

Improve Monitoring Control and Surveillance scheme

Vessel Monitoring System study

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PURPOSE

To present to participants at the Working Party on the Implementation of Conservation and Management Measures (WPICMM) the report of the Vessel Monitoring System (VMS) study for their review to provide comments on the report and make recommendations for the consideration of the VMS Steering Group and the Compliance Committee on the way forward.

RATIONALE

The Twentieth Session of the Commission tasked the IOTC Secretariat with contracting an independent consultant to prepare a report identifying possible options to strengthen the IOTC VMS. The Report, once completed, seeks to address the recommendations from the First and Second Performance Review panels for the IOTC to develop an integrated MCS system including strengthening existing MCS tools.

OBJECTIVE

The objective of the VMS study is to provide the Commission with options for strengthening the IOTC VMS, such that the VMS provides an effective platform for the monitoring and controlling IOTC fisheries, consistent with the Commission's management regime. Specifically, in monitoring and controlling the activities of vessels authorised to operate in the IOTC Area of Competence. The establishment of a regional or Commission VMS should also be considered, taking into account the costs and benefits, the existing national VMS approaches as well as regulatory framework, technical, confidentiality and Secretariat staffing requirements.

TASKS AND RESPONSIBILITIES OF THE VMS CONSULTANT

1. Outline of the legal and institutional basis for VMS, including any multilateral arrangements already in place for VMS in the IOTC Area of Competence or by its members. It includes identification of the basic domestic legislation that regulates VMS in IOTC member States.
2. Description of the VMS technology and systems being used by IOTC member States, comprising any limitations for VMS at the regional level and including, inter alia, satellite coverage (i.e. geographical areas, number of vessels), cost or national capacity.
 - a) The description shall be of a general nature, but include at minimum, any constraints faced by States, the VMS technologies and systems currently being used in the region.
3. Review of the VMS approaches used in the region and in other RFMOs, with a particular focus on tuna RFMOs and/or in areas beyond national jurisdiction, providing at least the following information, at a regional level and for each IOTC Member States:
 - a) geographical areas and vessel types/sizes covered under current VMS mandates;
 - b) requirements to share information with other States/stakeholders, including reference to centralized VMS;
 - c) transmission intervals;
 - d) confidentiality rules;

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- e) rules to ensure quality of VMS data (i.e. type-approval of VMS units, and rules in case of VMS failure).
4. Outline possible options to strengthen the IOTC VMS, including but not limited to:
- Defining the target fleet or fleets, area and jurisdiction of the VMS
 - Describing the types of information that could be collected by the VMS (e.g. vessel position, speed, course, catch, etc.)
 - Possible system architecture and, minimum standards and requirements, including on ensuring that VMS is operational all times, data reporting, rates of transmission, rules on polling, and data sharing
 - Responsibility for VMS data reporting, VMS system audits and management
 - Costs and benefits of the different VMS approaches
 - Technical issues. Is there justification to allow on/off switches to be connected to monitoring devices installed on board vessels, etc.
 - Analyse the main shortcomings of the current IOTC VMS guideline (IOTC Resolution 15/03) and make recommendations to resolve them
 - Legal considerations including discussion on how to address confidentiality considerations
 - Any other options that meet the objective of this study.
5. Make recommendations, based on the analysis undertaken, on the best option for the IOTC to strengthen its VMS programme, identify capacity needs of IOTC members, including any technical and management aspects, and measures that can contribute to build their capacity.

BACKGROUND

Component 2, sub-component 2.1, of the Work Plan of the WPICMM comprise of the following activities:

2	Examine Monitoring, Control and Surveillance (MCS) technical matters in order to provide the Compliance Committee with options for strengthening MCS
2.1	<i>Improve IOTC MCS scheme</i>
2.1.1	Review CPCs national MCS scheme and current MCS practices
2.1.2	Review existing IOTC MCS tools
2.1.3	Review upcoming MCS reports comprising of reports on VMS and CDS
2.1.4	Recommendation that the VMS and CDS study reports are submitted to the WPICMM
2.1.54	Make recommendations on these reports for the Compliance Committee

DISCUSSION

The VMS study report is available as reference IOTC-2019-WPICMM02-VMS Study.

An extract of the main outcomes/recommendations of the VMS study are reproduced below.

4. Potential options for strengthening the IOTC VMS

4.1 Brief introduction to available options

The technical proposal stated that four options would be selected for detailed review and comparison as anything larger would introduce too much variability to be useful for consensus decision-making. This section briefly describes the identified options for enhancement. The next section provides detailed analysis and evaluation.

1. Cooperative decentralised – Similar in construct to a completely decentralised system, but with requirements for the flag State to share information with others in specific circumstances. For example, to share with:

- coastal States when vessels are located in their EEZ;
- port States when undertaking inspections; or

- the Commission Secretariat for specific purposes (such as monitoring any time/area closures and science).

Costs completely borne by flag State, but perhaps with minor costs to Secretariat to handle/use the data. ICCAT is an example of a cooperative decentralised system.

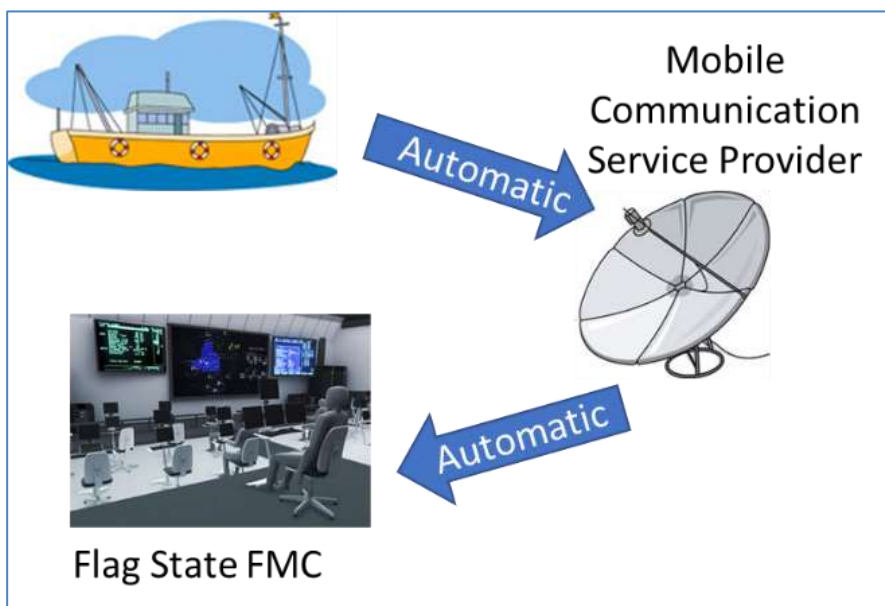
2. Shared decentralised – as per 1, but with automatic sharing of data from the CPC's FMC to the Commission Secretariat and specific rules in place for how and when other CPCs can access it and what they can use it for. Costs of monitoring vessels, data transmissions etc borne by flag State, Commission will incur costs for receiving, storing and disseminating data to be funded through Commission budget, noting that this would be relatively minor and could be achieved in a number of ways. NAFO is an example of a shared decentralised system.

3. Partially centralised – similar to 2, but with data to be sent directly to the Commission Secretariat by the VMS satellite service providers contracted by each CPC (not through the CPCs' FMCs). This involves a greater degree of prescription on the operative elements of the VMS than earlier options – for example, being a centralised system means that the data received needs to be consistent, necessitating more formal type approval of MTUs (as opposed to general guidance on capability). Cost structure similar to 2. WCPFC is an example of a partially centralised system – data for vessels covered by the FFA VMS is passed directly from the Mobile Communications Service Provider (MCSP) to the Secretariat without going through FFA .

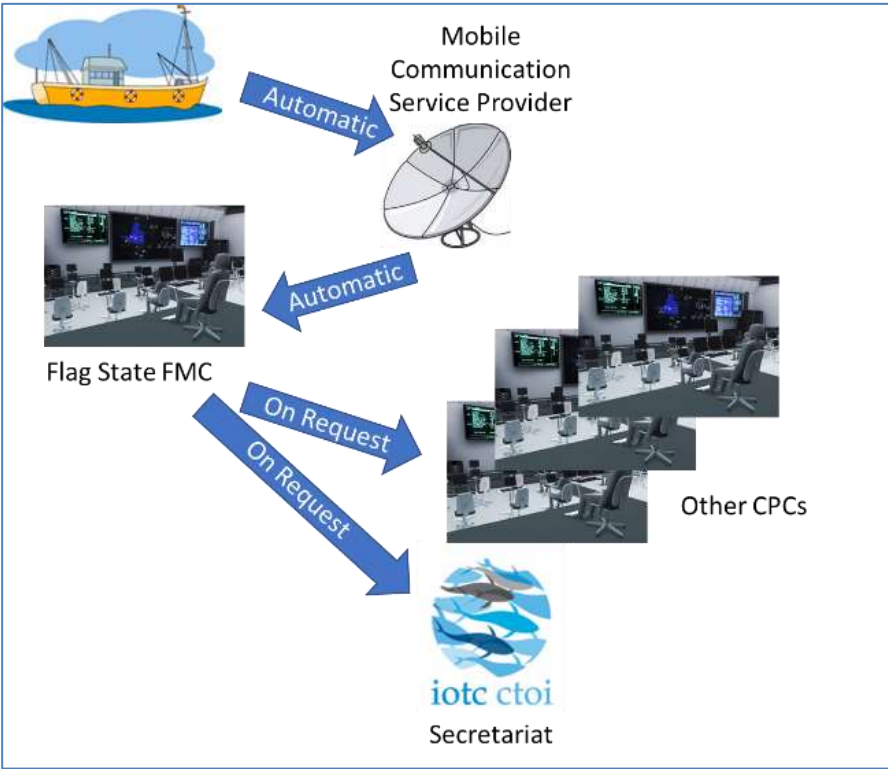
4. Completely centralised – The RFMO has complete autonomy over the system including direct administration of registration procedures, direct receipt of data from its own service providers and centralised control over data access, actions on failure etc (under rules agreed by the Commission). Costs completely borne by the Commission (although flag States may continue to incur costs if they choose to also maintain a national VMS). FFA is an example of a completely centralised system.

Figure 13 below shows a simplistic comparison of the four options and the status quo.

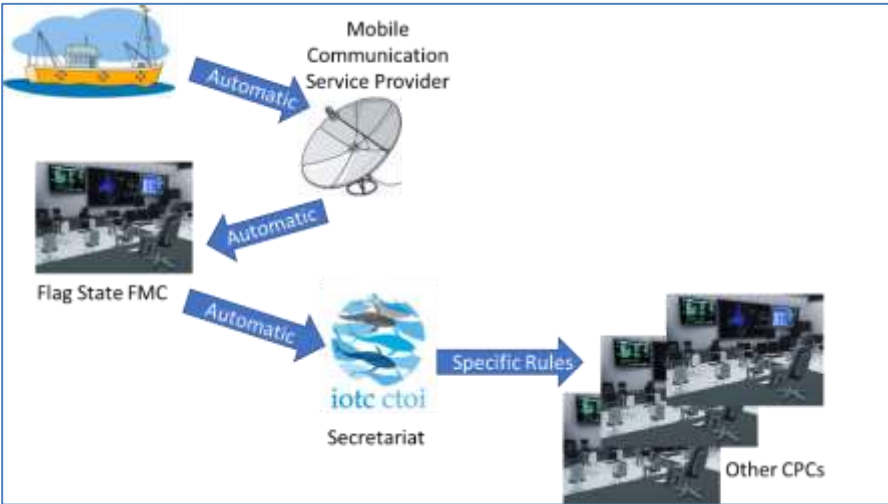
Status quo – Completely decentralised



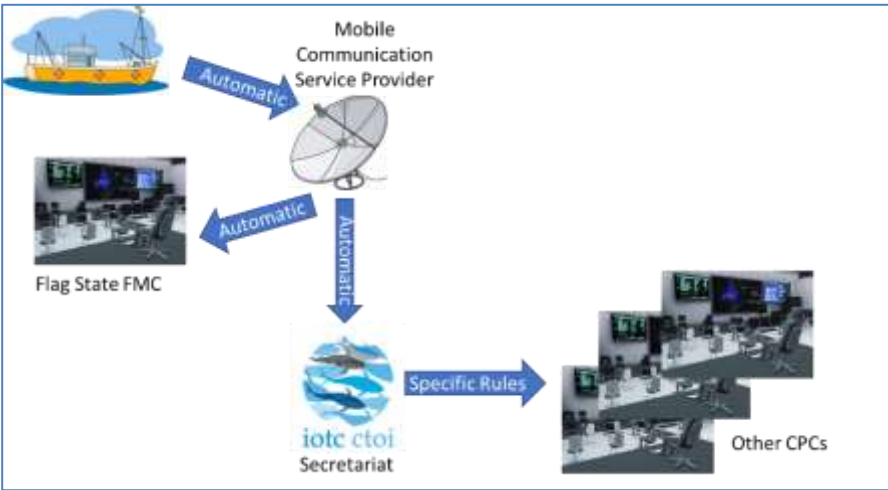
Option 1 – Cooperative decentralised



Option 2 – Shared decentralised



Option 3 – Partially centralised



Option 4 – Completely centralised

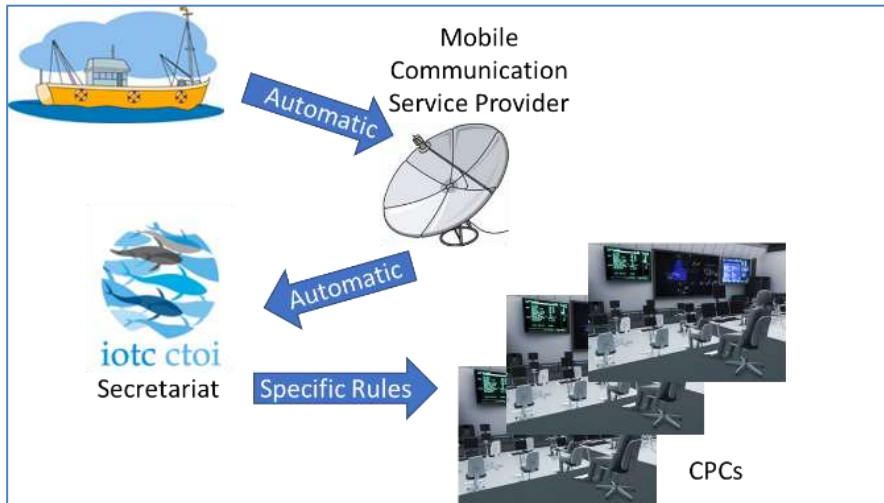








Figure 13 - Options

Table 2 – Assessment of options

Option/Criteria	1. Cooperative decentralised	2. Shared decentralised	3. Partially centralised	4. Completely centralised
Consistency with national law	Difficult elsewhere 			Proven possible
	In other RFMOs many CPCs have claimed that requirements for them to provide nationally collected information to RFMOs is inconsistent with their national privacy laws. While these claims have been questioned, they have undoubtedly led to delays (in some case ongoing) in data provision and incomplete sharing.		CPCs that have experienced difficulty with sharing their nationally collected information have been able to participate in centralised data collection in other RFMOs.	
Transparency	Least 			Greatest
	Even though this option would still be a substantial improvement over the <i>status quo</i> , it still relies solely on flag State monitoring, with requirements for specific decision making on the part of the FMC on who to share data with and when. It also relies on other CPCs submitting requests.	Having all data automatically provided from the FMC to the Secretariat increases the likelihood that it will be accessed by relevant CPCs as and when appropriate, without potentially complex bilateral application and decision making. There would likely be a need for the Secretariat to have some form of audit capacity to assess the way that the FMC receives and transmits the data.	The major progression from option 2 is that data is sent immediately from the satellite service provider to the Secretariat rather than via a CPC FMC. This contributes to greater transparency in that the data is received and therefore available to other stakeholders in “near real-time”, and without any CPC having the opportunity to review, filter, aggregate or delay it. It therefore places all CPCs on a more level playing field in terms of access to data (subject to specified rules).	Having a centralised VMS represents the greatest degree of transparency in that it is a program overseen by the Commission as a whole and administered by the Secretariat on behalf of all CPCs.
	Least 			Greatest

Option/Criteria	1. Cooperative decentralised	2. Shared decentralised	3. Partially centralised	4. Completely centralised
<p>Effectiveness in promoting vessel compliance (how easy is it for CPCs to use to monitor their own flag vessels, EEZs, vessels using their ports)</p>	<p>This is related to transparency and access to data.</p> <p>For <i>most</i> flag CPCs, this option is no different to the <i>status quo</i> – they already implement VMS and use it as they see fit.</p> <p>For coastal and port CPCs wanting to access information about vessels fishing in their waters or using their ports, this is a slight improvement over the <i>status quo</i>, but the improvements are relatively minor because of the issues of request permission, decision making and timeliness raised above, which make this option far weaker than others that would facilitate routine access.</p>	<p>The submission of all information from the FMC to the Secretariat promotes greater access to VMS data by non-flag CPCs (according to agreed rules) and therefore increases the likelihood of that data being used to promote vessel compliance.</p> <p>The issue of timeliness is an important consideration here though. For maximum effectiveness, VMS information must be available to the stakeholder in as near real-time as possible. This is particularly important during MCS operations (either direct actions such as at sea/aerial patrols, or routine action such as reviewing vessel activity as part of port inspections/CDS). This option poses greater risks than options 3 and 4 that data will not be available quickly enough or at the level of detail required to facilitate fully effective use.</p>	<p>This option substantially addresses the issue of timeliness of data. While there will always be delays in the transmission of information from vessels to the Secretariat via the satellite provider, options 3 and 4 both minimise this delay and result in data being available to relevant stakeholders as quickly as possible.</p> <p>The main weakness in terms of effective use of the data is that it would likely require a greater degree of manipulation by the Secretariat to produce a single, consistent database. The CPC survey showed large variation in the specifics of each CPCs current VMS, and it would take time and resources for the Secretariat to receive all of these outputs and collate them in a way that a single feed could be provided to relevant CPCs. This is also (even more so) a weakness of options 1 and 2.</p>	<p>A completely centralised system addresses the issues of both timeliness and consistency of data.</p> <p>Timeliness is maximised by the fact that the Secretariat is the “first receiver” of the information and, with the correct set-up, this can then be automatically made available to relevant CPCs.</p> <p>Consistency is also best addressed in this option because the Commission as a whole would determine standards for the data provided to the system, requiring little to no manipulation or collation before it can be made available.</p> <p>It is also worth noting that the current flag-based system has some obvious gaps in terms of flag CPCs that do not have the ability or capacity to run a standalone VMS. A centralised system would facilitate coverage of these fleets.</p>
<p>Usefulness for other MCS programs (CDS, PSM etc)</p>	<p>The analysis of usefulness largely correlates with those for effectiveness above. Using VMS information as part of other specific MCS programs or activities is enhanced through options that provide greater information that is automatically available to relevant CPCs and that is available in a consistent format in as near real-time as possible (ie – options 3 and 4).</p>			
<p>Usefulness for science</p>	<p>Less  More</p>			
	<p>There is potential that VMS data could be provided by each CPC to contribute to scientific work, but given past and current difficulties with sharing national fine scale data, this seems unlikely.</p>	<p>Centralised systems have a greater potential to contribute to the science because the data would more likely be considered as “owned” by the Commission and therefore able to be used for Commission purposes. This includes being able to use the data for routine data management and checking purposes such as the dis-aggregation of catch and effort information provided by flag CPCs under the current data rules.</p>		

Option/Criteria	1. Cooperative decentralised	2. Shared decentralised	3. Partially centralised	4. Completely centralised
Costs - CPCs	Unlikely to change	Sharing of all data from FMCs to the Secretariat would need to happen according to a pre-agreed framework of data transmission standards (see Secretariat infrastructure costs below). Individual CPCs would need to acquire the capacity to comply with these standards. Depending on the software platform in use by the CPC, that could be significant.	Unlikely to change with the exception that those CPCs yet to establish a VMS may be able to do so at slightly lower cost (see 4.4.1 and 5.2.2)	Unlikely to change, although flag CPCs would have the option of removing their national VMS and only using the IOTC VMS, thereby lowering the costs borne directly by the CPC.
Costs – Secretariat staff	Lowest  Highest			
	Unlikely to change as this would simply represent an additional defined data set that the Secretariat would use for limited and clearly specified purposes. The Secretariat would not be involved in sharing of data between CPCs.	<p>There would need to be some form of audit process to assure all CPCs that data passed on from the FMC was not being filtered, delayed or altered contrary to agreed rules.</p> <p>Given the number of CPCs and the magnitude of the data, these costs would not be insignificant in terms of additional staff and travel costs.</p>	<p>Additional staffing would be required. Substantial information would be transferred to the Secretariat, who would then have specific responsibilities to collate the information, store and protect it, but facilitate CPC access according to Commission rules.</p> <p>Additional staffing is likely to be required in both VMS (operational management) and IT (system and database design).</p>	As per option 3, additional staffing would be required. The additional staffing would be far more substantial under option 4 as the Secretariat would be responsible for a range of tasks currently undertaken by CPCs, such as type approvals, responding to unit failure, direct receipt of manual reports and routine report monitoring.

Option/Criteria	1. Cooperative decentralised	2. Shared decentralised	3. Partially centralised	4. Completely centralised
Costs – Secretariat running			Running costs come in two forms: <ul style="list-style-type: none"> • Reporting costs – MCSPs will charge to provide position reports to the Secretariat • System provision – while it would be possible for IOTC to develop a stand-alone VMS operating system, that is unlikely to be cost-effective. Commercially available solutions are well developed and have become far more affordable over time. 	Costs would be similar to those in option 3, but reporting costs would be substantially higher. As explained below (section 5.6.4), MCSPs generally charge a primary recipient a higher charge than a secondary recipient. Reporting costs under option 4 could be as high as double those under option 3.
Costs – Secretariat infrastructure	Lowest  Highest			
	Minimal additional IT infrastructure would be required as this would simply represent an additional database for internal usage by Secretariat staff. The amount of data and the lack of need to deal with it in real-time further reduce the need for dedicated hardware.	Infrastructure costs would be similar to option 1, although the magnitude of data would be greater. While not necessarily an “infrastructure” cost, it is worth noting that requirements for FMCs to pass data to the Secretariat and for the Secretariat to pass it back to CPCs relies on agreeing formal data standards. This is not a simple, quick or cheap process and would require at least one year of intersessional work followed by lengthy period for CPCs to adjust their national systems.	Additional infrastructure required is potentially significant because of the magnitude of data being received and transmitted. This infrastructure would be in the form of hardware (additional servers and back up facilities) and software to facilitate receipt of the data and to disseminate it according to a potentially complex set of agreed rules.	

5. Recommended Approach

Section 2 concludes that the current IOTC VMS as driven by Resolution 15/03 is quite weak compared to many other RFMOs in that it is completely decentralised, without any inducement or even encouragement for the sharing of data from the flag CPC to the Secretariat or to other CPCs.

Section 3 demonstrates potential weaknesses, or at least missed opportunities that arise from the vastly different means of implementation by different CPCs (different standards, states of implementation and service providers).

Section 4 lays out a suite of potential end-state options for an enhanced IOTC VMS and a series of additional considerations surrounding each.

This section focusses on the specific steps that are required to move towards one of those enhanced options. Table 2 shows that the major trade-off that IOTC needs to consider is between effectiveness and transparency on one side and cost on the other. As a well-established RFMO, and given that many CPCs are already in arrears, it is considered unlikely that CPCs will be in a position to make an instant transition to one of the high cost models, and this difficulty is probably exacerbated by the fact that the “start-up costs” are high. This section therefore proposes a multi-year approach to enhancing the VMS. This gradual approach will help to mitigate a rapid and large increase in cost, as well as ensuring that CPCs and the Secretariat have the necessary rules, capacity and infrastructure in place before additional data is collected.

5.1 Objective

At this time there is no particular stated objective for the IOTC VMS, and as discussed above, this is critical to informing the eventual design of a more robust system. The following objectives are recommended for an enhanced IOTC VMS, and these objectives drive further recommendations below:

The IOTC Vessel Monitoring System shall be developed as a secure; web-based; near real-time; user-friendly; system that will be operated to:

1. Assist flag CPCs to discharge their duties and obligations to ensure compliance by their vessels with flag and coastal State laws and with IOTC Resolutions;
2. Support CPCs' efforts to closely monitor, control and manage IOTC fisheries with a particular focus on assisting flag, coastal and port CPCs to prevent, detecting and deterring IUU fishing;
3. Facilitate greater cooperation between all CPCs by providing accurate, near real-time data in support of integrated IOTC Monitoring, Control and Surveillance programs and activities; and
4. To provide critical data to support decision making by CPCs and IOTC.

These objectives cannot be achieved by the current IOTC VMS as they necessitate a high degree of data sharing that does not exist at this time and could not be easily achieved without fundamental change in practice and policy.

5.2 Eventual end-state to achieve Objective

The recommended eventual end-state to achieve these objectives is option 3 – “partially centralised”, which maintains the responsibility on flag CPCs to ensure that their vessels carry MTUs, but ensures that the data is passed directly from MCSPs to the IOTC Secretariat. This option remains focussed on flag States as the primary recipients of the data, in keeping with their obligations under international law to monitor and ensure compliance by their vessels. However, it also provides the most robust avenue for ensuring that that complete and timely data is available to relevant stakeholders, while regulating RFMO costs and building from the advanced state of implementation amongst most CPCs already.

5.2.1 Why not option 4?

On balance, a completely centralised system meets the proposed objectives better than option 3 as it places all CPCs in control of all aspects of the program (although some specific functions would likely be ceded to the Secretariat). If there were no IOTC VMS framework in place at all, then option 4 would be the recommended end-state, however option 3 is more likely to be preferable in terms of consistency with the current CPC-centric approach and the need to regulate cost increases, given that the cost of airtime alone under option 4 would be almost twice as expensive as the estimate below for option 3.

5.2.2 Why not option 2?

Option 2 potentially meets the objectives proposed above, but does so at greater risk for a few reasons:

- At this time, there is little to no established practice of flag CPCs sharing detailed fine scale catch and effort information with the IOTC Secretariat or with other CPCs, including coastal States in whose EEZs their vessels fish;
- It relies on a high degree of trust between CPCs that the data passed from one to another will be unaltered and treated in the way that it should. With no degree of centralisation, there is little opportunity to determine if this is the case, or to institute solutions if it is not. This is not to imply that CPCs should not have reasonable faith in each other that data will be managed appropriately under any option, but the time, effort and money that many RFMOs (and many non-fisheries multilateral bodies) invest in compliance schemes is clear evidence that trust alone is insufficient to base such an important MCS scheme upon; and
- One of the only ways to determine if expectations are being met for full data disclosure from flag CPCs and full data protection amongst recipient CPCs would be a comprehensive audit capacity within the Secretariat. The costs of such capacity would likely be equal to, or perhaps even higher than the airtime costs under option 3.

As raised in section 4.4.1 above, there are also some CPCs that have yet to introduce the national VMS that would be required to make option 2 effective. While action is still required from those CPCs under option 3, it can be achieved with less capacity and expense. This is because the CPC would only have to implement the legislative requirement for vessels to carry MTUs, and enter into contracts with MCSPs to provide the data direct to the IOTC Secretariat. This option therefore does not rely on the CPC acquiring a software solution, developing the necessary ICT infrastructure and capacity and running a complete FMC.

Lastly, option 2 relies on CPCs sharing raw VMS data, which in turn necessitates IOTC agreement on a range of data standards. While data standards would be useful to facilitate more broad data sharing within IOTC, this is a significant body of work that is not required under option 3 as commercial software providers already have long experience and proven capacity receiving multiple data formats from MCSPs.

5.3 Improving consistency in CPC VMS'

The survey results in section 1 show that there is a very high diversity amongst CPCs as to how they implement the current Resolution. In particular, figure 12 demonstrates large differences in some aspects that are critical to ensuring a consistent and robust MCS that can contribute to MCS and management.

Improvements to these issues can be made relatively quickly and at little cost to IOTC and minimal cost to CPCs, and these should be progressed regardless of any decisions made by IOTC about further enhancement or centralisation. Consistency is particularly important for the following:

- Tamper-proof and tamper-evident MTUs – Paragraph 8 of the Resolution creates the requirement for MTUs to be tamper proof and tamper evident. These provisions are broadly consistent with other RFMOs and generally adequate. It is worth noting though that the CPC survey showed that many CPCs also place additional requirements on their vessels, and these would strengthen the IOTC VMS. Figure 12 shows that the vast majority of respondents require that MTUs be capable of reporting power on/off and about half require the ability to detect and report if the antenna is blocked.
- Frequency of reporting – The Resolution (para 7) specifies that reporting must occur at least every 4 hours, although there were some survey respondents that indicated periods longer than that. 4 hours

is consistent with many other RFMOs, although some have hourly (and even half hourly in some periods) reporting by purse seine vessels. IOTC should consider polling rates according to the activity of the vessel type and the ability to detect anomalous behaviour. For example, 4 hourly reporting has been considered adequate to monitor the fishing activities of longliners, which can take up to 12 hours to complete a set/haul. Purse seiners have a much shorter operation time and it is generally considered that a shorter interval is required to adequately detect setting behaviour. Similarly, reporting rates for carriers and bunkers and the vessels that tranship to, or provision from them should be based on the length of the interactions so that activities such as transshipment cannot occur undetected.

- Ability to poll – If the IOTC VMS is going to form a part of wider MCS programs, it is important that the MTUs being used do not only report location data on a regular basis, but can also be remotely polled under certain circumstances, such as where a vessel is fishing close to a closed area, or is detected in the proximity of another vessel. However, it should be noted that remotely polling vessels is costly, and implementing this requirement may require some CPCs to use different MTUs. Both of the examples above could be adequately managed through more regular standard reporting rates, so if that is implemented, this this particular requirement could be considered a lower priority.
- Ability to report to multiple destinations – The ability of the MTU, and the MCSP, to provide copies of raw position data to multiple locations is a critical aspect for the proposed end-state. Some survey respondents indicated that this is already in place and most of the MCSPs indicated in the survey respondents are capable of this, but it needs to be put in place as a rule as soon as possible so that any MTUs/MCSPs not capable of this functionality can be phased out before the “go live” date.
- Geofencing – A certain degree of automation is desirable for VMS to adequately contribute to MCS programs and to achieve the objectives above. Once data sharing rules are in place, it will be important for the VMS to have inbuilt notifications, such as entry and exit notifications in each EEZ, and perhaps proximity alerts to designated ports.
- Responding to MTU failure – Resolution 15/03 already has some detail about the obligations on vessel owners/masters if the MTU fails to report, both in terms of the timeframes to rectify the reporting issue and the manual reporting requirements in the meantime. However, despite this guidance, the survey revealed quite different practices amongst CPCs. Once data is shared more freely and VMS becomes more of a mainstream tool for fisheries management, monitoring and enforcement, it becomes far more important that non-reporting is dealt with in a consistent manner. In addition to clarifying and implementing consistent practice amongst CPCs, there are two areas of concern with manual reporting that IOTC should keep under continual review:
 - VMS is fishery independent data whereas manual reports are fishery dependent; and
 - Manual reports are generally far less usable than VMS data.

These weaknesses are partially addressed by the existing provision in Resolution 15/03 for a flag State investigation for any vessel that has more than two failures per year. IOTC should also consider strengthening manual reporting arrangements by:

- Reducing the allowable timeframe for manual reporting (currently 1 month); and
- Developing IT solutions so that manual reports are provided in a consistent format that can be automatically uploaded and displayed alongside normal VMS reports on the common operating picture.

Suggested amendments to Resolution 2015/03 are provided for consideration in Attachment 2.

5.4 Enhancing the scope of the VMS

The current IOTC VMS applies to all vessels that fish outside their own EEZ and to vessels greater than 24m that only fish domestically, and this is consistent with the vessels that need to be included on the Record of Vessels Authorised to Fish in the IOTC Area of Competence (Resolution 2015/04). There is some justification for excluding purely domestic vessels as the relevant flag, coastal and port State is the same CPC. However, there are two important factors to consider:

- this does assume that domestic vessels do not pose any risk of incursion into neighbouring EEZs; and
- IOTC has a very large number of registered vessels that fall into this category.

The justification for excluding vessels less than 24m has traditionally been based on concerns about the physical and electrical ability for these smaller vessels to carry MTUs. There are many large fleets of artisanal and subsistence vessels fishing for IOTC species that certainly would not be able to carry the necessary equipment, but the blunt 24m rule is quite weak as it excludes vessels that do have capacity to travel long distances and potentially engage in IUU fishing, whether that is in the form of incursions to EEZs that it is not authorised to fish in or other activities such as transshipment outside of IOTC rules. New technology, such as more reliable solar generation have allowed many fisheries around the world, including domestic and distant water fleets of many IOTC CPCs, to have MTUs installed on vessels far smaller than 24m. Figure 5 shows that CPCs are already applying VMS to a very large number of vessels far smaller than 24m. In fact, 54.5% of vessels reported as being covered were less than 24m.

Taking Resolution 15/03 and Resolution 18/06 in combination, it is clear that the VMS applies to fishing vessels and to carrier vessels, but it is less clear whether VMS also applies to other types of vessels that operate in support of fishing. It is important that these vessels be included in the VMS as they contribute to the overall fishery IUU risk, engage in activities directly relevant to ongoing management of IOTC stocks and effectively increase effective fishing effort.

The scope of the IOTC VMS should be amended to cover:

- All vessels greater than 24m;
- All vessels¹ operating outside of the flag CPC’s EEZ; and
- All domestic only longline, purse seine, pole and line, carrier and bunker vessels greater than 15m.

The change to 15m for the key types of commercial vessel is relatively arbitrary (although it is commonly used to differentiate between artisanal and industrial fisheries) and will no doubt be the subject of intense debate within the Commission. While a different threshold may be decided, it is vital that CPCs acknowledge that these vessels, particularly at sizes near to 24m do pose IUU risks to the IOTC and therefore do need to be included in the MCS programs of the Commission. Linking back to the objective, it is also worth noting that many of these vessels do contribute product to industrial canneries and processing facilities, meaning they would need to be accounted for any program such as an IOTC Catch Documentation Scheme.

Suggested amendments to Resolution 2015/03 are provided for consideration in Attachment 2, and as with the recommendations above about consistency, these should be progressed immediately regardless of wider decisions/options before IOTC.

5.5 Facilitating data sharing

One of the primary weaknesses with the current IOTC VMS is the complete absence of data sharing provisions in the Resolution. There are several good examples where smaller groups of CPCs have made arrangements outside of IOTC to share the VMS information that they have with each other, however these are mainly coastal State cooperative activities. Informal discussions with several IOTC coastal CPC representatives revealed no instances of flag States informing coastal States about potential incursions or illegal activities by their vessels since the VMS was first introduced in 2002.

The Objectives recommended above require a far greater degree of transparency and data access than is currently the case. While this is far more easily facilitated by the more centralised options described above, it still needs to be supported by a comprehensive set of rules about the provision, protection and dissemination of VMS data .

RFMOs that have been created more recently than IOTC, and particularly those that have been established since UNFSA (such as WCPFC and SPRFMO) have had the opportunity to develop such frameworks from their outset in a way that is unencumbered by any existing practice there. WCPFC has a comprehensive arrangement that is forward looking in terms of its openness. The basic premises of the rules for VMS access are:

1. Each CCM must nominate its “MCS entities” that are authorised to receive the non-public domain data (this generally includes entities such as the FMC, maritime police, coast guard etc).
2. Within each MCS entity, the CCM must also list the Authorised MCS Personnel that may request and access non-public domain data.
3. The data that an MCS Entity can obtain is based on:

- a. flag States shall have access to information relating to vessels flying their flag;
 - b. coastal States shall have access to information relating to vessels fishing in their EEZ, or applying to fish in their EEZ;
 - c. coastal shall also have access to information relating to vessels located with 100 nautical miles of their EEZ boundary;
 - d. port States shall have access to information relating to vessels using their port, or applying to use their port; and
 - e. CCMs that have an “MCS presence or capability” on the high seas shall receive information relating to specified areas of high seas where they are conducting MCS activities.
4. CCMs must store the data in accordance with the security it would have at WCPFC (there is a specific Information Security Policy that includes a risk assessment framework).
 5. CCMs must destroy the information within specified timeframes unless notified as being subject to an ongoing investigation.
 6. There are specific penalties (loss of access to any and all non-public domain data) for breaches of the rules, as well as for non-provision of data.
 7. There are reporting requirements for CCMs to describe how they have protected non-public domain data, including affirmation that the destruction provisions were complied with. The Secretariat also provides an annual report on access to non-public domain data.

The specific documents are obviously far more comprehensive than this brief summary, and a similar level of detail will be required within IOTC to find the right balance between a framework that makes the necessary data readily available to those CPCs that need it to undertake their respective functions (point 3), while also creating an environment of sufficient rigor that data providers can trust that all CPCs will use the data in good faith (points 1,2,4,5,6 and 7).

A comprehensive VMS will also add significant value to IOTC science, and specific rules and arrangements will be required for scientists to be able to access and use the data.

The WCPFC framework is already agreed and used by at least 7 IOTC CPCs and the Invited Experts, who between them represent a large proportion of the vessels that would be covered by the IOTC VMS. Therefore, while discussions on sharing sensitive data will be comprehensive, it is suggested that the WCPFC documents be used as a starting point.

5.6 Building Secretariat capacity and budget

Under option 3, receiving, collating, storing and disseminating VMS data will be a wholly new function for the IOTC Secretariat. While experience exists in the handling of scientific data, there are key differences here in the specificity of the information, magnitude of the data and the regularity of receipt and transmission.

There are private sector actors, non-government organisations and regional agencies that IOTC could potentially outsource VMS management to. This option has not been explored at this stage on the basis that collecting and sharing data under a regional VMS will be a new undertaking for IOTC, and one that will rely on significant trust amongst CPCs and between CPCs and the Secretariat. Introducing a third party that will also need to establish the necessary trust and credentials is unlikely to be possible in the early stages.

The proposed end-state of option 3, quite significantly reduces the need for additional Secretariat staffing than would be needed under option 4 because much of the responsibility for routine checking, such as responding to vessels that do not report, will remain with the flag State. Notwithstanding, additional investment will be required in at least four areas.

5.6.1 Staffing

Handling this amount of specialised data will require a dedicated VMS officer (as opposed to several under option 4). Based on existing positions within the Secretariat, this would likely be a P3 level position, with a cost of between USD 100,000 and 130,000 .

Additional IT capacity is also likely to be required – particularly during the start-up period where the Secretariat will need new databases, hardware and procedures. This could probably be achieved through a periodic standing consultancy at lower cost than a dedicated position, but even so, a cost of USD 100,000 per year in the initial phase is not unreasonable to expect.

5.6.2 System acquisition

As mentioned in table 2 above, it is possible for IOTC to build its own in-house system that would receive position data from the various MCSPs, display it graphically and provide the necessary tools for CPCs to access the information they are entitled to and analyse the data as required. However, given the state of advancement of commercial solutions and the level of competition amongst service providers that has driven down costs and increased customer-tailoring over the last decade, building a stand-alone system is unlikely to be cost effective. A variety of commercial products are already being used by IOTC CPCs, and in fact only 1 CPC reported using in-house developed software for its VMS.

The cost of using such a service provider will depend very heavily on the complexity of the system and the permissions that are granted via the data sharing rules. High complexity will demand high “service desk” costs for the provider to create new users with unique data permissions.

As an indication of potential cost, the WCPFC VMS software platform, which closely resembles option 4, costs about USD 230,000 per annum. The ICCAT VMS, which is very similar to the IOTC VMS except that it requires direct provision of data from the FMC to the Secretariat incurs an annual non-staff cost of approximately EUR 120,000 (≈USD 136,000). These are likely to be useful upper and lower cost bounds.

5.6.3 Infrastructure

Many commercial service providers include off site data storage in provision costs, but the Secretariat will still need new hardware to handle the data it receives and transmits. In both ICCAT and WCPFC this is about USD 10,000 per annum.

5.6.4 Airtime costs

The proposed end-state will require data to be transmitted directly from the MCSP to the Secretariat. While this incurs airtime costs, they are far lower than they would be in a centralised system (option 4). When an MCSP is instructed to provide data feeds to multiple recipients, they designate one recipient as the primary account holder and others as recipient agencies. The primary account holder (in this case, the CPC) pays the full fee. The recipient agency (the Secretariat) pays a lower fee and only receives a copy of the position data. As an example, in the Pacific FFA is the primary account holder in many cases, and WCPFC is the recipient. Generic information provided by FFA suggests that most MCSPs charge in the range of USD 0.01 to 0.03 per position, with recipient charges at the cheaper end of this scale.

It is difficult to predict total airtime costs that IOTC would incur as this relies on policy decisions on the scope of the VMS and the polling frequency. The CPC survey indicates that over 5,000 vessels are currently covered by CPC VMS, although the very large proportion (54.5%) of these are less than the current threshold of 24m. A high number (36%) are even less than the proposed revised threshold of 15m, suggesting that not all would be subject to data acquisition by IOTC. The table below provides indicative airtime costs for different vessel numbers at four-hourly and two-hourly polling.

Vessels	2 hourly <i>(USD / per annum)</i>	4 hourly <i>(USD / per annum)</i>
3,000	262,800	131,400
4,000	350,800	175,400
5,000	438,000	219,000

5.6.5 Summary of indicative costs

It is impossible to provide accurate estimates of the potential cost increase because there are many fundamental policy decisions that are required that would drive the marginal cost compared to the

status quo. However, the indicative costs above suggest that an enhanced VMS would require additional resourcing in an approximate range of USD 380,000 to USD 810,000 per annum. In absolute terms, these amounts are relatively minor compared to the size and value of the fisheries being managed and considering the number of CPCs participating in IOTC.

However, as a proportion of the overall IOTC budget this is quite high (\approx 8 to 18% of the indicative 2020 budget). There are three reasons why the proportional budget increase is relatively high:

- There is zero investment in VMS at present;
- The overall budget of IOTC is actually relatively low compared to some other RFMOs; and
- There are a huge number of vessels that could be included in the VMS compared to some other RFMOs (which increases air time costs).

5.7 Considering funding

An enhanced VMS that meets the objectives outlined above will undoubtedly come at additional cost to IOTC. IOTC should consider that the benefits in terms of fighting IUU fishing and the positive contribution that additional data would make to science and management outweigh this additional investment.

Of the RFMOs/RFBs directly consulted, most (and certainly all of the RFMOs) have chosen to fund their VMS through their normal budget. That is, CPCs contribute to the costs of the VMS through the general contributions formula, rather than through any special arrangement for flag CPCs etc. This is likely to be the most appropriate funding avenue for IOTC, at least in the short term.

However, this implies an increase in each CPC's contribution of anywhere between 8 and 18%, and that may well prove difficult to accept in a single increase and to sustain in the longer term. This could be partially mitigated in two ways:

- Commence contribution increases early – the section below sets out a proposed timeframe for key decisions and developments and this timeframe would suggest that the total cost increase would not be borne for several years. IOTC could proactively increase contributions early in the timeframe and hold the additional funds in trust to be used against costs incurred in latter years. In that way, start up costs can be defrayed slightly and contribution increases would be more staged.
- Investigate a direct cost recovery arrangement – Vessels fishing in the EEZs of Pacific island countries pay registration fees to both the FFA and the Parties to the Nauru Agreement and these registration fees are used inter alia to fund the centralised VMS' operated by those agencies on behalf of the countries. The huge diversity in profitability and operation of IOTC vessels would be a complicating factor, but some form of cost recovery – even if only limited to vessels fishing in high seas or other EEZs – would be an effective mitigation against contribution increases.

5.8 Key decisions, developments and timeframes

The steps outlined above are more or less presented in chronological order, although some tasks can and should be undertaken concurrently. The following provides a summary of how and when decisions and work might be progressed:

5.8.1 S23 – May 2019

1. Consider and amend the recommendations of this review.
2. Adopt a workplan based on recommendations of this review as amended.
3. Consider and endorse amendments to Resolution 15/03 to enhance consistency in CPCs' VMS, based on Attachment 2.
4. Agree to increase each CPC's financial contribution for 2020 by 5%, with that funding set aside for VMS development.
5. Consider and agree on an enhanced scope (inclusivity of additional vessel types and sizes), based on Attachment 2, but including phased-in additions if necessary.
6. Agree that each CPC will intersessionally:
 - a. confirm the type and number of its vessels that will be covered under the revised scope; and

b.obtain advice from their MCSPs as to the airtime costs that they would charge to transfer position data directly to the Secretariat.

7. Task the Secretariat to investigate the cost of various potential system providers through an EOI process; and

8. Establish an expertise-based intersessional working group to develop rules and procedures for the sharing, use and protection of VMS data.

5.8.2 S24 – May 2020

9. Consider the outcomes of tasks 6 (number of vessels and transfer costs from MCSPs) and 7 (EOI to service providers) to determine a more accurate indicative budget for long-term implementation.

10. Consider and endorse the output from task 8 (data sharing rules).

11. Agree to use the funds collected under the additional 5% 2020 budget to facilitate preparations within the Secretariat with a priority on recruiting a VMS officer (to assist in project management and all tasks), and if affordable, acquiring necessary infrastructure and IT support.

12. Agree to increased financial contributions for 2021 and beyond based on the budget developed under tasks 9 and 10.

13. Establish an expertise-based intersessional working group to develop options for cost recovery of at least some elements of the VMS.

14. Task the Secretariat to undertake a more comprehensive tender process to recommend a system provider.

5.8.3 S25 – May 2021

15. Select a system provider based on the outcomes of task 14 and recommendation of the Secretariat.

16. Agree on a subsequent work plan for “go live” of a system based on the set-up requirements of the system provider and Secretariat and necessary notification periods etc of the MCSPs.

It should be noted that the Compliance Committee (CoC15) made the following recommendation:

CoC15.21 ([Para 99](#)) Noting the progress made by the VMS Steering Group, the CoC **RECOMMENDED** that the Steering Group review the report of the VMS study and provide recommendations to CoC16, including a workplan and budget and if necessary a revision of the Resolution 15/03.

RECOMMENDATION

That the WPICMM02:

- 1) **NOTE** paper IOTC–2019–WPICMM02–05a and the consultant’s report IOTC-2019-WPICMM02-VMS Study,
- 2) Make **RECOMMENDATIONS** on the VMS study report for the consideration of the VMS Steering Group and the Compliance Committee.