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[54] **METHOD AND APPARATUS FOR EXPLOITATION OF VOICE INACTIVITY TO INCREASE THE CAPACITY OF A TIME DIVISION MULTIPLE ACCESS RADIO COMMUNICATIONS SYSTEM**

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[73] Assignee: Hughes Aircraft Company, Los Angeles, Calif.

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[52] U.S. Cl. 370/95.3; 455/33.1
[58] Field of Search 370/95.3, 77, 104.1, 370/60, 94.1; 455/33, 103, 214, 33.1, 33.2, 33.3, 33.4

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[57] **ABSTRACT**

A mobile telephone system multiplexes plural voice traffic channels on a single carrier using a TDMA protocol. The capacity of the mobile telephone system is increased by assigning voice traffic capacity, not on a conversation basis, but on a speech spurt basis. In order to avoid compromising the voice transmission capacity, control signals (for the allocation and deallocation of both forward and reverse traffic channels) are sent using multiple diversity, i.e. both time and frequency. In addition, to increase the number of available control channels, a control channel comprises a sub-divided portion of an otherwise equivalent voice traffic slot. For reverse allocation requests, which are transmitted over a contention access channel, power diversity is used in addition to time and frequency diversity.

69 Claims, 33 Drawing Sheets
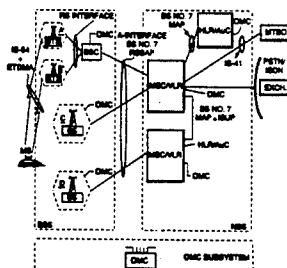
MSC MOBILE SWITCHING CENTER
HLR HOME LOCATION REGISTER
AuC AUTHENTICATION CENTER
VLR VISITOR LOCATION REGISTER
PSTN PUBLIC SWITCHED TELEPHONE NETWORK
ISDN INTEGRATED SERVICES DIGITAL NETWORK
MAP MOBILE APPLICATION PART (SS. NO. 7)
BS BASE STATION
BSC BASE STATION CONTROLLER
MS MOBILE STATION
OMC OPERATIONS & MAINTENANCE CENTER
ISUP ISDN SUBSCRIBER USER PART (SS. NO. 7)
RS RADIO SUBSYSTEM
BSS BASE STATION SUBSYSTEM
NSS NETWORK SUBSYSTEM

BTS BASE TRANSCEIVER STATION
MTSC MOBILE TELEPHONE SWITCHING OFFICE

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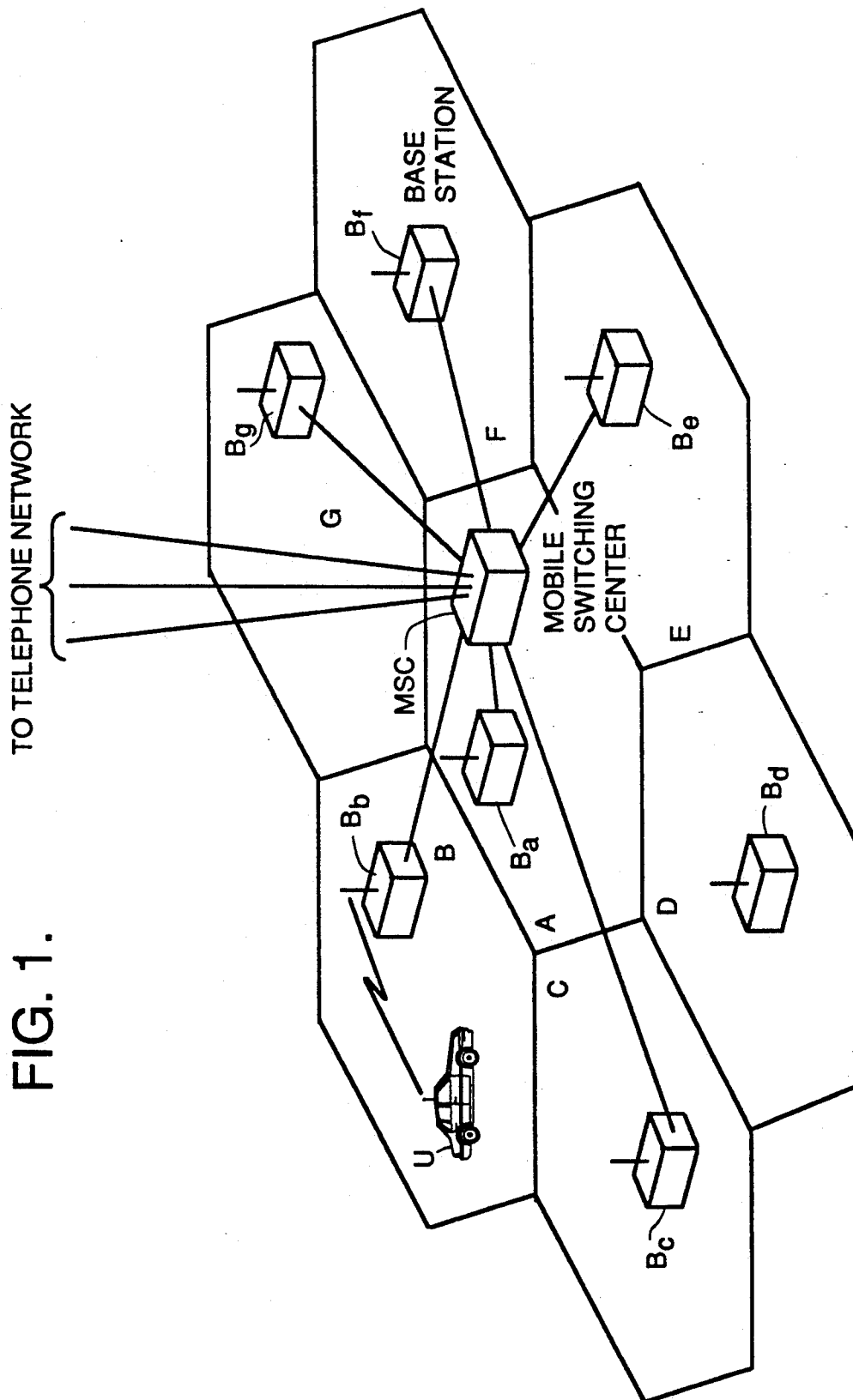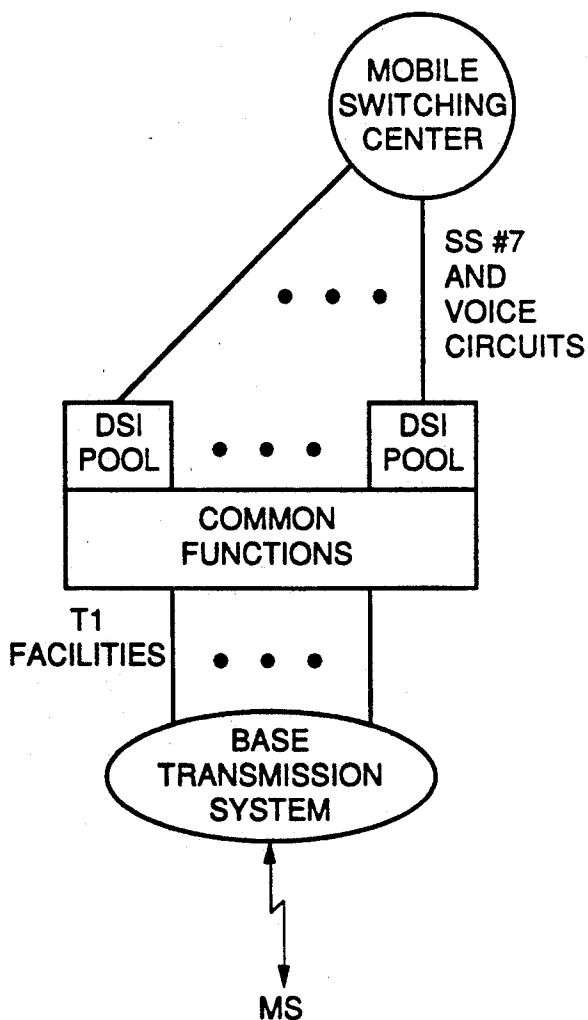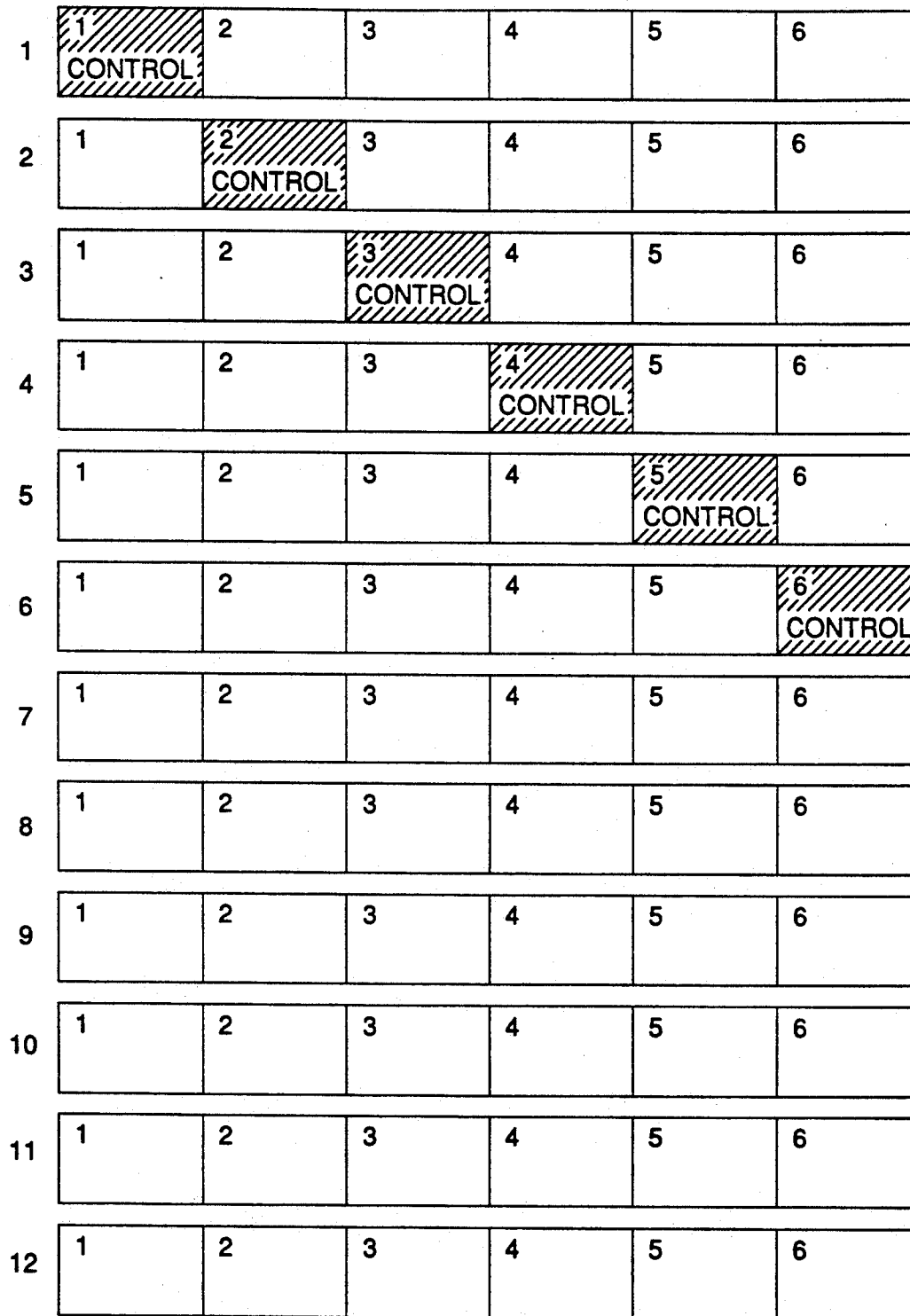
FIG. 1.

TO TELEPHONE NETWORK

BASE STATION

MOBILE SWITCHING CENTER

MSC

Bf

Bg

Be

F

G

E

Bb

Ba

B

Bd

A

C

D

U

Bc

FORWARD FRAMES

	SLOT 1	SLOT 2	SLOT 3	SLOT 4	SLOT 5	SLOT 6
FRAME 1	MS 15	MS 11	MS 21	MS 4	MS 1	MS 22
2	MS 15	MS 11	MS 21	MS 4		MS 22
3	MS 15	MS 11	MS 21	MS 4	MS 19	MS 22
4	MS 15		MS 21	MS 4	MS 19	MS 22
5	MS 15	MS 8	MS 21	MS 4	MS 19	MS 22
6	MS 15	MS 8		MS 4	MS 19	
7	MS 2	MS 8		MS 4	MS 19	
8	MS 2	MS 8	MS 32	MS 4	MS 19	
9	MS 2	MS 8	MS 32	MS 4	MS 19	MS 15

FIG. 2.

FIG. 3.

MOBILE SWITCHING CENTER

SS #7 AND VOICE CIRCUITS

DSI POOL • • • DSI POOL

COMMON FUNCTIONS

T1 FACILITIES • • •

BASE TRANSMISSION SYSTEM

MS

FIG. 4.

ONE DSI GROUP
12 RF CHANNELS
72 SLOTS
6 CONTROL SLOTS
66 USER SLOTS

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