**GENERAL FISHERIES COMMISSION FOR
THE MEDITERRANEAN**

**COMMISSION GÉNÉRALE DES PÊCHES
POUR LA MÉDITERRANÉE**

CoC Working group on VMS and related control systems in the GFCM Area

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Tunis, Tunisia, 1-2 October 2013

Relevant aspects relating to the phased development of a GFCM centralized VMS system

Countries

The word "countries" appearing in the text refers to countries, territories and areas without distinction.

INTRODUCTION

The General Fisheries Commission for the Mediterranean of the FAO (GFCM) is composed of 24 Contracting Parties which are under the obligation of monitoring their fishing fleets in light of applicable international and regional regulations - including recommendation GFCM/33/2009/7 "Concerning minimum standards for the establishment of a Vessel Monitoring System (VMS) in the GFCM area" - on the basis of technology available to them and their national capacity. The end result is a heterogeneous and complex system which is currently striving to respond to different objectives and needs. Nevertheless, in connection with technical meetings convened by the GFCM on VMS and control systems since 2008, Contracting Parties have consistently requested the harmonization of technical, administrative, financial and legal aspects so that a regional control system can be developed to fight illegal fishing. At the same time, the need for a phased development of a centralized VMS by the GFCM was underlined. This latter undertaking would significantly improve the real-time control of fishing fleets, according to established standards, the cooperation with other RFMOs (e.g. ICCAT) and relevant Organizations (e.g. FAO), the collection of data and

information for the SAC and its working groups and the assessment of the impacts of fishing at sub-regional level.

At present the development of technology enables the performance of most of these activities via ad hoc information systems (e.g. configuring alerts, reports and exchanges of data) and offers opportunities for technical assistance to those Contracting Parties which lack the capacity to ensure an effective control of their fleet. This background papers endeavors to shed light on these issues by clarifying relevant aspects relating to the phased development of a GFCM centralized VMS.

CONSTITUTIVE ELEMENTS OF A CENTRALIZED VMS

Recommendation GFCM/33/2009/7 established a decentralized VMS system which relies mainly on Contracting Parties and leaves to the GFCM the oversight of reporting duties. The phased development of a centralized VMS would call for a number of distinct elements which are needed to ensure the good functioning, efficiency and sustainability of such system. This would in turn imply a robust infrastructure, state-of-the-art functionalities for monitoring fishing fleets and trained professional manpower to operate the system.

Good functioning

In order to guarantee the good functioning of a centralized VMS a fishing monitoring center (FMC) capable of fulfilling high-level requirements of technology would be required. The FMC would have to be able to manage several types of satellite providers and, at least, those providers already used by Contracting Parties to monitor their fishing fleets. Compliance with minimum standards of IT architecture would guarantee against standby of the application and redundancies in the data collected. Otherwise data would be lost, with particular regard to major failures of the system (e.g. power failure, crash of servers, flooding, etc.). As a centralized VMS system means a common language to be shared by all of its components, standard formats of data to be exchanged through common protocols would have to be laid down. Other legal requirements might be needed to delineate the framework of a centralized VMS system.

Efficiency

The efficiency of a FMC is calculated according to the added value of the services it provides for monitoring, control and surveillance operations. It hence must be capable of providing at least the maximum level of:

- information on the identification of fishing fleets;
- multiple communication among service providers (satellite providers but also AIS data);
- data exchange capacity (to enable the exchange of VMS data with other FMCs)
- zone management, including in various sub-regions;
- alerts management (that can be configured within the system) and alarms detection (most of the time sent by the onboard VMS transponders);
- detection of prohibited actions (e.g. transshipment);
- reports knowledge basis (for control and statistic purposes).

Other optional features to be considered could be obtained by superimposing different sources of data like:

- Electronic reporting system data: this is indeed very relevant information when considering the management of marine resources;
- Oceanographic data: this can provide added value information such as knowledge of in-situ fishing behaviors, prediction of best fishing areas, management of protected areas, search and rescue operations management;
- Radar satellite data: this can allow a better surveillance through detection of illegal fishing or detection of pollutions

Sustainability

Hardware and software solutions are tools that must only be procured to trained personnel. This will be sufficient for the sustainability of the system in the short term whereas experience in use, feedbacks, new technological developments and update will secure that it lasts. In this latter respect, it is worth noting that VMS requirements are relating to other applications that could have regulatory traits (e.g. the Electronic Recording System) or perform different functions (e.g. reception of weather forecasts). When assessing the potential sustainability of an FMC, it is therefore critical to keep in mind the impact of future developments as well as the fast pace of evolution in technology. Capacity building and technical assistance would be critical to help Contracting Parties which are not equipped with a functional VMS in receiving adequate transfer of technology to them, including through pilot studies and feasibility trials. For the case of the GFCM, in light also of the ongoing development of a new data collection reference framework, it would be advisable to consider access to VMS data by the SAC and its working groups in support of their assessments and formulation of scientific advice for management.


MODULAR APPROACH OF THE CENTRALIZED VMS

As already suggested in the "Guidelines for a technical cooperation programme in the monitoring of fishing vessels in the GFCM area of competence", in order to increase the chances of success in the phased development of a GFCM centralized VMS system, the specificities and particularities existing at sub-regional level will have to be duly considered. Tools such as the census proposed in appendix 1 to this background paper would help the GFCM to assess them, bearing in mind the three more recurrent situations defining control systems in the GFCM Area.

1) Regular VMS already functioning
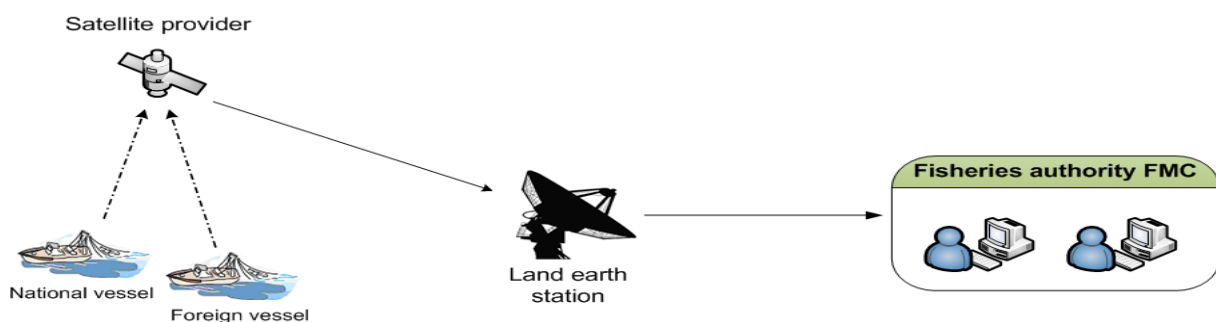
This is the typical situation regulated by Recommendation GFCM/33/2009/7 whereby a Contracting Party has implemented a satellite-based VMS. This is the easiest situation to cope with as the Contracting Party concerned is able to transmit VMS data to FMCs through a secured protocol (e.g. HTTPS) and via standard formats (e.g. North Atlantic Format or NAF). Integrating functioning VMS within the remit of a GFCM centralized VMS system should not pose high technical difficulties.

2) Non-conventional VMS
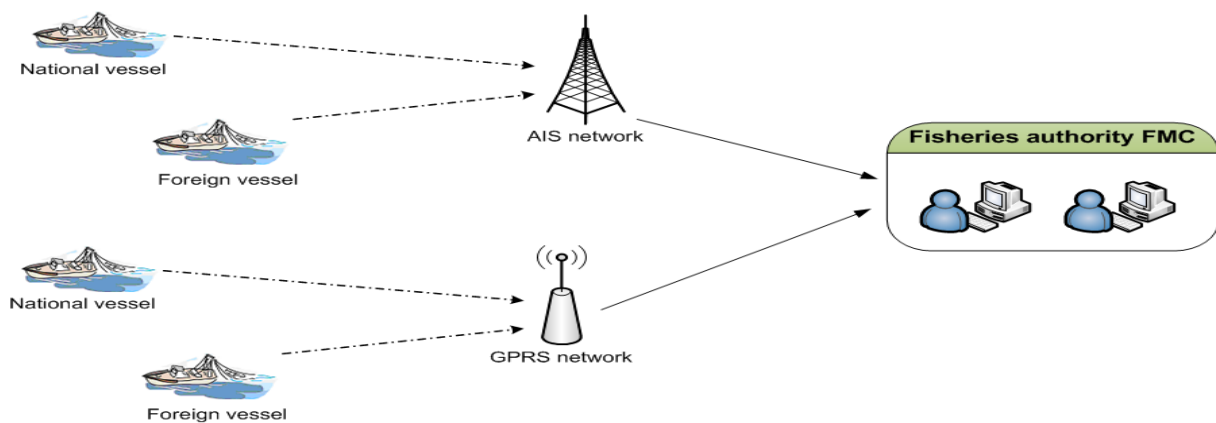
Some Contracting Parties already employ non-conventional means of monitoring their fishing fleet, such as AIS, or are in the process of evaluating them. Either way, their main objective is to propose an alternative to satellite-based monitoring of vessels whose financial costs would exceed the incomes of fishermen concerned or would not address small-scale vessels. Despite the fact these means of transmission could not guarantee the confidentiality in the transmission of VMS data, their integration into a GFCM centralized VMS system would be possible. Requirements relating to standard formats and protocols of transmission would have to be fulfilled though.

3) No VMS implemented as of yet

The GFCM has been working in close cooperation with some Contracting Parties (e.g. Lebanon and Egypt) in order to provide technical assistance necessary to comply with Recommendation GFCM/33/2009/7 as well as to develop national control systems. Special attention has been given to small-scale vessels and trials are ongoing to test a specially designed autonomous satellite beacon and the access to a remote FMC web service. The option of the FMC web service in particular, which is hosted by an external provider, has proven easy-to-implement and reliable to bringing about the basic functions of an FMC by the competent national administrations. Although devoid of an FMC, these administrations would still be able to ensure maintenance and technical infrastructure thanks to the external provider.
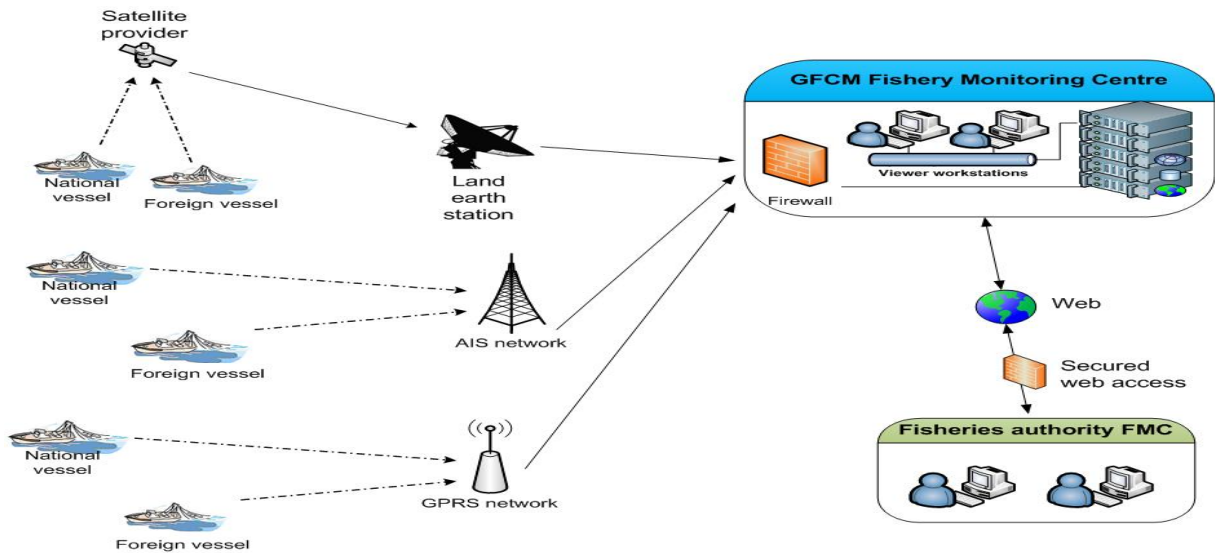
The decision on the selection of the monitoring means (e.g. satellite, GSM or AIS) would rest with the Contracting Party and would depend on its monitoring needs, provided compatibility is ensured in accordance with provisions of Recommendation GFCM/33/2009/7.

GFCM CENTRALIZED VMS POTENTIAL CONFIGURATION
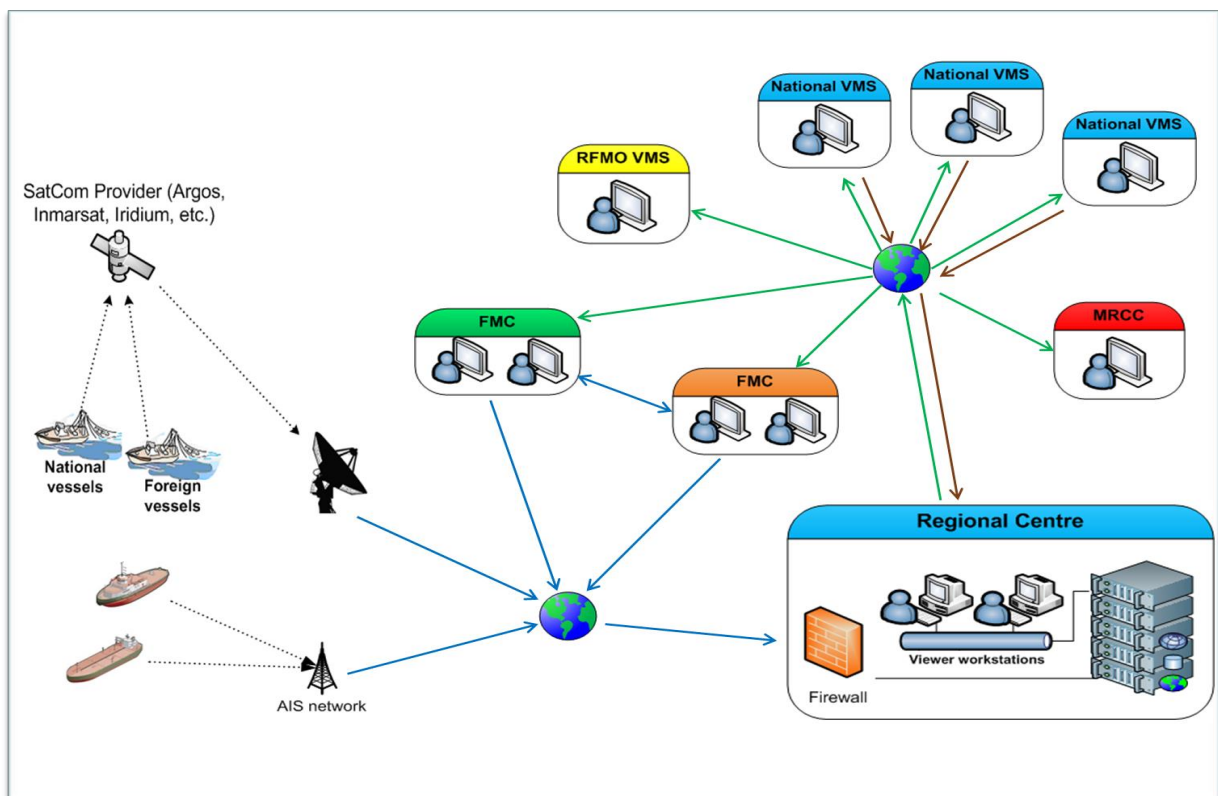
The sketch above illustrates what could be the final configuration of a GFCM centralized VMS in light of the three more recurrent situations described in the preceding paragraph. In order to respond to the need of a modular approach covering both industrial and small-scale vessels:

- FMCs (conventional or not) already operating in the GFCM Area would provide automatically data to the GFCM FMC and vice versa;
- Vessels operating under the flag of a Contracting Party devoid of a functional FMC could transmit their positions directly to the GFCM FMC which would act as a provider and handle an access interface for them to monitor the national fleet;
- All data collected through satellite-basis and other compatible means would be received, stored and managed by GFCM FMC. Policies on confidentiality and exchange of data would have to be agreed upon.

HOSTING OF A CENTRALIZED VMS – AVAILABLE OPTIONS

Having considered the configuration which would best respond to the need of ensuring a modular approach, when discussing the establishment of a GFCM FMC two options are available. The first option is to procure a complete FMC system for the following main elements: hardware, software, installation, training and technical support/maintenance contract. The second option is to contract a provider that hosts the system necessary and ensures the performance of the same functionalities[1] typical of a "concrete" FMC through a secured web access. In this latter case there will be a service contract encompassing all elements identified above.

First option: Complete system hosted at the GFCM premises

Below is an approximate breakdown for the procurement of a complete FMC system.
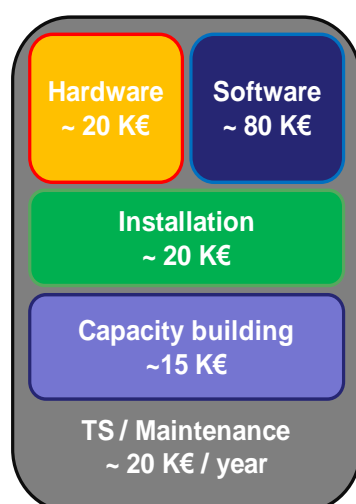
Hardware: minimum of 2 servers + 1 Firewall + 1 UPS

Software: database + Application (this would depend on the provider)

Installation: includes configuration, preparation and on-site installation (*per diem* included)

Capacity building: administrator (approx. 2 days) and the Operators (approx. 3 days), *per diem* included

Technical support & maintenance: yearly fee that includes hotline support, corrective maintenance and new releases

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[1] See Appendix 2 for the minimum requirements relating to the options presented.

The above configuration would centralize VMS data collected by GFCM within one single system. Having considered the needs of Contracting Parties not having established VMS already, some specialized providers could also offer to add a Web module enabling remote users to have access to the GFCM FMC thus enjoying the same functionalities of a national FMC without bearing the costs associated to it. The operators in these countries would only need a PC and an Internet connection (512Kps minimum).

Hardware: minimum of 3 servers (up to 4) + 1 Firewall + 1 UPS

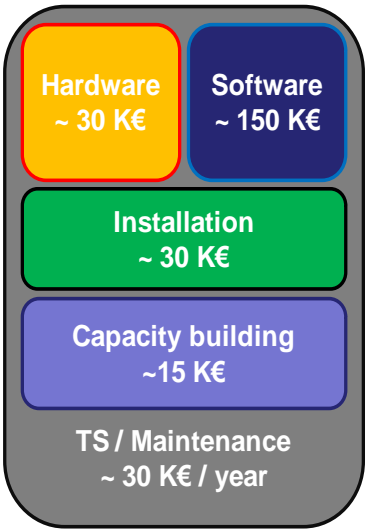Software: database + Application + Web (this would highly depend on the provider)

Installation: includes configuration, preparation and on-site installation (*per diem* are included)

Capacity building: administrator (approx. 2 days) and the Operators (approx. 3 days), *per diem* are included

Technical support & maintenance: yearly fee that includes hotline support, corrective maintenance and new releases

NB: In this case it will be necessary to consider the training of the Web operators (3 days per Contracting Party). This training can be done either at regional level for groups of Contracting Parties or at national level on ad hoc basis. The above breakdown does not consider these additional costs.

TENTATIVE BREAKDOWN OF TOTAL COSTS: Below is a recap concerning the estimated costs of the first option, being the FMC located at the GFCM premises. Figures provided are a gross breakdown in light of current market prices.

	Scenario 1 (FMC only)	Scenario 2 (FMC + Web)
Procurement costs "one-shot"	**135,000 EUR**	**225,000 EUR**
Recurring costs (yearly fees)	**20,000 EUR**	**30,000 EUR**

GFCM FMC (OPTION 1)	
PROS	**CONS**
This is a one-shot undertaking. Costs are known from the beginning and well controlled	There is a heavy initial financing to settle at once as the administrator must pay for all the HW and SW architecture and the physical installation

All data are stored at the premises of the main FMC administrator (e.g. GFCM) within the remit of the hardware maintained by it	Requires the maintenance of an IT infrastructure which could imply the employment of an IT expert by the administrator to maintain the infrastructure
Total autonomy as the administrator can easily monitor the FMC	Operational effectiveness depends on the administrator and of his working hours
Low yearly fees, known from the beginning and to be easily budgeted	
This is a tangible product whose tools and machines could be an asset for the administrators	
Other modules could be added to the FMC such as oceanographic data layers (for the SAC statistical analysis), ERS data center (in order to integrate e-logbooks) and radar imagery (IUU detection via radar satellite), etc.	

Second option: of hosting the centre by a provider

The cost breakdown is much simpler as the main income consists of the hosting of the FMC by a certified provider. VMS data would remain protected by confidentiality policies and agreements signed with the provider whose task is to monitor the system rather than the data.
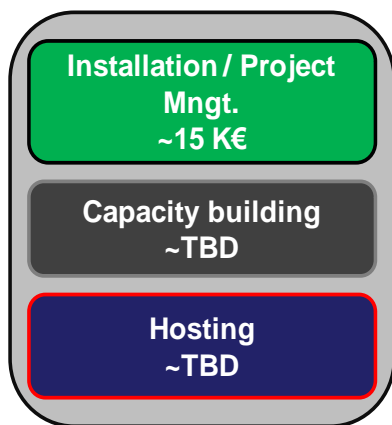
Installation/Project management: one-shot cost for the service to be up and running

Capacity building: as this would depend on the remote users, it has to be defined how trainings will be organized

Hosting: This is the price per active vessel. It could be negotiated per month or per year. This cost would cover the software technology available, the supervision of the system, the continuous maintenance and the at least 95% availability of the system.

TENTATIVE BREAKDOWN OF TOTAL COSTS: While underlying that it is much more difficult to present a tentative breakdown for this option, and that the final amount would depend on negotiations with providers on the market, the scale of the price to be paid would depend on the number of vessels for which data are to be integrated in the system. Average figures could hence vary between ladders, like the following one:

	Up to 1,000 vessels	Up to 3,000 vessels	Above 3,000 vessels
Estimated costs (yearly fees)	**35,000 EUR**	**45,000 EUR**	**Read below**

Should a large number of vessels be monitored, a forfeit price could be charged. The GFCM could initially focus on providing technical assistance to those Contracting Parties which are in the process of developing a national control system.

GFCM FMC HOSTED BY A PROVIDER	
PROS	**CONS**
High quality of service, which is guaranteed by a specialist supervising the system 24/7/365. Usual system level agreement (SLA) is of 95% of availability of the system, but this could be increased (with upgrade of costs)	The service has to be contracted for the duration of the project. The administration is somehow dependent on the provider
The provider will ensure the same quality of service irrespective of the number of active vessels in the system	This is an internet service which means it is not possible to access it without internet working properly. Nevertheless, the system will remain operational and up-and-running
No heavy financing of buying the infrastructure is required as the service provider is taken this charge	
The maintenance is included (i.e. evolution of the software, corrections of bugs and no obsolescence of the hardware)	
This is an easy-to-implement, cost-effective and innovative solution	

TIME SCHEDULE FOR THE ESTABLISHMENT OF CENTRALIZED VMS

Leaving aside considerations resulting from the phased development of a GFCM centralized VMS system, which are dependent on the specific features of the GFCM, establishing a centralized VMS is not a fast-track process. Although it is difficult to provide a regular time schedule for an RFMO, past experience shows that clearly identified steps to be successfully completed include:

- Agreement on the legal framework
- Assessment of the technical capability of the Contracting Parties
- Request for proposal/budget validation for the technical option selected
- Protocol and technical framework requirements
- Sourcing of a provider
- Installation and implementation of the system
- Training of the operators and involved stakeholders
- New developments and extension of the system

Several critical topics (administrative and political) could slow down the process and particular attention should be paid to the following elements:

- Agreements to be negotiated between Contracting Parties on exchange of data
- Zones and rules of exchange to be clearly defined (possibility of grey areas)
- Use of the data collected and confidentiality protocols
- Certificates of authenticity between Contracting Parties
- Identification of one sole interlocutor to coordinate operations (e.g. GFCM)
- Emission of web access code(s) and password(s) per national administration
- Capacity building to ensure the operational and sustainability of the system.

A prudent assessment would point to a total amount of a minimum 06 months and a maximum 18 months for the establishment of a centralized VMS to be completed, **starting from the establishment of a common framework**. Technically speaking this project would not present major constraints, short of the progressive integration of non-conventional VMS which will have to be performed on a case by case basis with Contracting Parties.

APPENDIX 1 - CENSUS OF GFCM CONTRACTING COUNTRIES

	Fishing authority name	VMS (Y/N)	VMS Reg. Ref.	FMC (Y/N)	NAF Compliant ?	CPC data exchange capacity?
Albania		?				
Algeria		N				
Bulgaria	National Agency of Fisheries and Aquaculture, FMC Departm	?				
Croatia		Y		Y		
Cyprus	Department of Fisheries and Marine Research	?				
EU	European Fisheries Control Agency	Y		Y		
Egypt		N				
France	CROSS Atlantique	Y		Y		
Greece	Ministry of Mercante Marine Shipping	Y		Y		
Israel		?				
Italy	Comando generale del Corpo delle capitanerie di porto —Gu	Y		Y		
Japan		Y		Y		
Lebanon		N				
Libya		N				
Malta	Veterinary affairs and Fisheries division	Y		Y		
Monaco		?				
Montenegro		?				
Morocco		Y		Y		
Romania		Y		Y		
Slovenia	Inspectorate of the Republic of Slovenia for Agriculture, Fore	Y		Y		
Spain	Secretaría General de Pesca Marítima	Y		Y		
Syrian A.R.		N				
Tunisia		N				
Turkey		Y		Y		

To be filled out with the assistance of the Contracting Parties.

APPENDIX 2 – STANDARD REQUIREMENTS FOR A CENTRALIZED VMS

Category		Functionalities
Alarms		Assistance; Port I/O; Beacon Opening; EEZ/IO; Beacon Out of order; Speed in Zone; Fishing license; Vessel Moving; Vessel Stationnary; New location; report GPS; Battery; Transshipment / "Rendez-vous"
Satellite systems		Argos; Iridium; Inmarsat-C; Inmarsat D+; Orbcomm; Globalstar
Reports		Mobiles; vessel log; Positions; fishing trip; exception messages; vessel alerts; system alerts; commands; Statistics; trips; Report planning
Alerts		Management of alerts; Broadcast of general alerts; Recipients of alerts
Cartographic options	Actions on the vessels	Send command; Change user style; show mobile position list; center map; Browse; Creation of a group of vessels from a list; Mobile form
	Cartographic tools	Zoom; Information tool; Concentric circles; Tool to measure distance; Selection of positions on the map; ETA; Manual register of a position; Edition/modification of zone; Save/delete views; Export of map in PNG format; Print of map in PDF format
	Other options	Continents; C-MAP; Openstreet map; Google