Proposed Internet2 Fee Model Changes  
February 2013

Background
The deployment of the new Internet2 Network (see Appendix A for map) provides the best opportunity for the Internet2 community to redefine advanced networking for research and education for our nation. Thanks to the investment our research universities, and others in our community, have made over the past decade and a half, Internet2 is in a position to deploy an advanced network to help us solve the great challenges of “big science”, develop transformative educational models, bring greater efficiencies to the business of education and better serve research and education. These changes have presented an opportunity for Internet2 and its members to review the 15-year old network fee model and to develop a new one for the years ahead.

Internet2 staff has been exploring ways to evolve the current fee model and ensure our membership is able to make the best use of Internet2’s new network capacity and capabilities. The development and review of network fee models has involved the work of the NAOPpag (formerly AOAC) ¹Fee Subcommittee (see Appendix B for a list of Fee Subcommittee members) as well as the engagement of the Internet2 community. Beginning late in 2011, the Fee Subcommittee was convened to review current network fees and work with Internet2 staff on the creation of a new fee model.

Additionally, Internet2 staff has engaged the community through listening tours (see list in Appendix E) that have included the participation and active involvement of over 50 CIOs and 18 regional executives, sharing a vision for moving forward as a community and gathering input on how to implement the changes. During the Internet2 Fall Member Meeting, a report on progress made by the fee subcommittee and the outcomes of the listening tours conducted up to that point was provided to CIOs and regional executives. A timeline of events is included in Appendix D.

Proposed Fee Model Changes

The Fee Subcommittee began their work by creating a set of principles (see Appendix C) that guided the discussions and formed the foundation for the development of the fee models that were considered. Internet2 staff developed three new fee models that were studied by Fee Subcommittee. After review, the Fee Subcommittee endorsed a fee model that reduces port fees and increases the Participation Fees for Level 1 Universities² (see Appendix F for list) by $30,000 per year, shifting about $3M from port fees to participation fees. The Fee Subcommittee and CIO’s who participated in the listening tours indicated that this model provides the greatest opportunity for full utilization of the new capabilities of the Internet2 network, while causing the least disruption to current

¹ Network Architecture, Operations and Policy program advisory group (NAOPpag) Architecture and Operations Advisory Council (AOAC)
² Internet2 Level 1 members include those universities who are classified as “Very High Research” by Carnegie.
connector and regional/state networks’ business models. *Other fee changes include an increase of $5000 to the base SEGP fee for each state.* During the listening tours, Internet2 staff heard comments from CIOs indicating that the increased fee for Level 1 research universities seemed to be consistent with founding principles of Internet2, with the institutions most likely to benefit from the increased capacity and capabilities providing the funding necessary to launch the new architecture for end-to-end 10G connectivity.

Based on the results of a survey of regional network executives, Internet2 staff proposed a flat-fee-per-port model that allows connectors and network members to pay the same fee regardless of the capacity of the port. These Layer 2/3 ports allow access to all of the traditional services available on the network, and new Advanced Layer 2 Services.

<table>
<thead>
<tr>
<th>Port Size</th>
<th>Current Price</th>
<th>Proposed Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>10Gbps</td>
<td>$480,000</td>
<td>$200,000</td>
</tr>
<tr>
<td>2x5 Gbps</td>
<td>$375,000</td>
<td>$400,000</td>
</tr>
<tr>
<td>2x10Gbps</td>
<td>$525,000</td>
<td>$400,000</td>
</tr>
<tr>
<td>L2/L3 100Gbps*</td>
<td>$800,000</td>
<td>$200,000</td>
</tr>
<tr>
<td>L2-only 100Gbps</td>
<td>$165,000</td>
<td>$165,000</td>
</tr>
<tr>
<td>L2-only 10G</td>
<td>$40,000</td>
<td>$40,000</td>
</tr>
</tbody>
</table>

* Includes up to 20Gbps of TR/CPS for each 100G port

The port fee is based on adoption of a total of forty-five Layer 2/3 ports across the country, a number that should be achievable based on survey results. Should we obtain a commitment for a lower number of ports, the port fee will need to be increased. As we increase the number of ports, we may be able to lower the participation fees paid by the Level 1 University members. While Internet2 staff expects the Layer 2/3 ports to be in demand, the community has articulated a continuing need for Layer 2-only ports to support researchers and to provide a test-bed for software defined networking initiatives.

We understand that any increase in operating expenses presents difficulties for most universities today. We have given the Participation Fee increase a great deal of consideration. With only a few exceptions, the 50+ CIOs of Level1 schools have told us they feel this is the right model to promote the best use of the new network. *We welcome your input, as well, as we bring this proposal forward for final approval.*

Sincerely,

George K. Loftus,
Associate Vice President Network Services – Internet2
GKLoftus@Internet2.edu

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3 The fees described herein are proposed by the staff of Internet2 and have been endorsed by the NAOPpag. They will not become official until the Audit and Finance Committee of the Internet2 Board of Trustees approves the proposed fees and will not be in effect before January 2014.
Appendix A

Internet2 100G Infrastructure

Please note that there is now an Advanced Layer 2 Service node in Jacksonville. Future versions will be available at: http://www.internet2.edu/pubs/Internet2-Network-Infrastructure-Topology.pdf
Appendix B

Fee Subcommittee Members

We would like to thank the members of the Fee Subcommittee listed below for their hours of dedication to this effort. They have been committed to this project, and spent hours developing the principles that guided this effort. They then spent hours in meetings going over very complex business model spreadsheets. They have provided great insights to the staff and shared their views on how we might move forward in ways that would benefit the entire community ecosystem. We certainly would not have made this progress without their guidance and dedication.

- Dave Gift, Michigan State University, Chair
- Steve Corbato, University of Utah
- Elias Eldayrie, University of Florida
- Ron Hutchins, SoX
- Harvey Newman, California Institute of Technology
- Brian Savory, Optelian
- Tripti Sinha, University of Maryland/MAX
Appendix C

Internet2 business model guidelines
(developed by the NAOPpag Fee Subcommittee)
WORKING DRAFT, update 4 September 2012

Internet2 purposes

1. Assure that the data networking needs of higher education, and particularly of research universities, continue to be met -- in the recognized absence of a national data networking strategy and the understandable shortcomings of commercial enterprise to meet specialized networking needs at times when sufficient ROI is not envisioned. In order to meet this assurance need

   a. Provide a mechanism/venue in which to organize planning, analysis, etc., regarding these needs

   b. Operate a national networking backbone service to support innovation and advanced services as well as traditional services.

   c. Provide a mechanism by which Higher Education institutions may speak or advocate “with one voice” on matters of data networking

   d. Support the needs of researchers by providing a platform that drives innovation

   e. Manage the collaboration/leadership balance

   f. Provide transparency of revenue and expenses, including the value proposition for each type of fee, recognizing that some fees may include support for other programs/initiatives for the greater good of the community

Community Perspectives

1. For universities and colleges to succeed in the broader transformation of higher education it will require the successful collaboration and cooperation of campus, state, regional, and national networks to deploy and support new and better networks and network-based services to our collective membership.

2. From an ecosystem perspective, we should optimize our collective investment and not spend more on services or architectures than is necessary and prudent.
3. As a community, we need to get to a vocabulary of "we" instead of us vs. them.

4. Competition can be very healthy in the right context but it can also be damaging in the wrong context; as a community we need to acknowledge that the outcome depends largely on the circumstances, and we need to be thoughtful and informed about where we pursue it and where we avoid it.

Architectural and business model guidelines

1. The architecture and operation of the Internet2 national backbone should be driven primarily by its purposes, good network engineering principles, and cost-effective operation. The associated business model should NOT drive architectural, service or operational designs (or, at least, should impose only the very smallest of impacts).

2. Our national interests are best served if Internet2 AND the regional networks are successful.
   a. The Internet2 business model should help regional networks to be implemented and operate in useful and cost-effective ways.
   b. The Internet2 business model should not drive regional networks to avoid use of Internet2 services.
   c. The Internet2 business model should encourage (not discourage) membership and active collaboration with regional networks.
   d. The Internet2 business model recognizes the inherent tension along the competition/collaboration continuum for national and regionals for distribution of revenue and open communication is central to the solution.
   e. The Internet2 business model should support aggregation that makes sense

3. The Internet2 business model should:
   a. encourage (not discourage) membership and participation by small and non-research institutions
   b. encourage (not discourage) use of the Internet2 network
   c. encourage (not discourage) growth within the constituencies
   d. encourage (not discourage) business policies that serve members
   e. encourage (not discourage) collaboration with regionals to grow the pie together for all
   f. create a cost/benefit ratio that is sensible for the members
   g. ensure that Internet2 is financially viable
h. create a value proposition for each fee
i. link services to revenues
j. provide information regarding unfunded services that contribute to the greater good of the community
k. provide a multi-year budget for the network
l. provide transparency into costs and fees
Appendix D

Timeline of the Network Fee Process

December 2011:
AOAC formed a fee subcommittee to review the network fees; they began by creating a set of guidelines to be considered when creating new network fees as well as reviewing the current fee model and some suggested fee models. The Guidelines document is found in Appendix C.

July 2012:
Three models were presented to the fee subcommittee for their review and consideration.

August 2012:
Internet2 staff began Listening Tours with CIOs and their regional leadership (see detailed list of tours at the end of the document). The three models were presented during the listening tours and the listening tour participants provided feedback on the models.

The fee subcommittee provided feedback on the models.

October 2012:
During the Internet2 Fall Member Meeting, network fees and the fee models were discussed with the CIOs, the regionals and in a combined meeting of the CIOs and regionals

Listening Tours continued.

Based on the feedback from the Listening Tours and the discussions during the Fall Member Meeting, the fee subcommittee endorsed a fee model that shifts about $3M from port fees to Level 1 participant fees with the result being that port fees are decreased without an overall increase in fees to the higher education community

November 2012
Listening Tours continued.

Using the model endorsed by the fee subcommittee, Internet2 staff created several fee scenarios with varying levels of adoption of 100G ports. The scenarios had been discussed with the community during the listening tours, and formed the basis for the survey questions. In the survey, data was sought to inform Internet2 staff as to how many ports and at what speeds the community plans to adopt through 2015. The results of the survey will assist Internet2 staff in the continuing community discussions and the setting of fees.

December 2012
Listening Tours continued.
Survey responses returned by the regionals.

*January 2013*
Listening Tours continued.

Survey follow-up conversations were held with individual network members and connectors and their associated CIOs to determine the overall needs of each regional.

*Upcoming Milestones:*

*February 2013*
Survey follow-up conversations were held with individual network members and connectors and their associated CIOs to determine the overall needs of each regional.

Final report and recommendations from fee subcommittee are presented to the full NOAPpag. NAOPpag will then submit their recommendation to the AVP of Network Services.

*March 2013*
Final internal Internet2 financial analysis and review of fees.
Review of fees by Internet2 Board Audit and Finance Committee.
Interim fees made available to regions that are eager and able to move to the new fees early.

*January 2014*
Implementation of new fees. Members should plan for the new fees structure to be fully implanted and in effect by July 1, 2014.
Appendix E

Listening Tours
August, 2012
FLR, August 5-6, 2012
CIC Omnipop CIOs, August 29-30

September 2012
LEARN Executive Committee, September 10
Presentation at Quilt Fall Member Meeting, September 13
MCNC Advisory Council, September 27

October 2012
LONI, October 9
MissiON, October 10
MARIA, October 18

November 2012
FRGP and CO/WY CIOs, November 7
UEN and University of Utah, November 13
NOX, November 20
Ohio Valley Internet2 Consortium, November 27

December 2012
GPN, December 4
CENIC, December 5
LEARN Board, December 6-7
3ROX/Drexel, December 10

January 2013
MAGPI and 3ROX/Drexel, January 30
Appendix F

Level 1 Institutions

Arizona State University
Boston University
Brandeis University
Brown University
California Institute of Technology
Carnegie Mellon University
Case Western Reserve University
City University of New York
Colorado State University
Columbia University
Cornell University
Dartmouth College
Duke University
Emory University
Florida State University
George Washington University
Georgetown University
Georgia Institute of Technology
Georgia State University
Harvard University
Indiana University
Iowa State University
Johns Hopkins University
Louisiana State University
Massachusetts Institute of Technology
Michigan State University
Mississippi State University
Montana State University - Bozeman
New York University
North Carolina State University
Northwestern University
Ohio State University
Oregon State University
Pennsylvania State University
Princeton University
Purdue University
Rensselaer Polytechnic Institute
Rice University
Rutgers University
Stanford University
Stony Brook University
Texas A&M University
Tufts University
Tulane University
University at Albany, SUNY
University at Buffalo, SUNY
University of Alabama at Birmingham
University of Alabama Huntsville
University of Arizona
University of Arkansas
University of California Davis
University of California Irvine
University of California Los Angeles
University of California Riverside
University of California San Diego
University of California Santa Barbara
University of California Santa Cruz
University of California, Berkeley
University of Central Florida
University of Chicago
University of Cincinnati
University of Colorado at Boulder
University of Connecticut
University of Delaware
University of Florida
University of Georgia
University of Hawaii
University of Houston
University of Illinois-Chicago
University of Illinois-Urbana
University of Iowa
University of Kansas
University of Kentucky
University of Louisville
University of Maryland - College Park
University of Massachusetts
University of Miami
University of Michigan
University of Minnesota
University of Missouri - Columbia
University of Nebraska-Lincoln
University of New Mexico
University of North Carolina, Chapel Hill
University of Notre Dame
University of Oklahoma
University of Oregon
University of Pennsylvania
University of Pittsburgh
University of Rochester
University of South Carolina
University of South Florida
University of Southern California
University of Tennessee
University of Texas at Austin
University of Utah
University of Virginia
University of Washington
University of Wisconsin- Madison
Vanderbilt University
Virginia Commonwealth University
Virginia Polytechnic
Washington State University
Washington University in St. Louis
Wayne State University
West Virginia University
Yale University