

Vietnam Studies
Communications – Electronics, 1962-1970
Major General Thomas Matthew Reinzi
Extracts that pertain to the 1st Signal Brigade

Forward

The following history of the 1st Signal brigade is an excerpt from the book, *Vietnam Studies, Communications – Electronics, 1962-1970* by Major General Thomas Matthew Reinzi, Department of the Army, Washington, D.C., 1972. General Reinzi commanded the 1st Signal Brigade from February 1969 to June 1970. These excerpts from General Reinzi's 141 page book are those that directly describe the origin and evolution of the 1st Signal Brigade. These excerpts (31 pages) contain some additional notes that clarify some of the content based on my personal observations of the initial planning for the Brigade and the Brigade's first six months.

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Lieutenant Colonel (US Army Ret)

Preface

There is an old Army maxim: "The communicators are the first ones in, and the last ones out." The 39th Signal Battalion was the first regular US Army ground unit to enter Vietnam, but from this modest beginning there followed a steady buildup of Signal troops to match the initially slow but later accelerated growth of US Army forces in Vietnam. By the end of 1968, the controlling Signal headquarters in Southeast Asia, the 1st Signal Brigade of the US Army Strategic Communications Command, comprised six Signal groups, twenty-two Signal battalions, and a total strength of over 23,000 men-by far the largest Signal organization ever deployed to a combat theater by the United States Army. This unit of larger than division size, when coupled with the field forces Signal organizations, composed a formidable command-control force.

This study attempts to record some of the most important experiences, problems, and achievements in the field of communications-electronics during the years 1962 to 1970. It lays no claim to the definity of history.

I hope that it will show the influences that were at work and lessons learned. While I accept full responsibility for the conclusions reached, it would be misleading to pretend that I have not been influenced by my gifted predecessors, my successor, and many contemporaries, along with a tremendously outstanding group of commanders who needed enormous electronic power to do their job.

As the tempo of operations in Southeast Asia continues to diminish, the Army can look back with pride-with new wisdom on the accomplishments, under very trying conditions, of its communicators in the Republic of Vietnam and throughout all of Southeast Asia. And a good candidate for the last Army unit to be extracted could well be a Signal

battalion composed of aggressively and dynamically great American soldiers who made it all possible.

Washington, DC

THOMAS MATTHEW RIENZI

15 October 1971

Major General, US Army

Vietnam Studies

Communications-Electronics 1962-1970

by

Major General Thomas Matthew Rienzi

(later Lieutenant General)

PART ONE

THE LEAN YEARS AND EARLY

BUILDUP, 1962 - 1965

CHAPTER I

Background and Beginnings of

Communications, 1962 - 1964

In 1962 U.S. Army Signalmen in South Vietnam began operating tropospheric scatter radio relay sets capable of providing numerous voice communications channels over extended ranges-the first use of that type of advanced equipment in a combat environment. By 1964, seven years after the Soviet Union had launched the world's first orbiting satellite, US Army Signalmen were operating a new satellite ground station which provided communications service between Saigon and Hawaii through a single communications satellite thousands of miles aloft-the first use of satellite communications in combat. And by 1968 US Signalmen in South Vietnam had begun to operate fully automatic digital message and data switches, another first in a combat zone. These events give some indication of the growth of Army communications during the Vietnam conflict. Any account of communications in Vietnam must include the increasing sophistication in equipment used to meet ever-growing communications needs in support of a multi-nation effort directed toward the dual roles of nation-building and combat. Such an account must also tell the story of the dedicated, highly skilled soldiers who fought the enemy and maintained and operated that equipment in a hot, humid, underdeveloped land thousands of miles from their homes.

The Vietnam Environment

The Republic of Vietnam, located on the eastern portion of the Southeast Asia mainland, lies entirely within the tropics. (*Map 1*) The terrain is varied, with the large

Mekong River Delta in the south, and alternating mountainous and highland areas in the north edging a narrow coastal plain along the South China Sea. Politically, the Republic of Vietnam is divided into forty-four provinces, which are equivalent to the fifty states of the United States. In turn, each province is made up of districts, comparable to US counties.



The weather has annual variations, from a wet, humid monsoon season to a dry season with practically no precipitation. The terrain and tropical climate have had significant effect on the US

Army's combat communications operations in Vietnam. In the Mekong Delta, for example, it was difficult to locate terrain suitable for the placement of communications facilities since most of the area is paddy land, which is partially submerged by the Mekong River during the rainy season, and those areas that are a few feet above water level are densely inhabited. Because of the flat terrain in the delta, tall towers reaching up to 200 feet or more were required to raise antennas to a communicable height. The muddy, silty delta lands provided a poor base for such construction. In the sparsely populated highlands and mountains, sites that afforded both feasible communications paths and reasonable access were rare. Some sites that were selected required extensive preparation, and installations were difficult to build, supply, and defend. As communications equipment became more and more sophisticated, the effects of humidity, dust, and mud were harder to overcome.

During 1959 insurgents in South Vietnam backed by the North Vietnamese were increasing their campaign of violence and subversion in an effort to obtain political

control over all Vietnam. In 1960 the Communist Party of North Vietnam decided that South Vietnam was to be "liberated" and unified with the north. Subsequently, Hanoi organized a National Liberation Front and claimed that it was made up of "several political parties" in South Vietnam, with a People's Revolutionary Party identified as the leader. By 1961 the South Vietnamese Communists, termed Viet Cong or VC, were conducting, in addition to their terrorist campaign, military operations of multibattalion size in South Vietnam. The South Vietnamese Government, although it had been receiving US civil and military assistance since 1954, could not cope with the worsening situation.

In late 1961, therefore, South Vietnam urgently appealed for immediate and extensive help from the United States. The US Government decided to expand its assistance to South Vietnam and increased the number of US military advisers from 700 to more than 3,400. Tactical aircraft and Army helicopter units were sent to Vietnam to support and train the South Vietnamese. To keep pace with the growing US commitment, communications in South Vietnam required tremendous expansion.

In February 1962 the United States Military Assistance Command, Vietnam, a US joint headquarters, was established to control the expanding US effort and was made responsible for all US military policy, operations, and assistance in South Vietnam. By that time there were over 3,000 US troops in the country, advising and supporting the South Vietnamese regular military and paramilitary forces.

Communications Background and Initial Buildup

As early as 1951, US Army Signal troops were providing a small US advisory group in Vietnam with communications that linked into the Army's worldwide network. By the time the US Military Assistance Command, Vietnam, was established, high-frequency radio circuits operated by the Strategic Army Communications station in Vietnam were providing communications from Saigon to San Miguel in the Philippines, to Fort Buckner a large Army logistics base in Okinawa and to Bang Pla near Bangkok in Thailand. These radio links provided a few telephone and message circuits. In addition to its high-frequency radios, the station operated an overseas telephone switchboard and the manual message relay in Saigon. At this time messages were relayed manually at a teletypewriter relay station by taking an incoming message off the receiving equipment in the form of punched tape and inserting the same tape at the appropriate send positions to transmit the message on to its destination.

The advisers, scattered up and down the more than 500-mile-long country, had to rely meanwhile on the low-capacity Vietnamese military communications networks and on a high-frequency radio network they operated themselves to pass messages and furnish telephone service. The Vietnamese commercial system was of little use since it consisted primarily of a few high-frequency radio links using old French equipment. The US Agency for International Development, however, was planning the construction of a major long-lines microwave system to connect Saigon with commercial grade service throughout the country and to include local cable distribution systems.

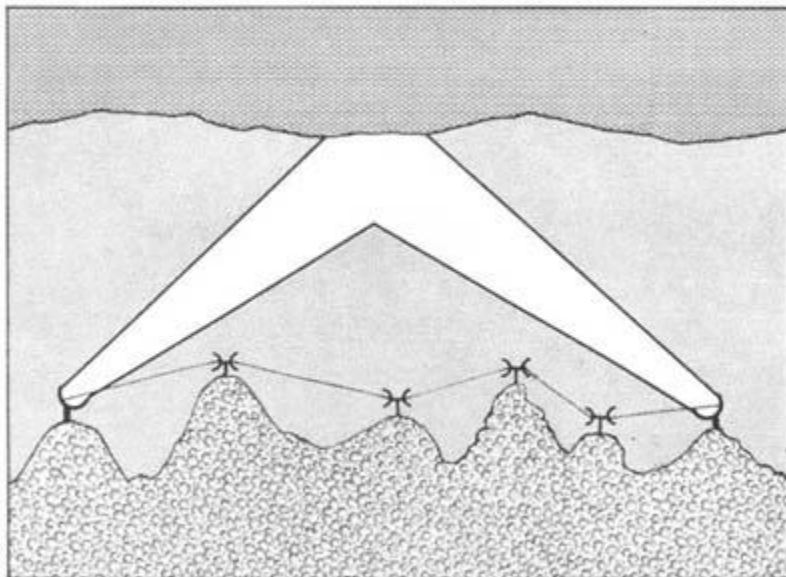
As the US effort expanded in Vietnam, the very limited communications available could not support the US helicopter units, tactical aircraft, and additional advisers being deployed throughout the land. During 1961 and 1962 the joint staff of the Commander in

Chief, Pacific, pushed to modernize the communications facilities in the Republic of Vietnam with two objectives: first, to create a communications system to meet the defense needs of the South Vietnamese in their counterinsurgency operations, and, second, to build it in such a way that it could be expanded to furnish the minimum needs in support of US forces.

Modern radio facilities were supplied through the US Military Assistance Program to improve the South Vietnamese Army's communications system. These radios provided voice and message circuits from Saigon to the outer-province cities of Da Nang, Qui Nhon, Nha Trang, Pleiku, Ban Me Thuot, and Can Tho, and supplemented the existing Vietnamese military high-frequency voice and morse code systems. The South Vietnamese Navy received similar radio equipment. A limited tactical air-control system which employed the integrated communications-electronics assets of the US Air Force and the Republic of Vietnam was put into operation. The US Military Assistance Program also supplied radio equipment to connect South Vietnamese hamlets and villages with their district headquarters, to link the district headquarters with patrols and Civil Guard posts within the district, and to connect the districts with their higher province headquarters. Province and district headquarters were also linked into the military communications networks by radio.

Long-Lines Systems: Back Porch

The increased tempo of counterinsurgency operations in Vietnam and the buildup of US assistance to the Vietnamese had created an urgent requirement for a modern, reliable, large-capacity communications system that could provide high quality telephone and message circuits between key locations in Vietnam. In early January 1962 Secretary of Defense Robert S



TROPOSPHERIC SCATTER AND LINE-OF-SIGHT COMMUNICATIONS

. McNamara approved the establishment of a "backbone" communications system to satisfy this need. The system, code-named BACK PORCH, as conceived by planners in Washington and at the headquarters of the Commander in Chief, Pacific, would utilize

tropospheric scatter radio trunks capable of providing numerous circuits between locations more than 200 miles apart. These tropospheric scatter trunks would be advantageous since, unlike conventional microwave, which needs a line of sight between sets, they would pass over the vast distances of underpopulated, enemy-infested terrain to connect the major operations and population centers in the Republic of Vietnam north of Saigon. Line-of-sight microwave relay links are limited to much shorter distances, averaging about twenty to thirty miles. From Saigon south to the delta region, long-lines service would be provided by a commercial microwave system, called SOUTHERN TOLL, funded by the US Agency for International Development.

The US Air Force was charged with responsibility for funding and building the BACK PORCH system; the Army would operate the system after its completion. A US Army Signal support battalion, suitably structured for its special mission, was approved for deployment to Vietnam to operate the BACK PORCH system. It would also operate shorter range "tails," or



BILLBOARD ANTENNAS OF THE BACK PORCH SYSTEM AT PHU LAM IN 1962.

On top of the 60-foot tropospheric scatter antennas are the smaller antennas for mobile combat equipment that provided the "tails," or extensions.

extensions, serving scattered users, and provide service such as telephone and message communications for the US forces supporting the Vietnamese. In addition, the battalion would give communications support and training to South Vietnamese armed forces.

In January 1962 the US Air Force awarded a contract to *Page Communications Engineers* to furnish and install BACK PORCH. The system would consist of vans containing tropospheric scatter terminals capable of transmitting and receiving up to seventy-two voice channels simultaneously. The links of the system would extend from the Army's Saigon station at Phu Lam to Nha Trang; from Nha Trang to Qui Nhon; from Qui Nhon to DA Nang in the north; from Nha Trang to Pleiku in the Central Highlands; and west from Pleiku to a terminal in Ubon, Thailand. (See *Map 2.*)

Although these large tropospheric scatter terminals, each of which was mounted in three large semitrailers, were designed for transportable operation, their 30-foot mobile antennas could not be used because of the relatively great path lengths. More effective and permanent were the 60-foot antennas, set in concrete and resembling billboards, that were constructed instead. The system began service in September 1962 when the BACK PORCH link between Saigon and Nha Trang was activated. At the same time the US Army's 39th Signal Battalion, headquartered at Tan Son Nhut, assumed responsibility for the operation of the system even though it had not been fully tested and accepted.

The 39th Signal Battalion

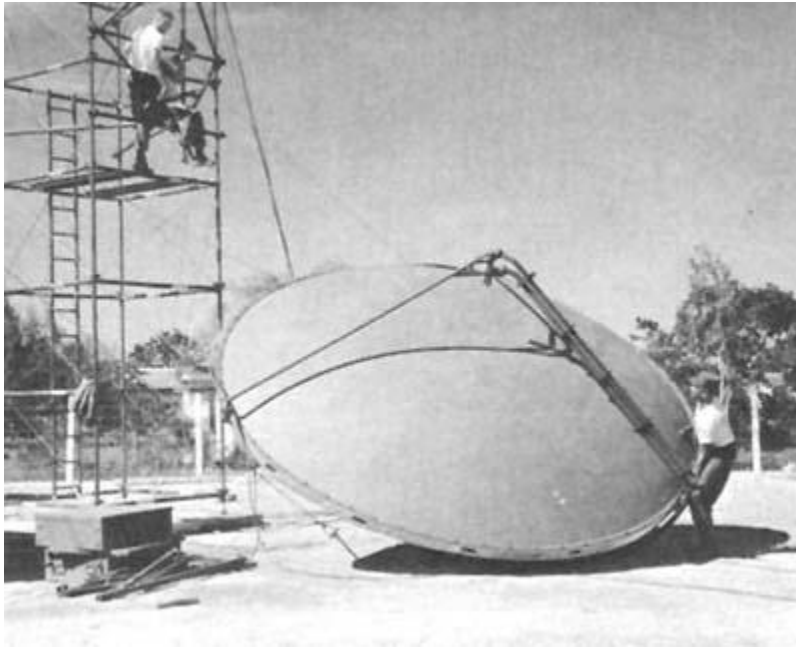
The 39th Signal Battalion commanded by Lieutenant Colonel Lotus B. Blackwell began to reach Vietnam in February 1962, and by midsummer the entire battalion had arrived. It had an authorized strength of over 1,000 men, consisting of a headquarters detachment and three numbered companies. The mission of the battalion was to operate and maintain the BACK PORCH system; the extensions, or tails, to the backbone system, using mobile teams and equipment; all telephone switchboard exchanges; and communications message centers in the country at that time. The 39th Signal Battalion was also responsible for telephone directory and information service; photographic service, including film and equipment exchange; motor and air courier message service; cryptographic distribution service and maintenance support for all US Army and South Vietnamese units in Vietnam; signal maintenance support; and operation of the US Army Signal Supply Point. The battalion was assigned to the US Army Support Group, Vietnam, which, as the Army component command in Vietnam, came under the operational control of Lieutenant General Paul D. Harkins, the senior commander in Vietnam.

As the elements of the battalion arrived, they were immediately committed, installing and operating communications services for all US forces in Vietnam. The 232d Signal Company was deployed in the Saigon and Mekong Delta areas to provide communications support to all the forces located there. That support included operation of manual telephone exchanges, message communications centers, high-frequency radio teletype and voice terminals, and tails of the backbone system. The 178th Signal Company, working out of DA Nang in the north, provided similar area communications support in the I and 11 Corps Tactical Zones located in the northern part of South Vietnam.

The 362d Signal Company, which was organized to operate the long-lines tropospheric scatter system, established its headquarters at Nha Trang in central Vietnam and immediately began deployment of its highly mobile tropospheric scatter terminals, of which six were sent to Thailand. These six terminals were put into operation in January 1963 by the 362d Signal Company to furnish long-lines support to the joint US Military Advisory Group, Thailand; they were transferred to the 207th Signal Company in Thailand during December 1963. Ten of the remaining fourteen terminals were put into operation in Vietnam supplying tails from the BACK PORCH system between DA Nang and Hue, DA Nang and Quang Ngai, Pleiku and Ban Me Thuot, Saigon and Soc Trang, and Saigon and Can Tho. The Can Tho terminal was moved to Vinh Long in mid-1963. Regarding these early efforts, a brief history of the 39th Signal Battalion states:

"Hardships were shared by all, often in insecure areas with . . . Viet Cong harassment. Speed was [the] order of the day and despite [rather poor] conditions, the men of the 39th, throughout the Republic of Vietnam, had begun the installation of the system."

The 39th Signal Battalion, meanwhile, was assuming more tasks. In May 1962 the battalion was charged with operating and maintaining the US advisers' voice radio net. Later in December 1962 it assumed operational responsibility for the countrywide S advisory Operations and Intelligence Radio Net down to elements located at South Vietnamese division U



INSTALLING INFLATABLE ANTENNA FOR A MOBILE RADIO TROPOSPHERIC SCATTER TERMINAL

level. The battalion received an augmentation of over 200 soldiers from the Military Assistance Advisory Group, Vietnam, to operate this network. In order to supervise the battalion's widespread operations, located at thirty-two sites throughout South Vietnam, a System Control was established. The System Control staff also planned and engineered proposed systems.

Control and Direction Over Communications

Early in 1962 the staff of the Commander in Chief, Pacific, believing that the buildup in Vietnam required centralized control and management of long-distance communications into, out of, and within the Republic of Vietnam, recommended to the joint Chiefs of Staff in Washington that the responsibility for the operation of the Army's worldwide communications "gateway" station in Saigon at Phu Lam be transferred from the control of the Military Assistance Advisory Group, Vietnam, back to Department of the Army and in turn to United States Army, Pacific. As it later developed, this concept required that the station continue to provide message communications support to the advisers in Vietnam and that it be attached to the 39th Signal Battalion. As a result, in September 1962 the station, consisting of 134 officers and men, was assigned to US Army Support

Group, Vietnam, and in addition was attached to the 39th Signal Battalion for operational control.

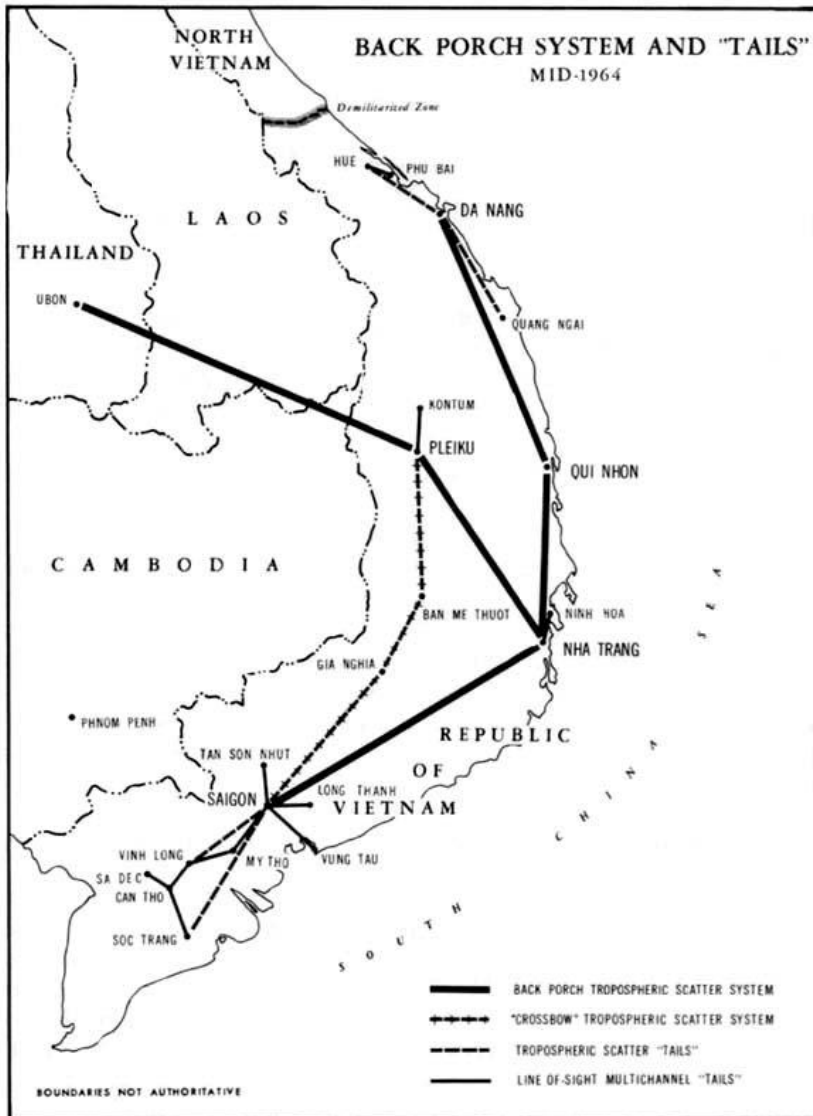
The station had previously become part of the worldwide Defense Communications System after the establishment of the Defense Communications Agency on 12 May 1960. In 1962 the midrange plan of the Defense Communications Agency assigned responsibility for the Defense Communications System in Vietnam to the US Army. Yet technical control and direction of this station became increasingly subject over the years to the Defense Communications Agency.

The over-all control and direction of communications in Vietnam was vested in the US joint communications-electronics staff in Saigon. Direction was provided to the 39th Signal Battalion from that staff office through the Army component Signal Officer, Headquarters, US Army Support Group, Vietnam. The commanding officer of the 39th Signal Battalion had dual responsibilities during this period and was referred to as being "dual-hatted." He was both battalion commander and the US Army's Vietnam signal staff officer.

Improvements, Problems, and Plans to Mid-1964

During 1963 and early 1964 US Army Signalmen continued to operate and improve the communications system installed in 1962 and early 1963. An additional mobile tropospheric scatter link was installed, connecting Ban Me Thuot in the Central Highlands to the small town of Gia Nghia in west central Vietnam near the famous Duc Lap Special Forces Camp. By mid-1964 a similar link was established between Gia Nghia and Saigon. Thus twenty-four channels of communications, passing over these new links and the one previously established between Ban Me Thuot and Pleiku, were available from Saigon to Pleiku in the Central Highlands. This three-link system became known as CROSSBOW. (*Map 2*)

A major improvement in the capability to relay messages into and out of the Department of Defense's worldwide network was made in January 1964 upon activation of a 50-line message relay facility operated by Strategic Army Communications Station, Vietnam, personnel at Phu Lam. Message traffic handled by the station steadily increased during the 1962-1963



MAP 2

buildup. In January 1962 the station processed over 35,000 messages. The total increased to over 117,000 in October 1963 and to more than 185,000 a month by mid-1964. Furthermore, the first circuit capable of passing lowspeed data traffic was activated over the radio links of the Strategic Army Communications Station, Vietnam, connecting Saigon and the large Army logistical base in Okinawa.

The station also activated modern high-powered high-frequency transmitter equipment at Phu Lam and receiver equipment at Ba Queo, both on the outskirts of Saigon, to replace older equipment which had provided radio trunks into the worldwide Defense Communications System. These improvements were not made without difficulty. For example, when the transmitters were installed in a new building at Phu Lam, their weight caused the floor to sink into the marshy earthfill. To cope with water seepage the building had to be expanded and modified. The new facilities improved the quality of communications consisting, by early 1963, of 16 message and 3 voice channels

operating on the high-frequency radio trunk to Okinawa, 16 message and 3 voice channels to the Philippines, and 12 message and 3 voice channels to Thailand.

A new Saigon overseas switchboard was installed at Phu Lam to improve long-distance telephone service. This manual switchboard had positions for four operators. However, even with this improvement, there were difficulties in placing overseas calls because of the limited reliability of high-frequency radio, particularly when operated in Southeast Asia. According to a history of the Phu Lam Signal Battalion, "The switchboard logs consistently included entries such as 'out,' 'out to fair,' 'poor to fair,' and 'out all day.'" By the end of October 1963 the switchboard was averaging thirty-three overseas calls a day, while later, at its peak in 1968-1970, over 1,500 calls were processed each day.

The Commander in Chief, Pacific, recognizing the limitations of these radio systems, had proposed as early as June 1961 a wideband system to furnish high quality communications throughout the Western Pacific defense line. The system would interconnect Korea, Japan, Okinawa, Taiwan, the Philippines, South Vietnam, and Thailand. It would also link up with commercial undersea cables to provide circuits from Hawaii to Japan and the Philippines. The part of the system between the Philippines and Vietnam would consist of a 55-mile microwave system between Clark Air Force Base and San Miguel in the Philippines; an 800-mile submarine cable between San Miguel and Nha Trang in South Vietnam; and a tropospheric scatter radio link connecting Nha Trang with Saigon. The Air Force, which was responsible for establishing the system, awarded the contract to *Page Communications Engineers* for construction in November 1963. This system, called WET WASH, which was not completed until January 1965, had a capacity of sixty voice channels from Southeast Asia to the Philippines. The Air Force was then charged with operating the system from the Philippines to Nha Trang; the Army was responsible for operation of the tropospheric scatter link between Nha Trang and Saigon.

In 1961 the US Army Japan awarded a contract to Nippon Electric Co to build a Tropo Scatter System throughout Japan with extensions to Okinawa and Korea. In 1964 the US Army awarded a contract to Page Communications Engineers to upgrade a Tropo system between the Philippines and Taiwan and to interconnect that system with a Collins Radio Tropo system that traversed Taiwan and extend into Okinawa. With the completion of this contract in 1964, a vital communication link was established that interconnected Japan, Korea, Okinawa and the Philippines.

Since communications with Thailand also needed improvement, a 24-channel tropospheric scatter system was proposed early in the 1960s to be installed between Saigon and Bangkok. The Army was made responsible for this 450-mile single-hop system, with Philco-Ford Corporation as the construction contractor. When activated in mid-1963, the system did not perform well because the distance proved too great for operation over the path between the original site locations. It was reengineered with terminals located at a site called VC Hill, southeast of Saigon near Vung Tau, in Vietnam, and a camp at Green Hill, north of Bangkok, in Thailand. This revamped system, scheduled for completion by September 1965, the world's longest single-hop tropospheric scatter system at the time, became operational in December 1965.

For a while in the early 1960s optimism ran high at General Paul D. Harkins' joint headquarters, in anticipation of an early end to hostilities. For example, a

telecommunications plan of June 1963 called for phasing out the Army's 39th Signal Battalion. This plan, which was modified by the staff of the Commander in Chief, Pacific, Admiral Harry D. Felt, and later approved by the joint Chiefs of Staff, envisaged that the communications operated by the Army would be turned over to the Republic of Vietnam. By the end of 1963 the 39th Signal Battalion was training South Vietnamese troops to operate its mobile radio relay equipment. Plans which had assumed that the Viet Cong could be eliminated by the end of 1964 provided the basis for communications efforts up to mid-1964. But they were precluded by events which drastically changed the requirements for communications in Southeast Asia.

MILITARY INTERFERES COMMUNICATIONS

ACTIVITIES 1964-1965

Before the 39th Signal Battalion could make much progress toward training Vietnamese communications personnel, optimistic plans looking toward an early military solution of the war were wrecked by current events. In November 1963, South Vietnam's first president, Ngo Dinh Diem, was assassinated and his government overthrown. There followed a series of rapidly changing governments, producing a state of disorganization that seriously weakened the South Vietnamese efforts against the Viet Cong. Meanwhile, in early 1964, Hanoi decided to infiltrate North Vietnamese Regular Army troops into South Vietnam to defeat the disorganized and confused South Vietnamese. Hanoi also started to equip the Viet Cong with modern automatic weapons.

The Tonkin Gulf incidents of early August 1964 marked the first direct engagements between North Vietnamese and U.S. forces and, according to General William C. Westmoreland, "represented a crucial psychological turning point in the course of the Vietnam War." By December 1964 the North Vietnamese had infiltrated no less than 12,000 troops, including a North Vietnamese Army regiment, into South Vietnam. At the same time a Viet Cong division had been organized and was engaged in combat operations. In order to bolster the faltering South Vietnamese forces, the United States deployed additional advisers and support units. The Republic of South Vietnam forces were increased by 117,000 men during 1964, attaining a strength of over 514,000. Their effectiveness, however, decreased markedly. Through the last half of that year US troop strength increased rapidly. The number was approximately 16,000 in June of 1964 when General Westmoreland assumed the responsibilities of Commander, United States Military Assistance Command, Vietnam. By the year's end, US troops in Vietnam numbered about 23,000.

Satellite Communications Come to Vietnam

The inadequacy and unreliability of the meager radio circuits linking Vietnam with Hawaii and Washington became painfully evident during the 1964 Gulf of Tonkin incidents. In the first week of August the engagement of US Navy vessels by North Vietnamese torpedo boats resulted in a flurry of telephone calls and messages between Saigon and Washington. The long-haul high-frequency radio circuits, hampered by severe sunspot activity and occasional transmitter failure in Saigon, were simply not capable of carrying the load. The WET WASH cable project, which would subsequently bring highly reliable services into Southeast Asia, was not yet complete.

An experimental satellite ground terminal, with an operating team under Warrant Officer Jack H. Inman, was rushed to Vietnam to bolster communications capabilities. The terminal, which provided one telephone and one teletype circuit to Hawaii, became operational in late August 1964. Signals were relayed from Saigon to Hawaii through a communications satellite launched into a stationary orbit some 22,000 statute miles above the Pacific Ocean. This experimental synchronous communications satellite system, dubbed SYNCOM, was the first use of satellite communications in a combat zone. The satellite ground terminal in Vietnam, which was operated by the US Army's Strategic Communications Command, provided the earliest reliable communications of high quality into and out of Vietnam.

The SYNCOM satellite communications service was improved in October 1964 with a newer terminal that provided one telephone and sixteen message circuits. These "space age" communications means immediately proved their worth. The Command History, 1964, of the United States Military Assistance Command, Vietnam, states: "Since October the . . . [satellite terminal] has handled a remarkable volume of operational traffic." And further: "It appears that satellite communications are here to stay and will increase MACV [Military Assistance Command, Vietnam] capability in the future."

System Problems, Further Plans, and Control Matters

Communications deficiencies within Vietnam became more apparent as the hard-pressed signalmen struggled to provide the communications service required by the new buildup. As early as mid 1963 it was recognized that the single 72-channel tropospheric scatter link between Saigon and Nha Trang did not have sufficient capacity to pass the required traffic from Nha Trang, where two other 72-channel systems from Pleiku and Qui Nhon converged for interconnections to the south. The BACK PORCH sites had been chosen as a compromise between the ease of maintaining site protection and securing the radio propagation characteristics required for operation. As a result some links performed poorly, the poorest link being the saturated one between Saigon and Nha Trang.

Another shortcoming of the long-lines systems which steadily became more apparent was the lack of adequate facilities to control, test, and interconnect circuits, that is, the lack of technical control facilities at the channel breakout or switch locations such as Nha Trang, Pleiku, and Qui Nhon. Colonel Thomas W. Riley, Jr., who was the US Army, Vietnam, Signal Officer in 1965, later recalled: "It was ironical that such big costly refined . . . links as . . . provided at Pleiku-involving a . . . [multimillion dollar] installation connecting Nha Trang to the east with . . . [Ubon, Thailand] to the west-came together at Pleiku in a shed." As more and more tails using mobile equipment were installed, branching off the BACK PORCH commercial grade system, various technical difficulties were encountered. Among these were differences in the voice channel electrical current levels where the circuits interconnected, and differences in the signaling frequencies that are employed to ring the telephone of the distant person who is being called. Without adequate technical control facilities at the circuit interconnecting points it was difficult to "match" electrically the incompatible equipment. Also, where circuits had to be rerouted or activated in support of fast-moving operations, the inadequate technical control facilities could not respond rapidly. Furthermore, the mobile equipment was not designed to operate at the low noise levels associated with more sophisticated high

quality "commercial" grade systems. These differences of channel levels, system noise levels, and ringing frequencies, and the lack of adequate technical control facilities all made for a system of degraded quality. Since high-speed data can pass only over high quality communications systems, it was becoming increasingly important to provide noiseless, error-free circuits so that data traffic could be accurately received at the distant end.

As a result of both these technical problems and the requirements generated by the buildup, the Commander in Chief, Pacific, by October 1964 had validated requirements to the joint Chiefs of Staff for additional communications service. These requirements became known as Phase I of the Integrated Wideband Communications System. A wideband communications system as described in the Military Assistance Command Vietnam History of 1965 is "a communications system which provides numerous channels of communication on a highly reliable basis; included are multi-channel telephone cable, troposcatter, and multi-channel line of sight radio systems such as microwave."

This communications project would include the establishment of a BACK PORCH type of system in Thailand. The Vietnam portion as visualized by the planners would provide support for up to 40,000 US troops by upgrading the existing fixed tropospheric scatter communications; by improving service in the Saigon area; by establishing an additional link north to bypass the system between Saigon and Nha Trang, extending additional channels north from the Saigon area and from the Da Nang area still further north to Phu Bai; and by installing adequate technical control facilities throughout the system.

By December 1964 the Defense Communications Agency had prepared a plan and forwarded it through the joint Chiefs of Staff to the Secretary of Defense for approval. According to this plan the wideband system would become a part of the Defense Communications System under a Defense Communications Agency control center located in Saigon. The authority to validate customer requirements for the use of circuits was vested with the communications-electronics staffs of the US military assistance commands in Vietnam and Thailand.

The Department of Defense, while the plan was being studied, decided to use permanent, fixed installations rather than large transportable shelters for the system. This decision would require construction of buildings and other facilities in Southeast Asia to house the equipment. The decision was made on the basis that time was the critical factor-the system was needed right then and the contractors were promising that the system could be operational one year after contract award if commercial equipment and prefabricated buildings were used. The use of "transportable," that is, commercial equipment installed in large vans similar to the equipment used on BACK PORCH, was considered; it was estimated, however, that transportable would require more time to manufacture and put into operation than a fixed system and that they would be more costly.

The plan called for the system to be operational by 1 December 1965, an early date that proved altogether too optimistic. For example, the plan was not approved for contracting action until the Department of Defense approved it as a "Telecommunications Program Objective" in August 1965. The US Army, which was designated as the contracting agency, awarded the contract for the Vietnam portion of the system to Page

Communications Engineers, Inc., in September 1965. The system would be operated by the US Army Strategic; Communications Command, which was originally activated on 1 April 1962 by combining the US Army Signal Engineering Agency and the US Army Communications Agency. This was in line with its mission as the Army's single operator of those portions of the worldwide Defense Communications System assigned as an Army responsibility.

Organizational and control arrangements changed during this period. The US Army Support Group, Vietnam, was redesignated as the US Army Support Command, Vietnam, in March 1964, when the dual-hat status of the Army component command signal officer also changed. Previously, he had served both as the Army Support Group Signal Officer and as the Commanding Officer, 39th Signal Battalion. But following the reorganization, the positions were allocated separately; according to personnel lists of March 1964, Lieutenant Colonel Earl R. Velie became Signal Officer of the Army Support Command and Major Leo T. White became Commanding Officer, 39th Signal Battalion.

Also in 1964 the command and control arrangements for the big Strategic Army Communications Station, Vietnam (*Phu Lam*), were affected by the creation and expansion of the US Army Strategic Communications Command and its Pacific subcommand headquartered in Hawaii. In November 1964 the station was redesignated Strategic Communications Facility, Vietnam, and at about the same time control of the facility passed from US Army Support Command, Vietnam, to US Army Strategic Communications Command, Pacific. These changes in 1964 marked the beginning of a division of control over Army communications in Vietnam between the Army Strategic Communications Command and the Army component command signal troops.

By the spring of 1965 the combat situation had deteriorated further. The casualties of the South Vietnamese Army were mounting to the point that the equivalent of almost one infantry battalion a week was being lost. In March the United States sent Army airborne and Marine combat troops to defend US air bases in Vietnam against enemy attack. In order to support these forces, it was necessary to deploy a logistical command and other combat support troops. An additional signal unit, the 41st Signal Battalion, and Headquarters, 2d Signal Group, were alerted for movement to Vietnam.

By mid-1965 it had been decided to commit substantial numbers of US fighting troops along with other combat support organizations. The emphasis was on the introduction of infantry, armor, and artillery elements. As General Westmoreland relates in his report on the war in Vietnam: "There were inadequate ports and airfields, no logistic organization, and no supply, transportation, or maintenance troops. None the less, in the face of the grave tactical situation, I decided to accept combat troops as rapidly as they could be made available and to improvise their logistic support." By the end of 1965 US strength in Vietnam stood at 184,000 men.

The 2d Signal Group Arrives

The first of the additional Signal Corps troops to reach Vietnam was the advance party of Headquarters, 2d Signal Group, commanded by Colonel James J. Moran, which arrived from Fort Bragg, North Carolina, in May 1965. Five companies of the 41st Signal Battalion, commanded by Lieutenant Colonel James G. Pelland, arrived in late June,

and the rest of the battalion was in Vietnam by 14 July 1965. A separate company, the 593d Signal Company, arrived in Saigon on 13 July 1965. By mid-July the 2d Signal Group had reached an authorized strength of about 2,900 officers and men.

The 2d Signal Group, upon its arrival, assumed command of the 39th Signal Battalion, taking over in fact all the missions previously assigned that battalion, such as the tasks of providing signal maintenance support and operation of the signal supply system in Vietnam. Later, these supply and maintenance missions were turned over to the 1st Logistical Command. Upon acquiring its second signal unit, the 41st Signal Battalion, in mid-1965, the 2d Signal Group made it responsible for all area communications in the northern half of the Republic of Vietnam in the I and II Corps Tactical Zones, while assigning responsibility to the 39th Signal Battalion for the southern half of Vietnam in the III and IV Corps Tactical Zones. The 362d Signal Company was also placed directly under the 2d Signal Group to operate the tropospheric scatter system throughout the country. The group was assigned to US Army Support Command, Vietnam, and subsequently to US Army, Vietnam, when the latter was established on 20 July 1965, replacing the Support Command. The US Army, Vietnam, was also commanded by General Westmoreland, who served concurrently as Commander, US Military Assistance Command, Vietnam.

These new Regular Army signal units immediately went to work to improve the existing communications and establish communications for new base areas. For example, by mid-July mobile equipment was provided to support the new logistical base being established at Cam Ranh Bay. A 12-voice channel radio relay link was installed to connect Cam Ranh with Nha Trang. A one-position tactical switchboard was put into operation, a mobile communications message center was installed, and high-powered radios linked Cam Ranh into radio nets in Vietnam. In just a few weeks the small switchboard at Cam Ranh had to be replaced with another mobile manual board that was much larger—a 3-position switchboard capable of serving 200 subscribers. Microwave teams with mobile equipment had arrived in Nha Trang to start installation of a 45-channel microwave link between Cam Ranh Bay and Nha Trang. By the end of October 1965 arrangements had been made to ship a fixed-plant, automatic dial telephone exchange to Cam Ranh Bay. The fixed automatic dial telephone equipment required a dust-free, humidity-controlled environment for operation; hence special building construction was required.

Colonel Moran's 2d Signal Group was also busily engaged in providing communications support to the combat troops, both to those that were already in Vietnam and to those that were being sent to the country. The group was alerted on 12 August 1965 to provide communications support to the famous 173d Airborne Brigade for an important Vietnam highlands operation in the Pleiku area. The next day the necessary equipment and Signal Corps troops were airlifted to Pleiku, and by evening on 14 August communications got into operation, linking the 173d's operating area into the large fixed backbone system at Pleiku.

Equipment and personnel also had to be redistributed to support arriving units. During the week of 15-21 August, twenty-four tons of signal equipment was moved to the I and II Corps Tactical Zones by special airlift, while an additional twenty-eight tons were awaiting movement. By early September 1965 US Army, Vietnam, had established

priorities for providing communications support throughout the country. First priority would go to the combat units, second to combat support elements, and third to logistic and administrative elements.

Command and Control Arrangements

During this period General Westmoreland's joint headquarters was establishing and refining command control arrangements in Vietnam. The final arrangement provided that the Commander, US Military Assistance Command, Vietnam, exercise tactical control over the US forces through the III Marine Amphibious Force in the northern I Corps Tactical Zone, through the I Field Force in the II Corps Tactical Zone, and through the II Field Force in the III Corps Tactical Zone. Both field force headquarters were modified US Army Corps headquarters. A senior US adviser was responsible for controlling and coordinating US advisory and support troop efforts in the IV Corps Tactical Zone. The Seventh Air Force controlled all US Air Force units, while United States Army, Vietnam, controlled all Army support and logistical units. The I Field Force, initially designated Task Force Alpha, was activated in August 1965, II Field Force headquarters during the spring of 1966.

When Task Force Alpha was activated in August, no signal organization to support it in central Vietnam was available. Interim communications support was provided for Task Force Alpha, headquartered at Nha Trang, by the 2d Signal Group. But on 15 September 1965 the organic 54th Corps Signal Battalion of Task Force Alpha started to arrive and by 1 October began to relieve the 2d Signal Group. The final elements of the 54th closed into Vietnam in October, thus freeing the overtaxed communicators of the 2d Signal Group to work in other areas in Vietnam. Initial communications support for II Field Force at Long Binh, fifteen miles northwest of Saigon, also had to be provided by the 2d Signal Group during the spring of 1966 until the 53d Signal Battalion arrived to provide the needed support.

Additional Communications Control Elements Enter Vietnam

Changes were being made, meanwhile, in higher level communications control, direction, and operations responsibilities. In line with plans for the integrated wideband system that called for establishment of a Defense Communications Agency center in Vietnam, the Deputy Secretary of Defense approved the manning of the Defense Communications Agency, Support Center, Saigon, on 29 April 1965. The support center would provide "system control and engineering support" to both the military assistance command in Vietnam and that in Thailand. The center itself would also be subject to the authority of Defense Communications Agency, Southeast Asia Region, located at Clark Air Force Base in the Philippines. The first Support Center elements arrived in Vietnam during May 1965. In early June US Military Assistance Command, Vietnam, assigned to the center additional tasks, including operational direction and restoration authority for all Defense Communications circuits in Vietnam. The Vietnam circuits included those passing over the BACK PORCH system, which would be integrated into the new wideband system as part of the worldwide Defense Communications System. This new mission also required that the Defense Communications Agency element in Vietnam supervise and restore defense circuits which passed over the mobile tails, down to and

including the subscribers' instrument, controlled by the Army component signal troops under the 2d Signal Group.

In September 1965 the Defense Communications Agency, Support Center, Saigon, was redesignated Defense Communications Agency, Southeast Asia Mainland Region. As a part of the Defense Communications Agency organizational structure, the region came under the Pacific area office located in Hawaii. By the end of 1965 the strength of the Southeast Asia Mainland Region had grown from eight men to 100.

In May 1965 Department of the Army directed that those facilities and personnel which would become a part of the Defense Communications System be transferred from US Army, Pacific, to the Army's Strategic Communications Command. This directive was in line with the Strategic Communications Command's mission to operate the Army's portion of the Defense Communications System. In July 1965 the command established an organization to operate the backbone system in Southeast Asia, namely, the US Army Strategic Communications Command, Pacific, Southeast Asia, located in Saigon. Subordinate elements of this new organization were formed in both Vietnam and Thailand and were charged with the actual operation of the system. Elements of the command's 11th Signal Group stationed at Fort Lewis, Washington, arrived in Vietnam in June 1965 to establish the headquarters of the Strategic Communications Command in Southeast Asia. Colonel Henry Schneider was designated as commander of all the Strategic Communications Command's troops in Southeast Asia, while Lieutenant Colonel Jerry J. Enders, who arrived with the unit from Fort Lewis, was designated to command the Vietnam element. Arrangements were made for turning over the Defense Communications System facilities of the tropospheric scatter systems operated by the 2d Signal Group for BACK PORCH and WET WASH and those at Green Hill in Thailand and Saigon in Vietnam.

Not until 19 August 1965 did the 2d Signal Group turn over to the Strategic Communications Command in Vietnam the responsibility for operation of these systems, along with the transfer of 121 officers and men. These developments increased the command's problems and widened the split in Army communications operations in Vietnam between the Army's Strategic Communications Command's organizations and the area support signal units of the 2d Signal Group under the Army component headquarters, U.S. Army, Vietnam.

A like transfer occurred in Thailand. The US Army's 379th Signal Battalion, which had been organized in Thailand in April 1965, assigned one officer and 71 enlisted men to the Strategic Communications Command element in Thailand in September 1965. The 379th provided mobile communications support to US forces in Thailand similar to that provided by the 39th Signal Battalion in Vietnam.

The Army's Strategic Communications Facility, Vietnam, continued to remain directly under the Hawaii-based Strategic Communications Command, Pacific, headquarters until November 1965, when the station was assigned to the Strategic Communications Command element in Vietnam and was redesignated US Army Strategic Communications Command Facility, Phu Lam. This vital gateway station continued to handle most of the communications passing into and out of Vietnam. The preponderance of the traffic flowed over the high quality circuits of the WET WASH undersea cable to the Philippines.

Earlier at the Phu Lam facility, on 23 March 1965, the first manual data relay center had been activated. At that time the data relay had three connected stations, Clark Air Force Base in the Philippines, Tan Son Nhut Air Base on the outskirts of Saigon, and the Army's 27th Data Processing Unit in Saigon. The station relayed 11,000 cards on its first day of operation. At the end of 1965 the station was processing approximately 400,000 cards per month from seven connected stations.

Early in 1965 the Phu Lam message relay with its twenty-five active circuits also was processing over 250,000 messages per month. By September the station began to experience extreme difficulty in handling the message traffic. The backlog of service messages became critical when at times up to 1,000 were awaiting action. Because of the deteriorating situation at Phu Lam, the only Defense Communications System message relay facility in Vietnam, an interim tape relay facility, using large transportable vans capable of terminating eighteen circuits, was deployed to Vietnam. These Strategic Communications Command contingency or emergency assets, which arrived in Nha Trang on 25 October, were operational by 3 November 1965. By the close of the year these two major message relays at Saigon and Nha Trang were processing over half a million messages per month out of and into Vietnam over circuits of the Defense Communications System.

More Mobile Radio, More Fixed Radio, and Cable

As more troops were deployed throughout the Republic of Vietnam, it became apparent that the existing BACK PORCH system and the planned Integrated Wideband Communications System could not support the critical circuit needs in Vietnam. Contingency transportable tropospheric scatter equipment was provided to Vietnam beginning in March 1965 when six Army mobile terminals arrived. These were used to establish additional circuits north from Saigon to Pleiku through a single relay point situated near the summit of the 7,000-foot mountain, Niu Lang Bian, which stood a few miles to the north of Dalat in the south central highlands. Initially installed as a 24-channel system, its capacity was increased in late summer to forty-eight voice channels when two terminals of another system were redeployed to provide the additional channelizing equipment.

Six larger tropospheric scatter terminals similar to those of the BACK PORCH system were also deployed and operational by the end of 1965. Using their transportable antennas these terminals established twenty-four voice channel links between Pleiku and Da Nang, Vung Tau and Cam Ranh Bay, and between DA Nang and Ubon, Thailand. These systems, along with other tails provided by the 2d Signal Group, had added approximately 35,000 voice channel miles to the Vietnam communications system during the last half of 1965. (Map 3) None of these statistics on facilities, however, included the numerous systems installed by the 2d Signal Group in direct support of combat operations.

Furthermore, the mobile systems were all stopgap measures. Additional circuits of the fixed type were required to support the expanding effort, particularly for the low priority logistical forces and their complex widespread operations. By the end of 1965, the US joint headquarters in Saigon had forwarded three requirements packages to the Commander in Chief, Pacific, which, as conceived by the US Military Assistance Command and component communications planners, would provide the necessary

long-lines support in Vietnam. The first package forwarded in October was an addition to the programmed wideband system and was later called Integrated Wideband Communications System, Phase 11; it was designed to support up to 200,000 troops. The second requirements package, sent in November 1965, requested a coastal submarine cable system to supplement the integrated wideband system. The third package, forwarded to the Commander in Chief, Pacific, in December 1965, was designed to support up to 400,000 troops.



This final major addition to the integrated system was later called Integrated Wideband Communications System, Phase III. The system would provide commercial grade service using fixed-plant equipment and construction techniques.

More Buildup

In November 1965 the 1,300-man 69th Signal Battalion (Army) commanded by Lieutenant Colonel Charles R. Meyer, arrived, along with the 580th Signal Company (Construction). The 69th Signal Battalion took over operation of all local communications support in the Saigon-Long Binh area. Besides providing area signal support for the numerous troop units, the 69th directly supported the headquarters of the US Military Assistance Command, Vietnam, US Army, Vietnam, and the US Army's 1st Logistical Command. To assist in this massive effort, the 593d Signal Company, which had been providing communications support in the Saigon area, was attached. The 580th Signal Company, which was capable of installing large fixed cable systems, was also attached.

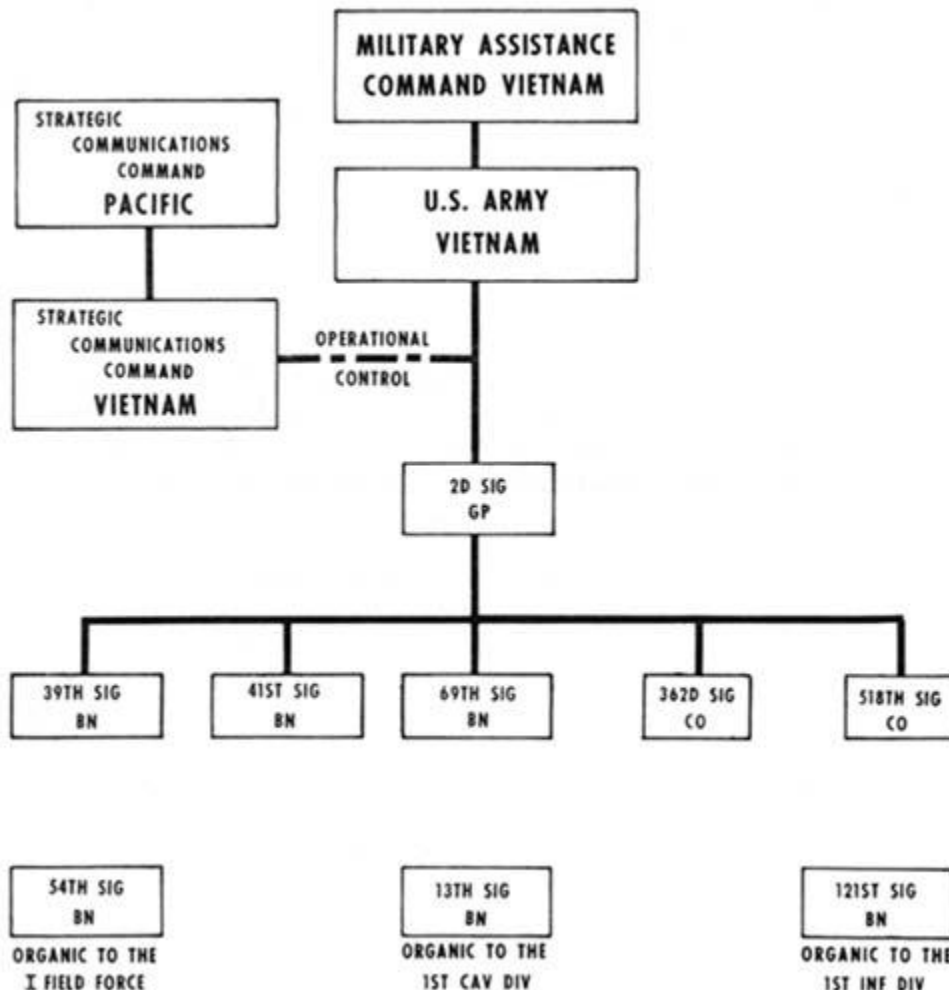
The last signal unit to arrive during 1965 was the 518th Signal Company, which reached Vietnam in late December. This company, capable of operating mobile tropospheric

scatter and microwave equipment, relieved the 362d Signal Company of the responsibility for the operation of the mobile tropospheric scatter and microwave systems in the III and IV Corps Tactical Zones in the South. With these additions Colonel Moran's 2d Signal Group had grown to a strength of nearly 6,000 by the end of the year. (Chart 1)

Even so, adequate communications service could not keep pace with the growing number of "customer" requirements. At the end of 1965 General Norton in his quarterly report continued to list inadequate communications:

The inadequacies of some major axes of long lines communications in USARV still remain alarmingly high: Saigon-Nha Trang 52%, and Nha Trang-Qui Nhon 50%. Programmed installation of multi-channel equipment has proceeded as planned, and every measure available to the command is being taken to obviate the situation.

CHART 1-SIGNAL ORGANIZATION IN VIETNAM, DECEMBER 1965



Impact of Circuit Shortages on Telephone Systems

The lack of voice channels especially affected the telephone system, particularly long-distance service within Vietnam. By July 1965 there were approximately fifty military

telephone exchanges in operation and most of these were manual, using a conglomeration of equipment which required operator assistance to reach any party. The 2d Signal Group at that time started to rearrange the limited trunking under a program that required switchboard operators at the numerous switchboards located throughout the country to place all long-distance calls through eight exchanges: at the US Military Assistance Command, Vietnam, headquarters in Saigon, and at Tan Son Nhut, Can Tho, Bien Hoa, Nha Trang, Qui Nhon, Pleiku, and Da Nang. This arrangement proved ineffective, however, because of the lack of trunk circuits and the ever-increasing number of manual switchboards that were being connected into the system. The inadequate trunking between switchboards grew worse as more and more general-user circuits (trunks between telephone exchanges) came to be required as sole-user on so-called dedicated circuits to support high-priority combat operations. Even as late as April 1968 approximately 85 percent of the total channels available were tied up on a sole-user basis. These dedicated circuits provided direct communication between two facilities, such as between the operations center at the US Military Assistance Command headquarters and the operations center of a field force headquarters. The US Air Force relied heavily on dedicated circuits and systems to provide and coordinate air support.

The state of general-user telephone service in Vietnam during the mid-1960s is best described in a report prepared by the joint Logistic Review Board. It states in part:

Operators were too busy to monitor effectively their circuits. Pick-up times of 3 to 5 minutes were common on the busy boards during peak traffic hours. Thus, not only were subscribers forced to route their own calls, but after completion of the call through the first operator, if the distant operator failed to answer, the calling party could not flash the operator back but was disconnected to join the queue again, . . . This led to the situation where, while one staff officer was tying up the operator by demanding an explanation of slow service, several other staff officers were cranking their generator handles furiously trying to get the attention of the same operator so that they, too, could discuss his reasons for being asleep at his job.

Automatic Telephone and Secure Voice Switch Plans

As early as mid-1964 the US Military Assistance Command headquarters and service component staffs had recognized the need for an integrated telephone network in Vietnam, including the need for direct distance dialing through automatic long-distance switches to be located at DA Nang, Pleiku, Nha Trang, and Tan Son Nhut. The rapid buildup overtook these early efforts. In September 1965, General Westmoreland's joint headquarters in Saigon restated a requirement for a general-user automatic telephone system for South Vietnam. As a result, following a conference in Hawaii at the headquarters of the Commander in Chief, Pacific, the Pacific area headquarters of the Defense Communications Agency was asked to develop a plan for automatic telephone service for Southeast Asia. The conferees had established a need for fifty-four fixed automatic dial telephone exchanges. Of these the

Army would be responsible for seventeen in Vietnam and nine in Thailand. To tie these telephone exchanges together the conferees decided that nine long-distance switching centers were required. Tentatively the centers would be at DA Nang, Qui Nhon, Nha Trang, Pleiku, Saigon, and Can Tho in Vietnam, and at Ubon, Korat, and Bangkok in

Thailand. These would be automatic tandem switches-providing direct distance dialing service much like the commercial system in the United States-designed to make most efficient use of the scarce long-distance trunks.

Earlier, in May of 1965, the Army Signal Corps planners in Vietnam and at US Army, Pacific, headquarters in Hawaii had realized that automatic dial telephone exchanges were needed immediately in South Vietnam. A proposal was promptly made to the Department of the Army in Washington that, as an interim measure, fifteen 400-line transportable dial telephone exchanges be provided. As stated in the 1965 History of US Army Operations in Southeast Asia: [the staff at Headquarters, US Army, Pacific] realizing that procurement of fixed plant equipment and the construction necessary to house such equipment would be unable to keep pace with the expanding communication requirement, developed criteria for a model transportable dial central office, and recommended that . . . [Department of the Army] expedite design, procurement, and fabrication of the transportable offices for early shipment to ... [Southeast Asia].

As a result of these actions Department of the Army in late 1965 ordered shipment of two fixed dial telephone exchanges, one of 2,400 lines for Cam Ranh Bay and another of 1,200 lines for Qui Nhon, and approved procurement of twelve more fixed dial exchanges and six 600-line transportable exchanges. In addition six large Army manual switchboards, modified for use as manual long-distance switchboards, were scheduled to arrive by January 1966, and would provide long-distance service until the automatic tandem switches became available.

Besides these large requirements for general-user service, there was also an urgent need for certain subscribers to be able to discuss classified matters over the telephone system. Installation of a secure voice switchboard was begun in Saigon on 22 September 1965 and the board became operational on 18 October when the first subscribers were tied in. By December 1965 this system, which consisted of seventeen subscribers in Vietnam, was completed. Voice-scrambling to frustrate enemy interceptions had hitherto been limited to a few fixed installations because of the complex and costly equipment. But there was a pressing need for its application to mobile radio, too. In the mid-1960s, secure voice equipment was for the first time programmed for the voice radios used by US combat troops. The 2d Signal Group, whose many varied tasks included the distribution and maintenance of US Army cryptographic material and equipment in Vietnam, began instruction on the repair of combat voice security equipment in early August 1965.

Fragmented Communications Control Is United, Summary 1962-1965

During the fall of 1965, as the overtaxed US Army Signalmen toiled to provide the best communications support possible with their limited resources, it became more and more apparent that the command and control arrangements over US Army Signal troops and systems in Vietnam were not responsive to operational requirements because they were not unified or single. These arrangements, as previously discussed, charged two separate US Army Strategic Communications elements in Vietnam, both under command of their headquarters in Hawaii and both subject to Defense Communications Agency direction, with responsibility for long-lines circuits in Vietnam. Neither of these elements was operationally under General Westmoreland. Moreover, the 2d Signal

Group, which was responsive to the US Military Assistance Command and which came under the command and control of Commanding General, United States Army, Vietnam, had responsibility for the tails of the long-lines system over which numerous Defense Department circuits were extended to the customers. In short, the circuits and systems were intertwined but their command and control were divided.

Major General Walter E. Lotz, Jr., who served as General Westmoreland's communications-electronics staff officer from September 1965 to August 1966, described this fragmentation. He said:

A number of sites were occupied jointly by . . . [US Army Strategic Communications Command and 2d Signal Group] units. When failures occurred in circuits transiting the systems of both, each unit pointed its finger at the other. . . . When a facility failed, determination of what circuits had been affected was primarily determined by the complaints of the operators at the circuit ends, rather than from circuit records, . . . , . . . when circuits also traversed cable systems installed by base commanders, problems were further compounded. As a result of these frustrations, I wrote a message which General Westmoreland dispatched to the Army Chief of Staff, recommending common command and control of the . . . [US Army Strategic Communications Command and United States Army, Pacific] theater Signal elements in South Vietnam.

General Westmoreland's message, dispatched to General Harold K. Johnson, Army Chief of Staff, on 19 October 1965, after outlining the fragmentation of the organization and control of the US Army Signal troops in Vietnam, declared:

Consider it urgent to resolve fragmentation of command and control of Army Signal Units in . . . {Republic of Vietnam} to ensure communications system is responsive to operational requirements, has unity of management and control and efficiently utilizes marginally adequate resources. . . . I believe extraordinary measures required. Signal Officer . . . [US Army Vietnam] should exercise operational control over all . . . [US Army Vietnam and Strategic Communications Command] elements in . . . [the Republic of Vietnam].

A Department of the Army team headed by Major General John C. F. Tillson III, which included representatives from Headquarters, US Army, Pacific, at once hurried to Vietnam in November to examine the situation and discuss the matter with General Westmoreland. As a result, on 1 December 1965 the Department of the Army placed the Strategic Communications Command's elements in Vietnam under the operational control of the Commanding General, US Army, Vietnam. The Department of the Army further directed the Commander in Chief, US Army, Pacific, General John K. Waters, and Commanding General, US Army Strategic Communications Command, Major General Richard J. Meyer, to provide a plan whereby all Army Signal elements down to field force level would be placed under a US Army Signal Command, Vietnam.

From the time the 39th Signal Battalion arrived in Vietnam in 1962 through the turbulent year of 1965, the US Army Signal Corps troops were continually responding to changing situations and requirements. Even from the early days in 1962 much of the communications support had to be improvised. Although plans, concepts, and programs were taking shape during the first big buildup year of 1965, actual resources in the theater remained limited and the communicators were hard pressed to provide adequate service to the customers. There was no established commercial system in

Vietnam to fall back on, as there had been in Europe in World War II. In October 1944, only four months after the Allied troops invaded Europe, the rehabilitated civil system yielded about 3,000 circuits, totaling over 200,000 circuit miles, supplemented by about 100,000 circuit miles of new construction built by the signal forces of the US Army.

By the end of 1965, however, Army signalmen were being trained and new units formed in the United States for deployment to Vietnam. These would be available in increasing numbers to upgrade and expand the improvised communications support then available in Vietnam. At the same time, as communications resources built up, the divided or fragmented control over US Army communications was being corrected. The logistical and administrative troops, who were most affected by the lack of adequate communications services, would benefit. And although the over-all communications did not meet all theater requirements, combat operations were sufficiently supported in every undertaking. General Westmoreland stated in a personal message to all of the communicators in South Vietnam during the fall of 1966:

The communications system, despite the handicap of having to provide more service than in any previous war and of operating under severe geographical and tactical equipment limitations, has responded brilliantly to the burgeoning requirements of a greatly expanding fighting force. No combat operation has been limited by lack of communications. The ingenuity, dedication, and professionalism of the communications personnel are deserving of the highest praise.

PART TWO

The Buildup Climaxes, 1966-1967

Creation of the 1st Signal Brigade Organization and Operation

General Westmoreland has referred to 1966 as "The Year of Development" for the U.S. forces in the Republic of Vietnam, and most assuredly it was for the Army communications effort. Yet the technical developments during the expansion of communication services at that time, although significant, were overshadowed at first by the attention given at the highest levels of Army command to eliminating the fragmented control that hampered the communications effort in the Republic of Vietnam.

Crucial Decisions

The decision by the Department of the Army at the turn of 1965-1966 to return the Strategic Communications Command's Vietnam signal elements to the operational control of the Commanding General, US Army, Vietnam, was made in direct and immediate response to General Westmoreland's "fragmentation" message of 19 October 1965. This arrangement, however, was recognized by the Army as only temporary; further organizational effort was required to attain a completely satisfactory solution. General Creighton W. Abrams, Vice Chief of Staff of the Army, therefore asked US Army, Pacific, in coordination with the Strategic Communications Command, to develop a plan for the organization of a US Army Signal Command, Vietnam, to include not only all signal units of US Army, Vietnam, above the field force level, but also elements of the Strategic Communications Command that were in Vietnam. General

Abrams further specified that this new command be headed by a brigadier general who would serve in a double or dual-hat capacity, both as communications-electronics staff officer for the US Army component in Vietnam and as the commanding general of the new communications command. Colonel Robert D. Terry, who was shortly to become a brigadier general, was given the two jobs.

US Army, Pacific, completing the plans early in 1966, recommended the formation of a signal brigade to be assigned to the Strategic Communications Command but to come under the operational control of US Army, Vietnam. To implement this proposal, the Department of the Army on 1 April 1966 authorized the activation of the Strategic Communications Command Signal Brigade, Southeast Asia. Later, on 26 May 1966, the embryo unit received its ultimate designation, 1st Signal Brigade.

Thus a single, unified structure to control and direct US Army communications effort in the Republic of Vietnam was authorized for the second time. Previously, in 1962, all communications responsibility had rested with the 39th Signal Battalion. But events and decisions had outdated this organization and restructuring was overdue. The signal command as formed in 1966 not only gave communications responsibility in Vietnam a new direction, but also closed a major gap that had existed between signal units and managers of communications throughout Southeast Asia.

The 1st Signal Brigade soon grew larger than a division, becoming the largest signal organization by far in the history of the US Army. Brigade headquarters in its first four months grew from an austere three officers to a strength of about two hundred. The first troops the brigade acquired were those of the 2d Signal Group. On 1 July 1966, Brigadier General Robert D. Terry reorganized the fledgling command by limiting the 2d Signal Group's responsibility to the III and IV Corps Tactical Zones only and by charging the newly arrived 21st Signal Group with communications responsibility in the I and II Corps Tactical Zones.

Thereafter, as new signal units arrived in Vietnam for assignment to the brigade or were activated in Vietnam, General Terry incorporated them in either the 21st Signal Group in the north or the 2d Signal Group in the south. And arrive they did. By the end of 1966 the 2d and 21st Signal Groups each comprised six battalions and each totaled well over 5,000 men.

Communications Support for Army and Corps Areas

These units of the 1st Signal Brigade maintained the area communications systems throughout the country. The area communications system is a concept whereby a signal unit, within its geographical area of responsibility, provides support to all military units-Army, Navy, Marine, Air Force, or Coast Guard-that require communications-electronics to supplement their organic capability. The US Army Signal Corps refers to this service as the Army Area Communications System; however, the US Army,

Vietnam, changed the designation to Corps Area Communications System in order to identify more closely with the geographical areas being served, that is, the four corps tactical zones, which were redesignated in 1970 as military regions.

Signalmen of the 2d and 21st Signal Groups operated message centers and telephone switchboards, maintained extensive networks of radio relay systems, and constructed telephone cable and wire lines between and within the increasing number of Army

bases. The area communications system in Vietnam departed from the Army's signal doctrine based on the grid concept. There were reasons for this variation. First, the area communication paths either connected regional nodal centers or extended the tails to isolated elements that were not organically self-sufficient. Second, the geographical distribution of base camps and other vital installations dictated a linear, rather than a rectangular, arrangement. The classic grid advantage was preserved, however, by the brigade's capacity to provide alternate routing between key points.

With the relief afforded by both the increase in signal troops and the establishment of even a partial corps area communications system, the vital matter of communications in support of the military advisers could finally be taken up. Before the end of 1966, General Terry had assigned a signal battalion to support the US advisory elements in each of the four corps tactical zones, providing area communications support for the advisers and for the South Vietnamese Army divisions. These important signal battalions were the 37th Signal Battalion in the I Corps Tactical Zone at Da Nang, the 43d in the II Corps Zone at Pleiku, the 44th in the III Corps Zone near Bien Hoa, and the 52d in the IV Corps Zone at the provincial capital of Can Tho in the Mekong Delta.

Two battalions of the 2d Signal Group had missions that differed from the rest of the units in the corps tactical zone signal groups. The 40th Signal Construction Battalion was unique within the US Army; the 69th Signal Battalion (Army), because of its size and responsibilities, became the nucleus of yet another signal battalion.

The 40th Signal Construction Battalion, the only heavy communications cable construction battalion in the active US Army at that time, arrived in Vietnam in the fall of 1966. The battalion immediately dispersed its companies and construction platoons the length and breadth of South Vietnam. By the end of 1970 this remarkable unit had installed over 500 miles of multipair cable within military cantonments under the most trying conditions that can be imposed by both enemy and friendly forces, having to cope with the Viet Cong's mortars and rockets and the Army's ubiquitous bulldozers. Bulldozers used in construction work invariably uproot or knock down more cables and wire lines or poles than are destroyed by enemy action.

The Saigon area had the largest aggregation of headquarters, camps, and stations in the land. The installation and operation of the myriad of communications in support of this area was the taxing job of the 69th Signal Battalion after its arrival in late 1965. When the development of the huge Long Binh military complex in October 1966 necessitated communications support for Long Binh Post, the 69th Signal Battalion was assigned the job. The battalion consisted of five signal companies, each organized to provide a specific communications service. Because of the distance involved from the 69th's home station in Saigon, it was necessary to station at Long Binh Post detachments from each company of the battalion. Since command and control problems resulted from this arrangement, the brigade commander decided to form two battalions from the assets of the 2,000-man 69th Signal Battalion. Reorganization was completed on 15 August 1967, with the 44th Signal Battalion gaining the personnel and equipment of the 69th's assets at Long Binh. It also acquired the mission of providing communications support for the Long Binh complex, including the headquarters of the US Army, Vietnam, and cryptologic support for the entire country. The 69th Signal

Battalion retained the responsibility for signal support in the Saigon area, including the headquarters of the US Military Assistance Command, Vietnam.

Both the 69th and the 44th Signal Battalions were assigned to Colonel Blaine O. Vogt's 160th Signal Group, which had arrived in Vietnam in the spring of 1967. 'This group headquarters, in addition to assuming the job of area and headquarters support assigned to the 44th and 69th Signal Battalions in the Saigon-Long Binh areas, was to control and direct other important communications activities in Vietnam. The 40th Signal Construction Battalion with its cable construction mission was assigned to the 160th Signal Group. The group reorganized and molded into an effective operation the US Army's countrywide communications security logistics support activities. Another traditional Signal Corps responsibility that of audio-visual (photographic) support was given to the 160th on a countrywide basis. This task included backup combat photographic support to the field forces and to divisions which had their own organic audiovisual facilities. And finally the 160th assumed the responsibility for the operation of the Southeast Asia Signal School, which had been established in June of 1966.

By the end of 1967 these three groups of the 1st Signal Brigade controlled and directed an even dozen battalions. The 2d and 21st Signal Groups provided the area communications support in the four corps tactical zones; 160th Signal Group provided headquarters support in the Saigon and Long Binh area, as well as cable construction, photographic, and communications security logistics support throughout the country.

The circuits and lines of the Corps Area Communications System operated by these groups merged at many points into the large backbone system, known from 1966 as the Integrated Wideband Communications System. This long-haul system was operated by thousands of men from the 1st Signal Brigade who were organized into battalions that constituted the US Army Regional Communications Group in Vietnam.

Regional Communications Group

The US Army Regional Communications Group evolved both from the US Army Strategic Communications Command, Vietnam, set up in 1965 by Lieutenant Colonel Jerry Enders, and from the gateway facilities at Phu Lam and Nha Trang, which had remained under the command of the Strategic Communications Command, Pacific, until the 1st Signal Brigade was organized on 1 April 1966. The big communications facilities and systems operated by these organizations were tagged as "fixed" and were often spoken of as "long-lines." As early as February 1966, Colonel Robert D. Terry and his planners were considering a Long-Lines Group to operate the gateway facilities at Phu Lam and Nha Trang and to provide the long-haul communications between DA Nang, Pleiku, Qui Nhon, Nha Trang, Dalat, Cam Ranh Bay, Phu Lam, and Vung Tau. This plan was realized on 4 July 1966 when the US Army Regional Communications Group was activated. At that time, the group consisted of the Long-Lines Battalion North, later the 361st Signal Battalion, for control and management of the long-haul communications in the two northern corps zones, and the large communication facilities in Nha Trang and Phu Lam. Later, the Long-Lines Battalion South, finally designated the 369th Signal Battalion, was activated and, by December 1966, the DA Nang message relay facility became operational under the US Army Regional Communications Group. All three message relay facilities were operated by battalion-

size units and were in fact designated in mid-1967 as Provisional Signal Battalions Phu Lam, Nha Trang, and DA Nang.

Signal Units in Thailand

There was still another signal group under the 1st Signal Brigade-this one in Thailand. Early in 1966 Brigadier General John E. Kelsey, Deputy Commanding General, Strategic Communications Command, had visited with the Commanding General, US Military Assistance Command, Thailand, Major General Richard G. Stilwell. They agreed that all US Army Signal units in Thailand should be organized into one signal group. This group was first designated Strategic Communications Command Signal Group, Thailand, under the command of Lieutenant Colonel Harold J. Crochet, and was organized to be effective 1 May 1966. It acquired all US Army communications facilities in Thailand. The group was redesignated in September 1966 as the 29th Signal Group, under the command of the 1st Signal Brigade in Saigon, but remained under the operational control of General Stilwell, the top US commander in Thailand. Later, in mid-1967, this operational control passed to the Military Assistance Command's Army component, US Army Support, Thailand.

Thus a dual-hat role evolved in Thailand as well as in Vietnam; the senior signal commander in each country also served as the principal communications-electronics staff officer for the Army component commander. The 29th Signal Group's organization and concept of operation was similar to that of its parent unit, the 1st Signal Brigade. By the end of 1967, the group consisted of the 379th Signal Support Battalion and two provisional support companies to provide the required area communications support in Thailand; the 442d Signal Battalion, a long-lines unit, to operate and maintain the wideband communication links and sites in Thailand; and two provisional battalions to man the large message relay facilities in Bangkok and Korat.

By the end of 1967 the troop units of the 1st Signal Brigade consisted of twenty-one battalions organized into five groups and totaled about 20,000 men. Nearly all of these units arrived or were activated in Southeast Asia in the short period from April through December 1966.

The Signal Brigade in 1967

These units of the 1st Signal Brigade, along with the combat signal battalions, companies, and platoons organic to the fighting forces, furnished the vital communications needed to support expanding operations in Southeast Asia. The huge buildup of US and other Free World Forces had resulted in an unprecedented demand for communications, from long-haul data circuitry to combat radio nets, taxing the resources of both the signal battalions of the combat forces and the 1st Signal Brigade.

Control and Direction: Problems and Solutions

The size and complexity of the communications systems in Southeast Asia, along with the fact that the systems were frequently interconnected and superimposed, required the formation of special organizations, techniques, and procedures to furnish effectively communications engineering and technical control and direction for the systems. This is sometimes referred to as technical management.

Technical Management

Technical management of the combat systems was comparatively simple because of the generally uniform system configurations and small size of the networks. The engineering and technical control functions were built into the operating unit, and overall direction came from the unit's operations staff. Each signal battalion of the field forces and divisions had a systems control section, popularly referred to as SYSCON. The section was in operation twenty-four hours a day, usually with two men on each shift. The systems control section was responsible for engineering and controlling all of the communications systems and networks operated by the unit.

The chain of technical management of the defense and corps area communications systems, however, was long, and, like the Mekong River, followed myriad paths. The chain for both systems began outside Vietnam. That for the 1st Signal Brigade originated at the Army's Strategic Communications Command Headquarters at Fort Huachuca, Arizona. Technical control and direction for the Defense Communications System went from the Defense Communications Agency in Washington to its Pacific Area in Hawaii, then to its Southeast Asia Mainland Region in Saigon. The Army aspects of the communications engineering and controlling efforts, rather than those of the joint Defense Communications Agency, are emphasized here.

When it was formed, the 1st Signal Brigade inherited the engineering and control tasks that always accompany any large headquarters charged with communications system installation and operation responsibilities. These tasks had previously been performed by Colonel Moran's 2d Signal Group systems control and engineering staff. To this small organization had fallen the chores of engineering and controlling all 2d Signal Group installations and operations at a time when the group consisted of about 3,000 men spread thinly throughout the republic.

In the spring of 1966 when Colonel Robert D. Terry was organizing the 1st Signal Brigade, the growing communications activity in Vietnam required separate, sizable, headquarters elements. Each engineering speciality would have its own headquarters element one for fixed-plant projects, another for the Integrated Wideband Communications System under construction and still another for telephone management. Similarly, centralized control over both Department of Defense and Corps Area Communications Systems required a separate, complex structure in the brigade headquarters. Elaborate equipment was needed in addition to a large, highly specialized work force of skilled communications controllers.

Communications Engineering and Installation

On 23 April 1966, Colonel Terry addressed a memorandum to his brigade deputy, Colonel Gordon B. Cauble, to Colonel Moran, and to Colonel Riley, Deputy U.S. Army Vietnam Signal Officer, on the subject of plant engineering and installation functions. He proposed that a communications engineering management agency be established composed of seventy-five men. A month later, on 23 May, the organization was set up as the Communications-Electronics Engineering and Installation Agency, responsible for developing the required plans and programs and providing the management of fixed-plant projects, especially heavy cable construction in Vietnam. Lieutenant Colonel Clarence R. Driscoll came to the 1st Signal Brigade from the Pacific field office of the

Strategic Communications Command's worldwide Engineering and Installation Agency on Okinawa. He arrived in Saigon in June 1966 to run Colonel Terry's engineering agency, bringing six engineers with him. By March 1967 he had sixty-six engineers at work in the agency. Before the end of 1967 the agency was enlarged still further and was renamed the Communications Systems Engineering and Management Agency. One of the most important elements of this agency was the project management office for the Integrated Wideband Communications System being installed in Southeast Asia. Originally headed by Lieutenant Colonel Patrick F. Kearins, this office was the focus for coordination between the contractor and the military services.

Note: The actual origin of Communications Engineering and Installation activity was the establishment by Colonel Terry of the IWCS Engineering and Management Office in late February or early March 1966, several weeks prior to the activation of the 1st Signal Brigade on 1 April 1966. This office was originally headed by Lieutenant Mervin L. Norton. Colonel Norton had been the IWCS Engineering Officer at Headquarters STATCOM from the origin of the IWCS until contract award. Colonel Norton was replaced by Lieutenant Colonel Kearns in September 1966 when Colonel Norton completed this Vietnam tour.

It was not until June of 1966 that Lieutenant Clarence R. Driscoll arrived from Okinawa. Originally Colonel Driscoll headed the Telephone Engineering and Management Office. This office was in addition to the IWCS Engineering and Management Office. These two activities remained separate through the fall of 1966. In late 1967, these two activities became sub elements of a new activity, the Communications System Engineering and Management Agency.

Telephone Engineering and Management

Another managerial element, also involving engineering duties, was the brigade headquarters organization that supervised the installation of telephone switches in and around Saigon. To supervise the mushrooming number of telephone switches in the metropolitan area, Colonel Terry created the Saigon Telephone Management Agency. In the summer of 1965 the U.S. military telephone system in Saigon had consisted of two manual switchboards that served the two separate joint U.S. headquarters complexes in the Saigon area. The total telephone cable facilities, or outside plant, at that time consisted of approximately 400 circuit miles of combat field wire, spiral four, and rubber-covered 5- and 26-pair cables. In addition, three cables systems were leased from the Vietnamese Postes, Telegraphs et Telephones office to provide circuit-routing between Saigon, Tan Son Nhut Air Base, and the 1st Signal Brigade's terminal at Phu Lam.

The number of U.S. Army telephone switchboards in Saigon was increased during the fall and winter of 1965 to six local manual telephone exchanges, three other small manual exchanges called private branch exchanges, and one long-distance switchboard connected into the countrywide system. Two of the manual exchanges were made up of large, nine-position switchboards mounted in vans. The remaining switchboards consisted of components of an older model, manual telephone central office, with four to nine operator positions, depending on the location.

As the need for more land for U.S. activities increased, so did the telephone requests. These six local exchanges no longer provided "on base" communications; instead, a U.S. Army metropolitan telephone system began to take shape. This system lacked an over-all manager and, as a result, several serious problems arose. Greatest of these problems were inadequate trunking, and in some cases none at all, between local exchanges; lack of an outside cable plant capable of meeting increasing subscriber demands; lack of unified cable and circuit records; and insufficient operator positions to handle traffic during the busy hours. At this time the nine-position switchboard vans were handling an average of 1,800 calls during their busiest hour. To further complicate the telephone communication picture, Saigon had two civilian and four Vietnamese Army dial telephone exchanges, a U.S. Air Force exchange at Tan Son Nhut Air Base, and three exchanges operated



SIGNALMEN OPERATING A LARGE MANUAL TELEPHONE SWITCHBOARD AT SAIGON

by the U.S. Embassy. The U.S. Army telephone system was superimposed on these existing facilities. With this maze confronting it the Saigon Telephone Management Agency was established and began operations in April 1966.

The inadequate manual facilities had to be replaced. The 1st Signal Brigade performed this task by providing automatic dial telephone switches, mounted in huge vans and serving up to 600 subscribers. Later, fixed automatic dial telephone exchanges were installed. The latter exchanges were sophisticated modern facilities, serving several thousand subscribers. Since these modern automatic telephone projects were being installed in the capital area they had to be interconnected by large, high-capacity cable links or trunks of high quality.

In the spring of 1966 these projects were the responsibility of the telephone management agency and were largely confined at first to the metropolitan area of Saigon. But as 1967 progressed, the need for automatic telephone service expanded

far beyond Saigon. Automatic dial telephone facilities were installed at many outlying points, not only in Vietnam but also in Thailand. The 1st Signal Brigade found it necessary to set up a telephone management office in each numbered signal group. Since telephone service was required beyond the confines of the automatic dial service provided to local areas, automatic long-distance dialing facilities were needed also. These last military sophistications were called tandem switches by the Army, but were better known in the United States as direct distance dialing.

Obviously the telephone management agency, the over-all control in the brigade, had to redouble its engineering and management responsibilities. By the end of 1967, therefore, it was enlarged and redesignated as Southeast Asia Telephone Management Agency. The accomplishments of the telephone agency and the workers of the brigade were most immediately evident in the metropolitan area. During the first nine months after the agency's formation, 90 percent of the telephone system in Saigon was transformed from a manual to an automatic dial system. Although there had been many problems, they had been solved; and now the single-manager concept pioneered by the Saigon Telephone Management Agency was being broadened to include telephone management for the entire country.

Communications Control Means and Methods

Within the first week after the creation of the 1st Signal Brigade, Colonel Terry had issued a letter of instruction, dated 7 April 1966, concerning communications control. The objective of communications control as he defined it was "to provide daily operational direction of the communications circuits which collectively form the U.S. Army Communications Systems Vietnam and Defense Communications System (DCS Army) circuits in Southeast Asia." The organization that was created to perform this function was originally called the Command Communications Control Center Agency. It utilized the resources and the operating personnel of the 2d Signal Group systems control element.

These men of Colonel Moran's 2d Signal Group had been performing communications control duties in Vietnam since mid-1965. In August 1965, when the U.S. Army Strategic Communications Command had become responsible for the Defense Communications System in Southeast Asia, it also became responsible for controlling the circuits of the Defense Communications System. The 2d Signal Group systems control had then continued to watch over only the combat and corps area circuits. This split responsibility had produced problems on procedures for reporting circuit failures, activations, and similar routine communications actions. Combining the communications control of the Defense Communications System and the corps area circuits was, of course, one of Colonel Terry's major objectives.

A crucial and central organization in this unifying effort was the new communications control agency, which was renamed in February 1967 the Army Communications Operations Center in Saigon. The center served as the primary control hub for all Army Southeast Asia communications. A secondary control center was established in November 1966 in Thailand at Korat. The center received up-to-the-minute information and data on all systems, their operation, and message traffic loads and flow. In particular, the center's operators watched for any breakdowns, or "outages" in communicator jargon, and insured that proper action was taken. This service was the

Army's contribution to the Defense Communications Agency's management over the Southeast Asia Wideband System. Besides this major over-all center in Vietnam and a secondary center in Thailand, there were similar, smaller system control elements within the 1st Signal Brigade's numbered groups, watching over area communications. Within the signal battalions of these groups were still smaller watchdog elements. This was also true of the combat signal battalions of the divisions and corps.

These agencies of the communications community were all established to provide the essential engineering and control efforts necessary to manage the communications network as it existed in the spring of 1966. All the agencies were eagerly anticipating the long-awaited Integrated Wideband Communications System which would give the country the fixed-station, high quality backbone so urgently needed for effective command control.

Integrated Wideband Communications System

The Integrated Wideband Communications System was a microwave and tropospheric scatter communications web that eventually spanned the entire Republic of Vietnam and Thailand. The equipment was commercially procured, installed by a contractor, and the system was, therefore, of commercial fixed-station improved quality throughout. It constituted the Southeast Asia portion of the global Defense Communications System which had been delegated to the Army by the Department of Defense through its Defense Communications Agency. The completed system became by far the largest communications complex the Army had ever undertaken, creating an equivalent of the Bell Telephone System for South Vietnam and Thailand. However, the integrated system did not come into being quickly, easily, or, for that matter, inexpensively.

An urgent request for the fixed-plant system had been made in mid-1964, accompanied by a required implementation date of December 1965. The implementation date, however, was not met; in fact, fifteen months elapsed from the date of the contract award until the first link became operational in December 1966. This initial link was a small part of Phase I of the three ultimate phases of the Integrated Wideband Communications System.

The Three Phases

In Vietnam, Phase I of the Integrated Wideband Communications System, incorporating and expanding the BACK PORCH links, was primarily intended to provide more circuits from Saigon and north throughout the country. A new extension was built from the Monkey Mountain site in Da Nang to Phu Bai, a large U.S. encampment area just south of the imperial city of Hue. In the center of a huge triangle between Saigon, Nha Trang, and Pleiku, an important circuit and system-switching facility was built on top of Pr' Line Mountain, a short distance to the southeast from Dalat. High-capacity links were to be provided between Pr' Line and the three corners of the triangle. Numbers of short links were built in and around the capital



PR' LINE MOUNTAIN SIGNAL FACILITY,

a key site of the Integrated Wideband Communications System.

city area, where the fixed systems of Phase I replaced earlier tactical microwave circuits. Phase I of the integrated system was not intended to support a large troop buildup but was to provide the communications for up to 40,000 U.S. troops in Vietnam, primarily advisers and helicopter units.

As the force level in Vietnam grew, the requirements increased, and General Westmoreland's communicators were forced to ask for the Phase II upgrade. The Department of Defense approved Phase II in January 1966 and scheduled its completion for October 1966.

The primary purposes of Phase II were to expand both the major north-south backbone trunk system and the Saigon microwave complex, and to extend the fixed-plant system into new areas in support of combat operations. Sixteen new sites were to be added, involving twenty-five new communications links; nine Phase I links were to be upgraded to a higher capacity. In all, the total number of terminals was doubled, and the circuit total was tripled. When the Saigon-Nha Trang tropospheric scatter link was upgraded to carry 240 channels, it was the world's first tropospheric scatter link to achieve daily operation at so large a capacity. In August 1966 the Secretary of Defense approved Phase III of the Integrated Wideband Communications System, which would provide support for 400,000 troops. The primary objective of this phase was to extend the wideband system into the Mekong Delta area in order to meet the needs of expanding combat operations there. No new major relay systems were included in this phase, but many short links were added around large nodal sites in the existing wideband network. The first link of Phase III would not be completed until December 1967.

Concurrent with the award of a letter contract to Page Communications Engineers, Inc., for the Vietnam portion of the fixedplant system, the Army awarded the contract for the Thailand portion to Philco-Ford Corporation. In Thailand progress was made in the

same phase pattern as in Vietnam. With the obvious exception of combat action, the problems experienced in Thailand during the ultimate completion of the wideband system paralleled those in Vietnam.

Problems and Delays

The installation project moved forward relentlessly, if somewhat unevenly at times, amid diversified problems and difficulties of funding, managing, supplying, and manning, which invariably accompany any large-scale effort. This effort, however, was unique in Army experience for its size and complexity. Implementation of such an ambitious project could not be expected to come easily. Construction and operation at the many sites, ultimately fifty-nine sites in Vietnam, fell short of the expected timetable. This situation was hardly surprising in view of such serious obstacles as remote sites and transportation difficulties in Southeast Asia and funding and programming delays in Washington. In retrospect, it is to the credit of everyone involved that the undertaking turned out as well as it did.

Because of these delays, Phase I and II were not completed on schedule. The last link of Phase I was not accepted by the government until January 1968, two years and one month after the original requested operational date of December 1965. Not until February 1968 did the last link of Phase II go into operation in Vietnam, a year and four months after the date requested, October 1966. The remainder of the Integrated Wideband Communications System, Phase III along with a few additional modifications, would not be completed until much later in 1968. In the meantime, commanders at all levels urgently demanded that the system be completed as soon as possible.

Such demands for the completion of the system, however, could not be easily met. The military had chosen to install a fixed, commercially procured system. And the commercial equipment needed for this system was entirely different from the communications hardware previously used in a war zone; it was custom built and enormously costly. In addition, engineering, manufacturing, testing, acceptance, and operation presented many difficulties at all levels. But it was the great expense of the system which surprised and chagrined many.

At Army and Department of Defense levels in Washington, the major impediment was getting money. The time-consuming process of funding had to come before anything else could be done. The budgetary mills of government could only grind out the funds slowly by increments. Yet, piecemeal funding, and the resultant bit-by-bit contracting and installing, apparently cost more in the long run than a single lump-sum allocation at the outset. For example, a Strategic Communications Command report dated 7 June 1967 states, in part: "This office has received a retransmission from Page Communications Engineers, stating that existing Phase III money would be exhausted by 15 July 1967 and that if additional incremental money was not forthcoming, the program will suffer in increased cost."

In mid-1966 the Assistant Secretary of Defense had returned a third addendum of the wideband communications program to the Defense Communications Agency for additional justification. The authorities in Washington were questioning the need for all the money that was being sought for channel expansions of trunks not yet in service and replacements of mobile combat systems at greatly increased capacity. They

disbelieved the reports and requirements coming from the Southeast Asia war zone and insisted that the funds be minutely justified. The requirements had to be stated in detail, despite the fact that no one could determine the precise requirements far in advance. Frequently, changes had to be made in the system-in such matters as site location, equipment, and number of circuits-during the process of contracting and even of construction. Unforeseen demands continually arose requiring changes and, usually, expansion, even after installation had begun or had been completed. Not until May 1966 were the Phase I and II contracts with Page Communications Engineers, Inc., finally "definitized" for Vietnam. And four months earlier, Phase III had already been launched, calling for more circuits, more terminals, and the upgrading of older terminals. This phase involved more equipment and larger antennas to provide more channels, resulting naturally in a plea for more money.

The increases and changes occurring in the midst of the funding and approval process were not the result of inefficient planning. Rather, because of the graduated nature of the troop buildup and the constantly changing situation caused by combat activities, the volume and type of traffic and the disposition of subscribers were not known early enough or in sufficient detail to enable proper engineering of the trunking system. The logical steps in fixed-plant network engineering-traffic, plant, transmission, and equipment engineering-could not be followed in this case.

The difficulties encountered in obtaining adequate funds and establishing firm requirements were not the only factors contributing to the delays in the fixed communications project. From the very beginning of the program, problems of site concurrence and site access were almost endless. For isolated sites, the problem was especially time-consuming, beginning with the initial engineering surveys to find suitable locations. There were delays in getting aircraft and ground transport to remote areas in order to survey hilltop sites, and to make tests to determine the adequacy of proposed radio paths. Time was also consumed in obtaining permission from the local government to use these sites. Other delays ranged from the care required to avoid desecrating sacred trees in Thailand to the payment exacted for future harvests in Vietnam.

Site acquisition difficulties involving the terminals on bases already established were often only a matter of building space. In many cases, installation commanders who had agreed to furnish space were not able to do so when the time came for construction. These commanders discovered that their own unanticipated expansion had taken all of the available space. In addition, the space requirements for the system increased beyond original estimates. Buildings had to be erected, and in some cases expanded, to meet new requirements.

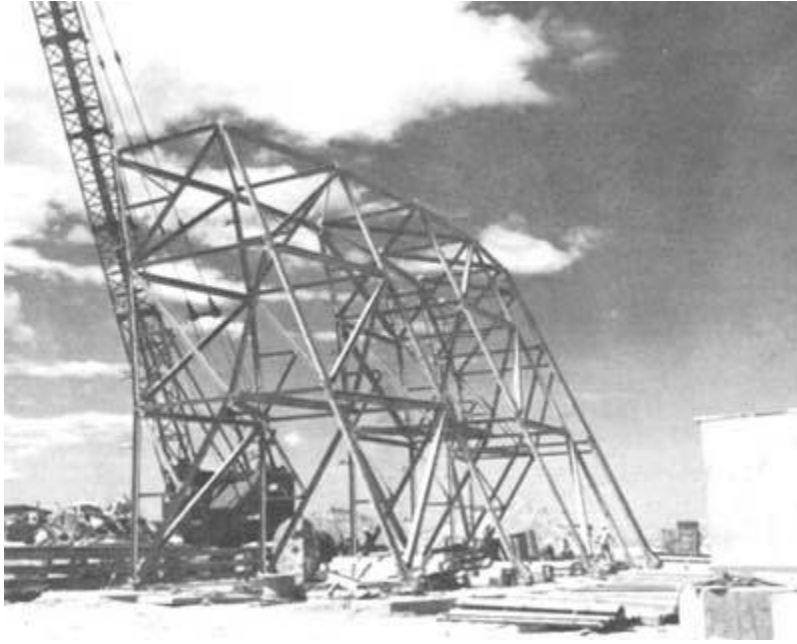
Production capacity and shortage of materials for the wideband system constituted another significant problem area. There were approximately 150 U.S. subcontractors providing material for the fixed communications in Vietnam and 100 subcontractors for Thailand. Page and Philco-Ford, the prime contractors, made every effort not to engage in direct competition for equipment by avoiding whenever possible the same vendors. In many cases, however, these prime contractors found themselves inadvertently competing with one another because the second-, third-, and fourth-tier vendors were furnishing components to the principal subcontractors for each. In addition,

procurements by other government agencies with equal or higher priority than the Integrated Wideband Communications System as well as increased purchasing by commercial firms saturated the market. The industry was saturated to such a point that even the offer of premium prices could not cause delivery dates to be moved up. Business was so good that many firms refused to accept a contract or subcontract with a penalty clause. In many cases, subcontracts were awarded to firms that offered the earliest delivery dates and not necessarily to those with the lowest prices; however, the majority of suppliers failed to meet promised delivery dates. The basic causes of these failures were the delayed delivery of components or raw materials and the shortage of skilled labor.

The transportation of material, once it was finally available, was one of the most serious problems in the program. The accelerated buildup in Vietnam caused seaports and airports to become congested with cargo of every type imaginable destined for the war zone. Special-mission aircraft was the only means of getting the fixed communications hardware to Southeast Asia quickly. Throughout the period of installation, the U.S. Air Force Military Airlift Command provided special flights to bring the sorely needed electronic equipment into Vietnam. In addition, because a very active war was being waged and ground movement was constrained, the Air Force combat cargo aircraft and the Army cargo helicopters were often the only means of getting the hardware to the sites.

Site construction was accomplished in a variety of geographical and geological areas that include the rice paddies of the Mekong Delta, the mountainous, rocky mid-country region, and the sandy beaches along the coast. Each location presented a unique problem. Building and antenna foundations in the delta area had to be of a spread-footing design to prevent sinking in the water-soaked clay of the rice paddies. In sandy areas, the problem of soil erosion was so severe that it frequently appeared to defy solution. The very pronounced wet and dry seasons in Southeast Asia also controlled construction schedules. It was virtually impossible to accomplish any outside construction on communications sites during the rainy seasons.

Other problems affecting construction of the wideband system were the remoteness of some sites and the security restrictions at practically all sites. Army cargo helicopters were used extensively to transport men and material to mountain



A 120-FOOT ANTENNA FRAME UNDER CONSTRUCTION ON VUNG CHAU MOUNTAIN, QUI NHON

sites such as Pr' Line, Hon Cong Mountain near An Khe, and VC Hill at Vung Tau. Often considerable stretches of new road had to be built even before the actual work could begin. Use of the Vung Chua Mountain site, for example, just north of Qui Nhon, required the construction of thousands of feet of new road. In addition, an enormous amount of rock and dirt had to be removed from the site in order to provide a flat surface on which the facilities could be built.

In the latter months of 1966 additional delays and difficulties in construction and installation were caused by enemy action. Earlier, the big military communications sites had remained remarkably free from enemy harassment. It was almost as if the enemy favored the new communications services which Southeast Asia was receiving for the first time in its history.

On Thanksgiving Day 1966, however, a costly ambush of a communications equipment convoy occurred near Dalat in the hills of south central Vietnam. The convoy, manned by 1st Signal Brigade soldiers and contract civilian workers, was attacked while en route to the mountaintop site at Pr' Line. Eight Page Communications Engineers employees and one 1st Signal Brigade trooper were killed and eleven men were wounded. Two of the soldiers in the convoy, Staff Sergeant Gerald



COMBAT SOLDIERS OF THE 1ST SIGNAL BRIGADE FIRING MORTARS FROM PR' LINE

H. Bamberg and Specialist Walter S. Rogers, were cited for valor in holding off the enemy and preventing the complete annihilation of the convoy.

Another major attack affecting communications facilities occurred on the night of 26 February 1967 at DA Nang. The enemy launched a large surprise rocket attack against the DA Nang Air Base. One of the first enemy targets was the Army's signal compound on the base. Fortunately there were no casualties, but the rockets completely destroyed four vans in the communications complex which housed the temporary mobile message relay facility. Replacement vans were rushed to Vietnam by the Strategic Communications Command's 11th Signal Group in the United States, enabling reactivation of the tape relay in ten days. Actually, no circuits or links were completely out for more than a few hours, partly because of quick rerouting of circuits and partly because the enemy had failed to damage the big radio and technical control vans located adjacent to the tape relay facility.

At last, by the end of 1966, despite all delays and difficulties, the first circuits of the wideband system were tested, accepted by the Army, and "cut to traffic," that is, put into service passing actual communications. Brigadier General Robert D. Terry accepted the first link of the Integrated Wideband Communications System on 21 December 1966. This was one of two links which carried traffic between Phu Lam and the Tan Son Nhut Air Base in the Saigon area. These were the first fixed sites completed in Vietnam. The first links in Thailand had been put into use a little earlier, on 5 November, following the completion of tests between Korat and Udorn.

After the cutover of the first links, the wideband communications system flourished, fed by the multimillion dollar contracts to civilian companies and pushed by the thousands of combat signal troops that joined the 1st Signal Brigade in the 1966-1967 period. By

mid-April 1967, hundreds of circuits in the integrated system had gone into service and eleven sites had been completed in Vietnam.

Combat Mobile Equipment Used in the Interim

It should be noted, however, that because of the long delays invariably encountered since the submission of the initial requirements in August 1964, the fixed communications system could not keep pace with the huge buildup of U.S. and



SITE OCTOPUS, OUTSIDE SAIGON, A MAJOR COMMUNICATIONS HUB IN 1967

and other Free World military forces in Vietnam. Keeping in mind that Phase I of the over-all system was designed to support 40,000 troops in Vietnam and that Phase II had a ceiling of 200,000, it can easily be understood that the Army communicators had many problems when the U.S. strength alone exceeded 350,000 men the day the wideband system's first circuit was put into service.

The solution to these problems, however temporary, was to use every piece of medium and heavy tropospheric scatter, microwave, and other mobile and transportable multichannel radio equipment that could be deployed into Vietnam. Throughout the long months of delay in the fixed communications project, the buildup of troops continued as did their appetite for long-haul circuitry. Consequently, the mobile tropospheric scatter and microwave links of the Defense Communications System were rushed into service and abounded throughout the country, not only providing circuitry from the backbone system to locations that would one day be served by the fixed communications being installed, but also supplementing the backbone system itself. In October 1967, eleven months after the first fixed-plant link was accepted, approximately 70 percent of the circuits of the Defense Communications System in Vietnam were in fact provided by mobile equipment inadequate for fixed-station standards. They were operated by the corps area signal groups of the 1st Signal Brigade.

Status at the End of 1967

Regardless of the long, continued, and heavy dependence on mobile equipment for the long-haul Defense Communications System in Vietnam, enthusiasm among the customers ran high in 1967 as the fixed communications system became a reality. At mid-year in 1967, all praised the progress made by Phases I and II. Most of the basic links were in service or were being tested prior to activation. Wind-up activities of Phases I and II peaked in 1967, and by the end of November testing had begun on the final thirteen of seventy-six links. The last link of Phase I in Vietnam, between Vung Tau and Pleiku, was accepted on 27 January 1968, and acceptance of the last link of Phase II, between Vung Tau and Long Binh, followed one month later.

The total system upon completion of Phase II consisted of seventy-six communications links operating at fifty-eight sites in Southeast Asia. Of the more than ten thousand circuits, nearly all reached their destination by both tropospheric scatter and microwave radio trunks. However, a few circuits passed through a recently completed submarine cable system. This system, approved by the Department of Defense in February 1966, comprised six links, capable of sixty voice channels each, connected to the major communications sites at DA Nang, Qui Nhon, Nha Trang, Cam Ranh Bay, and Vung Tau in Vietnam, and Sattahip, south of Bangkok in Thailand. The installation was completed in May 1967. This dependable cable system, protected by its undersea route and interconnected with the fixed-station radio system at these six sites, constituted a valuable segment of the ever-growing Southeast Asia Wideband System.

Site construction meanwhile was progressing on the Phase III effort of the integrated system. Practically all of Phase III implementation occurred in 1968. While the first Phase III link in Vietnam, a 60-channel link between Vung Chua Mountain and Phu Cat Air Base, was accepted by the United States Government during December 1967, the entire system would not be completed until 1969.