

**Access to Microfinance & Improved Implementation of Policy Reform
(AMIR 2.0 Program)**

Funded By U.S. Agency for International Development

Spectrum Management Assistance

Final Report

**Deliverable for ICTI Component, Task No. 423.4
Contract No. 278-C-00-02-00210-00**

September 2002

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**ESTABLISHMENT OF THE SPECTRUM UNIT IN THE MINISTRY OF
COMMUNICATIONS AND INFORMATION TECHNOLOGY**

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EXECUTIVE SUMMARY

A plan has been developed to provide for the establishment of a unit within the Ministry of Information and Communications Technology (MoICT) of the Hashemite Kingdom of Jordan to prepare the National Plan for Frequency Assignment and the National Register of Frequencies in accordance with the Amended Telecommunications Law of 2002. This plan will result in the private sector, the civilian sector of the Government and the military and security agencies sharing information regarding the use of the spectrum in Jordan for the first time. This study was designed to assist the Minister of Information and Communications Technology in improving the management of the radio spectrum within Jordan and enabling greater commercial use of the radio frequency to support overall economic development. The project involved identifying those issues that needed to be addressed to implement a cohesive working unit housed in the MoICT responsible for maintaining the National Plan for Frequency Assignment and the National Register of Frequencies. It is anticipated that this project will lead to a more efficient and effective spectrum management process by clearly identifying the respective uses of the spectrum resource by the civilian and military users within the Kingdom. The result of the effort is a series of recommendations for establishing the Spectrum Unit in the MoICT and for assisting the Minister, His Excellency, Dr. Fawaz Hatim Zu'bi (the Minister), and the Telecommunications Regulatory Commission (TRC) to continue to effectively plan for advancing commercial use of the spectrum within Jordan.

The consultant visited the Kingdom of Jordan from August 4-15, 2002, and met with the Minister and government personnel involved in the management of the radio spectrum in Jordan, including members of the staff of the TRC, the Royal Signal Corp (RSC), and the General Intelligence Directorate (GID). The recommendations given in this report are based on those meetings, materials provided to the consultant, and international best practices.

To facilitate the establishment of the Spectrum Unit in the MoICT, the following is recommended:

- 1) Appoint a program manager to oversee the construction of the Spectrum Unit's space.
- 2) If applicable, and/or required, seek funding to support the housing of the Spectrum Unit at the Ministry and the Spectrum Unit's ongoing operations.
- 3) Develop and circulate the specific functions of the MoICT Spectrum Unit
- 4) Press to have the TRC, RSC, and GID identify the personnel who will be assigned to the Spectrum Unit by the end of October.
- 5) The Spectrum Unit should be staffed with professional-level persons from the TRC (1 staff member), the GID (1 staff member), and the RSC (2 staff members).
- 6) The terms of the appointment of the professional staff at the Spectrum Unit should be 2 years.
- 7) The staff of the Spectrum Unit should have no other responsibilities than those required to carry out their roles at the MoICT.
- 8) The RSC (Director of the RSC, or his representative at the Spectrum Unit) should provide the management oversight of the Spectrum Unit and report directly to the Minister of Information and Communications Technology.

- 9) All professional staff at the Spectrum Unit should have access to all of the contents of the National Register of Frequencies.
- 10) When called upon to do so, the staff of the Spectrum Unit shall assist the spectrum management functions of the TRC and of the RSC and the GID.
- 11) Enlist the services of a consultant experienced in developing and utilizing spectrum-use databases and the associated hardware and software to assist in the initial operation of the Spectrum Unit.

I. INTRODUCTION AND BACKGROUND

Telecommunications and information technologies are an integral part of a country's financial services, commodities markets, media, transportation and the travel industry. They provide vital links among manufactures, wholesalers and retailers. Increasingly, wireless systems, with their ease in portability and mobility, are being used to enable upgrades and improvements to telecommunications infrastructures in a time-frame and on an economic scale that is far less than that for corresponding wireline infrastructure upgrades and build-out. A key element to improving the telecommunications infrastructure by use of radio-based systems and services is an efficiently managed, modern spectrum management system.

The Kingdom of Jordan's Law Amending the Telecommunications Law of 2002 (hereafter referred to simply as "the Law") defines the organizational responsibilities within the Kingdom for management and regulation of the spectrum used to provide wireless systems. The Telecommunications Regulatory Commission (TRC) has the primary authority to regulate the use of the radio frequency spectrum in Jordan. However, the responsibilities to prepare the National Plan for Frequency Assignment and the National Register of Frequencies are shared with the armed forces and the security services. The Ministry of Communications and Information Technology (MoICT) provides the facilities to allow the TRC and the armed forces and security agencies to prepare and maintain these databases, as well as preparing coordination procedures between all interested parties.

The powers and duties of the TRC are stated unequivocally in Article 6 of the Law. Article 6i addresses specific responsibilities of the TRC for spectrum management:

"To manage the use of the Radio Frequency Spectrum, whether terrestrial, maritime, aviation, or satellite-based, including:

1. Preparing and maintaining the "National Table of Frequency Allocations."
2. Preparing the "National Plan for Frequency Assignment" and "National Register of Frequencies," in coordination with Armed Forces and Security Agencies.
3. Maintaining the civilian portion of the "National Plan for Frequency Assignment" and the "National Register of Frequencies," and making it publicly available."

So that there can be no misunderstanding, specific definitions are given in Article 2 of the Law for the terms National Table of Frequency Allocations, National Plan for Frequency Assignment and National Register of Frequencies. These definitions are:

National Table of Frequency Allocations: The table containing the division of the radio frequency spectrum into bands, in such a way as to permit the use of such bands to provide certain types of service, in line with the International Telecommunication Union's Table of Frequency Allocations.

National Plan for Frequency Assignment: The plan including the technical standards established by the Commission for the use of frequency bands, as shown in the National Table of Frequency Allocations, taking into consideration the requirements of national security in their use.

National Register of Frequencies: The special register containing all the information related to channels and frequencies which are assigned to civilian Radio Stations and others.

In Article 30 of the Law, it is stated that: “The Radio Frequency Spectrum is a national resource the use of which shall be regulated by the Commission pursuant to this Law.” (Underline added for emphasis.) The TRC is instructed: “...to prepare and maintain the tables, plans, and registers necessary for this purpose as specified in this Law. The civilian portion of the spectrum use shall be publicly available.”

The rights that the Jordanian armed forces and security agencies have in using spectrum and operating spectrum-dependent systems and services is given in Article 31(b) of the Law. Article 31(b) states:

“The Jordanian Armed Forces and Security Agencies, in coordination with the Commission, have the right to use existing radio frequency bands, which have been assigned for their use without a License, provided that no interference is caused thereby to other radio frequencies. The military and security bodies may also use other frequencies only upon the approval of the Commission, provided that such use is subject to the same licensing conditions applicable to other Licensees, and shall not cause harm to other users of radio frequencies; in this case they shall be exempted from the payment of license fees.”

The role of the Ministry of Communications and Information Technology in spectrum management is given in Article 3(j) of the Law. This article states that the MoICT is:

“To provide the necessary facilities to allow the Commission and designated members of the armed forces and security services to prepare the National Plan for Frequency Assignment and the National Register of Frequencies; to maintain these in the Ministry and prepare procedures for the coordination among these parties so as to ensure the optimal use of the radio frequencies and to prevent harmful interference between frequencies assigned for civilian and military uses.”

It is the establishment of these facilities within the MoICT that form the basis for this report.

II. ISSUES RELATED TO ESTABLISHING THE SPECTRUM UNIT IN THE MOICT

Shortly after arriving in Jordan on August 4, 2002, the consultant met with His Excellency, Dr. Fawaz Hatim Zu'bi, Minister of Communications and Information Technology (hereafter the Minister), and was requested to develop the procedures and recommendations necessary to establish a group within the MoICT building consistent with the Law. All other tasks during this particular consultancy were to be secondary to developing the parameters for the Spectrum Unit.

Following the meeting with the Minister, detailed discussions concerning the implementation of the Spectrum Unit in the MoICT were undertaken with Mr. Mamoun Balqar, Director General of the TRC, and Mr. Roger Guichard, Telecommunications Project Manager of the AMIR 2.0 Program. Mr. Balqar arranged a meeting on August 6 with the responsible representatives from the TRC, the military (Royal Signal Corp – RSC), and the security forces (General Intelligence Directorate - GID).

The discussions during the August 6 joint meeting were based on the following outline prepared by the consultant:

A. Personnel Issues

1. Functions required
 - a. Develop and maintain National Register of Frequencies
 - b. Develop and maintain National Plan for Frequency Assignment
 - c. Coordinate on a continuous basis with the TRC, RSC and the GID
 - d. Provide written and oral summaries of status of frequency use in the Kingdom
2. Number of professional staff required
 - a. At least one each TRC, RSC and the GID
 - b. Support staff
 - i. Computer programmer, data clerk, secretary, aid
3. Qualifications and background
 - a. Professional staff
 - i. Engineering degree with 5 years experience working in areas related to spectrum management issues
 - ii. Detailed understanding of spectrum use policy issues of the Kingdom
 - iii. Graduate level understanding of basic radio propagation phenomena as it relates to sound spectrum management principles
 - iv. Experienced in resolving interference issues
 - v. Familiarity with the structure of the International Telecommunication Union and other international/regional telecommunications organizations
 - vi. Able to articulate views and findings verbally and in written form in a coherent and concise manner
 - b. Computer programmer
 - i. Degree in Computer science or electrical engineering with a minor in computer programming

- ii. Experienced in working with the *types* of computer software (not necessarily the exact software) used by the Spectrum Unit
 - iii. Expertise in handling large data bases
 - iv. Understanding of spectrum management terms and processes
 - c. Data clerk
 - i. Experience handling frequency assignment data
 - ii. Experience working with large data bases
 - d. Secretary
 - i. Experienced working with Microsoft Office XP, assuming that Microsoft Windows XP will be the operating system for the administrative functions of the Spectrum Unit
 - 4. Reporting structure
 - a. Spectrum Unit reports directly to the Minister
 - b. Need for a “Coordinator” to assure optimum workflow
 - i. Probably does not require a full-time position
 - ii. Could be rotated on a yearly basis between the TRC, RSC, and GID – excluding the individuals assigned to the Spectrum Unit Director, RSC
 - 5. Tenure
 - a. Professional staff - assignment duration of 1-2 years to be reviewed after that time and modified if needed
 - b. Support personnel – no limit
 - c. Training of staff – Who pays? Who supports?
 - 6. Position descriptions: To be developed as part of implementation of the Spectrum Unit
 - 7. Other issues
 - a. All personnel assigned to the Spectrum Unit must be able to obtain the appropriate security clearance.
 - b. Salaries and support for all staff paid by the Ministry.
- B. Space Issues
 - 1. Size of area to be occupied
 - a. MoICT lower level – former training area
 - 2. Controlled Access
 - a. Restricted entrance - guarded area to the lower level
 - b. Vault-like entrance into the work area
 - c. Server/computer housing data bases contained within a smaller vault-like structure
 - 3. Who has access in addition to assigned personnel?
 - a. Minister, Directors TRC, RSC, GID
 - 4. Office set-up
 - a. Four separate offices – one each for TRC, GID rep, 2 for RSC, programmer occupies space with the servers
 - b. Server area
 - c. Individual desks for all staff
 - d. Conference room
 - e. Lavatories
- C. Security issues
 - 1. Level of security

- a. Level set by that necessary to protect the data at its required level
 2. Clearance procedures, if applicable
 - a. Need to establish if outside persons can gain access to the facility
 - i. If so, then procedures must be adopted to determine need-to-know requirements
 3. Access to databases
 - a. The TRC, RSC, GID personnel assigned to the Spectrum Unit will have access to the general data description, i.e. what frequency is being used, and where deployed - such as a region or a city
 4. Control of database contents
 - a. The TRC, RSC, GID personnel assigned to the Spectrum Unit have the final say regarding the contents of the database
 5. Database support
 - a. RSC to provide
 6. Cameras
 - a. Two to be installed – one looking at entrances, one looking in the equipment area
 - b. GID to take responsibility to implement
- D. Infrastructure issues
1. Commercial phone lines supporting voice and fax
 - a. Each desk should have its own unclassified telephone
 2. Internet access
 - a. Needs to be at least the data rate at the TRC
 3. Need for secure communications between “Spectrum Unit” and GID and military offices?
 - a. If required, data rate must be high enough to support the largest requirements
 - b. Level of security of the communications must be established
 4. Secure phones, faxes, email
 - a. Secure phones, faxes, copiers should be separate and distinct from the unclassified equipment - one secure phone and one secure fax
 5. Leased lines from organizations to MoICT
 6. Transportation – Driver/automobile (funded by whom?)
 7. Need for encryption – Must be determined
- E. Hardware issues – Ministry to take care of
1. Who oversees the procurement and installation of hardware during the setup phase of the Spectrum Unit?
 2. Computers/Workstations
 - a. Is there uniformity in the hardware used by the spectrum management staff at the TRC and the RSC?
 - b. Need:
 - i. Server with a backup
 - ii. Estimate 10 workstations networked together
 - iii. Plotters, faxes, printers, copiers – separate ones for unclassified and classified information
 - iv. Networking hardware – to be determined
 3. Phones, fax machines
 - a. Separate ones for unclassified and classified information

4. Wideband Internet access
 5. Who provides hardware support?
 - a. Internal to “Spectrum Unit” or from outside
 - b. Can this be done by the RSC? The TRC?
- F. Software issues – Ministry to take care of
1. Who oversees the procurement and installation of software during the setup phase of the Spectrum Unit?
 2. Programs
 - a. Latest Windows Operating system
 - b. Normal Office programs
 3. Need for specialized database software?
 - a. GIS/Terrain data bases
 - b. Frequency assessment programs providing interference assessment
 4. Training of personnel with the customized software
 - a. Backup when staff is in training
 5. Need for obtaining software license
 6. Who provides software support?
 - a. Internal to “Spectrum Unit” or from outside
 - b. Can this be done by the RSC? The TRC
- G. Further hardware and software considerations:
1. Server: The major issue is storage capacity and this depends on how much space each assignment will take with the expectation that existing and future records will grow in size. As an example, the U.S. Department of Commerce’s National Telecommunications and Information Administration (NTIA), the spectrum manager for the U.S. Federal Government’s use of the spectrum, has HP1000s and the biggest servers they could buy. They have one server just for the people who maintain and work with the Government Master File (GMF).
 2. Computers and System: The number and type of computers that must be used depend on how many people will have access to the frequency assignment databases and the different access levels. Firewalls will have to be implemented so that people can not gain access unless they have the proper clearances. At NTIA each member of the GMF staff has at least one computer – most have two – because they have a physical break between the classified and the non-classified materials. All work is done in a closed user environment. They have 2 printers – one for classified and one for non-classified materials, and 2 photocopiers. They have a couple of classified telephones to receive classified information but not everyone has one.

It was clear from the discussions at the meeting that the type of personnel to be assigned to the Spectrum Unit was a major concern for all representatives. Also a major concern was the reporting structure for the personnel assigned to the Spectrum Unit and the degree that the personnel could participate in spectrum management activities that were secondary to their primary functions, such as attending ITU and other international meetings.

III. RESOLUTION OF ISSUES RELATED TO ESTABLISHING THE SPECTRUM UNIT IN THE MOICT

A series of meetings were held between August 7-14, 2002, to resolve major issues that could present an impediment to establishing the Spectrum Unit in the MoICT in a timely fashion. These meetings were arranged by the consultant and were of two types: meetings at which all the principals participated, and meetings between the consultant and a representative from only one of the interested parties (MoICT, TRC, Royal Signal Corp, Security Services).

It is clear that all the prospective participants in the Spectrum Unit want it to be a successful operation. Jordan is the first country in the Middle East region to have an independent telecommunications regulatory commission and a spectrum consultative committee. Jordan is a recognized leader in regulatory reform in the region and would like the spectrum management reforms to be a successful model for the region. In addition, Jordan can be a catalyst for introducing spectrum management reform in the region and advance more transparent regulatory oversight of wireless markets.

Issues that were believed to have an impact on the ability of the Spectrum Unit to undertake and perform the duties assigned to it were discussed at length and agreement on how to move forward was obtained on all major issues. The issues discussed fell into two general categories: those related to the physical plant and equipment within the MoICT and those related to the actual work of the Spectrum Unit, including the personnel assigned.

Major issues related to the physical plant and equipment that were resolved:

1. Agreement that the first efforts in establishing the Spectrum Unit should focus on the physical plant within the MoICT – identifying and modifying the space to house the Spectrum Unit, resolving all physical security requirements (GID to provide guidance and direction in this area), determining office equipment requirements, etc.
2. Determination of the hardware and software required to support the activities of the Spectrum Unit. The hardware and software should be consistent with those required to support the spectrum use databases that are currently employed at the TRC and the RSC.
 - a. As a minimum, the hardware should include a server with a back-up, workstations (approximately 10), network hardware, and printers, plotters, faxes.
 - b. The software should include the latest Windows Operating system (XP), Office XP programs, GIS/Terrain databases, frequency assessment programs as required to perform the functions of the Spectrum Unit. Training on the use of the software was also identified as being a critical item that must be addressed in the early phases of the operation of the Spectrum Unit.

Not surprising, the discussion of issues relating to the actual work of the Spectrum Unit was lengthy and more intense than those concerning the physical plant. However, in the spirit of working together for the benefit of the Kingdom, these

issues too were able to be resolved. Major agreements affecting the operation of the Spectrum Unit included:

1. The Royal Signal Corp agreed to have its data base on spectrum used for military purposes to be part of the Spectrum Unit, subject to implementation of appropriate measures to protect the security of the information contained therein.
2. The TRC agreed to place one professional-level staff at the MoICT as part of the Spectrum Unit, as did the GID. The RSC agreed to place two professionals (officer-level) at the MoICT.
3. The RSC further agreed to place personnel to perform the functions of a computer programmer and a data clerk at the MoICT.
4. Personnel assigned to the MoICT will remain in those assignments for a period of at least two years.
5. The Spectrum Unit will report directly to the Minister.
6. The day-to-day management of the work of the Spectrum Unit will be overseen by the Director of the RSC.
7. The exact functions of the Spectrum Unit must be clearly described and made available in a public document.
8. The position descriptions of the personnel assigned to the Spectrum Unit need to be developed and already put in place when the personnel assigned to the Spectrum Unit report for duty.
9. Personnel assigned to the Spectrum Unit should be supported so that they can participate in regional and international telecommunications meetings and negotiations, such as those held under the auspices of the International Telecommunication Union, and its Radiocommunication Bureau and its Development Bureau.

IV. FINAL RECOMMENDATIONS AND TIMELINE FOR ESTABLISHMENT OF THE SPECTRUM UNIT

As a result of the foregoing, the following recommendations provide for the orderly establishment of the Spectrum Unit at the MoICT.

Recommendations for Possible Ministerial Action

- 1) Appoint a program manager to oversee the construction of the Spectrum Unit's space.
 - a) The program manager will work with the RSC and the GID to determine security and infrastructure requirements and including those in the construction activities.
 - b) The program manager will initiate hardware and software procurements when the details of the requirements become available.
 - c) The program manager must be empowered to coordinate with the TRC, RSC, and GID and obtain commitments from those entities.
- 2) If applicable, and/or required, seek funding to support the housing of the Spectrum Unit at the Ministry and its ongoing operation.
 - a) Determine if MoICT will/wants to provide salary and travel support for the staff assigned to the Spectrum Unit.
- 3) Develop and circulate the specific functions of the MoICT Spectrum Unit
 - a) Reiterate the relative roles of the TRC, military, and intelligence services in the spectrum management process of the Kingdom.
- 4) Press to have the TRC, RSC, and GID identify the personnel who will be assigned to the Spectrum Unit by the end of October 2002.
- 5) Enlist the services of a consultant experienced in developing and utilizing spectrum-use databases and the associated hardware and software to assist in the initial operation of the Spectrum Unit.

Recommendations of a General Nature

- 1) The Spectrum Unit shall be staffed with professional-level persons from the TRC (1), the GID (1), and the RSC (2).
- 2) The term of the appointment of the professional staff at the Spectrum Unit will be 2 years.
- 3) The staff of the Spectrum Unit shall have no other responsibilities than those required to carry out their roles at the MoICT.
- 4) The Director of the RSC or representative of the Director shall provide the day-to-day management of the Spectrum Unit and report directly to the Minister.
- 5) All professional staff at the Spectrum Unit should have access to the contents of the National Frequency Register.

- 6) When called upon to do so, the staff of the Spectrum Unit shall assist the spectrum management functions of the TRC and the military and security functions of the RSC and the GID.
- 7) Position descriptions clearly identifying the duties of the personnel assigned to the Spectrum Unit should be developed and made publicly available by the end of October 2002.

As indicated above in *Recommendations for Possible Ministerial Action 5*), a consultant is suggested to help assist the work of the Spectrum Unit during the early stages of its establishment and implementation. It is envisioned that this consultant would work with the personnel assigned to the Spectrum Unit for a period of time on the order of 3-4 months providing “hands-on” training and other assistance in establishing the actual working methods and procedures needed to carry out the mandate of the Spectrum Unit. The consultant must be experienced in handling large spectrum-use databases, setting-up hardware and software needed to analyze spectrum usage information, addressing potential radio interference issues, and operating wireless systems under a variety of “real-world” conditions. A well-qualified candidate is available to this work and may be available to undertake this effort under the AMIR 2.0 program.

Action Plan Timeline – Major Tasks

| | Month 1* | Month 2 | Month 3 | Month 4 | Month 5 | Month 6 | Month 7 | Month 8 |
|--|---|---|--|---|---------|---------|---------|---------|
| Personnel Issues: Develop PDs for staff to be assigned to Unit |  | | | | | | | |
| Personnel Issues: Identify personnel to be assigned to Unit | |  | | | | | | |
| Personnel/Operation Issues: Establish, write, and implement operational procedures guiding work of the Unit | | |  | | | | | |
| Space Issues: Decide on space to be used and begin tenders for work to be completed |  | | | | | | | |
| Space Issues: Unit housed in MoICT | | | |  | | | | |
| Security Issues: Agree level of security and undertake required actions to implement |  | | | | | | | |
| Infrastructure Issues: Agree infrastructure requirements and undertake required actions to implement | |  | | | | | | |
| Hardware Issues: Agree hardware requirements and undertake tenders, contracts to implement |  | | | | | | | |
| Hardware Issues: Hardware delivered, tested and operational | | |  | | | | | |
| Software Issues: Agree software requirements and undertake tenders, contracts, licenses to implement | |  | | | | | | |
| Software Issues: Software delivered, tested and operational | | |  | | | | | |

* Month 1 is assumed to begin September 2002.

KEY:  Timeframe assumed firm
 Timeframe uncertain; directly related to occupancy date at MoICT

ANNEX 1
List of Officials Interviewed by Charles Rush in Jordan
August 4-14, 2002

His Excellency, Dr. Fawaz Hatim Zu'bi, Minister of Information and Communications Technology

Mr. Mamoun Balqar, Director General, Telecommunications Regulatory Commission,

Eng. Moh'd Alwathiq Shaqrah, Director, Spectrum Management, Telecommunications Regulatory Commission

Majdi Alyacoub, Colonel, GID

Ziad Abdelkarim, Lt. Colonel, Jordanian Royal Signal Corp

Ms. Muna Hakooz, Director, Management Development and Training, Telecommunications Regulatory Commission

Eng. Ahmad M. Al-Khawalden, Director, Telecommunications Policy Department, Ministry of Post and Communications

Mr. Roger Guichard, Telecommunications Project Manager, AMIR 2.0