Building an Infrastructure For the International Math Olympiad

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competa™

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IMO Infrastructure | Agenda

- The IMO
- Requirements
- Architecture
- Technology
- Building
- Issues encountered
- Lessons learned

IMO | Facts

- Yearly event
- Different country every year
  - 600+ Intl. high school students
  - 100+ members of Jury
- 7 days long
  - 2 days of actual contest
  - 5 days of preparation / translation / correction

Network | Requirements

- 5 Locations
  - 2 Amsterdam hotels
    - Contestants / 2nd Jury location
  - 1 Amsterdam sports complex
    - Contest location
  - 1 Eindhoven Hotel
    - 1st Jury location
    - (150 mi. from Amsterdam)
  - 1 Amsterdam Data center
    - At masters of system administration dept.



Network | Requirements

- Controlled Internet Access
  - The Jury location needed to be offline for some time
- Access to the logistics system
  - Located in the data center
- Scanned work available at Jury location
- Q&A session before contest

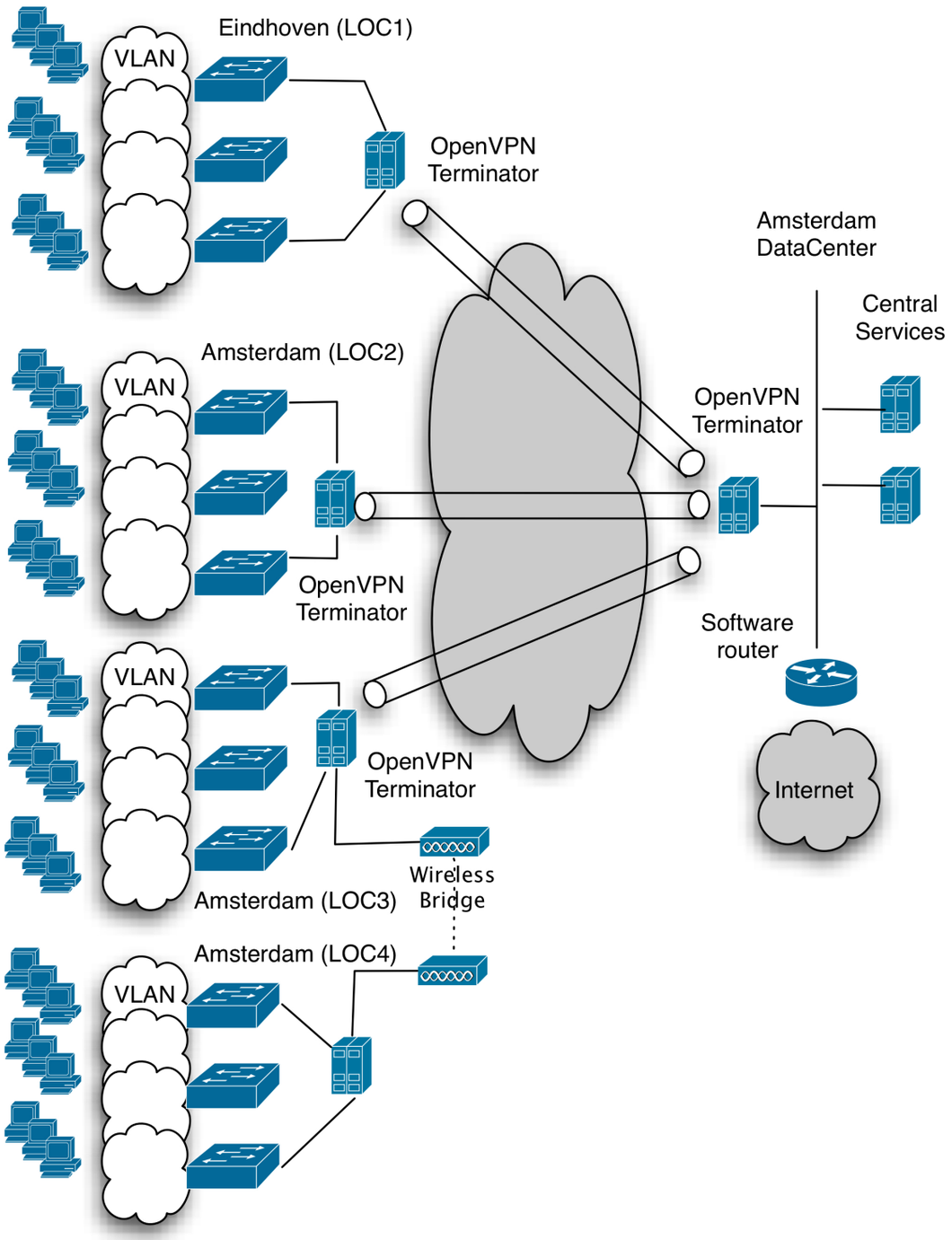
Network | Requirements

- "enough" Bandwidth
  - Definition: Better than last year
- Backup scenario (s)
  - When connectivity fails
- Separate networks
  - Security
- Flexibility
  - Changing topology

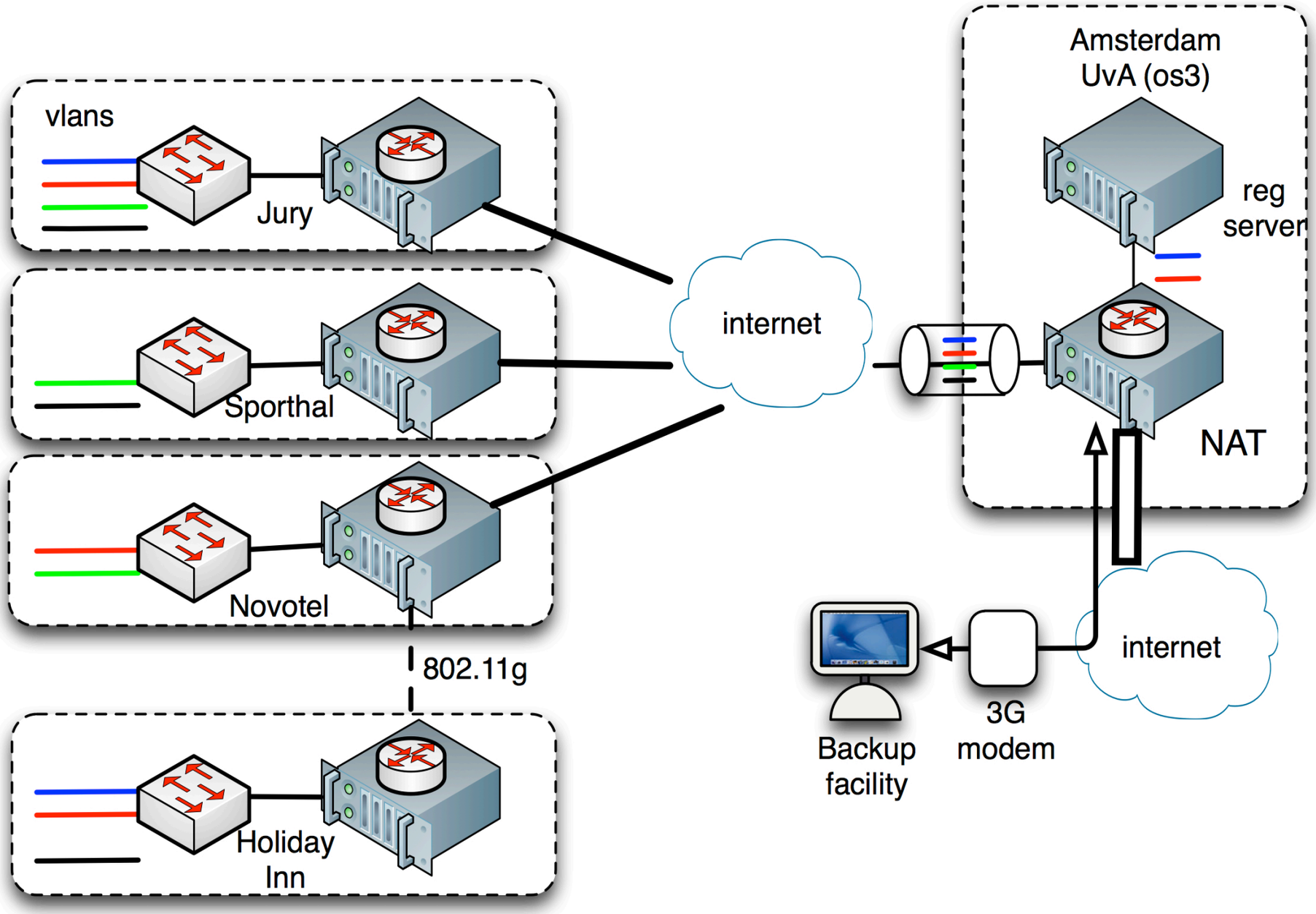
Network | Solution

- Use VLANS to separate traffic
- Use a VPN setup
- Use NAT to access internet
  - One internet gateway (and one firewall)
- Use Common Sense
  - Complexity
  - Modularity
  - Open, UNIX

Network | Architecture



Network | Architecture



Network | Technology

- A FreeBSD server at every location
  - OpenVPN
  - DHCP
  - DNS (slave server)
  - Router (central site)
- Cisco Wired switches
  - VLAN separation
- Simple Wireless AP's

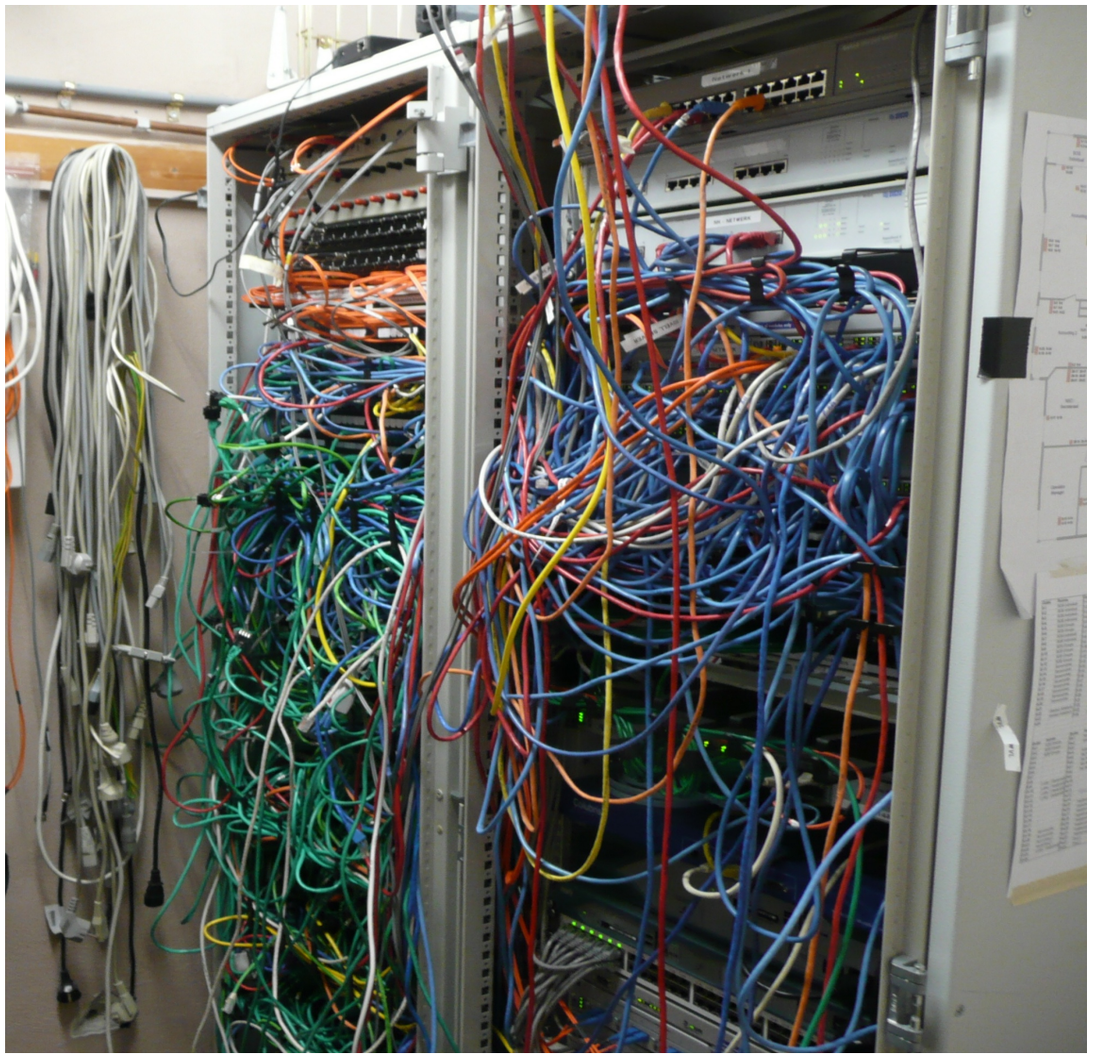
Central site | Technology

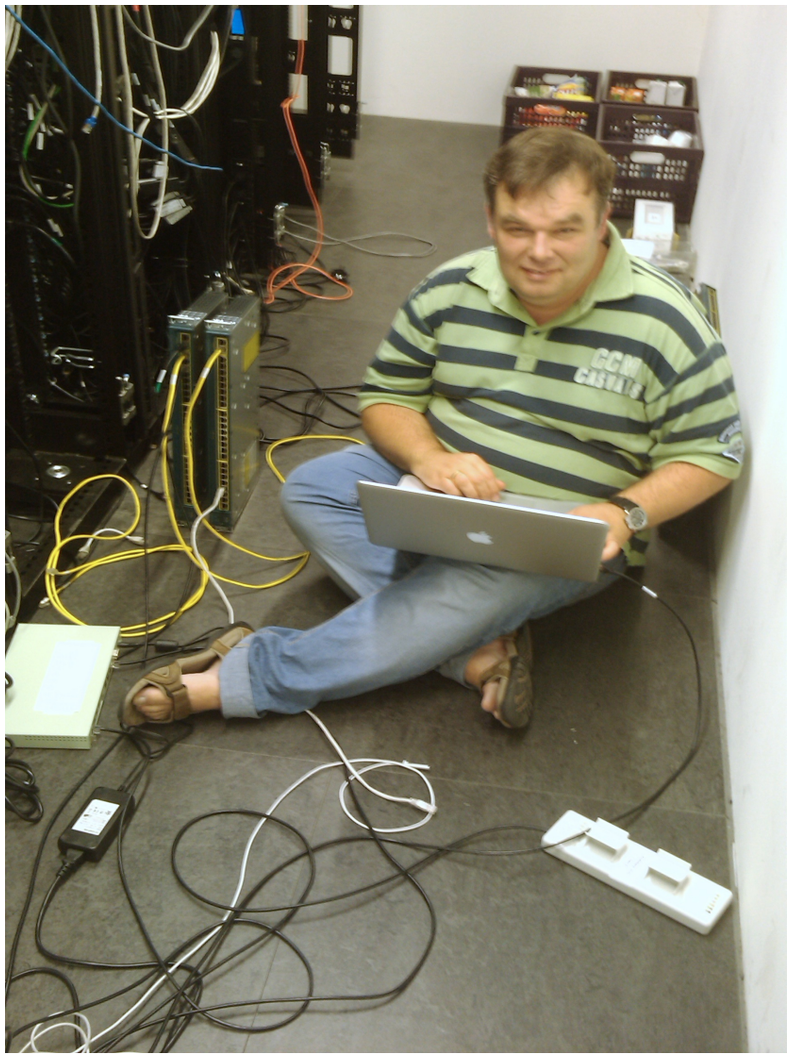
- Open VPN
  - 4 copies of daemon on separate ports
    - OVPN: single treaded running on Qcore
  - Self signed certificate / pki
- NAT
  - Large number of sessions (think Skype)
    - use in-kernel NAT instead of Userland
  - Multiple IP#s
    - prevent running out of source ports

Remote site | Technology

- Same setup
  - OpenVPN / Certificates
  - DNS Slave
  - DHCP on VLANS
- Anti Lockout Rule
  - Default route
  - Specific route

Site | Setup





Sites | Building

- 6 people, 4 days
  - Improvise, Improvise, Improvise
  - Document every step
  - Disseminate documentation
- Schedule
  - Reasonable deadlines !
    - Engineers estimate * pi

Sites | Backup

- 3G Modems
  - No dongles
- (warm) standby machine
  - Replacement for every site
  - All configs in **one** directory
- Central site: Multiple internet feeds
- Logistics system
  - Reachable over internet
  - laptop backup

Setup | Issues

- Local situation
  - Internet Feed
  - Cabling / patches
- Changing / dynamic requirements
- Routing issues
- Switch configs

- [Logistics]

Setup | Lessons learned

- Site Surveys
  - Expect the unexpected
- Document
  - Wiki
- DNS forever
- Label **everything**
- Tools (like wireshark)
- Handtools

Setup | Lessons learned

- Do not underestimate the Engineer
  - Some really creative solutions
- Flexible by design
  - All VLANS available on **all** switches
  - No complicated procedures: be **pragmatic**
- TEST, Test, test
- Allow enough time to build
- Be able to cope with politics

Setup | Lessons learned

- Communication !
  - E-mail, GSM, SMS
- Preparation
- Rely on other parts of the organization
- A good and motivated team
  - Is **fun** to work with
  - Can do **more** than you think
  - Is a **TEAM**

Questions | Lessons learned

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