



II Encuentro
Sociedad y TI

Santiago, Chile
13 Dec 2001

UNIVERSITY OF CHILE

Infocommunication over Fixed and Wireless Broadband Networks

Eduardo Vera
Director, AccessNova Program
Department of Computer Science (DCC)
University of Chile



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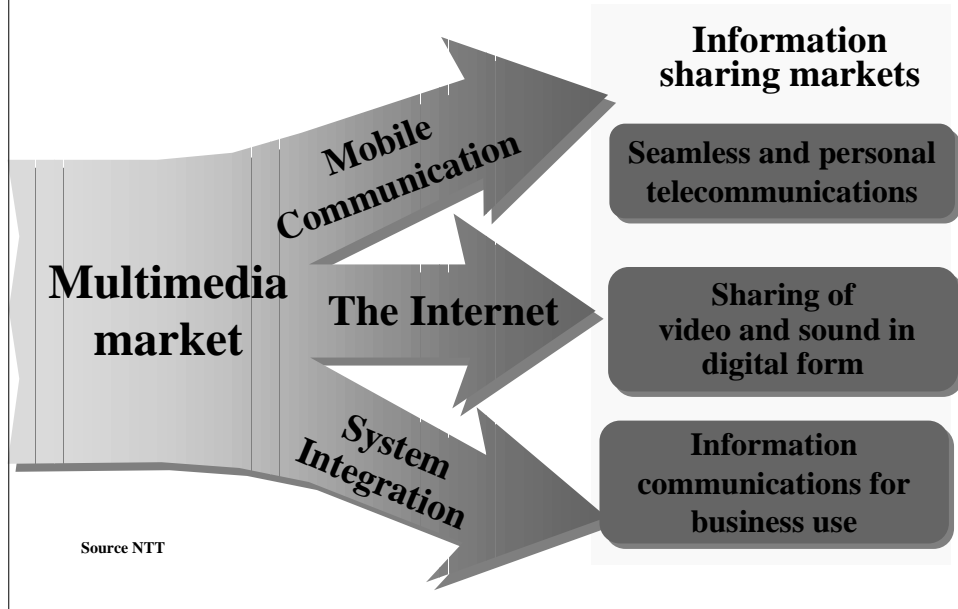
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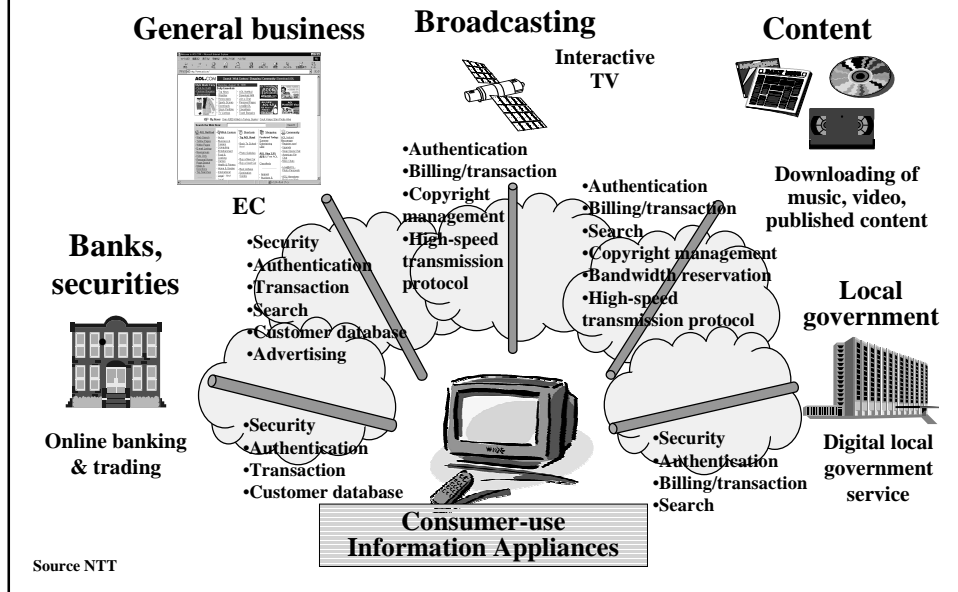
Outline

- **Communication & IT in the World**
 - **Multimedia Communications**
 - **Wireless Mobile**
 - **Information systems**
- **Communication & IT in Chile**
 - **National Infrastructure**
 - **AccessNova Research (FONDEF-CONICYT)**
 - **AccessNova Incubation (FDI-CORFO)**
 - **Photonic and mobile networks**

Multimedia Information Sharing

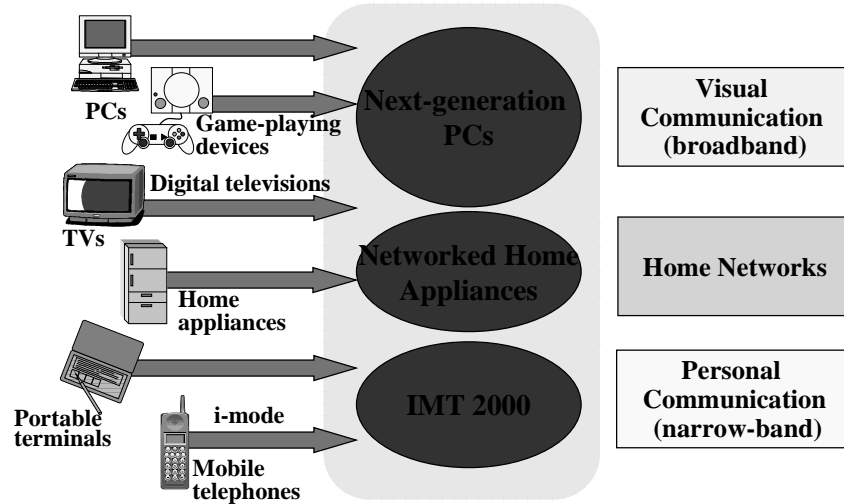


Information Sharing Services



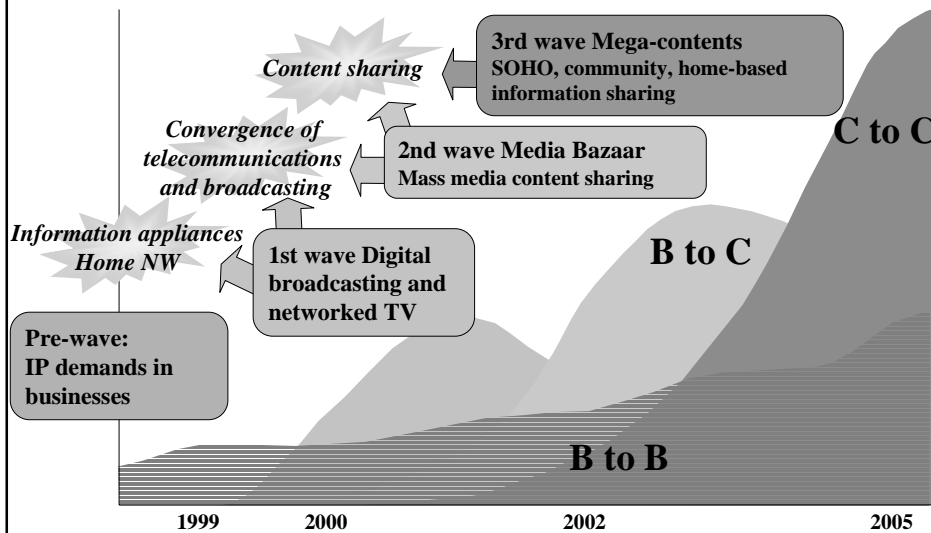
Consumer-use Information Appliances of the Future

Great possibilities for Information Appliances other than PCs



Source NTT

Three Waves of Global Information Sharing



Source NTT

High-Speed Networks

- **University of Chile (UCHile)**

- First connection to Internet in Latin America (early 80s)
- First ATM Campus Network in Latin America (1994)
- Strong R&D Effort in IT: AccessNova Program (since 1995)

- **REUNA (National University Network)**

- ISP for Chilean universities WAN (Reuna-1, early 90s)
- High-Speed Chilean universities WAN (Reuna-2, 1998)
- High-Speed international research WAN (Internet-2, 2000)

Fiber Optic Network Infrastructure

- **Two National Backbones**

Telefónica Chile 4 pairs 2.5 -> 5.0 Gbps
ENTEL Chile

- **International Connectivity**

GLOBAL CROSSING, EMERGIA (Telefónica Group)
WDM 60λ 8 pairs 40 Gbps -> 1.2-1.9 Tbps



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DCC-UChile Technology Programs

AccessNova Research/Incubation

- **Advanced Communications Research on IP Broadband Networks and Applications**
 - Electronic Commerce (1996)
 - Remote Interactive Education (1997)
 - Remote Monitoring and Control (1998)
 - Digital TV over IP (1999)
 - Wireless IP (2000)
 - Remote Astronomy/Photonics (2001)
- **Advanced Communication and Information Technology Business Incubation**
 - Low-Cost infrastructure
 - 2 year start-up period



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FONDEF Project (D96I1064)

Director: Eduardo Vera (UChile)

Deputy Director: Rodolfo Feick (UTFSM)

- **Infocommunication on Broadband Networks**
 - **Level 1: Physical Transport**
(Rodolfo Feick, UTFSM)
 - **Level 2: Distributed Systems**
(Jose M. Piquer, UChile)
 - **Level 3: Access Tools**
(Ricardo Baeza-Yates, UChile)
 - **Level 4: Multimedia Applications**
(Eduardo Vera, UChile)

AN-FONDEF Project (D96I1064)

Director: Eduardo Vera (UCHile)
Deputy Director: Rodolfo Feick (UTFSM)

- **Technology Milestones**

- **High-Speed Link Santiago-Valparaiso: 1998**
(with Telefónica CTC Chile)
- **High-Speed Link Santiago-Tokyo: 1997**
(with Telefónica Mundo, NTT)
TeleCabinet Meeting, Astronomy Forum
- **Mbone System for video over IP: 1998-2000**
(with Waseda University, NTT Labs)
- **Remote Monitoring & Control System: 1998-2000**
(with United Technologies Corp., USA)
- **Novel Web Access Tools: 1999-2000**
(with Kwan, Brazil)

FONDEF Project (D00I1048)

Director: Eduardo Vera (UCHile)
Deputy Director: Rodolfo Feick (UTFSM)

- **Development of Multimedia
Communications over Wireless Networks**

- **Level 1: Wireless Local Loop**
(Rodolfo Feick, UTFSM)
- **Level 2: IP-Wireless Interface**
(Jose M. Piquer, UChile)
- **Level 3: IP-Wireless Applications**
(Eduardo Vera, UChile)

**Principales actividades derivadas del
Proyecto D96I1064**

2001 Comienzo de trabajo conjunto en proyecto FONDEF D00I1048: **“Desarrollo de Comunicaciones Multimediales sobre Redes Inalámbricas** *Contrapartes:* CISCO CHILE S.A., NOKIA CHILE S.A., ENTEL CHILE S.A., NTT DoCoMo, TELEFÓNICA CTC CHILE S.A.

El nuevo proyecto extiende los temas del Proyecto D96I1064 al medio inalámbrico. Se aprovechan la experiencia de trabajo conjunto, los equipos y la vinculación industrial obtenidas en el proyecto previo.

Access Nova

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1997 CHILE-JAPAN CENTENNIAL

- **Academic Virtual Forum on Communications and Astronomy Santiago-Musashino (Aug 97)**



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- **New Offices Inauguration
AccessNova Technology
Research and Incubation
Program (Apr 98)**



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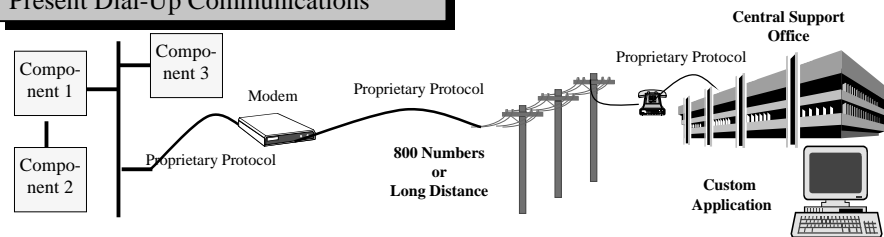
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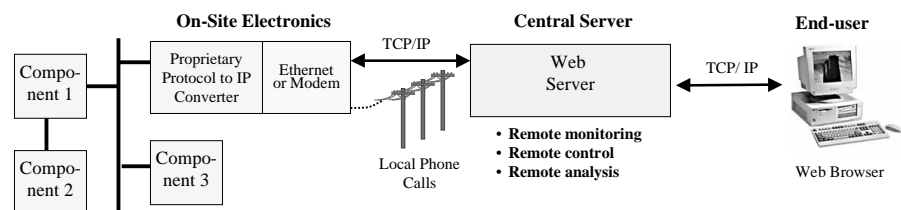
- **AN aims to develop and introduce
advanced communications to link
Chile/South America and Japan/Asia.**
- **AN is an Interdisciplinary,
Interinstitutional, International effort
creating an academic/business
human/technology network**
- **AN research activities 1995-2000
(electronic commerce, remote
education, remote monitoring and
control)**
- **AN research activities 2001-2005
(multimedia IP, integration of control
and data IP networks, wireless IP,
astronomy ultra-high speed IP)**

Internet-Based Communications

Present Dial-Up Communications

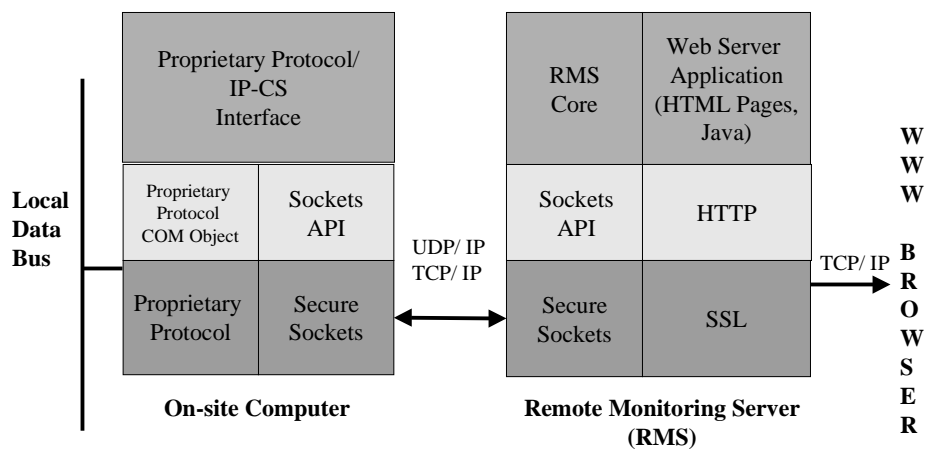


Internet-based communications

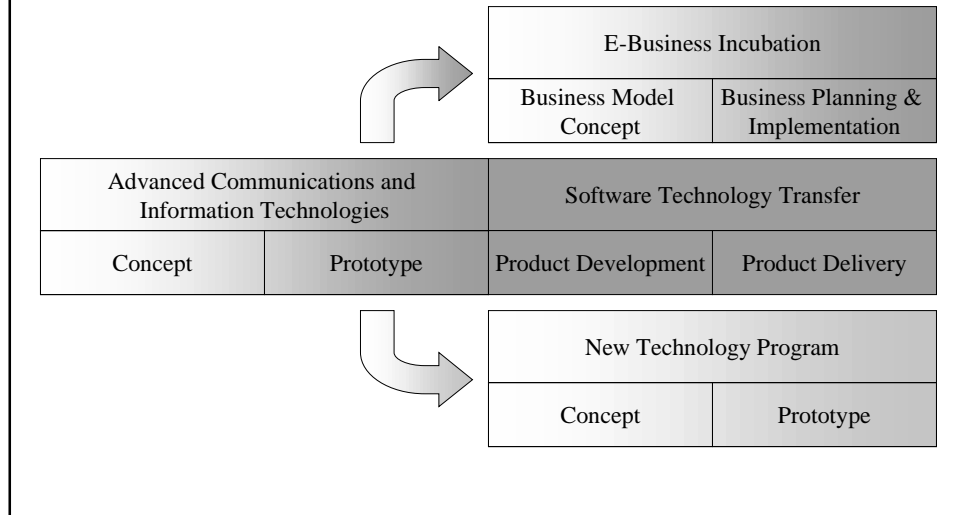


Internet-based Remote Control and Monitoring System

Software Architecture Developed and Implemented



Innovation Cycle



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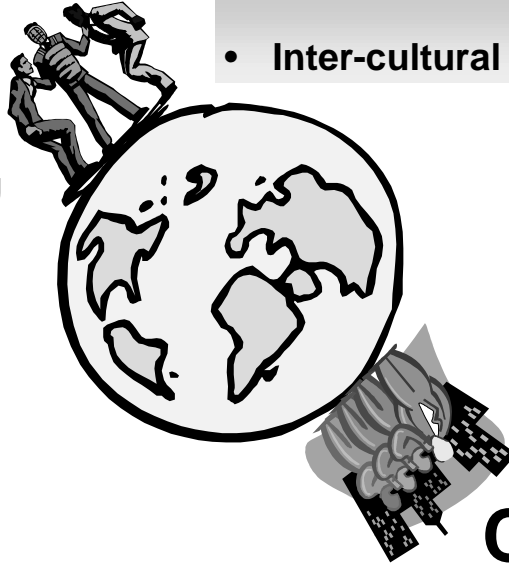
DCC-UChile Technology Cluster

- **AccessNova Space**
(Beaucheff 850, 3rd Floor, South Wing)
 - Applied Research
 - Technology Transfer
 - Software Engineering
 - Continuous Learning
 - Technology Enterprise Incubation
 - Exchange, cooperation and competition
 - Synergy and Cross-Fertilization
 - Provider and Client Contact Network

Japan

- Furthest multimedia broadband networks
- Inter-cultural use of NW

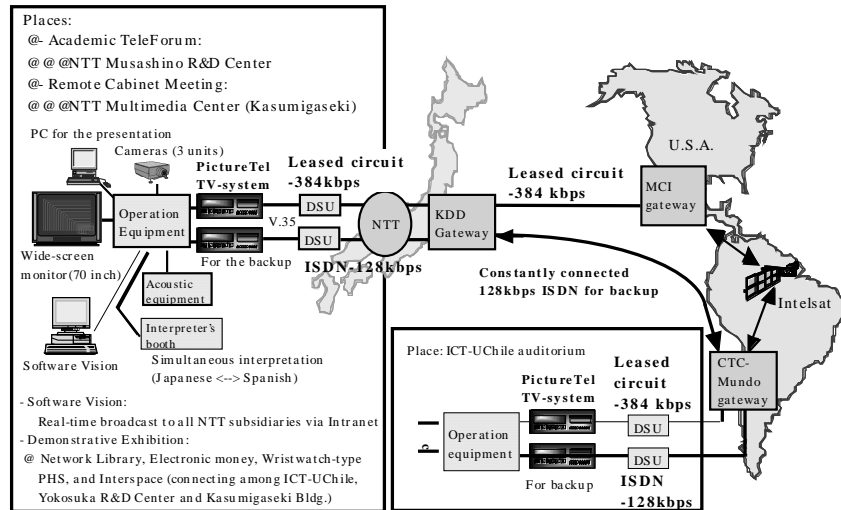
NTT
NAOJ
Waseda U



Chile

Virtual Laboratory Using Networks

Networks for the Centennial Events



Remote Cabinet Meeting for President Frei



Sept 1997, Tokyo

Japan-Chile Academic TeleForum



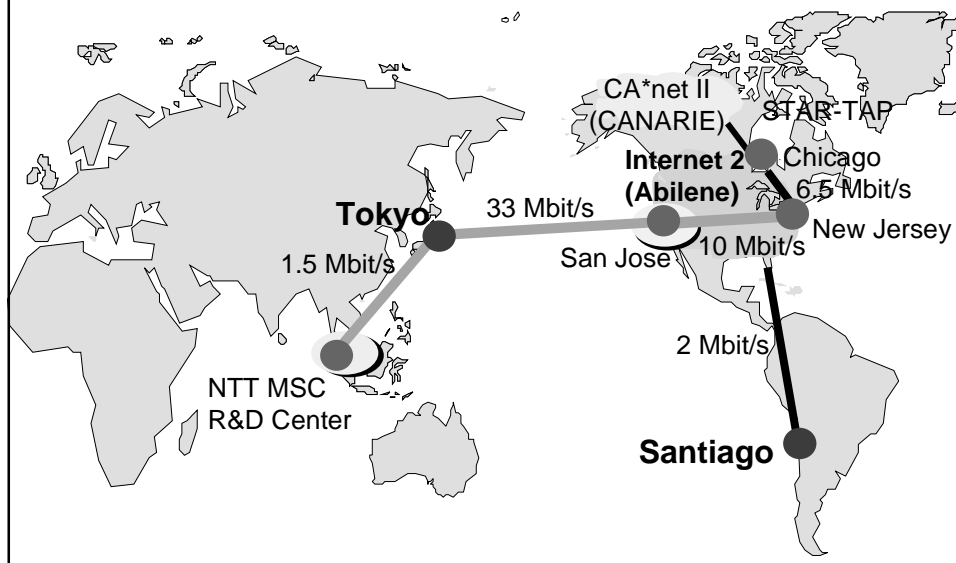
Tokyo



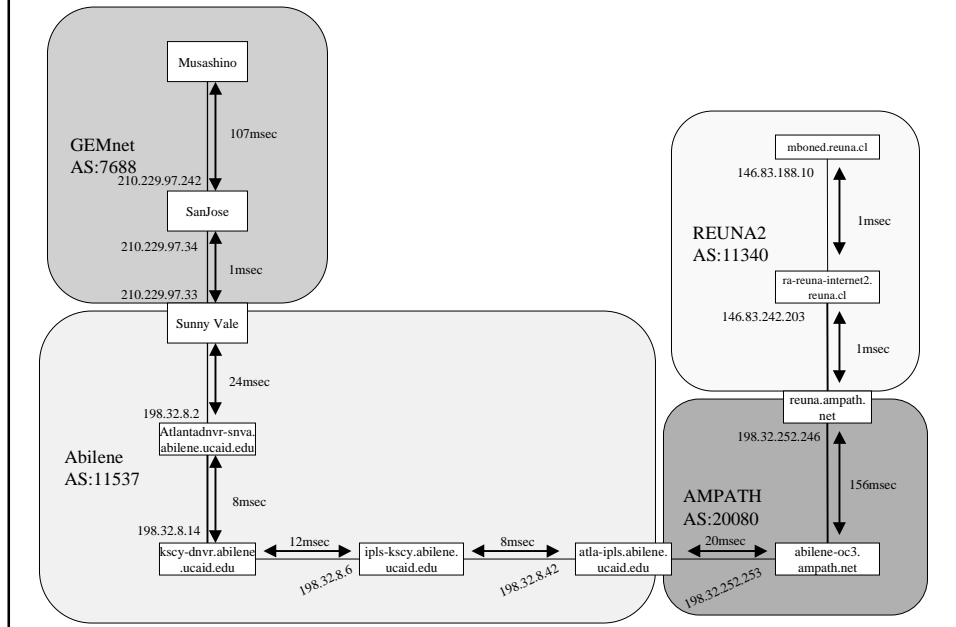
Santiago

August 1997

Broadband Connection between Tokyo and Santiago



Network Topology between Tokyo and Santiago



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Program Partners

- **Japan**
 - NTT Laboratories
 - NTT DoCoMo
 - NTT Data
 - National Astronomy Observatory Japan (NAOJ)
 - University of Tokyo
 - Waseda University
 - University of Electro-Communications
- **Malaysia**
 - NTT Laboratories, Kuala Lumpur
 - Multimedia University
- **Chile**
 - University of Chile, Santiago
 - Technical University Federico Santa Maria, Valparaiso
 - REUNA
 - Telefonía CTC Chile, Santiago
 - CODELCO-CHILE
- **Brazil**
 - NTT do Brazil, Sao Paulo
 - DoCoMo do Brazil, Rio de Janeiro
- **USA**
 - United Technologies Corporation, East Hartford, Connecticut
 - Sun Microsystems, California
 - Sma Camera Technologies, Cambridge, Massachusetts
 - National Radioastronomy Observatory USA (NRAO)
 - TINA Consortium
- **Europe**
 - NTT DoCoMo Eurolabs, Munchen
 - European Southern Observatory (ESO), Garching