



Network performance overview

TEIN2 – Bangkok – September 2005





Agenda

- Network performance
- RRDtool
- Cacti (RRDtool Front-end)



Network performance monitoring

- **MRTG**
 - The first, open-source, easy to use performance monitoring tool
 - Limitations : file oriented data storage, graphics continually generated and stored, unique graphic representation
- **RRDtool**
 - Logging & Graphing
 - Database oriented storage and on-demand enhanced graphics production. Include also a poller.
- **Cacti**
 - A Web portal for monitoring, include RRDtool, and everything else (Nagios access, looking-glass access, trouble ticketing access, documentation access)



Network performance monitoring: RRDtool

- **Official support available on**
 - <http://people.ee.ethz.ch/~oetiker/webtools/rrdtool/>
 - <http://www.caida.org/tools/utilities/rrdtool/>
- **RRDtool (Round Robin Database tool) is:**
 - A system to store and display time-series data (e.g. network bandwidth, machine-room temperature, server load average, or even the height of surfing waves on La Jolla Shores).
 - It stores the data in a very compact way, aggregating at stepwise coarser granularity as it archives further back in time, so as to maintain manageable archive size,
- **RRDtool presents useful graphs by processing the data to enforce a certain data density.**
- **RRDtool can be used either via simple wrapper scripts (from shell or Perl) or via user-friendly frontends that poll network devices.**
- **Tobi Oetiker developed part of RRDtool during his summer 1999 sabbatical with CAIDA. He continues to support it from his home institution, the Swiss Federal Institute of Technology.**



RRD World:

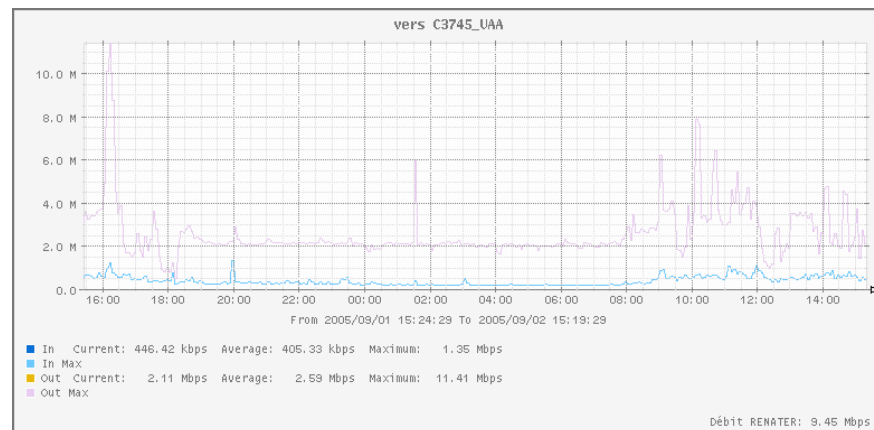
<http://people.ee.ethz.ch/~oetiker/webtools/rrdtool/rrdworld/index.en.html>

- Drraw
- RRD merger
- WeatherMap4RRD
- rrdUtils
- Big Sister system and network monitor
- Cacti
- Mailgraph
- rrd.cgi
- RRDutil
- SICM – Simple Infrastructure Capacity Monitor
- SnmpGraph
- Serverstats
- Tinygraph
- Torrus
- Tstat
- ...



RRDTOOL (Round Robin Database Tool): configuration file

```
/usr/local/rrdtool-1.0.49/bin/rrdtool graph - \  
--imgformat=PNG \  
--start=1125581069 \  
--end=1125667169 \  
--title="vers C3745_UAA" \  
--rigid \ --base=1000 \  
--height=220 \  
--width=700 \ -c CANVAS#FDFDFD -c BACK#F5F5F5 -c SHADEA#777777 -c SHADEB#777777 -c FONT#777777 -c GRID#DDDDDD -c MGRID#888888 -c FRAME#FFFFFF -c  
ARROW#000000 \  
--alt-autoscale-max \  
--lower-limit=0 \  
COMMENT:"From 2005/09/01 15:24:29 To 2005/09/02 15:19:29" \  
COMMENT:"\n" \  
--vertical-label="" \  
DEF:a="/logiciels/cacti/cacti-0.8.6c/rra/c7606_lille_i_traffic_in_216.rrd":traffic_in:AVERAGE \  
DEF:b="/logiciels/cacti/cacti-0.8.6c/rra/c7606_lille_i_traffic_in_216.rrd":traffic_in:MAX \  
DEF:c="/logiciels/cacti/cacti-0.8.6c/rra/c7606_lille_i_traffic_in_216.rrd":traffic_out:AVERAGE \  
DEF:d="/logiciels/cacti/cacti-0.8.6c/rra/c7606_lille_i_traffic_in_216.rrd":traffic_out:MAX \  
CDEF:cdefa=a,8,* \  
CDEF:cdefd=b,8,* \  
CDEF:cdeff=c,8,* \  
CDEF:cdefi=d,8,* \  
LINE1:cdefa#096FD5:"In" \  
GPRINT:cdefa:LAST:" Current\:%7.2lf %sbps" \  
GPRINT:cdefa:AVERAGE:"Average\:%7.2lf %sbps" \  
GPRINT:cdefd:MAX:"Maximum\:%7.2lf %sbps\n" \  
LINE1:cdefd#6DC8FE:"In Max\n" \  
LINE1:cdeff#E9B80C:"Out" \  
GPRINT:cdeff:LAST:"Current\:%7.2lf %sbps" \  
GPRINT:cdeff:AVERAGE:"Average\:%7.2lf %sbps" \  
GPRINT:cdefi:MAX:"Maximum\:%7.2lf %sbps\n" \  
LINE1:cdefi#E8CDEF:"Out Max\n" \  
COMMENT:"\n"
```





Web Portal: Cacti

- Official support available on <http://www.cacti.net/>
- Cacti is:
 - A complete network graphing solution (Web Portal) designed to harness the power of [RRDTool](#)'s data storage and graphing functionality.
- Cacti provides a fast poller, advanced graph templating, multiple data acquisition methods, and user management features out of the box. All of this is wrapped in an intuitive, easy to use interface that makes sense for LAN-sized installations up to complex networks with hundreds of devices.
- Cacti could be used to consolidate everything else (Nagios access, looking-glass access, trouble ticketing access, documentation access)



Web Portal: Cacti

Data Sources

To handle data gathering, you can feed cacti the paths to any external script/command along with any data that the user will need to "fill in", cacti will then gather this data in a cron-job and populate a MySQL database/the round robin archives.

Data Sources can also be created, which correspond to actual data on the graph. For instance, if a user would want to graph the ping times to a host, you could create a data source utilizing a script that pings a host and returns it's value in milliseconds. After defining options for RRDTool such as how to store the data you will be able to define any additional information that the data input source requires, such as a host to ping in this case. Once a data source is created, it is automatically maintained at 5 minute intervals.

Graphs

Once one or more data sources are defined, an RRDTool graph can be created using the data. Cacti allows you to create almost any imaginable RRDTool graph using all of the standard RRDTool graph types and consolidation functions. A color selection area and automatic text padding function also aid in the creation of graphs to make the process easier.

Not only can you create RRDTool based graphs in cacti, but there are many ways to display them. Along with a standard "list view" and a "preview mode", which resembles the RRDTool frontend 14all, there is a "tree view", which allows you to put graphs onto a hierarchical tree for organizational purposes.

User Management

Due to the many functions of cacti, a user based management tool is built in so you can add users and give them rights to certain areas of cacti. This would allow someone to create some users that can change graph parameters, while others can only view graphs. Each user also maintains their own settings when it comes to viewing graphs.

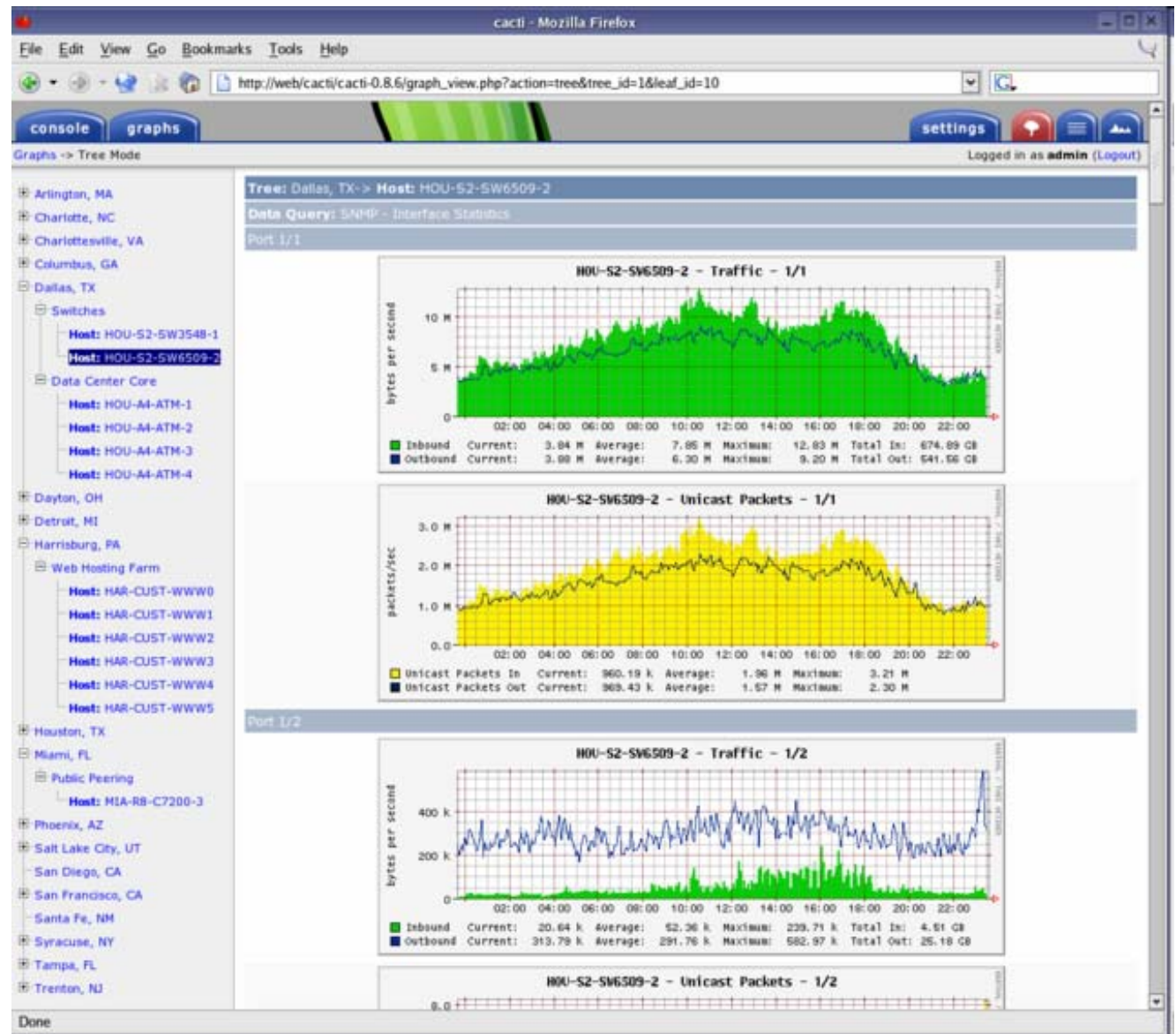
Templating

Lastly, cacti is able to scale to a large number of data sources and graphs through the use of templates. This allows the creation of a single graph or data source template which defines any graph or data source associated with it. Host templates enable you to define the capabilities of a host so cacti can poll it for information upon the addition of a new host.



Cacti Web portal

- Web portal (Front-end) based on RRDTOOL and MySQL





Cacti: NOC infos

NOC Stats - Mozilla Firefox

http://stats.noc.c-s.fr/infos_view.php

NOC Infos | Graphs | Trouble Tickets | Network Maps | Browse Documents | Looking Glass | Options

Logged in as **pacrret** (Logout)

Network Operating Center

Bienvenue sur l'interface web d'infogérance de Communication & Systèmes. Cette interface a pour but de vous offrir un véritable tableau de bord en temps réel de vos indicateurs, consultable 24h/24, et vous permettant de suivre en détail l'état de votre plateforme.

→ Noc Infos:

Les entreprises qui nous confient l'infogérance de leur plateforme ont besoin d'une transparence totale sur les opérations effectuées et sur leurs interlocuteurs techniques. Ci-contre se trouvent les divers points de contact à même de répondre à vos questions.

→ Graphs:

Avec son service de monitoring, le NOC publie en temps réel les performances de vos accès ainsi que des indicateurs vitaux du réseau. Sur cette interface, une historisation est disponible et visualisable à travers un panel de graphes correspondant à vos divers indicateurs seuils.

→ Trouble Tickets:

Cet onglet correspond aux demandes d'assistance, détection/déclaration d'incident et de maintenances actuellement gérées par nos équipes d'intervention.

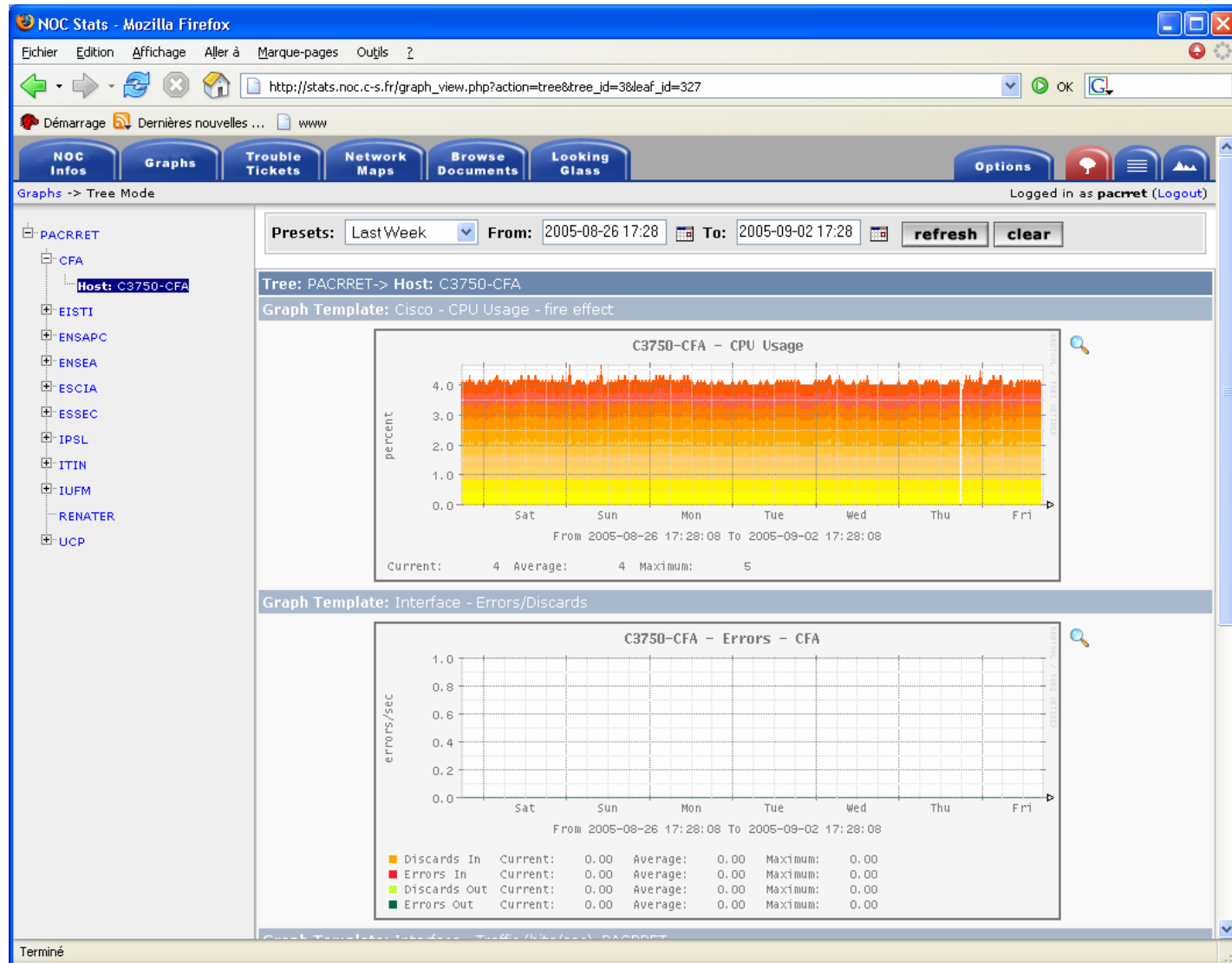
→ Network Maps:

Cet onglet vous donne une vision graphique en temps réel de l'état opérationnel de vos équipements. Grâce à la fonction "Weathermap", il offre une vue globale de la charge de vos liaisons d'accès.

Terminé



Cacti: graphics presentation





Cacti: trouble tickets presentation

The screenshot shows two overlapping browser windows displaying the NOC Stats web interface. The top window shows the 'Trouble Tickets' list, and the bottom window shows the details for ticket 2005_08_30_01.

Filter by Site: All **Filter by Status:** [dropdown]

Ticket	Status	Site
2005_09_02_01	Closed	C3750-CFA
2005_09_01_01	Closed	C3750-CFA
2005_08_30_01	Closed	C6506-PACRRET
2005_08_22_01	Closed	C6506-PACRRET
2005_08_19_01	Closed	C3750-IPSL
2005_08_18_01	Closed	C3750-IPSL
2005_08_17_01	Closed	C3750-ENSAPC
2005_07_28_02	Closed	C6506-PACRRET
2005_07_28_01	Closed	C3750-UCP
2005_07_25_01	Closed	C3750-ITIN
2005_07_22_01	Closed	C6506-PACRRET
2005_07_20_01	Closed	C6506-PACRRET
2005_07_19_02	Closed	C6506-PACRRET
2005_07_19_01	Closed	C6506-PACRRET
2005_07_13_01	Closed	C6506-PACRRET
2005_06_28_02	Closed	C3750-ITIN
2005_06_28_01	Closed	C3750-IPSL
2005_06_03_01	Closed	C3750-UCP
2005_05_31_01	Closed	C6506-PACRRET
2005_05_30_02	Closed	C3750-ESCIA
2005_05_30_01	Closed	C3750-ESSEC

Ticket 2005_08_30_01

Dernière mise à jour : Aug 31 2005 11:16:33

Objet : Travaux Planifiés
Incidence : Site isolé
Cause : Annulation ticket
Equipement : C6506-PACRRET
Adresse Complète : Université de Cergy-Pontoise
: 33, Boulevard du Port
: 95011 Cergy-Pontoise

Début de l'incident : 31/08/2005 à 06 H 00 m
Fin de l'incident : 31/08/2005 à 06 H 01 m
Durée de l'incident : 0 jour(s) 0 heure(s) 1 minute(s)

Ouverture du ticket : 30/08/2005 à 07 H 43 m
Fermeture du ticket : 31/08/2005 à 11 H 16 m

Mercredi 31 Août 2005 à 11:18:13
La maintenance a été annulée, une nouvelle date sera prochainement définie.

Mardi 30 Août 2005 à 09:06:11
Une erreur de saisie s'est produite à l'ouverture du ticket.

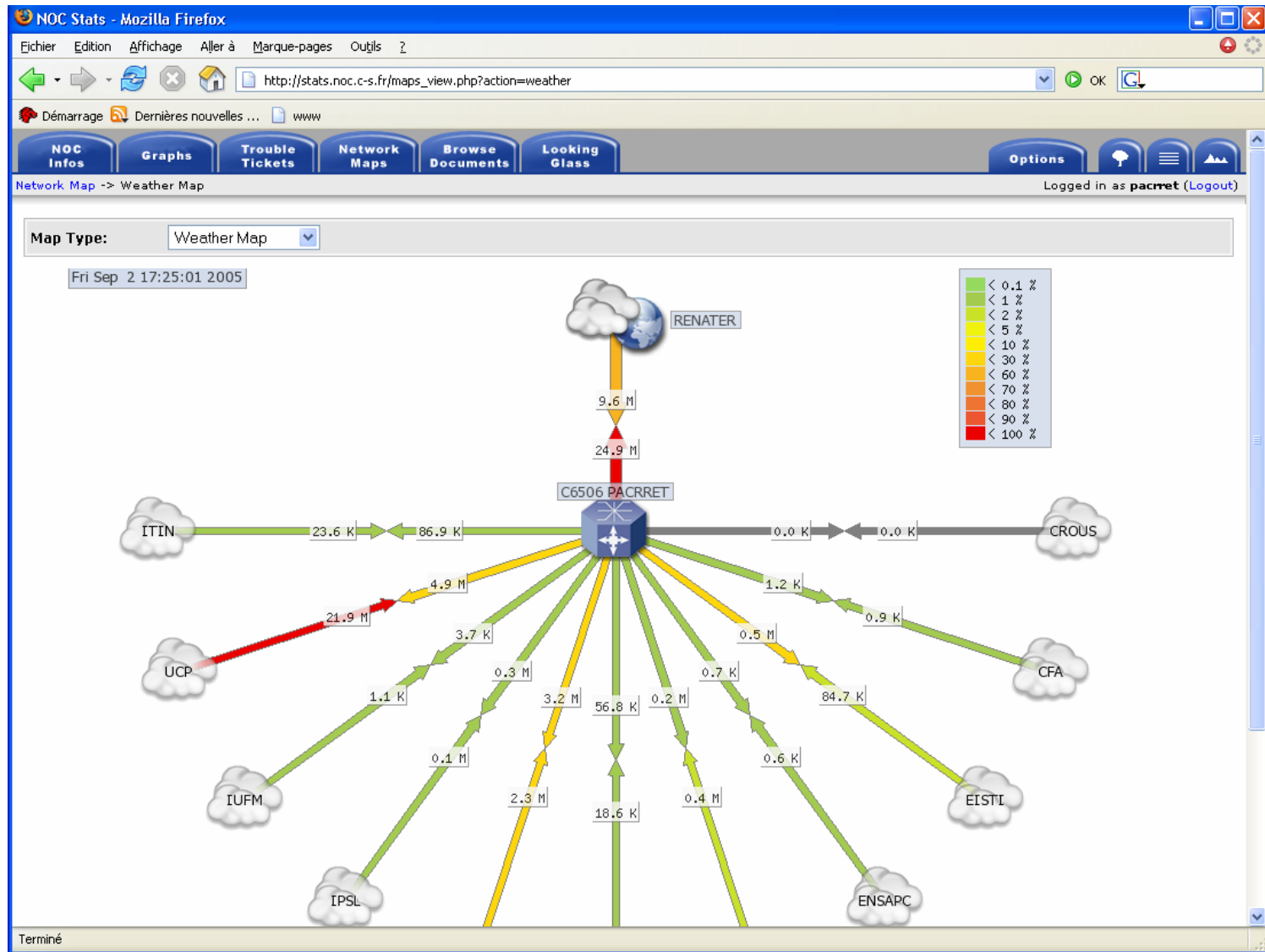
Veillez lire :

RENATER doit intervenir sur le NR de Cergy.
Ceci engendrera une coupure de service dont la durée est estimée à 2 heures.
Cette coupure est programmée le 31/08 de 6h00 à 8h00.
Ainsi, les sites raccordés sur PACRRET n'auront plus accès à Internet.

Terminé



Cacti: network map presentation





Cacti: documentation access

The screenshot shows a Mozilla Firefox browser window titled 'NOC Stats - Mozilla Firefox'. The address bar contains the URL: `http://stats.noc.c-s.fr/files_view.php?dir=/Tableau%20de%20Bord%20Mensuel`. The browser interface includes a menu bar (Fichier, Edition, Affichage, Aller à, Marque-pages, Outils), a toolbar with navigation buttons, and a navigation pane with buttons for 'NOC Infos', 'Graphs', 'Trouble Tickets', 'Network Maps', 'Browse Documents', and 'Looking Glass'. The main content area shows a file listing for 'Tableau de Bord Mensuel' with the following data:

Action	File	Size	Last Modified
	CSSI_513-1_SB_SP_5_103-0001_TableauDeBordJanvier2005[TDB].pdf	1.65 Mb	Mon 07/02/05 18:48:36
	CSSI_513-1_SB_SP_5_103-0002_TableauDeBordFévrier2005[TDB].pdf	1.47 Mb	Thu 10/03/05 10:12:16
	CSSI_513-1_SB_SP_5_103-0003_TableauDeBordMars2005[TDB].pdf	1.21 Mb	Mon 04/04/05 12:52:14
	Métrologie	4 Kb	Mon 08/08/05 18:28:57
	Supervision	4 Kb	Mon 08/08/05 18:28:53

The browser status bar at the bottom indicates 'Terminé'.



Cacti: looking glass access

NOC Stats - Mozilla Firefox

Fichier Edition Affichage Aller à Marque-pages Outils ?

http://stats.noc.c-s.fr/lg_view.php?host_id=2

Démarrage Dernières nouvelles ... www

NOC Infos Graphs Trouble Tickets Network Maps Browse Documents Looking Glass Options

Looking Glass -> Select Command Logged in as pacret (Logout)

Hosts : C6506-PACRRET go

Global Commands

- Version Show the current equipment software version.
- Clock Show the equipment current clock.

go

IPv4 Commands

- Ping [address/name] Send ICMP Echo Request packets to network hosts.
- Traceroute [address/name] Print the route packets take to network host.
- Show bgp [prefix] Displays entries in the BGP routing table for one network prefix.
- Show bgp summary Displays a summary of the status of all BGP connections.
- Show bgp neighbor [address] Displays detailed status of a particular BGP peering.

IPv4 Address/Prefix: go

Interface Commands

- Show interface description Show a list of network interfaces and their associated descriptions.
- Show ip interface brief Show a list of network interfaces and their associated IP addresses.
- Show interface [interface] Show a detailed information on a specific interface.

Interface Name: go

Terminé



CONCEPTEUR INTEGRATEUR OPERATEUR DE SYSTEMES CRITIQUES

THE END

Thank you for your attention