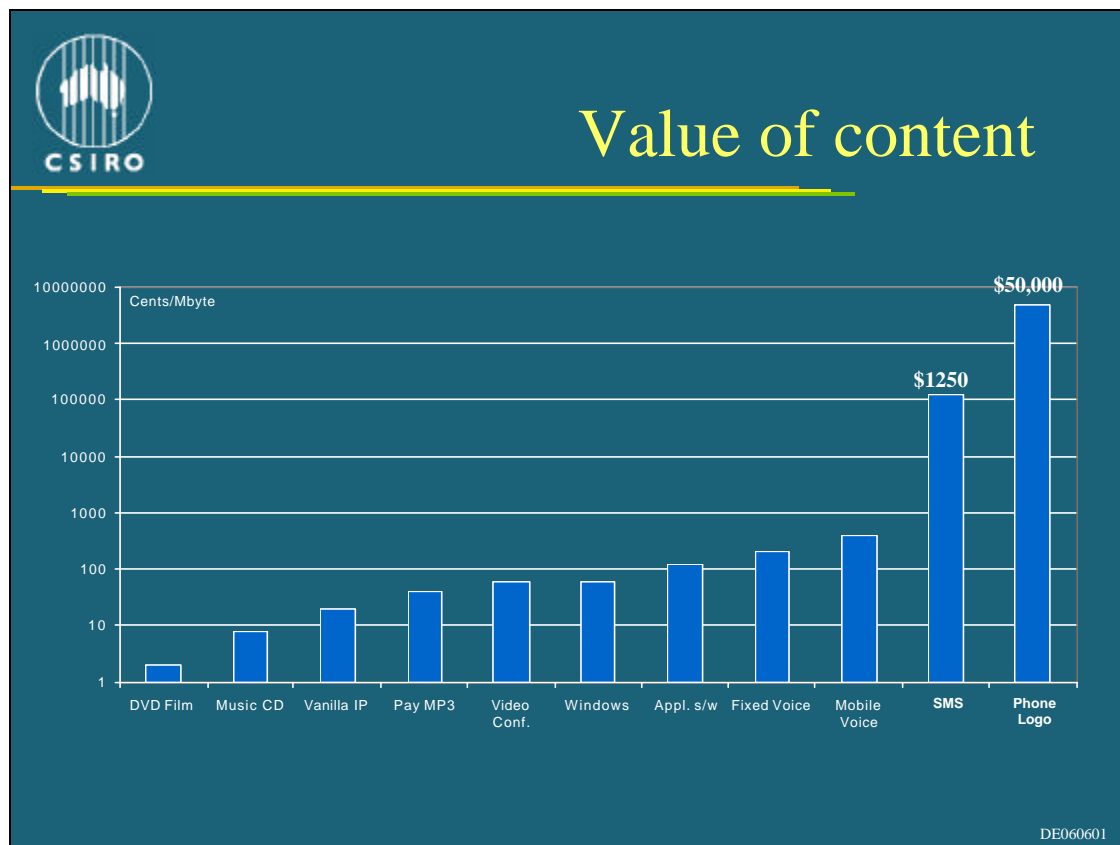
## Half-life of typical VEs?

- Auto and aerospace – long term (years)
- Film PPI – duration of film shoot (months)
- Commerce JIT or manufacture at point of sale
  - custom made shoes, clothes; why ship a book, CD?  
shopper, store, OEM – (minutes)
- Finance – transactions & trust (seconds)
  - e.g. mobile phone parking meters
    - » you, local council, Telco, bank, ATO, your accountant,  
for GST, insurance company
    - » ideally all happens at once




Feature of ANs for the IE

- Ubiquitous – connect anyone to anyone
- Performance matched to the requirement of the application, either/or/and
  - large bandwidth (health, film, collaboration etc)
  - large # of small transactions
  - latency loss & security
  - charge by value & service level not per Mbyte
- Implement via QoS, SLS & SLA



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- ## DCITA's ANP - Aims
- Demonstrate the feasibility and define the requirements for any future national networks.
  - Stimulate a partnership with industry, universities and research community to carry out R&D in the full range of communications, in particular Internet technologies, services and applications.
  - Showcase Australian technologies, applications and services, and provide foundations for building of a sustainable, high performance research and engineering network.

 **CeNTIE** - ANP winner

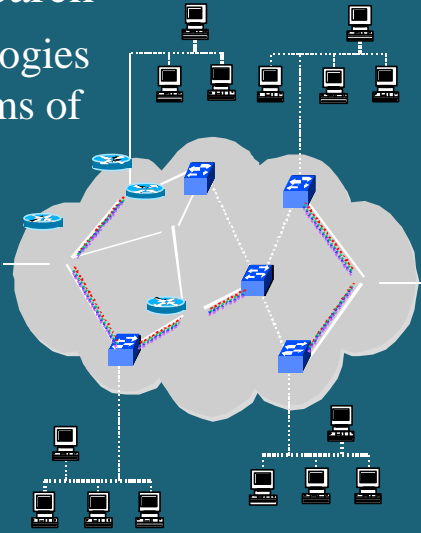
- An advanced network for research
  - develop and prove new technologies required for the business systems of the information economy

**NOT**

- A research network
  - one which links researchers

**NOT**

- Offering commercial services



 **CeNTIE** Major Participants

- Research Organisations
  - CSIRO, WA-IVEC, UNSW, UTS
- Vendor
  - Nortel Networks
- Carrier
  - IP1 (Amcom Telecommunications)
- End Users
  - Surgeons, health professionals, film post-production industry, educators, finance industry





## Bring the future forward 5 years

- Assume bandwidth is (almost) free and infinite
- Lets users do things they cannot do today due to economic or technological impediments
- Demonstrate network enabled applications required by end user groups not currently possible with today's networks
  - Provision of guaranteed QoS, capacity and security matched to the requirements of the application
  - Provision of such services on the fly - VNO

**Instant enterprises!**



## Focus Groups

- End user and industry interface, ask focus groups “What would you do if .....””
- Development cycle/spiral of research-technology-user feedback: applications and network drive each other.
- 4 Business systems
  - Tele-health - VE
  - Media systems - VE
  - Tele-collaboration - VE
  - Information brokering - VE





## Tele-Health

- Business /Social Need
  - Shortage/costs of specialists, remote care
- Impediments
  - BW, latency, not ubiquitous
  - Heterogeneous requirements
- Outcomes
  - Flagship Project -Virtual reality surgical trainer (technologically demanding). CSIRO, Medic Vision, RACS and CTEC
  - Real time tele-radiology
  - Prove efficacy of tele-medicine and applicability of convergence to health



## Networked haptic-visual-acoustic environments

- high bandwidth, QoS for low latency
- haptic - 1000 Hz updates (viz 25Hz for video)
- how to connect several users miles apart, collaborating in the one virtual space ?
- application to other areas, museums, manufacturing, geophysics




A multi-sensory small scale immersive virtual environment.

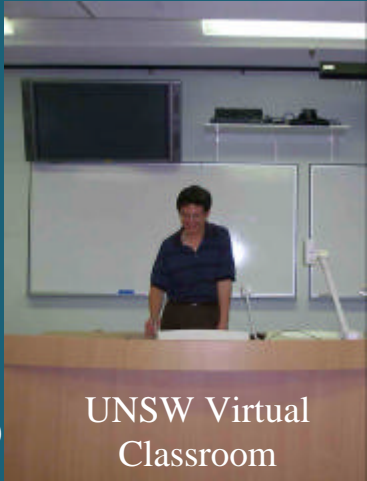
 **Media Systems**

- **Business/Social Need**
  - Australian post-production industry is a high growth industry competing on the international stage,
  - FIBRE “*local collaboration and international competition*”
- **Impediments**
  - mismatch old to new
  - large digital data sets
  - high BW costs
  - fragmented, SMEs
- **Outcomes**
  - new applications: interactive & collaborative work
  - demonstration on QoS enabled network



 **Tele-collaboration**

- **Business/Social Need**
  - academics are in short supply
  - corporate learning, tele-travel
- **Impediments**
  - human factors
  - latency, bandwidth, ease of use
- **Outcomes**
  - programmable network technology for VPIs with QoS,
  - decision support systems (Farmscape)
  - social benefits from improved skills training, also inputs to tele-health, PPI



UNSW Virtual Classroom



## Information Brokering

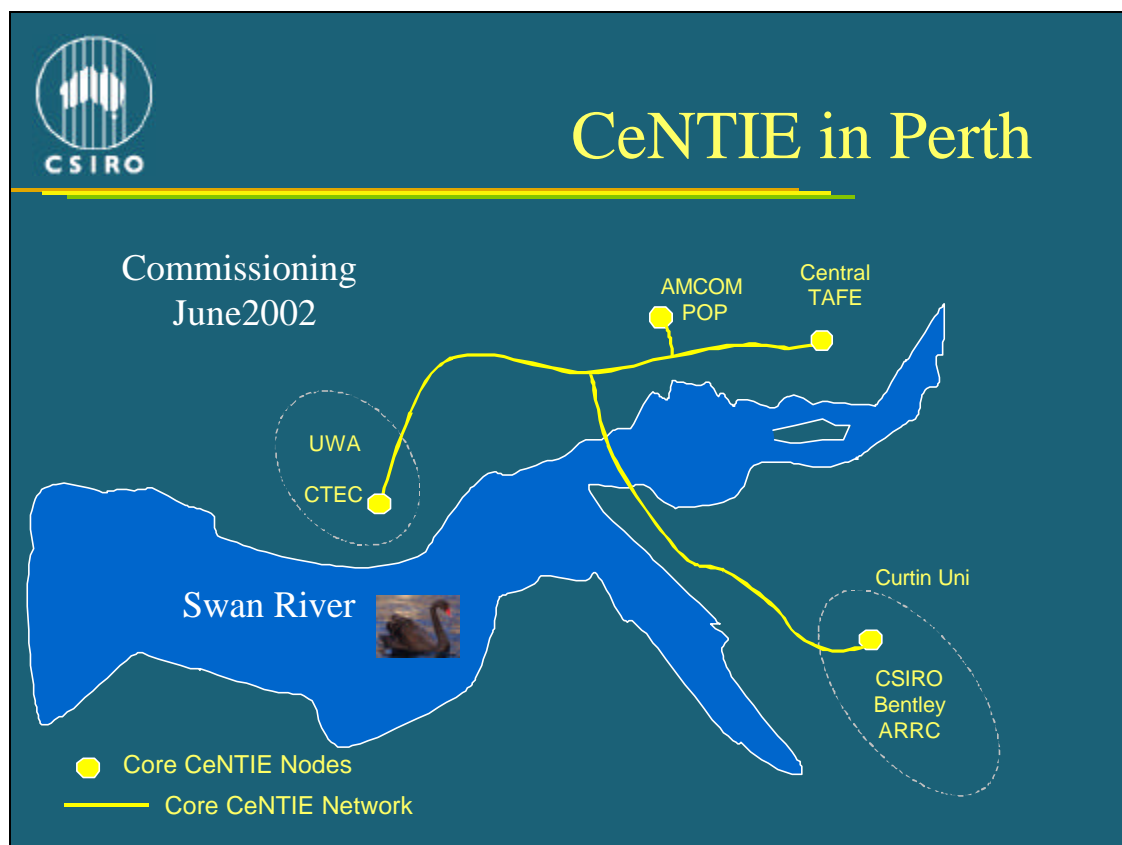
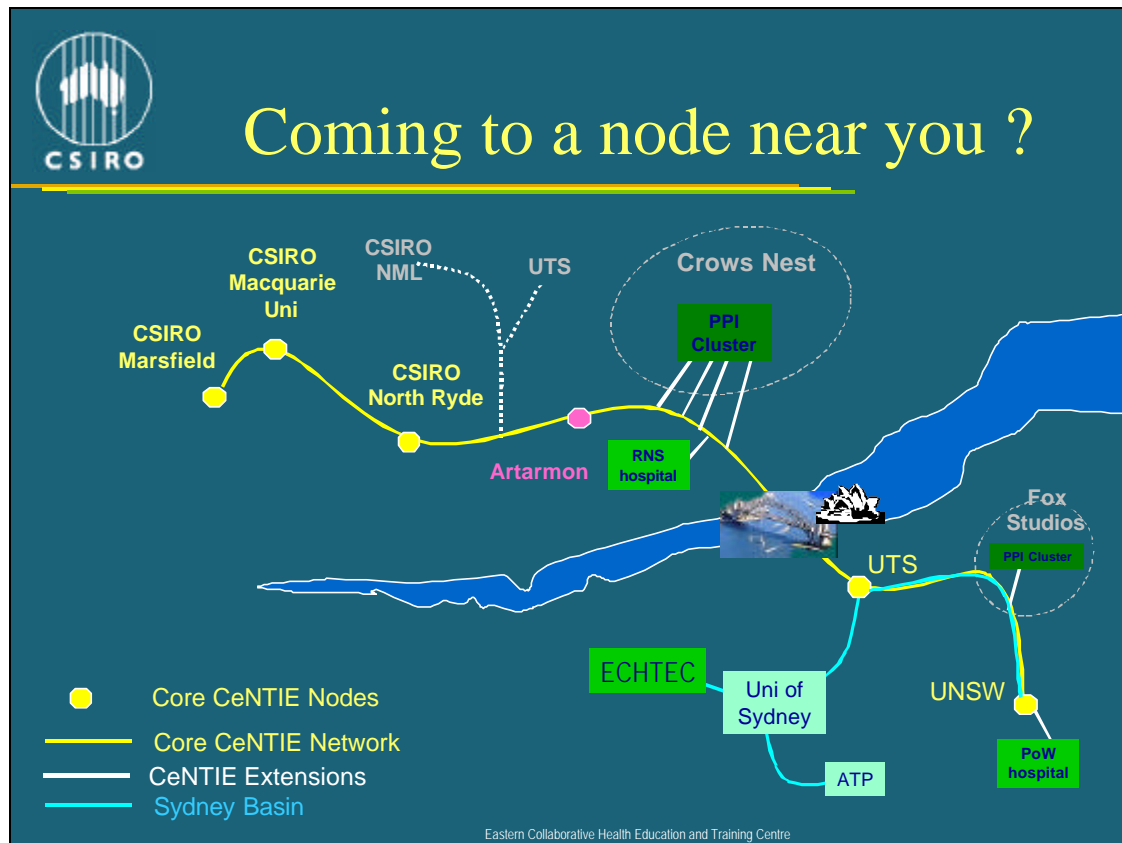
- Business/Social Need
  - Virtual enterprise creation with appropriate functionality, scales
- Impediments
  - Latency in distributed networks, scalability, setup and tear down
  - migration from LAN to WAN, different requirements, data sizes, interactions, distributed processing
  - QoS for RPCs real-time interactions, content aggregation for decision support
- Outcomes
  - new techniques for XML for loosely coupled distributed systems
  - The testbed uses open distributed computing technologies to deliver integrated services and information to a geographically dispersed user community



## Technology projects

- Networked hapto-visual acoustic environments
- Virtual networks using programmable network technology from Nortel Networks
- Content sensitive QoS with programmable networks
- Multimedia technologies







THE END

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