Chapter 5

Communications

PRINCIPLES AND DEVELOPMENTS IN COMMUNICATIONS SYSTEMS

Communications systems are essential for gathering and disseminating data. Personnel need them to plan and execute operations. Commanders use them to perform C2 functions and to supervise performance. Effective management of DISCOM functions depends on adequate communications to keep abreast of changing situations and requirements.

The DISCOM relies on both its organic communications assets and the support of the division signal battalion. Communications equipment and systems in the division and corps are changing. The MSE system replaces the area communications system (Figure 5-1) described below. SINCGARS and IHFR replace the FM-VHF (AN/VRC-12) series radios and AM-SSB (AN/GRC-106) radios.

These changes affect how the DISCOM units connect to the area system. Under the old area system, the DISCOM extension platoon in the area signal company provides signal facilities to the DISCOM. Services include –

- Automatic telephone central office and switching facilities for trunk and local telephone circuits. The area telephone system is common user. It is automatically switched and designed as transparent to the users. Dial-up services include not only voice service but also data transfer, facsimile, and other forms of electronically formatted information. Cable/wire installation teams install the internal cables and local telephone circuits. They lay cable/wire to tagged junction boxes. Subscribers install local telephone circuits to the junction boxes. If time permits, the cable/wire teams help install wire in the DISCOM CP.
- Secure multichannel LOS communications terminals for access to the automatic switched network. The LOS multichannel is the most common and most frequently used system in the division. The BSA and the DSA are normally in the division multichannel system in the initial deployment of the multichannel system. However, this depends on the timing of the DSA or BSA moves through the operational area and their locations relative to the threat force.
- Net-radio interface facility for secure single-channel FM radio access into the division automatic switched network. The basic single-channel radio net which passes personnel and supply information is the administrative and logistics net.
- Secure single-channel HF RATT terminals for entry into the GP RATT net. The GP RATT net provides hard-copy communications traffic between the DSA and the BSAs and extended distance communications.
- Secure multichannel TACSAT terminal at the DISCOM for access to the automatic switched network over extended distances. TACSAT assets supplement existing LOS multichannel systems. When tactical situations disperse the division beyond any service by LOS, the TACSAT communications network is essential. It maybe the primary means of connection between the forward elements of the division and the various support bases.

DISCOM units' switchboards tie into the area system based on their location in the division. With the MSE area system, personnel are not able to enter the 4-wire digital system using the organic 2-wire switchboards and telephones. The DISCOM retains its organic 2-wire switchboards for local security purposes and internal operations.

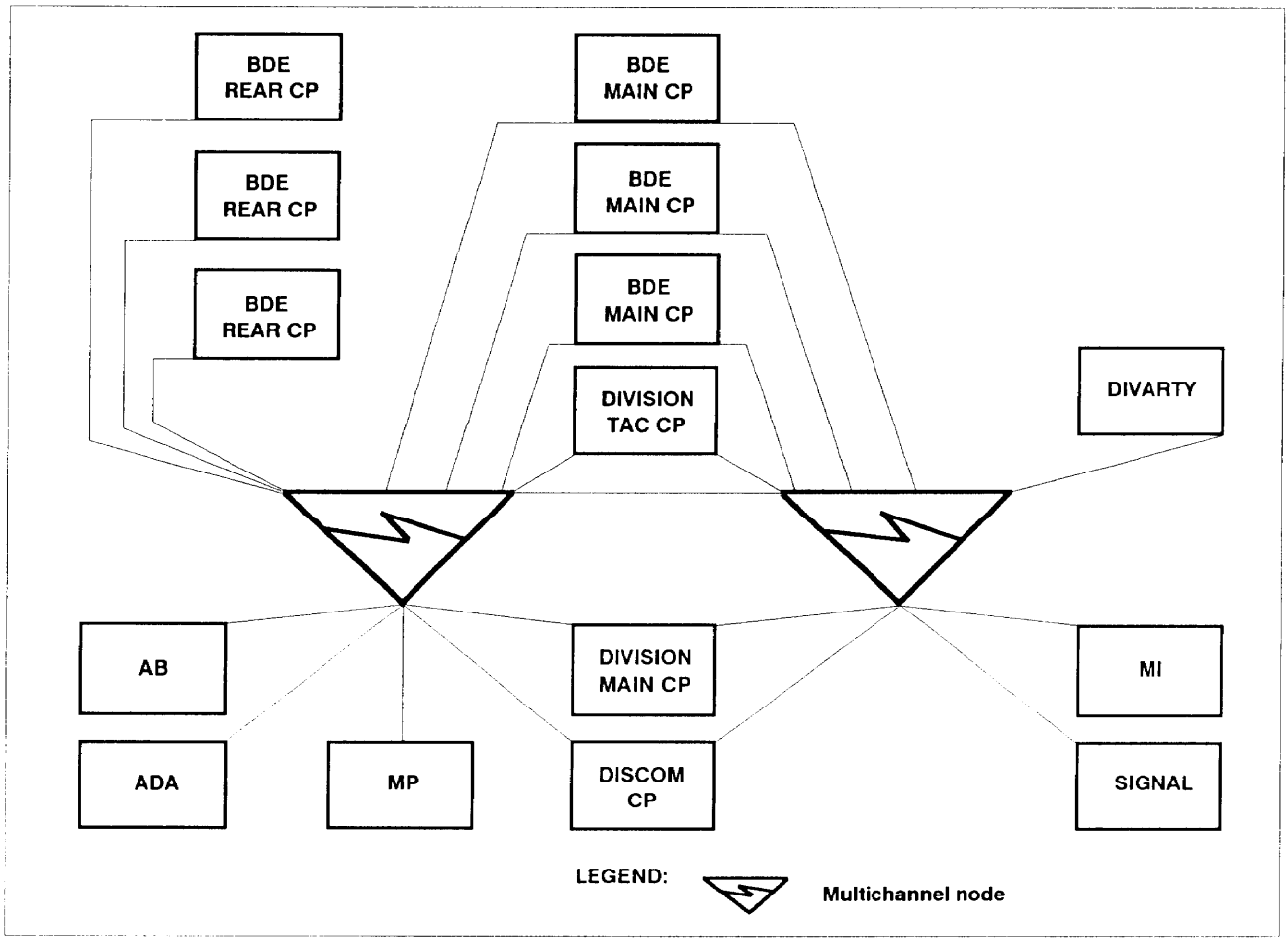

Figure 5-1. Sample area communications system.

MOBILE SUBSCRIBER EQUIPMENT AREA COMMUNICATIONS SYSTEM

MSE is the area common user voice communications system within the corps. It is the backbone of the corps system and deploys from the corps rear boundary forward to the maneuver battalion main CP. The MSE system is comprised of four functional areas:

- Area coverage.
- Wire subscriber access.
- Subscriber terminals.
- Mobile subscriber access.

AREA COVERAGE

Area coverage means MSE provides common user support to a geographic area, as opposed to dedicated support to a specific unit or customer. These nodes are called node centers. They are under the control of the corps signal officer.

At division level, the signal battalion operates four of these nodes. Connected to these nodes, via LOS radios, are small extension node switchboards and large extension node switchboards. The following switchboards are organic to the division signal battalion:

- 16 SEN switchboards, 12 of which are capable of supporting 26 subscribers each and 4 of which are capable of supporting 41 subscribers each.
- 1 LEN switchboard capable of supporting 176 customers.

The G3 determines the location of switchboards based on the recommendations of the division C-E officer. The C-E officer considers the commander's intent, customer requirements, and other factors of METT-T. Switchboard locations are not consistently assigned to specific units.

WIRE SUBSCRIBER ACCESS

Wire subscriber access points provide the entry point (interface) between fixed subscriber terminal equipment owned and operated by users and the MSE area system operated by signal units. DISCOM users tie into the area system through a configuration of MSE switchboards. The interface points are —

- The signal distribution panel (junction box) J1077. Each panel can provide up to 13 subscriber access points.
- The, remote multiplexer combiners which provide **Up** to eight subscriber access points.

Beyond these two interface points the using units are responsible for the installation and operation of fixed subscriber terminal instruments as well as the installation and maintenance of the WF 16 field wire from the instruments to the interface points into the area system.

FIXED SUBSCRIBER TERMINALS

Subscriber terminals used by the DISCOM units are digital nonsecure voice telephones. These provide full duplex digital, 4-wire voice as well as a data port for interfacing the AN/UXC-7 facsimile for informal record traffic, the TACCS computers for CSS STAMISs, the AN/UGC-144 (the single subscriber terminal) for formal record traffic, the unit-level computers for the unit-level logistics STAMIS, and ATCCS for the CSSCS. Tables 5-1 through 5-4 portray the assignment of this equipment for DISCOM units.

Table 5-1. DISCOM HHC/DMMC subscriber terminal asssignment, fixed and mobile.

DISCOM HHC/DMMC	DATA TERMINAL	STAMIS
♂ ● CDR		
● DPTY CDR		
♂ ● S1	AN/UXC-7, UGC-144, TACCS	SIDPERS
● UMT		
♂ ● S2/S3		
♂ ● PLANS & OPS (2 EA)	AN/UXC-7, AN-TCP	MCS (INTERIM) CSSCS
● C-E OFF		
♂ ● MCO (2 EA)	TACCS	DAMMS-R
● S4 (2 EA)	ATCCS	ULLS-S4
● DISCOM SURG		
● MED SUP (2 EA)	ATCCS (2 EA)	MEDSUP/MEDMNT
♂ ● DMOC	ATCSS	MEDBLD, MEDPAR
● CO CP		
● DMMO (2 EA)		
♂ ● DMMO OPS	AN/UXC-7	
● GEN SUP SEC		
● DMMC CL I		
● DMMC CL III/WTR		
● DMMC CL II-IV	REMOTE	SARSS-2A
● PROP BK/CL VII BR (3 EA)	TACCS (6 EA)	SPBS-R, SPBS-R (V)
♂ ● DAO		
● DIV AMMO OFC (2 EA)	TACCS	SAAS-DAO
● MAT MGT OFC		
● MAINT BR	TACCS	SAMS-2
● ARMT TECH	REMOTE	SAMS-2
● C-E TECH	REMOTE	SAMS-2
● AVN NCO	REMOTE	SAMS-2
● MSL NCO	REMOTE	SAMS-2
● ASL MGT BR	TACCS & REMOTE	SARSS-2A
● CSS AMO	REMOTE	STAMIS SPT

LEGEND: ● DNVT ♂ MSRT

Table 5-2. MSB subscriber terminal assignment, fixed and mobile.

MSB HQ	DATA TERMINAL	STAMIS
♂ ● BN CDR		
● XO		
● S1	FAX	
● PAC	TACCS	SIDPERS
♂ ● S2/S3		
● PLANS & OPS BR	FAX	
♂ ● SPT OPS SEC	ATCCS	CSSCS
● SPT OPS SEC	TACCS (2 EA)	DAMMS-R
● S4	ULC	ULLS-S4
MAINT CO	**DATA TERMINAL**	**STAMIS**
♂ ● CO HQ	ULC	ULLS-PLL
♂ ● MAINT CON & LT MAINT PLT HQ	TACCS	SAMS-1
● SUP PLT HQ	TACCS	SARSS-1
● BN MAINT SEC	ULC	ULLS-PLL
TMT CO	**DATA TERMINAL**	**STAMIS**
♂ ● CO CDR/TRUCKMASTER		
● CO HQ	ULC	DAMMS-R
SUP CO	**DATA TERMINAL**	**STAMIS**
♂ ● CO HQ		
● SUP PLT HQ	TACCS	SARSS-1
MED CO	**DATA TERMINAL**	**STAMIS**
● CO HQ	ULC	ULLS-PLL MEDSUP/MEDMNT
● DMSO	ATCCS	
● AMB PLT HQ		
LEGEND:	● **DNVT**	♂ **MSRT**

Table 5-3. AMCO subscriber terminal assignment.

AMCO	DATA TERMINAL	STAMIS
● CO HQ	TACCS	SIDPERS
● PROD CON SEC	TACCS	SAMS-1
● SUPPLY	ULC	ULLS-PLL
LEGEND:	● **DNVT**	

Table 5-4. FSB subscriber terminal asssignment, fixed and mobile.

FSB HQ	DATA TERMINAL	STAMIS
♂ ● FSB CDR		
● XO		
● S1 (2 EA)	TACCS, FAX	SIDPERS
♂ ● S2/S3	FAX	
● S2/S3 (3 EA)		
♂ ● SPT OPS SEC	TACCS, FAX	
● SPT OPS SEC	ATCCS	CSSCS
● S4	ULC	ULLS-S4
MAINT CO	**DATA TERMINAL**	**STAMIS**
♂ ● CO HQ	ULC	ULLS-PLL
● MAINT CON & PLT HQ	TACCS	SAMS-1
● SUP SEC	TACCS	SARSS-1
● BN MAINT SEC	ULC	ULLS-PLL
MED CO	**DATA TERMINAL**	**STAMIS**
♂ ● CO HQ	ULC	ULLS-PLL
● TRMT PLT HQ	ATCCS (2 EA)	MEDPAR-D, MEDLOG-D
● AMB PLT HQ		
SUP CO	**DATA TERMINAL**	**STAMIS**
♂ ● CO HQ		
● SUP PLT HQ	TACCS	SARSS-1
LEGEND:	● DNVT	♂ MSRT

MOBILE SUBSCRIBER TERMINAL

The MSE mobile subscriber terminal is the AN/VRC-97 mobile subscriber radiotelephone terminal. This MSRT, which consists of a very high frequency radio and a digital secure voice terminal, is a vehicle-mounted assembly. It interfaces with the MSE system through a radio access unit. The primary use of MSRT is to provide mobile subscribers access to the MSE area network. RAUs are deployed to maximize area coverage and MSRT concentrations. MSRTs also operate in CPs to allow access to staff and functional personnel. The MSRT user has a KY68 telephone connected to the radio mounted in his vehicle. As long as the radio unit has LOS contact with the RAU, it connects into the area system. The operational planning range is 15 kilometers from any RAU.

COMBAT NET RADIO SYSTEM

The combat net radio structure is designed around three separate radio systems; each has different capabilities and transmission characteristics. The three systems are –

- Single-channel objective tactical terminal.
- Improved high frequency radio.
- Single-channel ground and airborne radio,

SCOTT is a stand-alone transportable tactical satellite communications terminal which is transparent to the DISCOM. The other two systems, IHFR and SINCGARS, provide the primary means of voice transmission of C2 information and the secondary means for data transmission, which is required if data transfer requirements arc not met by the MSE system.

Current CNR equipment in the DISCOM consists of the AN/GRC-106 and the AN/VRC-l2 series radios.

The IHFR and SINCGARS series respectively replace these radios. For a description of the new radios, refer to FM 24-24. SINCGARS is a new family of VHF-FM radios. These radios are designed for simple, quick operation using a 16-element keypad for push-button tuning. They are capable of short-range or long-range operation for voice or digital data communications. The planning range is 8 to 35 kilometers. They also operate in a jam-resistant, frequency-hopping mode which can be changed as needed. IHFR is a family of high frequency radios consisting of the AN/PRC-104 man-pack radio and the AN/GRC-193 vehicular radio.

DISCOM RADIO NETS

DISCOM COMMAND/OPERATIONS NET (FM)

The principal radio net operated by the DISCOM headquarters is the DISCOM command/operations net (Table 5-5). This net is used to command and control elements of the DISCOM in performance of its CSS mission and its internal functions as a major subordinate command of the division. The NCS is the S2/S3 section. Stations in this net monitor the division command/operations net and the division intelligence net. This net is also used for rear operations as required.

Table 5-5. DISCOM radio nets.

Cmd/Ops	Mat Mgt	Log Ops	Med Ops
S2/S3 Sec (NCS)	DMMO (NCS)	S2/S3 Sec (NCS)	DMOC (NCS)
Cdr	CL I Off	DMMO	MSB Med Co
Dpty Cdr	DAO	MSB	FSB Med Co
DMMO	ATP Reps	FSBs	Corps Air Amb Element
S2/S3	CL V Sec		
MCO	Water Supv		
S4	CL III Off		
DMOC	MSB		
HQ Co Cdr	FSBs		
MSB	AMCO		
FSBs			
AMCO			

DISCOM MATERIEL MANAGEMENT NET (FM)

This net is used to support the technical aspects of logistics support to the division. It maintains continual communications between components of the DMMC (Class I, III, V, and maintenance management) for coordination of these critical areas. The NCS is the DISCOM materiel management office.

The Class I and III and water branch, subordinate to the general supply section, is a distinct operating entity within the DMMC. The subsistence supply supervisor has a radio for the Class I operations. The petroleum supply NCO has a radio for the Class III operations. The water supervisor has a radio for water supply operations. Each uses the mobile station in this net to coordinate with the other DISCOM elements on issue points, problems, shortages excesses trends, and requirements. They are constantly traveling within the division and brigade areas to ensure the smooth functioning of their respective supply operations.

The DAO uses the materiel management net to provide coordination and control necessary to monitor ammunition supply. The DAO uses a mobile station in this net to ascertain and solve problems while on the move, The DAO is responsible to the DMMC chief and must have the ability to communicate with the chief at all times. The DAO maintains contact with the G3 and the CMMC Class V section via the area communications system and with each subordinate battalion via the materiel management net.

Within this net, the DAO has a radio. The ammunition supply technician, the chief ammunition NCO, and the ammunition inspection NCO share a radio and function from the DMMC field location. The two radios are in separate

Table 5-6. MSB radio nets.

Cmd/Ops	Sup Co	Med Co	Maint Co	TMT Co
S2/S3 Comm Br (NCS)	Co Cdr (NCS)	Co HQ (NCS)	Maint Con Sec (NCS)	Co HQ (NCS)
MSB Cdr	Sup Plt HQ	Co Cdr	Co HQ	Co Cdr
XO	Water Sec	Trmt Sqd (2)	Maint Plt HQ	Lt Trk Plt HQ
S2/S3	Water Pts (3)	Area Spt Trmt Tm	Autmv Sec	Lt Trk Cargo Sqd (2)
Spt Ops Off	CL III Sec (3)	Amb Plt HQ	GSE Rep Sec	Lt/Mdm Trk Plt HQ
S4		Amb Sqd (4)	Bn Maint Sec	Mdm Trk Cargo Sqd
Sup Co		Pvnt Med Sec	Lt Maint Plt HQ	Lt Trk Cargo Sqd
Med Co			C-E Sec	
Maint Co			Armt Maint Sec	
TMT Co			Msl Maint Sec	
			Tech Sup Plt HQ	

trucks. These radios provide a communications link with the division and brigade ammunition NCOs located at the ATPs. Each ATP NCO has a radio and communicates with these two sources for his information and guidance.

The materiel management officer uses his mobile station in this net to provide close and constant coordination with the DMMC in the resolution of materiel problems throughout the division.

Personnel in the ASL management branch, although not assigned a radio, have access to nets assigned to other branches in the DMMC. The layout of the DMMC determines the branch radio they use.

DISCOM LOGISTICS OPERATIONS NET (AM)

This net provides a long-range command and control link for the DISCOM when the division is operating over extended distances. It also provides a long-range link with the COSCOM elements as required. The NCS for this net is the S2/S3 section in the DISCOM.

MEDICAL OPERATIONS NET (AM)

The medical operations net provides long-range voice capability to tie division medical elements into the overall corps medical treatment and evacuation system.

MSB COMMAND/OPERATIONS NET (FM) AND COMPANY COMMAND NETS

The MSB command/operations net is used to command and control the elements of the MSB both from a tactical and a CSS mission perspective. Net control is maintained by the S2/S3 section. The S2/S3 section and support operations section collocate and use a combination of remotes and installed radios to operate in the DISCOM command/operations net and the DISCOM logistics operations net. The company command nets provide C2 for the companies of the MSB. Table 5-6 depicts the nets for the MSB.

AMCO COMMAND NET

The AMCO commander uses the AMCO to command and control elements of his company. Table 5-7 shows the stations in this net.

Table 5-7. AMCO Radio Net.

Co Cdr (NCS)
Prod Con Sec
Wrecker
Hel Sys Rep Plt HQ
Util Hel Rep Sec
Atk Hel Rep Sec
Obsn/Sct Hel Rep Sec

FSB COMMAND/OPERATIONS NETS AND COMPANY COMMAND NETS

The principal radio net operated by the FSB headquarters ‘is the FSB command/operations net. This net is used to command and control the elements of the FSB. The NCS is the S2/S3 section in the CF.

Table 5-8. FSB radio nets.

Cmd/Ops	Sup Co	Med Co	Maint Co
S2/S3 Sec (NCS)	Co Cdr (NCS)	Co HQ (NCS)	Maint Con Sec (NCS)
FSB Cdr	Sup Plt HQ	Co Cdr	Maint Plt HQ
XO	ATP Sec	Trmt Sqd (2)	Elct Maint Sec
S2/S3	CL I	Area Spt Trmt Tm	Armt Sec
Spt Ops Off	CL III Sec (3)	Amb Plt HQ	Autmv & Gnd Spt Rep Sec
S4		Amb Sqd (2)	Bn Maint Sec
Sup Co			
Med Co			
Maint Co			

In addition, headquarters personnel monitor the following nets:

- FSB commander – DISCOM command/operations net.
- Support operations section – brigade administrative/logistics net.
- S2/S3 — DISCOM command/operations net.
  - brigade command net.
  - FSB command/operations net.
  - DISCOM logistics operations net.

Table 5-8 depicts the nets for the FSB.

SIGNAL SECURITY

As part of the overall operations security program, DISCOM elements consistently practice signal security. Guidelines include –

- Remoting antennas away from CP by at least 1 kilometer.
- Constructing and using directional antennas.
- Using terrain features, such as hills, vegetation, and buildings, to mask transmissions.
- Dispersing transmitters.
- Maintaining radio or radio listening silence; using radio only when absolutely necessary.
- Distributing codes on a need-to-know basis.
- Using only authorized call signs and brevity codes.
- Using wire and messengers whenever possible.
- Using available secure voice/RATT devices.
- Maintaining net discipline and control.
- Using authentication and encryption codes specified in the current SOI.
- Keeping transmission short (less than 20 seconds).
- Reporting all COMSEC discrepancies to the NCS.
- Using lowest transmitter power output consistent with good communications.
- Avoiding significant surges in traffic on single-channel radio nets.

COURIERS

Courier service, although slow, is a reliable means of exchanging information. In the LID, courier service is the norm rather than a backup means. A DISCOM element performs this service for the DISCOM, not a signal unit. With the high density of elements in the DSA and BSA, use of couriers and wire lessens the risk of substantial radio use.