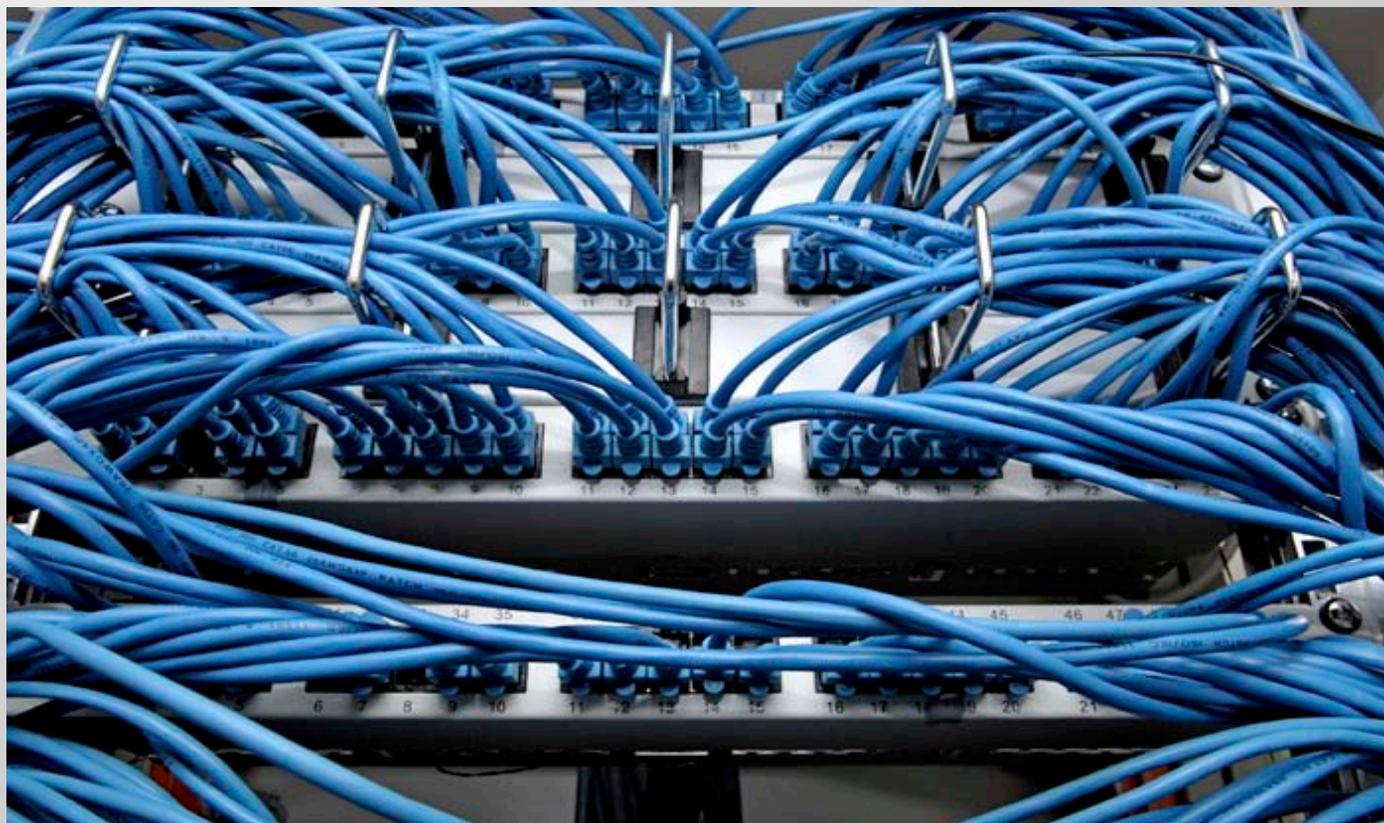


# CIC OmniPoP 5-Year Evaluation

*Better. Together.*



Report prepared by Karen Partlow, CIC

With guidance from:

Steve Cawley (UMN), OmniPoP Lead CIO

Charley Kline (UIUC), OmniPoP TAC

Jay Young (OSU), OmniPoP TAC

Patrick Christian (UW-Mad), OmniPoP TAC

Approved by OmniPoP TAC: Aug 20, 2010

Approved by CIC CIOs: Sept 13, 2010

Presented to CIC Provosts: Sep 30, 2010

**September 2010**

## Table of Contents

---

Executive Summary.....	page 3
Part I: Overview.....	pages 4-6
Part II: Strategic Priorities and Accomplishments FY2007-10 .....	pages 7-9
Part III: 5-year Evaluation Survey Summaries.....	pages 10-11
Part IV: Cost and Cost Avoidance FY 2006-2010.....	page 12
Part V: Strategic Priorities Summary FY2011-2015.....	page 13
Part VI: Conclusion.....	page 14
Appendix A: Memorandum of Agreement on Collaborative Principles for CIC OmniPoP Services.....	pages 15-20

---

## CIC Chief Information Officers

---

Klara Jelinkova	◆ <i>University of Chicago</i>
Robert Goldstein	◆ <i>University of Illinois at Chicago</i>
Sally Jackson	◆ <i>University of Illinois at Urbana-Champaign</i>
Brad Wheeler	◆ <i>Indiana University</i>
Steve Fleagle	◆ <i>University of Iowa (Chair)</i>
Laura Patterson	◆ <i>University of Michigan</i>
David Gift	◆ <i>Michigan State University</i>
Steve Cawley	◆ <i>University of Minnesota</i>
Patricia Todus	◆ <i>Northwestern University</i>
Kathy Starkoff	◆ <i>Ohio State University</i>
Kevin Morooney	◆ <i>Pennsylvania State University</i>
Gerry McCartney	◆ <i>Purdue University</i>
Joanne Berg	◆ <i>University Wisconsin-Madison</i>

## Executive Summary

---

OmniPoP is a fiber optic network collaboration between the 12 participating CIC institutions, connecting them to each other and to research “hubs” worldwide with very high bandwidth connectivity. The joint 20-year purchase of fiber optic cable in downtown Chicago in 2004 by the participating CIC Chief Information Officers (CIOs) was a primary driver to create OmniPoP in 2006 for the purpose of sharing network equipment and services in Chicago. OmniPoP and its related Regional Optical Networks (RONs) owned by CIC member universities have become the primary infrastructure upon which CIC digital collaborations operate including CourseShare, HathiTrust, federated access to shared applications and collaborative research.

In its first few years of existence (2006-2010), OmniPoP’s focus was on deployment of the shared network collaborative, getting all members connected (to Chicago, each other, and beyond) and establishing high need services (Internet2 research and education transit, Commodity Peering Service, leasing additional ports).

A spring 2010 survey of the CIC CIOs and lead OmniPoP engineers (the Technical Advisory Council or TAC) identified the following primary values of OmniPoP participation:

- By sharing equipment and services, OmniPoP greatly helps contain the cost of campus networking.
- Having OmniPoP and the RONs in the CIC operated by talented, experienced, and collaborative network engineers allow campuses to be very agile in their responses to faculty/researcher requests (weeks instead of months).
- OmniPoP (and RONs) allow CIC universities’ faculty, researchers and staff to respond to collaborative opportunities requiring significant bandwidth, increasing CIC member universities’ competitiveness for research grants and other related funding.

Now that network deployment is complete, OmniPoP’s strategic priorities have matured to include developing strategic partnerships, advanced technologies exploration, and preparing for the next generation of America’s research and education network (with transmission speeds of 100 gb/s) in 2013. Specifically, the strategic priorities of OmniPoP from 2011-2015 are to:

1. Improve interactions with ourselves, our partners and users.
2. Identify and engage with potential strategic opportunities.
3. Protect existing fiber assets.
4. Identify and deploy new strategic technologies.
5. Develop strategic partnerships.
6. Develop strategies for expanding commodity services and underlying infrastructure.
7. Develop a technology cycle plan for deployment of next generation infrastructure.

In its first five years of existence, CIC member schools have invested \$4,143,052 in OmniPoP and avoided costs of approximately \$33,250,000 yielding an overall return on collaboration of 8:1.

## Part I: Overview

---

OmniPoP is a fiber optic network collaboration between participating CIC institutions, connecting them to each other and to research “hubs” worldwide with 2 X 10 gb/s connectivity. This collaborative project of the CIC CIOs knits together the members’ regional optical networks on collaboratively owned fiber cable circling downtown Chicago. It provides multiple access points for researchers as well as the sort of redundancy that eliminates network downtime due to unforeseen fiber optic cable damage. OmniPoP provides services to faculty and researchers that allow them to share bandwidth-intensive applications (such as high definition video) and massive research datasets between regional, national or global collaborators. In addition, OmniPoP has established direct ultra-high bandwidth connections to higher education and research peers which reduce users' cost and network latency.

**Background:** The name “OmniPoP” was coined at its inception in 2006 and was defined to mean “a gigaPoP of gigaPoPs” where PoP stands for “point of presence” of networking equipment. As such, OmniPoP was envisioned as:

- A place where members can place and/or share their networking equipment.
- A place to develop a rich mesh of various services and peerings between members as well as external entities.
- A framework to provide common and elective services to the members.

**Members:** All CIC CIO universities are OmniPoP members, except Penn State (geographical distance from Chicago currently makes membership unattractive to PSU). All OmniPoP members are assessed an annual fee for base services, set by TAC and approved by the member CIOs. Members may also choose to participate in elective services, for which they are assessed separately.

### Drivers of the Formation of OmniPoP:

- CIC collaboratively-owned fiber rings in downtown Chicago pre-paid for 20-years
- Need for Internet2 connectivity and National LambdaRail (NLR) connectivity in Chicago
- Need for member-controlled collocation space in Chicago
- Opportunity for direct (layer 2) peering with CIC members via Campus and Regional Optical Networks (RONs) including BOREASnet (Iowa, UMN and UW-Mad), MiLR (UMich and MSU), I-Light (IU and PU), Oarnet (includes OSU), Wiscnet (UW-Mad) and ICCN (UIUC and UIC).
- A central need for 24/7/365 production support and NOC services

**OmniPoP Governance and Oversight:** A Memoranda of Agreement (see Appendix A) signed by the CIC and its participating universities describes the governance and oversight of OmniPoP. OmniPoP oversight and governance is provided by 5 entities including:

- OmniPoP Executive Board: The CIO from each participating CIC university is the member of the OmniPoP Executive Board (EB). The EB sets the strategic vision, reviews and approves policies and finances, and approve technical service and architectural proposals.
- Technical Advisory Council (TAC): Up to 2 reps from each member school plus OmniPoP operator (Indiana’s Global Research Network Operations)

Center/GRNOC) and CIC-HQ; prepare annual budget, strategic technical plan, recommend changes to service and architecture, approve routine purchases and service contracts.

- Tactical Technical Team: Up to 6 TAC members who work with OmniPoP operator and CIC-Hq on day-to-day technical coordination of operational issues
- Strategic Technical Team (added in 2010): Up to 6 TAC members who work together to identify and engage with strategic opportunities for OmniPoP.

**Mission:** Maximize advanced internetworking opportunities to enable our individual and collective missions.

**Vision:** To create and maintain reliable, high performance regional, national and international connectivity for our institutions.

**Values:**

Non-technical Values:

- Trust and mutual respect among partners
- Maintain respect and influence locally, regionally and nationally
- Pragmatic, Midwestern values (“get it done”) applied to national networking
- Economy of scale
- Communication, collaboration, cooperation, consensus
- More gain from working together than independently
- Voluntary participation

Technical Values:

- Transparency
- Simplicity of design
- Scalable
- Production-oriented
- Using best common practices when appropriate
- Bleeding edge moderated with calculated risk

**OmniPoP Technical Architecture:**

- Two co-owned high-performance, full-featured switches with routing capability are located at member facilities in downtown Chicago plus all fiber has presence in another member facilities. (By terminating fiber in member facilities, OmniPoP avoids costly monthly fiber X-connect fees.)
- Each member received one 1 & 10GE line-rate port on each network switch with options to purchase additional line rate and/or over-subscribed ports.
- Direct peering established between all member CIC universities campus networks or Regional Optical Networks (RONs)
- 2 X 10GE connectivity (including CPS) to Internet2.
- Other direct peering with ESnet (Large Hadron Collider), NLR, and Big Ten Network.

**OmniPoP Base Services for Members:**

- OmniPoP members receive a “birthright” 1GE and 10GE port on each of the two OmniPoP switch/routers.

- OmniPoP members have the opportunity to connect to all the OmniPoP negotiated peering arrangements.
- OmniPoP members may purchase elective services as structured by the TAC.

**OmniPoP Elective Services for Members:**

- OmniPoP members have the opportunity to connect to 2 X 10GE connectivity from Internet2, assessed per a cost-share model developed by TAC and approved by the CIOs.
- OmniPoP members may purchase additional 1GE and 10GE ports on the switches for cost-recovery prices as determined by the TAC.

**OmniPoP Services for Affiliates:**

Although there are currently no affiliates to OmniPoP, the TAC has established an Affiliate annual fee that provides affiliates with the opportunity to establish peerings with mutually agreeable OmniPoP peers, and to purchase the same elective services offered to members.

**Early Lessons Learned:**

- Need collaboration idea & drivers to maintain group cohesion
- Recognize and balance constant tension between collaboration and self-control requires management
- CIC important to facilitate “people networking” to identify other collaborators and common problems
- Good ideas grow – Chicago fiber and OmniPoP ideas started small (2 members) and grew quickly
- Needs assessment to determine sharing opportunities difficult and time consuming but vital to success
- Successful collaborations yield substantial rewards after accounting for additional time, communication and effort required to sustain collaboration

## Part II: Strategic Priorities and Accomplishments FY2007-10

---

The strategic priorities established by the OmniPoP TAC and approved by the OmniPoP EC (participating CIC CIOs) at the beginning of OmniPoP were focused on getting the operations and primary services up and running. A summary of the activities and accomplishments related to the five strategic priorities from FY07 to FY10 are listed below:

### Strategic Priority #1: Promote use

OmniPoP engineers purposefully route campus traffic through OmniPoP, so its “use” is not something that faculty or researchers need to “request.” However, some CIC researchers purchase fiber and wave services from vendors for their research work because they are not aware of OmniPoP, its extensive bandwidth, nor how quickly and easily and cheaply it can be connected to their labs. It is for this reason that the OmniPoP TAC wishes to “promote the use” of OmniPoP.

The following accomplishments were targeted at promoting the use of OmniPoP over the past four years.

- OmniPoP TAC representatives met (virtually) with the CIC CIO IT Research Support peer group to ensure they understood the availability and features of OmniPoP and could direct researchers to its use.
- Developed [web pages](#) on the CIC website that describe OmniPoP, its membership, services and management.
- Developed OmniPoP “use stories” involving CIC researchers (e.g., Wesley Smith, UW-Mad, LHC researcher) and printed them in [CIC e-newsletter](#), [on CIC website](#), and in CIC [annual report](#).
- OmniPoP representatives are very involved with the Internet2 organization including several CIC CIOs who serve on their various advisory boards, and network engineers who serve on their technical committees. The CIC-HQ staff serve as administrative liaison for OmniPoP as an Internet2 connector. OmniPoP has been widely recognized and respected as the CIC networking collaborative among national networking organizations.

### Strategic Priority #2: Cultivate richer connectivity

Cultivating richer connectivity was a primary goal of the OmniPoP TAC between 2006-10 for two primary reasons; one, to increase the value of OmniPoP to its members by connecting to desirable research and education services (i.e., Internet2) while sharing the cost, and two, to connect to desirable research entities directly thereby offloading Internet2 traffic and extending that finite bandwidth further.

The following accomplishments were completed in the interest of cultivating richer connectivity:

- Bilateral peering between all CIC universities.
- Peering with ESnet, the network that connects the Large Hadron Collider (LHC) project at CERN in Switzerland with the United States.
- Peering with National LambdaRail (NLR). Although CIC was a charter member of NLR when it started in 2002, they terminated their NLR membership in 2007.

Some CIC researchers utilize the NLR network so maintaining a no-cost peering arrangement is beneficial.

- Peering with the Big Ten Network (BTN). BTN uses OmniPoP and the campus networks to transmit video of non-revenue sports, thereby extending the exposure of CIC athletes in sports other than football and men's basketball while saving the universities significant networking dollars.
- Established two 10gb/s connections to Internet2 providing very high bandwidth for researchers as well as very economical Commodity Internet (CPS) opportunities for all OmniPoP members as well.
- In progress is the development of an agreement with the Great Plains Network (GPN), headquartered in Kansas City, MO for a no-cost reciprocal Internet2 back-up agreement.

### **Strategic Priority #3: Evolve business model**

The start-up of OmniPoP required the development of a long-term, sustainable, funding model for basic infrastructure and a clarification of roles, responsibilities and relationships with other key operational entities in Chicago (MREN, Starlight, Internet2 and NLR).

The following accomplishments helped to establish the OmniPoP business model:

- Core (birthright) services and an annual fee were established for OmniPoP members
- Base services and an annual fee were established for Affiliate members
- Equitable pricing models for elective services including Internet2 connectivity and leasing extra ports on the switch were developed and revised as needed
- A rolling 5-year budget is revised annually and approved by the OmniPoP EC. The current budget, which extends out to FY2015, includes infrastructure upgrades for next generation equipments that will bring OmniPoP to network speeds of 100gb/s.

### **Strategic Priority #4: Develop technical strategies**

The OmniPoP TAC meet monthly via concall to identify and discuss new technical strategies that would increase the value of OmniPoP to its members.

The following are the technical accomplishments of the OmniPoP TAC:

- Implemented a layer 2 service
- In progress, implementing a layer 3 service
- In review, considering a layer 1 service
- In progress, configuring a second switch/router capable of layer 3 service increasing OmniPoP's redundancy; also implementing reciprocal Internet2 back-up with GPN
- In progress, OmniPoP's Cross-connect project with vendor Level 3 which is bringing OmniPoP fiber into CIC university-owned or controlled collocation space in Chicago, all but eliminating the on-going Cross-connect fees charged by vendors and saving CIC schools millions of dollars over the 20-year life of the fiber.

- In progress, a CIC collaborative proposal to the NSF's GENI (Global Environment for Network Innovations) Solicitation 3 to implement OpenFlow software across the Regional Optical Networks (RONs) of the CIC and the OmniPoP itself, greatly contributing to network research.

**Strategic Priority #5: Formalize operations**

A 20-year network collaborative such as OmniPoP necessarily adds complexity to the mix. Therefore, it is crucial that OmniPoP operations are formalized, routinized and well-documented so that as time passes and individuals change their posts, the operations continue to function seamlessly.

The following are accomplishments related to formalizing operations

- The responsibilities, term, order of succession of the TAC chair has been established, as well as the establishment of both a Tactical Technical Team (to manage day-to-day technical functions) and a Strategic Technical Team (to identify and engage with strategic opportunities).
- In progress (and nearly complete!), we are confirming the accuracy of the CIC fiber database with vendor Level3; once completed, the fiber database will be managed by CIC OmniPoP technical manager, Global Research Network Operations Center at Indiana University
- In progress (and nearly complete!), we are correcting billing errors made by vendor Level 3 and routinizing invoicing from OmniPoP to member universities.
- Created a secure CICme website where TAC can have access to meeting notes, reports, and contracts associated with OmniPoP.

### Part III: 5-Year Evaluation Survey Summaries

---

The survey went to all the OmniPoP EB and TAC members, with follow-up phone calls with TAC members. The survey asked each campus to identify OmniPoP's value to their university, opportunities for further leveraging OmniPoP, and their vision for the near-term future of OmniPoP. Highlights of the survey responses are summarized below.

#### **Primary values/advantages of OmniPoP for campuses:**

- Offload network traffic onto Internet2 connection, CPS and direct peerings with CIC schools, ESnet, BTN. Helps contain costs of other I2 connections and commodity Internet.
- Having OmniPoP (and RONS) allows campuses to be very agile in their responses to faculty/researcher requests. Can deploy resources in weeks (rather than months).
- Eliminates need to purchase additional equipment, collocation space, and management in Chicago.
- Having OmniPoP resources have allowed campuses to facilitate other collaborative opportunities that it otherwise wouldn't have had the connections to do (or it would have taken more engineering to create).
- A key to OmniPoP's success has been its "buffet " approach to services; each member pays a minimal membership fee but then selects elective services that make the most sense.
- Trusted relationships between skillful OmniPoP engineers for guidance and solution ideas.
- Knowing who to contact for quick OmniPoP support, technically and administratively.
- Stronger national voice as OmniPoP; however, judiciously using clout (unlike some other RONS).

#### **Ideas for further leveraging OmniPoP:**

- Need better communication to VPs for Research, Grants & Contract offices and researchers in general that CIC member schools have campus and collaborative networking assets to meet their needs, so they can qualify for grants.
- Develop relationship with Great Plains Network beyond Internet2 back up; member peerings, and extending reach of OmniPoP; Perhaps explore relationships with 3ROX and SURA through Atlanta.
- TAC and CIC Networking Directors needs more details about other CIC CIO projects to identify OmniPoP-related opportunities.
- Explore customizable networks such as the GENI project that provides the ability to not only develop dedicated sub-networks on a scheduled basis, but also allow for application aware routing.

- Potentially explore DR capabilities – example, host back-up DNS services for another university, DR web site hosting, etc.
- pursue private, CIC-based cloud computing initiatives. In addition to the shared storage pilot, these services may include a virtual machine hosting platform, software as a service offering (SaaS) and perhaps even large-scale sharing of collaboration tools such as Adobe Connect.
- Leverage of CIC fiber and OmniPoP for other initiatives such as green computing or shared data center opportunities in or perhaps outside our region may also be possible and worthy of exploration.
- Use of new routing capabilities as well as serving as a platform to enhance connectivity to remote, collective academic programs such as CIC Parks and People Program in Sub-Saharan Africa.
- Explore possibilities of leveraging CIC fiber and OmniPoP to join CIC voice systems (per idea of CIC Networking Directors)

**Next 5-year vision/future of OmniPoP:**

- At a minimum, OmniPoP should retain assets and services as indemnification against the national networks failing. Beyond this, we should consider what a major regional “RON of RONs” such as OmniPoP means in the larger context of the national and international networking.
- OmniPoP should continue to be about how it helps us facilitate any and all collaborative efforts across the CIC by providing basic and highly-functioning infrastructure for those.
- OmniPoP should enable any single CIC institution to collaborate with other institutions nationally and internationally.
- CIC OmniPoP should continue to cost-effectively facilitate interdisciplinary research and other collaborative academic and administrative interests and needs across geographic and political boundaries to the benefit to our stakeholders.
- CIC OmniPoP should explore providing a customizable, programmable, highly available and stable high speed network that allows the ability to segment real-time and add intelligence. This may translate to on-demand reservation based dedicated high speed links between desired institutions; QoS for certain applications; dynamic routing beyond traditional routing protocols (i.e., change route path based on jitter), etc. In summary, a programmable L1 or L2 network that is flexible to meet the real-time needs of various constituents.
- CIC OmniPoP should incorporate 40G and 100G in 5-year roadmap.

### Part IV: Cost and Cost Avoided FY2005-10

FY	Cost Description	Total Cost	Cost Avoided	Return on Collab	Notes
2006-07	OmniPoP annual membership + elective fees (Internet2)	$(\$76,262 \times 12) =$ $\$915,144 +$ $\$480,000 =$ <b>\$1,395,144</b> <b>(TOTAL)</b>	~\$3,750,000	3:1	Start-up costs including purchase of large network equipment
2007-08	OmniPoP annual membership + elective fees (Internet2)	$(\$45,242 \times 12) =$ $\$542,904 +$ $\$480,000 =$ <b>\$1,022,904</b> <b>(TOTAL)</b>	~\$7,500,000	7:1	No special purchases
2008-09	OmniPoP annual membership + elective fees (Internet2)	$(\$35,000 \times 12) =$ $\$420,000 +$ $\$480,000 =$ <b>\$900,000</b> <b>(TOTAL)</b>	~\$7,000,000	8:1	No special purchases
2009-10	OmniPoP annual membership + elective fees (Internet2)	$(\$0 \times 12) = \$0 +$ $\$480,000 =$ <b>\$480,000</b> <b>(TOTAL)</b>	~\$7,250,000	15:1	No member fees due to ample reserves; doubled I2 connectivity mid-year; purchased 2 <sup>nd</sup> switch
2010-11 (pro-jected)	OmniPoP annual membership + elective fees (Internet2)	$(\$25,000 \times 12) =$ $\$300,000 +$ $\$525,000 =$ <b>\$825,000</b> <b>(TOTAL)</b>	~\$7,750,000	9:1	Annual fees reinstated; small increase in I2; Add'l cost avoided with X-connect project and GPN agreement

**Comments:** The start-up costs for OmniPoP decreased from FY2006 to 2010 as initial technical plans were sorted out by the TAC, while avoided costs increased steadily over this time. In total to date, CIC universities have invested \$4,143,052 in OmniPoP and avoided cost of approximately \$33,250,000, yielding an overall return on collaboration of 8:1. The forecast for 2011-2015 includes slight cost increases as OmniPoP adds more services (e.g., twice the Internet2 connectivity bandwidth) and upgrades its infrastructure to become a next generation (100gb/s) network by 2013. Due to accumulated reserves in the OmniPoP budget, these additional costs will be fractional and will yield even greater avoided cost and more substantial return on collaboration.

## Part V: Strategic Priority Summary FY2011-2015

---

The OmniPoP TAC met on June 8-9, 2010 in Chicago to revise OmniPoP's strategic priorities. The following seven priorities were identified and later approved by the OmniPoP EC.

**Priority #1: Facilitate improved interactions with ourselves, our partners and users.**

*Update:* A communications team has been formed (CIC staff, TAC member, Lead CIO) and will meet once a month to identify primary messages, target audiences, communications products and timelines.

**Priority #2: Identify and engage with potential strategic opportunities.**

*Update:* A Strategic Technical Team of six TAC members and CIC staff has been formed and will meet once a month. Strategic opportunities they are engaging with so far include (1) the OmniPoP-GPN reciprocal Internet2 back-up agreement, (2) US UCAN, a new federally funding networking initiative that will result in the next generation research and education network of the US, and (3) the GENI solicitation 3 as a CIC collaborative submission for network research.

**Priority #3: Protect existing fiber assets.**

*Update:* Once the Cross-connect project with vendor Level 3 is completed (Fall 2010), the TTT will form a form team to approach Level 3 for renewal options for existing fiber assets, generate an RFI for acquisition of new fiber resources in downtown Chicago, and based on RFI response, clarify needs and generate (as appropriate) an RFP.

**Priority #4: Identify and deploy strategic new technologies.**

*Update:* The Tactical Technical Team is presently working to full deploy the second switch at 600 W. Chicago, including a layer 3 service. Once this is completed, they will develop a plan for connecting to GPN for reciprocal Internet2 back-up. The TAC convenes monthly and identifies and evaluates the relevance of new technologies. When there is consensus among the TAC, then a TTT sub-group determines how to implement and develops a proposal for CIO to approval.

**Priority #5: Develop strategic partnerships.**

*Update:* The STT has also been charged with identifying strategic partnerships, particularly with other GigaPoPs and networks to leverage assets and create new opportunities. They will also be working to further OmniPoP's existing Big Ten Network (BTN) partnership by developing more reliable connectivity to BTN.

**Priority #6: Develop strategies for expanding of services and infrastructure.**

*Update:* The Tactical Technical Team (TTT) will survey OmniPoP members to determine current commodity usage, peering and cost. They will report the results back to the TAC, who will then develop a recommendation to forward to the CIOs regarding expanding and funding commodity services and underlying infrastructure.

**Priority #7: Develop technology cycle plan for next generation infrastructure deployment.**

*Update:* The TTT will gather and/or forecast new technology and expansion requirements over the next 18 months in anticipation of the new 100gb/s network built through US UCAN and develop a infrastructure technical architecture plan and refresh timeline based on capabilities and financial conditions.

## Part VI: Conclusion

---

The use and maintenance of the Chicago fiber rings that were jointly purchased in 2004 through CIC have been paid in-full through 2024. Therefore, this “evaluation” was not so much to determine whether or not to *continue* OmniPoP, but rather to critically assess the value OmniPoP has presented to its members and, informed by that, identify future strategic priorities for leveraging OmniPoP’s investment further.

While the value OmniPoP has brought to its members to date is substantial in terms of providing increased connectivity, significant avoided costs, and agile and creative service deployment for researchers, OmniPoP is positioned to do much more in the next 5 years.

At a minimum, OmniPoP’s assets and services serve as indemnification against the national networks failing. Beyond this, OmniPoP should be considered a major regional “RON of RONs” and with such a unique stature, it can and should lead and influence the greater national and international networking community. Pursuing awards to participate in activities such as GENI (Global Environments for Network Innovations) are important national collaborative endeavors. Developing strategic partnerships with other GigaPoPs such as the Great Plains Network will better position OmniPoP to avail itself to new opportunities that arise from such partnerships and advance OmniPoP in the greater national networking community. Preparing now for the 2013 upgrade to a 100gb/s national network will help ensure that CIC universities quickly capitalize on the both the federal government’s and our own network investments further increasing the competitiveness of CIC universities nationwide.

By continuing to focus the technical “braintrust” of the OmniPoP TAC toward identifying and deploying new technical innovations and services, OmniPoP’s value to its member universities’ faculty, students and staff should continue to increase. Although high-performance network connectivity is widely available in higher education today, because of the carefully developed and implemented strategic framework of OmniPoP, it is well positioned to deliver the “future faster” to its member schools. OmniPoP will position CIC as the easiest place in the nation to collaborate, share research and digital resources, and will greatly accelerate collaborative innovation to the academic benefit of students, faculty and the member universities at-large.

## Appendix A

---

### MEMORANDUM OF AGREEMENT ON COLLABORATIVE PRINCIPLES FOR CIC OMNIPOP SERVICES (“Agreement”)

The <name of institution> wishes to join the CIC OmniPoP (“OmniPoP”) , a collaborative effort of the Committee on Institutional Cooperation (“CIC”) to serve the participants’ networking needs by creating a framework for a network infrastructure to promote regional network connectivity and shared services. It is envisioned that a primary vendor will operate the OmniPoP under a MASTER SERVICE AGREEMENT and will be referred as the OMNIPOP OPERATOR. The <name of institution> will join the CIC OmniPoP as an OMNIPOP FOUNDING PARTNER/NEW PARTNER.

1. **(Effective Date)** This Agreement will become effective upon execution. This Agreement will continue until terminated as provided in Paragraph 14 below.
2. **(Define OmniPoP Services)** OMNIPOP SERVICES generally include connectivity services, operational “hands and eyes”, and network infrastructure. The description of OMNIPOP SERVICES may change from time to time pursuant to the governance process described in Paragraph 13. OMNIPOP SERVICES include both COMMON and INDIVIDUAL SERVICES.<sup>1</sup>
3. **(Fiscal Agent Role of UIUC)** The University of Illinois, in its capacity as fiscal agent for CIC, will acquire and hold the OmniPoP service agreements, including the MASTER SERVICE AGREEMENT with the OMNIPOP OPERATOR, and any COMMON ASSETS (e.g., physical property, licenses, leases or co-location agreements), on behalf of and for the benefit of CIC and the OMNIPOP PARTNERS, and all documents executed by the University of Illinois shall so indicate. Further, the University of Illinois will purchase and hold insurance for OmniPoP assets at OmniPoP expense. CIC will administer the service agreements and COMMON ASSETS as provided herein, including designating a contract representative and a technical representative to work with each vendor. The contract representative will be responsible for maintaining the records related to the service agreements. The initial contract representative will be Karen Partlow, Associate Director for Technology Collaboration, CIC, and the initial technical representative will be Patrick Christian, Network Engineer, University of Wisconsin-Madison.
4. **(No Marginal Cost to CIC; Self-contained Arrangement)** The OMNIPOP PARTNERS and OMNIPOP AFFILIATES, as defined in Paragraphs 8 and 11, together will reimburse the CIC for their proportionate or allocated share of costs relating to the service agreements and COMMON ASSETS as defined elsewhere in this AGREEMENT. There will be no marginal cost burden due to the OMNIPOP SERVICES for the CIC or its non-participating CIC member universities. All expenses of the OMNIPOP SERVICES throughout the life of the collaboration will be paid by the OMNIPOP PARTNERS and AFFILIATES.
5. **(Common Services)** COMMON SERVICES are those OMNIPOP SERVICES and related expenses (e.g., legal expenses) procured collectively and used in common by all OMNIPOP

---

<sup>1</sup> In the context of the MASTER SERVICE AGREEMENT, OMNIPOP SERVICES are referred to as “Projects”.

PARTNERS.<sup>2</sup> COMMON SERVICES will be administered by CIC according to the following cost principles:

- a. Each OMNIPOP PARTNER will pay an equal share of the total initial acquisition, ownership, and ongoing common expenses for COMMON SERVICES for which fixed initial or annual pricing applies.
- b. Each OMNIPOP PARTNER will pay its own direct expenses for COMMON SERVICES for which variable pricing applies.
- c. Each OMNIPOP PARTNER will pay its own direct expenses for connections to the demarcation points OF COMMON SERVICES.
- d. Any additional future common fixed expenses of the COMMON SERVICES (for example, equipment refreshes), will likewise be charged in equal amounts to each OMNIPOP PARTNER.

**6. (Individual Services)** INDIVIDUAL SERVICES are those OMNIPOP SERVICES and related equipment and other expenses procured individually by one or more, but not all of, the OMNIPOP PARTNERS.<sup>3</sup> INDIVIDUAL SERVICES will be administered by CIC according to the following cost principles:

- a. Each OMNIPOP PARTNER invoking INDIVIDUAL SERVICES will be responsible for its own direct expenses for the INDIVIDUAL SERVICES it uses, and of any equipment or other expenses related to the INDIVIDUAL SERVICES so used. When certain INDIVIDUAL SERVICES are shared by a subset of OMNIPOP PARTNERS, those OMNIPOP PARTNERS involved in the sharing arrangement may agree how to share the related expenses in a separate agreement between those OMNIPOP PARTNERS and CIC.
- b. Each OMNIPOP PARTNER will pay its own direct expenses for connections to the demarcation points of INDIVIDUAL SERVICES.
- c. INDIVIDUAL SERVICES will at no time and in no way interfere with COMMON SERVICES, divert the OMNIPOP OPERATOR's attention from serving COMMON SERVICES, or adversely affect the cost of COMMON SERVICES. Similarly, INDIVIDUAL SERVICES will at no time and in no way interfere with or violate the terms of COMMON ASSETS.

**7. (Common Asset Ownership)** Certain COMMON ASSETS (e.g., physical property, licenses, leases or co-location agreements) may be required from time to time to support various operating needs or objectives of the OMNIPOP PARTNERS. The University of Illinois will acquire and hold title to THESE COMMON ASSETS as described in Paragraph 3. The OMNIPOP PARTNERS will each assume an equal share of the total expenses of COMMON ASSETS.

**8. (New Participants)** If an institution is interested in joining the CIC OmniPoP collaboration as a NEW OMNIPOP PARTNER:

- a. The institution is directed to approach the CIC headquarters and indicate its interest in participating. The CIC headquarters will then promptly notify the existing OMNIPOP PARTNERS of this interest.

---

<sup>2</sup> In the context of the MASTER SERVICE AGREEMENT, COMMON SERVICES are referred to as "Common Projects".

<sup>3</sup> In the context of the MASTER SERVICE AGREEMENT, INDIVIDUAL SERVICES are referred to as "Individual Projects".

b. A NEW OMNIPOP PARTNER will be permitted to join the existing OMNIPOP PARTNERS with the consent of two-thirds of the existing OMNIPOP EXECUTIVE BOARD (EB) as described in Paragraph 13.

c. If a NEW OMNIPOP PARTNER joins and is added to the existing OMNIPOP PARTNERS, that NEW OMNIPOP PARTNER will buy in to OmniPoP membership by providing to CIC an amount of money equal to that NEW OMNIPOP PARTNER's equal share of the total expenses of COMMON ASSETS calculated using the new number of OMNIPOP PARTNERS. The existing OMNIPOP PARTNERS may decide either to have CIC rebate the amounts collected from the NEW OMNIPOP PARTNER to the existing OMNIPOP PARTNERS in equal amounts, or may elect to have CIC retain such amounts and apply them as credits to existing OMNIPOP PARTNERS' future expenses for COMMON SERVICES.

d. The NEW OMNIPOP PARTNER also shall pay CIC for the amount of its proportional share of any COMMON SERVICES expenses, prorated for the remaining portion of the then-current annual term of the OmniPoP services agreements with the service vendor(s). OMNIPOP PARTNERS may decide either to have CIC rebate the amounts collected from the new OMNIPOP PARTNER to the existing OMNIPOP PARTNER in equal amounts, or may elect to have CIC retain such amounts and apply them as credits to existing OMNIPOP PARTNERS' future expenses for COMMON SERVICES.

**9. (Assessment of OmniPoP)** Annually the EB, as defined in paragraph 13, will assess the effectiveness of the OmniPoP to ensure that it continues to meet the PARTNERS' networking needs and goals. At the same time the EB will also determine if the collaboration should continue as a CIC initiative. For example, if there are NEW OMNIPOP PARTNERS admitted from organizations other than CIC member universities, then the collaboration will need to be changed so that it is no longer affiliated with the CIC. The collaboration could be changed or the oversight and fiscal responsibility might be provided by one of the OMNIPOP PARTNER organizations.

**10. (Termination of Participation)** An OMNIPOP PARTNER may terminate its participation in the collaboration at any time, but the withdrawing OMNIPOP PARTNER will pay in full any amounts owed to the CIC OmniPoP collaborative, including any unpaid balance of any acquired Common Assets, the withdrawing OMNIPOP PARTNER's share of COMMON SERVICES expenses through the end of the then-current annual term of the OmniPoP MASTER SERVICES AGREEMENT with the OMNIPOP OPERATOR and any other service agreements for COMMON SERVICES with other vendors. The withdrawing OMNIPOP PARTNER will forfeit any and all of its interests in COMMON ASSETS or their value.

**11. (OmniPoP Affiliates)** OMNIPOP AFFILIATES are those institutions or organizations that procure services from or otherwise do business with (e.g., network peering) the OmniPoP from time to time, but do not become OMNIPOP PARTNERS.

a. Procurement of OmniPoP services or a business relationship by OMNIPOP AFFILIATES may only occur with the concurrence of and under terms established by the EB, described in Paragraph 13.

b. Subject to the approval of the EB, OMNIPOP AFFILIATES generally may procure INDIVIDUAL SERVICES under the same terms as OMNIPOP PARTNERS as described in Paragraph 6.

c. OMNIPOP AFFILIATES may participate in, by utilization of, COMMON SERVICES with the concurrence of and under terms and conditions established by the EB, described in Paragraph 13.

d. INDIVIDUAL SERVICES or participation in COMMON SERVICES by OMNIPOP AFFILIATES will be subject to the terms of this Agreement, including termination of this Agreement.

e. The relationship between the CIC OmniPoP collaboration and any OMNIPOP AFFILIATE will be described in a written contract between the CIC OmniPoP collaboration and the OMNIPOP AFFILIATE.

**12. (Transit Service and Third-party Access)** All OMNIPOP PARTNERS and AFFILIATES agree to abide by such policies and procedures as may be established from time to time by the EB, described in Paragraph 13. Such policies and procedures will be intended to ensure that the operation of the OmniPoP is in compliance with all applicable laws and regulations, with the terms of any relevant IRU(s) for fibers the OmniPoP may be using to provide its services, with the Acceptable Use Policies of any providers the OmniPoP may be using or to which it is connected, and with any other technical requirements the EB may deem appropriate to assure the orderly and efficient operation of the OmniPoP. Each OMNIPOP PARTNER and OMNIPOP AFFILIATE shall be responsible for complying with all applicable laws, regulations, IRU terms, and provider and EB policies in connection with its use of the OMNIPOP. The EB reserves the right to regulate attachments and use of OMNIPOP connections and services, and to take any actions necessary to correct noncompliance with applicable laws, regulations, IRU terms or provider and EB policies. The EB may delegate the necessary regulating actions to the OMNIPOP OPERATOR.

Should an OMNIPOP PARTNER or AFFILIATE desire to use the OmniPoP to provide services to other organizations (e.g., if the OMNIPOP PARTNER is a GigaPoP), the OMNIPOP PARTNER or AFFILIATE agrees to provide the Executive Committee in advance with a description of its operation including the services it provides, the types of other organizations to which such services are provided, and any Acceptable Use Policies it uses for its own operation. The OMNIPOP PARTNER or AFFILIATE agrees to immediately notify the Executive Committee should any of this information change so the Committee can be assured that the OMNIPOP PARTNER or AFFILIATE is always using the OmniPoP services in accordance with the EB's policies and procedures.

**13. (OmniPoP Governance)** The CIC OmniPoP collaboration will be governed as follows:

a. An EB will be constituted of two types of representatives. One type of representatives will be from FOUNDING PARTNER institutions with each institution having one representative. The other type of representatives will be from all PARTNER institutions with each institution having one representative. Initially the membership of the EB will be all of the FOUNDING PARTNER institutions. The EB may, by two-thirds vote, change its overall size from time to time to address governance efficiency, but the total number of FOUNDING PARTNER representatives on the EB will always be at least half of the total number of EB representatives.

b. The EB will be responsible for:

- i. Overseeing all aspects of the OmniPoP;
- ii. Approving an annual budget;
- iii. Determining OmniPoP policy;
- iv. Determining the definition of COMMON SERVICES and the means and terms of their procurement and management;
- v. Determining whether and how to procure COMMON ASSETS and their disposition;
- vi. Approving NEW OMNIPOP PARTNERS and AFFILIATES;

- vii. Deciding whether to undertake network peering relationships;
  - viii. Enacting amendments to this Agreement as stipulated in Paragraph 15;
  - ix. Assessing the effectiveness of the OmniPoP and determining if it should continue as a CIC collaboration as stipulated in Paragraph 9;
  - x. Acting to terminate the CIC OmniPoP collaboration as a whole and this Agreement as stipulated in Paragraph 14;
  - xi. Approving all equipment purchases and service contracts valued at \$29,500 or more.
- c. All actions taken by the EB must be approved by at least two-thirds of the OMNIPOP PARTNER representatives, except as set forth in Section 14.
- d. The EB will convene at least once every calendar year, and may convene more frequently as needed. The EB may convene in person, by telephone or by electronic means.
- e. There will be an OMNIPOP TECHNICAL ADVISORY COUNCIL (TAC) composed of i) not more than two representatives from each OMNIPOP PARTNER, as identified and appointed by their respective EB representatives, ii) representatives of the OMNIPOP OPERATOR as identified and appointed by the OMNIPOP OPERATOR, and a representative of the CIC office, as identified and appointed by the CIC. In addition each AFFILIATE may appoint not more than two non-voting representatives to the TAC. The TAC will convene as needed to provide technical advice and recommendations to the EB, and recommend to the EB technical strategic directions and an annual budget for operations. The TAC may convene in person, by telephone or by electronic means.
- f. The TAC will be responsible for:
- i. Preparing or updating an annual OmniPoP strategic technical plan to recommend to the EB;
  - ii. Preparing an annual OmniPoP budget to recommend to the EB;
  - iii. Proposing new or modified COMMON and INDIVIDUAL OMNIPOP SERVICES to recommend to the EB;
  - iv. Approving all equipment purchases and service contracts less than \$29,500. Equipment purchases and service contracts valued at \$29,500 or more must be approved by the EB;
  - v. All decisions made by the TAC will be approved by simple majority;
  - vi. The TAC may appoint a subset of up to six members to serve as a TACTICAL TECHNICAL TEAM to work with the OMNIPOP OPERATOR and the CIC office on a day-to-day basis to provide technical coordination between the OMNIPOP PARTNERS and AFFILIATES and OmniPoP service vendor(s), adjust the OmniPoP operational procedures to meet the needs of the OMNIPOP PARTNERS and AFFILIATES, and provide a third level escalation group to assist the OmniPoP service vendor(s).
- 14. (Termination)** The CIC OmniPoP collaboration as a whole and this Agreement will terminate when all remaining OMNIPOP PARTNERS and the CIC agree mutually to terminate the arrangement. Assets will be sold and profits placed in a CIC account to be redistributed to OMNIPOP PARTNERS as determined by the EB.
- 15.** This Agreement may be amended at any time by a two-thirds vote of the OMNIPOP PARTNERS provided that such amendment is consistent with the obligations of the OMNIPOP PARTNERS and the University of Illinois under the service agreements with the OMNIPOP OPERATOR and any other OMNIPOP vendor(s).
- 16.** This Agreement is not intended, and shall not be deemed, to create a partnership or otherwise authorize joint action for any purpose except as specified herein. No party shall

act as agent or representative of any other party except as authorized in accordance with this Agreement.

Agreed to:

By: \_\_\_\_\_  
Name, Chief Information Officer

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, University Signature Authority

\_\_\_\_\_  
Title

\_\_\_\_\_  
CIC OmniPoP Member University

\_\_\_\_\_  
Barbara Allen, CIC Director

\_\_\_\_\_  
Date