



JANET Measurement System
Central Database, User Interfaces and Measurement Interfaces

Statement of Requirements

This document and the information it contains are provided solely for the purpose of allowing potential suppliers to provide a tender for the services being procured. It is issued under the Catalist procedures.

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This document contains UKERNA's requirements for the provision of development and deployment services for its JANET Measurement Architecture. It is provided solely to allow suppliers to bid for the supply of the system described below.

1. OUTLINE OF CURRENT PROVISION

UKERNA currently use two systems to provide network performance measurement data: JANET Netsight for production quality data and a development system called Memon which monitors network development projects and provides additional interfaces into existing data.

JANET Netsight gathers SNMP and ping data from the 800+ JANET connected organisations for which UKERNA is responsible for providing network connectivity. The Netsight system is distributed around the JANET Regional Networks that provide the physical links to most of the connected organisations. Each Netsight system in each Regional Network gathers data on the connection it provides to organisations. User access to the data is through a web interface running on the Netsight host itself; a Sun server. The system gathers accessibility and round trip time (RTT) performance data.

The system is built from a number of open source products but there is no central data gathering/storage facility built in to Netsight. In order to gather end to end data for University A to University B three Netsight systems must be queried: the Regional Netsight system for University A, the core Netsight that gathers data on the core of the network and the regional Netsight for University B (assuming that the Universities are connected to different Regional networks.) See www.ukerna.ac.uk/about/topology/index.html for more details on the topology of JANET and the Regional Networks.

Memon is a development platform used to monitor the performance of various systems in trials such as Content Delivery Infrastructures and Quality of Service. Memon has developed into a system that has explored the features that will be required or desirable in any new production monitoring system. It is a centralized system that currently monitors up to 200 sites and gathers:

- accessibility and performance data for three quality of service classes (Best Effort, Less than Best Effort and Premium IP) every 60 seconds using Cisco IP SLA as a measurement probe.
- Network Time Protocol (NTP) server accuracy. The JANET network has NTP servers located around the network synchronized to stratum 0 clocks (radio and satellite). Data on the accuracy of the clocks is gathered every 60 seconds and displayed for each clock and as comparisons between clocks. The measurement probe is an NTP daemon along with a Perl script to extract the accuracy data.
- Web server response: Using Cisco IP-SLA as a measurement probe, HTTP transfers are run against a range of web servers to gather statistics on: name lookup, TCP connection time, data download and overall operation time.

- Nameserver Response: Using Cisco IP-SLA as a measurement probe, nameserver(DNS) response times can be gathered and stored.

The Memon system is built as a centralized model based round a PostgreSQL database running on a Sun V480 server. Two other Sun servers provide 1) a script host - to gather data from the Cisco IP-SLA and other measurement probes and store it in the database and 2) a web interface which provides pages to deliver data based on fixed design html pages, CGI based database access pages and text (csv format) download pages.

2. OUTLINE OF REQUIREMENT

UKERNA wishes to replace the existing production JANET Netsight network monitoring system, along with the development systems, with a new production-grade system that will be based on a central database. Various interfaces will be required to allow administration, configuration, data-gathering and data-delivery to users. The system will also interface with the existing UKERNA Central Database Facility that provides process management for circuit provisioning, contact information etc.

The system will replace the existing JANET Netsight system and support the business processes of the Network Resource Group within UKERNA, generating reports of accessibility and performance of JANET Connected Organisations and JANET Services.

The system will be required to store a range of measurement data including IPv4, IPv6, Multicast (IPv4 & IPv6) accessibility and performance type data which will be gathered from a range of measurement probes/interfaces.

The central database must be fully extensible in terms of the addition of new measurement types and sub-interfaces.

The basic system description can be found in the *JANET Measurement System Outline* document available at: <http://www.ukerna.ac.uk/development/mm/documents.html>

The key requirements are organised into three modules that are briefly described below. Module 1 is a prerequisite for Modules 2 & 3. Modules 2 & 3 are expected to be developed in parallel, following the acceptance of the recommendations developed in Module 1. Suppliers' bids must contain a response to all modules. There is no option for allocating different modules to different suppliers.

1. Requirements analysis and system design

The system requirements will be gathered from user groups within UKERNA who will use the final system.

The deliverable from this module will be the full system design including: database design - structure, tables, backups, security, access, host system, etc; interface design (administration, user, data gathering, data delivery) and any other elements required to build a functional system to gather, store and deliver JANET performance measurement data. It will include any necessary processing of data for display in tabular or graphical form as well as any suitable statistical analysis on the presented data. See Section 5.2 below for further information

2. Database and user interface: implementation and support

Implementing the database and user interface design on agreed hardware. The supplier will be responsible for the operation of the system for the initial three years of service. This will include responsibility for managing the hardware, operating system, database system software, web server and ensuring the security and resilience of the system. UKERNA will physically host the system platforms on the JANET network. See Section 5.3 for further information.

3. Measurement interfaces: implementation and support

Implementing the interfaces and network measurement probes that gather raw data through various methods and store it in the database. These systems may be independent, simple exporters of data into the database or they may need to read from the database the locations against which they are required to gather data. Error checking, data verification and time sensitivity will need to be managed appropriately. See Section 5.4 for further information.

The initial system build will be expected to handle measurements for up to 2,500 locations, each of which may have multiple measurements associated with it. Suppliers are asked to consider that the system may require scalability in the future and to bear this in mind during the system design.

A single supplier or consortium with a lead supplier will be acceptable to provide this system. Suppliers should note that the lead supplier in any consortium will be expected to take overall responsibility for delivery of the solution.

A suppliers meeting will be held on Tuesday 20th February 2007. For further information, and to book a place, please contact the procurement coordinator. Places will be limited initially to two per supplier. Additional space may become available later dependent on the response level.

3. PROCUREMENT PROCEDURE

3.1 General Issues

All formal communication with suppliers over the course of the procurement will be handled or arranged by UKERNA.

3.2 Clarifications on the requirements

Suppliers will be provided with clarification of UKERNA's requirements on request. Suppliers should raise any issues of clarification with the Procurement Co-ordinator whose contact details are:

Procurement Co-ordinator UKERNA Atlas Centre Chilton, Didcot Oxfordshire OX11 0QS UK	Telephone: +44 (0)1235 822 341 Fax: +44 (0)1235 822 286 E-mail: Procurement@ukerna.ac.uk
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3.3 Timetable

The steps and timetable for this procurement are as follows:

Activity	Date
Operational Requirement available	26 th January 2007
Closing date for tenders	12:00 Noon on March 2 nd 2007
Selection of preferred supplier	March 14 th 2007
Contracts placed by	March 30 th 2007
Module 1 delivery date	April 27 th 2007
Modules 2 & 3 delivery date (service commencement date)	August 3 rd 2007

3.4 Evaluation

The contract will be awarded on the basis of the offer that is the most economically advantageous. The main criteria to be used in determining which offer is the most economically advantageous will be:

- the supplier's ability to meet the mandatory requirements;
- UKERNA's assessment of the supplier's ability to provide the service on a timely basis based on the responses to the mandatory and information requirements; and
- capital and recurrent costs.

UKERNA reserves the right not to award a contract.

3.5 Delivery of tenders

All copies of the tender documents, on paper and electronically, must be delivered on or before 12:00 Noon on the date specified in 3.3 above and to the contact listed in section 3.2 above.

ONE paper copy and six electronic copies of the tender on CD-ROM are required and must be sealed and clearly marked “**JANET Measurement System**”. The electronic copies should be provided in PDF format with the exception of spreadsheets that should be provided in Excel. Any non-standard fonts used in electronic submissions must be embedded in the document.

All tenders must be returned in a plain envelope that does not identify the supplier on it. Any tender that identifies the supplier on the label will be deemed invalid.

Delivery of the tender by FAX is **not** acceptable.

Tenders submitted after the deadline will **not** be considered.

4. RESPONSE TO REQUIREMENT

The response to this requirement shall take the following format:

A. Management Summary

Include the major points of the proposal and the supplier's approach.

B. Description of the Solution Proposed

Describe the solution proposed. The information required to satisfy Mandatory (MR) and Information (IR) Requirements should be provided in this section. The order of replies to requirements should follow their numeric order. Each response should be preceded by the reference number and the text of the requirement to which it relates.

Note that the response will be evaluated based on the replies to the mandatory and the information requirements. Suppliers should explain *how* their solution will meet the requirement as specified.

5. DETAILS OF REQUIREMENT

5.1 Relationship

5.1.1 General

UKERNA is looking for a long-term relationship with a supplier that will benefit both parties. It is vital that the supplier understands UKERNA's business requirements, that it builds and maintains a good working relationship with UKERNA's staff and that it is able to provide continuity of suitably skilled staff.

IR1..... UKERNA values an open and collaborative relationship with its suppliers, the supplier is invited to explain briefly how it will work with UKERNA to achieve this.

MR2..... The supplier shall agree to a maintenance contract term, for the system, of an initial period of three years with optional extension(s) for up to a further two years (extensions may be for one year at a time or for multiple years).

5.1.2 Contract Management

UKERNA will work with the supplier to review the performance of the service regularly and to ensure that the service continues to meet UKERNA's business needs. In doing so UKERNA expects to hold service review meetings quarterly that will cover the following items:

- a) consideration of the key issues of the past period's performance including response to incidents (all reported faults, timescales and eventual resolution), service trends, details of service release deployments and achievements;
- b) report on the status of minor enhancements (those completed in the past period and those yet to be completed);
- c) agreement of the current list of minor enhancement items and their relative priorities; and
- d) suggestions for changes by either the supplier or UKERNA that will improve the service.

UKERNA expects this meeting to be attended by UKERNA staff responsible for the business need served by the system and the management of this contract together with the relevant staff from the supplier.

In addition to the meeting, the supplier will provide a brief monthly written report on the maintenance activities undertaken in the previous month.

MR3..... The supplier shall agree to the contract management details as described in this section 5.1.2.

5.1.3 Technical Competence

Over the term of the contract, the supplier must be able to demonstrate technical competence and experience in database design and maintenance, and must be prepared to work closely with UKERNA staff in all areas. As the contract may last for up to five years, there may be changes in the staff assigned to the contract. UKERNA requires assurance that it will be consulted on such staff changes and that it will be able to approve (or otherwise) the deployment of staff.

IR4..... The supplier shall describe the relevant qualifications and experience of the key staff who will be involved in the management and provision of this support and how a suitably skilled team will be maintained.

IR5..... The supplier shall describe the process by which UKERNA will be consulted regarding changes to the deployment of key staff involved in the management and provision of this support.

IR6..... The supplier shall detail the method(s) by which those staff will become sufficiently familiar with the system to provide proactive technical input to the specification of requirements

5.2 Module 1: Measurement system requirements analysis and system design

UKERNA has experience of running network measurement infrastructures for production and development networks. In light of this experience, an outline description of the new system is provided in the *JANET Measurement System Outline* document available at: <http://www.ukerna.ac.uk/development/mm/documents.html> Suppliers should use that document to understand the overall requirements for the system in terms of its configuration and operation.

In addition to understanding the outline requirements, the supplier will be expected to undertake a requirements analysis with a limited number of users of the measurement system to inform the final system design. This will involve meeting with a small number of groups at UKERNA's offices to discuss the features required in the new system as well as looking at documentation supplied on the existing systems in use.

It is expected that the Requirements Analysis will primarily focus on processes required for analysing and reporting the data in an effective manner, delivering that data through suitable web and other interfaces and integration with UKERNA's existing Central Database Facility that holds information that will be useful to the system.

MR7..... The supplier shall perform a Requirements Analysis to determine the design of the final JANET Measurement System The supplier should provide full details of the Requirements Analysis process that will be used to inform the system design. The Requirements Analysis must be delivered by April 27th 2007

MR8..... The supplier shall provide full costs for the Requirements Analysis.

MR9..... *At the end of the Requirements Analysis, the supplier shall provide full costs for implementation of the system. The costs must be delivered by April 27th 2007. It is expected that the costs provided shall be modular, allowing UKERNA to choose to implement selected items immediately and other items on a longer term basis if appropriate.*

MR10. *The supplier shall agree that all the deliverables from the Requirements Analysis shall be owned by and be the copyright of UKERNA.*

If the outcome of the Requirements Analysis is acceptable, based on the features and costs for the proposed system, UKERNA will commit to build the final system. UKERNA reserve the right to defer or cancel the system build and, if appropriate, to seek an alternative supplier to implement the system or to offer an alternative design should the outcome of the Requirements Analysis be unsatisfactory.

5.3 Module 2: Database and Delivery sub-system implementation

Whilst the final system design will be determined by the Requirements Analysis detailed in Module 1, UKERNA expect that suppliers will be able to provide indicative pricing based on the *JANET Measurement System Outline* document and previous experience of designing and building database systems.

The selected supplier, in the event of acceptance by UKERNA of the requirements analysis, system design and final costings, must satisfy the requirements of this Module 2 and the following Module 3.

MR11. *The supplier shall provide a JANET Measurement System that will meet the needs of UKERNA as determined by the Requirements Analysis, the requirements in this document and the JANET Measurement System Outline document available from: <http://www.ukerna.ac.uk/development/mm/documents.html> . The system shall be ready for production operation by the 3rd August 2007.*

MR12. *The supplier shall provide a central database based system that will interface with measurement gathering and data delivery interfaces to gather, store and deliver network measurement data relating to the JANET network and its connected organisations.*

MR13. *The supplier shall supply and maintain the hardware, operating systems and any related software including the database system in order to maintain a fully functional system.*

MR14. *The supplier shall allow external systems to interface with the database through a variety of interfaces including as a minimum: Perl, PHP and SQL from remote machines. Access shall be strictly controlled by suitable mechanisms to ensure only authorised access is available.*

IR15..... *The supplier shall provide guideline costs for the implementation of the full system.*

IR16..... *The supplier shall provide options to enhance the resilience and reliability of the system in the event of equipment failure or network outages.*

5.4 Module 3: Measurement sub-systems implementation

- MR17. *The supplier shall provide a system that will use SNMP to poll equipment across the JANET network to gather SNMP-based statistics including interface utilization and other available metrics. The system must be capable of polling 2500 interfaces in a 30 second period and must be capable of polling any SNMP available metric.*
- MR18. *The SNMP gathering system must interface with the central database described in Module 2 in order to get its list of interfaces to poll and in order to store the gathered data.*
- MR19. *The supplier shall provide a system to gather Cisco IP-SLA data from a set of measurement points. This data is gathered by SNMP from the measurement points and should be stored in the database.*
- MR20. *The supplier shall provide an automated method of configuring the Cisco IP-SLA probes from the database without manual intervention*
- MR21. *The supplier shall provide a system to gather Network Time Protocol statistics on distributed NTP systems and store the results in the database.*
- MR22. *The list of NTP servers to be polled shall be downloaded from the central database.*
- IR23..... *The supplier shall provide recommendations on implementing an interface to external databases (flow-monitoring, Gridmon etc) for the exchange of measurement data.*
- IR24..... *The supplier shall provide guideline costs for the implementation of the full system by the 3rd August 2007.*
- IR25..... *The supplier shall describe how resilience and/or redundancy could be built into the measurement sub-interfaces to mitigate against any outages or equipment failures.*

5.5 Intellectual Property Rights

- MR26. *The supplier shall agree that all Intellectual Property Rights in the system design, implementation, code and any other element that makes up any part of the system shall vest with UKERNA.*
- MR27. *The supplier shall provide UKERNA with root/administrative level access to all equipment that is part of the system at all times. UKERNA require this for business continuity purposes only.*

5.6 Maintenance

UKERNA requires a maintenance service on the Hardware and software that implements the Measurement System.

This maintenance service will provide fixes to bugs and faults that are encountered in the system according to the following requirements:

- a) Application support cover is required within weekday business hours (09:00 to 17:00) excluding Bank Holidays in England and the period between Christmas and New Year (UKERNA is considering the possibility of extending the cover to the Christmas to New Year period – see section 5.13).
- b) A reported issue will be acknowledged by the supplier within 1 business hour of a report being submitted by UKERNA.
- c) Updates on progress will be provided.
- d) A **critical** priority fault will be fixed or a work around provided normally within four business hours (where **critical** is defined as a fault that stops the system or a part of the system from working, or causes loss or corruption of data, such that UKERNA is unable to provide the required service).
- e) An **urgent** priority fault will be fixed or a work around provided normally within two business days (where **urgent** is defined as a fault that causes us to be unable to provide, or significantly impairs our ability to provide, the required service but for which an immediate fix is not required).
- f) A **normal** priority fault will be fixed or a work around provided normally within five business days (where **normal** is defined as a fault that causes inconvenience but UKERNA is able to temporarily work around the problem to provide the required service).

The maintenance service will also provide some on-going support as detailed below:

- a) Updates to the application configuration as required from time to time (changing some items of application configuration that are not available to UKERNA staff through standard web-based interfaces).
- b) Minor intervention to ease use of the application.
- c) Answers to general queries regarding the configuration and operation of the system.

MR28. The supplier shall provide a single point of contact to report faults and bugs using both telephone and e-mail and shall acknowledge the receipt of the report within one business hour.

MR29. The supplier shall provide updates on the progress of fault and bug fixes both proactively and on request from UKERNA.

MR30. The supplier shall provide a fault and bug fixing service and on-going support as described in this section.

5.7 Minor Enhancement

UKERNA would like to explore the ability to enhance the system with minor changes that can be implemented preferably using the effort available from the maintenance team if there are few or no maintenance items on which to work.

UKERNA expects this to work by maintaining a list between the two parties that contains costed and prioritised enhancements that can either:

- a) be implemented by the maintenance team in lieu of maintenance work; or
- b) be implemented at an additional cost agreed between the parties and using additional staff effort.

MR31. The supplier shall provide advice on requested enhancements, and suggest alternative approaches where applicable to help identify the most cost effective solutions.

MR32. The supplier shall provide a means to implement minor enhancements to the system as described in this section 5.7.

IR33..... The supplier is invited to propose other methods of meeting UKERNA's requirement to implement minor enhancements to the system.

5.8 Major Enhancement

As business needs change and develop, UKERNA may require the supplier to undertake major enhancements that will require significantly more effort than that available from the maintenance team. UKERNA would like to work with the supplier to take its initial outline requirement to a fully defined and costed proposal for work.

UKERNA requires the supplier to:

- a) work with UKERNA staff, on location at the UKERNA offices, to refine the requirement (including the design of the user interface elements of the requirement);
- b) prepare a fully costed proposal for the work including a projected timescale for completion; and
- c) if accepted by UKERNA, to implement the work in the proposal.

MR34. The supplier shall provide a means to implement major enhancements to the system as described in this section 5.8.

IR35..... The supplier shall indicate what processes it follows to ensure that the output of such design and development work meets UKERNA's requirements.

IR36..... The supplier is invited to propose other methods of meeting UKERNA's requirement to implement major enhancements to the system.

5.9 Enhancement and Development Deployment

Following enhancement and development work there will be the need to deploy the new version of the system (the “service release”). UKERNA expects normally to deploy service releases every six months, however this might vary. Service releases should be deployed out of normal working hours, normally at a weekend.

In making the preparations for a service release, UKERNA staff will need to test the new version of the software and the supplier must provide a facility for doing this.

MR37. The supplier shall provide a means for UKERNA staff to test the service release before it is deployed on the production service (at a time and for a period agreed with UKERNA).

MR38. The supplier shall deploy service releases at dates agreed with UKERNA and implement the deployment out of working hours (normally at the weekend).

MR39. The supplier shall be responsible for configuration management of all the related software and for ongoing maintenance of the inbuilt help text.

MR40. The supplier shall maintain and develop the existing system test suite and ensure adequate regression testing of all changes.

IR41..... The supplier shall detail how adequate configuration management will be implemented and agree with UKERNA how release levels will be identified.

5.10 Equipment and Hosting

UKERNA will purchase the equipment detailed in the system design and any licences necessary to run the service. UKERNA requires the supplier to provide the measurement system by fully managing the equipment involved. The supplier is required to:

1. maintain the software and the hardware of the systems used to provide the service (including the operating system and applications to ensure that the system is secure and fully up to date with relevant software patches and upgrades);
2. operate the systems on UKERNA’s behalf to ensure that the systems continue to provide the JANET Measurement System; and
3. provide advice to UKERNA on updates and new hardware requirements.

MR42. The supplier shall provide the service on UKERNA’s equipment that the supplier manages and maintains according to the requirements in this section 5.10.

5.11 Reliability

UKERNA requires the service to have a high level of availability as detailed below. Suppliers should propose a solution that is reliable and resilient. In considering the proposal, the supplier should note that UKERNA will host the equipment in its co-location facilities at no cost to the supplier.

Periods of unavailability are permitted in two categories: **scheduled maintenance outage** (where the outage is notified at least one week in advance), and **emergency maintenance outage** (where the nature of the problem is such that notification cannot be given in the normal timeframe and it is vital that work is carried out). In calculating outage time, the following items will **not** be included:

- a) the outage time attributed to bringing enhancements and developments into the production service; and
- b) the outage time that occurs out of the supplier's control and outside of the contracted hours of 09:00 to 17:00 weekdays.

MR43. The supplier shall aim to make the service available for 24 hours a day, 7 days a week. The following scheduled and emergency maintenance periods are permitted when the service is not available:

- *emergency maintenance: up to eight hours unavailability in any one contract year; and*
- *scheduled maintenance: up to twelve hours unavailability in any one contract year*

In both cases (emergency maintenance and scheduled maintenance) any period of outage should not normally exceed one hour.

MR44. The supplier shall notify UKERNA of scheduled maintenance at least five working days before the outage and shall allow UKERNA the choice to request a different date if necessary.

MR45. If the supplier uses emergency maintenance that results in a service outage, UKERNA shall be informed of the downtime and the reasons for the outage as soon as possible and in any case within one working hour.

UKERNA is interested in increasing the availability of the JANET Measurement System outside of the contracted hours for application support (09:00 to 17:00 weekdays). UKERNA envisages this being effected by the supplier offering a *system* support service outside of the *application* support hours (for example, to restart the system if a power failure occurs). This support will focus on the underlying systems providing the JANET Measurement System rather than the application itself.

IR46..... The supplier is invited to offer a system support service outside of the contracted hours for application support. The supplier shall detail the scope of the service, if offered, and to provide options for evening and weekend support (pricing shall be detailed in the response to section 5.12 below.

In meeting UKERNA's requirements for reliability, the supplier may choose to deploy multiple systems such that fail over from one to another is transparent. In cases where the system fails, the supplier must restore the service ideally within three hours but in any case within eight hours. In addition to the time taken to restore service, UKERNA is interested in a solution in which the likelihood of an event occurring that causes a loss of service is less than once in every five years.

MR47. In the event of a system or component failure, the service should be restored ideally within three hours and in any event within eight hours with the data it contained ideally at least four working hours before the failure occurred (clearly to restore data closer to the failure would be an advantage).

IR48..... The supplier is invited to explain (in outline) the way in which the system will be designed in order to implement the resilience that we require.

5.12 Documentation

Up to date documentation must be maintained by the supplier for all elements of the service including the hardware, software, database and interfaces. This documentation should be available online through a web interface and also in an offline format such as on a CD or DVD. User interfaces should have easily accessible help and guidance for users. This shall be done through the use of Tool Tips and adjacent links to more detailed help or through another similar interface.

MR49. The supplier shall maintain fully up to date on-line documentation with off-line copies on CD/DVD also available.

MR50. User interfaces shall have easily accessible help available through the use of Tool Tips and links to more detailed help or through a similar interface.

5.13 Charges

UKERNA wishes to see the full detail of charges for proposals for the requirements laid out in this document. Such charges shall be shown excluding VAT but including expenses and clearly indicating the charges for any options that the supplier is offering together with capital and recurrent charges shown separately for:

- a) each year of the initial three year period; and
- b) the optional extension(s) up to a maximum of two further years in annual increments.

As noted in section 5.6, UKERNA is interested in the charges for providing maintenance cover during the period between Christmas and New Year. The supplier is invited to provide costs for cover excluding and including this period.

As noted in section 5.11, UKERNA is interested in the charges for providing *system* support service outside of the *application* support service hours. The supplier is invited to provide costs for this cover on weekday nights (between 17:01 and 08:59) and over the weekends with the costs for evenings and weekends to be shown separately.

MR51. The supplier shall provide the full charges for its proposals, as defined in this section, in the accompanying spreadsheet available at: <http://www.ukerna.ac.uk/development/mm/documents.html>. Any additional costs proposed for options must be clearly indicated as additional to the costs in the spreadsheet.