

Network Cost Recovery Task Force
Summary Report

November 2001

Contents

This report provides detail and recommendations of the Network Cost Recovery Task Force, including:

- Executive Summary
- Members
- Background
- Mission
- Guiding Principles
- Recommendations
- Associated Conditions and Notes
- Sample Bills
- Appendices:
 - A. Scenarios Considered by the Task Force
 - B. Current Enterprise Network Costs
 - C. Proposed Academic/Administrative Cost Recovery
 - D. White Paper: Network Service Billing Strategies at Cornell
 - E. White Paper: Cornell Data Network Futures

Executive Summary

The Task Force was formed to evaluate how best to charge users of Cornell's data network resources. Since the user population's consumption patterns vary greatly, there is no simple solution.

After studying various options, the Task Force developed a rate structure recommendation for academic and administrative users with four components:

- Network Access Fee: There are two flavors of Network Access Fees.
 - Network Port Access Fee: for access to the Cornell backbone and the Internet. The fee covers access for a single user.
 - or
 - Single Port Gateway Fee: for access to the Cornell backbone and the Internet for schools and departments that provide their own Local Area Network service. A port access fee, higher than the single user fee, covers access for many users.
- Backbone/Wireless Service "Tax": Recovers the cost of the Cornell's backbone network since a portion of the traffic remains within the Cornell network. This headcount-based tax is intended to cover part of the costs of maintaining and improving the Cornell network. It is recovered by assessing a tax to departments and units based upon the number of employees and students.
- Public Port Access "Tax": Public network ports would have the cost of their use recovered through a student headcount-based tax assessed to the departments or colleges to whom the students using these public ports are accountable.
- Tiered Wide Area Network Consumption Fee: Based on actual incoming and outgoing usage that crosses the border between Cornell network and the larger Internet. There would be a tiered-fee structure to support those users (or groups of users behind a single port gateway) who generate a much higher volume of traffic. The needs of more than half of the users would be met by the terms of the lowest tier.

Taken together, these four components cover all of the academic and administrative network infrastructure cost.

The Task Force recognizes that the ResNet recovery mechanism may require modifications to the recommended structure. The operational strategy to implement the spirit of this report may be different for ResNet in comparison with general campus network services.

Members

The Task Force and invited participants met seven times over three months and included the following Cornell University Members:

Rohit Ahuja	Director, Finance, Budget, and Planning, Office of Information Technologies (Task Force Chairman)
Michael D. Anthony	Manager, Indirect Cost (Representing Joanne M. DeStefano, Acting Vice President, Financial Affairs & University Controller), Division of Financial Affairs
Richard J. Duell	Associate Director, University Budget Office
Edna R. Dugan	Assistant Vice President, Student & Academic Services
Marge H. Ferguson	Associate Dean for Business Administration, Hotel Administration Accounting Services
Ray G. Helmke	Director, Computing Facility, Laboratory of Nuclear Studies
Charles W. Kahle	Customer Services Director, Cornell Information Technologies
Dean B. Krafft	Computing Facilities Director, Computer Science Department
Joe M. Lalley III	Business Operation Director, Facilities Services
Kellie A. Page	Business Services Director, Campus Life
Jason Rhoades	Communications Products Director, Cornell Information Technologies
Robert J. Swieringa	Dean, Johnson Graduate School of Management
R. David Vernon	Director, Information Technologies Architecture, Office of Information Technologies

Background

Polley McClure, Vice President, Information Technologies, formed a Network Cost Recovery Task Force to evaluate specific mechanisms by which Cornell recovers the costs of providing data network services on campus. Cornell Information Technologies (CIT) incurs a cost of providing network services to the Cornell user community, and the general guidance from central administration has been for CIT to recover all enterprise network costs. The Cornell user community includes employees, students, and visiting scholars. The current rate structure focuses on data ports and assumes that there is one user for each network connection and that each port uses the same amount of CIT "services." However, this is not the case. Many subscribers have increased the number of users and devices per data port via "hublets" or wireless access points and a few users consume a vast majority of available Wide Area Network (WAN) resources. This complicates cost recovery, undermines notions of fairness, and results in network fragmentation. The Task Force was asked to recommend a rate structure that is fair to all and promotes scholarship.

Mission

The mission of the Network Cost Recovery Task Force is to recommend a network cost recovery process at Cornell University that will support Cornell's mission as "the best research university in the country for undergraduate students" and as an institution "where any person can find instruction in any study."

Guiding Principles

The Task Force identified the following principles as the base conditions to judge the value of any given network cost recovery process:

- Cost should be assigned to the unit incurring the cost.
- Rate structure should support a unified campus network architecture.
- Users should have an opportunity to select from multiple levels of service:
 - Universal and affordable access to basic services; and
 - Premium levels of services to allow world-class research and education.
- Network that is competitive in features, performance, and cost with
 - Our peer institutions; and
 - Commercial service providers.

Recommendations

It was the consensus of the Task Force that the guiding principles could be best met by a hybrid network cost recovery process segmented into four components.

These components are:

1. Network Access Fee: either
 - a. Fixed Network Port "Access" Fee
 - or
 - b. Single Port Gateway (SPG) Fee
2. Backbone / Wireless Service Headcount "Tax"
3. Public Port Headcount "Tax"
4. Tiered Wide Area Network (WAN) Consumption Fee

1a. Fixed Network Port "Access" Fee

To assure the best network architecture, the fees which departments pay for edge Ethernet port access should not encourage the ad hoc use of multi-port repeaters (hublets). The Task Force recommends that the network port fee reflect only the barebones edge costs. In addition, to assure fair use of backbone resources, only one user will be allowed access to any one port contracted from CIT. For example, a single contracted port cannot be used to support more than one user, but can be used to support more than one device. If more than one user wants access to a single port, the contracting party would need to purchase an "SPG" class port, outlined next (component #1b).

1b. Single Port Gateway (SPG) "Access" Fee

Some colleges or departments at Cornell elect to provide their own Local Area Network Service. These colleges or departments require Cornell's backbone and WAN services only. For these patrons there would be a monthly SPG access port fee plus a tiered rate-based WAN fee for the aggregated use of WAN resources by represented users. SPG port cost should only reflect cost associated with supporting SPG ports. The tiered rate-based fees for SPG ports and single user ports could be the same, although the lowest tier appropriate for an SPG port would be at a significantly higher volume of traffic.

As with fixed network port charges, all SPG users' colleges or departments will be assessed backbone (component #2) and public port (component #3) taxes.

2. Backbone / Wireless Service Headcount "Tax"

Backbone:

Currently 40 percent of the backbone is consumed by client access to the Internet; the remaining 60 percent is consumed by local client/server traffic. As there is currently no way to associate the cost of Cornell-to-Cornell backbone use to individual users, and as there is little correlation between total port count and backbone costs, a "headcount tax" for allocating local use of the backbone was seen as the best solution. This tax would be billed to each school or department based on the percentage of total "heads" (faculty, staff, and students) attributable to each department. The remaining 40 percent of backbone costs will be linked to WAN consumption fees outlined later (component #4).

Wireless:

The Backbone / Wireless tax should be computed to include all costs for the Red Rover wireless service. All users who have paid a fixed network port access fee or SPG access fee may use Red Rover services without additional fees. A Red Rover user who has no "wired" connection should be charged a port access fee. It is important to note that the CIT Red Rover wireless service is not intended for fixed-location use or for high-bandwidth server and client applications, but targeted to provide limited mobile network client access for the Cornell Community.

3. Public Port Headcount "Tax"

There are many public ports that provide services not easily associated with any one sponsoring college, academic department, or unit. The Task Force recommends that these facilities costs be recovered through a student headcount tax. This process would be similar to the backbone / wireless tax but would only use the student headcount as the denominator and would only be billed to colleges or academic departments to whom these students are accountable.

The Task Force recommends that a committee with appropriate campus representation be created to assure proper identification of ports to be covered by this tax by reviewing and approving any public port classification requests.

4. Tiered Wide Area Network (WAN) Consumption Fee

Internet network access costs are high and consumption can vary greatly from user to user, and the Task Force concluded that it was important to provide users cost "feedback" for WAN resource consumption. In order to allow stable budgeting at the department or individual level, it was considered critical that users be allowed to purchase tiered service based on their expected level of need. In turn, CIT would track the WAN usage for each contract, and if consumption exceeded the contracted level, the patron, within a reasonable time, would be required to reduce their consumption or "upgrade" the existing service contract and pay any new applicable fees. Where technologically feasible, CIT may jointly develop an arrangement with the departments and units which would like to limit their consumption.

Inherent in the tiered service is the notion of a universally affordable base service contract that would address the needs of 50 to 80 percent of users.

Associated Conditions and Notes

The Task Force considered the following conditions.

Campus Rewire Costs:

The Task Force generally believes that any expense associated with the campus wire plant should not be reflected in network costs charged to colleges or departments. This belief is based on the following three observations:

- Some colleges or departments on campus have already capitalized upgraded wire from alternative funding sources and therefore any general network cost associated with the backbone or WAN rates would unfairly "double bill" them.

- Including wiring costs associated with selected building fixed network port fees would inflate port costs and encourage the proliferation of "hublets."
- It is difficult to predict applications that would require an enhanced physical infrastructure in the future. Hence the re-cabling of the campus buildings falls into the category of "future-proofing" or investing in future capability. Given this, many colleges or departments believe that they should be allowed to set their own cost priorities relative to any rewiring project.

If it is determined that the campus will move forward with a campus-wide rewiring project, the Task Force recommends that a new committee be formed to consider cost allocation options, i.e., the potential for the building wire to be recovered through a central source or incorporated back into the network rate.

Cost-to-Cost Causer Relative to ResNet Services:

It was the consensus of the Task Force that ResNet expenses should not be recovered through inflated general campus network cost recovery charges. CIT should continue to adjust ResNet rates to the point of market acceptance. The remaining deficit should be covered by the central administration and other mechanisms identified by EBG.

Implementation of Headcount Tax:

The Task Force acknowledged that some members are concerned about the implementation of headcount tax for employees who have no direct access to or need for network resources. The Task Force further noted that it is important to recognize that every employee indirectly consumes network resources through our administrative systems. A majority of Task Force members supported an equal headcount tax charge across all employee classes. The Task Force recommends that CIT make every effort to ensure that implementation of the headcount tax is fair and no one is counted twice.

Operational Complexity:

The Task Force recognizes that tiered rate billing will require additional operational overhead and associated costs. The Task Force also recognizes that the operational strategy to implement the spirit of this report may be different for ResNet than for general campus network services. Information about current costs and the recovery of those costs under this proposal can be found in Appendices B and C.

Sample Bills

The following hypothetical charges depict the above network cost recovery process. These are for illustrative purposes only. The actual charges will reflect the network cost and consumption at the time the network cost recovery process is implemented. However, it is important to recognize that the Task Force shaped its recommendations in the context of these and similar hypothetical charges.

Standard Network Service Bill

Sample number 1:

Account number: XXXXX Department: YYYYYY	
Monthly port fee:	\$ 7.50
Tier one WAN service agreement:	\$ 5.50
Total monthly bill:	\$ 13.00

Sample number 2:

Account number: XXXXX Department: YYYYYY	
Monthly port fee:	\$ 7.50
Tier three WAN service agreement:	\$ 60.00
Total monthly bill:	\$ 67.50

SPG Service Bill

Account number: XXXXX Department: YYYYYY	
Monthly ISP port fee:	\$ 45.00
Tier eight WAN service agreement:	\$ 650.00
Total monthly bill:	\$ 695.00

Public Port Tax Bill

Account number: XXXXX Department: YYYYYY	
Total student headcount applicable:	250
Cost per head:	\$ 1.90
Total monthly bill:	\$ 475.00

Backbone Tax Bill

Account number: XXXXX Department: YYYYYY	
Total headcount applicable:	300
Cost per head:	\$ 4.35
Total monthly bill:	\$ 1,305.00

Appendices

- A. Scenarios Considered by the Task Force
- B. Current Enterprise Network Costs
- C. Proposed Academic/Administrative Cost Recovery
- D. Network Billing Strategies at Cornell
- E. Cornell Data Networking Future