EURECOM
Sophia Antipolis

Networking and Security Department Research Overview

Ernst Biersack

Philosophy

- **Internet today is:**
  - "Simple" core in terms of functions (routers, etc.)
  - Complexity at Edge (TCP, DNS, etc…)
  - Allows to support a wide range of applications in a cost efficient manner
    - ➔ Lot's of innovation, new players in the market; e.g. Skype,
  - Question: What makes the Internet so robust and scalable??
- **Objectives of Investigations:**
  - Understand protocols and concepts in networking
  - Understand key security treats
  - Study and design new paradigms in distributed systems
    - Peer-to-peer (file sharing, file replication, streaming,…)
    - Cloud computing, data centers
- **Approach:**
  - Theory: Build models
  - Practice: Build systems, work with companies
  - Be interdisciplinary

Networking

Ernst Biersack

Patrick Loiseau

Marco Milanesio

- **Peer-to-peer Applications**
- **QoE and Internet Troubleshooting**
- **Size-based scheduling in WLANs (ELAN)**
- **BGP Traffic Analysis (VIS-SENSE)**
- **Network Measurement and Stochastic Modeling (MPLANE)**
- **Game Theory and Network Economics**

Security Protocols and Applied Cryptography

Refik Molva

Yves Roudier

Melek Önen

Kaoutar Elkhiyaoui

- **Secure Software Design**
- **Secure Automotive Systems**
- **RFID Security and Privacy**
- **Privacy & Security in Social Networks (SafeBook, PROSE)**
- **Cloud Security & Privacy (EIT-ICT PPSS, A4CLOUD)**
- **Privacy & Usage Control (RECOGNITION)**

Distributed Systems

Pietro Michiardi

Marko Vukolic

Matteo Dell'Amico

Antonio Barbuzzi

- **P2P Backup Systems**
- **Scalable Algorithm Design (BIGFOOT, MPLANE)**
- **Parallel Processing Systems**
- **Distributed Data Stores**
- **IBM Zurich (ICStore), Playadz**

System and Software Security

Davide Balzarotti

Aurélien Francillon

Marc Dacier

Andrea Lanzi

- **Malware Capture and Analysis**
- **Botnet Detection**
- **Web Security**
- **Secure Software Design**

- **Cloud and Smart Phone Security**
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DEFCON 2012, SYSSEC NoE

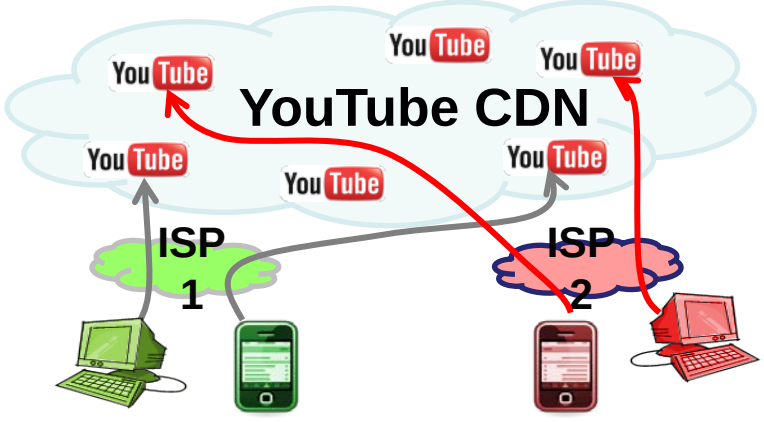
Networking and Security - People

- **Professors**
  - Davide Balzarotti
  - Ernst Biersack
  - Marc Dacier *
  - Aurélien Francillon
  - Patrick Loiseau
  - Pietro Michiardi
  - Refik Molva
  - Yves Roudier
  - Marko Vukolic
- **Visiting Scientists**
  - Konstantin Beznosov
  - Damiano Carra
  - Anwitaman Datta
  - Yong-Quan Fu
  - Zhen Huang
  - Tobias Lauinger
  - Luciana Marconi
  - Sevil Sen
  - Yan-Qiang Sun
- **Post-doctoral fellows**
  - Antonio Barbuzzi
  - Matteo Dell'Amico
  - Kaoutar Elkhiyaoui
- **Ph. D. Students**
  - Francesco Albanese
  - Marco Balduzzi
  - Leyla Bilge
  - Davide Canali
  - Jinbang Chen
  - Heng Cui
  - Leucio A. Cutillo
  - Olivier Fouache
  - Aymen Hafsaoui
  - Hadrien Hours
  - Sabir Idrees
  - Jelena Isacenkova
  - Quentin Jacquemart
  - Samuel Kaluvuri
  - Andrea Lanzi
  - Marco Milanesio
  - Melek Önen
  - Mehdi Khalfaoui
  - Iraklis Leontiadis
  - Changlin Liu
  - Shengyun Liu
  - Thomas Mager
  - Mario Pastorelli
  - Giancarlo Pellegrino
  - Marcin Pietrzyk
  - Louis Plissonneau
  - Giuseppe Reina
  - Theodor Scholte
  - Hendrik Schweppe
  - Gabriel Serme
  - Xialoan Sha
  - Pierre-Antoine Vervier
  - Jonas Zaddach

YouTube: Video Streaming Analysis

YouTube is the most popular video download system on the Internet (*)

- **It is a big share of the video uploaded during 2010**
  - more than 500 tweets per minute containing a YouTube link



Question:

- What about the performance?

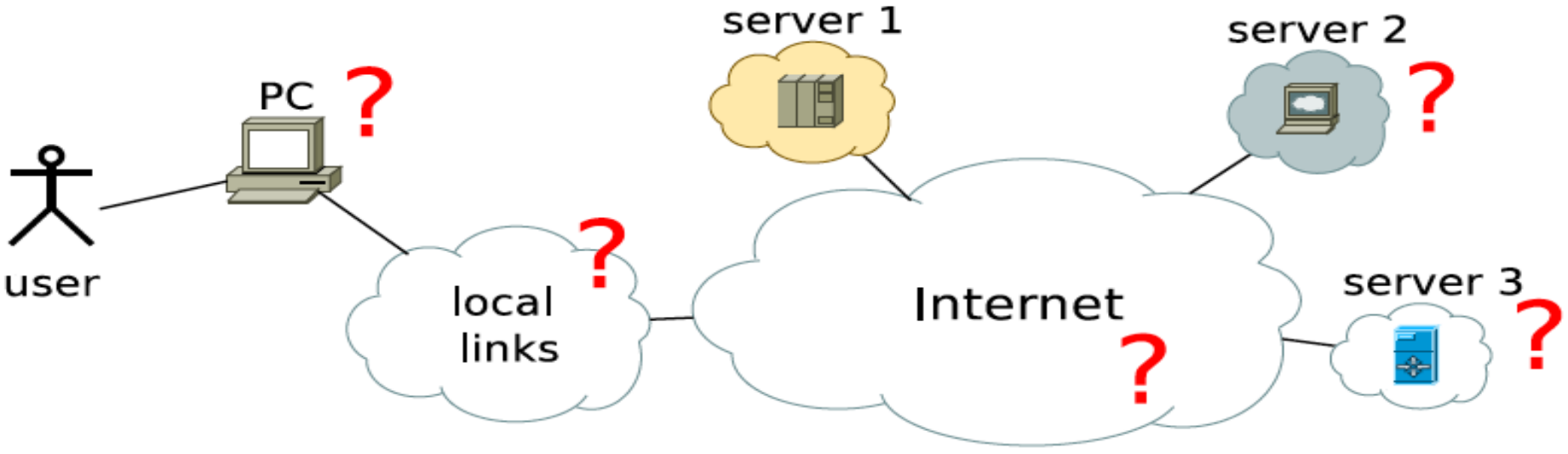
YouTube Data Center

(*) www.youtube.com/t/press_statistics

YouTube: Cache server selection

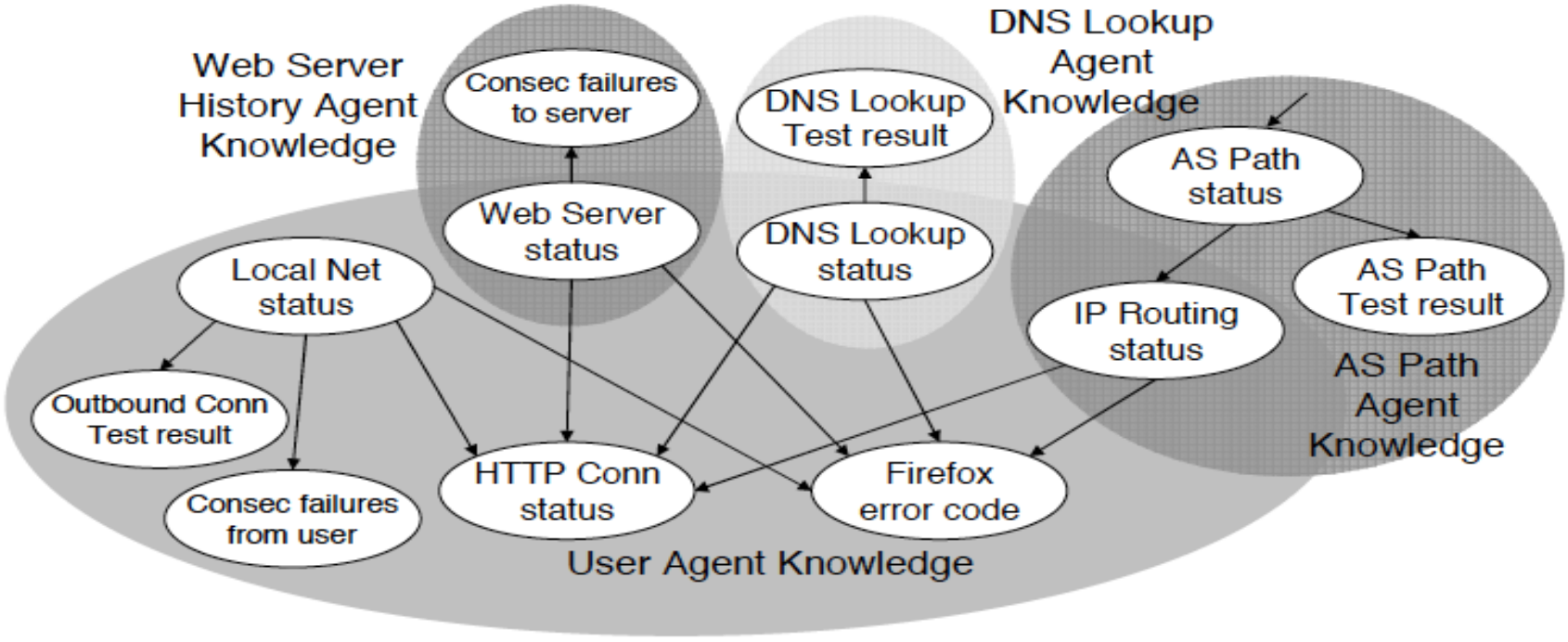
Application-level Trouble shooting

- **End to end path from client to servers**



- **Which element(-s) cause(-s) the performance problem**

Vision of distributed trouble shooting"



Example of game state

Immutable State

Mutable State

Interactive 3-D environment (maps, models, textures)

Ammo

Monsters

Game Status

Player

Screenshot of *Serious Sam*

Client-server example

Any local action by a player is transmitted to the central server who holds all the game state and updates all the players