FY ‘11 NETWORK PLANNING TASK FORCE

Final Rate Setting Meeting
Agenda

- Service enhancements
- Operating efficiencies
- PennNet Phone update
- Review of FY ‘11 requested initiatives
- FY’12 CSF monies requested
- Other FY ‘12 proposed rates
FY‘11 Service Enhancements

- All closet electronics gig capable
- 100+ buildings/complexes with dual gig connections (list posted soon in 10/18 slides)
- Single-mode fiber to 146 buildings
- 1850 wireless access points upgraded to “N”
  - Increased capacity & security
  - Improved provisioning coming soon
- Internet bandwidth increased from 1.25 Gig to 2 Gig
FY’11 Service Enhancements

- Addressing researchers’ needs by providing high-speed infrastructure from their lab to their collaborators
  - MAGPI bandwidth increased from 2.5 Gig to two–5 Gig circuits
  - Deployed ION (interactive bandwidth on demand) connectivity at Penn, to further reduce cost versus a permanent connection
  - Upgraded DWDM infrastructure (Penn to Telecomm Hotel/MAGPI) from 1 to 10 Gig, will enable 5 Gig capability for ION or dedicated wavelengths to Internet 2
  - Penn’s Internet2 bandwidth increased from 200 to 500 Meg, 2X burst at no additional cost from MAGPI
FY‘11 Operating efficiencies

- Strategic efforts to keep rates level, despite greatly enhancing capacity
  - Deferred core router/core switch purchases to FY’12 & increased depreciation from 5 to 6 years
  - Continued concerted server virtualization efforts
  - Continued strong negotiations with all vendors
  - Continued efforts to keep headcount level, despite sizable increases in ports, IPs APs, etc.
    - FY’05 to FY’11 headcount increased from 80 to 82
    - No increase in headcount projected FY’12–FY’16
  - Continue to manage down Internet costs by limiting ResNet aggregate bandwidth
Client Impact of Operating Efficiencies

- CSF rate very stable over the last 4 years
- FY‘12 rate request is 2% lower than FY’08 despite many enhancements
- Gig port rate reduction will save customers over $108k in FY’12 (25% reduction—$15 vs. $20/month)
- Student telephone fees reduced $400k in FY’11 by elimination of mandatory service
- Telephone audits saving customers $100k
- PennNet Phone and audits will save Penn community over $1M annually by project completion
PennNet Phone – Challenges

- We are keenly aware of service reliability and feature issues and have re-focused internal resources to solve the problems and are pressing our vendors as well
- BLA – capability to place a call on hold and pick-up from another set
  - Solution anticipated 3Q/FY’11
- NG infrastructure upgrades to increase reliability
  - Connecting to the PSTN
    - From PRIs to SIP Trunks (Verizon)
    - From gateways to SBCs (Cisco–Juniper)
  - Proxy services
    - From SER to SIP–router
  - Presence services
    - From OpenSER to OpenSIPS
PennNet Phone – Update

- Over 6,000 PennNet Phones in production
- Limited installations continue during BLA issues
- Free telephone wiring/conversions through FY’12
- Monthly training sessions well attended
  - Telephone Support Provider (3rd Tuesday/month)
  - Customer (1st and 2nd Tuesday/month)
  - On-site training sessions offered
- Getting started “post–its” provided with phones
- Remedy web services grow
  - Reporting problems (6AM–11PM support)
  - Monitor ticket progress
    - [http://www.upenn.edu/computing/voice/help/repair.html](http://www.upenn.edu/computing/voice/help/repair.html)
Review of Requested Initiatives for FY’12

- Intrusion Detection Systems
- 2-Factor
  - Productionizing central infrastructure & support
- Wireless
  - Open guest network
  - Full campus deployment
- Network SLA
Effective, real-time identification of network-based attacks and/or policy violations

Ability to correlate related network attacks to/from multiple sources across the University

Robust packet inspection capabilities (more than a limited sample of data, more than just header data)

Various IT stakeholders, including InfoSec, have requested IDS in an effort to improve the visibility of security events at the local and campus level

IDS is an important option to have available in the information security toolkit. It can help Penn better understand our current posture and inform future initiatives, including what proactive measures are most worthy of investment
Four options for moving forward

- Option 1: ($0)
  - Do nothing

Option 2: $11,250
  - Study the options, write a report recommending solution

Option 3: $38,750
  - Study the options, write a report recommending solution
  - Implement limited pilot of chosen solution

Option 4: Enterprise-wide vendor solution (cost unknown, further analysis required)
2-Factor Authentication

- In FY’11 NPTF funded $25k for pilot central infrastructure.
  - We are currently doing two pilots.
    - RSA SecurID (hardware token)
    - PhoneFactor (phone call) two channel authentication
- By the Spring, we will have a recommendation on how best to proceed
- In order to productionize the central infrastructure and provide TSS support for a limited set (less than 500) of additional users the funding needed would be $75,000
- Should we take this next step or should we wait and shut down the pilot infrastructure?
Customers have requested the following changes to the existing Network SLA

- Quicker than 4 hours guaranteed response from their email tickets to ProDesk
- Customers want us to reflect the more critical nature of wireless as a service and not just as an overlay or supplemental network
  - Total building wireless – P2 critically
  - Single AP – P3 critically
- Quicker and more proactive communications for network outages
  - [http://www.upenn.edu/computing/pennnet/maintschedules.html](http://www.upenn.edu/computing/pennnet/maintschedules.html)
Network SLA Follow-up

- Customers want visibility to Remedy tickets like FRES
- Customers want to be better informed of upgrades and tickets we do in the off hours
  - NOC will soon enter Remedy tickets
- For really critical things, customers want access to the NOC directly
- Customers asked about details on current operational services
  - Enhanced service for special events
  - VIP rate or SLA on some special ports
- Customers want an occasional “I want you here now process.”
- If a seasoned professional is calling into the ProDesk, customers want us to bypass some of the very basic information that is requested. (ProDesk Triage)
Priority 1 (P1) Critical Infrastructure Problem
- Outage to all or a significant part of PennNet

Priority 2 (P2) Major Networking Problem
- Outage involves 96 or more user ports

Priority 3 (P3) Intermediate Networking Problem
- Outage involves at least 10 and not more than 96 user ports

Priority 4 (P4) Limited Networking Problem
- Outage involves fewer than 10 users

<table>
<thead>
<tr>
<th>Priority Level</th>
<th>ProDesk (9–5)</th>
<th>After Hours</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 Critical Infrastructure</td>
<td>Near Immediate</td>
<td>Within 30 Minutes</td>
<td>Work Until Resolved</td>
</tr>
<tr>
<td>P2 Major</td>
<td>Within 1 Hour</td>
<td>Within 2 Hours</td>
<td>Within 24 Hours</td>
</tr>
<tr>
<td>P3 Intermediate</td>
<td>Within 2 Hours</td>
<td>Next Business Day</td>
<td>Next Business Day</td>
</tr>
<tr>
<td>P4 Limited</td>
<td>Within 4 Hours</td>
<td>Next Business Day</td>
<td>Next Business Day</td>
</tr>
</tbody>
</table>
APs/wireless controllers are monitored by the NOC

4 Controllers in n+1 configuration
- Max AP count per controller card = 512
- Average client associations per AP across campus = 13

AirPennNet SLA
- Loss of service to 1 controller = P2 – Major
- Loss of service to > 6 APs = P2 – Major
- Loss of service to 1 to 6 APs = P3 – Intermediate

AirPennNet–Guest
- Loss of service to > 6 APs = P3 – Intermediate
- Loss of service to 1 to 6 APs = P4 – Limited
PennNet Enhanced SLA Services

- ISC will work with customers to identify critical network ports, servers and network applications.
  - Offers ability for rapid response to network incidents
- ISC can also provide network design options and enhanced network monitoring to provide higher available services
  - VIP ports or firewalls
  - Redundancy designs for high profile networks
  - Output results in enhanced SLA to pre-identify all critical areas
- Request an SLA network consultation
  - Contact us at 6–6000 or
  - [http://www.upenn.edu/computing/isc/networking/orderforms.html](http://www.upenn.edu/computing/isc/networking/orderforms.html)
ISC provides technicians to support special events during the business day, evenings and weekends (Penn Relays, VIP guests, etc.)

Request a special event consultation
- [http://www.upenn.edu/computing/isc/networking/orderforms.html](http://www.upenn.edu/computing/isc/networking/orderforms.html)

PennNet labor rates (FY’11)
- [http://www.upenn.edu/computing/isc/networking/rates/labor.html](http://www.upenn.edu/computing/isc/networking/rates/labor.html)

<table>
<thead>
<tr>
<th>PennNet Support Level</th>
<th>Monday–Friday 9–5</th>
<th>After Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Tier Support</td>
<td>$65/hour</td>
<td>$97.50/hour</td>
</tr>
<tr>
<td>Second Tier Support</td>
<td>$90/hour</td>
<td>$135/hour</td>
</tr>
<tr>
<td>Third Tier Engineering Support (router configuration, network analysis, etc)</td>
<td>$120/hour</td>
<td>$180/hour</td>
</tr>
</tbody>
</table>

*Note: Unscheduled weekend support or Sunday support would be 2x hourly labor rates*
Two New Customer Remedy Services

- **PennNet/Remedy Notification Service**
  - ISC will trial a PennNet web service Q3/FY’11
  - Volunteers will be invited to participate in trial
  - Unplanned and planned PennNet network maintenance tickets will be displayed, except security tickets
  - Building/location of incident will be included
  - All incidents will be displayed for all organizations
    - Name of customer who submitted the ticket will be excluded
    - Access to notification service
      - Current proposal is to allow only FT staff to have access
      - Managed access through Grouper service at later date

- **MyServiceRequests – Remedy Service**
  - Individuals may review the status of their own tickets
  - [http://www.upenn.edu/computing/voice/help/repair.html](http://www.upenn.edu/computing/voice/help/repair.html)
“Customer Override – Charge me if I am wrong”

- Intended for ticket escalation and priority dispatch during critical outages or urgent issues
- Director level or designee would be authorized
- When reporting the problem to the ProDesk, please indicate that this is a local priority and immediate on-site support is requested. Please provide a local point-of-contact.
- ProDesk will immediately contact the NOC who will follow up directly with the local contact to coordinate onsite response
- We will begin piloting this in January 2011
SLA Follow Up (New From ProDesk)

- **Direct access to NOC**
  - Will develop a web-based form that enables LSPs to submit incidents directly to the NOC queue
    - Provides a better and faster alternative for LSPs that had been using email for network requests in order to have a structured record of the request
    - Required fields necessary or gets kicked back to ProDesk

- **ProDesk Triage**
  - Currently rewriting business rules and reviewing existing practices in order to streamline the intake process for LSPs
Response times

- For email, the goal will be to respond in less than 1 hour after ProDesk receives the message
  - Currently integrating email management with ACD.
  - Rewriting business rules and exploring alternatives to accurately measure response time performance.
- Issues needing rapid response should still be submitted by phone, which will always be given precedence over email.
- We recommend leaving the email SLA at 4 hours even though we intend to meet the desired 1 hour response most if not all of the time.
## Current Network SLA

<table>
<thead>
<tr>
<th>SLA Commitments</th>
<th>6am to 9am</th>
<th>9am to 5pm</th>
<th>5pm to 11pm</th>
<th>11pm to 6am</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOC Hours of Operation</td>
<td>NOC Open</td>
<td>NOC Open</td>
<td>NOC 2nd Shift Open</td>
<td>NOC On call</td>
</tr>
<tr>
<td>ProDesk Hours of Operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOC Response Time P1</td>
<td>Near Immediate</td>
<td>Near Immediate</td>
<td>Near Immediate</td>
<td>Within 30 Minutes</td>
</tr>
<tr>
<td>ProDesk Forward to NOC Email/Phone</td>
<td></td>
<td></td>
<td>Email up to 4 Hrs/Phone Immediate</td>
<td>Email NBD/Phone NBD/VM Page</td>
</tr>
<tr>
<td>NOC Response Time P2</td>
<td>Within 1 Hr</td>
<td>Within 1 Hr</td>
<td>Within 1 Hr</td>
<td>Within 2 Hrs</td>
</tr>
<tr>
<td>ProDesk Forward to NOC Email/Phone</td>
<td></td>
<td></td>
<td>Email up to 4 Hrs/Phone Immediate</td>
<td>Email NBD/Phone NBD/VM Page</td>
</tr>
<tr>
<td>NOC Response Time P3</td>
<td>Within 2 Hrs</td>
<td>Within 2 Hrs</td>
<td>Within 2 Hrs</td>
<td>Within 4 Hrs (6hrs after 12am)</td>
</tr>
<tr>
<td>ProDesk Forward to NOC Email/Phone</td>
<td></td>
<td></td>
<td>Email up to 4 Hrs/Phone Immediate</td>
<td>Email NBD/Phone NBD/VM Page</td>
</tr>
<tr>
<td>NOC Response Time P4</td>
<td>Within 4 Hrs</td>
<td>Within 4 Hrs</td>
<td>Within 4 Hrs</td>
<td>Next Business Day</td>
</tr>
<tr>
<td>ProDesk Forward to NOC Email/Phone</td>
<td></td>
<td></td>
<td>Email up to 4 Hrs/Phone Immediate</td>
<td>Email NBD/Phone NBD/VM Page</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOC Repair Time P1</th>
<th>Work Until Resolved</th>
<th>Work Until Resolved</th>
<th>Work Until Resolved</th>
<th>Work Until Resolved</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOC Repair Time P2</td>
<td>Within 24 Hrs</td>
<td>Within 24 Hrs</td>
<td>Within 24 Hrs</td>
<td>Within 24 Hrs</td>
</tr>
<tr>
<td>NOC Repair Time P3</td>
<td>By Start of NBD</td>
<td>By Start of Next Business Day (NBD)</td>
<td>By Next Business Day (NBD)</td>
<td>Next Business Day (NBD)</td>
</tr>
<tr>
<td>NOC Repair Time P4</td>
<td>By NBD</td>
<td>By Next Business Day (NBD)</td>
<td>By Next Business Day (NBD)</td>
<td>Next Business Day (NBD)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communicate Time/Freq. P1/Target Campus</th>
<th>First Communications Campus-Wide Announcement within 2 hrs if Outage Severity Warrants. Update Interval in Message</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ProDesk Communications - Pro Alert or Email</td>
<td>Same As NOC P1</td>
<td></td>
</tr>
<tr>
<td>Communicate Time/Freq. P2/Target Area LSP</td>
<td>First Communications IT Support Staff or LSP within 4 hrs if Outage Severity Warrants</td>
<td>Update Interval in Message</td>
</tr>
<tr>
<td>ProDesk Communications - Phone or Email</td>
<td>At Start of Business Day</td>
<td></td>
</tr>
<tr>
<td>Communicate Time/Freq. P3/Target Ticket Red</td>
<td>First Communications Ticket Requestor within 4 hrs. Update by end of Shift (in ticket)</td>
<td>Update By Start of Next Business Day</td>
</tr>
<tr>
<td>ProDesk Communications - Phone or Email</td>
<td>At Start of Business Day</td>
<td></td>
</tr>
<tr>
<td>Communicate Time/Freq. P4/Target Ticket Req</td>
<td>First Communications Ticket Requestor within 4 hrs. Update by end of Shift (ins ticket)</td>
<td>Update By Start of Next Business Day</td>
</tr>
<tr>
<td>ProDesk Communications - Phone or Email</td>
<td>At End of Business Day</td>
<td></td>
</tr>
</tbody>
</table>

**Chart Color Codes**
- ISC NOC Manned Hours
- ISC NOC Un-Manned Hours
- ISC NOC On call Hours
## Review of FY ‘12 Initiatives

<table>
<thead>
<tr>
<th>Initiatives with no rate increases in FY’12</th>
<th>Initiatives with potential cost increases in FY ‘12</th>
<th>Initiatives with incremental costs in FY’13 and beyond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next Generation PennNet</td>
<td>2–Factor productionizing central infrastructure and TSS support Intrusion Detection Systems</td>
<td>Wireless full campus deployment</td>
</tr>
<tr>
<td>More dual gig buildings</td>
<td></td>
<td>Next Generation PennNet</td>
</tr>
<tr>
<td>More single-mode fiber to buildings</td>
<td></td>
<td>10 gig in–building backbones faster than 10–15 a year</td>
</tr>
<tr>
<td>10 Gig in–building backbones &amp; new BE equipment</td>
<td></td>
<td>UPS to closets and building entrance equipment</td>
</tr>
<tr>
<td>100 gig core router and switches</td>
<td></td>
<td>Security</td>
</tr>
<tr>
<td>Internet connectivity increase from 2 to 3 gig</td>
<td></td>
<td>Expanded 2–Factor Authentication deployment</td>
</tr>
<tr>
<td>IPv6 continued deployments</td>
<td></td>
<td>Expanded IDS deployments</td>
</tr>
<tr>
<td>Enhancements to network and ProDesk SLAs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Remedy web services</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Wireless full campus deployment**
- **Next Generation PennNet**
  - 10 gig in–building backbones faster than 10–15 a year
  - UPS to closets and building entrance equipment
- **Security**
  - Expanded 2–Factor Authentication deployment
  - Expanded IDS deployments
CSF Bundle of Services

- Campus Backbone Infrastructure
- Internet and Internet2 access
- Bandwidth Management
- IPv6, Multicast and Advanced Networking
- Public Wireless Subsidy
- NAP Operations/Fiber and Cable Management
- NOC Services and Network Management
- Penn's Main Web and Central Pages
- Online Directory and LDAP access
- Classlists and SMTP Mail Relay
- University Calendar Service
- Infrastructure Software Services
  - DNS, DHCP, NTP
- Security/ID Management
  - Kerberos, KITE, RADIUS
  - Penn WebLogin (CoSign and Shibboleth)
  - The InCommon Federation
  - Authorization (Penn Groups)
  - PennNames and Penn Community Services
  - Wireless Authentication & Support
  - AirPennNet Guest Self Service
  - DNSSEC
  - Vulnerability Scanning
  - Security Tools, Education, and Response
  - PennKey School Support
  - PGP Whole Disk Encryption LSP Support
CSF Funding Requests

- FY‘11 funds requested to do CSF bundle of services $5,082,919
- FY ‘12 funds requested to do the base CSF bundle of services $5,091,857 (assumes a 3% salary increase)
- The projected IP rate is $1.46 down from $1.54 in FY’11

Additional CSF Funding Request

<table>
<thead>
<tr>
<th>Cost</th>
<th>Percent Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY '11 CSF Aproved request</td>
<td>$ 5,082,919</td>
</tr>
<tr>
<td>FY '12 CSF base request</td>
<td>$ 5,091,857</td>
</tr>
<tr>
<td>2-Factor productionizing central infrastructure &amp; TSS support</td>
<td>$ 75,000 Approved by NPTF</td>
</tr>
<tr>
<td>IDS-R&amp;D/revise strategy document &amp; Pilot</td>
<td>$ 38,750 Approved by NPTF</td>
</tr>
<tr>
<td>TOTAL CSF FOR FY'12</td>
<td>$ 5,205,607</td>
</tr>
</tbody>
</table>

2-Factor report will be reviewed in Spring before proceeding
# FY’12 Proposed Monthly Rates

<table>
<thead>
<tr>
<th>SERVICE</th>
<th>FY ’11 RATE</th>
<th>FY ’12 PROPOSED RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NETWORK</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10baseT port charge</td>
<td>$5.00</td>
<td>$5.00</td>
</tr>
<tr>
<td>100baseT port charge</td>
<td>$5.00</td>
<td>$5.00</td>
</tr>
<tr>
<td>1000baseT port charge</td>
<td>$20.00</td>
<td>$15.00</td>
</tr>
<tr>
<td>Wireless Access Point without vLAN &amp; port</td>
<td>$25.75</td>
<td>$25.75</td>
</tr>
<tr>
<td>vLAN Charge</td>
<td>$1.25</td>
<td>$1.00</td>
</tr>
<tr>
<td><strong>PHONES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional services (lines, set, usage, long distance)</td>
<td>See next page</td>
<td>See next page</td>
</tr>
<tr>
<td>Phone (VoIP)</td>
<td>See next page</td>
<td>See next page</td>
</tr>
<tr>
<td><strong>VIDEO</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penn Video Network</td>
<td>$17.50</td>
<td>$18.50</td>
</tr>
<tr>
<td>Video Production, Conferencing, Streaming</td>
<td>No rate increases</td>
<td>Slight increases</td>
</tr>
<tr>
<td><strong>HOURLY RATES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Project Managements /Consulting</td>
<td>No rate increase</td>
<td>Slight increases</td>
</tr>
</tbody>
</table>
# FY ‘12 PennNet Phone Rates (Monthly)

<table>
<thead>
<tr>
<th></th>
<th>Traditional Phone</th>
<th>FY ‘12 VOIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centrex line/VoIP line</td>
<td>$16.50</td>
<td>$16.50</td>
</tr>
<tr>
<td>Phone set maintenance</td>
<td>$3.90</td>
<td>$2.50- $4.00</td>
</tr>
<tr>
<td>Voicemail</td>
<td>$9.75</td>
<td>$3.00</td>
</tr>
<tr>
<td>Port</td>
<td>$0</td>
<td>$5.00</td>
</tr>
<tr>
<td>Subtotal/user</td>
<td>$30.15</td>
<td>$27.00 to $28.50</td>
</tr>
<tr>
<td>Usage - Local ($0.08/call)</td>
<td>$3.00</td>
<td>$1.50</td>
</tr>
<tr>
<td>Usage - Long Distance ($0.10/min)</td>
<td>$3.00</td>
<td>$1.50</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$36.15</td>
<td>$30.00 to $31.50</td>
</tr>
</tbody>
</table>
Next Steps

- NPTF makes rate recommendations
- ISC calculates and finalizes CSF headcount and IP rates and sends them to senior BAs
- Approved rates sent to ABA in December
- Rates published in Almanac on December 14th
- Next meeting in Spring 2011