NicLabs
NIC Chile’s Research Laboratory

Tomás Barros

Reseco Workshop, Santiago November 25th, 2008
NicLabs

- New Research Laboratory Held by NIC Chile (TLD of the .CL zone)
- Created on 2008
- Its mission is to develop Internet in Chile by producing world class apply research around IP technologies.
  - Generating new knowledge and sharing it with the community.
  - Doing technology transfer
  - Becoming a national reference about Internet Technologies.
NicLabs Methodology

Based on Specific Projects

▶ Required by NIC
  ▶ DNS Analysis and research
  ▶ Technical concerns

▶ Required by or proposed to enterprises/Government
  ▶ ENTEL PCS
  ▶ SixLabs
  ▶ Asociación de Proveedores de Internet (API)
  ▶ Subsecretaría de Telecomunicaciones
  ▶ Codelco
  ▶ SkillUp Japan
  ▶ NovaWare USA

▶ In Collaboration with the International Scientific Community
DNS Analysis and research

Active analysis

.CL Pulsómetro

- 23 evaluations by zone
- National Statistical
- Evolution in time
DNS Analysis and research

Passive analysis

DNS queries characterisation
DNS Analysis and research

Passive analysis

Domain registration characterisation

► Define Semantic groups
► Introduce an alternative to Levenshtein distance based on a membership relative to a specific dictionary
► Dictionaries built on periodically news
DNS Analysis and research

Simulations

- AnyCast Cloud versus Round Robin (or both)
- Validated with real experiments
- Use:
  - Stress and collapse analysis
  - Find optimal configurations
Technical Concerns

DNSSEC

- Impact on systems
- Impact on processes
- Provide clues to take decisions
External projects
ENTEL PCS

- Multimedia Streaming over 3G networks
- Localisation using antennas
- Linux driver for 3G modems
- DB analysis for scalability
External projects
SixLabs

- Definition and implementation of a Service Delivery Platform (SDP)
- IP version 6 support
- Innovation services
- Redundancy implementation
- Garbage Collector performance
External projects
Asociación de Proveedores de Internet (API)

- Chilean IPv6 Task Force
  - Diffusion and Training
  - IPv6 Bone
  - Apply Research
- Internet Security Agency
External projects
Subsecretaría de Telecomunicaciones

Number Portability for Chile

- Setting up the technical solution for Chile
- Introducing the regulation
- Coordinating with the operators
- Proposing extensions
External projects
SkillUp Japan

Content Smart Distribution
Distribution of content for heterogeneous devices and media transmission. Transport and signalling of H264/SVC over Stream Control Transmission Protocol (SCTP)

- Trade-off between quality and delay
- Real Implementation over 3G networks
- Simulation and analysis in NS2
- Firewall traversal
- Peer-to-peer using SCTP
- Peer-to-peer mesh construction
External projects
NovaWare USA

Remote Health Care
- Open health platform
- Wearable communicating devices
- Remote evaluation
- Continuous monitoring
Scientific Collaboration
France, Uruguay, Argentina, Brasil

- ReSeCo: Reliability and Security of Distributed Software Components
- FMCrypto: Formal Methods for Cryptographically Secure Distributed Computations
- SCAN – Self-Conscious Ambient Networks
Coming Next
Active analysis

Chilean Internet Map
Coming Next
Passive analysis

Other analysis

- DNS Anomalies
  - SPAM [1]
  - Botnets Detection [2]
  - Final User Impact [3]

Bojan Zdrnja, Nevil Brownlee and Duane Wessels
Passive Monitoring of DNS Anomalies
Detection of Intrusions and Malware, and Vulnerability Assessment, LNCS 4579, 2007.

John Kristoff
Botnets, detection and mitigation: DNS-based techniques

Anees Shaikh, Renu Tewari, and Mukesh Agrawal
On the Effectiveness of DNS-based Server Selection
Coming Next

Technical Concerns

- IPv6
- ENUM
Eventually

Other Projects

- Open-Source software/systems
- Atomisation and sensors
- Low cost and good quality National Internet access
The Team

- 3 Researchers
- 4 Master Students
- 4 Engineers
- 1 Undergraduate student
- Several Collaborations
Collaborations
ReSeCo and FMCrypto

what we can do together?
Collaborations
ReSeCo and FMCrypto

what we can do together?

▶ Create a formal method branch within NicLabs
Collaborations
ReSeCo and FMCrypto

what we can do together?

▶ Create a formal method branch within NicLabs
▶ Formalisation of DNS/DNSSEC
Collaborations
ReSeCo and FMCrypto

what we can do together?

▶ Create a formal method branch within NicLabs
▶ Formalisation of DNS/DNSSEC
▶ Open source system for e-voting
Collaborations
ReSeCo and FM Crypto

what we can do together?

- Create a formal method branch within NicLabs
- Formalisation of DNS/DNSSEC
- Open source system for e-voting
- Strong authentication using mobile devices
Collaborations
ReSeCo and FMCrypto

what we can do together?

- Create a formal method branch within NicLabs
- Formalisation of DNS/DNSSEC
- Open source system for e-voting
- Strong authentication using mobile devices
- Distributed Internet data collector for final users... proof of concept for secure distribution

Any suggestion is welcome!
Collaborations
ReSeCo and FMCrypto

what we can do together?

▸ Create a formal method branch within NicLabs
▸ Formalisation of DNS/DNSSEC
▸ Open source system for e-voting
▸ Strong authentication using mobile devices
▸ Distributed Internet data collector for final users... proof of concept for secure distribution
▸ Any suggestion is welcome!