I.T. POST-IMPLEMENTATION BENEFITS AUDIT

OF

THE MONTSERRAT INFO-COMMUNICATIONS AUTHORITY

INTEGRATED TELECOMMUNICATIONS MANAGEMENT SYSTEM

Office of the Auditor General

March 2023

**INTEGRATED
TELECOMMUNICATIONS
MANAGEMENT SYSTEM**

This is a report of an Information Technology Post-Implementation Benefits audit conducted by the Office of the Auditor General

Auditor General
Office of the Auditor General
27 March 2023

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ABBREVIATIONS

CO	Central Office
EMCI	Enterprise Master Customer Index
GoM	Government of Montserrat
HNI	Home Network Identifier
iTMS	Integrated Telecommunications Management System
ITU	International Telecommunication Union
MCWLE	Ministry of Communications and Works, Labour and Energy
MoFEM	Ministry of Finance and Economic Management
MICA	Montserrat Info-Communications Authority
OAG	Office of the Auditor General
PWCI	P. W. Consulting Incorporated
SA	System Administrator

PREAMBLE

Vision Statement

"To be a proactive Supreme Audit Institution that helps the nation make good use of its resources."

Mission Statement

"The O.A.G is the national authority on public sector auditing issues and is focused on assessing performance and promoting accountability, transparency and improved stewardship in managing public resources by conducting independent and objective reviews of the accounts and operations of central government and statutory agencies; providing advice; and submitting timely Reports to Accounting Officers and the Legislative Assembly."

The Goal

"To promote staff development, enhance productivity, and maintain a high standard of auditing and accounting in the public sector, thereby contributing to the general efficiency and effectiveness of public finance management."

AUDITOR GENERAL'S OVERVIEW

The Integrated Telecommunications Management System was introduced in 2014 to enable the Montserrat Information and Communications Authority to digitise its main operational activities. This post implementation benefits review was conducted to determine whether (a) the software system met the Authority's work objectives and delivered the anticipated benefits; (b) the system was upgraded since it was implemented and (c) the MICA has any plans for future enhancement of the software.

Our review revealed that the system provides the MICA with the tools to meet its work objectives and benefits but the system is underutilised. Thus, with regard to objective (a) we could not determine whether the full benefits as outlined were achieved. However, through walk thru tests and observations, it was determined that the software streamlined the former manual and automated services. It was also found to be well-designed and user-friendly. With respect to (b) we found that the MICA detected and reported inconsistencies which were later modified by the Contractor. In relation to objective (c) there are plans to integrate the software system with the online payment system – PayPal, to enable direct payments in order to reduce the related expenses and speed up the process of issuance of licences.

I wish to thank the management and the staff of the MICA for the courtesies extended to my staff during the audit.

Marsha V.E. Meade
Auditor General (Ag)
27 March 2023

EXECUTIVE SUMMARY

Overview

1.   Spectrum is the scarce resource that enables internet connectivity, mobile phones, aircraft and shipping communications plus broadcasters on AM/FM and TV frequencies, along with a host of other telecommunications practices.   Spectrum Management is the process of regulating the use of radio frequencies to promote efficient use and to gain a net social benefit.   The radio spectrum is an important limited resource.   Therefore, all entities and persons using radio frequency for, or in relation to, the operation of a telecommunications network or providing a telecommunications service, must obtain authorisation for the use of such frequency.   The Montserrat Info-communications Authority (MICA) is the regulatory body for the spectrum (or radio frequency bands) that is used on the island.

Main Findings

2.   **Logical access security risk.**   The MICA's staff and select members of the Board have their own unique user ID and password to log into the office computers and the iTMS system.   However, some members of the staff practice sharing their unique log-in credentials to their iTMS user account, with provisional administrative staff.   The sharing of unique login credentials is a very poor and risky practice, as dishonest or disgruntled temporary employees can conduct fraudulent and underhanded activities under the guise of being one of MICA's authorised users.

3.   **No backup generator.**   There is no backup generator at the building complex where the MICA is located.   Therefore, in the event of loss of electrical power, the MICA's employees are unable to gain access to their personal computers and the iTMS system.

4.   **Self-Serve feature still in testing phase.**   Currently, the Self-Serve online portal is still in the testing phase since 2019.   It was pointed out that the testing phase was delayed by the onset of the COVID-19 pandemic in 2020; and by a very low rate of participation of the MICA's clients in the testing of the online portal.

5.   **Business continuity measures.**   There is a contingency measure in place that enables the MICA's staff to continue to use the iTMS system if the local service providers'

Internet service is interrupted, via a system-specific URL address. This is reliant on network connectivity between the office computers and the intranet server. The MICA's employees have indicated that although they are aware of this contingency measure, they have not been using the URL address when there is disruption to the Internet connectivity.

Recommendations

6. **Creation of temporary user accounts and better password management.** Both the Corporate Secretary and Executive Manager have the Administrative rights and privileges (and were trained), to create iTMS user accounts, and to assign the appropriate system user access rights and job role privileges for users. Hence, it would be practical for them to create and to issue restricted/limited user access to provisional staff, instead of continuing to share personal login credentials, which poses a high security risk.

7. **Procurement of a back-up generator.** The MICA should consider making a business case to the owner of the building, and/or to the GoM, for the procurement and maintenance of a small back-up generator for continuity of the Authority's business operations. This auxiliary source of power will ensure the maintenance of network connectivity between the MICA's computers and its local server, and direct access to the iTMS system in the event of power outages; especially during the aftermath of inclement weather.

8. **Re-commencement of testing the Self Serve online portal.** The MICA's staff should renew their efforts to solicit the assistance of the customers to test the Self Serve online portal, in order to expedite the implementation process of this module. Clients can be contacted via local telephone calls, or by posting of the guidelines on how to use the test feature, on the MICA's website.

9. **Use of business continuity measure to access iTMS.** The MICA should commence using the system-specific URL address (reactive measure) that was provided by the contractor, to gain direct access to the iTMS system for continuity of business, whenever there is a disruption in Internet connectivity.

Audit Conclusion

10.   The Office of the Auditor-General has determined that the web-based Integrated Telecommunications Management System, is very comprehensive, well-designed, and user friendly.   The customised iTMS system provides the MICA's staff with the required tools to meet the Authority's work objectives, including the anticipated benefits of system.

11.   This audit has concluded that iTMS system is underutilised. We also found that the employees' level of knowledge regarding the modules and the offered features is fairly basic, although training and a detailed Users Guide were provided by the contractor. It is highly anticipated that the implementation of the Self-Serve module, and the successful recruitment of a Spectrum Management Engineer, will increase the regularity and the scale of how the software is used.

CHAPTER 1   INTRODUCTION

Background

1.1   [1,2]**Spectrum** is the scarce resource that enables internet connectivity, mobile phones, aircraft and shipping communications plus broadcasters on AM/FM and TV frequencies, along with a host of other telecommunications practices. **Spectrum Management** is the process of regulating the use of radio frequencies to promote efficient use and gain a net social benefit.   The radio spectrum is an important limited resource; therefore, all entities and persons using radio frequency for, or in relation to, the operation of a telecommunications network or providing a telecommunications service, must obtain authorisation for the use of such frequency.

1.2   In general, effective spectrum management is required for:

- the protection of frequencies used by critical services, by preventing harmful interference;

- identifying opportunities to maximise efficiency;

- allowing development and implementation of new technologies in flexible frameworks;

- reduction in the cost of telecommunication equipment.

1.3   The Montserrat Info-communications Authority (MICA), is the regulatory body on the island for the spectrum (or radio frequency bands) that is used in Montserrat.

Management's Responsibility

1.4   Management is responsible for ensuring that the MICA's Integrated Telecommunications Management System (iTMS) project objectives were achieved.   More

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[1]*https://digitalregulation.org/spectrum-management-key-applications-and-regulatory-considerations-driving-the-future-use-of-spectrum/*
[2] *https://www.ectel.int/regulatory-framework/spectrum-management/*

specifically, management is to ensure that the project's outputs are advantageous to the users and the beneficiaries of the iTMS web-based software.

Auditor's Responsibility

1.5   Our responsibility is to independently express a conclusion on the Post-Implementation Benefits audit of iTMS web-based software, based on our audit.   Our work was conducted in accordance with International Standards of Supreme Audit Institutions (ISSAI) 100 and International Standard on Assurance Engagements (ISAE) 3000.   These principles require that we comply with ethical requirements, and plan and perform the audit in order to obtain reasonable assurance, whether tried and true policies, plans, procedures, and internal controls exist and are functioning effectively, proper records have been and are being kept, and all the necessary information and explanations, for the purpose of our audit, have been obtained.

Audit Mandate

1.6   The Office of the Auditor General (OAG) is mandated through the Montserrat Constitution Order 2010 to perform audits.   This mandate is supported by International Standards of Supreme Audit Institutions (ISSAI) 1, 200, 300, 400, and strengthened by the Public Finance (Management and Accountability) Act (PFMAA) of 2008 and the Public Finance (Management and Accountability) Regulations (PFMAR) of 2009.

Audit Standards and Guidelines

1.7   The standards and guidelines used to assess the iTMS web-based software included the use of International Standards of Supreme Audit Institutions (ISSAI) 3000, 4000, 5300, and the WGITA-IDI (Working Group on IT Audit-INTOSAI Development Initiative) Handbook.

Audit Objectives

1.8   The aims of this Post-Implementation Benefits review were to:

- determine if the implementation of the iTMS web-based software met the Montserrat's Info-Communications Authority's work objectives and delivered the anticipated benefits.

- establish if any changes were made to the iTMS web-based software since it was implemented.

- establish if there are any plans for future enhancements to the iTMS web-based software.

Audit Scope and Methodology

1.9   The study covered the period 2014 to 2021, and focused on the examination of the Post-Implementation Benefits of the iTMS web-based software.   The Auditor monitored the audit in the field and may have amended any area of the audit scope in consultation with the Auditor General, so as to maximise the efficiency of the audit.

1.10   A combination of techniques was utilised to gather information and to validate the beneficial achievements for implementing the iTMS web-based software.   These included, but were not limited to, interviewing the key stakeholders at the MICA; the local System Administrator of the MICA's server; key stakeholder at PW Consulting Incorporated; inspection of documents; and observation of the software in order to gather in-depth information about iTMS.

1.11   The findings of this study were discussed with the Chairman of the Board, the Executive Manager, and the Corporate Secretary of the MICA; their views were taken into consideration when finalising the report.

CHAPTER 2   THE MONTSERRAT INFO-COMMUNICATIONS AUTHORITY

2.1   [3,4,5,6,7]The Montserrat Info-Communications Authority is the local regulatory agency for the Government of Montserrat, established by law in 2009 to be responsible for managing all of Montserrat's telecommunications licensing and the associated allocation of the valuable spectrum.   The MICA is a statutory body and its main functions are to regulate the Info-Communications sector on Montserrat; to ensure that there is no overlapping of radio frequency bands used by the service providers; to ensure that there are fair competitive practices by all Info-Communications providers; and to promote and to maintain high quality Info-Communications services at fair and competitive prices (refer to *Appendix I* for the comprehensive listing of the MICA's functions from *Part 2 Section 18.1 (a) – (u)* of the *Info-Communications Development Act of 2009*).

2.2   The Spectrum Plan Radio Regulations Regions Frequency bands are allocated to different services worldwide and regionally. As per the Radio Regulations, the world is divided into three Regions (**Regions 1, 2,** and **3**) and Montserrat's radio frequency bands are located in **Region 2** along with Canada, U.S.A., and South America.

Figures I & II – Radio Regulations Regions Worldwide 1, 2, 3 and Radio Regulations

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[3]*http://www.mica.ms/*
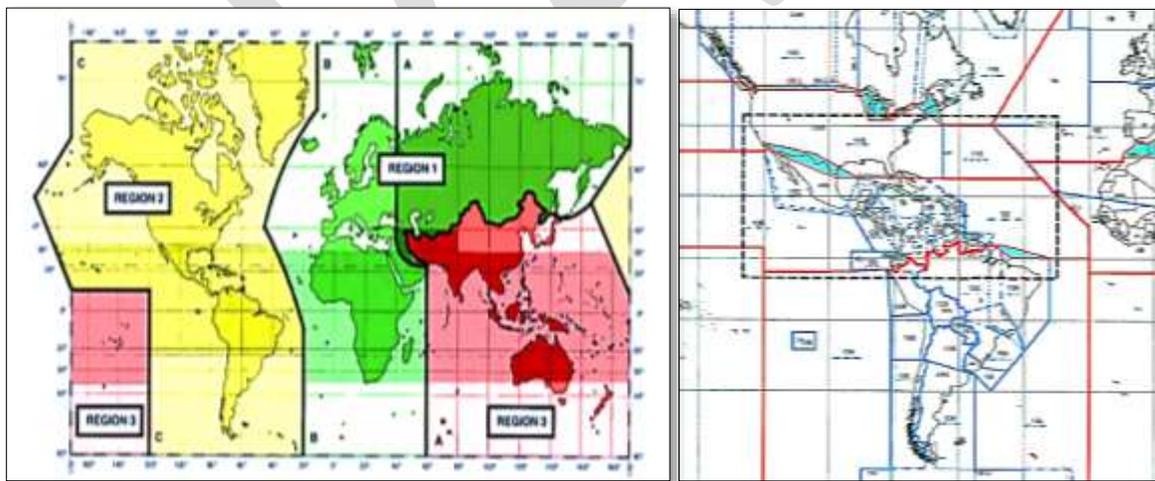
[4]*Guidelines for the preparation of a National Table of Frequency Allocations (NTFA), International Telecommunication Union (ITU), 2015*

[5]*Info-Communications Authority's Spectrum Plan For The Island Of Montserrat, Prepared by John Prince, March 8, 2010*

[6]*https://www.itu.int/en/council/Documents/basic-texts/Constitution-E.pdf*

[7]*The Numbering Plan Of Montserrat, Prepared by John Prince, September 2010*

2.3   All of the countries in Region 2, including Montserrat, are allocated the same spectrum by the ITU for different types of services such as: Amateur or Ham Radio operators, Aero-Nautical Radio, Maritime Radio, Radio Broadcasting, Fixed or Mobile Telephony, and Wireless Network.   Therefore, persons must obtain a licence from the MICA if they want to establish, to operate, to use, or to install: [a] terrestrial radio communications services, [b] radio-transmitting, [c] non-military marine and aeronautical equipment, or [d] registered satellite in Montserrat's territorial water or airspace.

Figure III – Extract of Part 4, Section 31. (1) & (2) of Info-Communications Development Act 2009

2.4   For each of the different categories of service, there are specific application forms, approval procedures for a new service, and an amendment, or renewal.   The Executive Manager is responsible for screening and authorising most of the requested services, and for issuing the required licences, except for requests for concessions for info-communications network and/or services, by service providers like FLOW and Digicel. Requests for concessions are vetted and approved by the Board of Directors before being forwarded to the Permanent Secretary of MCWEL, who is in charge of submitting these types of requests to the Cabinet.

2.5   The main reasons that the MICA would reject requests for concessions and other info-communication services are if: (a) the proposed service does not have a proper, sustainable business plan, (b) the network's plan and design are not acceptable, and/or (c)

the requested spectrum is not available.   In such cases, the Authority will recommend other available radio frequencies to the applicants.

Legal Framework

2.6   The MICA is mandated by the Info-Communications Development Act of 2009, in addition to the following regulatory legal tools:

(a) Montserrat Info-communications Interconnection Regulations, 2011 (S.R.O. 35 of 2011);

(b) Montserrat Info-communications Interconnection Regulations, 2011 (S.R.O. 36 of 2011);

(c) Montserrat Info-Communications Fees Rules, 2011 (S.R.O. 37 of 2011);

(d) Montserrat Info-Communications (Applications and Forms) Rules, 2011 (S.R.O. 38 of 2011).

Observations

2.7   **Management of the Montserrat Info-Communications Authority**.   The MICA is governed by a Board of Directors (a minimum of three (3) or a maximum of five (5) members) selected by the Cabinet and appointed by the Governor for a maximum of three years.   Each member's term of service varies between one to three years, and commences and expires in different calendar years.   The Permanent Secretary of MCWLE specifies the duration of each Director's tenure.

2.8   The MICA's current Board of Directors, consist of 5 members: a Chairman; an Attorney-at-law; a Technical Consultant with an Info-communications background; and the GoM's 2 representatives, 1 being from the Ministry of Communications and Works, Labour and Energy (MCWLE), and 1 being from the Ministry of Finance and Economic Management (MoFEM).   The MICA office is overseen by an Executive Manager and by a Corporate Secretary, who are appointed by the Board of Directors.

2.9 **Drafting of Montserrat's Info-Communications Spectrum and Numbering Plans**. All governments are responsible for developing a spectrum management plan that:

(a) Complies with international treaty obligations outlined in the world's governing body for coordination of international spectrum allocation and use;

(b) Complies with the ITU's Radio Regulations;

(c) Meet each country's specific national spectrum requirements without causing interference in neighbouring countries (e.g., for Montserrat, these include Antigua, St Kitts and Nevis, and Guadeloupe).

2.10 The services of a Trinidad-based consultant were contracted to draft the *Info-Communications Act of 2009*, the *Info-Communications Authority's Spectrum Plan (2009)*, and a *Numbering Plan for Montserrat* (2010).

2.11 The Info-Communications Authority's Spectrum Plan provides for the efficient use of Montserrat's spectrum resources. For instance, it is a requirement for spectrum users to apply the latest technology and standards, as soon as possible, in accordance with *Article No. 195* of the *Constitution of the ITU*.

2.12 The Numbering Plan of Montserrat governs the management of the national numbering resources used by the public info-communications network and service operators and providers on Montserrat. The plan was developed as per *section 38* of the *Info-Communications Act, 2009,* to identify and/or define the:

(a) Numbering scheme for the allocation of Central Office (CO) codes to info-communications service types (e.g., fixed [wired/wireless] service, mobile service);

(b) Principles and guidelines that will govern the administration of CO codes and the Numbering Plan Area (NPA);

(c) Obligations that attend assignment of CO codes (e.g., number conservation methods);

(d) Guidelines that will apply in the administration of Home Network Identifiers (HNIs) and other number assignments.

2.13   **Collection of revenue.**   One of the functions of the Authority is to collect all fees, including concession and license fees, numbering fees, and any other charges levied as per the *Info-Communications Development Act,* of 2009.   When the various revenues are collected, the monies are initially deposited into the MICA's bank account before being withdrawn and paid directly into the Treasury at the end of each calendar month.

2.14   **Annual subventions**. Although the MICA is a statutory body, separate and apart from the GoM, the Authority receives annual subventions from the GoM in quarterly disbursements to cover its operational expenses.

CHAPTER 3   IMPLEMENTATION OF THE INTEGRATED TELECOMMUNICATIONS MANAGEMENT SYSTEM SOFTWARE

Overview

3.1   Before the commissioning of the Integrated Telecommunications Management System (iTMS) software, the MICA's licencing procedures were a combination of manual and automated systems.   Physical log books and the Microsoft Office Suite (Word documents and Excel spreadsheets) were used in tandem for the processing and recording of applications, for clients' information, for receipts for clients' payments, and for the issuing of licences.

3.2   A decision was eventually made by the Board to streamline the MICA's customer services by fully digitising its operations.   Therefore, after researching and comparing spectrum resources management software on the market, and consulting with local (Montserrat Utilities Limited) and regional (Antigua and Dominica) entities, the MICA's Board of Directors chose the iTMS, which is an enterprise software solution, instead of the ITU's Spectrum Management for Developing Countries (SM4DC) software.

Project Summary

3.3   [8]The iTMS, is an 'open-source' web-based enterprise software system that was developed by the Canada-based PW Consulting Incorporated (PWCI), and that can be tailored to the specifications of each client.   The iTMS software system would be customised in accordance with Montserrat's Info-Communications Spectrum Plan, to enable the MICA:

- To effectively manage all of Montserrat's telecommunications licensing, and associated allocation and use of spectrum, by creating a database on all frequency use; and

- To optimise activities around the allocation and frequency occupancy, for all its varied customer base.

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[8]*http://www.pwconsulting.com/news.php*

Project Deliverables[9]

3.4   The iTMS is modular in design with four (4) modules; each were customised for the MICA to perform the Authority's main operational activities.   The main objectives of the MICA's iTMS project were to:

(a) have the ability to create and maintain accurate records on all licenses, frequency authorisation, and related data.

(b) have a backup and business continuity mechanism in the event of natural disasters or loss of service in the geographic location.

(c) have the capability to perform full data management and information monitoring, such as:

- enable capacity building of the MICA's staff in database development, in programming, and in systems implementation;

- reduce the cost of operations by automating major tasks within the local regulator;

- facilitate enhanced search capabilities of the database so that users would be able to query time-sensitive information on demand.

Project Outputs Schedule

3.5   The iTMS project was comprised of six (6) project phases or Life Markers (LM):

Birth & Learn

3.6   The MICA and PWCI teams identified and determined what the system would look like, how it would operate, and which functionalities needed to be tweaked in order to meet the Authority's business needs.   The initial project LMs were to be achieved within two to four weeks:

- **Discovery Meeting**: The PWCI's project team first toured the MICA's facility and discussed, analysed, and identified the interface design and preliminary infrastructure

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[9]*Montserrat Information Communication Authority, Integrated Telecommunications Management System (iTMS), Software License and Professional Services Quotation, Prepared by: Jim Stewart, Project Manager, PW Consulting, 14 August 2013*

considerations with the MICA's team (for example, networking, radio frequencies, hardware, etcetera).

- **Life Classroom**: The PWCI team, on its return to home base in Canada, designed and analysed the operational "to-be" processes and interfaces, before delivering the project proposal documents to the MICA. The proposal included: (a) business process flow diagrams; (b) functional requirements and interface design specifications; and (c) statement of work and project plan.

3.7 The PWCI and MICA teams further discussed and verified the required host interfaces. They also reviewed, edited, and approved the project documentation.

Grow

3.8 The developmental phase was estimated to take 8 to 12 weeks, during which the PWCI team was expected to have completed the design, to build the system, and to conduct testing as per the MICA's specific data and test cases.

3.9 At this point of the project, the MICA's team was able to review the progress of the iTMS system at any time by logging-in to the test system via a link (**"Log-Me-In"**).

Practice

3.10 The PWCI team returned to the MICA for an estimated 3 to 4 weeks to install the iTMS software on the MICA's server. During this visit, the team also created a test environment for performing fully integrated tests such as: (a) stress tests; (b) backup and disaster recovery tests, (c) dry runs of 'go-live' testing, and (d) any additional testing requested by the customer.

Launch and Visit

3.11 In this implementation phase, the end users at the MICA received full training to use the iTMS system before it was officially launched. The contractor was on hand for a short period of time to ensure that the software was working properly (the **Launch** and **Visit** markers usually last 2 - 4 weeks). Once the iTMS system was stabilised, any ensuing issues after the PWCI team left were referred to the contractor's Customer Support. The MICA's iTMS system went live in April, 2014.

Observations

3.1 **iTMS software operational modules**. Although the iTMS software consists of [10]four (4) operational modules for the effective and efficient execution of MICA's procedures, the Authority utilises only three (3) of them as follows:

Module One

- **Spectrum Management** - for the insertion and maintenance of all the related details associated with the customers' Frequency Assignment; that is, Spectrum utilisation, including:

  (a) specific details for each transmitter location and each service offered by that customer at that transmitter location;

  (b) specifications on frequency, technology, and geographical coordinates and other relevant information.

3.2 This module was designed to be utilised by qualified and experienced personnel to monitor and to manage the use of radio frequencies in Montserrat. The Authority advertised the post of Spectrum Management Engineer in 2021, but, to date, recruitment has not been successful.

Module Two

- **Licence and Services** - stores all the types of licence offered, along with the associated services. It is used by the MICA to produce the various licences (certificates) for the clients via a template that is populated with information such as: (a) name and contact details of the individual or business, (b) spectrum usage/radio frequency, (c) class of service and license code; etcetera.

Module Three

- **Type Approval** - is used by the MICA for the creation of new customers accounts from applications that were vetted and approved; and the update of the information for renewals for the MICA's established clients.

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[10] *iTMS, PW Consulting Users Guide, Version 5.0 VM*

Module Four

- **Automated Invoicing and Financial Module** - is not used by MICA to generate client payment invoices and receipts. Payment invoices are instead created in QuickBooks, and handwritten payment receipts are issued to the clients, from Treasury-issued receipt books. The decision was made to use QuickBooks, because the format of the financial data extracted from the iTMS, and required by MICA's accountants and auditors to prepare the annual financial statements, is not compatible with QuickBooks. An attempt was made to integrate QuickBooks with the iTMS; however, it was unsuccessful as a result of incompatibility issues.

3.12 **Initial iTMS software licence agreement**. The MICA signed a software licence agreement with PWCI in October, 2013, for the implementation of the iTMS enterprise software. The services to be provided by PWCI at the time included: (a) the installation of the iTMS core system, automated invoicing and financial history module; (b) populating the iTMS database with client and spectrum information provided by the MICA; and (c) the training of the MICA's staff to use iTMS.

3.13 In this initial software licence agreement, PWCI was not responsible for: (a) setting up an internet-ready network infrastructure for the MICA, or (b) installing the web server software (Apache), the SQL open source data relational management database (MySQL), and the Operating System on the MICA's intranet server. By its own request, the above tasks were undertaken by MICA.

3.14 **Ownership of the iTMS enterprise software, MICA's client and spectrum data.** PWCI retains the ownership of all patents, copyrights, trade secrets, trademarks, and other intellectual property right pertaining to the ITMs software. The MICA owns all of Montserrat's client- and spectrum-related data that are entered and stored in the ITMS database.

3.15 **Features of iTMS software.** The iTMS software is web-based, and the iTMS database can be accessed from any ICT device that has Internet or Wi-Fi connectivity, by typing in a secured URL (Universal Resource Locators) address, in the web browser (for e.g., Internet Explorer, Google Chrome, Mozilla Firefox, Microsoft Edge, or Opera). Log-in is via a customised splash-screen window.

3.16   The iTMS software is well-designed with very straightforward, user-friendly modules.   Each web page consists of application controls for the accurate input and capture of client and spectrum-related information, such as: text fields; dropdown menus with correct options; check boxes; embedded calendars; contained and action buttons (Quick Search, Renew Licence); and navigation links at the bottom of each window (Function keys, Main Menu, System Hub, etc.).   Other application controls include indicator error validation, invalid, and notification or informational messages.   These occur, for example: (a) when the data entered are incorrect; (b) when input is incomplete and an action is required; or (c) when there is an invalid server response when a request does not reach the server as expected.

3.17   Supporting electronic documents can be uploaded and saved in the iTMS, and the client database can be searched, sorted, and displayed by name or unique identifier number on the screen, or listed in printable system-generated reports.   The iTMS client reports are created in Microsoft Excel spreadsheets, and each report has four (4) worksheets that contain the information related to the person or entity categorised as *Customer Profile*, *Applications*, *Spectrum Information* and the type of service, for e.g. Amateur Radio.

3.18   There are information-security controls such as logical access control built into the system, via individual user accounts with unique user IDs and encrypted passwords.   There are three types of users: (i) Administrator, (ii) Supervisor and (iii) User.   The Administrator is responsible for the creation and the oversight of the user accounts.   Once an account is created, the status is set to 'Active', and each user is assigned access rights and privileges to use specific components of the iTMS (restricted), or the entire system, in keeping with their job role/function (per the principle of the segregation of duties).   Access to the system can be blocked by either suspending the user's account, or deleting it.

3.19   The system is also set to time-out after 20 to 30 minutes of inactivity, and users are required to log back into the iTMS with their unique user ID and password.   Other security control measures in place are timestamps that record when a user logs in/out, his/her name, the date, and the time, which are displayed at the top of the window.   Audit logs are also created to record all user activity each time they sign into iTMS; that is, the insertion, modification, or deletion of information.

3.20   **Help Desk support.** Whenever technical issues occur with the iTMS, beyond the MICA's main end user's knowledge, they are referred to the PW Consulting's Help Desk via

e-mail, direct telephone calls, or WhatsApp calls and text messaging.   Depending on the severity of the problem(s), the reported issues are usually resolved within a few hours.

3.21   **Administration of the Montserrat Info-Communication Authority's local server.**   The MICA contracted the services of a local System Administrator (SA), who is solely responsible for the oversight and the maintenance of the Authority's intranet server. The local SA's role is to ensure that the MICA's network and server are operational; that the Operating System is well maintained; and that the mission-critical applications and resources on the server are always available to the MICA's staff.

3.22   The MICA's local SA does not have an account or authorised login credentials for the iTMS.   Therefore, everything else in relation to the administration of the iTMS system is performed by the software contractor PWCI: such as, troubleshooting, software updates and/or upgrades, and patches.

Figures IV to VIII – Screenshots of iTMS the modules, features, and sample client report

CHAPTER 4   CHANGES AND FUTURE INITIATIVES

Changes in iTMS

Data Integrity Project

4.1   [11]In 2019, the MICA detected and reported to the contractor several gaps and inconsistencies in the original data that were used for the initial population of the iTMS. In response, PWCI carried out a Data Integrity Project to improve the usability and reliability of the various data sets in the iTMS. The PWCI did a comprehensive review and modification of the software, including the existing five (5) Spectrum ANNEX Types in the iTMS Spectrum Module.

4.2   The project steps involved the:

- review of existing source data and filling the data gaps;

- cleansing of the source data;

- identifying, prioritising, and extracting each standardised datasets for each Spectrum ANNEX;

- inclusion of Authorised Frequencies details in the iTMS Licensing Module (Reporting functionality);

- modifying the iTMS Spectrum Module to utilise the standardised datasets;

- reviewing of the datasets and cleansed data;

- establishing, converting, and uploading of the Data of Record into the iTMS;

- updating and testing of the modified the iTMS production system;

- creation of a new Spectrum Report for the MICA.

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[11]*Data Integrity Project, Integrated Telecommunications Management System, Updated Time & Materials Quotations for Software and Professional Services, September 26 2019, Prepared by Jim Stewart, Project Manager, PWC*

Self Serve for Type Approvals Project

4.3   The Self Serve for Type Approval online portal project commenced at the MICA in October 2019, (and is still currently in progress); and the purpose of implementing this module, is to automate and streamline the administration of the Type Approvals process. Therefore, when the Self Serve project is concluded, it will permit the MICA's new applicants and established clients alike, to securely sign into the iTMS via a web URL address to create, to pay, and to review submitted and approved applications.

4.4   The Self Serve module will be very beneficial to the MICA and its clients, as it will:

- enable clients to gain access at any time, from anywhere, in the world;

- reduce the need for, and the costs of postage or couriering of documents to the applicants or clients;

- reduce time and effort taken to process the applications and to issue the licences; and

- increase customer satisfaction.

Figure X – iTMS Self Serve Window
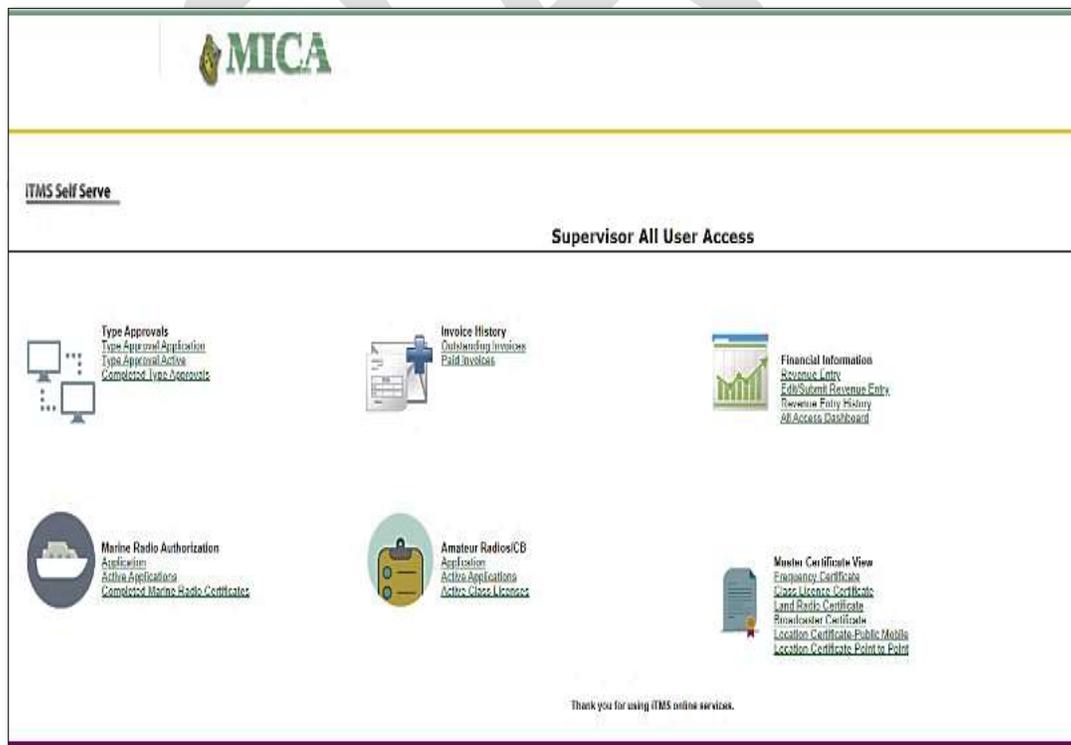
Future Initiatives

Integration of PayPal

4.5   The MICA has plans to integrate the online payment system, PayPal, with the iTMS. This will enable applicants and clients to make convenient direct payments to the MICA through the Self Service online portal.   It will significantly reduce the time and expenses related to the approval of applications and the issuance of licences.

CHAPTER 5 FINDINGS AND RECOMMENDATIONS

Findings

5.1   **Logical access security risk**.   The MICA's staff and select members of the Board have their own unique user ID and password to log into the office computers and the iTMS system.   However, it was realised that some of the employees practise the sharing of their unique log-in credentials to their individual iTMS user account, with provisional administrative staff.   This sharing of unique log-in credentials is a very poor and risky practice, as dishonest or disgruntled temporary employees can conduct fraudulent and underhanded activities under the guise of being one of the MICA's authorised users. Notably, this ritual is unnecessary, as the MICA's staff have the system Administrative capacity, and were trained, to create and to manage users' accounts and passwords.

5.2   **No backup generator.** There is no backup generator at the building complex where the MICA is located.   Therefore, in the event of loss of electrical power, the MICA's employees are unable to gain access to their personal computers and the iTMS system.

5.3   **The Self Serve feature still in testing phase.** Currently, the Self Serve online portal is still in the testing phase since 2019. It was pointed out that testing phase was stalled mainly owing to the:

(a)   onset of the COVID-19 pandemic in 2020, and

(b)   very low participation of the MICA's clients with the testing of the online portal.

5.4   **Business continuity measures.**   There is a contingency measure in place that enables the MICA's staff to continue to use the iTMS system if the local service providers' Internet service is interrupted. Continuity of the Authority's business operations is possible via a system-specific URL address that enables direct access to the iTMS, on the MICA's intranet server.   However, this is reliant on network connectivity between the office computers and the intranet server.

5.5   MICA's employees have indicated that although they are aware of this contingency measure, they have not been using the URL address when there is disruption to the Internet connectivity.

Recommendations

5.6   Creation of temporary user accounts and password management.
Both the Corporate Secretary and the Executive Manager have the Administrative rights
and privileges (and were trained), to create the iTMS user accounts, and to assign the
appropriate system user access rights and job role privileges for users.   Hence, it would be
practical for them to create and to issue restricted/limited user access to provisional staff,
instead of continuing to share personal login credentials, as this poses a high security risk.
The accounts can either be disabled or deleted when the temporary workers leave; and
reactivated if necessary.

5.7   Procurement of a back-up generator.   The MICA should consider making a
business case to the owner of the building, and/or to the GoM, for the procurement and
maintenance of a small back-up generator for continuity of the Authority's business
operations.   This auxiliary source of power will ensure the maintenance of network
connectivity between the staff's computers and the MICA's local server, and direct access
to the iTMS system in the event of power outages; especially during the aftermath of
inclement weather.

5.8   Re-commencement of testing the Self Serve online portal.   MICA's staff
should renew their efforts to solicit the assistance of the customers to test the Self Serve
online portal, in order to expedite the implementation process of this module.   Clients can
be contacted via local telephone calls, or by posting of the guidelines on how to use the
test feature, on MICA's website.

5.9   Use of business continuity measure to access iTMS. The MICA should
commence using the system-specific URL address (reactive measure) that was provided by
the contractor.   This would provide the MICA direct access to the iTMS system for
continuity of business, whenever there is a disruption in Internet connectivity.

CHAPTER 6   AUDIT CONCLUSION

6.1   The Office of the Auditor-General has determined that the web-based Integrated Telecommunications Management System is very comprehensive, well-designed, and user friendly.   The customised iTMS system provides the Montserrat Info-Communications Authority's staff with most of the tools that are required to meet the MICA's work objectives, and delivers the anticipated benefits.

6.2   The audit has concluded that the iTMS system is under-utilised within the MICA. We also found that the employees' level of knowledge regarding the modules and the features offered is fairly basic, although training and a detailed Users Guide were provided by the contractor.   Expectedly, the implementation of the Self Serve module, and the recruitment of a Spectrum Management Engineer, will increase the regularity and the scale of the use of the software.

Subsequent Events

6.3   In an effort to expedite the implementation of the Self Serve feature, the MICA has resumed soliciting help from its clients to test the feature, when they apply for renewals of their licences or for new services.

6.4   In addition, the MICA decided to abort the original plan to integrate the iTMS with PayPal. Instead, the organisation has decided to utilise the Bank of Montserrat's merchant application instead.

CHAPTER 7   MANAGEMENT RESPONSE

7.1   In general, the Management concurs with the key observations made in relation to the initial implementation, subsequent review and development of the ITMS.   However, Management submits its responses to specific observations/recommendations collated from discussion of Management stakeholders with the Chairman.   These conclusions are captured in the table below:

ITEM REFERENCE:	AUDITOR'S FINDINGS:	AUDITOR'S RECOMMENDATIONS:	MICA'S MANAGEMENT RESPONSE:
Pages 19 and 20	**Logical access security risk.** The MICA's staff and select members of the Board have their own unique user ID and password to log into the office computers and the iTMS system. However, it was realised that some of the employees practise the sharing of their unique log-in credentials to their individual iTMS user account, with provisional administrative staff. This sharing of unique log-in credentials is a very poor and risky practice, as dishonest or disgruntled temporary employees can conduct fraudulent and underhanded activities under the guise of being one of the MICA's authorised users. Notably, this ritual is unnecessary, as the MICA's staff have the system Administrative capacity, and were	5.6 **Creation of temporary user accounts and password management.** Both the Corporate Secretary and the Executive Manager have the Administrative rights and privileges (and were trained), to create the iTMS user accounts, and to assign the appropriate system user access rights and job role privileges for users. Hence, it would be practical for them to create and to issue restricted/limited user access to provisional staff, instead of continuing to share personal login credentials, as this poses a high security risk. The accounts can either be disabled or deleted when the temporary workers leave; and reactivated if necessary.	Management agrees with this observation, but must point out that this practice of sharing individual login credentials occurs only in the case of a person substituting for the Corporate Secretary. This substitute carries out the functions of the Corporate Secretary, and must of necessity have access to the relevant data, including email and files send by the Secretary. This logon credential to the Corporate Secretary's computer and the local network requires a password change every 30 days. While acknowledging that some risk is involved, Management concludes that the heavy fines outlined in the Act, for the kind of conduct suggested in the report, would serve as a fitting deterrent to any employee of MICA who may be so inclined.

ITEM REFERENCE:	AUDITOR'S FINDINGS:	AUDITOR'S RECOMMENDATIONS:	MICA'S MANAGEMENT RESPONSE:
	trained, to create and to manage users' accounts and passwords.		
Pages 19 and 20	5.2 **No backup generator**. There is no backup generator at the building complex where the MICA is located. Therefore, in the event of loss of electrical power, the MICA's staff are unable to gain access to their personal computers and the iTMS system.	5.7 **Procurement of a back-up generator.** The MICA should consider making a business case to the owner of the building, and/or to the GoM, for the procurement and maintenance of a small back-up generator for continuity of the Authority's business operations. This auxiliary source of power will ensure the maintenance of network connectivity between the staff's computers and the MICA's local server, and direct access to the iTMS system in the event of power outages; especially during the aftermath of inclement weather.	Management agrees that this is a reasonable proposal. However, the Authority will need to justify this additional expenditure in relation to the actual benefits that will accrue from this expenditure. Fortunately, power outages have become less frequent, and the outages have not been extended.
Pages 19 and 20	**The Self Serve feature still in testing phase.** Currently, the Self Serve online portal is still in the testing phase since 2019. It was pointed out that testing phase was stalled mainly owing to the: (i) onset of the COVID-19 pandemic in 2020, and (ii) very low participation of the MICA's clients with the testing of the online portal.	**Re-commencement of testing the Self Serve online portal.** MICA's staff should renew their efforts to solicit the assistance of the customers to test the Self Serve online portal, in order to expedite the implementation process of this module. Clients can be contacted via local telephone calls, or by posting of the guidelines on how to use the test feature, on MICA's website.	The Self-Serve module has been in use for Type Approval processing for some time, but payments were made by electronic payment through the local banks. As the Authority sort to minimize the increasing difficulty and high cost of bank transfers that resulted from the loss of the Intermediary Bank. The new Self-Serve option for online credit card payments, has been changed from being processed by PayPal, to being processed by the Bank of Montserrat, using the Caribbean Credit

ITEM REFERENCE:	AUDITOR'S FINDINGS:	AUDITOR'S RECOMMENDATIONS:	MICA'S MANAGEMENT RESPONSE:
			Card Corporation (4Cs) Online Processing of credit/debit card transactions. **Subsequent Events** Shortly, MICA will be soliciting the help from clients to test the new Self-Serve Credit/Debit Cards feature, when they apply for renewals or new services.
Pages 19 and 20	5.4 **Business continuity measures.** There is a contingency measure in place that enables the MICA's staff to continue to use the iTMS system if the local service providers' Internet service is interrupted. Continuity of the Authority's business operations is possible via a system-specific URL address that enables direct access to the iTMS, on the MICA's intranet server. However, this is reliant on network connectivity between the office computers and the intranet server. 5.5 MICA's employees have indicated that although they are aware of this contingency measure, they have not been using the URL address when there is disruption to the Internet connectivity.	5.9 **Use of business continuity measure to access iTMS.** The MICA should commence using the system-specific URL address (reactive measure) that was provided by the contractor. This would provide the MICA direct access to the iTMS system for continuity of business, whenever there is a disruption in Internet connectivity.	Management agrees that staff should commence using the system-specific URL address to gain access to the iTMS whenever there is a disruption in internet connectivity. **Update on URL Processing.** The URL that MICA uses, if used inside the network in the Office, routes internally to the server. This means that if the internet goes down, they will not be impacted. This happens with changes to the Host Record in the Hosts File on the individual's computer. URL will not work, if it is accessed outside of the office environment.

APPENDICES

Appendix I – Info-Communication Development Act 2009, Functions of the Authority

(a) any act or omission of the Board; or

(b) anything done or permitted in good faith in the course of the operations of the Authority under this Act.

(2) Any sums of money, damages or costs recovered against the Authority or any member of the Board for anything done, omitted or permitted in good faith in the course of the operations of the Authority shall be paid out of such amounts as may be appropriated by Legislative Assembly.

(Amended by Act 9 of 2011)

Functions of the Authority

18. (1) Subject to the provisions of this Act, the Authority may exercise such functions and powers as are imposed on it by this Act and in particular to—

(a) promote the efficiency and regional and international competitiveness of the info-communications industry in Montserrat;

(b) ensure that info-communications services are reasonably accessible to all people in Montserrat and are provided as economically as practicable and at performance and standards that meet the social, industrial and commercial needs of Montserrat;

(c) promote effective participation of all segments of the info-communications industry on the Island in the domestic, regional and international markets;

(d) serve as the national, regional and international representative body of Montserrat in respect of info-communications matters;

(e) advise the Government on national needs and policies in respect of all info-communications technology matters and those pertaining to the Authority in general;

(f) make recommendations to the Governor acting on the advice of Cabinet through the Minister on the granting of concessions and monitor and ensure compliance with the conditions set out therein;

(g) exercise licensing functions, and regulatory functions in respect of info-communications systems and services in Montserrat, including establishment of standards and codes relating to equipment attached to info-communications systems, and any software or software used as an adjunct to or in conjunction with such systems and the monitoring of access to such equipment and software;

(h) exercise licensing and regulatory functions in respect of the allocation and use of satellite orbits and allocation, reallocation and monitoring of radio frequency spectrum in Montserrat for all purposes, including the establishment of standards and codes relating to any matter connecting therewith;

(hh) to regulate the importation, exportation, sale, installation, use, and trading of terminal equipment, including the authorisation and registration of terminal equipment dealers;

(i) exercise licensing and regulatory functions in respect of installation, use and provision of undersea cable, cable frontier stations and satellite stations, receivers and transmitters in Montserrat and all equipment used in connection therewith;

(j) where required by the Minister, use its facilities to provide training for the purpose of advancing the skill and knowledge of persons in Montserrat in any area of the info-communications industry where the Authority has developed the requisite skill and knowledge to undertake such training;

(k) promote, develop, facilitate and implement info-communications systems and services for Government, ministries, departments and agencies;

(l) advise on, establish and maintain standards of education and training in info-communications technology in Montserrat;

(m) establish and maintain, to the extent permitted by any law, standards and codes for monitoring and regulating of such aspects of info-communications technology, data privacy and protection as the Authority thinks fit;

(n) promote the use of Internet and electronic commerce, the acceptance of info-communications technology in Montserrat and establish regulatory framework for that purpose;

(o) provide consultancy and advisory services concerning info-communications technology;

(p) determine universal service obligations throughout the Island, pursuant to section 27, and ensure that such obligations are realised;

(q) ensure compliance with the Convention;

(r) determine and approve prices, charges and tariffs for provision of info-communication services and facilities and bill and collect all fees, including concession and license fees, numbering fees and any other charges levied under this Act;

(s) investigate and resolve all allegations of harmful interference;

(t) investigate complaints by users, operators of info-communications services or other persons arising out of the operation of a public info-communications network, or the provision of public info-communications networks, providers of info-communications services, in respect of rates, billings and services provided generally and to facilitate relief where necessary; and

(u) implement and enforce the provisions of the Act and the policies, regulation and rules made hereunder.

(2) In the performance of its functions the Authority shall have regard to—

(a) efficiency and economy;

(b) the social, industrial and commercial needs of Montserrat for info-communications services;

(c) the state and trends in the development of info-communications technology and the evolution of international standards and protocols in the info-communications industry;

(d) ongoing convergence among broadcasting, telecommunication and computing platforms and the need to accommodate technology applications which are driving such change;

(e) improvement in the effective and efficient use of radio frequency spectrum;

(f) fair treatment of consumers and service providers similarly situated;

(g) respect of consumers similarly placed, to non-discrimination in relation to access, pricing and quality of service; and

(h) national environmental policy.

(3) In the performance of its functions under subsection (1)(b), (c), (e), (h) and (r) and any other provisions of the Act as the Authority shall have discretion to adopt procedures by which would—

(a) afford interested parties and the public opportunities for consultation;

(b) permit affected persons and the public to make appropriate submissions to the Authority.

(4) At all times, the Authority shall, in the performance of its functions and duties and exercise of its powers, act in an objective, transparent and non-discriminatory manner.

(Amended by Acts 9 and 15 of 2011)

Montserrat

Info-Communications Development (Amendment) Act 2011

No. 15 of 2011

1. **Short title**

This Act may be cited as the Info-Communications Development (Amendment) Act, 2011.

2. **Interpretation**

In this Act-

"principal Act" means the Info-Communications Development Act, 2009.

3. **Section 2 amended**

Section 2 of the principal Act is amended by—

inserting, immediately below the section heading "Interpretation", the following chapeau:

"2. In this Act—"; and

inserting, in the appropriate alphabetical order, the following definition:

""terminal equipment dealer" means a person who imports, exports, repairs, maintains, sells or trades in terminal equipment in any manner;".

4. **Section 18 amended**

Section 18 of the principal Act is amended in subsection (1) by inserting, immediately after paragraph (h), the following paragraph:

"(hh) to regulate the importation, exportation, sale, installation, use, and trading of terminal equipment, including the authorisation and registration of terminal equipment dealers;".

3

Appendix II - Extract from Constitution of the ITU

CHAPTER VII

Special Provisions for Radio

ARTICLE 44

PP-98

Use of the Radio-Frequency Spectrum and of the Geostationary-Satellite and Other Satellite Orbits

195
PP-02

1   Member States shall endeavour to limit the number of frequencies and the spectrum used to the minimum essential to provide in a satisfactory manner the necessary services. To that end, they shall endeavour to apply the latest technical advances as soon as possible.

196
PP-98

2   In using frequency bands for radio services, Member States shall bear in mind that radio frequencies and any associated orbits, including the geostationary-satellite orbit, are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to those orbits and frequencies, taking into account the special needs of the developing countries and the geographical situation of particular countries.

Table 3: Montserrat's Dialing Scheme

Type of Calls	Existing Dialing Procedure
Inter-exchange	7 digits (May not be applicable)
- Unassisted	0 + 7 digits
- Operator assisted	
Automatic Intra-exchange	7 digits
International to World Zone 1 (WZ1)	
- Unassisted	1+NPA+7 digits
- Operator assisted	0+NPA+7 digits
International outside WZ1	
- Unassisted	011+ Country Code + national number
- Operator assisted	01+ Country Code + national number
Local Operator	0
Directory Assistance	3 digits
Emergency	
- Police	3 digits
- Fire	3 digits
- Ambulance	3 digits

Appendix IV – Montserrat's CO Code Allocation and Assignment

Type of Service	CO Code/Number
PSTN Expansion	414
PSTN Expansion	415
PSTN	491
Post-paid Cellular	492
Pre-paid Cellular	493
Fixed Cellular (new)	349
GSM Mobile Post-paid	495
GSM Mobile Pre-paid	496
Audio-text (USA)	492-0000, 492-7999
Audio-text (USA)	492-3000, 492-0999
Audio-text	410
Audio-text	412
Audio-text	413
Directory Services	411
Internal Dispatch	114
Police	999
Emergency/Fire	911
Emergency/Ambulance	311
Customer Care Services	211
Contact Centre	1-800-804-2994

Appendix V – Sample Amateur Radio Station Licence

AMATEUR RADIO STATION LICENCE

Name of Licensee

Address   Look Out, Montserrat

Call Sign

Amateur Radio Licence Class   ADVCLS

Maximum Power   1 KW

Amateur Bands Authorized   ALL Bands

Type of Emission   A1, A3, F3

This Licence issued to the Licensee is hereby authorized, subject to the provisions of the Info-Communications Development Bill, 2009
(hereinafter referred to as the Act) and the conditions contained in this Licence, to establish, operate and use the radio-transmitting
equipment identified in Schedule A to this Licence, to use the radio frequencies identified in Schedule B to this Licence,
and to establish, operate and use the related radio-communications equipment to provide amateur radio communications.

EMCI No

Licence No.

Date of Issue   2022-01-04

Date of Expiry   2023-01-03

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Executive Manager
Montserrat Info-Communications Authority