Future Internet Testbed Landscape in Latin America

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First

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Objectives

• This presentation aims to present the availability of Future Internet (FI) testbeds in Latin America and their applicability for global experimental networks and collaboration on FI.

• Also, it includes a review of shortfall and limitations of FI experimental facilities in this region and some proposals of what could be done to improve the situation.
Agenda

- **PART I:** Facts and figures in Latin America

- **PART II:**
  FI testbeds and experimentation facilities in Latin America

- **PART III:**
  Shortfalls & limitations of FI testbeds and experimentation facilities

- **PART IV:** Proposals of what could be done in this region

- **PART V:** Conclusions

Questions? : Twitt me at @fut_internet
Part I:

Facts and Figures in Latin America that will impact the development of Future Internet

“The most interesting things are coming from developing countries”

Gerd Leonhard
Facts and figures in Latin America

Why Latin America will impact the development of Future Internet?

Demographic Development
Regional Competitiveness
Technology Readiness
Broadband Growth
Challenges in Innovation
Demographic Development

• By 2020 the potential market will be of 600 million inhabitants;

• Qualified human resources;

• Young populations with the potential to contribute to productivity;

• Support for non-working population in years to come;

• This development will represent a significant advantage for regional competitiveness;

• The region is going digital, the web population has increased in some countries more than 20%, which means at least 18 million new web users in the past year.
Regional Competitiveness

Latin America is becoming more competitive

“The past few years have witnessed a shift of economic power toward the emerging and developing nations, a trend accentuated by the recent global economic crisis.”

World Economic Forum

Expected average GDP growth in the next years above 4%.

Networked Readiness Index

- In the next decade emerging economies will play an important role in the development of Future Internet;

- A number of countries in the region show notable improvements in networked readiness;

- Many countries of this region appear in the top 20 within the Upper Middle Income country classification.

By 2014, Latin America & the Caribbean is expected to have the second largest growth in broadband subscribers.

63% Projected Growth

Aprox. 70 million subscribers
Challenges in Innovation

- Innovation has risen to the top of the agenda for decision makers in government and business;

- Several countries have designed and implemented environments to increase the capacity for innovation;

- Latin American businesses are redefining global business by developing new business models;

  e-skills for innovation is growing.


Policy makers recognize that investing in and promoting innovation can help to close that gap
Part II

Future Internet testbeds and experimental facilities available in Latin America

“A testbed is an environment which allows experimentation and testing for research and development products.”

Experimentally driven research white paper, April 2010

Fireworks
FI testbed and experimental facilities in Latin America

1. Ongoing projects on ICT and FI testbeds
**Project First and Latin American Technology Platforms (LATPs)**

**Aims:** to extend the concept of European Technology Platforms (ETP) to Latin America on Future Internet, ICT Components and Systems.

**Goal:** set up 5 ICT technology platforms and facilitate the networking and collaboration links with ETPs.
Project First: Common Interest between EU-LA

- Technology fields of high interest: Net!works, NEM and NESSI;
- Coordination at regional and EU environment;
- Coordination of Strategic Research Agendas (SRA) in these fields;
- International collaboration and partnerships;
- Mutual contributions on future internet technology platforms;
- Dissemination of R&D strategies and priorities for adoption of European technologies.
Project TEFIS: Testbed for Future Internet Services (TEFIS)

- An open platform to integrate a wide range of heterogeneous and complementary testbeds;
- Create a single access point to multiple platforms;
- Addressing the full development lifecycle of innovative services;
- An EU-BR platform;
- Brazilian testbed: KyaTera

Insight provided by First Project Dr. Julian Seseña – Rose Vision
Project FIBRE: Future Internet testbeds / experimentation between Brazil and Europe

- Common space between EU and Brazil for FI experimental research;

- The Project aims to:
  - Build, operate, share and federate the EU-Brazil FI large-scale experimental facility;
  - Enables experimentation on network infrastructure and distributed applications;
  - Allow researchers to use resource of both FIBRE-EU and FIBRE-BR testbeds in the same experiment;
  - Showcase the potential of the facility by demonstrating experimental network enabled applications deployed on top of the federated facilities resources;
  - Enhance the collaboration and exchange of knowledge between European and Brazilian researchers in the field of Future Internet.

- 15 partners

Insight provided by First Project Dr. Julian Seseña – Rose Vision
2. Advanced networks

There are 4 types of networks to be used as testbeds connectors:

- National Research & Education Networks (NREN)
- Advanced Networks
- Regional Research & Education Networks (RREN)
- Regional Public Private Partnerships (PPP)

C@ribNET
Advanced Networks: 1 - National Research and Education Networks (NREN)

- **At least 20 NREN operating** in the region;
- **Memberships/Stakeholders mainly:**
  - Government’s entities
  - Universities
  - R&D Centres
  - Non profit organizations
- **These networks may be FI experimental facilities connectors** (ex: Fibre Project and RPN);
- **Main areas of R&D:**
  - **Academy and education:** Peru, Uruguay, Venezuela, Argentina, Cuba, Honduras, Mexico;
  - Information society and technology (Internet, multimedia, communication and data).
Advanced Networks: 2 - Regional Research and Education Networks (RREN)

**RedClara: Latin American Cooperation of Advanced Networks**

- Year established: 2004;
- **Countries and NREN connected: 14**
  - Argentina (AR), INNOVA|RED
  - Brazil (BR), RNP
  - Colombia (CO), RENATA
  - Costa Rica (CR), CR2Net
  - Chile (CL), REUNA
  - Ecuador (EC), CEDIA
  - El Salvador (SV), RAICES
  - Guatemala (GT), RAGIE
  - Mexico (MX), CUDI
  - Nicaragua (NI), RENIA
  - Panama (PA), RedCyT
  - Peru (PE), RAAP
  - Uruguay (UY), RAU
  - Venezuela (VE), REACCIUN
- **Countries to be connected: 5**
  - Paraguay (PY), Arandu (experimental)
  - Bolivia (BO)
  - Cuba (CU)
  - Honduras (HN)
  - Nicaragua (NI)

Source: RedClara with insights provided by the author
Advanced Networks: 2 - Regional Research and Education Networks (RREN)

C@ribenet: Caribbean Research and Education Network

- Year established: 2010
- Countries and NREN connected: 8
  - Dominican Rep
  - Barbados *
  - Haiti *
  - Jamaica *
  - Trinidad and Tobago *
  - Suriname *
  - The Bahamas *
  - Belize *

* NREN under development

Source: Caribbean Knowledge and Learning Network (CKLN)
Regional PPP are partnerships for research, education and collaboration across the Americas;

These partnerships aim to:
- Interconnect science research and education networks;
- Create research interregional infrastructures;
- Production, experimental and pre-production of services;
- Operation of infrastructure for communication and collaboration between science and engineering research and education communities.
Advanced Networks: 4 - Innovation Networks

• These networks offer **solutions to major society challenges** and aim to promote innovation in:

  • Regional and national infrastructure and experimental networking;

  • Community networks, sustainability and climate change;

  • Applications for e-learning, e-healthy among others;

  • Digital Accelerators: seed funding for digital innovation and technology based start-ups

Reasons to grow

UnaCloud

frida

wayra.
Innovation Networks: Reasons to grow

Latin America is hungry for Internet Connectivity

- 70 Million content providers
- The Content Generation
- FI Services
- + Content
- + Mobility (devices & apps)
- + Capacity (Bandwidth)
- >70% Growth
- + Subscribers

International Internet Bandwidth Growth by Region

Source: TeleGeography

Decentralisation of the global network is imminent
Advanced Networks: 4 - Innovation Networks

Mesoamerican Information Highway (AMI)

- **Fully Operating: 2011 expected**;

- Fibre optic network supported on the electric interconnection system for the countries in Central America (SIEPAC);

- Stakeholders: A public-private partnership was created (REDCA) for administration, operation and maintenance of the fibre optic assets;

- Aims to promote:
  - Optical communications and networking
  - Use of information technology extensively
  - Rural applications

Source: Project Mesoamerica and REDCA
Advanced Networks: 4 - Innovation Networks

Project GIGA: High speed experimental network

- Year established: 2003;

- First large-scale experimental network in South America (Brazil);

- Stakeholders: CPqD, RNP, FUNTTEL, FINEP (funded by the Brazilian Government);

- Aims to promote innovation in:
  - Optical communications and networking
  - IP networking and Future Internet
  - Telecommunications services
  - Scientific applications

Source: Project GIGA
Future Internet Testbed Landscape in Latin America

Advanced Networks: 4 - Innovation Networks

La Boquilla – Living Lab in Colombia

Source: CINTEL
Advanced Networks: 4 - Innovation Networks

ANKLA – Advanced Networks Knowledge Lab

- First multi-vendor laboratory in Colombia and Latin-America for R&D&I and training in new technologies and advanced networks;

- ANKLA fosters the development and training for the creation of services and applications with an impact on the market in the topics related to:
  - Interoperability
  - Management
  - Security
  - Connectivity
  - Technological convergence
  - Telecommunications regulation

Source: CINTEL “ADVANCED KNOWLEDGE NETWORKS LAB (ANKLA) Paper”

Insight provided by First Project
Dr. Julian Seseña – Rose Vision
UnaCloud – Opportunistic Cloud Computing

**Objective**: Provisioning of computing infrastructures for the development of e-Science projects and to support computing related activities.

UnaCloud is an opportunistic cloud computing IaaS model Implementation

It provides at lower cost, basic customized computing resources (processing, storage and networking)

to run operating systems and applications

Source: Castro, Harold. “UnaCloud - Opportunistic Cloud Computing Infrastructure as a Service” Universidad de los Andes

Insight provided by First Project
Dr. Julian Seseña – Rose Vision

Source: http://www.spanishdict.com/
The global network is less centred on the U.S., except Latin America.

The world’s Internet backbone architecture
Top interregional routes

Submarine Cables Infrastructure landing in Latin America

Regional Internet hubs: Brazil, Mexico, Colombia, Panama, Chile, Argentina and Venezuela
Part III

Shortfall & limitations of Future Internet testbeds and experimental facilities

“We have no money, we shall have to think”

Sir Winston Churchill
Shortfalls & limitations of Future Internet testbeds in Latin American R&D Expenditure & Funding

Robustness of FI Testbeds

Support for Advanced Networks

Market Structure & Size

R&D Expenditure & Funding

Regional Public Policies

Fragmentation of Digital Agendas
In Latin America **R&D expenditure** has grown although it still does not reach **1% of the GDP**;

- Latin American countries are not characterized as technology developers, but as technology adopters;

- **The interests of many countries** are more directly concentrated on innovation rather than in the basic research field;

- Restriction to get funding for innovation.
Future Internet Testbed Landscape in Latin America

Shortfalls & Limitations: Regional Public Policies

• In general, in Latin America there are no formal plans for broadband development, except in Brazil;

• Policymaking in this area is not convergent with other sectors, such as education, health, social development and energy;

• Common regional policies supporting broadband development do not exist;

• Coordinated efforts to design a common regional policy are incipient;

• International cooperation is mostly left to bilateral relations.

Brazil’s Broadband Plan is the only one approved at the highest policy level.

Types of broadband policies in Latin America and the Caribbean

<table>
<thead>
<tr>
<th>Country</th>
<th>Broadband plan in effect</th>
<th>Broadband included in plans, agendas or projects</th>
<th>Under analysis</th>
<th>Subject not yet addressed</th>
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Shortfalls & limitations:

**Fragmentation of Digital Agendas**

- **Policies for the broadband ecosystem are fragmented and discontinued in time;**

- **Countries are still working along separate tracks;**

- **Lack of a Regional Broadband Plan, exclusion of regional development, integration and international collaboration;**

- **Lack of a long-term strategic vision, which weakens coordination and allocation of resources;**

- **Lack of effective mechanisms for implementation and for the necessary resource commitments.**
Shortfalls & limitations: Support for Advanced Networks

• The explicit public policy on advanced networks as central to the national innovation system is almost non-existent;

• The degree of political and financial support for advanced networks is uncertain;

• Duplication of efforts of national research and education networks (NREN);

• There is no regional body that exhibits a speech pointing to the long-term and constant integration of research communities through the advanced networks;

• Division between government, industry and universities is severe.
Shortfalls & limitations:

**Market Structure & Size**

- There is no regional research framework that applies to Latin America;

- **The regional market is not fully integrated**;

- Many companies and confined to their domestic markets;

- Diseconomies of scale in R&D Projects.
Shortfalls & limitations:

**Robustness of FI Testbeds**

- Lack of robustness FI testbeds and experimental facilities in this region, except in Brazil;

- FI testbeds in Brazil may have low utilization of the network for experimentations, few users, low traffic and extended time for publishable results;

- Researchers are not equally distributed in the region. More than 80% of researchers of the region are in Brazil, Argentina, Mexico, Colombia and Chile;

- Regional competitiveness can be improved by an harmonized preparation, transfer of knowledge and development for the Future Internet.
Part IV

Future Internet proposals of what could be done in Latin America

“Latin America will contribute and play a key role in the design and development of Future Internet”

The Author
Future Internet proposals for the region

1. Develop a Digital Agenda for Latin America
2. Create a common Framework for Innovation
3. Consolidate an harmonized Regional & International Collaboration
4. Start the federation of advanced networks as FI testbeds connectors
5. Play a key role in the design and development of Future Internet
Future Internet proposals for the region

1. Develop a Digital Agenda for Latin America

- Compromise at the highest political level;
- Consensus of priority regional actions, target ambitious but realistic;
- Design and implementation based on broadband ecosystem model;
- Adequate mechanisms for follow-up, implementation, consultation and updating;
- Medium-term funding commitments;
- Responsibilities clearly defined;
Future Internet proposals for the region

2. Create a Common Framework for Innovation

- Development of cross sector applications and digital contents;
- Strong products: software, entertainment, content apps, online content management;
- Consolidation of software development clusters;
- Design tools to encourage industry participation and ICT learning;
- Suitable ICT training programmes;
- Dissemination of best practices throughout the region;
- Creation of innovation funding.
Future Internet proposals for the region

3. Consolidate an harmonized Regional & International Collaboration

- Raising participation of other countries in the region in R+D+I initiatives, programs & projects;
- Implementing mechanisms for effecting measuring of projects;
- Promotion of regional coordination for Future Internet activities;
- Preparation of Future Internet timeline for the region;
- Encourage the installation of infrastructure for Content Distribution Networks;
Future Internet proposals for the region

4. Start the Federation of advanced networks as FI testbeds

* Federation of the different advanced networks in the region (efficient development + sharing of resources);
* Integration of advanced networks and their community to the industrial sector;
* Explicit declaration supporting advanced networks at regional level;
* Promotion of the use of exchange points for regional IP traffic (-costs+QoS)
Future Internet proposals for the region

5. Play a key role in the design and development of Future Internet
Part V

Conclusions

“...the ones who are crazy enough to think that they can change the world, are the ones who do”

Steve Jobs
Extracted from Apple Advertisement, 1997
Thank you!!!

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