EISCAT Scientific Association
Enquiry for
White Rabbit based
Time Distribution System

Closing date for offers:	**2022-03-31**
Latest validity date for offers:	2022-05-13

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TABLE OF CONTENT

1 INTRODUCTION

The EISCAT Scientific Association, also called "EISCAT" throughout this document, conducts research on the lower, middle, and upper atmosphere and ionosphere using the incoherent scatter radar technique. EISCAT is implementing a project called EISCAT_3D where the final product is a new, multi-static scientific radar system which will be a next generation incoherent scatter radar capable of providing 3D monitoring of the atmosphere and ionosphere. Please visit our homepage for more information, https://www.eiscat.se/.

1.1 Purpose

The purpose of this document is to describe all requirements valid for the purchasing of the EISCAT_3D Time Distribution System, the TDS.

2 TIME DISTRIBUTION AND SYNCRONIZATION SPECIFICATIONS

The EISCAT_3D phased array radar system is heavily reliant on a very accurate control of the time offset and phase synchronization across the array. The required accuracy is in the sub-nanosecond scale within each site, and within microseconds between sites.

The synchronization of clocks throughout the EISCAT_3D network must be based on the White Rabbit Precision Time Protocol Core (WRPC), an Ethernet-based hierarchical master-slave architecture for clock distribution including compensation for any latencies in transmission lines and electronics within the network. The WRPC hardware, gateware, and software is entirely based on open-source designs as described at https://white-rabbit.web.cern.ch/.

3 TECHNICAL REQUIREMENTS

The EISCAT_3D prototype system has been built from devices using the CERN Open Hardware. Technical documentation is available at https://ohwr.org/projects/white-rabbit/wiki/switch.
It is required that the TDS is form, fit and function compliant with the CERN WR switch version 3 or higher, CE-marked, and accepting standard European line power.

The Procurement Objects are defined as a number of 18-channel WR switches, but this TDS procurement requires that the White Rabbit time distribution is maintained throughout the layer configuration as illustrated in Figure 1 and Figure 2.

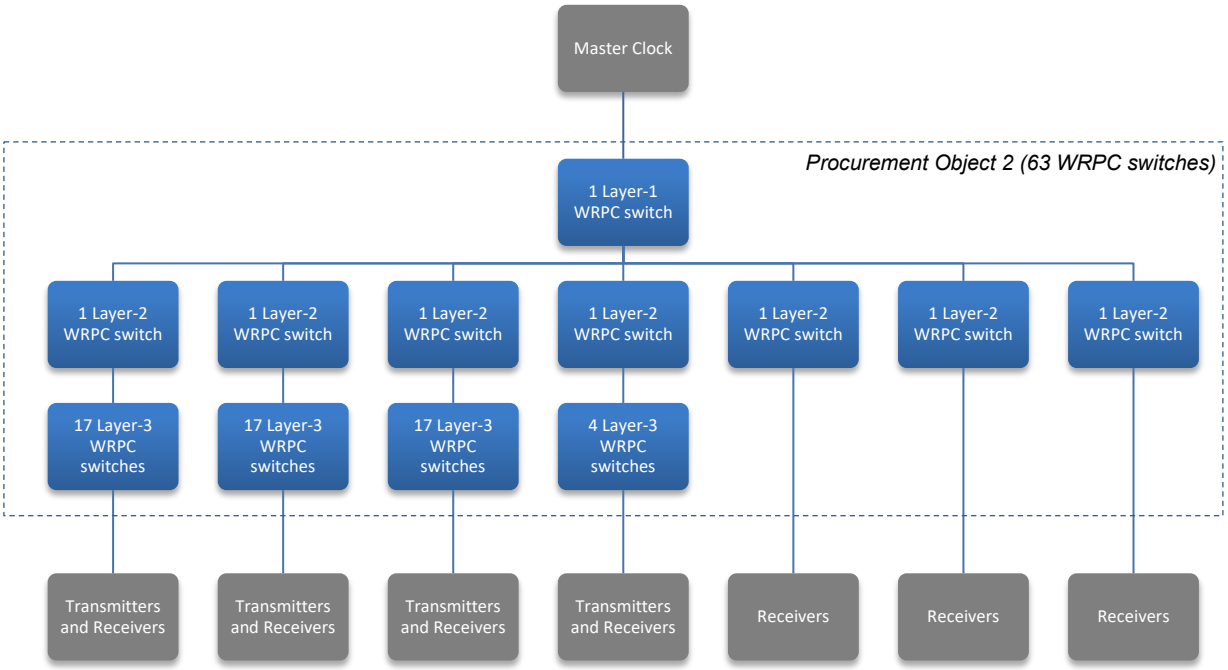

Figure 1. Procurement Object 2 block schematics

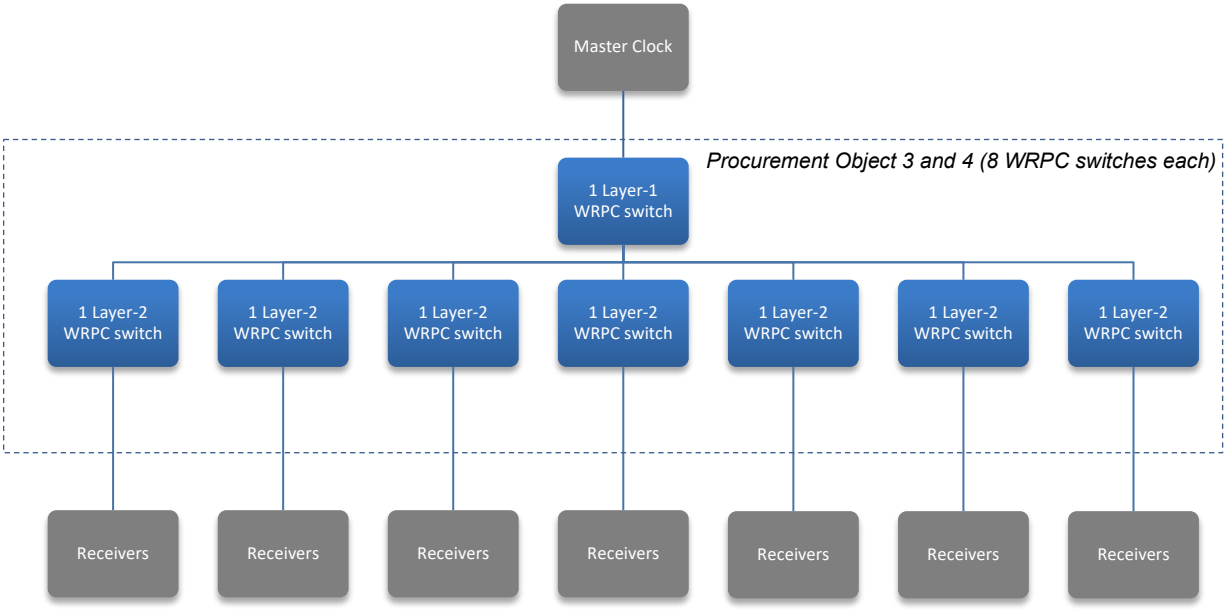

Figure 2. Procurement Object 3 and 4 block schematics

4 THE PROCUREMENT OBJECTS

There are four *procurement objects* related to this purchase:

Procurement object 1 - Four (4) 18-channels WR switches for test and verification by EISCAT
Procurement object 2 - Sixtythree (63) 18-channels WR switches for the Norwegian site in Skibotn

Procurement object 3 - Eight (8) 18-channels WR switches for the Finnish site in Karesuvanto
Procurement object 4 - Eight (8) 18-channels WR switches for the Swedish site in Kaiseniemi

Procurement Object	Number of 18-channel WR switches
Procurement object 1	4
Procurement object 2	63
Procurement object 3	8
Procurement object 4	8

Table 1. Definition of Procurement Objects

5 TENDERING INFORMATION

5.1 General instructions

EISCAT would like to emphasize that it is very important that all potential bidders monitor the specific tendering area in the EISCAT web-site (https://eiscat.se/procurements/) on a regular basis in order to get access to possible changes and/or clarifications of the procurement, cancellations, questions & answers and all other information relating to this enquiry.

EISCAT responsibility for the correctness and accuracy of the documentation for this enquiry is limited to the documentation published on the EISCAT web site and/or sent out by e-mail.

This enquiry consists of this enquiry document and two appendices. The first part consists of requirements for tender and Tenderer. The second part, starting at page 9, describes the intended terms and conditions of any future contract. The appendices include requirements answer template to be used when responding to this enquiry and General terms for supply of goods to the public sector, ALOS 05.

In order to qualify as Tenderer and have tenders evaluated, a Tenderer must reply to and/or comment on all the requirements stipulated in this enquiry. Note that this also includes all requirements stipulated in any appendices. The tender must be received by EISCAT, at the latest, at the closing date, be confirmed by an authorised representative and include an affirmation that the submitted tender is valid until the expiration of the validity period as stated above.

5.2 Form of contract

5.2.1 Time of delivery

EISCAT foresees deliveries of all *Procurement objects* during 2022. The Tenderer shall indicate planned delivery dates assuming a contract activation latest mid-May 2022.

5.2.2 Price

EISCAT awaits tenders using the form(s) of contract and observing the conditions described below. The prices of all offered items and any options must be quoted in one of SEK, EUR, NOK, GBP, JPY or CNY exclusive of VAT.

5.2.3 Fixed price

Fixed price means that the price shall not be adjusted for foreign exchange and/or index, or in any other way.

5.2.4 Envisaged payment schedule

At contract award	20%
Design Review	20%
Production Readiness Review	20%
Shipped from Factory	20%
Final Acceptance	20%

5.2.5 Advance payment

Any advance payments by EISCAT shall be covered by Tenderer advance payment guarantees issued by bank or a corporate entity.

5.3 Verification of qualification of Tenderers

EISCAT's requirements for Tenderers are stipulated below. EISCAT will examine if the Tenderer fulfils these requirements before a tender is further evaluated.

5.3.1 Exclusion of Tenderer

Candidates or tenderers are excluded from participation in procurement procedures if:

- they are bankrupt or are having their affairs administered by the courts, have entered into an arrangement with creditors, have suspended business activities, are the subject of proceedings concerning those matters, or are in any analogous situation arising from a similar procedure provided for in national legislations or regulations;
- they have been convicted of an offence concerning applicable laws and regulations of the environment, human rights, working conditions, anti-corruption, gender equality and diversity.
- they are banned or restricted from doing business in the European Union.

5.3.2 Requirement for registration

The company's registration from the Register of companies, commercial enterprises, or associations, whichever is applicable, shall be attached to the reply (verified by a registration certificate or special certificate from a competent authority). If there is no such official register as referred to above in the country where the Tenderer is established, the Tenderer shall provide a certificate containing corresponding details signed by a competent authority or an authorised accountant or equivalent. The above certificates shall not be more than six months old.

5.3.3 Requirement for technical and professional capacity

The qualification criteria relating to technical and professional capacity are designed to show if the Tenderer has the capacity needed to perform the contract. The following qualifications are required, and evidence must be included in the reply:

- A list of the principal customers in the past three years with the sums involved and whether they are public or private customers.
- Short description of two completed reference projects (with relevant need for technical and professional capacity as this enquiry) for two different customers.
- CV's for two persons that are employed by the Tenderer and have technical and professional capacity to perform the contract,

- Description of the test facilities where the verification is planned to take place and contact details of the person responsible for booking of the facility.

5.4 Submission of the enquiry

5.4.1 Language

All documentation in this procurement matter including all correspondence shall be in English.

5.4.2 Disposition

The reply must be complete based on what is stipulated in this enquiry. The disposition of the Requirements Answer Template shall be followed. The reply shall contain comments on all requirements and any award criteria stipulated. If no comment is made in respect of a stipulated requirement, EISCAT shall be entitled to interpret this to mean that the requirement is not accepted by the Tenderer.

5.4.3 Tenderer data

The reply shall show the Tenderer's:
Name
Address
Registration number
Telephone number
E-mail address

5.4.4 Subcontractors

The Tenderer shall in its tender state to what extent parts of the Contract and/or which parts of the Contract it intends to subcontract to third parties and which subcontractors are proposed.

5.4.5 Submission

Tenders are accepted both as originals or via email (PDF format). The reply shall be (electronically/scanned) signed by the Tenderer and marked with “ENQUIRY, E3DS1 TDS” and the stipulated closing date for submission.

The enquiry shall be addressed to the following postal address:
EISCAT Scientific Association
Bengt Hultqvists väg 1
SE-981 92 Kiruna
Sweden

Replies submitted by email shall be sent to the following email addresses:
Craig.Heinselman@eiscat.se and registrar@eiscat.se

EISCAT must receive the enquiry, at the latest, by 18.00 Central European Time (CET) on the closing date.

5.5 Information regarding the enquiry

Questions regarding this tender shall be submitted in writing and may be addressed to:
Harri.Hellgren@eiscat.se with a copy to Johan.Svensson@eiscat.se.

Relevant answers will be published on EISCAT's web site (at https://eiscat.se/procurements). Updates will be published regularly, however not after five days before the closing date.

5.6 Tenders received too late or being incomplete

A tender received after the closing date may not be considered. Submissions lacking requested supporting material, and/or not provided using the requirements answer template, will not be considered.

5.7 Applicable law

Swedish law applies.

5.8 Delivery and Invoice addresses

All invoices must be sent electronically to faktura@eiscat.se.

The Procurement Objects 1 to 4 shall be delivered to the following addresses:

Procurement Object 1:
EISCAT Scientific Association
Bengt Hultqvists väg 1
SE-981 92 Kiruna
Sweden

Procurement Object 2:
EISCAT Scientific Association
Hesteslettvegen 135
N-9027 Ramfjordbotn
Norway

Procurement Object 3:
EISCAT Scientific Association
Tähteläntie 54B
FIN-99600 Sodankylä
Finland

Procurement Object 4:
EISCAT Scientific Association
Bengt Hultqvists väg 1
SE-981 92 Kiruna
Sweden

5.9 Award of contract

EISCAT will accept the tender that meets the requirements or has given reasonable justifications for the requirements that are not met and is the most economically and technically advantageous. A further criterion for this procurement will be indicated delivery times.

6 MANAGEMENT AND STATEMENT OF WORK

This section covers the envisaged management and Statement of Work (SOW) requirements for the TDS contract.

6.1 Project Reviews

EISCAT monitors the progress of the Contractor through project reviews. The Contractor needs to relate to the Project Phases in Figure 3 (Requirement, Design, Test, Production and Acceptance) and the related Project Reviews. Each accepted Project Review allows for progress to the next project phase. EISCAT shall be invited to participate in the Project Reviews.

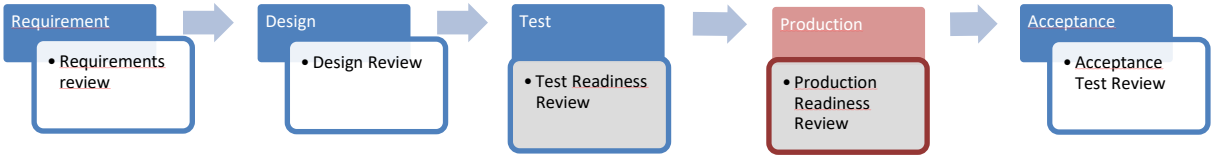

Figure 3. The TDS project model that includes Project Phases and Project Reviews

EISCAT propose two types of Project Reviews: Project Phase Reviews and Readiness Reviews. Project Phase Reviews decide whether Project Phase is completed or not:

- Requirements Review
- Design Review
- Acceptance Test Review

Readiness Reviews decide whether to proceed within the phase or not:

- Test Readiness Review
- Productions Readiness Review

6.1.1 General Project Reviews Requirements

SOW 1. Before a Project Review can take place, the Contractor must ensure the following:

a. a **Project Review Invitation** must be **presented** to EISCAT with at least 7 calendar days of notice,
b. that the Project Reviews are done in the sequence as described in Figure 3,
c. that all preceding Reviews are approved by EISCAT.

SOW 2. At any Project Review the Contractor shall **present** the following to EISCAT:

a. the content of the proceeding configuration baseline that will be established upon an approval of the Project Review.
b. how the quality of each configuration item in the configuration baseline has been controlled for the current review.
c. major risks and uncertainties and what actions has been taken to mitigate the major risks.

SOW 3. During each Project Review the Contractor shall write **Project Review Minutes**. The **Project Review Minutes** shall include any decisions taken and any actions identified.

SOW 4. The Contractor shall maintain and present a complete **Project Schedule**, including any contractually agreed dates and activities and other key events. The level of detail shall be sufficient to allow project work to be tracked in terms of time. The Project Schedule shall relate to the Project Phases and the Project Reviews and the Contractor shall immediately report any deviations that will impact to the project schedule.

6.1.2 Requirements Review

The purpose of the Requirements Review (RR) is to ensure that:

- all systems requirements have been correctly identified,
- EISCAT and the Contractor agree upon the understanding of the requirements,
- the Contractor's development and production processes are adequate for the task at hand.

EISCAT will approve the RR when EISCAT agrees that the system requirements, the verification methods and the development and production processes are adequate. An approved RR results in the establishment of a configurations baseline.

SOW 5. Before the RR may start, the following shall be fulfilled:

a. the Contractor has identified system requirements, including requirements on function, performance, and external interfaces,
b. the Contractor has identified a verification method (e.g. inspection, demonstration, test, analysis, simulation) for each system requirement,
c. the Contractor has produced a draft **Development and Production Plan**,

6.1.3 Design Review

The purpose of the Design Review (DR) is to review the detailed design to ensure that the design implementation has met the requirements.

The DR demonstrates that the:

- detailed hardware and software design meet system requirements,
- design has been documented in Design Description of the Procurement Object,
- design has been satisfactorily audited by the production, integration, and verification functions with the Contractor's organization,
- production processes and resources are sufficient to proceed with production,
- planned quality assurance activities are appropriate.

EISCAT will approve the DR when EISCAT is confident that design is appropriate and production resources are available for full-scale production. An approved DR results in an allocation of a configurations baseline, which describes the detailed design for production and integration. The configuration baseline also includes detailed procedures for how the First Article unit will be verified and accepted before full-scale production may start.

SOW 6. Before the DR may start, the following shall be fulfilled:

a. the Contractor has defined the system design, including functions, performance, and interfaces,
b. system requirements have been allocated to design elements,
c. the Contractor has documented the design and allocation of system requirements to design elements in a draft **Design Description** for the *Procurement Object*,

d. the Contractor has defined detailed verification procedures and system requirements acceptance criteria and documented it in the **Verification Specification** for the *Procurement Object*,

6.1.4 Test Readiness Review

The purpose of the Test Readiness Review (TRR) is to review preparations and readiness for verification, including adequate version identification and test procedures.

If a First Article is produced, it is presented to EISCAT at the TRR. An approved TRR results in establishment of a configurations baseline.

SOW 7. Before the TRR may start, the following shall be fulfilled:

a. The *Procurement Object* is developed and ready for testing
b. The verification objectives are described
c. The verification methods are described
d. The verification procedures are described
e. The verification scope is described
f. The required test resources have been properly identified and coordinated to support the tests
g. The traceability between planned tests and requirements exists

SOW 8. The **First Article** shall be produced and be **available** to EISCAT for inspection at the TRR.

6.1.5 Production Readiness Review

The purpose of the Production Readiness Review (PRR) is to ensure that the Contractor is ready to efficiently produce the required number of units. It ensures that the production plans; fabrication, assembly, and integration enabling equipment; and personnel are in place and ready to begin full-scale production. An approved PRR results in establishment of a configurations baseline.

SOW 9. Before the PRR may start, the following shall be fulfilled:

a. Testing of First Article has successfully been performed
b. Production resources have been allocated and sourcing of components is confirmed
c. Unit testing methods and equipment during and after production are in place

6.1.6 Acceptance Test Review

The purpose of the Acceptance Test Review (ATR) is to ensure that the Contractor has produced and verified that the *Procurement Object* meets the requirements stated in the contract with EISCAT and is ready to deliver the *Procurement Object*. An approved ATR results in establishment of a complete configurations baseline for the *Procurement Object*.

SOW 10. Before the ATR may start, the following shall be fulfilled:

a. All requirements have been verified
b. The *Procurement Object* is ready for shipping to EISCAT
c. Full testing of First Article has been performed
d. Sample testing during /after production has been performed

SOW 11. At ATR the Contractor shall present the following:

a. The Procurement Objects that is ready for shipping to EISCAT
b. Lists of how inspection of the design is expected to meet functional requirements, performance requirements and interface requirements,

6.2 Delivery Requirements

6.2.1 Procurement Object delivery

SOW 12. The Contractor shall agree that the delivery of the *Procurement Objects* will be without any additional costs.

6.2.2 Documentation delivery

The following requirements shall be met during the delivery of documentation:

SOW 13. The Contractor shall agree that delivery shall take place on the agreed delivery dates for review by EISCAT.

SOW 14. The Contractor shall agree that the delivery will be sent without any additional costs for EISCAT.

SOW 15. The Contractor shall be responsible for **delivery** of **Review Meeting Minutes** from the review meetings.

SOW 16. The Contractor shall agree that all needs of updates that are detected at reviews shall be carried out without additional costs for EISCAT, unless they are caused by EISCAT.

6.3 Management

SOW 17. **Status and progress meetings:** Part from the project phases and reviews, the contractor shall agree to support progress meetings, and to take minutes from those without additional charge.

SOW 18. The Contractor shall agree, without additional charge, to make the **production environment** (e.g. databases) that is used for production of documentation **available** for inspection by EISCAT.

SOW 19. The Contractor shall agree that all documentation produced for TDS can be used by EISCAT without restrictions.

6.4 Facilities

SOW 20. The Contractor shall provide premises to conduct all its work without any additional cost for EISCAT.

SOW 21. The Contractor shall be able to **present** a **document that describes all used tools and production environments** including test facilities.