Annex No. 2
to the Regulations of the open tender "MODERNISATION OF THE VESSEL TRAFFIC MANAGEMENT SYSTEM OF THE FREEPORT OF VENTSPILS"
Procurement identification No. VBOP 2015/198 CEF

MODERNISATION OF THE VESSEL TRAFFIC MANAGEMENT SYSTEM OF THE FREEPORT OF VENTSPILS

TECHNICAL SPECIFICATION

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Abbreviations

AIS – Automatic Identification System

ARPA – Automatic Radar Plotting Aid

ASL – Above Sea Level

CCTV – Closed Circuit Television

COTS – Commercial off-the-shelf

CPA – Closest Point of Approach

EIA – Electronics Industry Association

ETA – Estimated Time of Arrival

ETD – Estimated Time of Departure

IALA – International Association of Marine Aids to Navigation and Lighthouse Authorities

IEC – International Electrotechnical Commission

IEEE – The Institute of Electrical and Electronics Engineers

IMO – International Maritime Organization

ISO – International Organization for Standardisation

ITU – International Telecommunication Union

VTS – Vessel Traffic Management Service

VTMS – Vessel Traffic Management System

MMSI – Maritime Mobile Service Identity

MW – Micro Wave

nm – Nautical Mile

RDF – Radio Direction Finder

TCPA – Time of Closest Point of Approach

UPS – Uninterruptible Power Supply

VHF – Very High Frequency

X-band – 8.0–12.0 GHz

WMO – World Meteorological Organization

1. Background

The Vessel Traffic Service (VTS) is operating according to Chapter V – Safety of navigation of SOLAS (Safety of Life at Sea) Convention and Resolution A.857(20) Guidelines for Vessel Traffic Services of the International Maritime Organization.
The task of the VTS is to promote safety of life at sea, safety and efficiency of navigation and protection of the marine environment.
The VTS should be able to create a comprehensive review of vessel traffic within the area of its responsibility, including all the factors affecting traffic. A comprehensive reflection of the traffic of vessels allows VTS operators to assess the situation and to take proper decisions. The VTS receives information about the traffic of vessels from the set of hardware – the vessel traffic management system (VTMS).

2. Purpose of the project

To upgrade and modernise the existing VTMS to improve the safety of navigation in the area of responsibility of Ventspils VTS, to perform uninterrupted digital recording of the traffic of vessels, to increase the capacity to act of the Port of Ventspils in unexpected situations. The area of responsibility of Ventspils VTS is from the outer roadstead to the second bridge across the River Venta from the side of the sea.

3. General provisions of the project

The VTMS should be modernised by installing new hardware using the existing infrastructure. The modernisation of the VTMS and the upgrading of its hardware should be performed without interrupting the operation of the VTMS.
The VTMS should not disturb or negatively affect the operation of surrounding GMDSS (Global Maritime Distress and Safety System), GSM (Global System for Mobile Communications) and TV (Television) systems.
Remote management and control of remote locations should be organised from the Vessel Traffic Service Management Centre of the Freeport of Ventspils Authority in Ventspils, Krisjana Valdemara Street 14.

4. Standards

All the components and materials of equipment and hardware should be designed, manufactured and tested according to the latest revisions of the standards, regulations and recommendations listed below:

- IMO resolutions
- ITU-R recommendations
- CEPT standards
- IEC standards,
- ETSI/CENELEC standards
- IALA recommendations
- IEE wiring regulations.

Specific standards and regulations for individual equipment are indicated in their technical specifications.

5. Conformity assessment

The conformity of equipment to regulatory enactments of the Republic of Latvia is ensured by the *AS Elektroniskie sakari*, Eksporta Street *(Eksporta iela)* 5, Riga, Latvia.

6. Warranty and service life

All the delivered equipment and hardware should have at least 2 (two) year warranty.
The contractor should deliver hardware with all the necessary materials and components to ensure maintenance of this hardware according to the maintenance plan for a warranty year period.
All the delivered equipment and hardware should be able to operate in Latvian climatic conditions for at least 20 (twenty) years.
Foundations, brackets, adjustment parts, service platforms, containers of antennas or hardware to be installed in the Vessel Traffic Service Management Centre, on the roof of the building of Association of Fishermen of Northern Kurzeme in Ventspils, Sarkanmuizas dambis *(Sarkanmuižas dambis)* 29b, Southern RS1, on the existing radar masts, on the existing mast of the radio direction finder should be able to operate in Latvian climatic conditions for at least 20 (twenty) years.

7. Technical support during warranty period

The Tenderer shall include an offer of technical support for the warranty period in its tender. Consultations of a technical specialist by phone should be available in English or in Latvian 24/7 on any day of the week, including weekends and holidays. The Contractor should provide the possibility to remotely connect to the VTMS to perform diagnostics and find faults in the system's operation. If faults in the VTMS's operation cannot be corrected remotely, the technical specialist of the Contractor should arrive to the VTMS centre personally no later than within 3 (three) working days from the moment, when the Contracting Authority has informed the Contractor about a fault or a damage in the operation of VTMS. The Tenderer should specify in its offer a phone number and an e-mail for reporting of system damages and faults, as well as for the provision of technical consultations. System damages or faults (if impossible to correct remotely) should be corrected by the Contractor within 5 (five) calendar days after the arrival of the technical specialist.

8. Offer of the system

The Tenderer should supply a modern, field-proven system, which does not require further research or improvement. The delivered system should meet the requirements defined in the document – Operational and Technical Performance Requirements for VTS Equipment, Edition 4, IALA.

Commercial off-the-shelf (COTS) software and hardware should be used to construct the system.

9. Design of the VTMS

The design of the system should envisage access to the equipment for maintenance and repair.

10. Protection of equipment

Appropriate protection of the equipment should be provided in such a way that a fault in one assembly or part of the VTMS does not cause faults in other assemblies of the VTMS. Protection of the equipment should also be provided in such a way that an erroneous (incorrect) installation of a replaceable block does not cause a fault. Special attention should be paid to lightning protection, overvoltage protection and returned power of the equipment.

11. Labelling and engravings

All the labelling and engravings must be waterproof, all the designations must consist of international symbols, inscriptions must be in English. Each cabinet, block and assembly of equipment, including cables, must be marked for easy identification.

12. Works for dismantling and installation of equipment

12.1. The Contractor shall completely dismantle and mount the equipment, supervise works, provide shop drawings, necessary work procedures and methods, which ensure dismantling and installation of the equipment according to standards, manufacturer's instructions and labour safety requirements. The equipment to be dismantled and to be installed should be listed in the cost estimate.
12.2. The dismantling and installation of the equipment should be gradual – one after another or in parallel to such equipment only, which does not disturb the operation of the system.
12.3. Prior to dismantling of any equipment, the Contractor shall inform the Contracting Authority in writing and receive a written permit of the contracting authority to dismantle the equipment.
12.4. Prior to installation of any equipment, the Contractor shall inform the Contracting Authority in writing and receive a written permit of the contracting authority to install the equipment. The Contracting Authority should receive the permit to install the equipment from the *AS Elektroniskie Sakari*.

12.5. The Contractor should dispose of dismantled equipment.

12.6. Equipment to be dismantled does not include the radar mast in Ventspils, Dienvidu mols 5, in the premises (building) of the Vessel Traffic Service Management Centre in Ventspils, Krisjana Valdemara Street 14, Southern RS1, as well as the mast of the radar and the radio direction finder in Ventspils, Krisjana

Valdemara Street 14. Also, the equipment to be dismantled does not include power inlet cables in Ventspils, Krisjana Valdemara Street 14 and Southern RS1. No dismantling of any structures is envisaged on the roof of the building of Association of Fishermen of Northern Kurzeme in Ventspils, Sarkanmuizas dambis 29b, it is only necessary to install a mast of the radar and the radio direction finder. In Ventspils, Sarkanmuizas 29b, installation foundations, brackets, adjustment parts, service platforms, containers of antennas or hardware is envisaged.

13. Factory Acceptance Test (FAT)

13.1. A Factory Acceptance Test is required before the delivery of any equipment. The purpose of the test is to make sure that the manufactured equipment meets the standards defined in the technical specification. Factory acceptance test must be conducted to all radars to be installed, AIS receiver, to all VHF radios, meteorologic station, all VHF RDF equipment, all VTMS operator tables, all VTMS operator chairs, VTMS data recording device.

13.2. 5 (five) weeks before the Factory Acceptance Test, the Contractor shall send technical descriptions of the equipment to the *AS Elektroniskie sakari,* and shall request a conformity assessment of the equipment.

13.3. 4 (four) weeks before the Factory Acceptance Test, the Contractor shall send an invitation to the Contracting Authority, which notifies of the place, date and time of the tests. A technical description of the equipment and the programme of tests should be attached to the invitation to equipment tests, the equipment to be tested should be listed, testing methods, procedures and tools used should be described in detail, a sample equipment testing protocol should be attached.

The Tenderer shall envisage in its tender covering of all the costs related to business trips of 2 (two) representatives of the Contracting Authority (transport, accommodation and other costs).

Business trip standard: traveling of both representatives in same car and airplane. Travel in a car with driver, economy class flight ticket. Hotel must be at least 3 (three) star, separate room for each representative. Room must be with toilet and shower (bathroom). Room size - not larger than 2 person. Catering 3 (three) times per day, including travel and working days. During working days, meal must be as close to work place as possible.

Two weeks before the Factory Acceptance Test, the Contracting Authority and the Contractor shall coordinate the plan of equipment tests, the Contracting Authority shall appoint 2 (two) representatives, who will test the equipment.

13.4. Before the Factory Acceptance Test, the Contractor shall inform the Contracting Authority about conformity of the equipment based on the reply of the *AS Elektroniskie sakari* on compliance of the equipment in the Republic of Latvia.

13.5. The Contractor should ensure Factory Acceptance Tests according to the plan of Factory Acceptance Tests.

13.6. The protocol of the Factory Acceptance Test shall be signed by both parties, the conclusion regarding conformity of the manufactured equipment can be positive or negative. Representatives of the Contracting Authority should receive 3 (three) copies of the protocol of the Factory Acceptance Test.

13.7. If the Contracting Authority does not accept the conformity of manufactured equipment, the Contractor shall eliminate any defects and perform the procedure of the Factory Acceptance Test again.

13.8. All the possible costs of repeated Factory Acceptance Tests shall be covered by the Contractor (transportation, accommodation, training, when necessary, repeated tests, working hours of other personnel should also be paid, if it is not the manufacturer's personnel).

13.9. The Contracting Authority can terminate the contract immediately, if the Contractor has not been able to fulfil the requirements of the plan of the Factory Acceptance Test or ensure conformity of the equipment to the regulations of the Republic of Latvia for 3 (three) times.

14. VTMS Installation Temporary Acceptance Test (ITAT)

Upon completion of mounting of the equipment, the Installation Temporary Acceptance Test (ITAT) is performed according to the plan of the VTMS Installation Temporary Acceptance Test prepared by the Contractor and approved by the Contracting Authority. If no faults or non-compliances are found during the VTMS Installation Temporary Acceptance Test, the protocol of the VTMS Installation Temporary Acceptance Test shall be signed. The protocol should consist of 2 (two) parts – a VTMS mounting completion part and a VTMS operational capability inspection part.

14.1. Any installed equipment or an equipment unit and the operational capability of the VTMS in general should be included into the Installation Temporary Acceptance Test.

14.2. As soon as the Contractor believes that installation of any equipment is complete and meets the specification, the Contractor shall inform the Contracting Authority.

14.3. At least 4 (four) weeks before the expected VTMS test, the Contractor shall submit to the Contracting Authority a plan of the VTMS Installation Temporary Acceptance Test, which should include the inspection of each individual equipment and all the other necessary tests of VTMS. This plan should also state the methods and tools to be used.

14.4. The Contracting Authority shall review the plan of the VTMS Installation Temporary Acceptance Test and shall make the necessary corrections, where appropriate. No later than 2 (two) weeks before the VTMS Installation Temporary Acceptance Test the Contracting Authority shall send the plan of the VTMS Installation Temporary Acceptance Test back to the Contractor. If there are no more corrections, the Contractor shall draw up the final report and the parties shall coordinate the VTMS Installation Temporary Acceptance Test. The Contractor shall submit the harmonised version no later than 1 (one) week before the VTMS test.

14.5. Upon the Contracting Authority's request, the Contractor shall provide the Contracting Authority's personnel with the instruction of the VTMS Installation Temporary Acceptance Test so that the people appointed by the Contracting Authority understand the activities of the Contractor. The Contractor shall perform mounting completion tests in the presence of persons appointed by the Contracting Authority.

14.6. The Contractor together with the Contracting Authority's representatives complete the VTMS mounting completion part of the protocol and the VTMS operational capability inspection part of the protocol.
14.7. Upon the Contracting Authority's request, the Contractor shall allow the Contracting Authority to perform the tests according to the instructions of the VTMS Installation Temporary Acceptance Test.
14.8. If no faults or non-compliances are found during the Installation Temporary Acceptance Test of operational capability of the equipment and VTMS, the Contractor and the Contracting Authority shall sign the VTMS operational capability inspection part of the protocol.
14.9. Each party should keep a copy of the acceptance and delivery protocols of the VTMS Installation Temporary Acceptance Test.
14.10. Any costs related to additional or repeated tests, if any, shall be paid by the Contractor. Working hours of other persons, if this is not the Contractor's personnel, shall be paid as well.
14.11. The Contracting Authority should receive the permit to operate the equipment from the *AS Elektroniskie sakari*.
14.12. If the Contractor and Contracting Authority have signed both parts of the Installation Temporary Acceptance Test protocol, the operators of the Vessel Traffic Service Management Centre of the Freeport of Ventspils Authority should start using the VTMS.

15. VTMS Site Acceptance Test (SAT)

15.1. 6 (six) months after signature of the protocol of the VTMS Installation Temporary Acceptance Test, the Contracting Authority shall perform the VTMS Site Acceptance Test (SAT).
The purpose of the 6 (six) month period is to state and resolve problems in the operation of the VTMS, which were not discovered during the VTMS Installation Temporary Acceptance Test. If no errors or faults are found during the VTMS Site Acceptance Test, the protocol of the VTMS Site Acceptance Test shall be signed.
15.2. At least 4 (four) weeks before the VTMS Site Acceptance Test the Contractor shall submit the plan of the VTMS Site Acceptance Test to the Contractor. This plan should state the date and time of the VTMS Site Acceptance Test, the methods and tools to be used in the VTMS Site Acceptance Test.
15.3. The Contracting Authority shall review the plan of the VTMS Site Acceptance Test and shall make the necessary corrections, where appropriate. The Contractor shall draw up the final report and the parties shall coordinate the VTMS Site Acceptance Test. The Contractor shall submit the harmonised version no later than 1 (one) week before the beginning of the VTMS Site Acceptance Test.
15.4. Upon the Contracting Authority's request, the Contractor shall provide the Contracting Authority's personnel with the instruction of the VTMS Site Acceptance Test so that the people appointed by the Contracting Authority understand the activities of the Contractor. The Contractor shall perform the VTMS Site Acceptance Test in the presence of persons appointed by the Contracting Authority.

15.5. Upon the Contracting Authority's request, the Contractor shall allow the Contracting Authority to perform the tests according to the instructions of the VTMS Site Acceptance Test.
15.6. After the VTMS Site Acceptance Test, the Contractor together with representatives of the Contracting Authority shall complete the protocol of the VTMS Site Acceptance Test.
15.7. If non-compliances with the plan of the VTMS Site Acceptance Test, problems in operation of VTMS or in hardware checks are found during the Site Acceptance Test, the Contractor shall eliminate them and repeat the VTMS Site Acceptance Test. The operation of the VTMS must comply with the requirements described in the plan of the Site Acceptance Test of VTMS.
15.8. Any costs related to additional or repeated tests shall be paid by the Contractor. Working hours of other persons, if this is not the Contractor's personnel, shall be paid as well.
15.9. The date of signature of final acceptance and delivery protocol of VTMS is the beginning of the 2 (two) year warranty period.

16. FAT, ITAT, SAT documents.

Within 1 (one) week after FAT, ITAT, SAT the Contractor shall submit to the Contracting Authority documented test results. 3 (three) originals of the test documents should be submitted.

17. Training of Contracting Authority's personnel

17.1. General requirements

The purpose of the training is to ensure that the delivered equipment is operated and maintained according to the manufacturer's requirements.
The Contractor shall train personnel of the Contracting Authority to operate and maintain the system. Trainings should be provided in Latvian.

17.1.1. VTMS operators should learn at least:
- 17.1.1.1. knowledge of the general concept and design of the system;
- 17.1.1.2. knowledge of operation of the VTMS.

17.1.2. VTMS technical personnel should learn at least:
- 17.1.2.1. knowledge of the concept and design of the system;
- 17.1.2.2. knowledge of system components;
- 17.1.2.3. routine inspection and adjustment procedures of VTMS;
- 17.1.2.4. equipment maintenance procedures;
- 17.1.2.5. troubleshooting procedures up to the block level of the equipment.

Trainings should consist of a theoretical part, where the trainees are provided with theoretical knowledge, and a practical part. The Contractor should cover all the costs related to the trainings. Costs of trainings, should be indicated in the Cost estimate of works.

17.2 Training of VTMS operators

not more than 15 (fifteen) operators should be trained. Both theoretical and practical trainings should be held in the premises of the Ventspils Vessel Traffic Service Management Centre in Ventspils, Krisjana Valdemara Street 14. Training shall conducted before before the Installation Temporary Acceptance Test (ITAT).

17.3 Training of VTMS technical personnel

Not more than 4 (four) VTMS technicians should be trained.
Both theoretical and practical trainings should be held in the premises of the Ventspils Vessel Traffic Service Management Centre at Ventspils, Krisjana Valdemara Street 14. Training shall conducted before before the Installation Temporary Acceptance Test (ITAT).

17.4 Training programme

At least 2 (two) month before the training begins the Contractor shall submit to the Contracting Authority the training programme, the plan and materials in latvian language. The training programme, the plan and materials should be submitted as hard copy and a soft copy (on a USB stick).
Duration of the VTMS operator training course should be 8 (eight) working hours.
Duration of the VTMS technican training course should be 8 (eight) working hours.

Contractor should provide 10 (ten) VTMS operator training sessions. Each session should be conducted on working day from 0800 till 1700 with lunch break from 1200 till 1300. Each session should last 8 (eight) working hours. There should not be more than 4 (four) trainees participating in session.

Contractor should provide 4 (four) VTMS technican training sessions. Each session should be conducted on working day from 0800 till 1700 with lunch break from 1200 till 1300. Each session should last 8 (eight) working hours. There should not be more than 4 (four) trainees participating in session.

18. VTMS technical documentation.

At least 4 (four) weeks before the expected VTMS Installation Temporary Acceptance Test (ITAT), the Contractor shall submit to the Contracting Authority VTMS technical documents - drawings, operating, maintenance manuals and all the necessary documentation with regard to the operation and maintenance of the VTMS. All the equipment supplied within the scope of the contract should have the documentation, which contains all the necessary information about safe operation and the necessary maintenance of the equipment.

18.1. The documentation shall include:

18.1.1. drawings of the VTMS;

18.1.2. drawings and block diagrams of the each appliance available from manufacturer.

18.1.3. technical manual from manufacturer of each appliance for use of VTMS technician.
18.1.4. operating manual from manufacturer of each appliance for use of VTMS operator.
18.1.5. maintenance plan of the equipment. Plan must be in accordance with manufacturer recommended maintenance plan.
18.1.6. list of spare parts for maintenance plan. Spare parts of each equipment must be indicated with catalogue numbers;
18.1.7. wiring diagrams from the entrance cable (from the external mains) to the terminal point in the hardware.

Hard copy and a soft copy (on a USB stick) should be submitted.
The quality of hard copy of documents should be fit for long-term use, it should be hard-bound, clearly marked and indexed.

19. Work project

Within 1 (one) month after the conclusion of the contract the Contractor shall submit to the Contracting Authority a work project. The work project should include the list of equipment to be dismantled and to be installed and the time schedule. The work project shall also include mounting sketches, calculations for installation of equipment. The Contracting Authority shall review them within two weeks and provide its opinion. If the Contracting Authority has any objections, the Contractor shall eliminate any shortages in the work performance project within 3 (three) weeks. The work performance project should be coordinated with the Contracting Authority prior to starting any equipment dismantling or installation works.

20. VTMS equipment electrical, data and other cables, waveguide.

The Contractor shall install new VTMS equipment with new cables. Existing waveguides, electric, data and other cables should not be used.
Contractor should tie the cables with proper cable ties or other cable fixing equipment to ensure safe operation of the cables.
Electric cables must be installed new from electrical network cable to the appliance.

21. Additional works, mounting materials, additional equipment.

Any equipment, materials, works not mentioned in this Technical Specification, but necessary to deliver VTMS, must be indicated in Cost Estimates of the works.

22. General technical requirements

22.1. Operation of VTMS

Any operational activities in any VTMS assembly should not affect the work of any other VTMS assembly.

22.2. Hardware operation failures and backups

Failures of individual VTMS components should not cause the failure of the entire VTMS. Hardware should be sufficiently backed up to keep VTMS operating.
The Contractor should identify all the components of VTMS and provide an analysis, how damages to each component affect general operation of the VTMS.
The hardware should be operational with a long-term voltage deviation within 10% of the rated voltage and a long-term frequency deviation within 5% of the rated frequency.

22.3. Electrical power supply

The Contractor should indicate detailed electrical power requirements at all hardware installation sites. The Contractor should lay new wiring from the hardware terminal point to the external mains (to the entrance cable). The Contractor should design this wiring and the Contractor should submit the wiring diagram to the Contracting Authority.

22.4. Environmental impact

Rooms, in which hardware is installed should be equipped with air conditioners/heaters. The required number should be indicated in the project. The design power should provide +23°C in the rooms, where the hardware is installed, with the maximum outdoor temperature of +55°C and the minimum outdoor temperature of -40°C.
Regardless of that, indoor hardware should be operational in the temperature range from 0° to +40°C and at air humidity 95%.
Outdoor hardware should be operational at wind speed of 140 km/h, air humidity up to 100% and in the temperature range from -40° to +55°C. The hardware should not be damaged by wind speeds up to 180 km/h.
Containers, in which hardware is installed, should be equipped with air conditioners/heaters to ensure temperature in the container, which is appropriate for operation of the hardware. Heat insulation of containers and the necessary number of conditioners/heaters should be stated in the work performance project, Latvian climatic conditions should be taken into account. Temperature should be maintained in the container automatically. The container of the emergency diesel generator should not be equipped with air conditioners/heaters.
On existing radar and RDF mast, the brackets, installation materials, parts, which are necessary to install the VTMS equipment, should be supplied by contractor.
Cost estimates should be included in cost estimate of works sheet.
Those brackets, installation materials, parts togather with installed equipment should be able to withstand the wind load up to 180 km/h, the ambient temperature range from -40° to +55°C, air humidity up to 100%, exposure to sun, rain, snow, ice and hail. Structural integrity calculations should be stated in sketches of these foundations, brackets, adjustment parts, service platforms in the work project.
Those brackets, installation materials, parts should be coated with corrosion protection materials.
The first corrosion protection coating of the foundations, brackets, adjustment parts, service platforms, containers of hardware to be installed outside (not inside) should be galvanization. Additional corrosion-proof layers can be used, if necessary.

22.5. Radiation safety

The Contractor should provide detailed information about safe use of radar and VHF radio station hardware.
Prior to installation, the Contractor should ensure preventive safety with radar to radiation emissions from radar and VHF radio station hardware.

22.6. Operational availability and safety of VTMS equipment

Operational availability due to critical failures of VTMS (except for failures as a result of external causes) should be no less than 99.9%, counting the average break in operations of 1 hours during each break.
No system data should disappear in case of hardware or software faults.
VTMS should be protected from unauthorized access. On the workstations, from which operational functions will be performed, access to the system should be protected with an operator's password.
The Contractor determines, which system adjustments require an administrator's password.
The Contractor should indicate, which hardware should be installed in rooms for security reasons.
Containers should be closed, labelled with respective warning marks according to labour safety requirements.

22.7 Diagnostics and maintenance

VTMS should have a widely used diagnostics to analyse faulty operations and processes. Messages about faults in operation should be displayed at all workstations.
The delivered VTMS should have a self-diagnostics function and integrated test equipment.

22.8. Power cables, data transmission cables, cables for operation of installed hardware.
22.8.1. Souther RS1. New electric cable should be installed from electric network cable to new equipment.
22.8.2. Ventspils, Krisjana Valdemara str. 14. New electric cable should be installed from electric network cable to new equipment.
22.8.3. Ventspils, Sarkanmuizas dambis 29b. New electric cable should be installed from electric electric box on 2nd floor in building to the new equipment.

22.9. Southern RS1 emergency diesel generator container.
Southern RS1 emergency diesel generator container should be designed in a way to operate emergency diesel generator in container. There should be air intake duct and flue gas exaust pipe. Air intake duct and flue gas exaust pipe should be diameter and length to ensure correct operation of emergency diesel generator. Air intake duct and flue gas exaust pipe should not be attached to container by welding. Bolts and nuts should be used. Change of air duct and exaust should be possible without welding works.
1 (one) electrical socket with 1 (one) phase 220V electrical current from electrical network should be installed. Cable diameter 3x2.5mm^2. Purpose of the socket is to

connect portable light during maintenance of the generator, or portable electric heater, or portable air cooler, should necessity arise.

22.10. Southern RS1 radar equipment container 220V electric supply, drain pipe, hot air exaust pipe.
In addition to electric wiring for operating radar equipment and automatic temperature maintaining equipment, 1 (one) electrical socket with 1 (one) phase 220V electrical current from electrical network should be installed. Cable diameter 3x2.5mm^2.
Purpose of the socket is to connect portable light during maintenance of the generator, or portable electric heater, or portable air cooler, in case of breakdown of fixed temperature maintaining equipment.
Drain pipe for water from fixed temperature maintaining equipment (air cooler) should be provided.
Hot air exaust pipe for portable air cooler should be provided, diameter 140 mm. Hot air exaust pipe should have means to close it, if not in use.

23. Description of the current VTMS

The current Ventspils VTMS was created on 24 October 1998. Part of spare parts of the system are not produced anymore.

The hardware is currently deployed on two sites.

Figure 1. Chart of the Freeport of Ventspils with current and planned VTMS hardware sites.

Red stars mark sites of the current VTMS hardware on the figure – Vessel Traffic Service Management Centre of the Freeport of Ventspils Authority, Kr. Valdemara Street 14, Ventspils and Dienvidu mols 5, Ventspils (Southern RS1). The blue star marks the planned additional site for installation of hardware – on the roof of

the Association of Fishermen of Northern Kurzeme in Ventspils, Sarkanmuizas dambis 29b.

23.1. The following hardware is operative in the Vessel Traffic Service Management Centre:

Radar ATLAS 9600 VTS (3 cm, antenna 22 feet, 12 rpm) 1 pc.
Radar ATLAS 8600 (8 feet antenna) 1 pc.
Central processing unit (multitracker) 1 pc.
Workstations of operators (each having a double display) 2 pcs.
VHF radio stations 5 pcs.
Uninterruptible power supplies – UPS 2000 4 pcs.
Emergency diesel generator 380 V 18 kW 1 pc.
Radio direction finder (RDF) 1 pc.
The height of the radar mast is 18 metres, the height of the mast of the radio direction finder is 30 metres.

The Vessel Traffic Service Management Centre uses the database of vessels VELKONIS (produced by Latvian company HMS) and AIS – Transas Marine electronic chart programme with internet connection to the Search and Rescue Coordination Centre of the Coast Guard (Riga).

23.2. Hardware of Southern RS1 (address Dienvidu mols 5, Ventspils):

Radar ATLAS 9600 VTS (3 cm, antenna 22 feet, 12 rpm) 1 pc.
Automatic weather station Aanderaa AWS 2700 1 pcs.
Uninterruptible power supply UPS 2000 1 pcs.
Emergency diesel generator 380 V 15 kW 1 pc.
Two-way radiocommunications between the radar tower of the Vessel Traffic Service Management Centre and Southern RS1 is ensured using ERICSON MINILINK 23 E (2 Mbit/s) microwave line.
The height of the radar mast is 22 metres.

23.3. Pilot boat Ronis.

Radar JRC JMA-2300, Global positioning system (GPS) GPS Navigator S-NAV500, B Class AIS transponder MA-500TR.

23.4. Navigation marks

For navigation in harbour entrace channels and at outer roads, 19 buoys are installed. Many of the buoys are equipped with transmitters, which are working in automatic observation system Regional Control Centre E741. This system is not currently integrated into the VTMS and is operating as a separate system.

24. Modernisation of VTMS

24.1. Vessel Traffic Service Management Centre
24.1.1 To replace the radar and the antenna ATLAS 9600 VTS (22 feet antenna);
24.1.2 To replace the radar and the antenna ATLAS 8600 VTS (8 feet antenna);
24.1.3 To replace VHF radio stations KT-730;
24.1.4 To replace UPS (≥5 min);
24.1.5 To replace air conditioning/heating units;
24.1.6 To replace the radio direction finder;
24.1.7 To install AIS receiver;
24.1.8 To replace VTMS hardware, VTMS operator desktops and other equipment which is necessary for the work of operators;
24.1.9 To install new VTMS data recording device and data archiving device;
24.1.10 Install new Electronic chart set for Port of Ventspils area and the outer roadstead
24.1.11 To replace the target tracking processor;
24.1.12 No replacement of the existing masts and the emergency diesel generator is envisaged;
24.1.13 No reconstruction of the building of the Vessel Traffic Service Management Centre is envisaged;
24.1.14 No connection of VELKONIS vessel database to VTMS is envisaged.

The work project should include a sketch of the hardware to be deployed in Vessel Traffic Service Management Centre of the Freeport of Ventspils Authority in Ventspils, Krisjana Valdemara Street 14, on the radar mast and on the mast of the radio direction finder at Krisjana Valdemara Street 14, Ventspils.

24.2. Southern RS1.
24.2.1 To replace the current automatic weather station;
24.2.2 To replace the radar ATLAS 9600 VTS (22 feet antenna);
24.2.3 To replace the target tracking processor;
24.2.4 To replace the microwave line for communication between the Vessel Traffic Service Management Centre and Southern RS1. Bandwidth of MW lines ≥10Mbit/s;
24.2.5 To replace containers of hardware and the emergency diesel generator. Container and guarding system should be restored in new containers;
24.2.6 Marks and safeguards should be installed in proximity of the hardware for security reasons to prevent any labour safety related accidents during operation of the hardware;
24.2.7 No replacement of the existing mast and the emergency diesel generator is envisaged.
The work project should include a sketch of the hardware to be deployed at Southern RS1.

24.3 Roof of the building of Association of Fishermen of Northern Kurzeme in Ventspils, Sarkanmuizas dambis 29b.

24.3.1 install a radar on roof of the building to observe waterway of Venta river from bend to the 2nd bridge across the river. Radar must be integrated into the VTMS. Radar mast be bolted to the fabricated bracket or mast. Mast or bracket must be installed on the roof of the building, height of the roof above ground is 13 meters.

24.3.2 install a radio direction finder (RDF) on roof of the building, integrate in VTMS at Vessel Traffic Service Management Centre. RDF should be installed by mast or bracket.

24.3.3 install an electric power meter, which will record power consumption of the radar, the RDF and associated equipment of both. Marks and safeguards should be installed in proximity of the hardware for security reasons to prevent any labour safety related accidents during operation of the hardware.

24.3.4 Install 4G wireless router working in network of one of the local mobile network operator (LMT, BITE, TELE 2, etc.) to connect radar and RDF to Vessel Traffic Service Management Centre at Krisjana Valdemara Street 14 via wireless internet.

24.3.5 Install box for wireless router and electric cables. Box must be from steel and should maintain working temperature for wireless router. If it is not possible to place the box in the building, then automatic temperature maintaining equipment should be installed in box to maintain working temperature for wireless router. Box must be covered with corrosion protection material.

24.3.6 The work project should include a sketch of the hardware to be deployed on the roof of the Association of Fishermen of Northern Kurzeme in Ventspils, Sarkanmuizas dambis 29b.

24.4 Pilot boat Ronis.

24.4.1. Old radar, AIS and GPS from the pilot boat Ronis should be dismantled.

24.4.2. Install new radar with at least 12 kW emitted power. Install chart plotter with screen size from 11 to 13 inch. Electronic chart plotter must be compatible with AIS, GPS, radar and heading sensor.

Install new GPS. Install new AIS.

The AIS Class B transponder should ensure transmission of at least the following vessel data: name, Maritime Mobile Service Identity (MMSI), calling signal, length and width, Course Over Ground (COG), Speed Over Ground (SOG) and Heading.

Install heading sensor.

Install Electronic charts of the Port of Ventspils area and the outer roadstead, central Baltic sea. Charts must be from official chart distributor. There should be possibility to update the electronic charts.

24.5. Navigation marks

Integrate an automatic observation system of buoys in the VTMS system of Ventspils. After integration, VTMS should receive information from buoys with transmitters.

25. Radars

25.1. Characteristics of the existing 22 feet radars.
Two 22 feet radars of the current system are installed in such a way to make the outer roadstead and the inner roadstead visible from both of them. The radar of the Southern Breakwater is mainly used to control vessel traffic along channels.
Both radars are X-band (9375 MHz). 25 kW transmitters (2 for each radar). Transmitters with switchable pulse wavelength – 80, 300, 1000 ηs, with PRF 2.0, 1.0, 0.5 kHz respectively.
Parameters of antennas:
Size – 22 feet, rotation rate – 12 rpm, horizontal beam width - 0.40° at 3dB level, vertical beam width - 15° at 3dB level, antenna gain 35 dB, side lobe level at +/-10° angle - -31.2dB. Polarisation – horizontal.

25.2. Requirements for the new 17-23 antenna radars.
2 (two) new 17-23 feet open array type antenna radars should be installed. 1(one) at the Southern RS1 (address Dienvidu mols 5, Ventspils) and 1 (one) at Vessel Traffic Service Management Centre of the Freeport of Ventspils Authority in Ventspils, Krisjana Valdemara Street 14. Both 17-23 feet antenna radars should not be solid state modulator driving magnetron type.
Both offered 17-23 feet antenna radars should be X-band with dual 25 kW transceivers, with switchable pulse wavelength (short, medium, long). Pulse waveform – fast rise no worse than 20 ηs, fast fall no worse than 30 ηs. Switching of pulse wavelength should not affect frequency stability. Both radars should be equipped with electronic devices, which effectively reduce sea and rain clutter (STC, FTC). Total noise level of receivers – no worse than 3.5 dB. Dynamic range of receivers – no worse than 120 dB. Transmitters should be equipped with a radiation blanking device with at least four adjustable sectors. There should be the possibility to prevent radars from affecting each other (Stagger). Hardware containers of both radars should provide the possibility to visually control raw and processed radar video, adjust transmitters, diagnose the hardware and display fault messages.
The Contractor should install a circular polarisation antenna for the radar at Southern RS1 and horizontal polarisation antenna for the radar of the VTMS centre (radiating element and a transmission with a motor) with frequency of ≤ 20 rpm, size of the radiating element ≥ 19'. Horizontal beam width ≤ 0.40° at 3dB level, vertical beam width ≤ 15° at 3dB level, first side lobe level at 28 dB, side lobes +/- 10˚ or more outside the beam of 35 dB. Gain of the radiating element – 35 dB.
A scan converted raw video signal is used for identification and display of targets of the VTMS radar system in Latvia.
Radar capability should correspond to the advanced level of X-band radars as per IALA Guideline 1111 (target detection, range performance, target separation, etc.).
Radars must be protected from lightening damage or damage by electrical current. Protection can be earthing (grounding), fuse or breaker, protection must be as per manufacturer design.
The delivered radar equipment should correspond to the below mentioned standards and recommendations or their equivalents:

IEEE Std 686-1997- IEEE Standard Radar Definitions;
ITU – ITU-R SM.1541 Unwanted emissions in the out –of –band domain;
ITU – ITU-R SM.329-9 Spurious emissions;
IALA Guideline 1056 – On The Establishment of VTS Radar services.

Radar must be certified in accordance with 96/98EC or 1999/5/EC.

In technical offer manufacturer and model should be indicated.

25.3. Requirements for the new radar with 7-9 feet antenna.
1 (one) radar with an 7-9 feet open array type antenna should be installed at Vessel Traffic Service Management Centre of the Freeport of Ventspils Authority in Ventspils, Krisjana Valdemara Street 14.
Requirements: transmitter pulse output in range 10-14 kW, range scale up to 48 nm or more, to be used in conjuntion with ARPA and electronic charts. Electronic charts should not be installed separately for this radar, but the charts of VTMS should be used. Radar should be integrated in VTMS.
7-9 feet antenna radar should not be solid state modulator driving magnetron type.
Radar must be able to indicate the position of SART (Search and Rescue Radar Transponder) operating in 9.2-9.5 Ghz range.
The 7-9 feet antenna radar should be connected to the data recording system and all other systems same as 17-23 antenna radars. The 7-9 feet antenna radar will be used in heavy winds instead of 17-23 feet radars because of lower wind resistance to antenna. In those conditions vessel traffic in approach channel and river will be stopped. Vessels will be moored, anchored or drifting.
Radar must be protected from lightening damage or damage by electrical current. Protection can be earthing (grounding), fuse or breaker, protection must be as per manufacturer design.

IEEE Std 686-1997- IEEE Standard Radar Definitions;
ITU – ITU-R SM.1541 Unwanted emissions in the out –of –band domain;
ITU – ITU-R SM.329-9 Spurious emissions;
IALA Guideline 1056 – On The Establishment of VTS Radar services.

Radar must be certified in accordance with 96/98EC or 1999/5/EC.
In technical offer manufacturer and model should be indicated.

25.4. Requirements for the radar to be installed on roof of the building Sarkanmuizas dambis 29b, Ventspils.
Requirements:
Antenna type: radom antenna
Signal processing: digital
Power output (kW): 3.8 - 4.2
Horizontal beam width (degrees): 3.7 - 4.2
Vertical beam width (degrees): 24 - 26
Polarization: horizontal
Rotation rate: 24RPM
Maximum Dimensions (length, width, height): 1500 mm x 1500 mm x 1500 mm
Maximum weight: 20 kg
Range scale: up to 3 nm or more
Transmitting frequency: 9405+/-125MHz
Receiver Noise figure: less than 5 dB
Transmitter type: solid state modulator driving magnetron
Must be equipped with magnetron heater
CE approval: must conform to 1999/5/EC
Radar must be integrated in VTMS via 4G wireless router working in network of one of the local mobile network operator (LMT, BITE, TELE 2, etc.)
Operator at VTMS centre at Krisjana Valdemara str. 14, Ventspils should be capable to operate radar remotely (switch on/off, change range, etc.) via wireless internet.

Radar must be protected from lightening damage or damage by electrical current. Protection can be earthing (grounding), fuse or breaker, protection must be as per manufacturer design.
In technical offer manufacturer and model of RDF should be indicated.

25.5. Table of technical parameters of radars.
All tenderers must complete and submit Table 1 – technical parameters of radars in their technical offer.
Table 1 – Technical parameters of radars.

17-23 feet open array type radars	Radiating element	
	Manufacturer	
	Size	
	Rotation rate	
	Gain	
	Horizontal beam width at ____(state)dB level	
	Vertical beam width at ____ (state)dB level	
	First side lobe level	
	Side lobes +/-10˚ or more outside the beam	
	Radar transmitter	
	Manufacturer	
	Frequency	
	Peak output	
	Pulse wavelength	
	Pulse waveform – fast rise time/fast fall time	
	Pulse repetition frequency	
	Blanking	
	Stagger	
	Radar receiver	
	Maximum receiver input signal	
	Total noise level	
	Dynamic range	
	STC	
	FTC	
	Characteristics of reflected targets	
	Accuracy in range	
	Accuracy in bearing	
	Separation in range	
	Separation in azimuth	
	Antenna bearings	
	Number of bearings to grease	
	Grease specification	
	Greasing frequency (interval)	

	Heating	
	Magnetron	
	Antenna	
	Protection from lightening or damage by electrical current	
	Description	
	Electrical power supply (minimum/maximum)	
	Voltage	
	Power consumption (W)	
	Current consumption (A)	
	Phase requirement (number)	
7-9 feet open array type antenna radar	Radiating element	
	Manufacturer	
	Size	
	Rotation rate	
	Gain	
	Horizontal beam width at ____(state)dB level	
	Vertical beam width at ____ (state)dB level	
	First side lobe level	
	Side lobes +/-10˚ or more outside the beam	
	Radar transmitter	
	Manufacturer	
	Frequency	
	Peak output	
	Pulse wavelength	
	Pulse waveform – fast rise time/fast fall time	
	Pulse repetition frequency	
	Blanking	
	Stagger	
	Radar receiver	
	Maximum receiver input signal	
	Total noise level	
	Dynamic range	
	STC	
	FTC	
	Characteristics of reflected targets	
	Accuracy in range	
	Accuracy in bearing	
	Separation in range	
	Separation in azimuth	
	Antenna bearings	
	Number of bearings to grease	

	Grease specification	
	Greasing frequency (interval)	
	Heating	
	Antenna	
	Magnetron	
	Protection from lightening or damage by electrical current	
	Description	
	Electrical power supply (minimum/maximum)	
	Voltage	
	Power consumption (W)	
	Current consumption (A)	
	Phase requirement (number)	
Radom antenna type radar (to be installed on roof of the building Sarkanmuizas dambis 29b, Ventspils)	Manufacturer	
	Model	
	Antenna type	
	Antenna size	
	Characteristics of reflected targets	
	Accuracy in range	
	Accuracy in bearing	
	Separation in range	
	Separation in azimuth	
	Antenna bearings	
	Number of bearings to grease	
	Grease specification	
	Greasing frequency (interval)	
	Heating	
	Antenna	
	Magnetron	
	Protection from lightening or damage by electrical current	
	Description	
	Electrical power supply (minimum/maximum)	
	Voltage	
	Power consumption (W)	
	Current consumption (A)	
	Phase requirement (number)	

25.6. Radar tracking processors.

Radar tracking processors should ensure tracking of at least 300 true targets by operator's choice – automatically or manually.
To avoid tracking of unnecessary targets (system noise, wave noise, etc.), the processors should use the sweep-to-sweep correlation.

25.7. Requirements for the Transceiver.
The radar transceiver should have the following functions:
25.7.1. The radar system of the transceiver should be intended for automatic operation.
25.7.2. High dynamic range and high separation to distinguish both large and small vessels, even when they are close to each other.
25.7.3. The transceiver should be equipped with remote control.
25.7.4. Several control profiles should be ensured, which are necessary to maintain the parameters of the transceiver that are defined above, which would optimise the performance of radar ranging, according to changeable weather conditions or special operational requirements. Thus, control profiles should provide operators possibilities to adapt the mode of the radar system and processing of receivers in a fast and trustworthy way. Possibility of pre-defined profiles, which would eliminate the risk in case of improper activities of operators or reduce the need for the operator to acquire detailed knowledge about functions and meaning of radio ranging.
25.7.5. The programme should ensure complete and comprehensive diagnostic function for the radar transceiver.
25.7.6. Use of dry air as drier for cleaning of waveguides,
25.7.7. All radio ranging control functions, including parameter settings, should be available in the VTMS centre.
25.7.8. Built-in automatic noise suppression mechanism, which eliminates the need for the operator to adjust sensitivity of the radar during normal operation.
25.7.9. The transceiver should have up to four transmitter blanking user-defined sectors. Each sector can be defined bearing 0 to 359 degrees and in sector width from 10 to 350 degrees with a 1 degree increment.
25.7.10. The operator display should show information that the sector preparation is on.
25.7.11 .After alternating current outages all radio ranging settings should remain unchanged and there should be the possibility to enter defined default values.

The above mentioned specifications should be applied to all frequencies, within normal operating range and in temperature conditions prevailing in locations of radars.

25.8. Requirements for antenna mechanisms

25.8.1. The turning unit of the antenna should have a secure design. The mechanism should be protected against corrosion in metal parts or finishing materials or parts.
25.8.2. An overhaul (for example, replacement of bearings, oil seals in gears) not more frequently than once in 60,000 hours of uninterrupted operation.
25.8.3. Requirements to the antenna turning mechanism.
Wearing out parts of the mechanism should be replacable by new.

26. Automatic identification system (AIS)

26.1. The AIS receiver should be installed in the VTMS centre and should be integrated into the entire system to display positions and information on operator workstation. AIS receiver should receive all Class A, Class B, AIS SART, AIS MOB and AIS Base Station transmissions. There should be the possibility to use radar or AIS information separately, as well as integrated radar/AIS information.
AIS receiver must be installed with own antenna, VHF radio antennas should not be used for AIS. AIS antenna should be installed on mast at Krisjana Valdemara 14, Ventspils high enough to receive AIS signal from station transmitting at second bridge across river Venta counting from sea.

The AIS unit should correspond to the below mentioned standards and recommendations or their equivalents:

1. IMO MSC.74(69), Annex 3 – IMO Recommendation on performance Standards for a Universal Shipborne Automatic Identification System (AIS);
2. ITU Radio Regulations – Appendix S18, Table of transmitting Frequencies in the VHF Maritime Mobile Band;
3. ITU-R M.1371-1 – ITU Recommendation on the AIS using Time Division Multiple Access in the Maritime Mobile Band;
4. IEC Standard 61993 Part 2 AIS Operational and Performance Requirements, Methods of Testing and required Test Results;
5. IALA Technical Clarification – IALA Technical Clarification of Recommendation ITU-R M.1371-1;
6. IALA Recommendation A-124 – IALA Recommendation on AIS Shore Stations and Networking Aspects Related to AIS Service;
7. IALA Recommendation V-125 – IALA Recommendation on the Integration and Display of AIS and other information at a VTS Centre.

26.2. AIS operational audio and/or visual alerts should be envisaged for the cases of:

1. Loss of AIS tracking or signal;
2. Contradiction in AIS data;
3. Loss of correlation between AIS and radar data;

26.3. AIS receiver must be protected from lightening damage or damage by electrical current. Protection can be earthing (grounding), fuse or breaker, protection must be as per manufacturer design.

In technical offer manufacturer and model should be indicated.

27. Radiocommunications system

27.1. The Contractor should replace existing VHF radio stations in the VTMS centre. It is necessary to install 5 (five) new stationary radio systems. 3 (three) in the VTMS centre, 2 (two) in the room of port supervisors. VTMS centre and room of port supervisor is located in building at Krisjana Valdemara str. 14, Ventspils. Each VHF station must be independent from other VHF or UHF station, that is it should have own antenna, transmitter, receiver, loudspeaker, microphone.Each VHF radio station must be equipped with VHF desktop microphone. Desktop microphone must be connected to VHF with wire, wireless should not be supplied.
All 5 (five) VHF radio stations should work in simplex radiotelephony mode on VHF channels 09,14, 16, 67, 71.
1 (one) of VHF radio stations in VTMS operator room in addition to above should have capability to receive and transmit DSC messages on VHF ch. 70. Modulation G2B.

27.2. Requirements for VHF radio stations to be installed.
Table 2 – Requirements for VHF radio stations.

Work modes	Simplex on VHF channels 09,14, 16, 67, 71 / DSC on VHF ch 70
Transmitting frequency range	155 MHz - 161 MHz
Receiving frequency range	155 MHz – 159 MHz
Channel bandwidth	25 kHz (12.5 kHz option)
Modulation	Radiotelephony – G3EJN DSC - G2B
Frequency stability	+/- 10 ppm
Temperature range	- 40˚C ˚ to +55˚C
Maximum Transmitter output	25 W
Optional transmitter output	1W
Receiver input sensitivity	at 12dB SINAD – 119 dBm
Signal/noise level	better than 40 dB
Antenna	Omni-directional 50 Ω

27.3. Earthing (grounding) should be installed in all necessary places to avoid damage from lightening Protection can be earthing (grounding), fuse or breaker, protection must be as per manufacturer design and recommendations.
27.4. Radiocommunications should correspond to the below mentioned standards and recommendations or their equivalents:

1. SOLAS Chapter IV (Radiocommunications);
2. SOLAS Chapter V (Safety of Navigation) Regulations 12,19;
3. Resolution A.694(17) – General Requirements for Shipborne Radio Equipment forming part of the Global Maritime Distress and Safety System (GMDSS) and for Electronic Navigational Aids;
4. IEC 721-3-6 – Classification of environmental conditions, Part 3: Classification of groups of environmental parameters and their severities; Ship environment;
5. IEC 60945 – Marine navigation and radiocommunication equipment and systems – General requirements, methods of testing and required test results.

In technical offer manufacturer and model of radios should be indicated.

28. Meteorological equipment

28.1. The existing meteorological unit on the mast at Southern Breakwater should be dismantled.

28.2. The Contractor shall deliver and install meteorological equipment on the mast at Southern Breakwater. Meteorological equipment should be integrated into the entire system. Transmission of data to the VTMS centre via microlink should be ensured. In the work room of VTMS operators at Krisjana Valdemara 14, Ventspils there should be the possibility to view meteorological data on the screen and to print them.

28.3 Meteorological station should be able to measure:
1. wind speed and direction
2. air temperature
3. liquid precipitation
4. barometric pressure
5. relative humidity

To measure wind speed and direction ultrasound sensor technology must be used.
Sensor housing must be protected against icing with heating.
All sensors can be mounted in one housing, if that is manufacturer technology or be in separate housings. All sensor housings must be protected against icing with heating.

28.4 Records, measurments, indications, calculations.
System should record meteorological readings automatically with frequency every 1 minute or less. The station should work and supply measurements 24/7.
Data must be stored in memory of the system, operator must be able to view and print indicated and/or calculated data on A4 or A3 size paper (operator selection). Printer must be dedicated for printing meteorological data only.
Measurments must be in m/s, degrees of direction (0- 360), degrees as per celsius, mm/hr, hPa, percents.

System should be able to indicate and/or calculate:
1. present reading of wind speed and direction, temperature, liquid precipitation, barometric pressure, relative humidity,
2. maximum wind gust in time period set by operator,
3. minimum wind speed in time period set by operator,
4. average wind speed in time period set by operator,
5. wind direction in time period set by operator,
6. average wind direction in time period set by operator,
7. graph of wind speed in time period set by operator,
8. graph of wind direction in time period set by operator,
9. maximum temperature in time period set by operator,
10. minimum temperature in time period set by operator,
11. average temperature in time period set by operator,
12. graph of the temperature time period set by operator,
13. maximum liquid precipitation in time period set by operator,
14. minimum liquid precipitation in time period set by operator,
15. average liquid precipitation in time period set by operator,
16. graph of the liquid precipitation in time period set by operator,
17. maximum barometric pressure in time period set by operator,

18. minimum barometric pressure in time period set by operator,
19. average barometric pressure in time period set by operator,
20. graph of the barometric pressure in time period set by operator,
21. maximum relative humidity in time period set by operator,
22. minimum relative humidity in time period set by operator,
23. average relative humidity in time period set by operator,
24. graph of the relative humidity in time period set by operator.

Minimum requirements to the measurable parameters and accuracy of data of the meteorological equipment to be installed are summarised in Table 3.
Table 3 – Minimum requirements of the measurable parameters and accuracy of data of the meteorological equipment to be installed.

Measurable parameter	Minimum accuracy of data or requirement of the parameter
Wind speed 0 to 15 m/s	+/- 4%
Wind speed 15 to 25 m/s	+/- 4.5%
Wind speed 25 to 35 m/s	+/- 5%
Wind speed 35 to 45 m/s	+/- 5.5%
Wind speed 45 to 55 m/s and more	+/- 6%
Minimum measurable wind speed	0 m/s
Maximum measurable wind speed	60 m/s or more
Wind direction	+/- 4%
Air temperature	+/- 1°C
Maximum air temperature	+60°C or more
Minimum air temperature	-52°C or less
Air relative humidity	+/- 5%
Maximum air relative humidity	100%
Minimum air relative humidity	0%
Barometric pressure	+/- 1 hPa
Maximum barometric pressure	1100 hPa
Minimum barometric pressure	600 hPa
Liquid Precipitation	+/-5%
Maximum Liquid Precipitation intensity	200 mm/hr
Minimum Liquid Precipitation intensity	0 mm/hr

28.5 Sensor or sensors must have protection against lightening.Protection can be earthing (grounding), fuse or breaker, protection must be as per manufacturer design and recommendations.
The meteorological hardware to be installed should correspond to the below mentioned standards and recommendations or their equivalents:

1. WMO – International Meteorological Vocabulary, Guide to Meteorological Instruments and Methods of Observation;
2. EMC - Electromagnetic Compability Standards.

In technical offer manufacturer and model should be indicated.

29. VHF radio direction finder unit

29.1. The existing antenna of the VHF radio direction finder is installed on 30 metre high tower near the Vessel Traffic Service Management Centre at Krisjana Valdemara str. 14, Ventspils. The receiver of the radio direction finder is located in the operator room, on the 3rd floor of the Vessel Traffic Service Management Centre at Krisjana Valdemara str. 14, Ventspils.

29.2. The Contractor should replace the existing radio direction finder and install the second VHF radio direction finder on the roof of the building at Sarkanmuizas dambis 29b, Ventspils.
Both VHF radio direction finders should be integrated into the entire system. Both receivers must be located at Vessel Traffic Service Management Centre at Krisjana Valdemara str. 14, Ventspils..

29.3. If there is associated electronic hardware which need to be installed on mast or roof of the building in direct vicinity of RDF antenna, then it should be installed in container or box with heating/cooling to maintain working temperature of electronic hardware. Box or container must be fire proof and weather proof.

29.4 4G wireless router working in network of one of the local mobile network operator (LMT, BITE, TELE 2, etc.) must be used to connect RDF to Vessel Traffic Service Management Centre at Krisjana Valdemara Street 14 via wireless internet.

29.5. Technical requirements for the VHF radio direction finder are given in Table 4.
Table 4 – Technical requirements for the VHF radio direction finder.

Parameter	Technical requirements
Channels to be scanned	VHF channels 09, 14, 16, 67, 71 mandatory, any additional channels as optional.
Modulation	Telephony – G3EJN, any additional modulations as optional.
Polarization	Vertical
Selection of channels to be scanned	From the VTMS Centre
Visual display of the bearing line	Automatically on the VTMS operatorscreen, if monitoring function selected
Minimum delay in visual display after signal is received	No more than 10 sec
Accuracy of the bearing line	No worse than +/- 5°
Switching from stand by to monitoring	From the VTMS Centre
Antenna operable temperature range	-60°C to +40°C
Electrical power supply	1 phase 220V

29.6 RDF must have protection against lightening. Protection can be earthing (grounding), fuse or breaker, lightening protection device. Protection must be as per

manufacturer design and recommendations. Contractor must supply diagram and description of lightening protection arrangement.

29.7 VHF RDF must comply with IALA guideline 1111 for radio direction finders.

In technical offer manufacturer and model of RDF should be indicated.

30. Workstations and equipment of workstations in the VTMS Centre

30.1. The Contractor should equip 2 (two) identical operator workstations in the VTMS centre Krisjana Valdemara str. 14, Ventspils.
The Contractor should deliver and install tables and chairs for 2 (two) operator workstations on 3rd floor at Krisjana Valdemara str. 14, Ventspils.
Tables and chairsmust be purchased or fabricated according to VTMS equipment specifics in VTMS operator room. Tables should have height adjusting mechanism. Height adjusting mechanism must be electric, compatible with 220 V electric current supply. Height adjustment should be done by push button. Tables can have additional features, which are not mentioned in this Technical Specification.
Chairs should have adjustable height and backrest angle. Chairs should not have electric adjustment mechanism.
In technical offer manufacturer and model of tables and chairs should be indicated.

Each workstation should be equipped with 3 (three) 23-24 monitors, monitors are part of the VTMS system. (Total 6 (six) 23-24 inch monitors for VTMS operator room). Monitors with resolution suitable for VTMS should be offered. Eye distance of the VTMS operator from monitor during work should be taken in account.
3 (three monitors) togather should be able to show full picture from outer roads to 2nd bridge across Venta.

One of the VTMS operator workstation must be equipped with 1 (one) printer for printing meteorologigal data
Printer specification: print type black and white, laser; print speed – no less than 16 A4 pages per minute; paper size: A4 and A3; memory: no less than 128 MB; printing resolution: no less than 1200x1200 dpi; available and usable ports – as minimum USB 2.0, 10/100 Mbps Ethernet; power cable 220V, socket for electrical network, USB cable.

30.2. VTMS operator work room must be supplied with:
30.2.1. one stationary (table top) telephone set.
Telephone description: Awireless telephone with caller ID display, phone book (at least 150 numbers), speed dial numbers (at least 9); battery capacity: at least 12h in talking mode, at least 180h in waiting mode; working area indoors at least 50 m; working area outdoors at least 300 m; call volume adjustment.
30.2.2. one VHF portable radio station with a charger. VHF portable radio station description:
VHF channels 09, 14, 16, 67 mandatory, any additional channels as optional. 650 - 750 mW Loud Audio, 6W RF Output Power, Waterproof, remaining battery power indicator, 220V for charging, socket for electrical network, spare battery.

30.3. Contractor should install 1 (one) workstation of technical personnel. Workstation of technical personnel should be located on 2nd floor in building of Krisjana Valdemara 14, Ventspils. Workstation should be equipped with 1 (one) desktop computer with a connection to the VTMS system. Specification of desktop computer must be defined by Contractor as it must be compatible with VTMS. Workstation of technical personnel should have the possibility to control technical state of the entire system, to analyse fault messages, update and upgrade system software, update and edit electronic charts, etc. Access to the system should be password-protected.

30.4. Contractor should deliver and install in VTMS at Krisjana Valdemara str. 14, Ventspils, electronic navigational charts from an official distributor of charts. Latest, most updated version of electronic charts by Hydrographic Service of the Maritime Administration of Latvia (Electronic Navigational Charts – ENC S-57) are required. Chart numbers required:
LV 532100 – Port of Ventspils, scale 1:8000;
LV 412257 – approaches to the Port of Ventspils, scale 1:22000;
LV 331015 – Central part of the Baltic Sea, scale 1:180000.

There should be a possibility to update and edit charts from workstation of technical personnel.

31. Table of main functional and performance requirements of the multi-target tracking processor

31.1. This section of the technical specification contains references to the IALA Recommendations V-128 Edition 4 and IALA guideline 1111.
31.2. The Tenderer must complete table 5 and submit it together with its technical offer.
Table 5 – Functional and performance requirements for the multi-target tracking processor.

No	Requirements	Type[1]	Degree[2]	Compliance of tenderer's equipment[3]	Proof of compliance of tenderer's equipment[4]
1	The multi-target tracking processor should be able to make changes in the position range–bearing measurements of at least two radar transceivers at the same time	F	R		
2	The target tracking processor should be able to prepare AIS position reports with target position information and vessel static voyage-related reports with target identification information	F	R		
3	The target tracking processor should be able to calculate at least time, position, course over ground and speed over ground for all targets	F	R		
4	The target tracking processor should be able to calculate rate-of-turn or acceleration information about targets	F	D		
5	The target tracking processor should be able to calculate a potential standard position deviation, course over ground,	F	R		

1 F – functional requirements
P – performance requirements
2 R – required
D – desirable
O – optional
3 Compliance of tenderer's equipment: F – fully compliant, P – partially complaint, N – non-compliant
4 All the items marked as fully compliant or partially compliant by the tenderer need proof.

	speed over ground for all targets				
6	The target tracking processor should be able to uniquely identify all the targets at any given moment.	F	R		
7	The target tracking processor should be able to classify all registered targets as probable target, acknowledged target, acknowledge false target, or lost target	F	R		
8	The target tracking processor should be able to maintain additional identification information at least vessel call signal, MMSI name provided by AIS, manual entry or other source	F	R		
9	The target tracking processor should be able to calculate vessel length, heading based on radar signal. When possible, these calculations should be approved using AIS static information and voyage-related reports	F	R		
10	The target tracking processor should be able to calculate radar bias, i.e. range-bearing deviations, if special sensor configuration or traffic distribution does not allow to get credible data	F	R		
11	The target tracking processor should be able to calculate characteristics of radar operations such as probability of reception or frequency of false alerts	F	D		
12	The target tracking processor should be able to calculate the target movement state – at unchanged route and/or speed, changes in course and/or speed	F	D		
13	The target tracking processor should be able to use advances filtration methods: Multiple-	F	R		

	Hypothesis Tracking (MHT), Interacting-Multiple Models (IMM) or Particle Filtering (PF)[5]				
14	The target tracking processor should be able to automatically identify targets by default	F	R		
15	The target tracking processor should be able to automatically delete targets by default	F	R		
16	The target tracking processor should be able to support automatic track initiation	F	R		
17	The target tracking processor should be able to support track calculation for blank areas of the radar	F	R		
18	The target tracking processor should be able to support radar blanking areas, where radar tracking measurements cannot be used	F	R		
19	The target tracking processor should be able to accurately display targets (without errors) in the cases, when the target is moving very close to the radar, is within a slanting range	F	R		
20	The target tracking processor should be able to track targets which correspond to target type 1–7 [IALA guideline 1111, paragraph 2.2.2]	P	R		
21	The target separation and accuracy capability of the target tracking processor should be able to track all targets described in IALA guideline 1111, paragraph 2.4 and 2.5.	P	R		
22	If a target is visible from more than 1 (one) radar, the position accuracy should be higher than individually from each radar	P	R		
23	The target tracking processor should be able to process at least	P	R		

	three targets in cases, when separation is lost, without deviations for at last 120s				

1 F – functional requirements
P – performance requirements
2 R – required
D – desirable
O – optional
3 Compliance of tenderer's equipment: F – fully compliant, P – partially complaint, N – non-compliant
4 All the items marked as fully compliant or partially compliant by the Tenderer need proof.

32. Additional technical requirements for the VTMS to be installed

32.1 Offered VTMS should have option to connect additional monitor at each VTMS operator workstation.
32.2. Processing of radar data.
Processing of radar data should take place fully automatically, which means without operator's participation. When processing radar data, noise and interferences caused by unfavourable weather conditions should be screened out.
The noise suppression mechanism should automatically adapt to local conditions. For example, if a rainstorm affects part of the radar's operational field, noise suppression should be increased in this area only, without affecting other areas of coverage.
An azimuth-based sector masking should be ensured for processing of radar data.
An area-based video masking should be ensured for processing of radar data.
The engineer should be provided the possibility to define and modify charts, using a graphic editor.
32.3. Radar selection and control.
There should be the possibility to enable any radar on any screen. Remote control functions: on/off, ready, pulse wavelength, gain, tuning, noise suppression and adjustment (FTC and STC), reception of hardware alerts and/or fault signals. These control functions shall be available from any display at each workstation.
32.4. AIS data processing should be ensured.
32.5. Tracking.
The target tracking system should provide sensor process measurements and should produce the so-called system track. This is a wide display of the system object. The system should ensure multisensor tracking, taking individual target measurements (radar points, AIS messages).
32.6. The target tracking processor should ensure:

1. The system should automatically initiate tracking in the indicated regions;
2. The system should save tracking of objects in the selected tracking regions;
3. The system should stop tracking objects, when they leave the tracking region;
4. The system should provide the possibility to initiate tracking of objects; manually in the regions, where automatic tracking of objects has not been initiated or has been delayed.

32.7 The tracking system should be able to perform the following functions:

1. The target tracking processor should be able to use advanced filtration; methods: Multiple-Hypothesis Tracking (MHT), Interacting-Multiple Models (IMM) or Particle Filtering (PF)[6];
2. Target tracking should use different algorithms to trace different targets and activities of the target.

The following features should be available when tracking targets:

1. Advanced processing with identification of targets with different characteristics, for example, manoeuvring;

2. Advanced data processing mechanism for target tracking, when many false measurements are possible;

3. Advanced data processing to initiate tracking in the environment with high density of false points.

32.8. Observation, tracing of buoys.

The tracing mechanism should provide the possibility to track buoys in the radar coverage. The purpose of buoy tracking is to identify and warn about deviation of buoys from their position or their drifting.

On the Traffic display there should be the possibility to remove the buoy tracking display.

The system should allow to maintain buoy positions within the safety radius geographically.

32.9. Target tracking coverage for dead zones (zones with limited radar coverage).

The system should provide tracking functionality in dead zones (zones with limited radar coverage). The system should start calculations:

Automatically as soon as the target leaves the radar coverage area,

Manually, it is started by an operator.

When calculating target tracking in zones with limited radar coverage:

The system should use the last known speed or manually indicated speed,

The system should take into account the planned course, or the last known course,

The operator should have the possibility to adjust speed and course manually.

32.10. Identification.

The system should maintain several plans. This plan list should be visualised on the traffic display.

32.11. AIS plan.

AIS identification data and other significant data about the voyage should be used to fulfil the AIS plan.

The AIS plan should be added to target tracking automatically. There should be the possibility to create such a record, using only AIS data or AIS data combined with radar data.

32.12. MIS plan (management information system).

The MIS plan is usually taken from the MIS system and is transferred to the VTMS, is usually within the define period before any vessel's expected arrival.

The system should recognise plans from other external (other) information systems and should be able to project them to the VTMS. The system should be able to add a MIS plan to the tracking list automatically.

32.13. Local plans.

There should be the possibility to use manual identification, using a local plan to identify a vessel, which is not equipped with AIS, or if the vessel has no MIS. The local plan should be defined.

The system should allow to create local plans in the Traffic display and to attach such plans to the tracked target manually.

The traffic display should ensure manual identification.

32.14. Identification of conflicts.
The system should identify and report the following identification conflicts:

1. Dual MMSI;
2. Two target entries, using the same plan.

32.15. Alert.
The alert function should determine potentially dangerous situations and provide reports to operators and operating personnel. In terms of usefulness and efficiency, it is essential to configure and adapt alarm to local traffic situations.
The system should allow adaptation for the needs of the port, by making changes to configuration files and geographical charts, rather than using software changes.
The system should allow configuration of the following items:
Alert region (region, where the alert functions is active (automatically));
Alert rules such as speed above which a speed alert is issued;
Alert presentation, target tracking colour (target label, designation, audible signals, list of alerts;
Filtering of alerts (who will see and which alerts).

32.16. Alert functions.

32.16.1. Protection lines.
A line should generate an alert, if the centre of the tracked target crosses the protection line.
Protection lines should be direction-sensitive. The system should be able to display protection lines on the chart on the traffic display.

32.16.2. Protection zones.
A zone alert should be generated, if the centre of the tracked target enters an active protection zone. Operators should have the possibility to activate individual protection zones.
The system should be able to visualise protection zones on the chart on the traffic display.

32.16.3. Observation, protection of the tracked target.
Operators should have the possibility to activate or deactivate observation of targets.
A circle should appear on the Traffic display, when observation of a tracked target is active or a target activates it.
The alert is active, while the target is in the observation region.

32.16.4. Buoy watch
The offered system should generate a buoy watch.
In case of alerts, when buoy tracking is drifting outside the indicated region.
The system should be able to display buoys on charts of system buoys or on ENC charts.

32.16.5. Anchor watch
Operators should have the possibility to activate or deactivate anchor watch for the target.

As soon as the target leaves watch zone, an alert circle should be generated around the target.
A circle is generated around the target, when anchor watch is activated. The circle size should correspond to the allowed drift region.
Prohibited anchorage should be envisaged.
An alert is generated, when the target is prohibited to anchor in the anchorage zone.
The criterion, identification of attachment, envisages that the target's speed felt below the set threshold.

32.16.6. A grounding prediction should be envisaged (vessel's striking the ground)
The grounding predictions are based on depth contours and barriers indicated on ENC charts.
Operators can activate ENC-based grounding.
The grounding prediction function requires that draughts from the watched target are known. If draughts are not known, a default value should be accepted.
The operator should have the possibility to define grounding prediction in the regions, where the target is watched automatically based on ENC-based grounding.
The operator should have the possibility to mark individual targets outside the grounding prediction watch region.

32.16.7. The operator should have the possibility to assign a track to the marked target, and then watch this track.

32.16.8. The operator should have the possibility to configure the alert time on any operator's display.
Operators should have the possibility to configure the following settings:

1. Underkeel clearance
2. Standard draught
3. Calculated time
4. Depth contours and barriers
5. Alert contour shape
6. Colour alert contours
7. ENC-based grounding activation territory (chart)

32.16.9. Prediction of potential collisions should be envisaged.
The system should be able to supervise, identify and alert about potential collisions of targets in specific regions.
The alert should be active, while the system defined potential collisions.
The system should be able to visualise potential collision alert territories on the chart on traffic displays.

32.16.10. Route observation watch should be envisaged.
The system should be able to watch whether targets observe the routes assigned to them.
The route observation signal is active while the target is outside the route.
The system should generate an alert, when the tracked target (its centre) navigates in the incorrect side of the segment, which is a part of the traffic distribution scheme.
Operators can activate, deactivate the route observation watch.

32.16.11. Speed watch should be ensured.

An alert is generated, when the target speed drops below the minimum defined speed or exceeds the maximum speed, which is defined for a certain period of time.
The alert should be active, while the target is located in speed watch regions, but the speed exceeds speed restrictions for this region.
The system should be able to visualise speed watch regions on the chart on the traffic display.

32.16.12. Fading out of a target.
The system should generate alerts, if the identified target signal fades out in the watched region.

32.17. Presentation of alerts.
The system should provide alert markers for the target, if the target is located in the alert state. All the alerts should be reflected in the list of alerts.
When an alert is selected from the list of alerts, the system shall expand a symbol around the target to mark the selected target.
When an alert is selected, which is outside the current view on the operator's display, the system shall automatically disable pan and zoom function for the camera, to display the tracked target.

32.18. Processing of alerts.
Only those alerts should be displayed, which are related to the territory of the alert
The system should allow to configure what types of signals need operator's acknowledgement.
After acknowledgement the alert should remain on the list, while the state of the alert is active.
An unacknowledged alert shall remain on the list of alerts, even if the alert state has been resolved.
Acknowledged alerts shall remain on the list of alerts, while the state of the alert is active.
An alert should be removed from the list of alerts, while the state of the alert has been suspended.
The list of alerts disappears as soon as all the alerts are acknowledged and there are no active alerts.
It is impossible to close the list of alerts while there are active alerts.
Operators should have the possibility to activate or deactivate the alert function for each alert type manually.
Operators should receive alerts, which come from the region having the selected status.

32.19. Routing.
The system should allow to assign records to routes to ensure effective management
When a record has been selected, and a route has been assigned to it, the system should indicate the assigned route.
The rote should allow for crossing of other routes.
The system should calculate the estimated time of arrival, list of stops along the route, based on the current course and speed.
The system should send the actual time of arrival to the MIS management system, when the target crosses the stop.

32.20. Exchange with traffic data.
Many traffic monitoring organisations today are interested or obliged to cooperate with other business entities and exchange traffic images with it. Even closer cooperation between different business entities is intended in the future.
Therefore, the proposed system should allow to import data about targets from other systems in the following formats:
• ITU 1371 (AIS)
• IVEF (IALA's XML Inter-VTS Exchange Format)
The system should allow to export data to other systems in the following formats:
• ITU 1371 (AIS)
• IVEF (IALA's XML Inter-VTS Exchange Format)

32.21. Traffic display.
On the traffic display the system should provide a real-time overview of the actual traffic condition.
32.21.1. Display image components.
The proposed system should have the possibility to display the following components on the Display: Main traffic window, Additional traffic window, Meteo window Events window.
32.21.2. Display and selection of meteorological data.
The Contractor should ensure displaying of data from the automatic weather station. The possibility should be envisaged to select all the available data by time periods: 10 min, 1 hour, 1 day, as well as to display maximum, minimum and average values of data in these time periods, including also in the graphic chart.
There should be the possibility to print out data about any of the above mentioned time periods.
Displaying of data from the automatic weather station on monitors should also be installed in the work room of the pilot service and the harbour master.

32.22. Display layers.

32.22.1. Charts. ENC charts. On the traffic display there should be the possibility to process the ENC charts, which are based on S63/S57 data formats. On the traffic display there should be the possibility to display and modify polygon-based and line-based geographic charts.

32.23 Radar video.
Radar video should be displayed at several levels, as a function of physical echo intensity.
32.23.1. The traffic display should allow for manual radar selection.
32.23.2. The traffic display should provide the possibility to use mosaics to define regions, which display radar video from specific radio sensors.
32.23.3. Mosaics on the Traffic Display should automatically switch to an alternative mosaic, if a radar sensor fails. An alternative mosaic should cover as large regions as possible from the coverage of the damaged radar.
32.23.4. The traffic display should provide the possibility to display radar video from each sensor separately at the same time using an automatic mosaic.

32.24. The traffic display should provide operator the possibility to adapt the following radar video presentation aspects to its work specifics:

1. Brightness (strength of radar video)
2. Contrast (degree of detail in the radar video)
3. Gain (display threshold, low gain, displays only the strongest radar video, low video signal is suppressed)
4. The Traffic Display should be able to display (synthetic) afterglow.
5. Operators should have the possibility to choose the duration of afterglow (0–50 scans)
6. Afterglow colours

32.24.1. Route display.
The traffic display should display system targets. The position of system targets should be updated at least once in three seconds.
32.24.2. Records of system targets should have at least the following components: target symbol, target label, speed vectors.
32.24.3. Target symbols should contain at least the following parameters: the target symbol depends on the vessel category (configurable maintenance level, it also includes buoys), there should be the possibility to track identity (unidentified/identified), source of identity (AIS, MIS, local), the size of the target symbol is proportionate to the size of the tracked target, with the set minimum size (if remote), the system should use different target symbols, which correspond to different categories, the operator should have the possibility to display or not to display target symbols by categories or by individual goals.
32.24.4. The target label should have at least the following parameters: Labels can freely move around the entry, several label templates should be available. The content of the label, each sticker, should be easily configured without software modifications, which can be made by the maintenance engineer. Labels can include any entry or plan or related field. A label can be a free text, which is specific for the Ventspils VTS centre. Editable fields should allow to edit a label.
32.25. The traffic display should be able to display speed vectors for one target or a group of targets. The speed vector indicates positions for the target by choice, forward, using the current speed and course.
32.25.1. The traffic display should be able to display history points for one target or a group of targets. History points indicate the previous state of the target.
32.25.2. The traffic display should ensure labelling for a target requiring additional attention.
32.25.3. The traffic display should show the route to which the target was added (if applicable).
32.25.4. On the display within the range of 0.5, 1, 1.5 miles on the screen in the outport in parallel, starting from the leading line, there should be lines with 50 m distance from 50 to 400 m with respective marks.

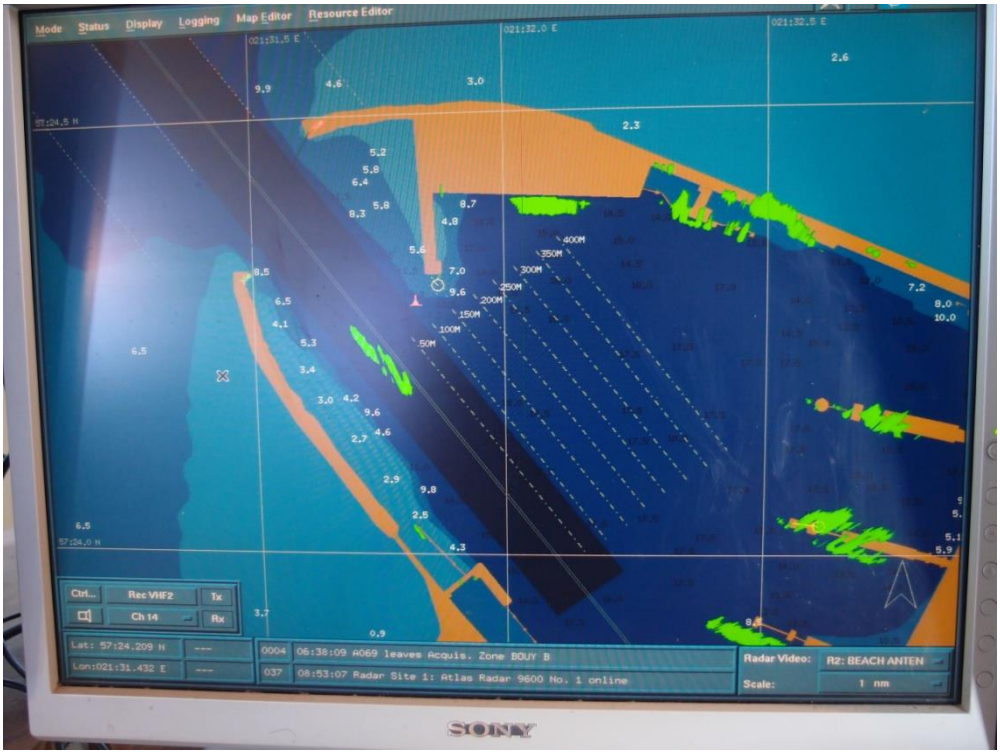

Figure 2. Display of the 50 metres line distance on the monitor.

32.25.5. On the display within the range of 0.5, 1, 1.5 miles, starting from the crossing of leading lined towards the port side, should be marked with points with a distance of 1 cable at a length of 5 cables.

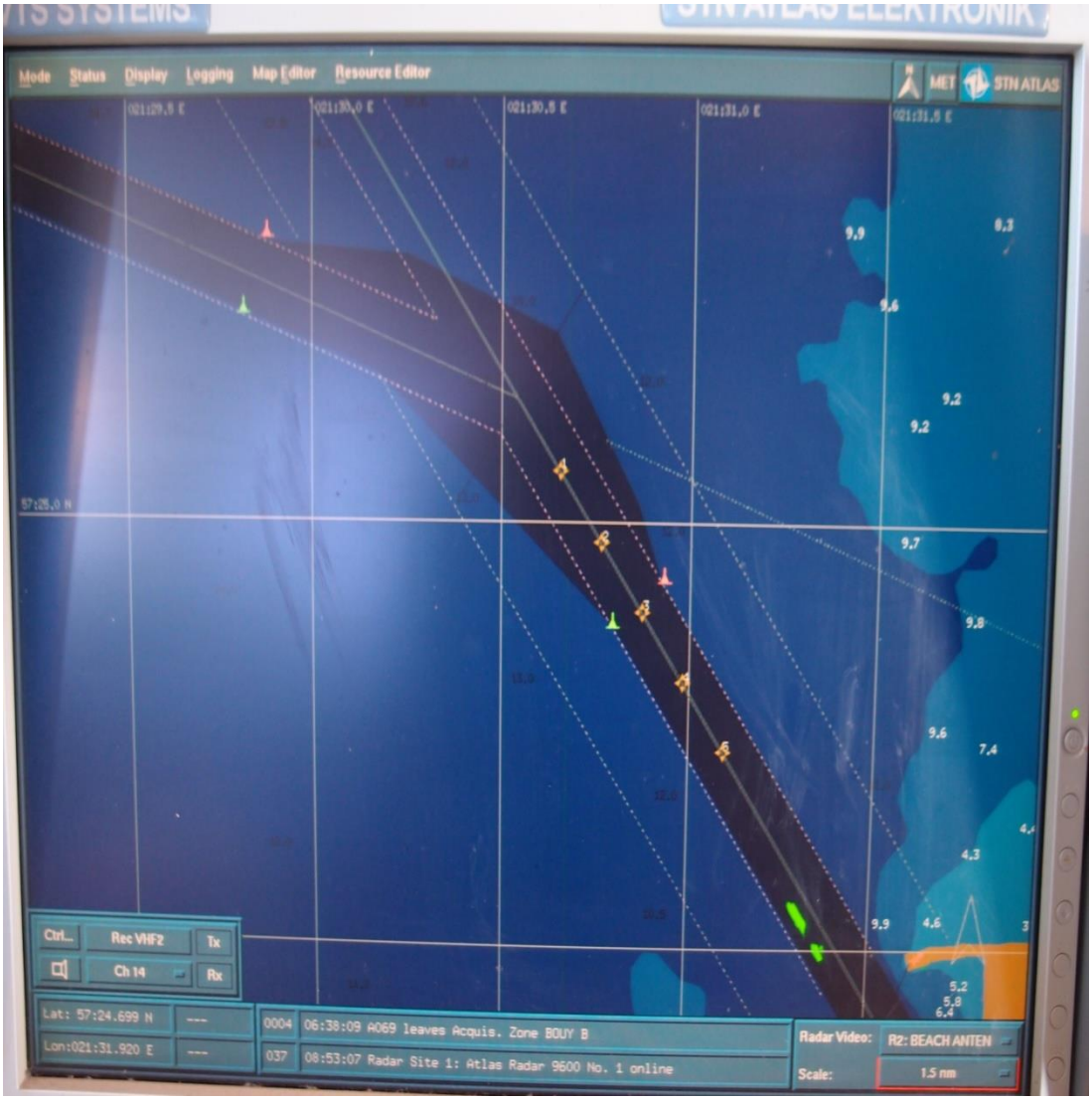

Figure 3. Display of the leading line on the monitor.

32.26. The system should provide visualisation of the bearing lines of the RDF scan. After the VHF transmission, bearing lines of scans should be visible for a certain time (which can be configured by a maintenance engineer without software modifications).
32.26.1. Control of radio direction finder.
32.26.2. Each workstation should display bearing lines from the existing and the newly installed direction finders on any monitor.

32.27. Additional system tools.
32.27.1. Measurements.
32.27.1.1. The system should provide a list of names of standard geographic positions, which the operator can choose as a starting point for measurements.
32.27.1.2. The system shall provide a bearing/distance line between the two targets, between the target and the position or between two places on the traffic display.
32.27.1.3. The bearing/distance line should be updated when each target is updated, unless one or both destinations are related to the target.
32.27.1.4. The label on the bearing/distance lines should state: angle in degrees, the mutual angle in degrees, distance between positions (in metres and nautical miles).

32.27.2. Closest point of approach (CPA) and time to closest point of approach (TCPA).
32.27.2.1. The system should be able to calculate and display CPA and TCPA between two targets or between the fixed point and the target.
32.27.3. Geographic position.
32.27.3.1. The system should provide a geographic position tool, with which operators (with a cursor) can mark a position on the Traffic Display.
32.27.3.2. It can be connected to a geographic location marker and the target. This market follows each time, when an entry should be updated to reflect the target state.
32.27.3.3. The system should be equipped with a position search tool. The position search tool shall allow the operator to find a geographic location by manually entering geographic coordinates (width and length). The marked position shall be marked with coordinates (width and length).
32.27.4. Target tracking.
On the traffic display there should be the possibility to track a target, to display it in a separate (special) window, which can be oriented north-up or heading-up.
32.27.5. Route planning.
The system should allow to define several routes consisting of: segments, zero or several stops and interrelated, the segment should have a middle line and boundaries at both sides, each segment should have the start and end width, a segment can be unidirectional or bidirectional.
32.27.6. Screenshots/film records.
32.27.6.1. The traffic display should provide operators a function to make a photo of full screen, of the selected window or of a specific region.
32.27.6.2. The traffic display should provide operators a function to make a film record of full screen, of the selected window or of a specific region. Films should be stored in the following format: for example, AVI or MPEG.
32.27.7. Display configuration.
Operators should have the possibility to optimize all the locations according to their needs, currently and in the future.

32. 28. Acess levels to VTMS, user definition.
32. 28.1. The system should provide registration of users - each VTMS operator, each VTMS technician, at each workstation.
32.28.2. VTMS should provide at least the following profiles:

1. Monitoring, the control profile, which provides possibilities for VTMS technician,
2. Maintenance, the engineer profile should provide system administration activities,
3. User profile, provides possibilities for VTMS operator.

32.29. Editors.
The system display should ensure at least the following editors: label editor, colour editor, chart editor.

33. VTMS data recording, data archiving, record playback.

VTMS data recording must be automatic 24/7.
There should be data recording device or devices connected to VTMS.
As minimum following data should be recorded:
1. VHF radiotelephony on channels 09, 14, 16, 67, 71;
2. VHF DSC on channel 70;
3. VHF RDF direction finding;
4. AIS;
5. Meteorology;
6. Target headings, speeds, positions, electronic chart, information displayed on VTMS operator screen.

Recording should be digital on HDD.
Recording is not acceptable on magnetic tape, CD or DVD.
Data must be transferable to external data recording device (HDD, memory stick, etc.) for archiving and playback.
Data recording device memory size should ensure data recording for at least 1 month without archiving.
Audio signal compression to MP3 is acceptable.

Data archiving and playback must be done by laptop.
Contractor should supply laptop with software and technical capabilities to:
1. archive data for at least 1 year
2. record playback at any time in any place.

Data recording device and data playback device costs to be included in Cost estimate.
In technical offer maker and model of data recording device and playback device should be indicated.

34. Portable electric heaters and air coolers.

Contractor should include in cost estimate and supply 2 (two) portable electric heaters and 2 (two) portable air coolers.
These 2 (two) portable electric heaters and 2 (two) portable air coolers will be used as emergency heating or cooling appliances in case of breakdown of fixed temperature maintaining equipment.

Specification of portable electric heaters:
Oil radiators with electronic temperature control, 230 V, 500 - 1000 W.
Temperature range 5-30 deg C. Temperature accuracy +/- 0.5 deg C.
Must have overvoltage protection. Must comply with EU standards.
Must be equipped with overheating protection. Must be equipped with cold protection if surrounding air temperature is below 5 deg C. Protection level IP20. Must be equiped with electric wire and plug. Must be equipped with supports (legs), so that radiator can be used without securing it to the wall.

Specification of portable air coolers:

Must have cooling, drying and ventilation modes. Designed for rooms with area up to 45 m^2. Cooling power 4.5-4.9 kW. Power consumption 1.2 - 1.5 kW. Air flow 400 - 490 m^3/hr. Temperature maintaining range 16 - 32 deg C. Voltage 220 - 240 V, 50 Hz. Hot air exaust pipe diameter from 100 mm up to 140 mm.