OARtech Meeting Minutes
December 8, 1999

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The network design presentation has been given at other meetings, e.g., EduCAUSE. The design decisions were internal although a contractor designer was on site from IBM.

Layer 1 Physical defines electrical and mechanical characteristics
Layer 2 Link controls physical layer data flow and frames packets
Layer 3 Network addresses and routes packets
Layer 4-7 Transport and above

Previously UT had a bus structure, no fault tolerance - looked at a star topology but it would have required too much cable to implement. The design engineer liked a FDDI ring for the 40 buildings on campus and it would have been the most economical for conduit runs and would reuse pipes. They would have had areas of high usage, as some buildings would have required doubling back to reach the regional point of presence.

Decided on regional stars - a physical layer that matches closely their logical layer - it can sustain a break in the ring. They are using an OC-12 ATM backbone. UT identified resilience of services as well as physical resilience.

There was discussion to centralize services and managed them locally but fault tolerance did not fit with the physical layer. They compromised with the idea of regional servers.

Link Layer
Ruled out Arcnet, Token ring, 10base2, 10base5, FDDI although they still have one token ring network that is not Y2K compliant.

UT has FDDI in their Engr. College that will go away and an Instrumentation Center that has good reasons for keeping FDDI to support their data collection and crystal labs.

Gb Ethernet was pre-standard and had physical distance limitations.
With thoughts toward partnering with telephone and video, ATM was the better choice to link telephone switches together - Gb is good for transporting lots of data but not for voice and video.

The only copper left is the desktop feeds.

UT implemented ATM-Lane that is fault-tolerant and OC-3 and OC-12, 155 Mb to each region and 622 Mb in backbone for data, now working on voice and video is in the planning stage.

6 on campus switches provide circuit emulation T1s as ATM.

Advantages
1.3 Gigabit real bandwidth scalable to 3.7 Gigabit with OC12, upgradeable to OC48 and beyond. They are running at 7% utilization on the OC12.

Protocol Choices

Rejected
appletalk
IPX/SPX one Novell box
DECNet
Non-routable - no bridging

Solutions/Alternatives
Dave Client
Windows NT Servers
TCP/IP Services

Standard Protocol TCP/IP only on backbone except one Novell box that is not even Network 5 supportable so there is a 3.1 box. Based on the request to do SQL across the network an administrator decreed NT (major problem with Novell was the Groupwise application which did not scale well.)
Appletalk was routed for a couple of years but it was decided not to route across network, met with Apple groups and where they needed to interact with groups out of buildings they use the Dave client SMB application to talk (www.thursby.com).

The consulting engineer wanted switches and said that routing was bad. Their legacy network had routers in every building, 30 routers that were unmanageable. It was decided to implement regions that had the advantage of a switched backbone in the ATM core and routed fast ethernet in the regions. Within each building UT uses a variable bitmask for the number of subnets required.

UT completely redid addressing on campus. They used to use static addresses - dual fed the building with two subnets - DHCP on one until all addresses were

changed and then the subnet was used in the next building. Expiration time is four months, which allows for tracking for most machines. They started running NT dhcp and dns and had to switch to MetaTCP which has stability issues. Apple computers do not recognize the lease time and requested a new one address each time so they would have to manually expire DHCP leases. Latest release has cleaned up some of these issues on Apples. The option was chosen to remember settings on reboot remembers an IP address. They also use dynamic presentation of hostnames.

UT's design has 17 regional starts and 6 DHCP and DNS servers.

They use single to multimode converters from Radion to feed a router interface.

They decided to use no unique piece of hardware or protocol so they can patch network pieces to keep the areas of highest priority available. Since last spring, the university has been out of dorm space so the university is housing students in apartments. On renovation, the apartment and university worked together to get data jacks in apartments wired with ethernet ports in bedrooms and living room and fiber connecting them and then fiber to the corner of the complex. Network access is free to all dorm students - no tech fee - initially tech fee used to pay for the wiring installation costs.

Now, they have students in apartments that wanted to be in dorms - so how do they provide access to them? A product called Public Port that works great in the apartment arena without a lot of management required. UT sells phone service to the apartment students. It is not required to use UT for the service; a phone plug is in the kitchen if students want to use someone other than UT for voice. It cost $400K to wire, the payback is 2 1/2 to 3 1/2 years.

UT has a 9 MB OARnet connection. They are trying to get student funds to pay part of the subscription rates using graphs from the Intermapper software from Dartmoth to show student usage. Intermapper knows that the OARnet connection is 9Mb and pegs it orange with 75% utilization.

The Public Port Device
Dory Leifer - Public Port/Tut Systems (worked for MERIT for years). Provides subscriber management. The Public Port device pushes high bandwidth across almost any copper media, e.g.,10Mb/sec home phone line networking. The device provides management for shared networking over physical media. Dial-up clients establish a session and then can be accounted for. With ppp the client authenticates and negotiates an IP address. The device can support two users on a piece of copper ethernet (Ethernet, wireless, cable modem, phone line networks, xDSL).

The Public Port:

does address mapping
uses radius servers
provides traffic shaping
accounting with a property management service
useful for walkup ports, classrooms, dorms.

How do you scale from a fixed network to roaming infrastructure? UT did not want to turn on/off ports so they use a radius to check if user is authenticated, SMS Subscriber Management Server.

They do not have to reconfigured IP addresses but use meta addressing so existing configuration is not altered. The gateway DNS/DHCP information and can tag SMTP messages with authenticated header information so it looks like an additional hop. They also can force customized default web page. The system was used at George Washington University.

If you use authentication, you have to open a web page for authentication - no matter what network protocol is first used. UT connects 800 per box. It looks like a router with 800 interface ports - a single shared address or address per machine. It supports remote management and flash upgrades. Ports can be static - if you put vLANs behind, it looks like a router. It works with dynamic ports with vLAN but expects 802.1 queue. For non-radius sites, you can redirect to a web server for policy control. The list price is around $6K or $10-15/port www.tutsys.com or www.publicport.com

OARnet presentation

Doug Gale
As bandwidth requirements double each year, the cost of buying International connectivity has not been going down; a large Internet buyer, like OARnet buying has been constant over the years.

How do we deal with containing our costs?

When everyone had T1s, it was self-regulating. The bandwidth required for T1s was less than the total number of T1s because not all were filled. With DS3s you could ask for 12 and use 24, the biggest single cost is external Internet connectivity. They could either raise fees or cap the bandwidth. Capping bandwidth is a financial requirement. OSTEER decided to cap bandwidth at what the institution could afford to pay.

Distributed storage - push and pull distributed storage, high bandwidth is positioned at the pops and so you don't have to purchase bandwidth of commodity bandwidth.

Negotiate quantity pricing - an OC3 that provided OC3 bandwidth which lowered cost.

Establish peering relationships such as the 70 now in Chicago with a DS-3. Now we are opening pops (NAPS) in Pittsburgh, DC, and Indianapolis so OARnet will not be buying additional commodity Internet, reducing the cost of Internet bandwidth.

Local loops - T1s are distance insensitive that is a good deal. OARnet will add POPs to save local loop costs for clients as people move to DS-3.

Promote the use of Internet2 for high bandwidth applications. Next year, Doug would like 10% traffic over I2 and 20% the following year.

I2 Technology Center
2nd level problem level determination NOC North Carolina is the preproduction testing. OARnet will evaluate emerging network technologies
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December 1 1999 OARnet split Enterprise and Academic Services which makes it easier to track Enterprise services and provide support for Academic Services.

Internet2 secondaries - there will be a cost but it is uncertain how to charge. Members agree that charge structure should be fair. Bursty traffic charges versus regular traffic.

Doug Gale's suggestions. He had previously killed two modem pools, eliminating free modem pools - outsourcing the services. As Ohio moves toward distance learning, should OARnet run a modem pool for university access anywhere in the state for a local phone call? Modem pools could run on the campus coordinated by OARnet. OhioLINK likes the idea. Peter brought up contracts providing services to individuals related to a university. Either VPN technology or kerberos .There are concerns - some schools would attract more students and there could be software challenges.

Suggests modems as an agenda item for consideration.

Gene Wallace:

Rise in traffic usage follows the classic school year but this year traffic has more than doubled.

Fred Croner and Mark Fulmer:
Napster.com

Napster is an MP3 client for creating, storing, and playing MP3 files which also (by default) becomes a sever, marketing local computer files to the Internet.

Normally most sites are asymmetric between incoming and outgoing traffic. Closing that gap has generally indicated to OARnet that one or more popular web sites or others types of servers were running at the site.

Napster is generally indicated by high bandwidth utilization , 20Mb inbound with an increase in outbound traffic. Napster starts at port 6699 and goes through the port range. OSU filtered access to the directory server server.napster.com 208.178.163.58 but the application figures out that you're behind a firewall or blocked and asks if you are. You clicks okay and then your machine is instructed to deliver the music. It isn9t just MP3 traffic, a sustained 10Mb connection is being used to deliver all sorts of traffic for free.

Jodi Santini is updating the contact update list. Please make corrections and additions and indicate what monitoring level do you want? 24X7? Please send responses to support@oar.net.

Ruth Crites provided the pricelist for DS-3 and additional T1s. Prices have to include local loop charges.

Anita
Firewalls 1make configuring access to 100 databases frustrating. OhioLINK has to work with gateway vendors and are receiving more calls for doing remote authentication . Clients are not familiar with browsers and cookies. The AOL browser does not allow cookies from anyone else; IE5.0 browser has other problems. One outsource modem company will support OARnet IP addresses. OhioLINK is adding diskspace to OhioLINK storage arrays. OhioLINK is moving into book services which will allows exclusive access to titles for a certain period.

Doug Gale indicated that educational services are offered by OARnet. Hopefully, the I2 position may serve in an education role.

Patricia Vendt, Network Services