



**GENERAL FISHERIES COMMISSION FOR THE  
MEDITERRANEAN**

**COMMISSION GÉNÉRALE DES PÊCHES  
POUR LA MÉDITERRANÉE**



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**Launching of a feasibility study for a GFCM vessel monitoring system (VMS)  
and related control systems**

## **INTRODUCTION**

1. At the Working Group of CoC on VMS and related control systems (Tunis, Tunisia, 1–2 October 2013; report available as CoC:VIII/2014/Inf.8) the possible establishment of a GFCM centralized VMS, which should also integrate related control systems, was endorsed. In this respect, the Working Group identified six building blocks which should be the pillars of such GFCM centralized VMS, namely the features of the system, its tracking requirements, the web-based system, the use of scientific data, the main implementation problems and constraints and technical assistance and capacity-building.

2. In light of the recommendations by the Working Group, which advised that (i) a GFCM centralized VMS should be tailored to the GFCM area for the purposes of monitoring, control and surveillance (MCS), safety, scientific research and fisheries management and (ii) a modular approach encompassing small-scale fisheries would be necessary in order to take into account the specificities of this sector, the launching of a feasibility study by CoC is proposed. This study should be envisaged as a practical step towards the phased development of a GFCM centralized VMS as it would facilitate the understanding of, *inter alia*, the requirements and technicalities entailed, should the Commission agree in the future to establish this system.

## **BACKGROUND**

3. The objective of this document is to outline the features of the prototype system that would be launched through the feasibility study by clarifying technical aspects and key factors to be assessed as a preliminary step, consistent also with Recommendation GFCM/33/2009/7 “concerning minimum standards for the establishment of VMS in the GFCM area” and the Guidelines for a technical cooperation programme in the monitoring of fishing vessels in the GFCM area (see document CoC:VIII/2014/Inf.12). More precisely, the feasibility study requires an initial assessment phase where various solutions proposed can be evaluated, possibly with the involvement of relevant institutions and industry offering MCS services. These solutions would help define the prototype system providing an adequate software layer along with specifications for onboard devices and connectivity, in line with the current requirements and industry standards. Relevant IT infrastructure to host the software layer for the feasibility study would be ensured by the GFCM Secretariat.

4. At present, the situation regarding the use of VMS in the GFCM area is varied. It encompasses situations where VMS is not used at all by the fleet of some GFCM Members, situations where GFCM Members employ a VMS-modified automatic identification system (AIS), like a surrogate to proper VMS, and situations where traditional VMS is used, comprising the monitoring of fishing vessels' position, speed and course up to very advanced and sophisticated systems that rely on traditional satellite VMS with GPRS added channels for more frequent reporting in coastal regions, ERS (e-logbook), AIS to supplement satellite VMS and advanced real-time MPA protection features. Some of the existing VMS used by GFCM Members could require modernization and their maintenance might represent a critical aspect, including the running costs of fishing monitoring centres (FMC). Those systems based on AIS, although useful in many respects, suffer limitations in terms of coverage, lack of bidirectional communication and the possibility to implement advanced VMS-related functionalities.

#### **FUNCTIONALITIES, METHODS AND PROCEDURES TO BE ACCOUNTED FOR**

5. Typical and standard requirements of a traditional VMS are to deliver the fishing vessel identification number, position, speed and course at a frequency of every one or two hours via satellite. All VMS devices have to be tamper proof. When satellite VMS transponders are used data received from the vessel are elaborated and sent regularly via a communication satellite system to the national FMCs. When hybrid VMS devices are used, in addition to mandatory satellite reporting, GPRS is also employed as a means of getting more frequent messages from vessels in near-shore areas. Hybrid devices are known to send additional and more frequent position reports to FMCs.

6. At the relevant FMC, data received from vessels are displayed on a mapping VMS software where operators monitor fishing activities and take actions as may be necessary to enforce fishing regulations in place. All messages received are stored in a database. Remote users such as police, coast guard or fishing inspectors can access the database to use the information in the performance of their duties. VMS devices are provided by several companies to GFCM Members, usually through national bids. In those RFMOs having a centralized VMS these companies are also providers of a different range of services.

7. To develop the feasibility study, some VMS devices should be installed onboard selected vessels, with the involvement of interested GFCM Members. During the feasibility study, it would thus be possible to feature the aggregation, storage and distribution of sample sets of VMS data acquired – including at least the vessel identification number, position, speed and course. These sample sets would serve as parameters to assess the required technical and operational capabilities for the set-up and implementation of the GFCM centralized VMS. It is envisaged that, within the feasibility study, the prototype system could serve several strategic MCS purposes, including:

- the aggregation of national VMS data currently collected from GFCM Members' vessels;
- the provision of an IT platform that could make up for the lack of adequate national IT resources, for GFCM Members that have not yet implemented VMS;
- the distribution of VMS data, including for the work of the GFCM Scientific Advisory Committee (SAC) and CoC;
- data processing for the detection of specific situations such as transshipment;
- the addition of safety at sea-related functions in support of search and rescue efforts;
- advanced real-time monitoring and protection of MPAs and FRAs in the GFCM area;
- a standard interface able to accept and handle various data formats, as collected from various types of devices;

- the integration of other important complementary technologies, such as satellite imagery as an additional cross-check tools for the detection of non-compliant vessels, as well as of future VMS/MCS developments, such as gear activity monitoring.

8. As VMS for small-scale fisheries is at an early stage of development at the moment of writing, it would also be important to take into account and require a certain level of flexibility in data format standardization when specifying what transponders would be used for small-scale fisheries. The inclusion of some small scale vessels should be made to test the responsiveness of IT resources used in the prototype system. In this regard, as the distress alert functionality would represent an important aspect of VMS for small-scale fisheries, the feasibility study should include this feature and procedures should be suggested for actions to be taken in case of distress alerts.

9. In more general terms, flexibility would represent one of the core design aspects for the feasibility study to take into consideration the various data formats presently in place in various GFCM Members. This could be achieved by means of a prototype system that would build upon national systems accepting an agreed standard format for data exchange. Should the prototype system be supposed to deal with differences in data formats, the task would be more complex and would imply that GFCM Members would provide conversion systems within their FMCs.

#### **IT PLATFORM FOR THE FEASIBILITY STUDY**

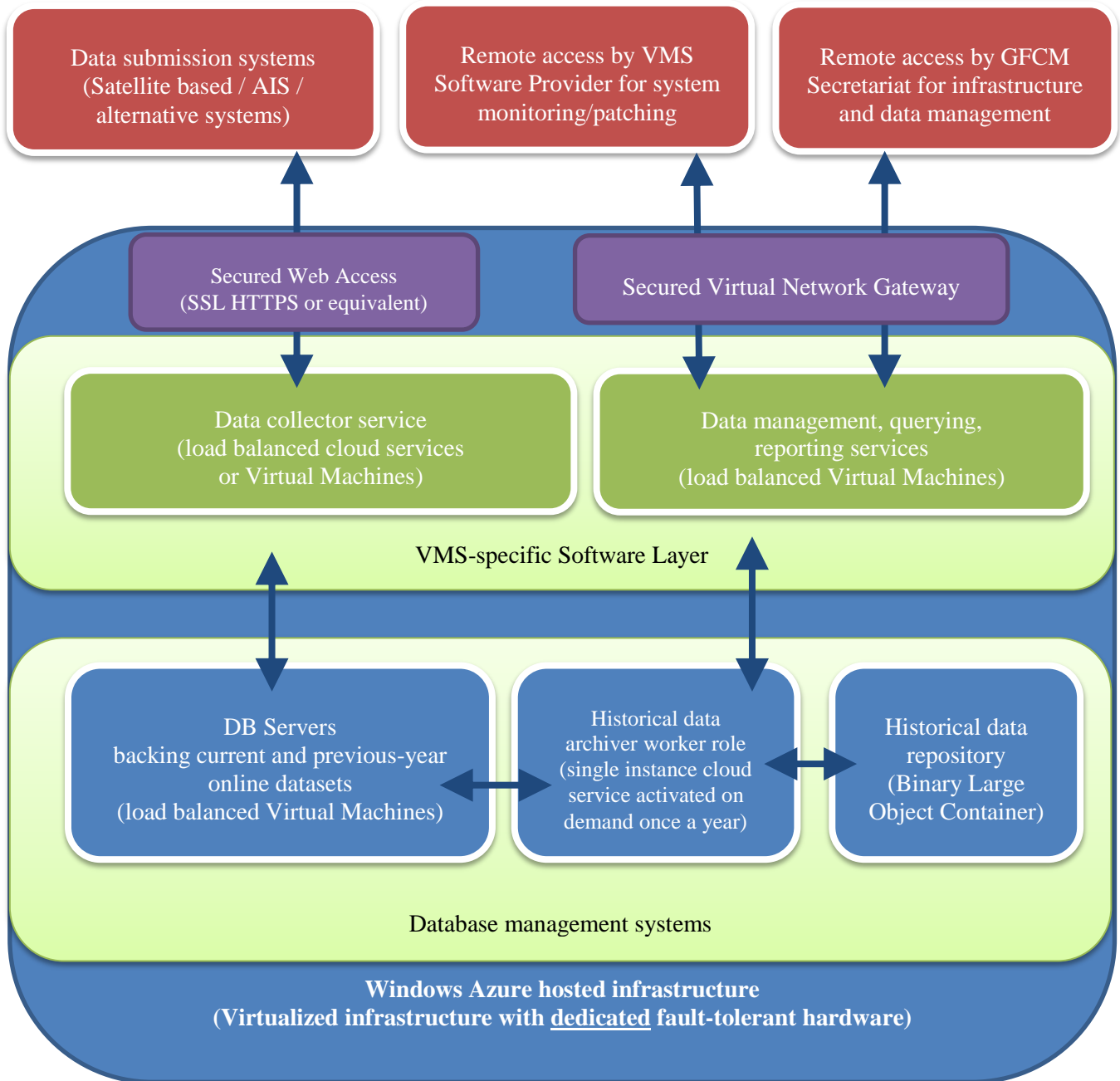
10. With a view to optimizing the available and existing means and resources, the feasibility study would depart from the following baseline:

- VMS-specific software along with communication hardware and connectivity delivered by a provider;
- GFCM VMS IT infrastructure (backend system) developed and managed by the GFCM Secretariat based on a its cloud environment, which would be extended for this purpose;
- storage of data collected by the GFCM Secretariat in order to establish synergies with already existing databases and information systems in support of scientific advice.

11. As the GFCM is already relying on a secure cloud-based, elastic platform on Windows Azure, which has ultimately led to the migration of former information systems for the sake of reducing start-up and running costs, limiting expenses relating to the maintenance of physical hardware and introducing high availability services, the IT platform foreseen would comply with the provisions of Resolution GFCM/35/2011/2 “on data confidentiality policy and procedures”. Furthermore, due to the nature of the technologies underpinning the launching of the feasibility study, the IT platform would grant the possibility of transferring to a technologically equivalent cloud service provider or to an on-premise data center (e.g. at the GFCM HQs) in a future phase, should the Commission decide to establish the GFCM centralized VMS at the end of the feasibility study. The added value brought about by the proposed IT platform for the feasibility study would be manifold and include:

- outstanding startup and maintenance costs reduction;
- enhanced technical sustainability (allowing enhanced historical data retention strategy);
- compliance with industry standards and data safety measures;
- superior service continuity;
- improved scalability over time;
- enhanced information use.

The below diagram illustrates redundancy measures, whereas critical system components require balanced workload and solid service continuity.

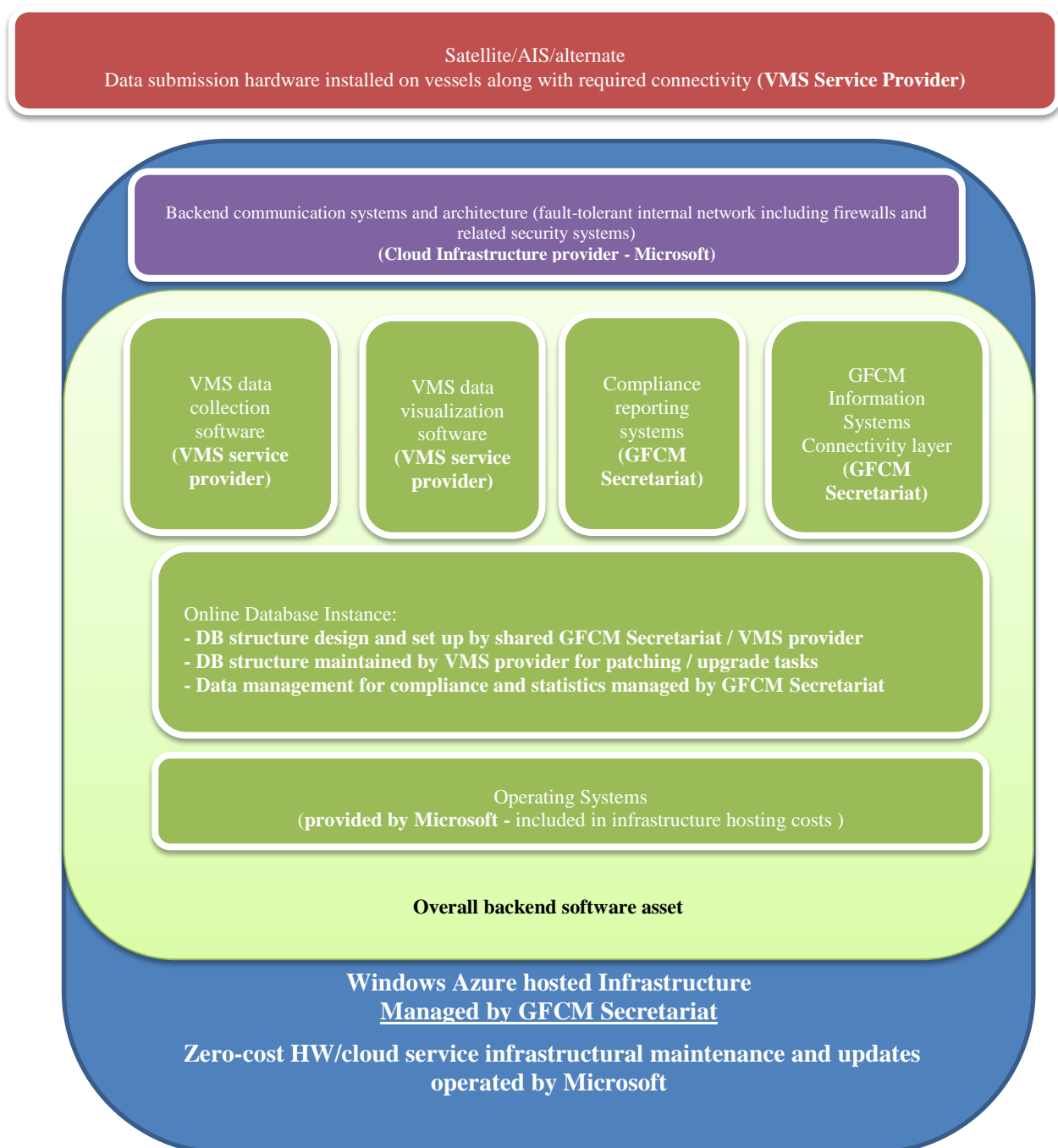


12. The data collected through the feasibility study could be accommodated by the identified cloud IT infrastructure as follows: the online database would handle data in accordance with confidentiality needs and could be frozen by special “worker roles” in VMS data files (up to approx. 525GB per year for 15,000 vessel) adhering to the hierarchical data format (HDF) whereupon the NetCDF standard for scientific data relies. Any resulting data dumps would be stored in a fault-tolerant and secured binary large objects (BLOBs) storage area. BLOB storage accounts are an ISO 27001 certified managed service capable of autoscaling to meet a massive volume of data, up to 200 Terabytes per account. Multiple accounts can be opened via the same infrastructure. Additional hardware resources or infrastructure components could be added in a very limited time due to the virtualized environment backing the overall system up. Data storage space may be increased in a flexible way without having to procure, install and configure any hardware.

13. Being managed by the GFCM Secretariat, the IT platform would allow the integration of the prototype with any other current or future information system developed by the Commission and hosted on the GFCM cloud IT infrastructure, consequently adding the following values:

- Cross-check of fleet composition data collected in the GFCM Vessel Records Database;
- Cross-check of fishing activity information collected in accordance with the Task 1 data submission;
- Integration and cross-system analysis with forthcoming information systems.

The following diagram is a graphical representation of the IT platform layers, set-up and maintenance.



**SUGGESTED ACTION BY THE COMMITTEE**

13. The CoC is invited to consider the information in this document and, as necessary, (i) provide guidance in connection with the feasibility study for a GFCM VMS and related control systems, while identifying inputs relating to its launching, undertaking, expected timeframes and outputs, and (ii) foster deep reflections on the establishment of a centralized system by GFCM.