



QUESTnet 2007 report

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Documentation

Audience

The intended audience for this document are:

- REANNZ staff members
- REANNZ Board members
- REANNZ Members

Reference Documents

No documents are referenced.

Version control

VERSION	DATE	REASON FOR UPDATE	AUTHOR
1	July 2007	Initial Draft	Mark Cordy
1.1	Aug 2007	Added additional information	Tim Chaffe

Review and Approval

This document has been approved for release by the following:

NAME	ROLE	ORGANISATION	DATE

Distribution

This document has been distributed to the following persons or parties:

NAME	ROLE	ORGANISATION

Pre Conference Workshop: The Australian Access Federation

- The Australian Access Federation (AAF) is a framework for trusted electronic communication and collaboration
- Builds on CAUDIT and AusCert's relationships, and uses PKI to encrypt communications between service providers and identity providers using Shibboleth
- Provides a common policy framework for the sector
- The AAF is looking to get the AusCert root certificate in vendors trust lists (e.g. Microsoft, Mozilla and Apple Computer)
- Certificates would be issued through the AAF, avoiding the need to purchase VeriSign or other commercial certificates

Benefits of Federated Identity Management:

- Simplified access to resources, data, instruments
- Organisations can manage resources, rather than user accounts and certificates
- Enables easier collaboration, drives modern identity management practices

The AAF project

- Funded by DEST
- Has 3 components: Governance and policies for the whole trust federation, specific policies for PKI, specific policies for Shibboleth
- Testbed available now, first production system should be available from early 2008

General Notes/Thoughts

- AAF brings together the work out of AusCERT (PKI) and MAMS (Shibboleth). The strategy for bringing these together has had its first cut and they are in the process of implementation. There is still a degree of competition (e.g. client side certificates vs. Shibboleth) however efforts are in place to unify (e.g. Shibboleth authentication downloads grid)

certificate)

- The first 'A' in AAF may be changed to 'Australasian' from 'Australian'
- There was comment on the co-ordination of New Zealand engagement as varied messages received from NZ interested (e.g. Bestgrid, Reannz, Universities, MinEdu). While not a major issue it would pay for NZ participants to co-ordinate more.
- AAF Certificate Issuing authority in progress and aiming for the end of the year/early 2008. To be housed at the University of Queensland

Keynote presentation: Secure Multimedia Communications that never stop! Jean Turgeon, NORTEL

- We are in a new era of hyper connectivity, applications aware networks, "true" broadband
- Hyper connectivity – an explosion of devices wanting to connect to the infrastructure – drives single user sign on, federation. Makes us rethink how we build applications, services and networks
- Key infrastructure requirements:
 - Reliability
 - Scalability
 - Multi-vendor support (open standards)
 - Mobility, indoor and outdoor
 - IPv4, IPv6 ready, QoS supported
 - Ability to trial evolving standards without disruption
 - Multimedia ready, multicast enabled
- Scalable mesh networks and computers will deliver scalability and resiliency without complexity
- Myth1: MPLS is the only answer to all VPN requirements

Keynote presentation: Top Trends in Higher Education, Tracey Wilson, Cisco Systems

- In her experience, she sees the following major trends/themes in higher education:
 - We are now faced with the evergreen student, one with a voracious appetite for new digital products and services
 - We are in an era of borderless education
 - Buildings will need to be intelligent. Power consumption is becoming critical
 - Data, data everywhere!
 - Branding affects enrolment and retention
 - Mobility is key
 - Distance learning is key
 - Physical and logical security and safety are critical
 - Libraries are becoming the knowledge hub – for all types of media. They need to make the transition to being content producers as well as content consumers
 - Interaction and engagement at all levels is key
 - Web 2.0 and “serious” gaming technologies are very important and increasingly pervasive
 - Governance and cultural change is important through this transition – as we move from instances of innovation towards clusters of innovation, then expanded innovation
 - Multiple networks of today will converge into one

Securing the Open Access Network: Mark Williams, Juniper Networks

- This is about perimeter security for networks, where the policy is for “default allow”
- Baseline the traffic
- Defend in depth
- Know what’s normal in your network
- Optimise each router and firewall for its own design purpose

- Implement selective rate limits
- Build a feedback loop between firewall and router to minimise dropping good traffic


Collaboration on Demand: Carol Daunt, LearnTel and Elaine Shuck, Polycom

- Web conferencing and wikis are more popular than blogs
- We live in an era of new media – blogs, wikis, mashups, podcasts, social networking, virtual worlds – videoconferencing is into its second life
- 126 Universities and many major vendors are operating in Second Life
- Polycom has a content searchable database - downloads have cost of \$USD100-\$USD150. Some Australian content is also available
- Polycom has two key products – a Video Media Centre which manipulates content, and RSS2000 which is a recording and playback device
- Factors for success include: infrastructure, support, training, policy, patience and a good sense of humour!
- Nice new Polycom feature of superimposing transparent presenter over presentation removing the need to have two screens.

Presence Technology: Vanessa Sulikowski, Cisco Systems

- Presence: information about a person's willingness and availability to communicate
- SIMPLE: SIP for Instant Messaging and Presence Leveraging Extensions
 - Base don work completed in RFCs 2778, 2779
- RFCs 3265, 3903, 3856,3863, 3857 are relevant
- RFCs 3848, 4479,4480,4662 are also useful
- The way this works is that a person will publish their status on a server. Watchers can subscribe to receive updates on changes of state for a presence
- Interconnection of presence servers is called Federation – this could be inside an organisation, outside an organisation or a mix

National Videoconferencing Service: Jason Bordijenko, AARNet

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- The objective of the national videoconferencing service is to facilitate and support videoconferencing for teaching and learning in the R&E sector
 - “You Tube” type technologies are used for support
 - CAVEs, or Coordinators of Audio Visual equipment are local videoconferencing support experts
 - Based on Codian MCU
 - Multiple Universities have partnered with AARNET to purchase ports on the MCU allowing individual institutions access to a peak port count that they could not afford by themselves.
 - A similar model would be suitable for New Zealand. This would require REANZ and partner institutions to determine the best approach to set up and house centralised shared MCU infrastructure.

Real Time Communications Network Review: Peter Johnson, AARNet

- AARnet’s VOIP service is essentially a toll-bypass service, started 8 years ago in CSIRO
- The service has had ad-hoc growth, only offers a single service (voice out calling) and runs on AARNet2 – it is difficult to manage, has a complicated charging mechanism, no legal intercept, and has limited flexibility
- The desired network supports:
 - Multiple services, out calling and inbound
 - Multiple protocols, e.g. SIP and H.323
 - AARNet 3
- And is cost effective, scalable, integrated into their billing and administrative systems, and supports legal intercept
- Instead of AARNet terminating calls on the PSTN directly, they intend to outsource this to an IP Telephone Service Provider (ITSP)
- New service ideas include: hosted voice, managed voice, voice and video mail, PSTN outdial backup, prepaid calling, differentiated voice services

About The Research Channel USA: Jim De Roest, Research Channel

- Is an R&E TV Network with about 60 contributing organisations, including AARNet
- Has an important relationship with Microsoft Corporate, and is operated out of the University of Washington
- Developing new partnerships with museums and libraries
- Also intends to work with the National Science Foundation for non-exclusive distribution of broadcast programs and internet distribution
- Exploring a pilot for "You Tube" for research
- Has over 3000 hours of broadcast quality video for participants in its program library – all subject areas, though a little slanted towards medicine and computer science
- Also partnering with some cable companies in the USA for video on demand
- Looking to have a 1080i HD stream available exclusively over the internet
- China's use of the material is almost an order of magnitude bigger than all other countries combined!
- www.ihdtv.org is a website for an open source high definition software suite
- www.digitalwell.org a site designed to build the capabilities of a grid enabled data management system – allows users to collect, classify, store and deliver material It is format agnostic – could be research data as well as multimedia content

Collaboration, Communication and Cooperation with inSORS : George Travan, Jumbo Vision International


- InSORS produce the commercial version of the access grid software from Argonne Labs
- Used extensively in the US amongst research communities, some penetration in the UK
- Compatible with access grids via gateways. Some features naturally incompatible
- Compatible with mobile phones. Demonstration from U.S desert across Sprint mobile broadband cellular data network
- As some scientific communities overseas use inSORS, at some stage NZ must determine how to interface

New Developments in Wireless Networking Research: Bjorn Landfeldt, CRC Smart Internet

- Exploring new traffic routing options for radio networks
 - Multipath routing – find X paths that give Y% success probability
 - Opportunistic routing – given radio is a broadcast medium, and since many radios can receive a packet, if packet delivery to the target radio fails over a single hop, other radio nodes may be able to step in and help recover the lost packet, meaning the transmission does not have to start again from step 1
 - Measurement driven routing – some routers act as monitors, and will intervene on traffic flow if the transmission path is not the expected path.
- Some results from field work show ~60 wireless access points at a single intersection
- Large numbers of access points and active radios can cause problems with 802.11 – channel contention means 802.11 delivers unreliable service, high delay and bandwidth variability – forget QoS sensitive services!
- Since current arrangements are chaotic, with no single administrators, there is a need for the network to become self managing.
- Hard problems to solve include: channel allocation, power management, and distributed collaborative algorithms
- Underwater communications, used by the natural sciences, have very low bandwidths
- The marine environment has lots of background noise, varying propagation paths and characteristics, long delays, low data rates, varying temperatures etc
- New algorithms and techniques are needed for latency bounds, fault tolerant routing, high mobility

VERNet optical Network: David Calello, AARNet

- VERNet = Victoria Education and Research Network
- Established by 9 Victorian Universities and CSIRO

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- VERNet is an optical fibre network deployed across metropolitan and regional Victoria to meet the needs of the R&E sector for the next 20 years
 - The network will connect 100 sites over a 1700km network
 - Members initially get dark fibre or GigE connections. It is a layer 1 network only
 - Services form VERN include:
 - Governance and Compliance
 - Circuit provisioning
 - Circuit maintenance and obligation management
 - Incident and response management
 - Circuit change management
 - Capacity expansion and reinvestment
 - Network information and exchange management
 - Technology is Nortel DWDM over dark fibre, much of which is aerial
 - Also uses Optical Add-Drop Multiplex
 - All VERN POPs are installed in member premises, which has caused some challenges

The Road to True High Definition Videoconferencing: William MacDonald, Codian

- Why HD?
 - To make up for the sub optimal environment
 - Large room environments
 - Continuous presence
- Factors affecting video quality:
 - Bandwidth
 - Macro blocks
 - Encoder tools
- To be HD compliant, you must decode all the baseline features – there is no particular requirement to use them all when encoding
- MCU Types include: Video switching, shared encode, universal encode
- The best MCU designs transcode every port maintaining quality between

HD participants even if a lower quality end node participates. Attempts to provide best quality output geared per end node, doesn't default conference to lowest common quality.

Crossing the Chasm: Julian Lefebvre, Sonic Foundry

- Sonic Foundry has found a way to digitise audio cheaply
- You Tube has over 100million hours of content
- www.mediasite.com is a portal that aggregates Mediasite captured content
- One University has put all their 100 level courses on Mediasite for free – this copes with students who don't make it to class
- Mediasite installation allows material to be captured and searched without the need for the academic staff to configure or turn off anything
- Captures slides as well as video of the spoken lecture
- Search technology is only made available to Mediasite customers. It runs on standard Windows servers.

Say Goodbye to IPv4: Geoff Huston, APNIC

- About 30% of all IPv4 addresses allocated are not seen on internet routing tables
- It is estimated that as much as twice as much as the current internet sits behind NAT
- NATs are great for service providers because the cost and complication of NAT is borne by the customer
- NAT is certainly viable in the short term to extend the life of IPv4 – they are already extensively deployed and have influenced all current application architectures
- Not sure that NATs are long term viable. Problem is that each NAT implementation actually performs slightly differently in real life.
- The major issue with NAT from an application perspective is complexity bloat. Multi ganged NATs are very complicated, so at some point this overhead just gets too much
- IPv4 trading raises questions of how such a market would work. The risk is the price would be set by the richest, and could lead to speculative

buying to control the market

- Probably viable as a short term solution, particularly if the market were somehow regulated, but unlikely to be viable long term
- IPv6: how much will it cost, how long will it take? The business case for IPv6 is not proven.
- Long term, IPv6 will be viable, however, it needs a critical mass of deployments. The challenge is deregulated markets only react to short term pricing signals – customers won't pay to change and businesses can't afford to
- No absolute end date for IPv4, but users should expect to have to start buying addresses. Expect to have to run dual stack, facing additional cost without additional revenue. Network managers need to plan urgently, vendors will have to provide IPv6 ahead of NAT
- Regulators and policy makers will have to develop clear and achievable policy targets
- It is likely this issue will be disruptive, not seamless or cost free, and will happen in the next couple of years

Over the Horizon: Global Networking and the Emerging R&E Environment: Jerry Sobieski, Mid-Atlantic Crossroads

- Grid applications will incorporate >100,000 processors within 5 years
- 3 Key drivers:
 - Large scale distributed cluster computing: challenges network speeds and power supplies – for example, Larry Smarr's example of 100,000 processors would require 300 racks, 25,000 GigE ports, 25MW power
 - E-Science: a new global business, shared instruments, global teams, global science
 - Disaster Resilient Networks: to deal with disaster radii of >100km, event durations of weeks not days – as the event radius increase, regional supply chains and customer bases disperse, with the potential to knock out large segments of the supply chain
- As a result, we need to think a lot bigger!
- Traditional concepts of the network are changing

- Traditional approaches and engineering may not work
- National R&E networks must become much more R&D oriented
- Advanced Capabilities are what Advanced Networks deliver


Large Hadron Collider: Big Science, Big Computing, Big Networks: David Foster, CERN

- CERN's mission is to:
 - understand the fundamental laws of nature
 - provide a world class laboratory facility
 - train young scientists
- CERN's tools are accelerators, detectors and computing
- For example, the ATLAS detector has 150 million sensors, each delivering data at 40 million times per second!
- The biggest challenge is actually with data storage
- Dedicated wavelengths are becoming the norm for R&E networks

Google Australia Engineering: Andrew McRae, Google

- Google maps was invented in Australia, starting in 2004
- Google's approach was to look to do maps via a web browser rather than as client software
- It is an early example of AJAX (web 2.0)
- Basic principles:
 - Software must be robust against failure
 - We buy cheap commodity equipment, so buy more, rather than less higher spec hardware, thereby saving money and getting higher service levels
- Things can break at any level – machine, disk, rack, data centre
- Google has a "follow the sun" approach to management of the global Google network

Applications and Network Throughput: Glen Turner, AARNet

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- AARNet has the longest 1Gb/s path in the world – 600msec
 - TCP algorithms vary a lot – this affects sharing of bandwidth
 - Connections with high RTT times always lose
 - BER looks like congestion to TCP
 - Firewalls can be a real problem, especially PC based ones – better solution is a firewall that looks more like a router
 - Data should be cached closer to users (as measured in msec not km)
 - UDP will often deliver better performance than TCP

Segmented and Virtual Infrastructures: David Gibb, Cisco

- Virtualisation need not be difficult, but could go all the way up to MPLS based VPNs
- Benefits include increased resource utilisation
- It is possible to virtualise all the different network layers, as well as servers, firewalls etc
- Virtual routing and forwarding is not seen as a viable long term approach – VRF requires routers to store multiple routing tables rather than single global tables