

DNS Monitoring Service for TLD Administrators

Service description

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1. Introduction

The Domain Name System (DNS) is a hierarchical and distributed database that translates domain names into IP addresses. Almost every application on the Internet uses DNS; it is a key element in the Internet infrastructure. At the top of the DNS hierarchy, there are thirteen root servers, known as a.root to m.root. These are located at various places all over the world.

For the DNS service to work properly, two things are essential: the server machines should be working correctly and the clients using the server should be able to reach it through the network. Monitoring the latter is difficult, as the clients can be thousands of kilometres and a few dozen network hops away.

The RIPE NCC offered the Test Traffic Monitoring (TTM) Service as a membership service since late 2000. For the TTM service, we installed measurement probes (called Test Boxes or TBs) at sites all over the world. The operators of these sites are usually referred to as "Test Box Hosts". The original idea was to use these TBs to measure performance between sites. In early 2003, it became clear that the boxes could also be used to monitor other services, for example DNS. The RIPE NCC has developed software to carry out these measurements, giving sites hosting Test Boxes an overview of the connectivity to each of the root servers. This feature is called DNSMON.

By grouping the data collected for DNS by root server, instead of by TB, it is possible to obtain an overview of the connectivity of the root server itself. While this may not be of interest to the Test Box Hosts, it is very interesting to the operator of the root server. It provides an overview of the connectivity of their server measured from more than 100 locations. By combining the data with topology information it can give a strong indication of the location of a connectivity problem. We also realised that this technique was not limited to the root servers but that we could also apply it to TLD servers. The ccTLD community expressed strong interest in doing this. This resulted in the development of the DNSMON service.

DNSMON provides a comprehensive, objective and up-to-date overview of the quality of the service offered by high-level DNS servers. Currently these are the root servers and some interested TLD servers. DNSMON is built on top of the TTM infrastructure. The service has already been running in test mode for several months. It will be offered as a production service in early 2005.

The main users of the DNSMON data will be

- the Test Box Hosts,
- the operators of the root servers and TLD servers, and
- the Internet community in general.

In the first two cases, the users of the data will rely on the data for their daily operations. During the test phase, it became clear that the users of this service often require additional support. The RIPE NCC will incur additional costs to provide this support will need to recover these costs. This generates certain expectations for the quality, reliability and support of the DNSMON service.

In case of the Test Box Hosts, a formal agreement [RIPE297] describing the responsibilities and obligations of both parties exists. This document covers the DNSMON services as well. This paper meets the need for a similar document for TLDs.

The outline of the remainder of this document is as follows: section 2 contains an informal overview of the service and explains what a TLD administrator can expect when subscribing to the service in plain language. Section 3 and the appendices contain the text of the contract that will have to be signed when a TLD administrator subscribes to the DNSMON service.

2. Global description of the service

There are two components in the DNSMON setup:

- The test boxes. These monitor the DNS servers by sending queries to them.
- The central machine that collects the data from the test boxes generates plots and presents them to the users.

Only the central machine is under the direct control of the RIPE NCC in this set up. The RIPE NCC aims to ensure that this machine is always working correctly.

The TB hosts, not the RIPE NCC own and operate the TBs. If a TB is down, it will not collect data. In this case, the central machine will be unable to present data. The RIPE NCC monitors the performance of the TBs, notifying any problems on a daily basis. Fixing problems requires effort from the host. It is reasonable to expect that sites hosting a TB would respond to such requests - as they are interested in the data and pay the RIPE NCC a fee for collecting it. This, however, is beyond the control of the RIPE NCC.

When subscribing to the DNSMON service, a TLD can expect:

1. The guarantee that as many TBs as possible will be used to monitor the servers of that TLD during a given time period.
2. Early access to the data. The TLDs will have access to the data as soon as it is collected, the public will only have access to the data after two hours. This gives the TLD an opportunity to solve problems. TLDs will also have posting rights to a mailing list, used to inform the public of problems, solutions and work-rounds.
3. Help desk support. In case of a problem, the TLD will be able to contact the RIPE NCC who will try to resolve the problem with the service as soon as possible. In addition, when "unusual" effects are seen in the data, the RIPE NCC will help the TLD to investigate them.

The RIPE NCC incurs additional costs to offer these services. These costs will be charged to the TLDs.

The RIPE NCC will include the servers of a TLD in the service if that TLD asks for it. Servers of a TLD may be included even if the TLD does not ask for it. The hosts of the TBs located inside a TLD may also ask for the TLD servers to be monitored. A TLD that did not ask for its servers to be monitored will not have access to the services listed above.

Subscribing to this service generates certain expectations from both sides and results in the transfer of money. In order to formalise the relation and to ensure that both sides understand their obligations, it is proposed to sign a “*DNS Monitoring Service Agreement*”. The text of this document is included in the next section. The service will start after both sides have signed this agreement.

3. DNS Monitoring Service Agreement

Note: This section and the appendices contain the text of the formal agreement between the TLD administrators and the RIPE NCC. When the former decides to use the service, a separate contract will be drawn up for both parties to sign. The text of this contract will be identical to section 3 and the appendices of this document, with names and dates filled out.

[TLD Administrator + address + postal code + city + country]

From here on referred to as “the TLD Administrator”, and

The Réseaux IP European Network Coordination Centre
Singel 258
1016 AB Amsterdam
The Netherlands,

Form here on referred to as “the RIPE NCC”.

Whereas:

The RIPE NCC has developed a service to monitor the performance of DNS servers called DNSMON. This service is described Appendix A.

The TLD Administrator wishes to use this monitoring service and wants to obtain early access to the data collected by the DNSMON service along with a help desk for this service.

The RIPE NCC membership requires receiving partial financial compensation for the operation of the DNSMON monitoring of the NN TLD from the TLD administrator.

3.1. Definitions

- a. **TLD Administrator:** The organisation(s) responsible for the registry of a Top Level Domain, as assigned by ICANN.
- b. **TTM service:** Test Traffic Measurements Service, as described in RIPE Documents 209 and 297.
- c. **Test Box/TB:** probes monitoring the DNS servers by sending queries to DNS servers.
- d. **DNSMON:** A service monitoring the performance of DNS servers designated by TLD Administrators, the RIPE NCC or the TB hosts, by the TBs. The results are collected and published in graphical form on

<http://dnsmon.ripe.net>.

These results will be made available to TLD Administrators and the public, and other bodies considered appropriate by the RIPE NCC.

- e. **Software:** Software as specified in Annex A to be used for DNSMON, including any upgrades.

3.2. Start of the agreement.

- a. The DNSMON Service Agreement between the RIPE NCC and a TLD Administrator shall come into effect by means of an offer and an acceptance.
- b. The TLD Administrator shall send the RIPE NCC at least two hard copies of this agreement, with the appropriate sections filled out, signed by an authorised representative of the TLD Administrator, as well as an extract from the Commercial Trade Register or similar document proving the TLD Administrator's business with the national authorities. (The latter is not necessary for TLD Administrators who are already RIPE NCC customers for TTM or RS Services.) When the documents arrive at the RIPE NCC, a representative of the RIPE NCC shall sign the documents and return at least one copy to the TLD Administrator. The RIPE NCC shall not commence the provision of the DNSMON service until a signed version of the agreement has been received.
- c. The RIPE NCC reserves the right to amend and/or supplement the DNSMON cooperative agreement. The RIPE NCC shall notify the TLD Administrator at least one month prior to any such amendment or supplement coming into effect.
- d. Upon signing this agreement, the TLD Administrator acknowledges and accepts that it has obtained the right to use and the obligation to pay for the DNSMON service in accordance with this agreement, as specified further in Annex B.

3.3. Scope of the Agreement

- a. The RIPE NCC will monitor the authoritative DNS servers serving the NN TLD and servers designated by the TLD Administrator.
- b. The RIPE NCC will publish the results to the public.
- c. The TLD Administrator can designate the servers, serving the NN TLD, to be monitored by the RIPE NCC. An initial list will be provided with this agreement (see Annex D); this list can be changed at any time with at least three full working days notice. The RIPE NCC will confirm any changes to this list during this period.
- d. The TLD Administrator and the RIPE NCC will designate administrative, technical and billing contacts for the execution of this agreement, as further specified in Annex C.
- e. The RIPE NCC and the TLD Administrator shall follow the operational procedures described in this Agreement and as further specified in Annex C.
- f. The RIPE NCC will offer e-mail help desk support to the TLD Administrator as further specified in Annex C.
- g. The RIPE NCC provides facilities to announce and communicate technical issues to technical contacts of the TLD Administrator as further specified in Annex C.

3.4. Management, maintenance and support

The DNSMON Service is operated and maintained under the sole administrative control of the RIPE NCC, including software upgrades, software configuration and system administration.

The RIPE NCC will present any plans for the DNSMON service for discussion in the RIPE DNS working group first. The same working group can be used by the TLD Administrators to provide feedback on the services and suggestions for improvements. The RIPE NCC will, in its annual activity plan, announce the final plan for the service for the next calendar year.

3.5. Assignment

The parties shall not assign, transfer, charge or deal in any manner with this agreement or any rights under it, without prior written consent of the other party.

3.6. Confidentiality and Publicity

- a. Each party shall treat as private the other party's confidential information. Confidential information includes any information relating to the service and any information imparted by the other party as being confidential. Confidential information shall not include information that has become public knowledge other than through violation of this duty of confidentiality.
- b. Both the TLD Administrator and the RIPE NCC may publish the data collected by the DNSMON server and make statements about the data (written or oral, press releases and interviews included). Each party shall endeavour to inform the other party about publications using the data if such a paper is in the public domain.
- c. The RIPE NCC shall be notified prior to any public statement (written or oral, press releases and interviews included) planned by the TLD Administrator related to the technical aspects of the DNSMON service. The TLD Administrator shall not make any such statements without prior written authorisation of the RIPE NCC.

3.7. Liability; Indemnification

- a. Each party shall indemnify and protect the other party from and against any damages and expenses, including legal fees that may result from a third party claiming compensation for loss or damage caused in whole or in part by non-performance of the indemnifying party, or for any acts or omissions of the indemnifying party, its employees, authorised representatives or subcontractors.
- b. The RIPE NCC shall not be liable for any damage caused by the monitoring software to the hardware or other property of the TLD administrator. The TLD Administrator shall indemnify and protect the RIPE NCC from and against any claims, damages and expenses, including related legal fees.
- c. The TLD Administrator shall be liable for all aspects of its use of the DNSMON service offered by the RIPE NCC.
- d. Without prejudice to section 3.10(a), the parties shall not be liable for loss or damage resulting from non-performance, except where the non-performance results in personal injury or is due to gross negligence or wilful intent.

3.8. Termination

- a. This Agreement shall be valid as from the date of signature including the information to be filled in by the TLD Administrator in Annex A and C.
- b. Each party may terminate this Agreement
 - I. By giving thirty days in writing notice. This must be sent by registered post with advice of delivery;
 - II. With immediate effect upon written notice to the other party (by registered post with advice of delivery) in the event of a substantial breach by either party of any obligation under the Agreement which is irremediable or which is not remedied within a reasonable period of time, following written notice requesting it be remedied;
 - III. With immediate effect upon written notice that the other party has filed or plans to file for bankruptcy or be declared bankrupt or plans to apply for a suspension of payment or order the liquidation of its organisation in any manner whatsoever.
- c. The RIPE NCC may terminate this agreement if the TLD Administrator does not pay the service fee according to the procedure described in Annex B.
- d. The RIPE NCC may suspend operation of the service at the end of one calendar year. This decision will be announced by e-mail to the contacts of the TLD

administrators 1 month before the end of the calendar year and published in the RIPE NCC annual activity plan.

- e. Any payments or credits outstanding upon termination remain due.
- f. Upon termination, each party shall ensure that all confidential information and software belonging to the other party (in whatever medium it is recorded or held) is returned, deleted or destroyed in accordance with the other party's written instructions.
- g. Upon termination, the RIPE NCC ensures availability of data for two years, though data may be removed from any website.

3.9. Variation of Terms

In the event that any of the terms of the agreement (including Annexes) is determined by any competent authority to be invalid, unlawful or unenforceable, such term will be removed from the remaining terms which continue to be valid to the fullest extent permitted by Dutch law.

3.10. Applicable law; jurisdiction

- a. The agreement shall be governed exclusively by Dutch law.
- b. The competent court in Amsterdam shall have exclusive jurisdiction in all matters relating to the agreement.

RIPE NCC:

By: _____
Printed Name: _____
Company: _____
Title: _____

[TLD Administrator]:

By: _____
Printed Name: _____
Company: _____
Title: _____

Annex A

Specification of the DNSMON service

The goal of the DNSMON service is to monitor DNS servers selected by TLD administrators, the RIPE NCC or the Test Box Hosts. Signing this document entitles a TLD administrator to:

1. The guarantee that the servers of that TLD will be monitored by as many TBs as possible during a certain period.
2. Early access to the data: The TLDs will have access to the data as soon as it is collected, the public will only have access to the data after two hours. This gives the TLD an opportunity to solve problems. TLDs will also get posting rights to a mailing list to inform the public of problems and solutions.
3. Help desk support: In case of a problem, the TLD will be able to contact the RIPE NCC, who will try to solve the problem with the service as soon as possible. When "unusual" effects are seen in the data, the RIPE NCC will help the TLD to investigate.

Software

1. The RIPE NCC will use the DNSMON software developed in house for monitoring.
2. The source code of the software for the service will be made available under the GPL on a CVS server.
3. Bugs can be reported to the RIPE NCC and will be fixed in a timely fashion.
4. Feature requests will be implemented by the RIPE NCC on a best effort basis.

Annex B: Billing scheme and procedure

The TLD administrator shall for contribution purposes self-declare to the RIPE NCC a category size of SMALL, MEDIUM or LARGE by stating this in the DNSMON agreement.

Guidelines for the charging category can be the number of registered sub-domains, the number of additional DNS servers that need to be monitored by DNSMON and the load that is expected on the DNSMON service team. Also the already declared size of other TLDs may be helpful.

The RIPE NCC will publish the fact that a TLD administrator supports the operation of DNSMON including the current self-declared category size of a TLD Administrator on the DNSMON web site.

Only TLD administrators in the MEDIUM and LARGE category may designate additional DNS servers to be monitored by DNSMON during the calendar year. The TLD Administrator can request a change in category size up to 31st of March. This change will be granted unless the TLD Administrator had more DNS servers to be monitored by DNSMON and requests to be shifted into the SMALL category.

The DNSMON Service fees shall be as follows:

Category size	Amount
SMALL	EUR 2,000 per year
MEDIUM	EUR 4,000 per year
LARGE	EUR 6,000 per year

Payment scheme

1. The TLD Administrator shall owe the RIPE NCC the service fee listed above, excluding 19% Dutch VAT or any applicable taxes, immediately due when the TLD administrator concludes the agreement. Dutch VAT will be charged to TLD Administrators inside the EU unless a valid EU VAT number is provided by the TLD Administrator.
2. The RIPE NCC reserves the right to update the service fee annually to reflect changes to the operational costs of the service. Changes will be announced at least one month in advance by e-mail to billing and technical contacts of the service.
3. Invoices for the relevant financial year will be generated and sent via e-mail and postal mail at the beginning of April. At the request of the TLD Administrator a copy of the invoice can be sent by e-mail to the contact. Payment is due 30 days after date of invoice.

The first reminder is sent via postal mail and e-mail 30 days after date of invoice. If the RIPE NCC does not receive payment within 60 days of the date of invoice, a second reminder including a late payment fee of EUR 50 is sent to the registry. After 90 days of non-payment the DNSMON service for the TLD Administrator is revoked. The DNSMON service will only be reinstated after the TLD administrator has paid all outstanding invoices.

4. The RIPE NCC withholds the right to charge the TLD pro-rata for any third party expenses incurred regarding the agreed services.
5. The TLD Administrator's obligation to perform its payment commitments shall commence on the day on which the DNS Monitoring Services Agreement is signed.
6. The TLD Administrator shall make all payments to the RIPE NCC within 30 days of date of invoice. Failing this, the Host will be in default, with no notice of default being required.
7. With effect from the day on which the TLD Administrator defaults on its payment obligations, the RIPE NCC withholds its right to, without prejudice, revoke any or all services agreed upon in this contract.
8. The TLD Administrator may not postpone its payment obligations or offset any of its legal or financial claims against the RIPE NCC.

Annex C: Operations

Operational Contacts

The RIPE NCC help desk will be available by e-mail, Monday to Friday between 10:00 and 16:00 Amsterdam time (GMT-1 or GMT-2), except for on Dutch public holidays. An initial response to e-mails will be given during the first working day after receipt of an e-mail. This response may be by e-mail or telephone.

	RIPE NCC	<TLD Administrator>
Helpdesk/ NOC	dnsmon@ripe.net	
Emergency contact	ops@ripe.net	
Finance/ billing contact	finance@ripe.net	

Both the RIPE NCC and the TLD Administrator will inform each other about any changes to the operational contacts as soon as possible, preferably before the new contact detail(s) come in to effect.

Announcements

The RIPE NCC will make a mailing list available to announce and communicate technical issues to technical contacts of the TLD Administrators. Technical contacts of the TLD Administrators will be automatically subscribed to dnsmon-contact@ripe.net

The RIPE NCC will make available a public mailing list to discuss the results of the monitoring. Posting rights will be limited to the RIPE NCC, technical contacts of the TLD administrators, technical contacts of TBs and others to be decided by the RIPE NCC. Announcements, in regards to the monitoring service, to the public will be published to dnsmon-user@ripe.net list.

Presentation and availability of DNSMON monitoring data

DNSMON monitoring results will be published in graphical format on

<http://dnsmon.ripe.net>

The RIPE NCC will make the raw data ("numbers that went into the plots") available on its ftp server for the TLD Administrator.

The RIPE NCC collects the data from the TBs with an average expected 30 minutes lag between measurement and collection. If there are connectivity problems with a TB, this may be longer. The RIPE NCC will update results retroactively if there are major changes. Data that could not be collected for 2 weeks will not be processed.

The RIPE NCC will analyse the collected data and make the results available to the TLD administrator. The TLD Administrator will have restricted access for the first 2 hours after the measurement, provided the data could be collected. Unlimited access to the data will be given 2 hours after the measurement, regardless whether the data was made available for restricted access before or not.

The RIPE NCC will only check that plots have been created correctly, it will not check the plots for any unusual events nor will it report on such events. It is the responsibility of the TLD administrator to study the plots.

The RIPE NCC may make the raw data collected by the services available to researchers for scientific and statistical analysis.

The RIPE NCC will maintain the software. Bugs will be fixed in a timely fashion. New features will be added, depending on available resources. The RIPE NCC will present its development plans and report on the service during the dns-wg sessions held at RIPE Meetings.

Upon termination of this contract, the RIPE NCC will ensure availability of data for two years, though such data may be removed from any website.

Annex D: Initial list of servers to be monitored

Domain	
Date	
Server (Hostname)	Server (IP Address)