

The etomic active probing infrastructure

I. Csabai, P. Hága, G. Simon, J. Stéger, G. Vattay, E. Magana, D. Morato, M. Izal, J. Aracil





- The European Traffic Observatory Measurement InfrastruCture (etomic) was created in 2004-05 within the Evergrow Integrated Project launched by the Future and Emergent Technologies Programme of the European Union.
- Its goals:
 - to provide an open access, public test bed for researchers investigating the Internet with active measurement methods
 - to serve as a Virtual Observatory active measurement data tridentcomⁱ⁰⁵ Best Testbed Award on the European part of the Internet







- Its Central Management System (CMS) has been developed by the Grupo de Redes, Sistemas y Servicios Telemáticos Departamento de Automática y Computación Universidad Pública de Navarra.
- Its hardware infrastructure has been designed and built by the Cooperative Center for Communication Network Data Analysis in Collegium Budapest Institute for Advanced Study.
- The measurement stations are hosted by European research groups collaborating in the Evergrow project.



Hardware architecture

- Each measurement station consists of:
 Standard server PC architecture
 - DAG 3.6 GE card with packet sending capability
 - own GPS antenna (Garmin 35 HVS)for time synchronization
- Repository and data processing:
 - Everlab IBM blade center (112 blades)



Measurement sites







Web interface

- Available via <u>www.etomic.org</u>
 - Account application -> own measurement design
 - Free access to periodic measurement end-toend data
- Measurement time slot reservation for registered users
- Programming DAG card via the user friendly Application Programming Interface
- Measurements are distributed automatically to the measurement stations



Screenshots





Open repository

European Traffic Observatory Measurement Infrastructure





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Experimental

bundle Create a bundle - Mozilla Firefox - 18 × <u>Fájl</u> Szerkesztés <u>N</u>ézet Ugrás <u>K</u>önyvjelzők <u>E</u>szközök <u>S</u>úgó 褖 🧿 🖸 https://etomic.tlm.unavarra.es/researcher/bundle2.php#ericsson Xal. New bundle: etomic demo (?) Researcher menu Upload file Next step is defining wich files will be used in each agent. An agent will run a program or eventually more than one. Edit/View files (Click on a node name to configure it) Shared files brussels (Belgium) Name: ericsson New bundle chania (N/A) Description: N/A colbud (Hungary) Edit/View bundles Country: Sweden elte (Hungary) ericsson (Sweden) New experiment Organization: Ericsson erusalem (Israel) Interfaces: crakow (Poland) Periodic experiment magdeburg (Germany) Experiments pamplona (Spain) • ericsson.etomic.org - 192.71.20.150 paris (France) Publish in Open Repos. • ericsson-dag.etomic.org - 192.71.20.151 salzburg (Austria) DAG sics (Sweden) Open Repository telia (Sweden) Manual and API Configuring ericsson (Click on a node to configure it) univet (Hungary) Logout ericsson Add binary data file Hard disk: 75 MB. **T** Binary file: etomic_check.bash <parameters> etomic_check.bash -Select Start End Command delete From 0 h. 0 m. to 0 h. 0 m. since experiment starts +0h 0m no limit "etomic_check.bash " 亩 Add command -> T Data file: etomic_check.tar.gz <tar zxf etomic_check.tar.gz> Description: <- go back | Display copy options | Save bundle etomic.tlm.unavarra.es 🔯 Kész



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User experiments

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GPS visibility information

Satellites in use (GPGGA) in date 210405



'Daily' Graph (5 Minute Average)



Max Positive Offset2697.0 usecs Average Positive Offset51.0 usecs Current Positive Offset75.0 usecs Max Negative Offset1935.0 usecs Average Negative Offset34.0 usecs Current Negative Offset 0.0 usecs

'Weekly' Graph (30 Minute Average)



Max Positive Offset449.0 usecs Average Positive Offset53.0 usecs Current Positive Offset154.0 usecs Max Negative Offset507.0 usecs Average Negative Offset27.0 usecs Current Negative Offset 0.0 usecs

'Monthly' Graph (2 Hour Average)



Max Positive Offset919.0 usecs Average Positive Offset66.0 usecs Current Positive Offset14.0 usecs Max Negative Offset209.0 usecs Average Negative Offset33.0 usecs Current Negative Offset24.0 usecs

unavailability: 5188 (6%)



Tracking topology changes

Traceroute from ericsson to huji





Topology of routers





One way delay





Remote router fingerprinting

• With our high precision measurements the clock skew of routers can

be detected and interfaces of the same router can be identified.





Visualization



v	'isualization
DATA TYPE	Mean Standard Deviation
TOPOLOGY	○ End to End ⊙ Resolved

Info

SOURCE NODE
DESTINATION NODE
MEAN
STANDARD DEVIATION

PETOMIC node



Visualization











IST Future and Emerging Technologies