



**Preliminary Concept Paper  
(2nd draft 3/4/99)**

**APRUNet: Developing Advanced Internet Capabilities Among APRU Universities and APEC Economies**

**Introduction**

In just a few short years, the Internet has transformed the modern world. It has empowered scholarly communication in ways never imagined; it has created vast new e-commerce and trade opportunities; and it has brought nations into closer communication and cooperation than was previously possible. In doing so, the Internet has also become an indispensable new part of the infrastructure for education, business, and government. Yet, even at this early date, the Internet as we have known it is faltering. So successful has it been that its overwhelming popularity now threatens to render it inadequate.

In response, a group of American universities, with the assistance of business and government, is leading the way to develop an advanced internet, known as Internet2, which will have 100 times the speed and capabilities of the current Internet. A group of California universities have created a consortium to build the California portion of Internet2, known as CalREN-2. (*Attachment 1* - Visit [www.internet2.edu](http://www.internet2.edu) for a description of Internet2's goals and its academic members and corporate partners. *Attachment 2* - Visit <http://www.cenic.org> for similar information on California's efforts.) These advanced internet capabilities, already being activated in 1999, will provide Internet2's member universities and the business communities which they serve with unparalleled opportunities and strategic advantages.

This concept paper suggests that APRU should orchestrate the development of the hardware, software, and human resource capacity to connect all APRU members to the advanced internet capabilities of Internet2 within the next three years. To do so, APRU would need to develop strategic business partnerships and stimulate APEC leaders to modify some of their existing national policies on education, telecommunications, and industrial preferences which block the development of APRUNet.

**Concept/Vision**

Because APRU members uniquely represent the necessary knowledge and technological expertise, APRU has the capability to lead the development of APRUNet, an advanced internet connecting APRU members with capabilities equal to those of Internet2. APRUNet would be developed in parallel with Internet2 and in collaboration with key commercial partners, who it is anticipated would contribute millions of dollars of services and equipment to develop APRUNet. It would be able to take advantage of Internet2's emerging communication technologies and of the experience of its academic members who are developing the project.

APRUNet would be designed to be the first step in creating an open and efficient information technologies infrastructure to be extended to all universities in the APEC economies. When completed, APRUNet would substantially expand the interaction and collaboration between APRU members and result in their evolution into e-Universities that enjoy a host of benefits, including distance teaching and research collaboration, library sharing, tele-medicine, and the development of e-commerce. APRUNet would thus provide a powerful foundation and catalyst for expanded economic and technical cooperation among APEC nations, thus dramatically improving the economic and educational competitiveness of APEC's community of Pacific Rim nations.

The APRUNet Project is realistic in scope and must be launched immediately if APRU members (and APEC nations) are to have an opportunity to be among the vanguard of those who enjoy the educational and trade advantages to be offered by the advanced internet. Because a project of this magnitude raises significant technical and policy challenges, it is conceived as a multi-year project. Much progress is possible in the first 12 months, however, because of the groundbreaking technical progress already made by the Internet2 effort. Full APRUNet implementation may be possible in as few as three years, depending primarily upon the speed with which a number of national and international policy issues can be resolved.

(See "Key APEC Policy Issues" section below.)

**Research:** The rapid expansion of the Internet and the WWW has had an enormous impact on the way that research is conducted. Researchers around the world interact on a timely basis using e-mail and have access to the latest research developments using document sharing and web pages. We can anticipate that the collaborative environments made possible by advanced internet technology will lead to further substantial increases in international research collaboration and productivity. For APRU members to remain competitive, they must have access to advanced internet technology to provide:

- Collaboration: researchers can collaborate on projects using videoconferencing and application sharing.
- Access to specialized resources: researchers can make use of remote supercomputers or specialized equipment.
- Tele-presence: allows participation in remote experiments.
- Remote Sensing and Telemetry: expands the scope of many projects by providing access to remote instruments.
- Virtual Conferences: allow for timely professional interchanges at greatly reduced costs in time and money.

**Tele-Medicine:** Clinical practice is another essential activity of most APRU members. Tele-medicine applications require high bandwidths for large-scale data transfer (high-resolution images), video-conferencing and tele-presence. Opportunities for time-shifting, access to specialized facilities and expertise are all of clear value to APRU members.

**Shared Infrastructure:** Many types of research infrastructure are too expensive for all institutions to own. A prime example of this is represented by limited access to supercomputing resources in many APRU institutions and excess capacity in supercomputing resources in other APRU members. Another key opportunity for sharing is represented by access to library resources. APRUNet will allow for the sharing of such expensive facilities and library resources, vastly enhancing the research potential of APRU members.

**Leveraging Industry Partnerships:** A common high performance network brings together key commercial partners (witness some 30 commercial participants in Internet2). Such partnerships can be leveraged to the joint benefit of the commercial partners, the APRU institutions, and the APEC nations.

**Education as Trade:** Education is an increasingly important component of international trade. The significance of this trade value will be greatly enhanced with the spread of distance learning across national boundaries. Imbalances here, combined with other global economic conditions, may lead to tariffs and educational trade wars. APRU can provide a forum for future APEC discussions about education trade issues and work towards Educational Free Trade Agreements.

**Cultural Diversity:** A challenge in facilitating international distance learning, international collaboration, and more generally e-commerce is the lack of appreciation for cultural diversity. The cooperation and interactions that will grow out of APRUNet can lead to better understanding and help break down cultural barriers and misunderstandings.

### **Key APEC Policy Issues**

Numerous policy decisions by various APEC government ministries would need to be made in a coordinated fashion in order for APRUNet to develop. Ministries of education, telecommunications, trade and industry, culture, and perhaps defense would all have to modify some of their policies. If APEC leaders recognize that the development of APRUNet is in their national interest, they could quickly stimulate the needed modifications in national policies.

Some illustrative examples of necessary policy changes are mentioned below.

APRU universities would have to be allowed to do things which many of them are currently prohibited from doing, e.g.

- Join an APRUNet international business consortium which would make independent technical and

business decisions regarding the development of APRUNet -- analogous to Internet2's UCAID and CalREN-2's CENIC.

- Connect itself to other local universities, training institutes, and businesses in order to expand the availability of APRUNet's very high speed network.
- Accept unrestricted, trans-border flows of information.

APRUNet's awarding of contracts or acceptance of commercial partnerships would challenge "industrial policy" strategies of some APEC governments. However, this process could also provide new opportunities to foster strategic partnerships between local and foreign firms which want to become APRUNet partners.

APRUNet would accelerate the expansion of e-commerce among the APEC economies. Thus, APRUNet would heighten the salience of contentious trade policy issues such as intellectual property rights, as well as challenge existing trade pacts and weaken tariff and quota restrictions.

APRU would work closely with APEC governments to identify and resolve such policy issues. Nevertheless, it is quite conceivable that some APEC governments might not allow their APRU member(s) to join APRUNet in the beginning. Keeping this in mind, APRUNet would be designed to have an open and efficient infrastructure that could be easily expanded to accept late-joiners.

#### **Action Agenda/Next Steps**

The following agenda represents some of the necessary next steps:

1. APRU reviews, modifies, and affirms the APRUNet concept.
2. APRU presents the concept to APEC leaders and obtains their approval.
3. APRU organizes a conference in the year 2000 to develop a detailed plan of action to implement APRUNet. This may take 18 months to pull together a meaningful discussion on all the critical issues for APRUNet.
4. APRU collaborates with USC's conference on "Distance Learning and the Internet around the Pacific Rim," which is being organized by USC's Presidential Commission on Distance Learning. This conference will be open to a broader group than APRU, but it could include a post-conference meeting of APRU's information technology leaders to lay the groundwork for APRUNet. This groundwork might include:
  - Creating an APRUNet project steering group
  - Creating an APRUNet -2000 conference planning group.
  - Creating a task force to identify commercial partners and multilateral lending institutions (Asian Development Bank, World Bank, etc.) which would participate in APRUNet. For example, to overcome the high cost of trans-Pacific connectivity, APRU might look to alternate providers to play a role, such as high bandwidth, low earth orbit satellite (LEOS) providers.
  - Creating a task force to identify the various national policies which APEC governments need to modify for APRUNet to be developed.