

FORESIGHT SIERRA III

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Military communications in developing nations as in developed nations, must be responsive and reliable. When the country in question is an archipelago comprised of more than 7000 islands, each of these factors becomes much more difficult to insure in the face of fewer design alternatives. In the late 1970s, the Armed Forces of the Philippines (AFP), supported by US Military Assistance Programs (MAP), embarked on an ambitious program to upgrade and modernize their nationwide communications networks. The approach was systematic and deliberate, and detailed in a ten-year master plan: FORESIGHT SIERRA III.

The first phase of this communications plan was designed to replace aging troposcatter military radio communications equipment, acquired as excess from US Army Vietnam in the early 1970s. With extraordinary developments in the state-of-the-art long range communications available, the AFP set for itself a challenge of not only improving the current system but also setting a new pace. Since commercial communications links existed throughout the 700-mile length of the country, decision-makers focused on these questions: Why only duplicate the current system? Why not improve on it and set a new benchmark for both the Philippines and all developing countries in the region?

In 1978, a Memorandum of Agreement was signed between the US Army Communications Command and JUSMAG-Philippines to engineer and install a microwave system for the southern half of the Philippines, making maximum use of Philippine armed forces talent. Two southern regions of the country were to be covered complementing the existing northern Philippine subsystems recently modernized with Japanese manufactured Nippon electric equipment acquired through war reparations in 1974. The two regions were the Visayas-Bicol region and the island of Mindanao, including the Sulu archipelago. Equipment in each region was to be installed in two phases. Mindanao would be first followed by Visayas-Bicol. The existing backbone 120 channel tropospheric scatter system would be replaced with modern digital microwave equipment with spur links installed as appropriate. Many armed forces of the Philippines (AFP) units would be served by the new transmission system. These included provincial and regional command headquarters, infantry, engineer, and logistic units, as well as one division headquarters and two unified commands.

The allocation of responsibilities for the project was designed in such a way as to place the maximum self reliance on the armed forces of the Philippines. It was felt that engineering should be done in country in order to develop the ability of the AFP to perform similar operations in the future. Systems engineering was to be performed by the AFP Office of the Chief Communications-Electronics (OTCC-E). The AFP Communications Electronics

Services (CES) would install, operate and maintain the radio equipment. Also the AFP took the responsibility for civil works construction and capital outlays such as buildings, towers, air conditioning, and electrical power for all communications sites.

Engineering of the system was to involve not just military planning but national planning as well. Extra capability would be designed into the system at negligible additional cost in order to provide circuits to other government ministries. The concept was for a national rather than just a military communications system.

Preparation of contract specifications and materiel acquisitions were to be the responsibility of the U.S. Army Communication System Agency at Fort Monmouth, New Jersey; system engineering was to be reviewed by the U.S. Army Communications-Electronics Engineering and Installation Agency, Fort Huachuca, Arizona. Philippine in-country assistance, coordination, liaison, and program management would be the responsibility of the JUSMAG-Philippines C-E Section.

By August 1977, planning was completed for the utilization of Military Assistance Program (MAP) funds. By April 1978, the Engineering Installation Plan was finalized. Funding of the program involved more than 10 million pesos in AFP funds and 16 million dollars in U.S. MAP funds.

In March of 1979, a contract for the manufacture of major end-items of equipment was signed with the Collins Division of Rockwell International. Factory training of AFP personnel began in July 1979. Included in the contract was one man-year of technical assistance to the AFP relating to equipment installation and operations and maintenance training.

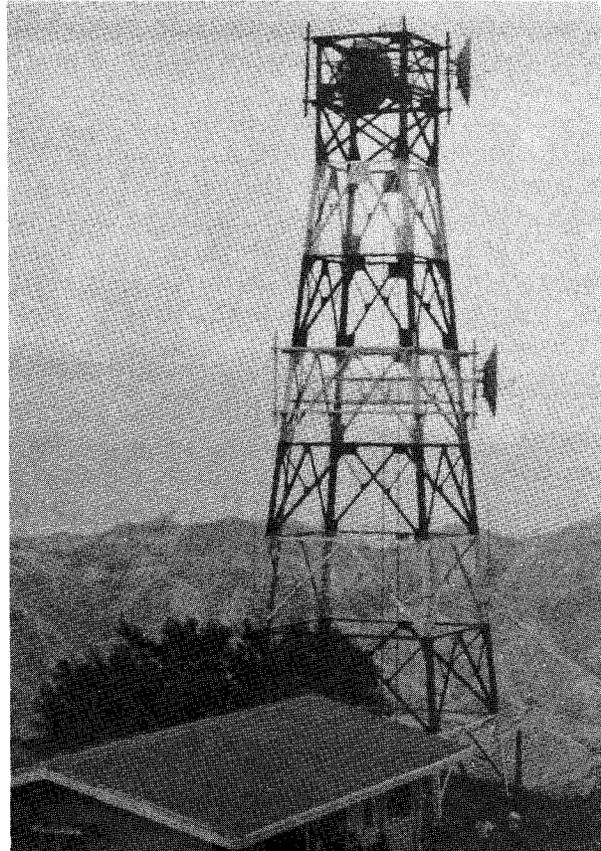
Rockwell-Collins Model MDR-8 digital microwave radios operating in the 7.125-8.500 GHz frequency band were selected as the backbone system transmission equipment. These radios are capable of carrying the equivalent of 672 voice channels of communications. For the digital spur links, 2 GHz Avantek model DR2C-96 radios capable of 96 channels were selected.

The Collins Digital Microwave equipment and the Avantek can use either frequency or space diversity; and hot stand-by redundant hardware to provide error-free reliable communications. The modulations are 8-level phase shift keying and provides the advantage of carrying the DS3 (44.736Mb/S) signal in only 20 MHz of bandwidth. The system also has an Automatic Adaptive Equalizer specially designed into the system by Collins in order to compensate for multipath in the long (60 to 70 miles) overwater links. The multiplexer-demultiplexer operates in two tandem stages according to the International Telephone and Telegraph Council Committee (ITTCC) North American Standards for digital multiplexer. When configured as a repeater the equipment has drop and insert capability.

Many maintenance and operational benefits accrued to the AFP by the use of digital equipment. Built-in test capabilities minimize the quantity of diagnostic equipment required on site or needed to be transported between sites. Most repairs simply require the replacement of plug-in modules; and, when compared to older designs, there are significantly fewer adjustments required during operation or maintenance.

Equipment delivery began toward the end of 1979, and was virtually completed by November 1980. Local training was conducted at a training facility at Camp Aguinaldo near Manila during the summer of 1980, and equipment installation began in September.

Installation of the system was not uneventful. Some problems have been substantial, some less so. Mindanao is characterized by rugged terrain, and substantial problems were met and overcome during the civil works phase of installation. Many of the sites, chosen for their line-of-sight characteristics rather than their strategic or convenient location, have poor roads, and only trail access in some cases. The site at Pagadian for instance involves a two- to three-kilometer walk up a mountain trail, and several of the sites pose serious security problems. Despite these hardships, the AFP began civil works construction activities during the summer of 1980; and by the beginning of 1981, they had completed all but two of the 11 Mindanao sites. Delayed receipt of funds from the AFP for locally-produced-and-engineered buildings, towers, and generators, like any other delays, caused costs to increase as inflation affected purchase prices. Late release of funds for local purchases meant that some materiel was purchased on credit, with a 20% surcharge. Nevertheless, most adverse impacts were minimized by joint U.S.-AFP management expertise. Potential problems were often times averted through effective planning.



Davao Relay Site at Malala, Mindanao, Republic of Philippines

As project implementation proceeded, and problems encountered and solved, the C-E element of the Armed Forces of the Philippines developed well deserved confidence in its ability to engineer and install a major transmission system network.

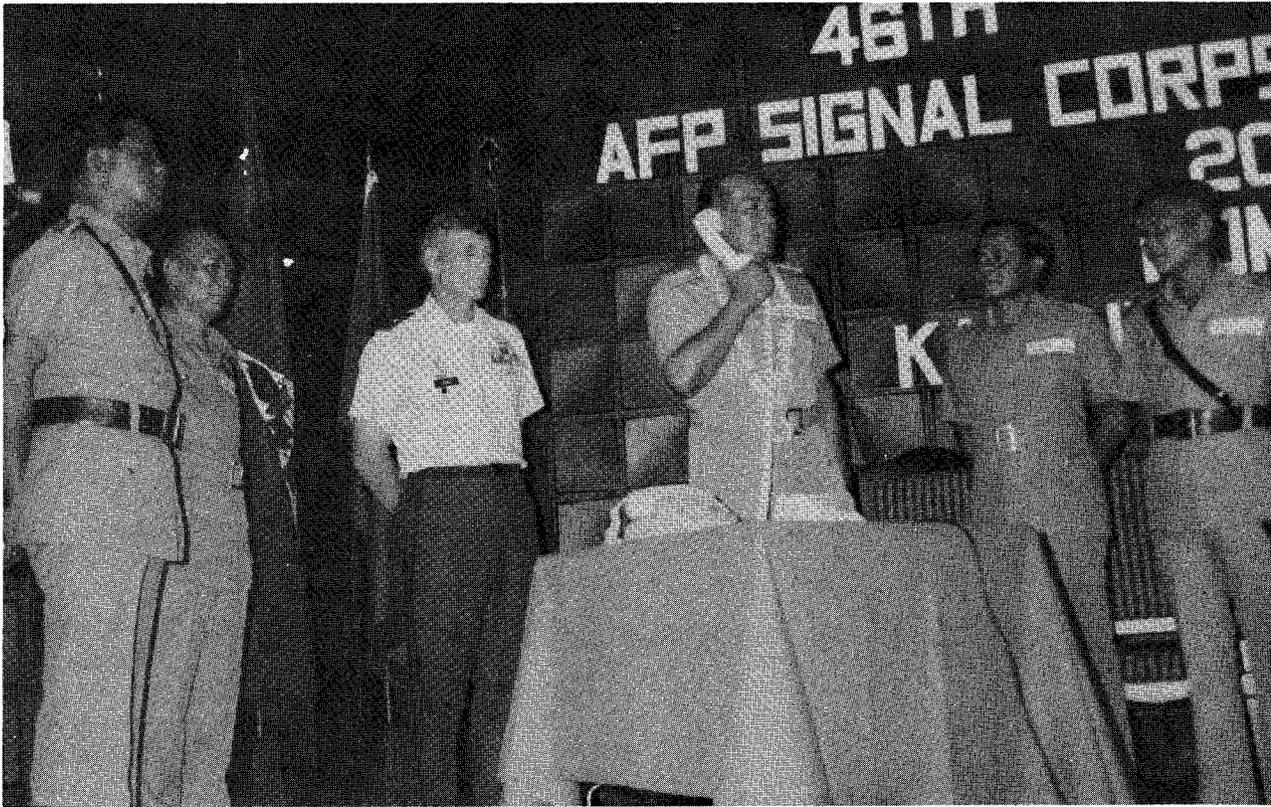
A common problem faced worldwide is a loss of technicians, who when finally trained to the sophisticated level of competency required to operate and maintain modern C-E equipment, find their talents sought after by the higher-paying civilian sector. To overcome this drain, the AFP and civilian Collins Technical Representative provided for a continuing an active training program.

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By November 1981, the eleven Mindanao Backbone sites were constructed; ten of which are now operational. Another Backbone consisting of seventeen other sites stretching from Manila through the Visayas-Bicol region to Mindanao is under construction. Of these seventeen sites, seven are completed, and the other ten vary from nearly completed to just starting, as of May 1983. Of the 42 Spur Link Sites, equipment installation has been completed at six sites. This project has been an extremely successful and rewarding experience to both U.S. and Philippine Armed Forces personnel. It is a good example of U.S. security assistance being used to help a country help itself.

The above outlined backbone transmission system and spur links for Mindanao and Visayas-Bicol represent just one sub-program in the concept of the ten-year master plan. The other three sub-programs are for telephone switching modernization (using digital switches), record and data communications upgrade, and special C-E system requirements.

The AFP, after FORESIGHT SIERRA III, will indeed be in the forefront of modern, long-range, high-speed, high-quality digital telecommunications system technology.



Dedication of Mindanao Backbone System, 20 November 1981, by General Fabian C. Ver, Chief of Staff of the Philippine Armed Forces. Pictured (left to right): Colonel Leo J. Santos, Constabulary Chief Communications Electronics; Colonel Lorenzo Z. Cepeda, Commander Communication-Electronics Service, AFP; Brigadier General John W. Foss, (former) Chief, JUSMAG-Philippines; General Ver; [Unknown]; Lieutenant Colonel Fragante, AFP. [Note: Since this photo was taken, Col Santos was promoted to Brigadier General, Commanding General, Communication-Electronics Service, AFP, and Chief, Communication-Electronics, AFP, and Col Cepeda retired.]

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