



RESTENA

TERENA

2nd School-NET Workshop

Connecting Schools – Status in Luxembourg –

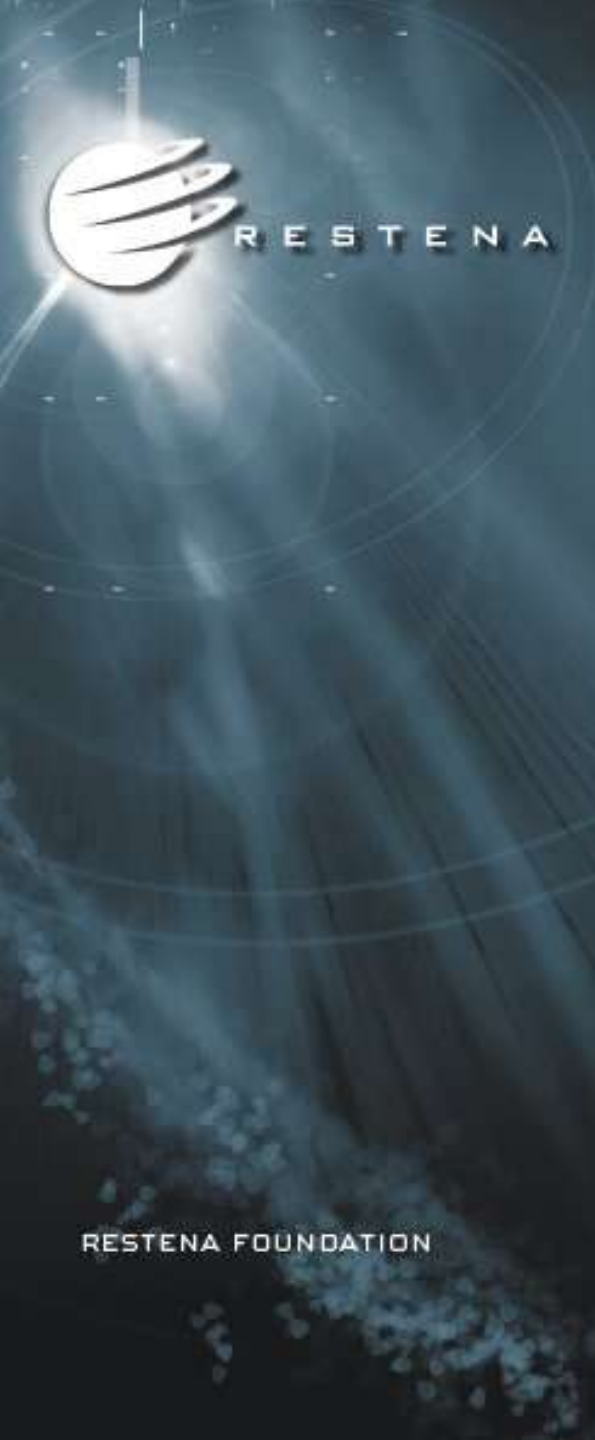
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Outline

- Introduction: RESTENA, CTE, P&T
- Connectivity
 - network backbone
 - edge
- Bandwidth, Provisioning, Maintenance
- Services
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 - For schools
- User Interaction
- Funding
- RESTENA vs. Commercial ISPs
- Relations to other entities



Introduction

➤ RESTENA

(Réseau Téléinformatique de l'Education Nationale et de la Recherche)

Luxembourg NREN, started as governmental project in 1989, became a non-profit foundation in 2000

from the beginning on, serving schools (~350 primary, ~ 40 secondary, 1 university) was one of the designated goals

also acts as the .lu DNS top-level registry and operates the Luxembourg Internet Exchange

Introduction (2)

- CTE
(Centre de Technologie de l'Education)

Organisation for helping schools to develop and maintain their in-house infrastructure

- P&T
(Poste et Telecommunication)

former government telecom monopolist

still biggest telco operator, providing the vast majority of DSL lines in the country

Connectivity - Backbone

- Schools are completely integrated into Gigabit backbone and get full internet access via RESTENA – connectivity inside towns, national and international connections
- Where feasible, schools are directly attached to a Gigabit ring that spans the city of Luxembourg (feasibility depends on availability of fiber connections)
- Where this is not possible: ISDN, DSL, leased lines or Ethernet
- International uplink: Geant2 (currently 300 MBit/s), backup commercial link

Connectivity - Edge

- RESTENA network extends to the access device in the schools – i.e. router or multi-layer switch
- Access devices managed by RESTENA
- Secondary schools get equipment through RESTENA, primary schools through their municipal authority
- Everything beyond that point is either administered by school staff itself (“correspondant informatique” in secondary schools, a “savvy” teacher in primary schools) or set up with the help of CTE

Bandwidth, Provisioning, Maintenance

- Schools get an IP pool for their internal LAN (usually class C)
- Very low demand for QoS
 - Probably because no projects that require guaranteed bandwidth
 - Some requests to get VLANs with higher priority
- Best-effort bandwidth sufficient
- Complete network up to the edge is constantly monitored by surveillance frameworks (“Big Sister”, “Nagios”)
- In case of outages: critical services are under 24/7 1-hour response time schedule (one on-duty officer, notification via SMS)
- If only one school is offline: reaction during office hours

Services – At home

- Idea behind services: “virtual office” for teachers
- Dial-up: Modem and ISDN in place; with the advent of DSL, user demand dropped
- DSL – in cooperation with P&T
 - P&T manages layer 1+2 and user authentication
 - RESTENA gets user traffic redirected and thus provides layer 3 connectivity
 - > P&T is cable operator, RESTENA is ISP
 - Users pay P&T for DSL cable via phone bill
 - RESTENA does not charge users for internet connectivity (costs covered by ministry)
- If none of these services is used, but access to restricted resources necessary: VPN connection possible



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Services – For schools

- One official domain name for schools
- Webhosting for school homepages
- E-Mail service
 - Teachers: established service since the first days of RESTENA (first.last@education.lu) administered by RESTENA
 - Pupils: started this school year, currently for 7th graders as start phase (llff123@school.lu) users administered by CTE
 - University students and staff: not yet, negotiations with uni.lu underway
- spam and virus filtering for RESTENA mail accounts + schools' local mail server if desired
- eduroam trial underway (teachers: international roaming, pupils: national roaming)

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Services – For Schools (2)

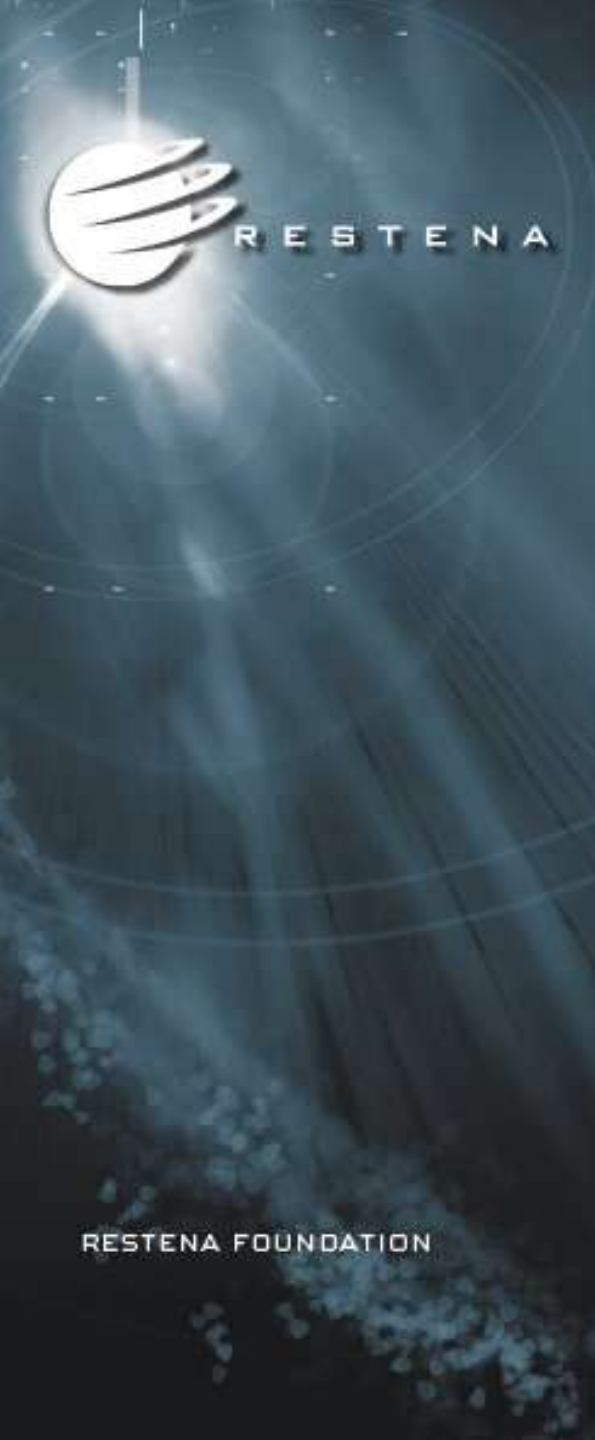
- Mailing list service on request
- Gateway NNTP -> WEB -> NNTP with a variety of (non-binary) newsgroups
- Multicast, QoS are ready to be deployed (backbone is ready) as soon as someone asks

- Security within schools is managed by CTE
- Content filtering: CTE has a simple system using a web proxy (“squid”) with teacher-configurable white- and blacklist



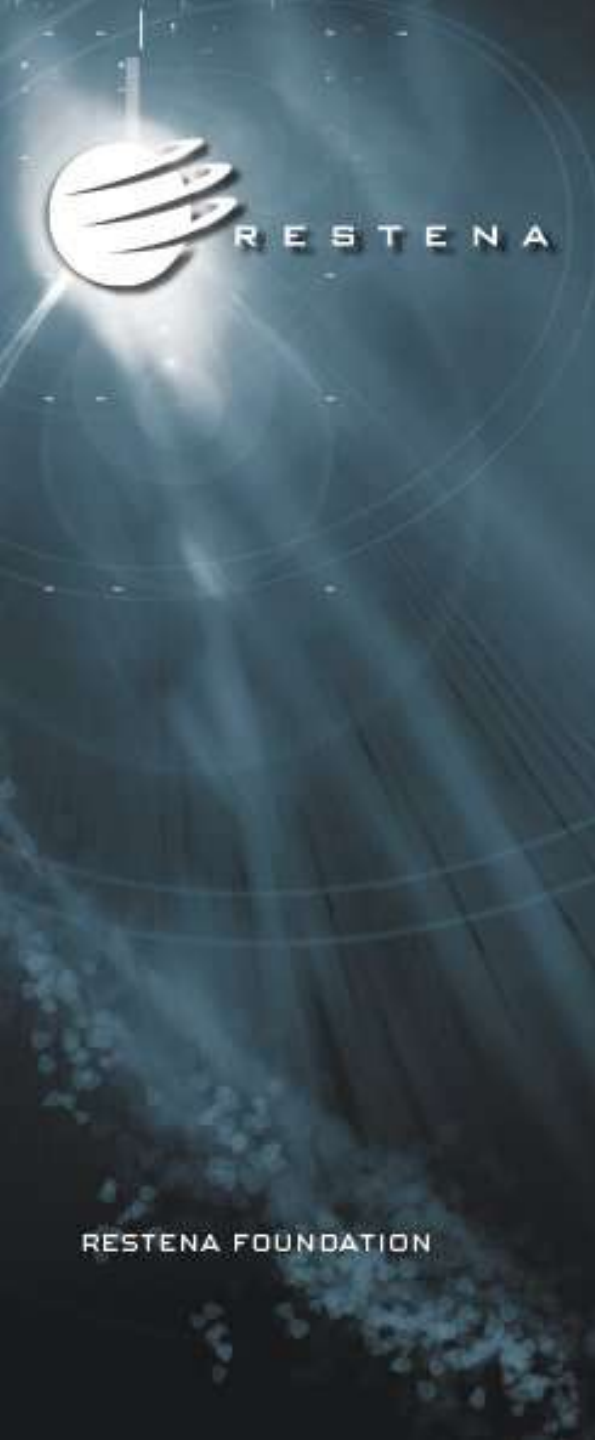
Interaction with users

- Installation of equipment at the place
- Helpdesk service: three engineers, all afternoons
 - Covers all services that are offered by RESTENA
 - Due to interwoven DSL service, users often confuse roles and contact our helpdesk for problems with their DSL connection
- Training courses
 - Basic internet courses were held up to some years ago (usage of e-mail etc.)
 - Content of these courses has meanwhile become common knowledge, so courses have been discontinued



Funding

- Secondary schools get equipment from RESTENA
- Primary schools get equipment from municipal authority
- RESTENA itself: NREN part is funded by the government
 - MEN (National Education Ministry) ~50%
 - MCESR (Ministry for Culture, higher education and research) ~50%
 - Big expenses: payments to fiber contractors, P&T for leased lines and DSL, network equipment
- DNS .lu and LIX part are completely separate



RESTENA vs. Commercial ISPs

- RESTENA is seen as superior to ISPs because
 - Low or even no connectivity cost for schools
 - Security: traffic stays within a governmentally controlled network, information leakage to other entities is prevented
 - Personal, competent contact in case of questions or problems
 - All-in-one solution: schools get everything delivered and configured from one central place
 - RESTENA staff in contact with both users and government -> negotiations about new services can be done efficiently
 - Connection has long-term stability: even when market changes and ISPs might disappear, NREN network always exists

Relations to other entities

- Funding ministries are happy with the service
- Equipment suppliers as well
- ISPs see RESTENA partly as a competitor in their market
- P&T would rather sell teachers their own DSL ISP service, so even they see us as competitor (even though they get customers and money from RESTENA)
- ISPs are welcome to offer a similar service as RESTENA does, but as of yet failed to do so (biggest problem: lack of flexibility)



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