



FFA

**The Regional Tuna Fisheries Information
Service Using The Peacesat Network**

Presented At

Peacesat Policy Conference, Sendai,
Japan, 25-29 February, 1992

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FFA Report 92/08

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1. INTRODUCTION

1.1 Synopsis

If governments are to have access to accurate, timely and relevant information and analysis to assist in policy making, a regional communications network will be required which provides this service. This Agency has been monitoring available and relevant technologies to provide this service since 1986 and has explored several avenues in this field.

This paper examines the emergence of telecommunications to become an essential service in a regional organisation based in the Pacific Islands. It is, in essence, a case study of how and why telecommunications became an important issue to the Member Governments of the Forum Fisheries Agency (FFA), and it examines the path being taken towards adoption of the technology and the important role of the PEACESAT network in providing a much needed solution.

1.2 The Independent Pacific Islands

Figure 1 summarises some basic demographic statistics on the independent island nations of the Central and South Pacific. Together with Australia and New Zealand, these countries constitute the full membership of the FFA.

Table 1: Population, land areas and EEZ sizes of the FFA developing member countries

Subregion/ country	Population ¹ (1983)	Land Area ² (sq kms)	EEZ size ³ (000 sq kms)
Melanesia			
Fiji	663,000	18,272	1,290
Papua New Guinea	3,508,000	462,243	3,120
Solomon Islands	259,000	27,556	1,340
Vanuatu	130,000	11,880	680
Sub total	4,560,000	519,951	6,430
Percent of total	90	99	32
Micronesia			
Federated States of Micronesia	80,000 *	701	2,978
Kiribati	61,000	690	3,550
Nauru	8,000	21	320
Marshall Islands	32,000 *	181	2,131
Palau	13,000 *	496	629
Subtotal	194,000	2,089	9,608
Percent of total	4	0.4	48
Polynesia			
Cook Islands	18,000	240	1,830
Niue	3,000	259	390
Tonga	103,000	699	700
Tuvalu	8,000	26	900
Western Samoa	156,000 *	2,935	119
Subtotal	288,000	4,159	3,939
Percent of total	6	0.8	20
TOTAL	5,042,000	526,199	19,977

* indicates 1981 data from South Pacific Commission 1984.

¹ESCAP, 1984.

²South Pacific Commission, 1984.

³South Pacific Commission, 1984.

2. INFORMATION ABOUT FFA

2.1 Origin

The South Pacific Forum Fisheries Agency traces its origins to the South Pacific Forum meeting in Port Moresby in 1977 which adopted a Declaration on the Law of The Sea and the establishment of a regional fisheries agency and outlined the proposed functions of the agency. The decision to establish an agency which would be restricted only to Forum Governments and would not include a wider range of countries, such as the United States, was taken by the Forum at Niue in 1978.

A convention was drawn up and was acceded to by the then twelve Forum members by October 1987. The convention established the Agency to promote regional co-operation in various aspects of fisheries with the objective of securing the maximum benefits from the living marine resources of the region for their peoples, and for the region as a whole and particularly for the developing countries.

2.2 Membership

Member governments are Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa.

2.3 Work Programme

The Work Programme of the FFA covers: the harmonisation of fisheries regimes and access agreements; fisheries surveillance and enforcement; current information services; tuna fishing development; economic analyses; fishing patterns; fisheries and administrative training; regional fishing vessels register; and delineation of fishing and related zones.

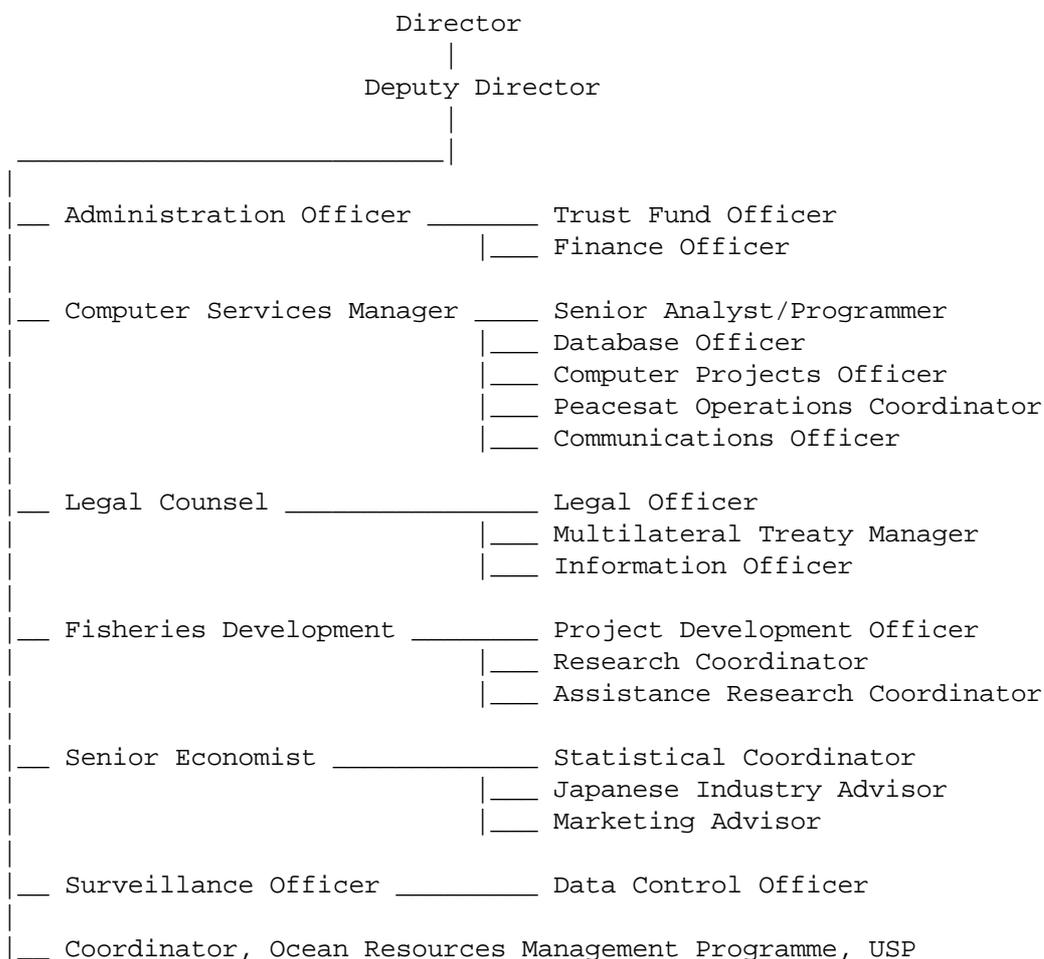
2.4 Funding

The on-going operations of the Agency are funded largely by contributions from the Member Governments with support from the United Nations Food and Agriculture Organisation (FAO), the United Nations Development Programme (UNDP), and the Commonwealth Fund for Technical Co-operation (CFTC). Valuable support for particular projects is also received regularly from a range of sources including the Australian International Development Assistance Bureau (AIDAB), the Canadian International Development Agency (CIDA), the Canadian International Centre for Ocean Development (ICOD), the New Zealand Overseas Development Assistance (NZODA) Programme, and the United States Agency for International Development (USAID).

2.5 Staffing

The Agency has a total staff of about 40 with the senior staff structure shown in Figure 2.

Figure 2. FFA Organisation Chart - Senior Staff



2.6 The Agency Database

A central database is maintained at the Agency headquarters in Honiara and includes the following subsystems:

Regional Register

This is an information base of foreign fishing vessels which have applied for registration and contains in excess of 2,300 vessels. Before any foreign fishing vessel is allowed to fish in the waters of any FFA member country, it must first apply for good standing on the register. Data is entered from the application form and includes details of the physical characteristics of that vessel (gross tonnage, length, construction, gear type, freezer capacity) and owner, charterer. etc.

Procedures have been agreed upon which would cause loss of good standing and prohibit that

vessel from fishing in the waters of a FFA member country.

Information from this register is supplied to member countries and to the Australian and New Zealand Air Force who perform regular surveillance flights in the region.

Vessel Logsheets

Each foreign fishing vessel which operates in the exclusive economic zones of FFA member states are required to submit logsheets to that state in whose waters the fishing occurs. These logsheets contain date, position and catch by species as well as the return and departure ports and are filled in by the vessel master and sent to the relevant member state at the end of the trip. The logsheets are then forwarded to FFA and South Pacific Commission (SPC) where they are entered into the database.

The data which is in excess of 30,000 logsheets and 1,000,000 position and catch records, is continually used for economic, biological and surveillance analysis. The surveillance analysis is used for planning the Air Force overflights.

Zones and Mapping

A database of the Exclusive Economic Zone (EEZ) boundaries, Closed Area boundaries for the US Fishing Treaty, and the complete coordinates of the South and Central Pacific are used for mapping, zone and boundary delineation and graphical analysis as well as determining apportionment of catch for distribution of fees in multilateral fisheries treaties.

Surveillance

Information and analysis of surveillance planning, flight sightings.

US Treaty

Multilateral Treaty Management system for monitoring the US Treaty Purse Seine fleet and distribution of fees. Inputs include telex reports, monthly logsheets, observer data, unloading and transshipment data.

Marketing

Landing data from major ports, sampling, prices.

Research

Data of all research projects within the region.

PIMRIS

Bibliographic reference data - Pacific Islands Marine Resources Information Service. A joint project with University of the South Pacific, South Pacific Commission and FFA.

3. RECOGNITION OF COMMUNICATIONS NEEDS

3.1 Background

The FFA Member Governments resolved at the level of Heads of Government in 1982 to introduce minimum standard terms and conditions for foreign fleet fishing in the region. This included standard formats for some data requirements. Since then, reporting requirements on foreign fleets have been strengthened using a common approach, and increasing volumes of valuable data are becoming available which can be used at a regional level.

Experience with this data in the FFA over the last five years, and the recent increase in the capacities of national fisheries administrations to analyses and use information, especially using microcomputers, suggests that strengthening information services on tuna fisheries at the regional level would bring gains in several areas. These include access agreement monitoring and negotiation, surveillance and negotiation, surveillance and enforcement, scientific research, resource management and economic analysis. If such regional services are to be enhanced, then an effective method of data transfer and dissemination to FFA Member Governments is essential.

3.2 Regional Standards

The FFA determined some years ago that three factors were critical to the success of future information services. They were:

- (i) training of fisheries and surveillance officers in member governments in the use of computer and communication equipment,
- (ii) promoting compatibility of equipment and services, and
- (iii) cost effective and reliable regional communications facilities.

The first factor, computer training, is being addressed through formal courses at the University of the South Pacific, as well as through a comprehensive fellowship programme involving Pacific Islanders working in the FFA or elsewhere for one week to six months at a time to gain experience outside their own environment.

With respect to the promotion of compatibility, the FFA has standardised on Hewlett-Packard computers. Reasons for this date back to the first acquisition which was aimed at achieving compatibility with the SPC. This brand has proved itself to be highly reliable in tropical conditions and such reliability is vital in Pacific Island countries where remoteness to service facilities is a reality.

In addition to the FFA Secretariat, most Member Governments have initiated and completed projects to install desktop computer systems in their national fisheries administrations to assist in the analysis of fisheries data and improve the timeliness and quality of fisheries management information. This area is vital to the formulation of sound project development and management proposals.

3.3 The Communication Problem

In practice, both in the FFA and the fisheries administrations of its Member countries, it has been found near impossible to capture and analyses information while it is still current, despite the

need to do so, particularly for surveillance purposes. This was and still is primarily due to inadequate telecommunications facilities.

Accepting that this problem would continue, at least in the short term, the FFA took to using daily logsheet data, containing position and catch, and plotting trends in the various fisheries to assist in planning regional fisheries surveillance activities. At the same time, steps were taken to define communications problems and to source information on various possible solutions.

Initially, one of the greatest difficulties was trying to define what was wanted when it was not known what was available. In other words, the technology was an unfamiliar subject. As a result, FFA documented the problems and let subsequent concepts and proposals suggest the requirements. Steps were also taken to learn about certain types of technology; specifically, satellite services and High Frequency (HF) radio.

At the FFA Regional Surveillance Officers meeting in Honiara in November, 1986, papers were presented on the use of satellite and HF radio technology for transmission of data and messages. That meeting endorsed a proposal for the FFA to present a paper to targeted delegates at the January 1987 meeting of the Pacific Telecommunications Council (PTC87) in Honolulu. The PTC87 Conference was seen as an opportunity to make known to industry experts the telecommunications problems of Island fisheries administrations. A paper titled "Telecommunications Problems of National and Regional Fisheries Administrations in the South Pacific" was distributed at PTC87 which prompted for responses and proposals from various companies.

This "problems" paper was oriented towards fisheries surveillance and identified the need for both land-based networks and ship-to-shore systems with facilities such as alternate voice/data and select broadcast capability, terms which were very new to the FFA.

3.4 Traffic Analysis

While the FFA waited for proposals from suppliers, an analysis was done on regional traffic requirements, not only for surveillance but also other functions. Figure 3 is a summary of that analysis for each of four line speeds: 2.4, 4.8, 7.2 and 9.6 kilobytes per second (kbps).

[Note: 8 kbps equals 1,000 characters per second]

Figure 3

Item (figures are combined totals of all FFA members)	Hours per month per kbps rate			
	2.4	4.8	7.2	9.6
Regular Data Transfers	116.0	58.0	39.0	29.0
Ad Hoc Data Transfers	4.5	2.3	1.5	1.1
Facsimile / E-Mail	1.7	0.9	0.6	0.4

Voice Usage	1.0	1.0	1.0	1.0
Graphics / Mapping	485.0	243.0	162.0	121.0
Database Queries	60.7	60.7	60.7	60.7
Totals (Hours per month)	668.9	365.9	264.8	213.2
Totals (Hours per workday)	33.4	18.3	13.2	10.7

The results clearly demonstrated the need for a line speed of at least 7.2 kbps and ideally 9.6 kbps assuming only one channel.

4. TECHNOLOGIES FOR A REGIONAL NETWORK

4.1 High Frequency Radio

Tests using this technology were undertaken as early as October 1986 and proved that high frequency radio offered a feasible and cost effective solution for digital data transfer over distances in excess of 2000 km.

Following the identification of a number of suitable HF systems, a field trial was conducted in November 1988 which demonstrated the viability of implementing a HF network within the South Pacific. The network would typically be used for a Vessel Surveillance System (VSS), communications with Patrol Boats, fishing vessel position and catch monitoring and communications between fisheries surveillance centres in the Member countries.

This project, if implemented, has the advantages of minimal operational costs but slow data transfer rates, possibly 100 bps.

4.2 Satellite Channel

The use of a dedicated single channel (SCPC) was investigated and tests were conducted which demonstrated that data transfers rates as high as 9600 bps were feasible over single and double satellite hops. These successful tests were undertaken in November 1987 and funded by the Defence Cooperation Programme (DCP).

After discussions with the local international carrier it was found that the lease of dedicated channel would offer a cost effective solution to a regional network.

A project for a Fisheries Management Information Service (FMIS), using the above technology to provide a regional network, was evaluated by an independent consultant. The project proposal was submitted to the European Development Fund for funding under Lome III to implement this service and approval was given in January 1989. In June 1989 the international carrier advised that the leasing cost for the channel was US\$ 3,900 per month and not US\$ 300 per month as was originally indicated.

The increase in operational costs has caused this project to select the PEACESAT system which operated out of the University of Hawaii as it offered an appropriate and cost effective technology suitable for the project.

The emergence of Inmarsat-C as a reliable communications network for mobile platforms has led to the proposal to adopt this network for a vessel management system. The system employs a store and forward messaging system with data rates of 600 bps and with message costs at less than US\$ 1 per 256 bytes it would prove ideal for location and activity reporting from fishing vessels. FFA has commenced implementation of a surveillance and enforcement communications network, called the Maritime Surveillance Communications Network (MSCN), which uses a mix of Inmarsat-A terminals and packet switching where available. The MSCN will allow interconnection of National Operation Centres throughout the member countries to

each other and to a centralised data service, necessary for effective deployment of the surveillance and enforcement function.

4.3 Other Alternatives

Alternatives that have been considered are:

- (i) X.25 Packet switching - most Pacific Island countries do not possess this service but should packet switching become universally available then this technology would offer the most functional solution.
- (ii) High speed Dial-up Modems - Operational costs too high for a high traffic network.
- (iii) Very Small Aperture Terminal (VSAT) - services are being offered in the major world countries but would likely be resisted in the Island Countries by the existing international carriers.

5. USE OF PEACESAT AT FFA

Recent developments concerning multilateral access agreements between Pacific Island Member States of the South Pacific Forum Fisheries Agency (FFA) and Distant Water Fishing Nations (DWFN's), especially the Pacific Rim countries necessitate a regional approach to fisheries management and data handling.

The member governments of the FFA include those of 8 Pacific ACP countries: Fiji, Kiribati, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa. This project was approved, as a matter of priority, as part of the FFA Work Programmes at the Forum Fisheries Committee meeting held in May 1986.

After a number of modifications the project was agreed upon as a component of the Regional Marine Resources Programme in the project dossier dated July 1988. The Financing Agreement was signed and entered into force on 3 May 1989.

Since then it became clear that the project could not be implemented in the way foreseen at the time of identification and formulation. This was mainly due to the fact that the cost of data transmission was quoted by Cable and Wireless, the Solomon Islands telecommunications authorities at the time, at US\$ 300 per month. This was later increased to US\$ 3,900 per month (a thirteen-fold increase). Such a level of transmission cost could not be borne by the responsible agency, the FFA, and necessitated a reformulation of the project

An evaluation of available alternatives showed that the only viable solution was to make use of the facilities offered by the PEACESAT system operated by the University of Hawaii as a service to Pacific nations. PEACESAT is a Pacific-wide non-commercial communications network for educational, cultural and environmental use, using available satellites. PEACESAT then employed an aging satellite, ATS-1, which was drifting however and could no longer meet the requirements. It was possible to re-establish the PEACESAT programme on a new satellite, GEOS-3, which became available in July of 1990.

The use of the PEACESAT facilities by the project is conditional upon the communities in the recipient countries being offered access to the voice transmission capabilities of the satellite on a continuous basis. This need not interfere with the data transmission capability necessary for this project. The condition implies that the telecommunications equipment (PEACESAT terminal) to be acquired for and installed in each country be set-up in a manner that allows members of the community to use it without hindering the work of the fisheries departments depending on the data transmission facilities.

The total allocation of ECU 900,000 as detailed in the Financing Agreement (Agreement No.4225/REG) dated 3 May 1989 has been altered to a total of ECU 730,000, as ECU 170,000 has been used to fund a TA contract for FFA (PAC No. PN 90-273). This adjustment will not effect project implementation unduly, as savings have been made by reducing consultancy costs in the original Project Dossier. The life of the Project has also been shortened to four years from the original five.

5.1 General Objective

This project aims to develop a centralized fisheries database system and regional information network, which will be a major contribution to enabling the Pacific island member states of the Forum Fisheries Agency (FFA) to more effectively discharge their obligations and responsibilities under the new Law of the Sea regime.

The project intends to provide for the development and operation over a four year period of a regional database for the conservation and management of the offshore tuna resources of the region. Access to, and updating of the database will be maintained by the establishment of a telecommunications link between the fisheries microcomputers of the member countries of the FFA, and the FFA computer in Honiara.

5.2 Future direction

The following table shows the status of PEACESAT stations at member country fisheries Administrations installed under the Regional Tuna Fisheries Management Information Service project. There are currently 2 terminals in operation at FFA headquarters in Honiara, Solomon Islands and a terminal at each of the Fisheries Administrations of Rarotonga (Cook Islands), Tarawa (Kiribati), Port Moresby (Papua New Guinea), Port Vila (Vanuatu). Terminals will be installed in the remaining coastal states by the end of 1992 as documentation has been submitted and approved by PEACESAT and payment has been made. Both Australian Fisheries Maritime Authority, Canberra, Australia and Ministry of Agriculture and Fisheries, Wellington, New Zealand are considering terminals for 1993.

COUNTRY	SHIP DATE	START DATE	COMMENT
Australia		1993	AFMA interested
Cook Islands	1-Dec-91	24-Jan-92	In operation
Federated States of Micronesia	22-Feb-92	1st qtr 92	Shipping
Fiji		1st qtr 92	
Kiribati	26-Sep-91	11-Feb-92	In operation
Marshall Islands		3rd qtr 92	
Nauru		1st qtr 92	
New Zealand		1993	MAF interested
Niue		1st qtr 92	Shipping
Palau		3rd qtr 92	
Papua New Guinea		10-Oct-91	In operation
Solomon Islands		30-Jun-91	In operation at FFA
Tonga		3rd qtr 92	
Tuvalu		1st qtr 92	
Vanuatu		24-Oct-91	In operation
Western Samoa		3rd qtr 92	

FFA will provide a multiuser computer dedicated to the PEACESAT network to all fisheries administration access to all FFA services. These will include bulletin board service, E-mail facilities, fisheries library service and gateway to all regional data holdings. FFA has purchased SCO Unix Open Desktop which includes ARPA and TCP/IP services and is currently developing the network features using a 386/25 workstation. This service allow local users to connect to the PEACESAT system through the FFA headquarters Ethernet LAN and remote users in the Solomon Islands to connect via dial up modems.

6. CONCLUSION AND RECOMMENDATIONS

The need for an increase in access to information within the region has been clearly demonstrated and the key to improving this information access is the provision of a reliable, inexpensive and easy-to-use communications network which features both voice and data links between the member governments, access to the FFA, SPC, PIMRIS and other regional databases as well as gateways to international information providers and database services. FFA

will continue to encourage further community participation in the PEACESAT network through dialogue with appropriate groups.

- It is recommended that the delegates to this conference endorse the allocation of two additional full duplex channels for data transfers between the Fisheries Administrations of the Forum Member Countries:

Benefits from these additional channels include but are not limited to:

- Ability to use one duplex channel dedicated to the FFA SCO unix box which will allow all Fisheries Administrations and other interested groups access to a bulletin board service, E-mail facilities, fisheries library service and gateway to all regional data holdings.
 - Freeing of valuable capacity for use by other users in Solomon Islands, such as Agriculture, Education and Health sectors.
- It recommended that fax interfaces be provided (under RTFMIS funding) for installation in all terminals of the Fisheries subnet.