The ECAR study on IT networking used a multifaceted research methodology to gather both quantitative and qualitative data from 517 higher education institutions (487 U.S. and 30 Canadian institutions). The data provide a view of one segment of higher education’s collective experience with IT networking as well as in-depth institution-specific perspectives.

**Research Approach**

We undertook four data collection and analytical initiatives: a literature review, a quantitative Web-based survey, qualitative telephone and e-mail interviews, and three case studies.

The literature review helped us identify and clarify issues and create a working set of hypotheses to be tested. Although abundant literature exists on the subject, the vast majority of both the academic and professional literature focuses on business rather than academia. Some exceptions are the publications of EDUCAUSE, the *Chronicle of Higher Education*, and *Campus Technology* magazine.

Because networking technologies and practices are undergoing such rapid change, probably the best information available is on the Web. We appended a short bibliography (Appendix D) that includes the Web sites and publications we found useful. The bibliography is not intended to be comprehensive.

The quantitative Web-based survey was designed by ECAR fellows and John Voloudakis, former fellow and now of Bearing Point. EDUCAUSE staff sent an e-mail invitation with the survey’s Web address and access code information to 1,477 EDUCAUSE member institutions from Canada and the United States. Senior IT leaders, most of them CIOs or networking administrators, from 488 institutions responded to the survey. Another 29 institutions that aren’t EDUCAUSE members asked to be included, giving a total of 517 institutions responding. These responses provided a detailed understanding of how higher education approaches IT networking. The survey questions appear on the EDUCAUSE Web site at <http://www.educause.edu/ir/library/pdf/ecar_so/ers/si/esi05a.pdf>. Appendix A lists the names of institutions that participated in the survey. All information collected is confidential.

We conducted qualitative telephone interviews with 19 IT executives and managers at 13 EDUCAUSE member institutions. To obtain depth and breadth of practice, we chose to interview respondents from institutions of varying size and mission, and we included...
both public and private institutions. We also selected institutions representing a range of institutional goals for their networks, from providing reliable performance and services at the lowest possible cost to providing leading-edge performance and services. We also hosted a small informal group discussion among four CIOs at the 2004 ECAR Symposium about their top networking issues. We interviewed 12 leaders in higher education networking to better understand anticipated networking directions and issues over the next 5 to 10 years. And finally, we sent e-mail follow-up queries to selected respondents for clarification and further description on some topics, including outsourcing of networking activities, use of service-level agreements, cost savings from converged networking, and how networks are used as a strategic differentiator in higher education. We received responses from 21 respondents. Appendix B lists all institutions interviewed via phone, personal conversation, or e-mail.

Three in-depth case studies were also undertaken. Designed to complement the core study, each case focuses on a single aspect of IT networking strategy and practice. Topics include higher education applications of mobile technology in The Netherlands (done by SURF, a Dutch higher education and research partnership), funding models for IT networking (Cornell University, University of California at San Diego, and the University of Wisconsin–Madison), and voice over Internet protocol (State University of New York, Courtland).

Carnegie Class as a Distinguishing Factor

The study grouped the sample by a modified Carnegie Classification of Institutions of Higher Education. The Carnegie taxonomy describes the institutional diversity in U.S. higher education. Most higher education projects rely on this classification to ensure a representative selection of participating individuals and institutions. The study collapsed the categories as follows to obtain larger numbers for statistical and descriptive purposes:

- **Doctoral/research universities (DR).** The study grouped the doctoral-extensive and -intensive universities together. These institutions typically offer a wide range of baccalaureate programs and graduate education through the doctorate degree. Doctoral-extensive institutions award 50 or more doctoral degrees per year in at least 15 disciplines. Doctoral-intensive institutions award at least 10 doctoral degrees per year in three or more disciplines, or at least 20 doctoral degrees per year overall.

- **Master’s colleges and universities (MA).** The study grouped master’s colleges and universities I and II together. These institutions typically offer a wide range of baccalaureate programs and graduate education through the master’s degree. Master’s I and master’s II institutions differ in the number of degrees offered.

- **Baccalaureate colleges (BA).** The study combined the three baccalaureate college groups (baccalaureate colleges–liberal arts, baccalaureate colleges–general, and baccalaureate/associate’s colleges) into a single group. Baccalaureate colleges are primarily undergraduate colleges with major emphasis on baccalaureate programs.

- **Associate’s colleges (AA).** These institutions offer associate’s degree and certificate programs but, with few exceptions, award no baccalaureate degrees.

- **Specialized institutions (Specialized).** These institutions offer degrees ranging from the baccalaureate to the doctorate and typically award most degrees in a single field. Specialized institutions include theological seminaries and other specialized faith-related institutions; medical schools (for medical and other health professions);
schools of engineering and technology; schools of business and management (which award most of their degrees in business or business-related programs); schools of art, music, and design; schools of law; and teachers colleges. The data presented for these schools must be interpreted in light of the enormous diversity of institutions within this category.

We also provide data, where appropriate, for the 9 U.S. higher education systems offices and 30 Canadian institutions in our study, recognizing that they vary by size and mission. For purposes of analysis, this study combines the Specialized and Systems Offices Carnegie class categories into one class, labeled “Other.”

Figure 3-1 compares the responding institutions’ distribution by their 2000 Carnegie class, EDUCAUSE membership, and the universe of higher education institutions in the United States. The responding schools mirror much more closely the EDUCAUSE membership than the national population of institutions by Carnegie class. Proportionally, we have strong participation from doctoral-extensive (60.5 percent) and doctoral-intensive (44.6 percent) institutions and weaker participation from the other Carnegie classifications.

Note also that because the study relied on volunteers and because participating institutions are drawn from the EDUCAUSE membership rather than from a random sample of all higher education institutions, results are not generalizable to all higher education institutions. Nevertheless, the overall 33 percent response rate from EDUCAUSE member institutions gives us confidence that the study’s respondents portray a reasonable image of the EDUCAUSE membership, especially for doctoral institutions.

A statistical analysis of the data’s representativeness proved inconclusive. The findings do not support the conclusion that the institutions surveyed represent the population as a whole. Nor do they support the conclusion that the respondents fail to represent the EDUCAUSE membership. Neither conclusion is statistically significant.

Figure 3-1. Survey Respondents, by EDUCAUSE Membership and Carnegie Class*

---

Analysis and Reporting Conventions

We followed the following conventions in analyzing the data and reporting the results:

◆ Some tables and figures presented in this study have fewer than 517 respondents. They were adjusted for missing information.

◆ A glossary of networking-related terms is included in Appendix C. These terms are not again defined in the text as they are used.

◆ The data for each question in the online survey is analyzed for differences in patterns of response among Carnegie classes (including doctoral-intensive versus doctoral-extensive institutions), Canadian and U.S. institutions, private and public institutions, and institutions of varying size. Institution size is determined by the number of full-time students. Any differences found that are both meaningful and statistically significant are noted in the text and/or the supporting figures and tables.

◆ The Likert scales used in the online survey are footnoted in the tables and figures showing results for these survey questions.

Profile of Responding Institutions

For this study, the median student enrollment of institutions was 4,107. Figure 3-2 shows institutions divided into the six groups that will be used for analysis. Smaller institutions dominated our study, as they do higher education: 47.7 percent have 4,000 or fewer enrolled students, and only 5.5 percent have more than 25,000 students.

Figure 3-3 shows the number of devices connected to institution networks. Fifty-eight percent of the institutions in our study have 5,000 or fewer devices, and 76.4 percent have 10,000 or fewer. Only 5.5 percent have more than 40,000 devices on their networks.

Figure 3-4 shows a similar pattern for the number of institutional users supported on the campus network. Forty-five percent of institutions have 5,000 or fewer institutional users, and 77.6 percent have 20,000 or fewer. Only 7.8 percent provide networking capabilities for more than 40,000 users.

Our responding institutions are deeply involved in voice telecommunications. Eighty-two percent own a private branch exchange (PBX), and almost all support phones operationally (see Figure 3-5).
Figure 3-3. Number of Devices on Institution Networks (N = 508)

Figure 3-4. Number of Institutional Users (N = 513)

Figure 3-5. Number of Phones Supported Operationally (N = 508)
The survey was distributed to EDUCAUSE primary representatives and was completed largely by senior IT leaders, reflecting their experiences, observations, and opinions about IT networking. As shown in Figure 3-6, our respondents bring much experience to our study and provide a broad view of IT networking in higher education. Almost a fifth of respondents (18.7 percent) report more than 20 years’ experience in IT networking. Further, 30.5 percent indicated that they focus on data networking full time.

We are gratified by the number of respondents, which makes the findings more than simply the observations of a small subset of the industry. In the following chapters, we present respondents’ collective view of IT networking in higher education.

Endnote

1. See <http://www.carnegiefoundation.org/Classification/CIHE2000/defNotes/Definitions.htm>. The study notes that the Carnegie Classification of Institutions of Higher Education recognizes 1,669 associate’s institutions, whereas the American Association of Community Colleges (AACC) membership includes 1,171. The AACC numbers are based on the definition of colleges eligible for membership in the AACC constitution: colleges that award the associate’s degree and are regionally accredited. The Carnegie count includes career colleges and colleges accredited by the Accrediting Council for Independent Colleges and Schools.