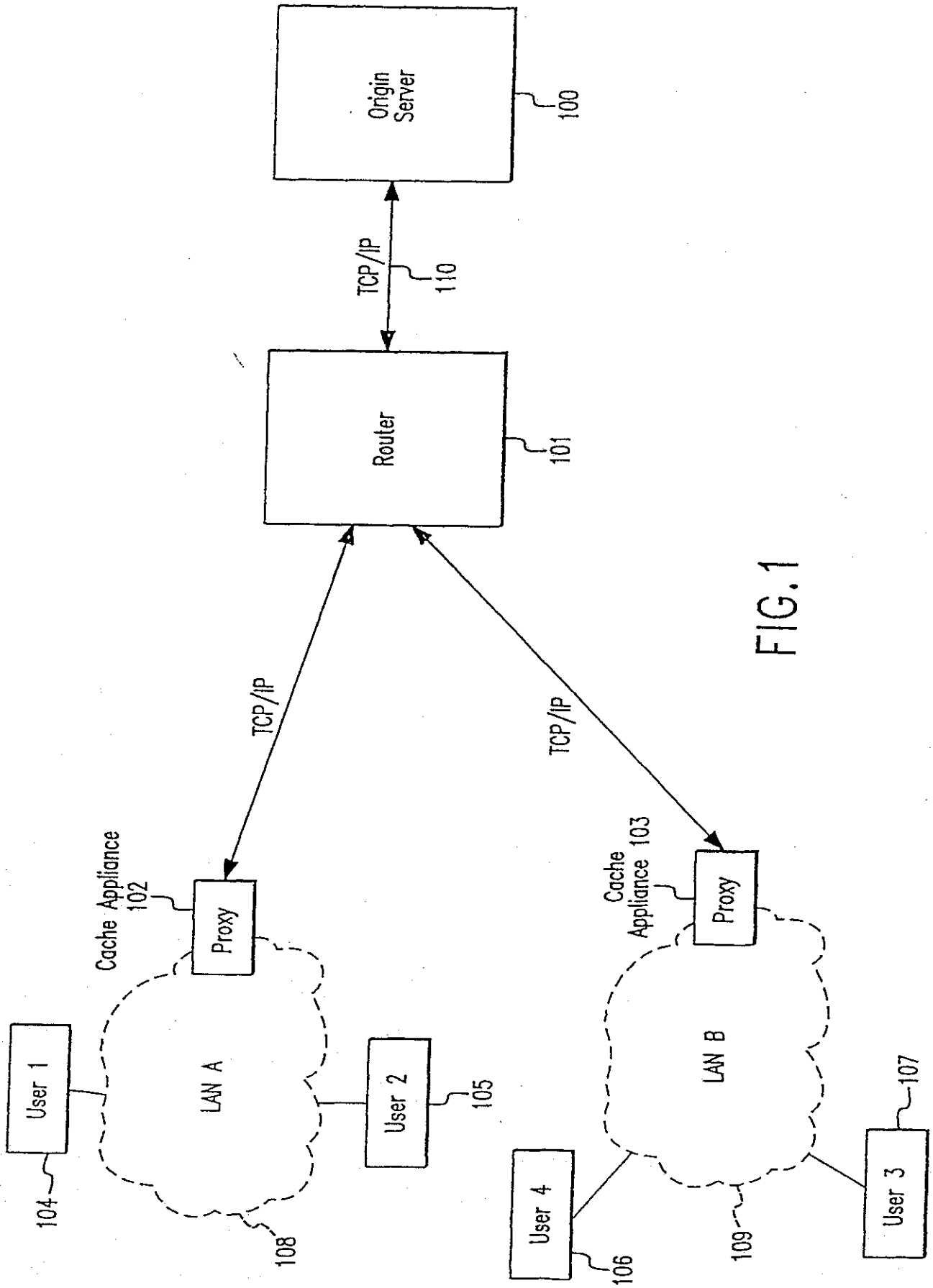

Origin Server
100
TCP/IP
110
Router
101
TCP/IP
TCP/IP
Cache Appliance 102
Proxy
Cache Appliance 103
Proxy
User 1
LAN A
User 2
105
104
108
LAN B
User 4
106
109
User 3
107

FIG. 1

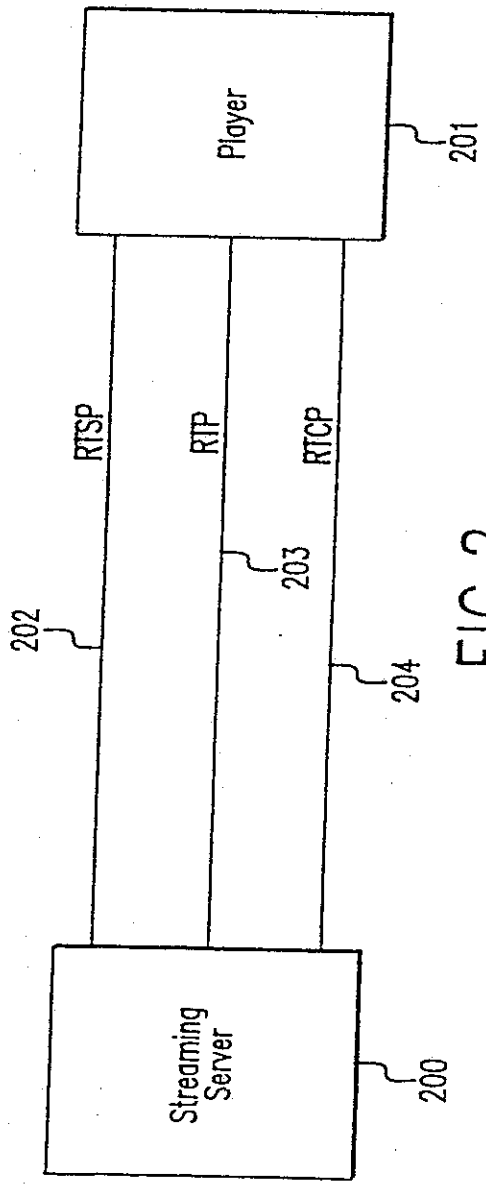


FIG. 2

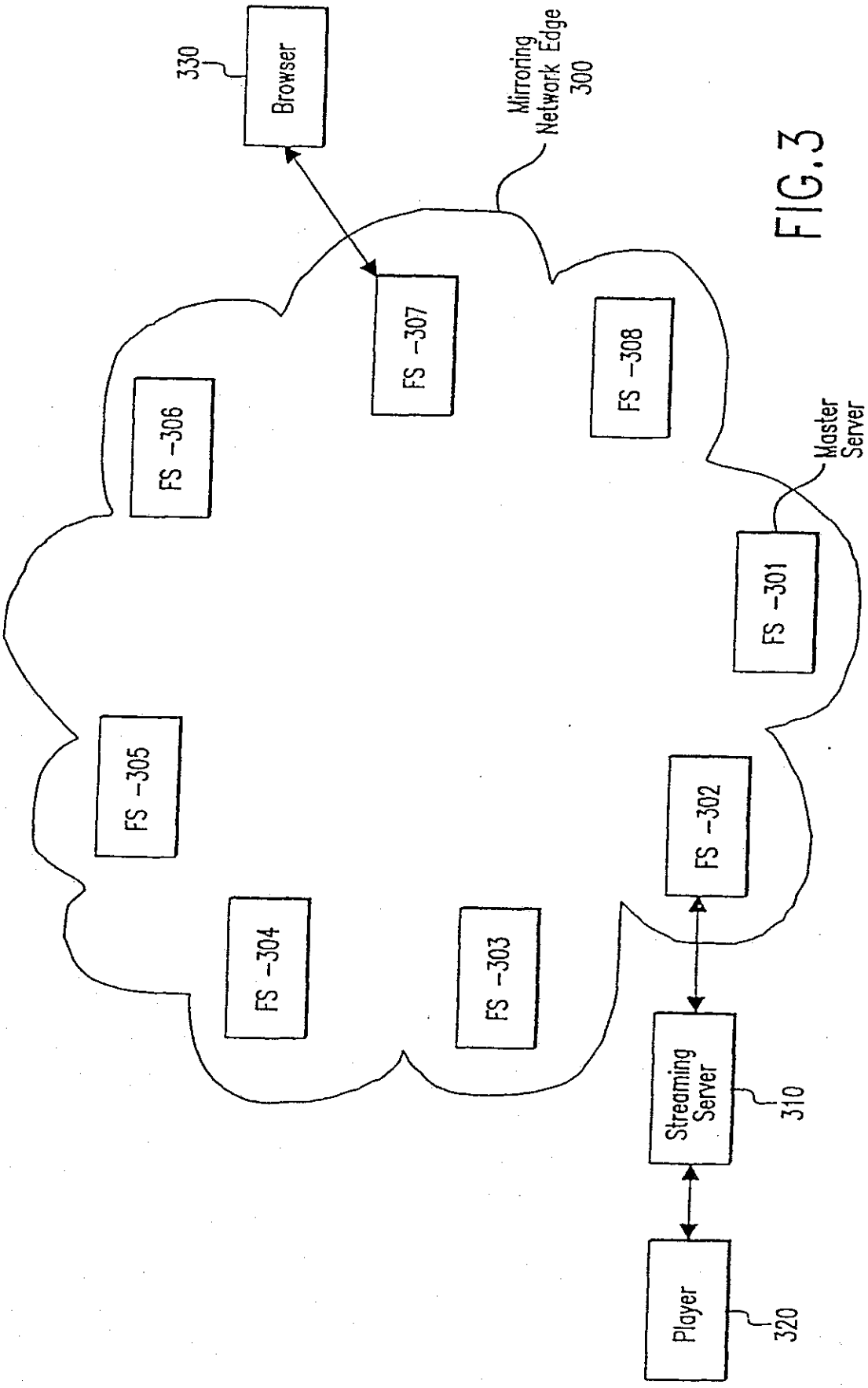

330
Browser
Mirroring Network Edge 300
FS -307
FS -308
FS -306
Master Server
FS -301
FS -305
FS -302
FS -304
FS -303
Streaming Server
310
Player
320

FIG.3

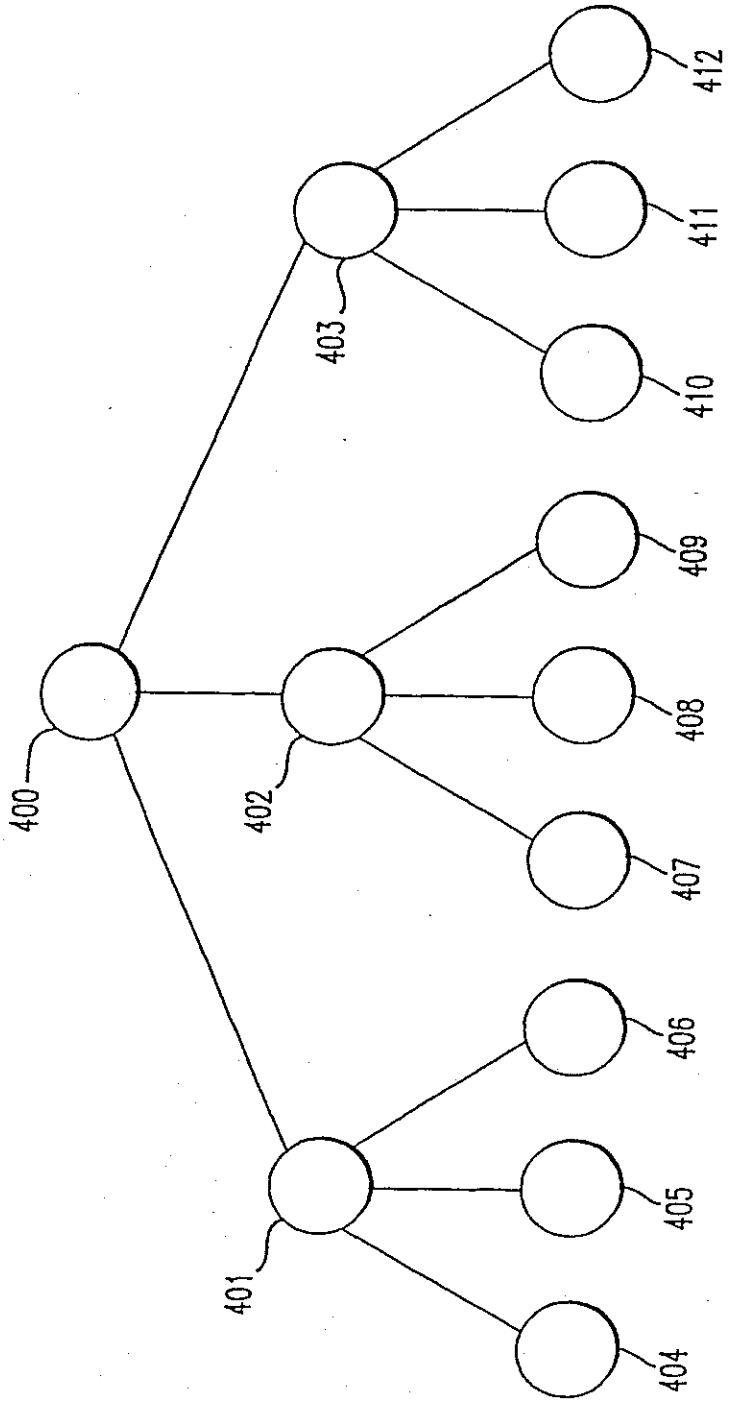


FIG. 4

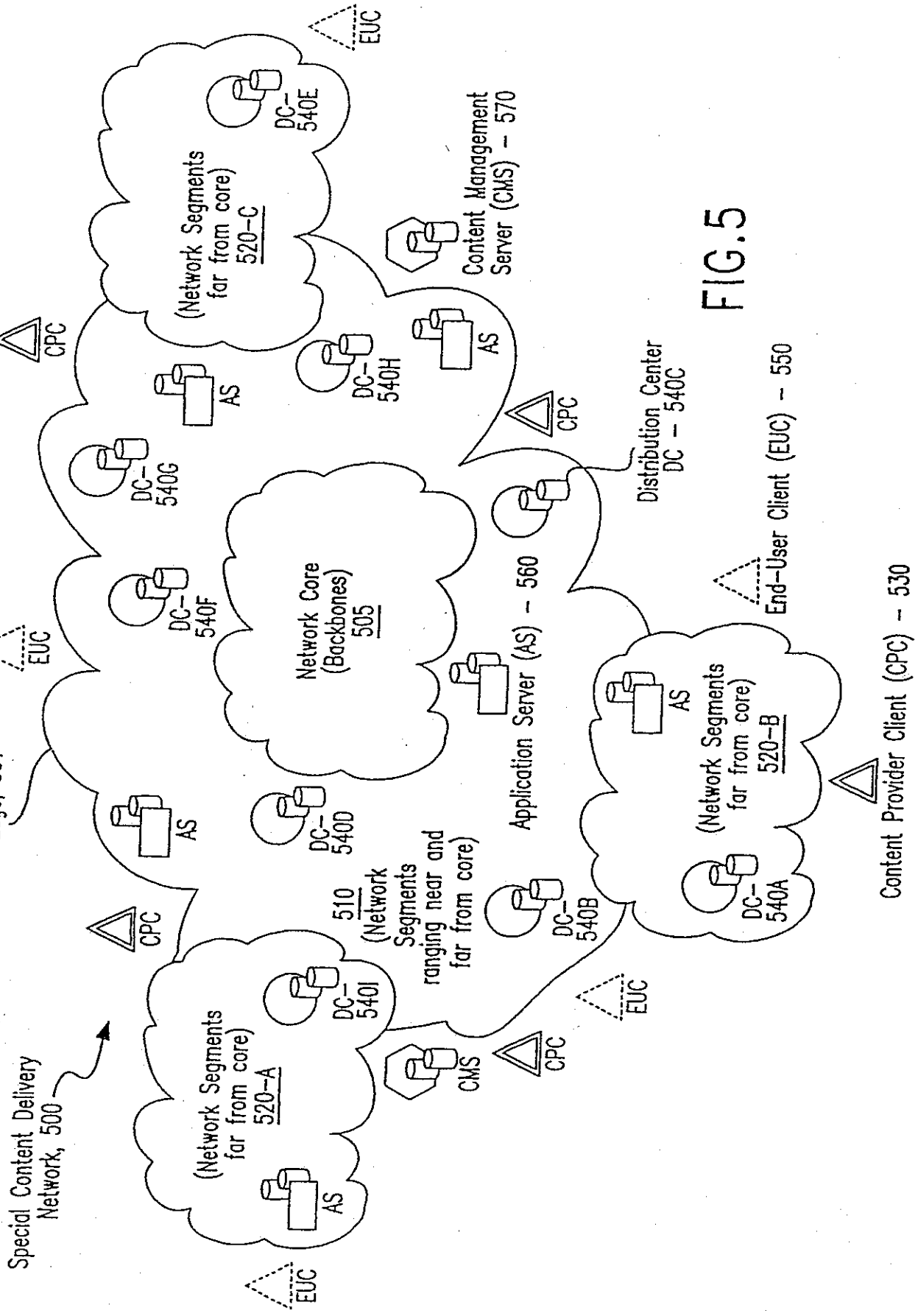

Special Content Delivery Network, 500
Network Edge, 501
(Network Segments far from core) 520-A
(Network Segments far from core) 520-B
(Network Segments far from core) 520-C
Network Core (Backbones) 505
510 (Network Segments ranging near and far from core)
Application Server (AS) - 560
Content Management Server (CMS) - 570
Distribution Center DC - 540C
End-User Client (EUC) - 550
Content Provider Client (CPC) - 530
DC-540A
DC-540B
DC-540D
DC-540E
DC-540F
DC-540G
DC-540H
DC-540I
AS
CMS
CPC
EUC

FIG.5

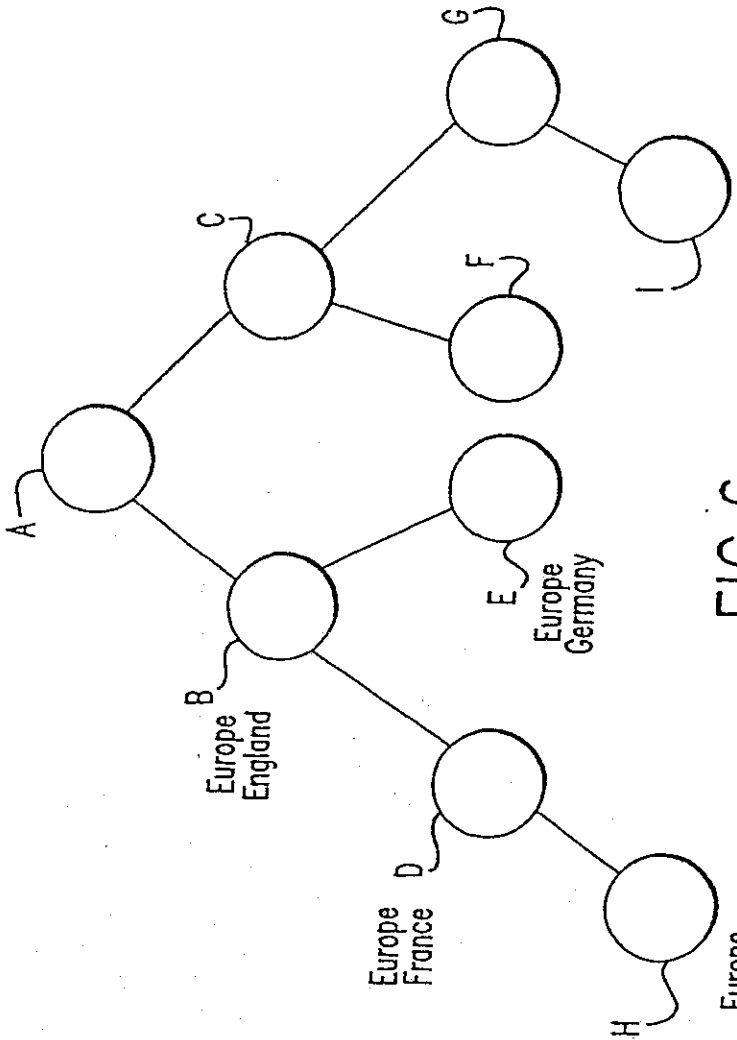

A
B
Europe
England
C
D
Europe
France
E
Europe
Germany
F
G
H
Europe
Italy
I

FIG.6

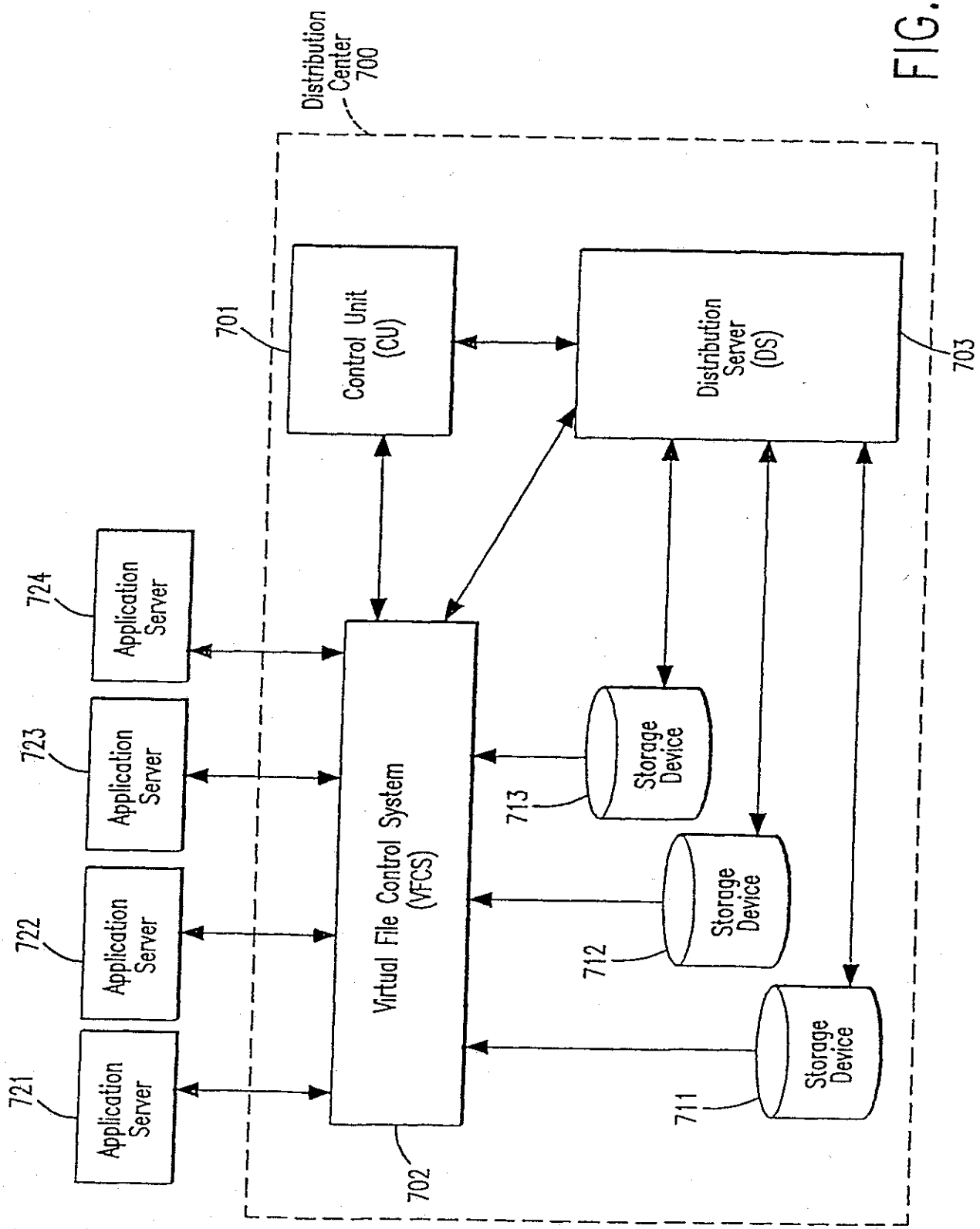

Distribution Center 700
Control Unit (CU)
701
Distribution Server (DS)
703
Application Server
724
Application Server
723
Application Server
722
Application Server
721
Virtual File Control System (VFCS)
702
Storage Device
713
Storage Device
712
Storage Device
711

FIG. 7

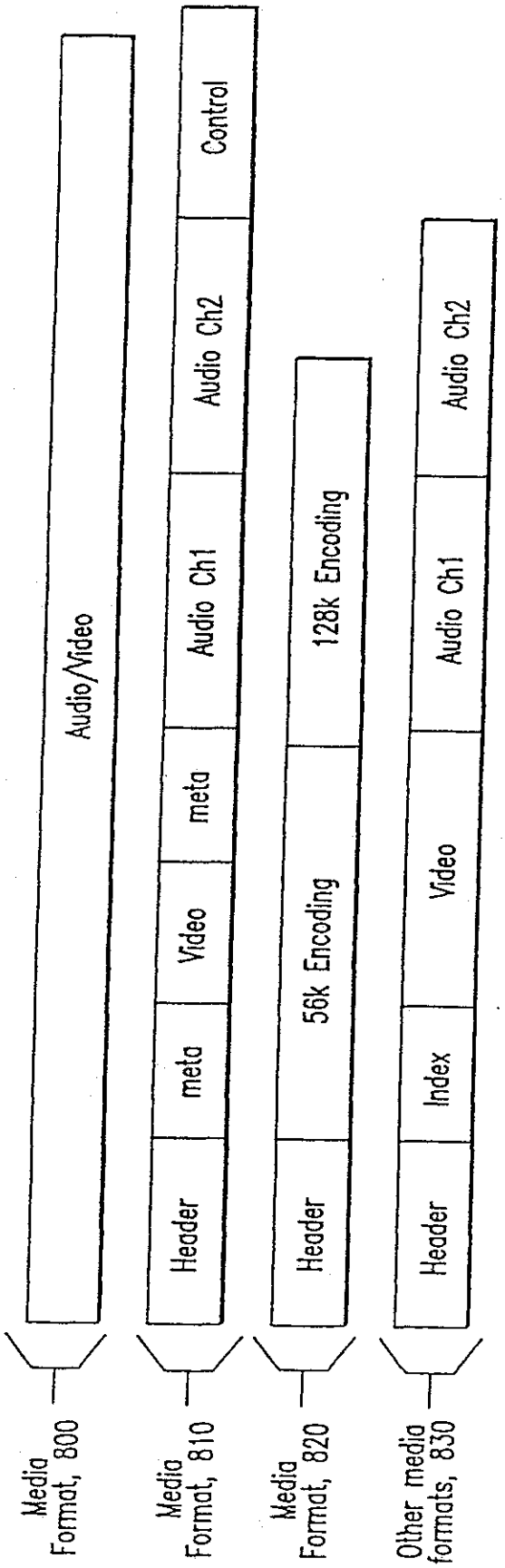

Audio/Video
Header
meta
Video
meta
Audio Ch1
Audio Ch2
Control
Header
56k Encoding
128k Encoding
Header
Index
Video
Audio Ch1
Audio Ch2
Media Format, 800
Media Format, 810
Media Format, 820
Other media formats, 830

FIG.8

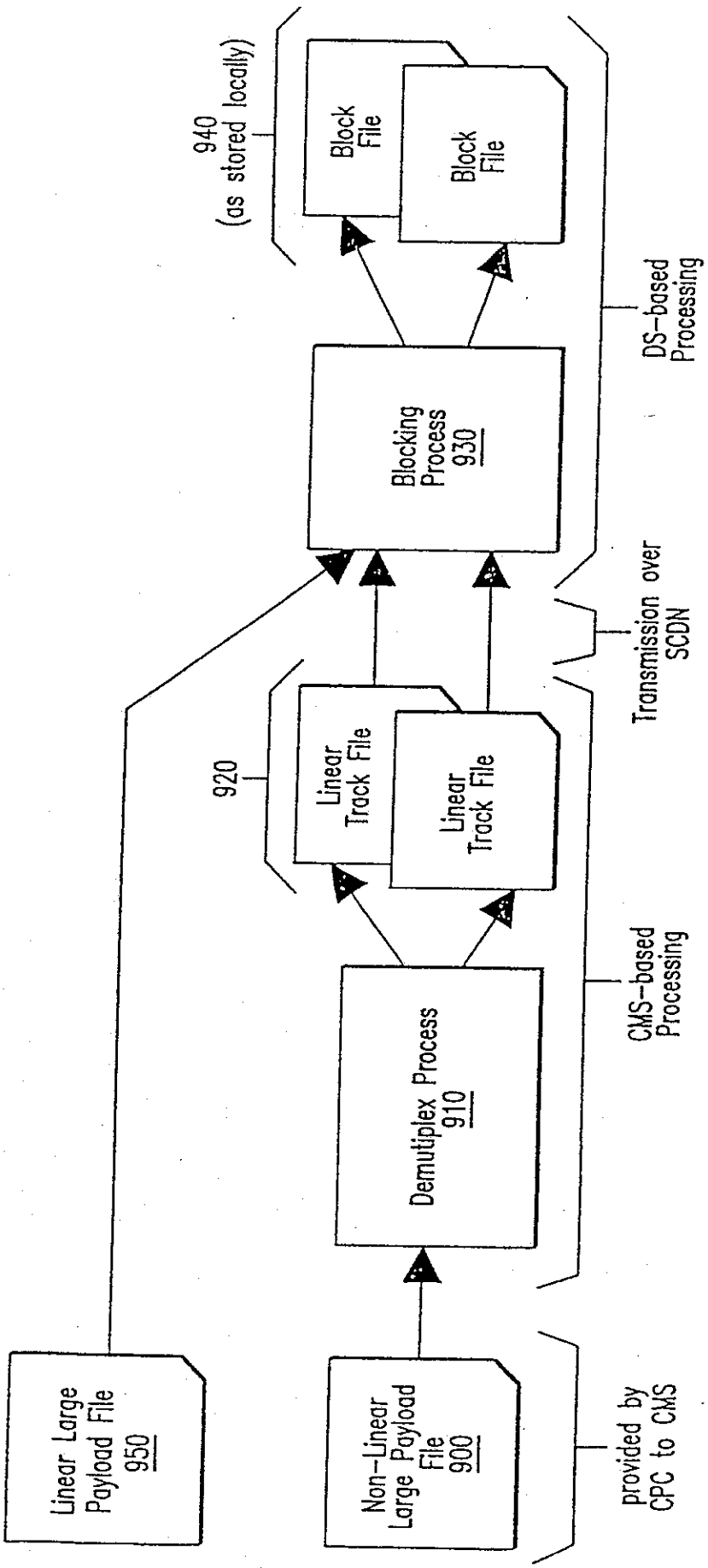

Linear Large Payload File 950
Non-Linear Large Payload File 900
provided by CPC to CMS
Demultiplex Process 910
CMS-based Processing
920
Linear Track File
Linear Track File
Transmission over SCDN
Blocking Process 930
DS-based Processing
940 (as stored locally)
Block File
Block File

FIG.9

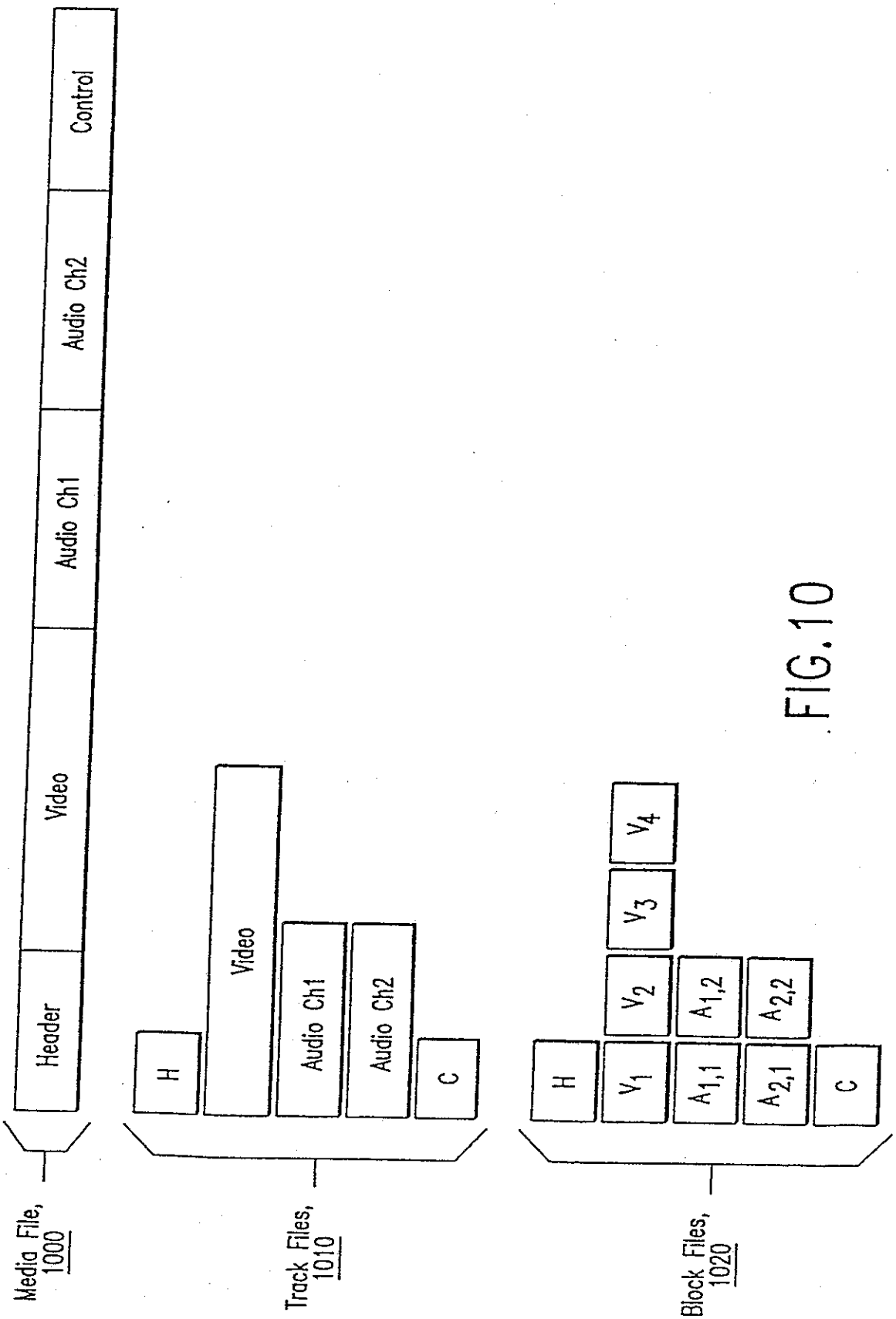

Header
Video
Audio Ch1
Audio Ch2
Control
Media File, 1000
H
Video
Audio Ch1
Audio Ch2
C
Track Files, 1010
H
V1
V2
V3
V4
A1,1
A1,2
A2,1
A2,2
C
Block Files, 1020

FIG.10

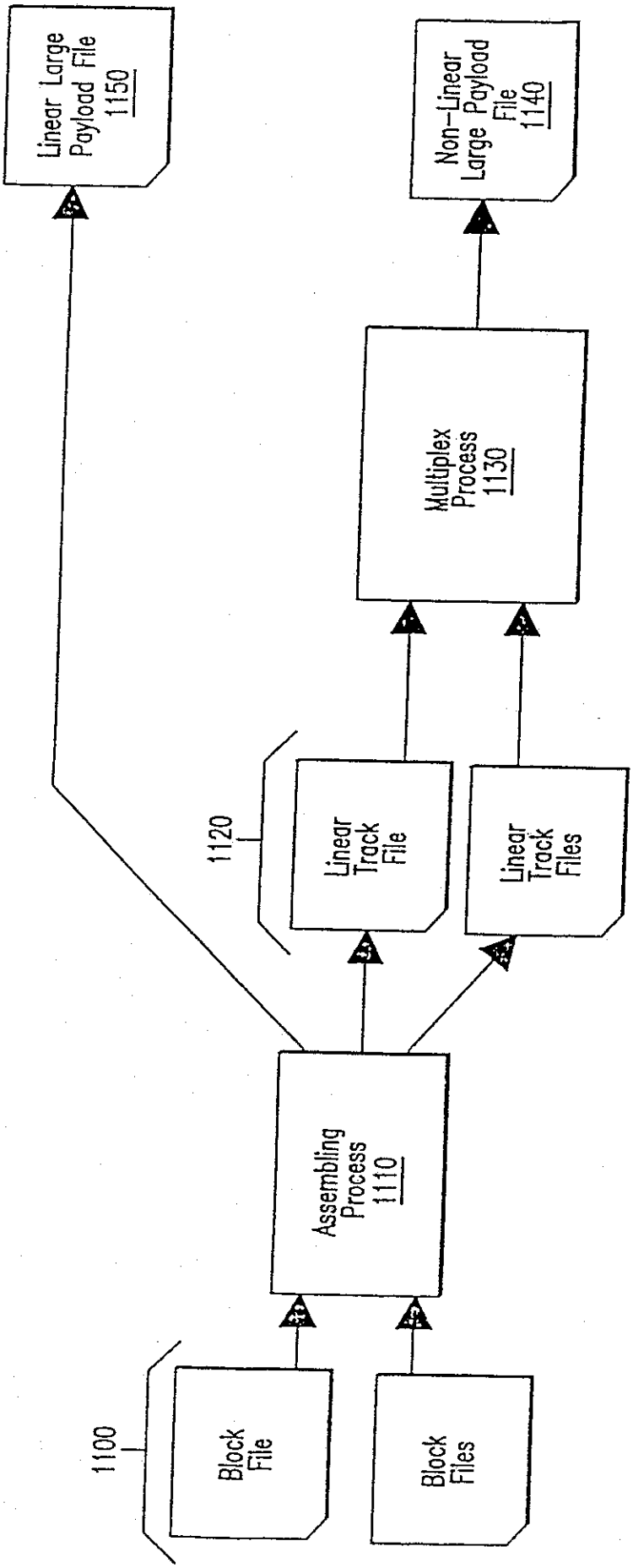

Linear Large Payload File 1150
Non-Linear Large Payload File 1140
Multiplex Process 1130
1120
Linear Track File
Linear Track Files
Assembling Process 1110
1100
Block File
Block Files

FIG.11

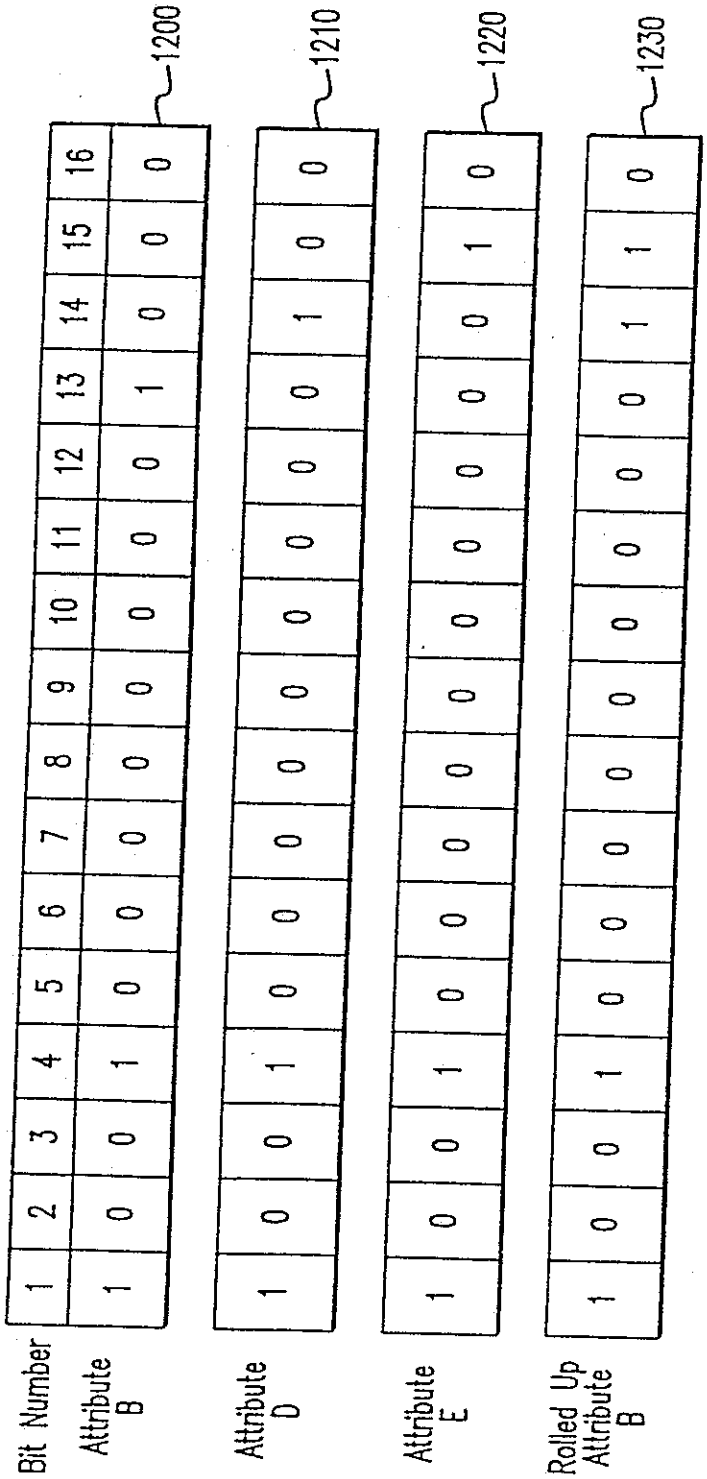

1200
1210
1220
1230
Bit Number
Attribute B
Attribute D
Attribute E
Rolled Up Attribute B
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
1 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0
1 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0
1 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0
1 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0

FIG.12

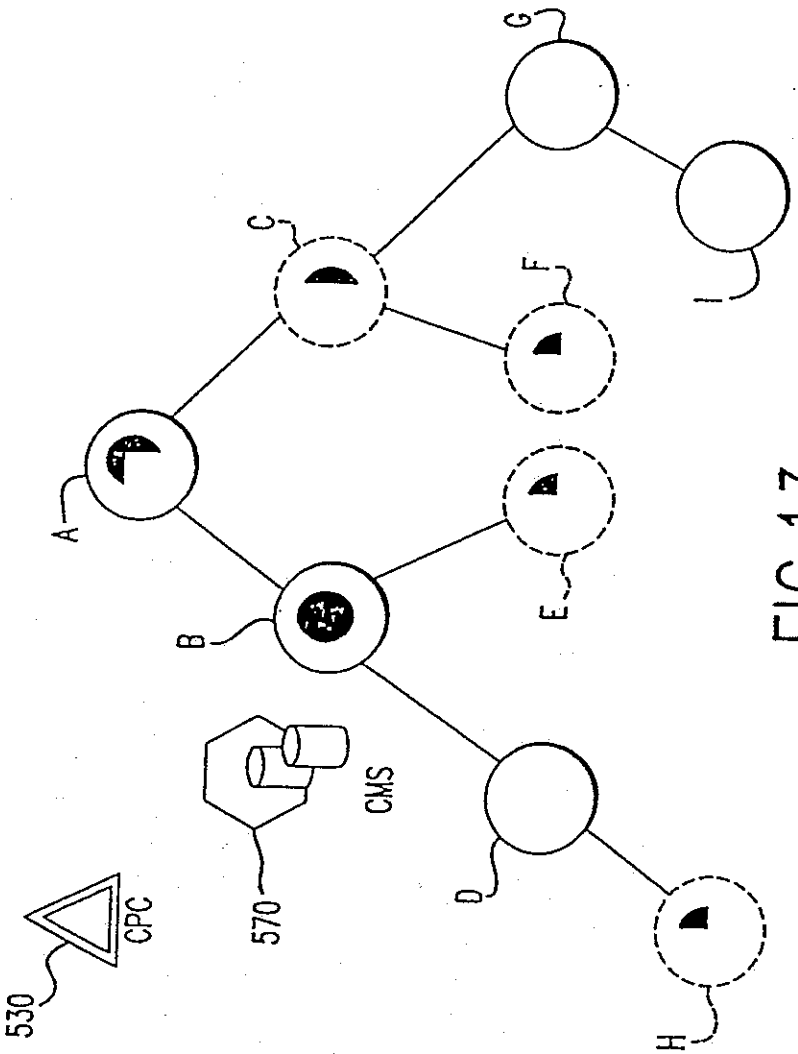


FIG.13

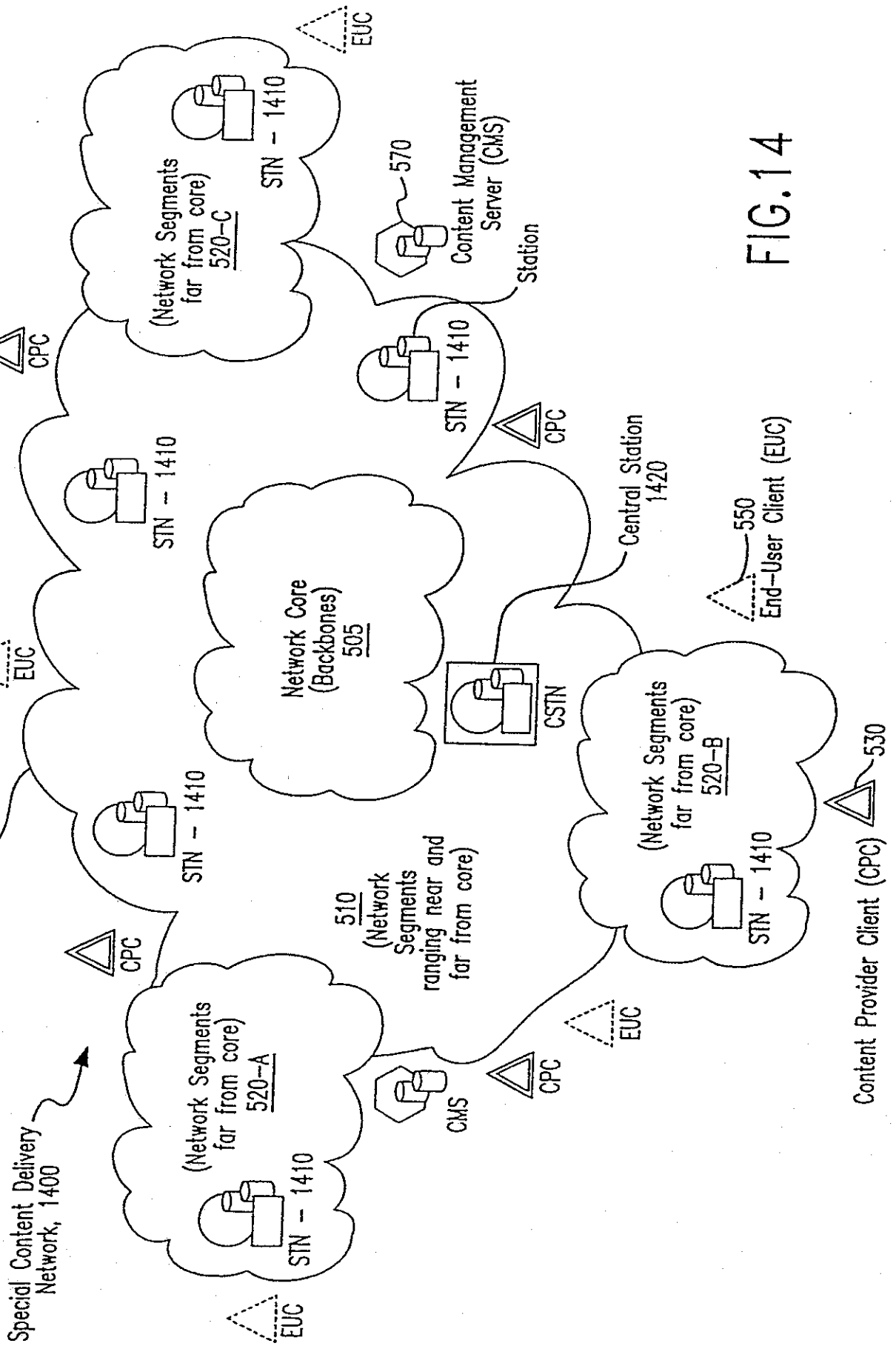

Special Content Delivery Network, 1400
Network Edge, 501
(Network Segments far from core) 520-A
(Network Segments far from core) 520-B
(Network Segments far from core) 520-C
510 (Network Segments ranging near and far from core)
Network Core (Backbones) 505
Central Station 1420
CSTN
CMS
Content Management Server (CMS)
570
Station
STN - 1410
CPC
EUC
550
End-User Client (EUC)
530
Content Provider Client (CPC)

FIG. 14

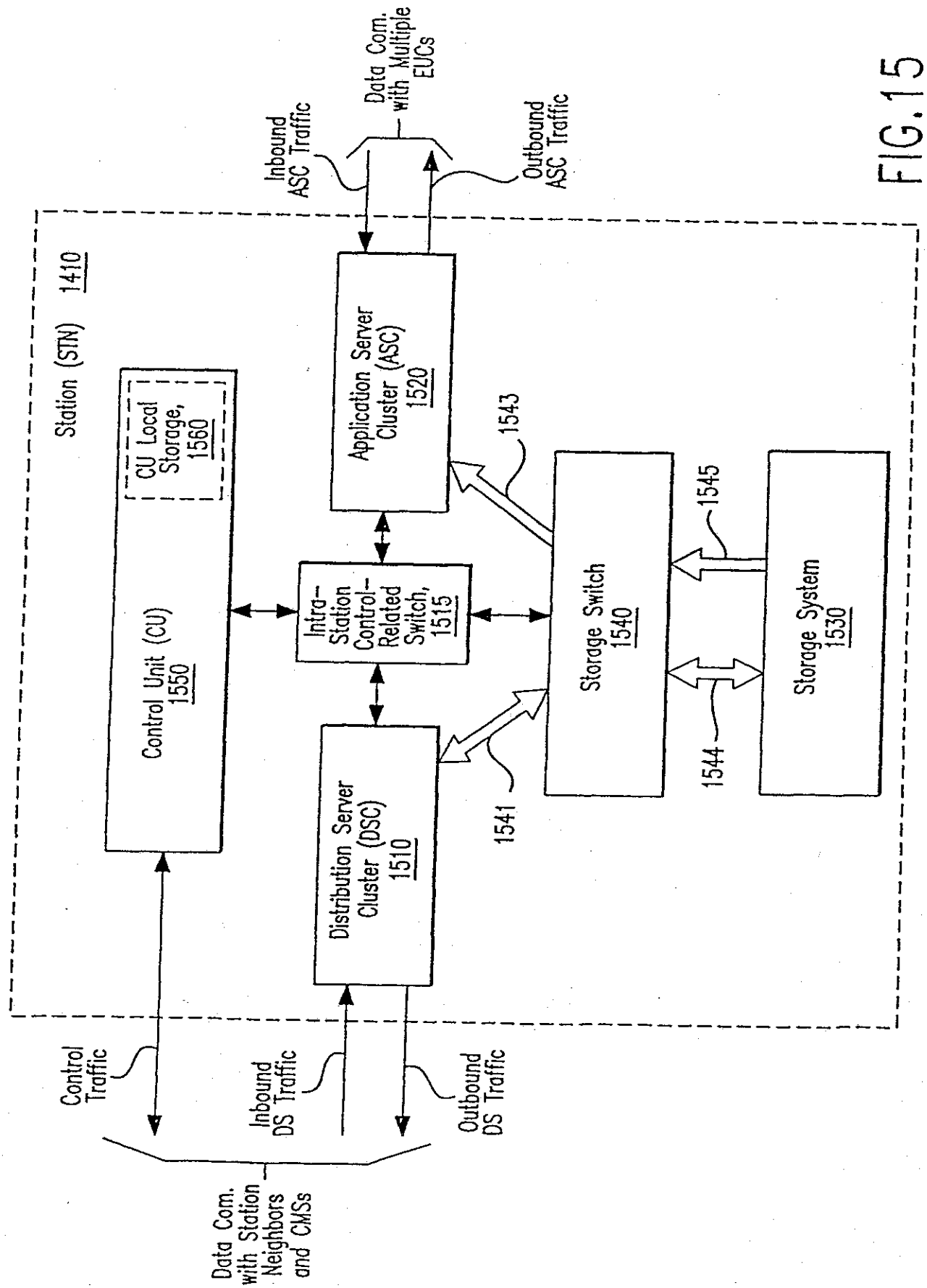

Station (STN) 1410
CU Local Storage, 1560
Control Unit (CU) 1550
Application Server Cluster (ASC) 1520
Intra-Station Control-Related Switch, 1515
Distribution Server Cluster (DSC) 1510
Storage Switch 1540
Storage System 1530
1543
1545
1544
1541
Inbound ASC Traffic
Data Com. with Multiple EUCs
Outbound ASC Traffic
Control Traffic
Inbound DS Traffic
Outbound DS Traffic
Data Com. with Station Neighbors and CMSs

FIG. 15

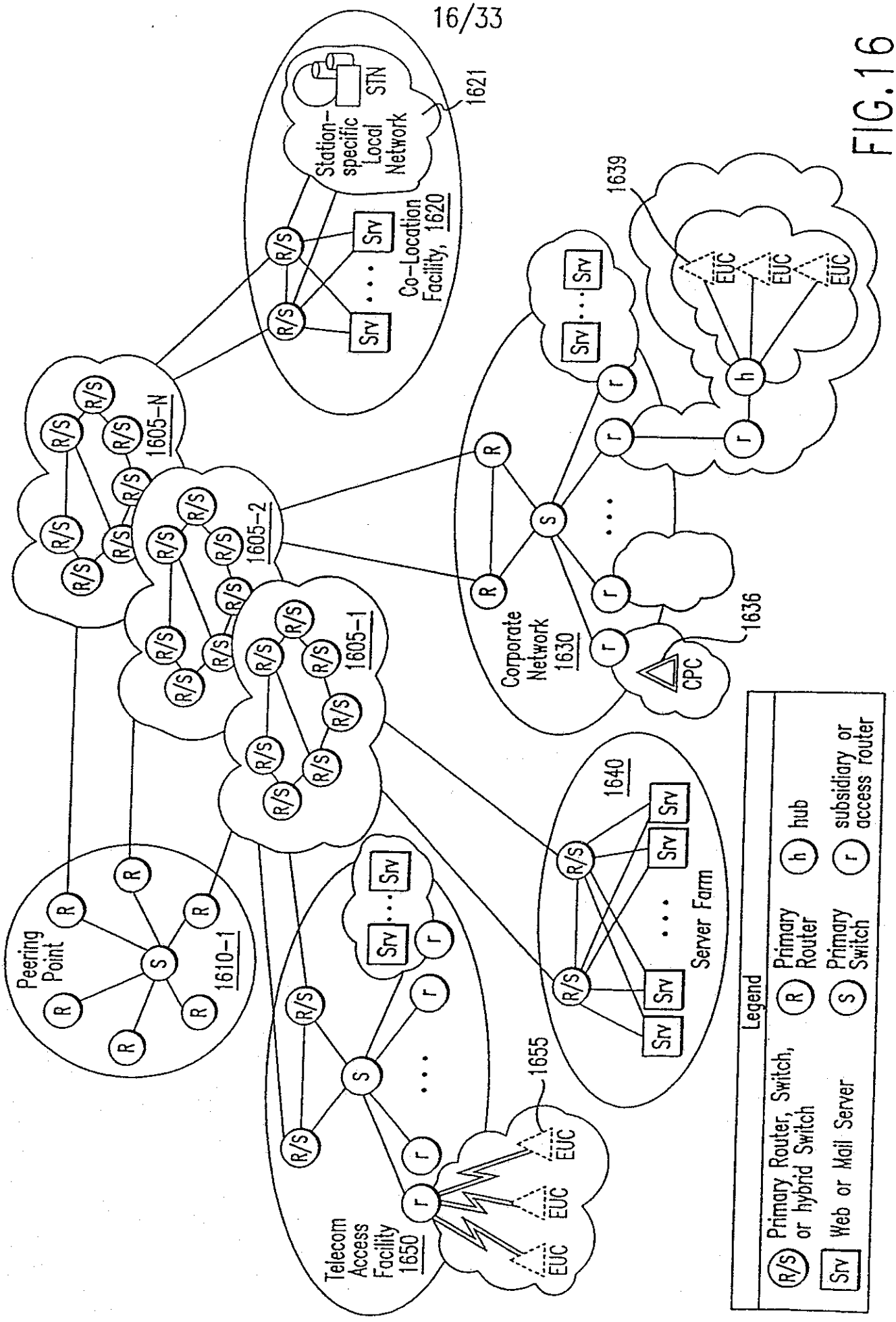

Station-specific Local Network
STN
1621
Co-Location Facility, 1620
Srv
R/S
1605-N
1605-2
1605-1
Peering Point
1610-1
R
S
Corporate Network 1630
r
h
1639
EUC
1636
CPC
1640
Server Farm
Telecom Access Facility 1650
1655
Legend
Primary Router, Switch, or hybrid Switch
Primary Router
hub
Web or Mail Server
Primary Switch
subsidiary or access router

FIG. 16

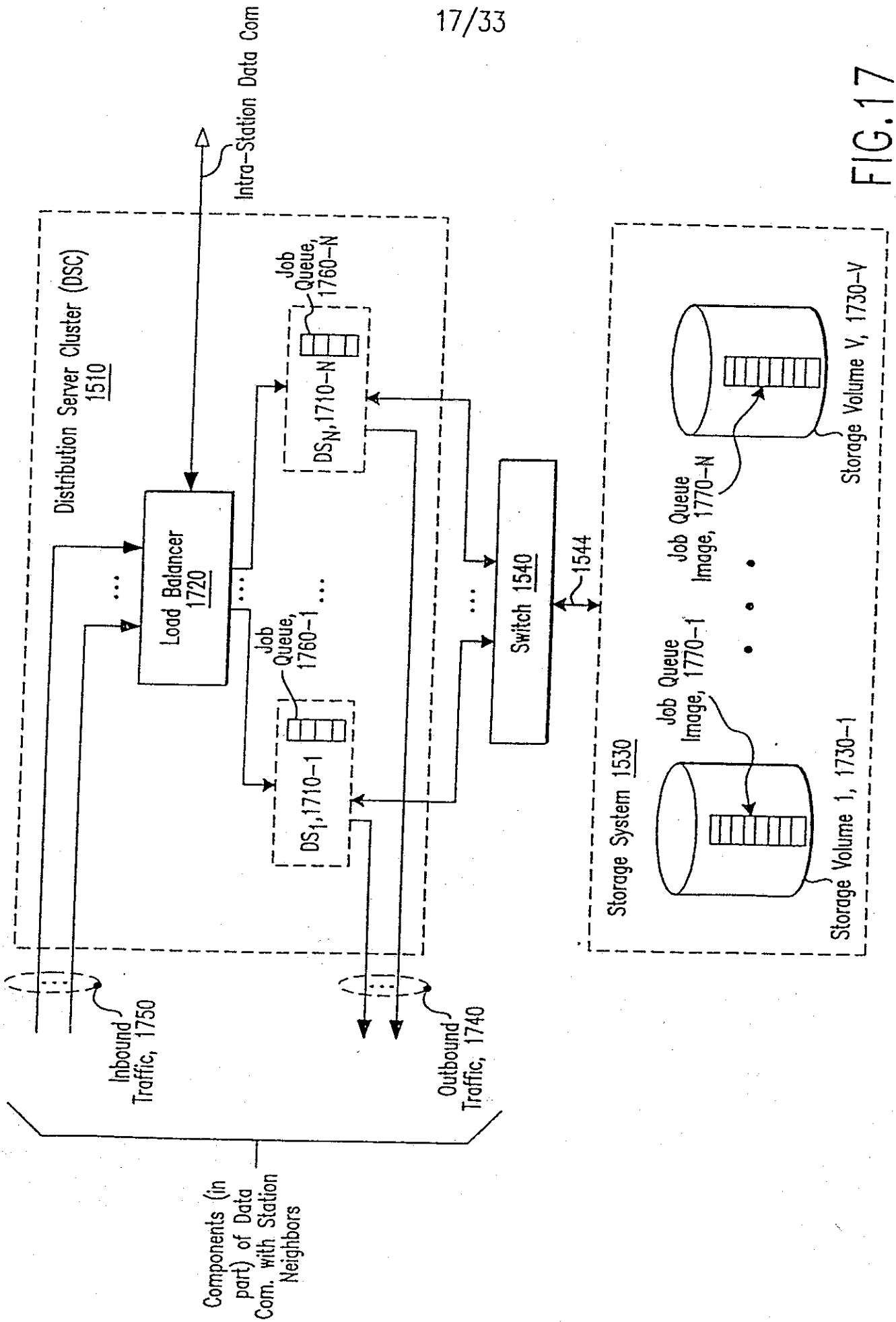

Intra-Station Data Com
Distribution Server Cluster (DSC) 1510
Load Balancer 1720
Job Queue, 1760-N
DS_N, 1710-N
Job Queue, 1760-1
DS_1, 1710-1
Switch 1540
1544
Storage System 1530
Job Queue Image, 1770-N
Storage Volume V, 1730-V
Job Queue Image, 1770-1
Storage Volume 1, 1730-1
Inbound Traffic, 1750
Outbound Traffic, 1740
Components (in part) of Data Com. with Station Neighbors

FIG. 17

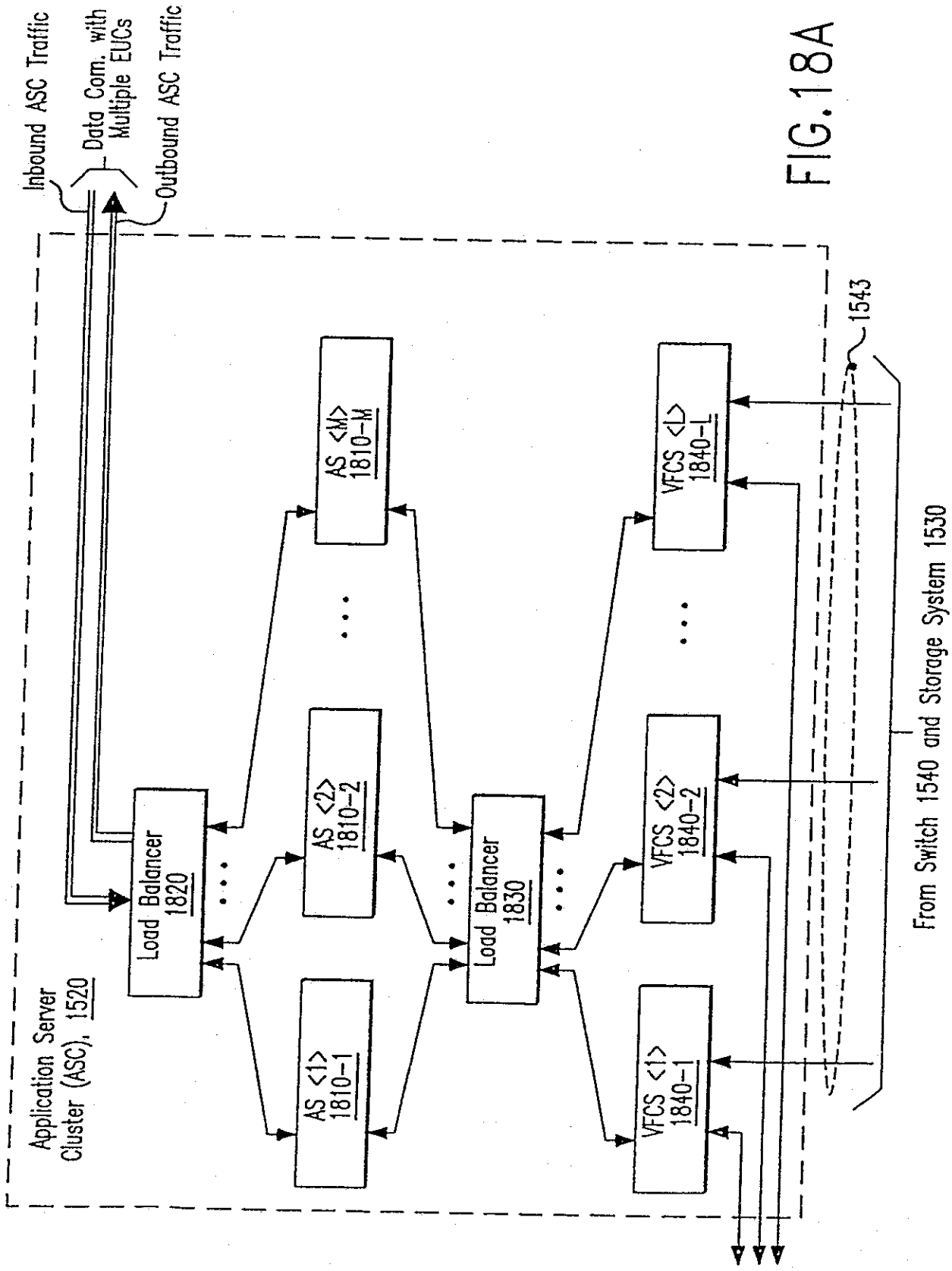

Inbound ASC Traffic
Data Com. with Multiple EUCs
Outbound ASC Traffic
Application Server Cluster (ASC), 1520
Load Balancer 1820
Load Balancer 1830
AS <1> 1810-1
AS <2> 1810-2
AS <M> 1810-M
VFCS <1> 1840-1
VFCS <2> 1840-2
VFCS <L> 1840-L
1543
From Switch 1540 and Storage System 1530

FIG.18A

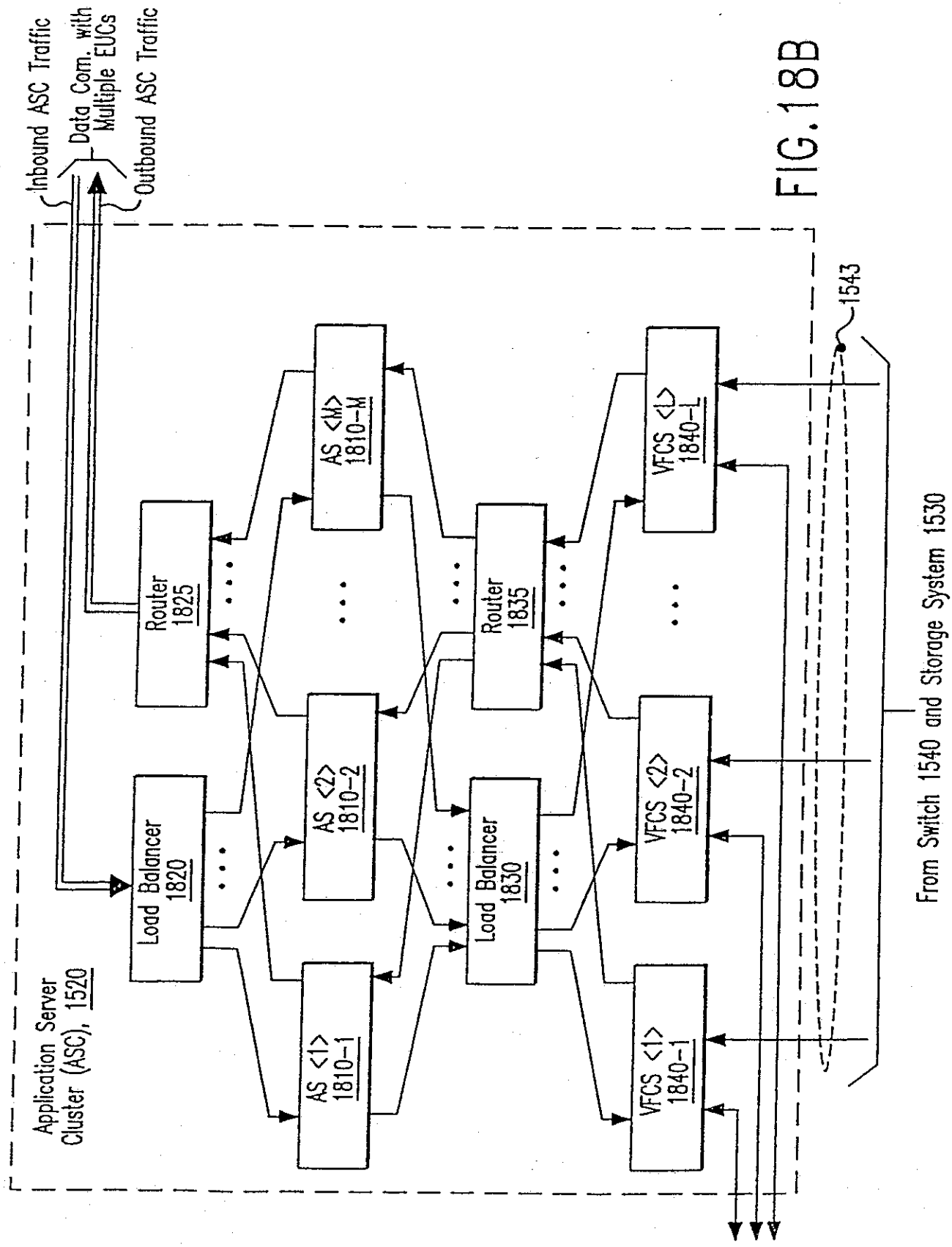

Inbound ASC Traffic
Data Com. with Multiple EUCs
Outbound ASC Traffic
Application Server Cluster (ASC), 1520
Load Balancer 1820
Router 1825
AS <1> 1810-1
AS <2> 1810-2
AS <M> 1810-M
Load Balancer 1830
Router 1835
VFCS <1> 1840-1
VFCS <2> 1840-2
VFCS <L> 1840-L
1543
From Switch 1540 and Storage System 1530

FIG. 18B

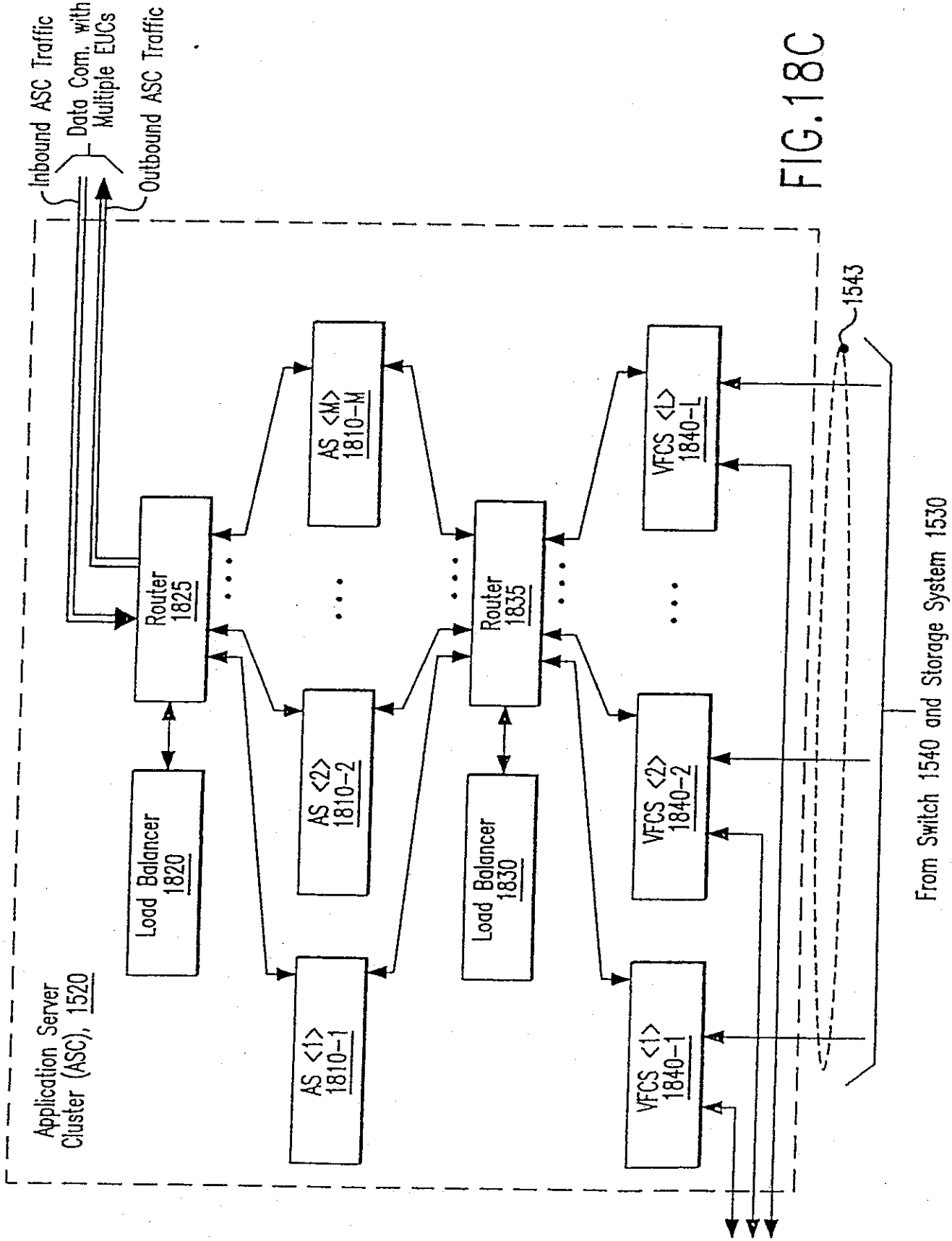

Inbound ASC Traffic
Data Com. with Multiple EUCs
Outbound ASC Traffic
Application Server Cluster (ASC), 1520
Router 1825
Router 1835
Load Balancer 1820
Load Balancer 1830
AS <1> 1810-1
AS <2> 1810-2
AS <M> 1810-M
VFCS <1> 1840-1
VFCS <2> 1840-2
VFCS <L> 1840-L
1543
From Switch 1540 and Storage System 1530

FIG.18C

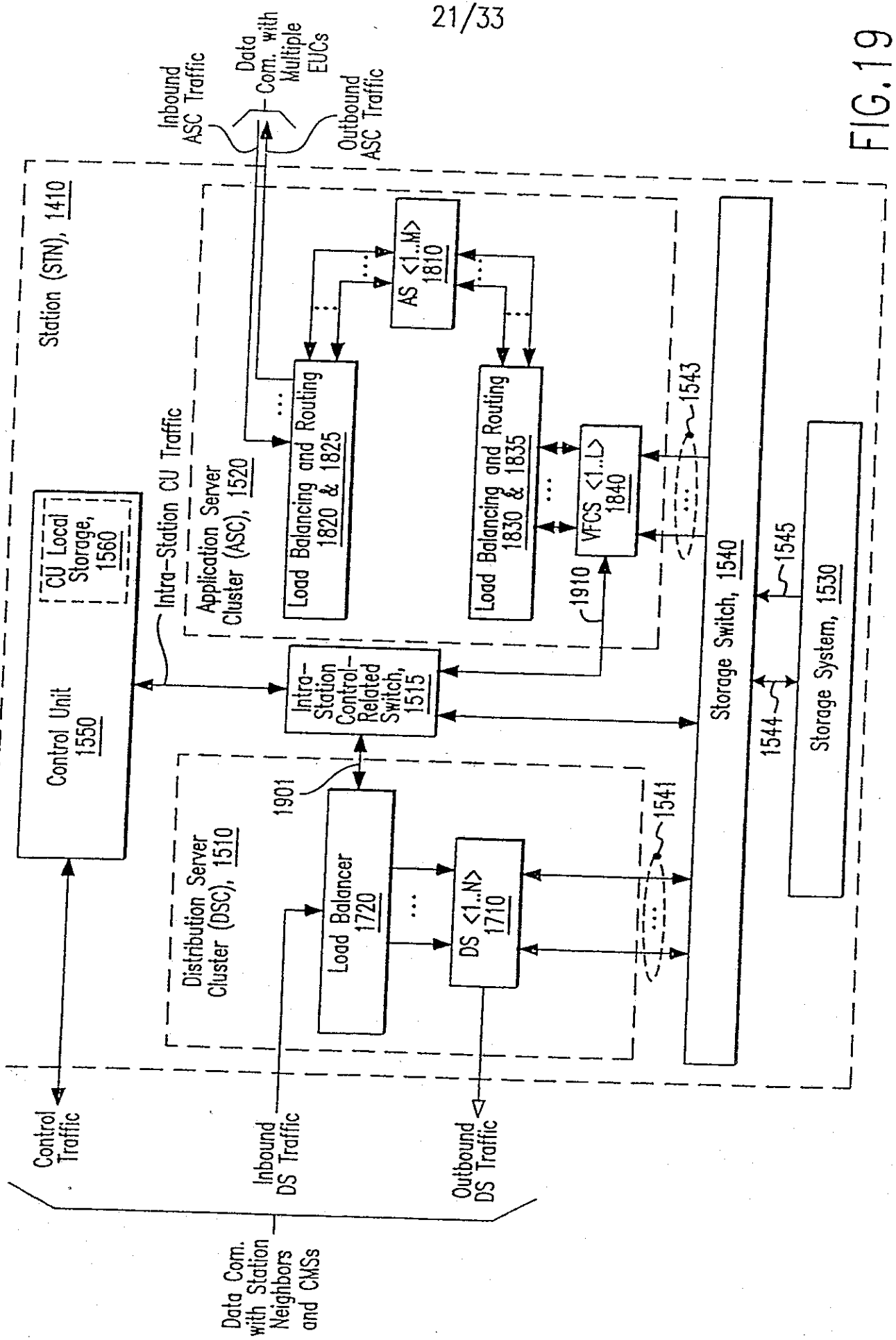

Station (STN), 1410
Inbound ASC Traffic
Data Com. with Multiple EUCs
Outbound ASC Traffic
Intra-Station CU Traffic
Application Server Cluster (ASC), 1520
AS <1..M> 1810
Load Balancing and Routing 1820 & 1825
Load Balancing and Routing 1830 & 1835
VFCS <1..L> 1840
1543
1910
CU Local Storage, 1560
Control Unit 1550
Intra-Station Control-Related Switch, 1515
Storage Switch, 1540
1545
Storage System, 1530
1544
1901
Distribution Server Cluster (DSC), 1510
Load Balancer 1720
DS <1..N> 1710
1541
Control Traffic
Inbound DS Traffic
Outbound DS Traffic
Data Com. with Station Neighbors and CMSs

FIG. 19

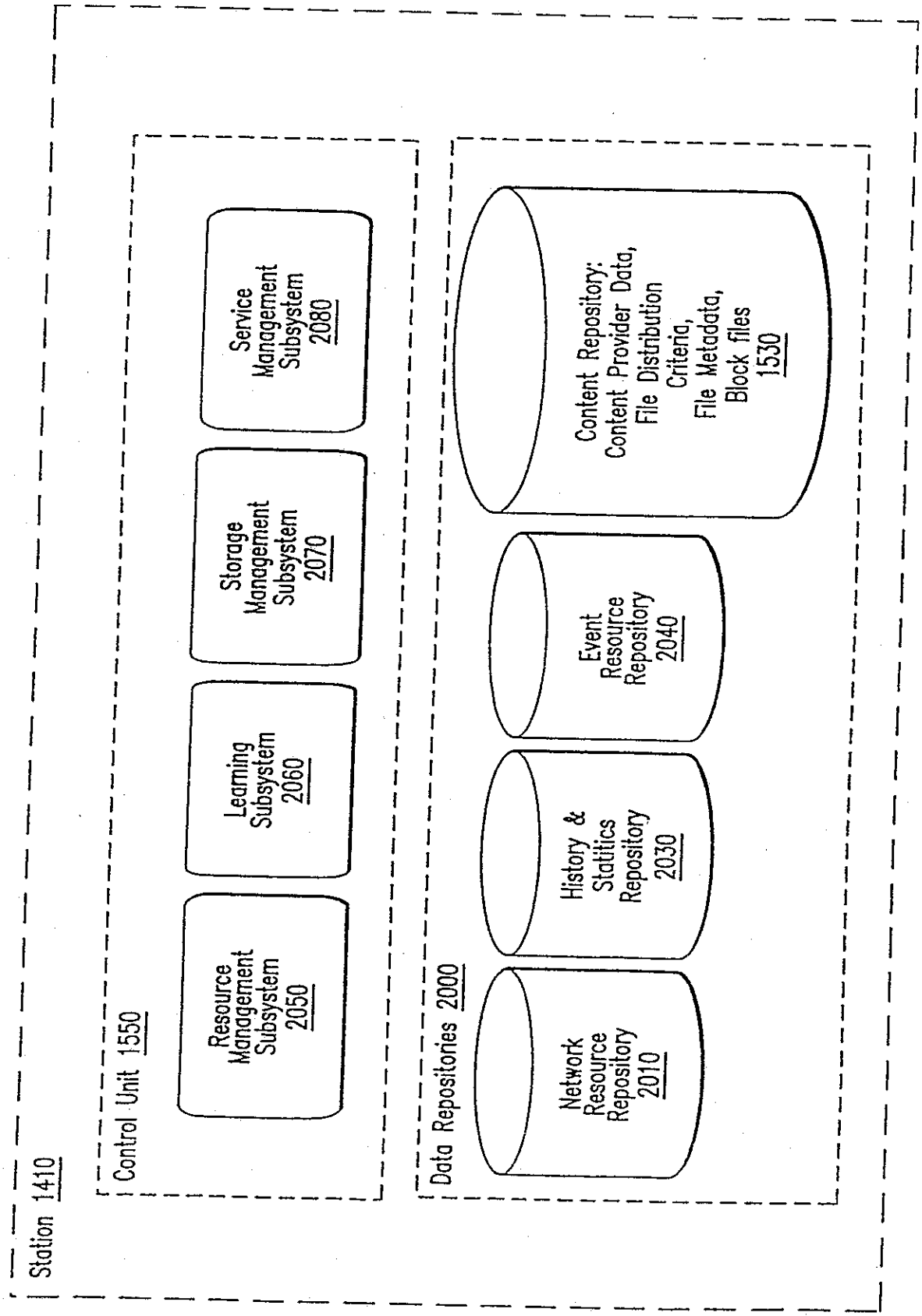

Station 1410
Control Unit 1550
Resource Management Subsystem 2050
Learning Subsystem 2060
Storage Management Subsystem 2070
Service Management Subsystem 2080
Data Repositories 2000
Network Resource Repository 2010
History & Statitics Repository 2030
Event Resource Repository 2040
Content Repository: Content Provider Data, File Distribution Criteria, File Metadata, Block files 1530

FIG.20

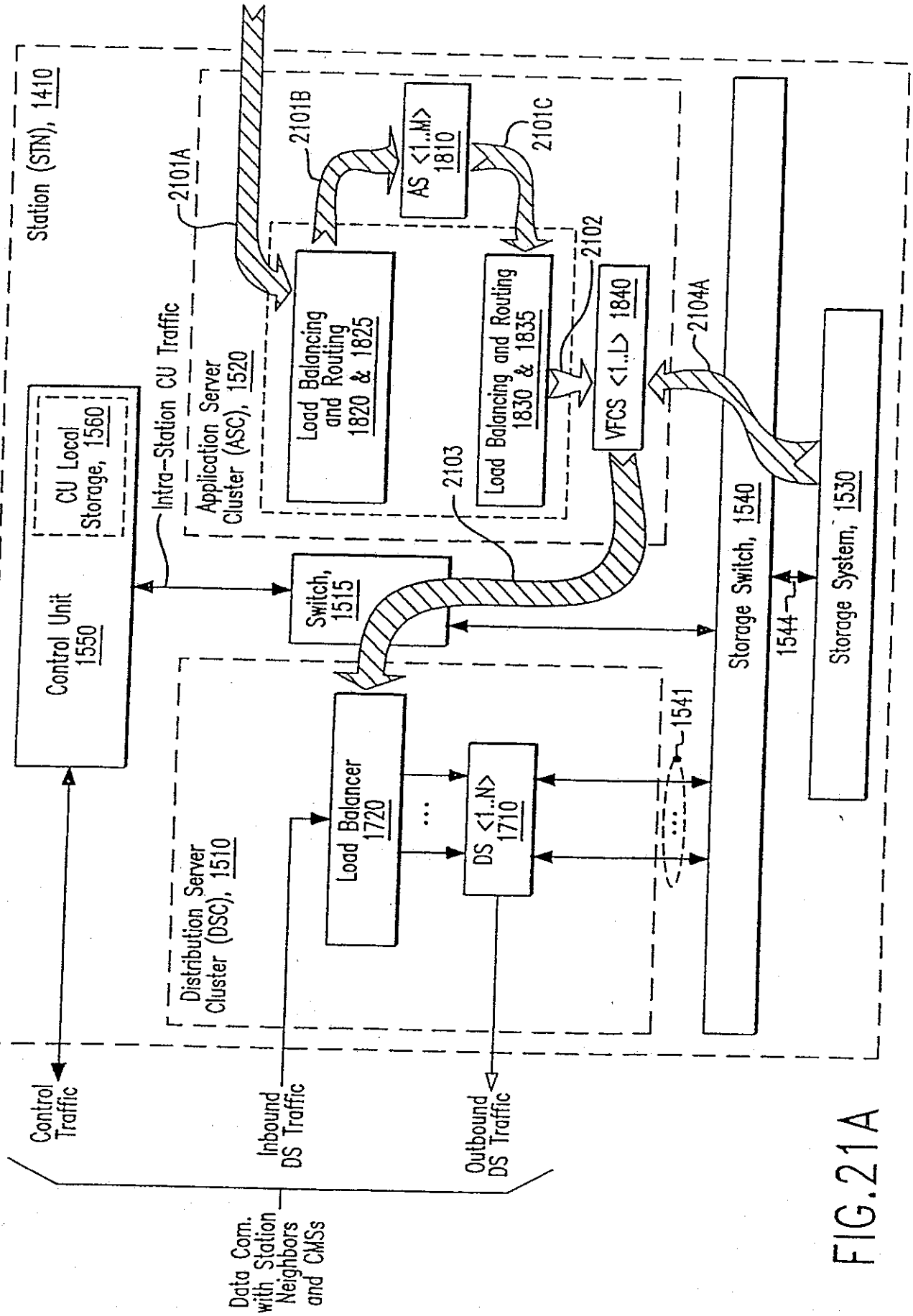

Station (STN), 1410
2101A
2101B
2101C
AS <1..M> 1810
Load Balancing and Routing 1820 & 1825
Load Balancing and Routing 1830 & 1835
2102
VFCS <1..L> 1840
2104A
Application Server Cluster (ASC), 1520
Intra-Station CU Traffic
CU Local Storage, 1560
Control Unit 1550
Switch, 1515
2103
Storage Switch, 1540
1544
Storage System, 1530
Distribution Server Cluster (DSC), 1510
Load Balancer 1720
DS <1..N> 1710
1541
Control Traffic
Inbound DS Traffic
Outbound DS Traffic
Data Com. with Station Neighbors and CMSs

FIG.21A

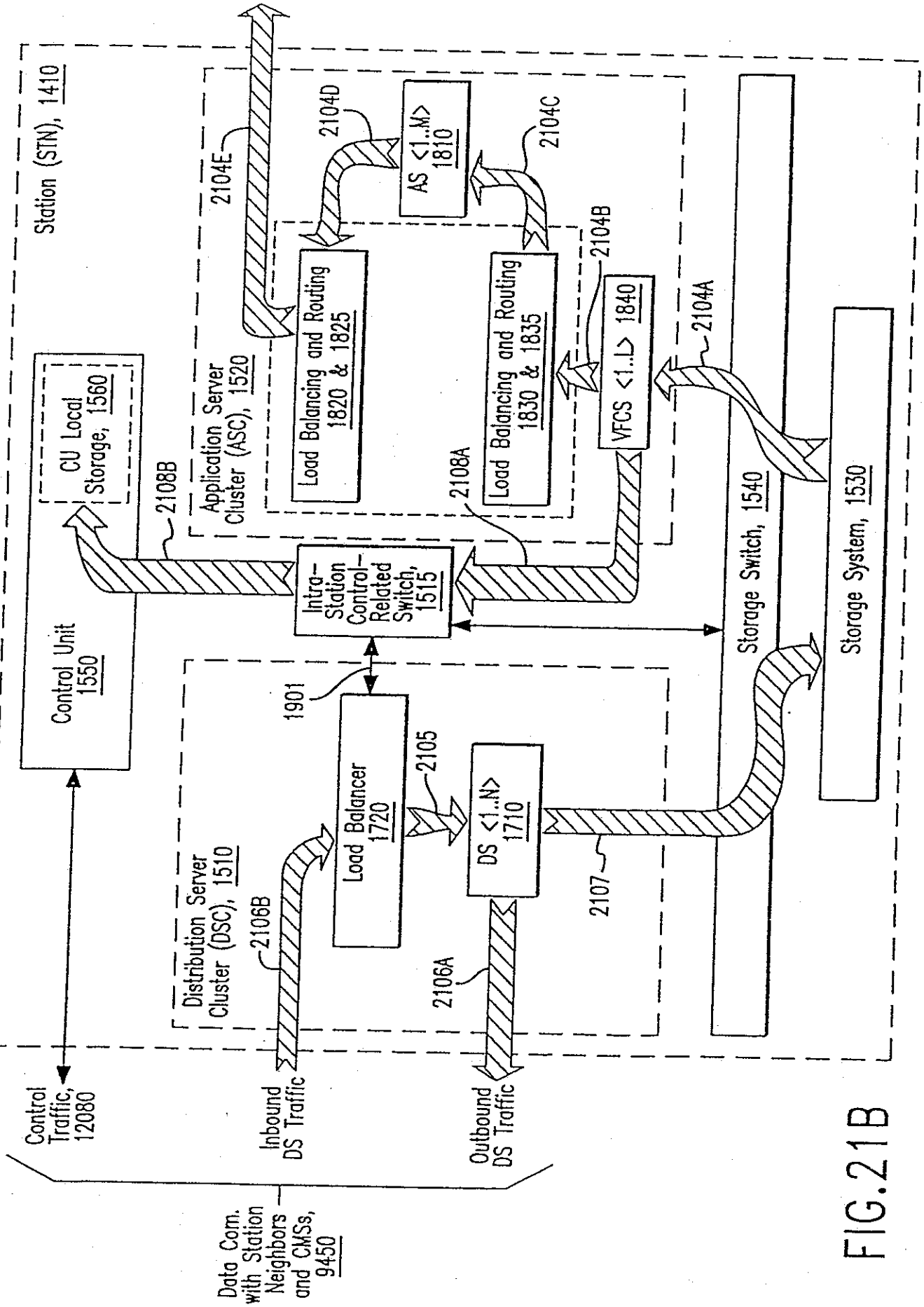

Station (STN), 1410
Application Server Cluster (ASC), 1520
Load Balancing and Routing 1820 & 1825
Load Balancing and Routing 1830 & 1835
AS <1..M> 1810
VFCS <1..L> 1840
2104A
2104B
2104C
2104D
2104E
2108A
2108B
CU Local Storage, 1560
Control Unit 1550
Intra-Station Control-Related Switch, 1515
Storage Switch, 1540
Storage System, 1530
1901
Distribution Server Cluster (DSC), 1510
Load Balancer 1720
2105
DS <1..N> 1710
2107
2106A
2106B
Control Traffic, 12080
Inbound DS Traffic
Outbound DS Traffic
Data Com. with Station Neighbors and CMSs, 9450

FIG.21B

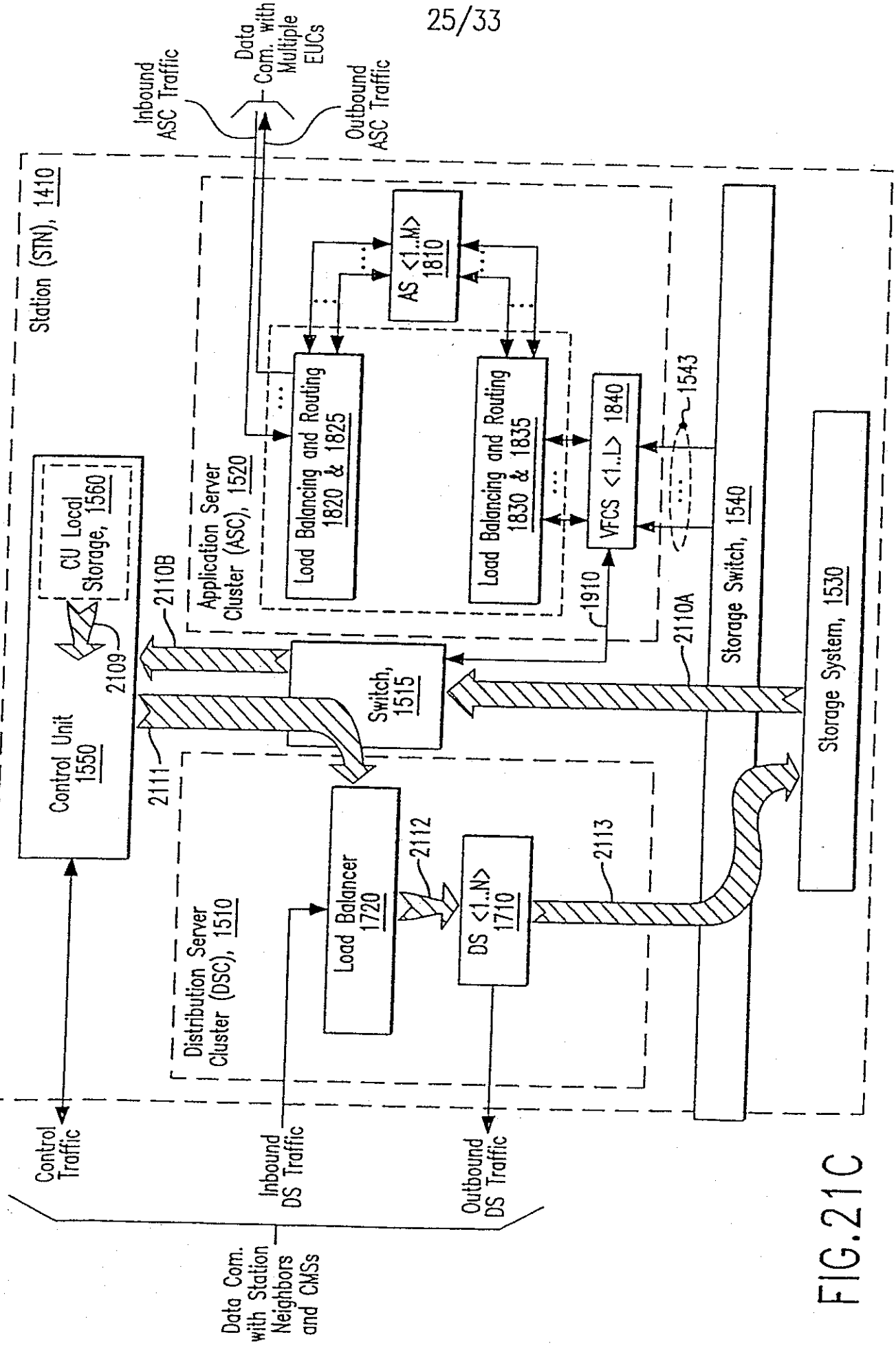

Station (STN), 1410
Inbound ASC Traffic
Data Com. with Multiple EUCs
Outbound ASC Traffic
AS <1..M> 1810
Load Balancing and Routing 1820 & 1825
Load Balancing and Routing 1830 & 1835
VFCS <1..L> 1840
1543
Application Server Cluster (ASC), 1520
CU Local Storage, 1560
2110B
2109
1910
2110A
Storage Switch, 1540
Storage System, 1530
Control Unit 1550
Switch, 1515
2111
Load Balancer 1720
2112
DS <1..N> 1710
2113
Distribution Server Cluster (DSC), 1510
Control Traffic
Inbound DS Traffic
Outbound DS Traffic
Data Com. with Station Neighbors and CMSs

FIG.21C

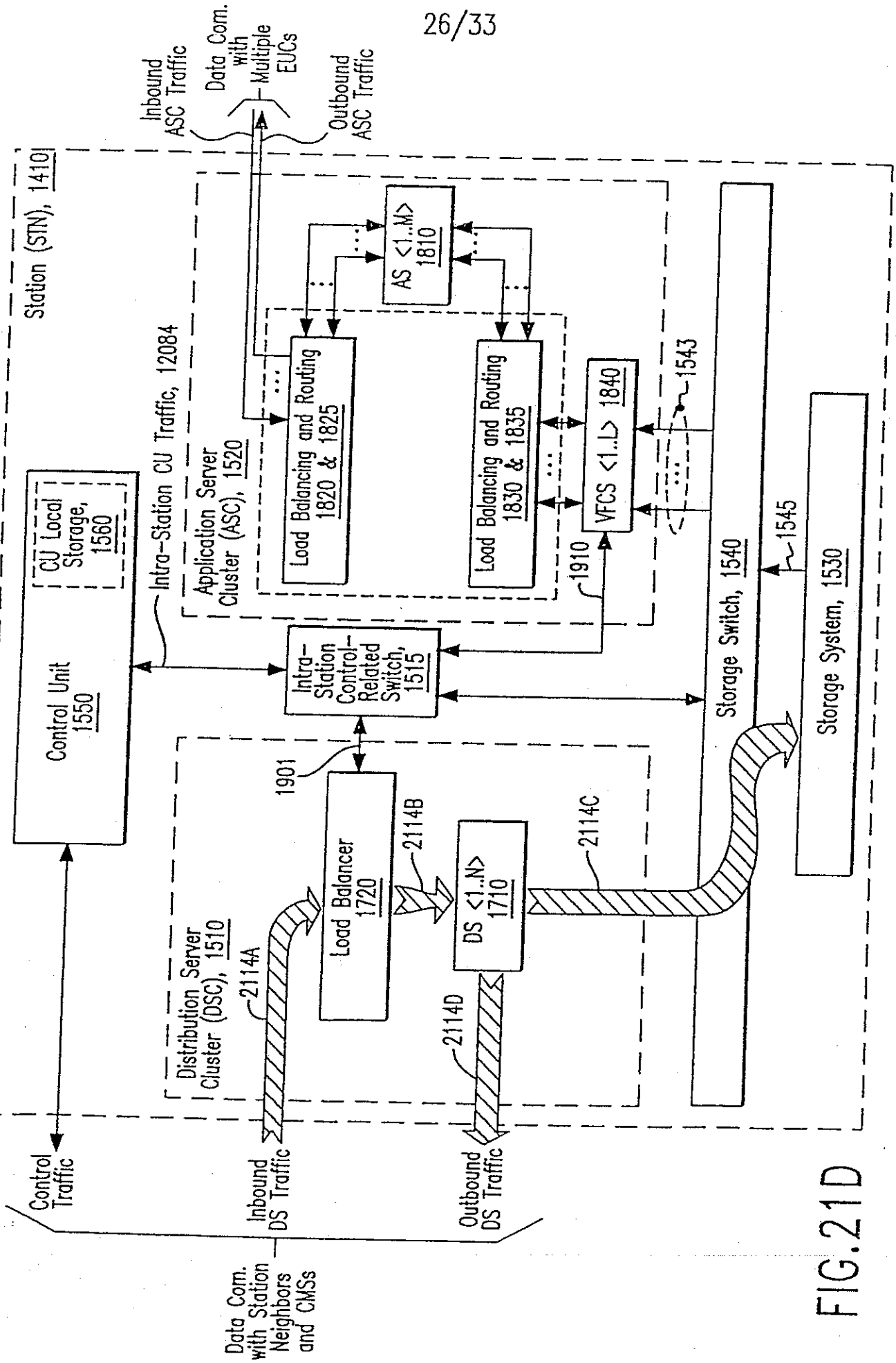

Station (STN), 1410
Inbound ASC Traffic
Data Com. with Multiple EUCs
Outbound ASC Traffic
Intra-Station CU Traffic, 12084
Application Server Cluster (ASC), 1520
AS <1..M> 1810
Load Balancing and Routing 1820 & 1825
Load Balancing and Routing 1830 & 1835
VFCS <1..L> 1840
1543
1910
CU Local Storage, 1560
Control Unit 1550
Intra-Station Control-Related Switch, 1515
Storage Switch, 1540
1545
Storage System, 1530
1901
Load Balancer 1720
2114B
DS <1..N> 1710
2114C
Distribution Server Cluster (DSC), 1510
2114A
2114D
Control Traffic
Inbound DS Traffic
Outbound DS Traffic
Data Com. with Station Neighbors and CMSs

FIG. 21D

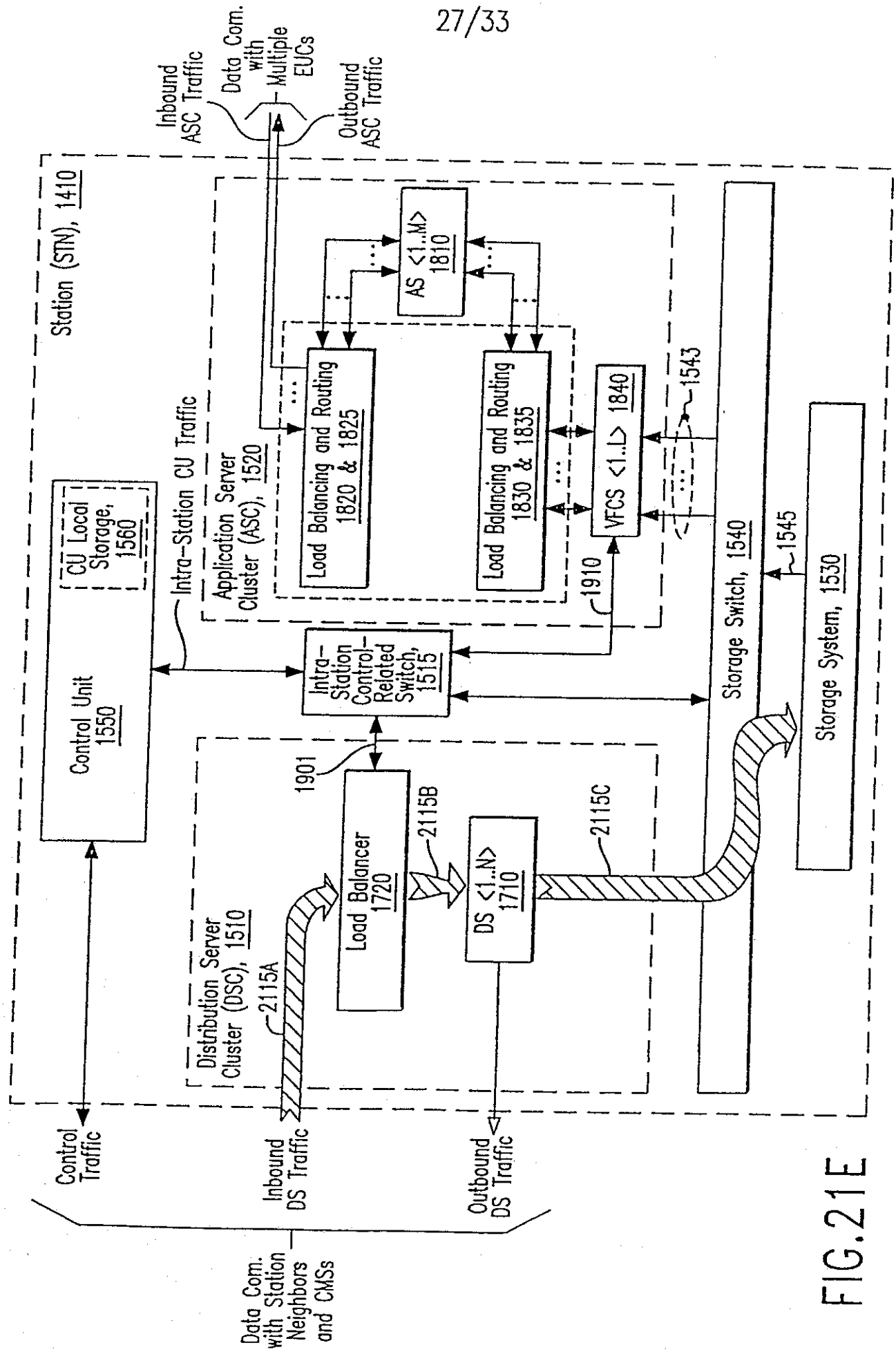

Inbound ASC Traffic
Data Com. with Multiple EUCs
Outbound ASC Traffic
Station (STN), 1410
Application Server Cluster (ASC), 1520
AS <1..M> 1810
Load Balancing and Routing 1820 & 1825
Load Balancing and Routing 1830 & 1835
VFCS <1..L> 1840
1543
1545
Storage Switch, 1540
Storage System, 1530
CU Local Storage, 1560
Intra-Station CU Traffic
Control Unit 1550
1910
Intra-Station Control-Related Switch, 1515
1901
Load Balancer 1720
2115B
DS <1..N> 1710
2115C
Distribution Server Cluster (DSC), 1510
2115A
Control Traffic
Inbound DS Traffic
Outbound DS Traffic
Data Com. with Station Neighbors and CMSs

FIG. 21E

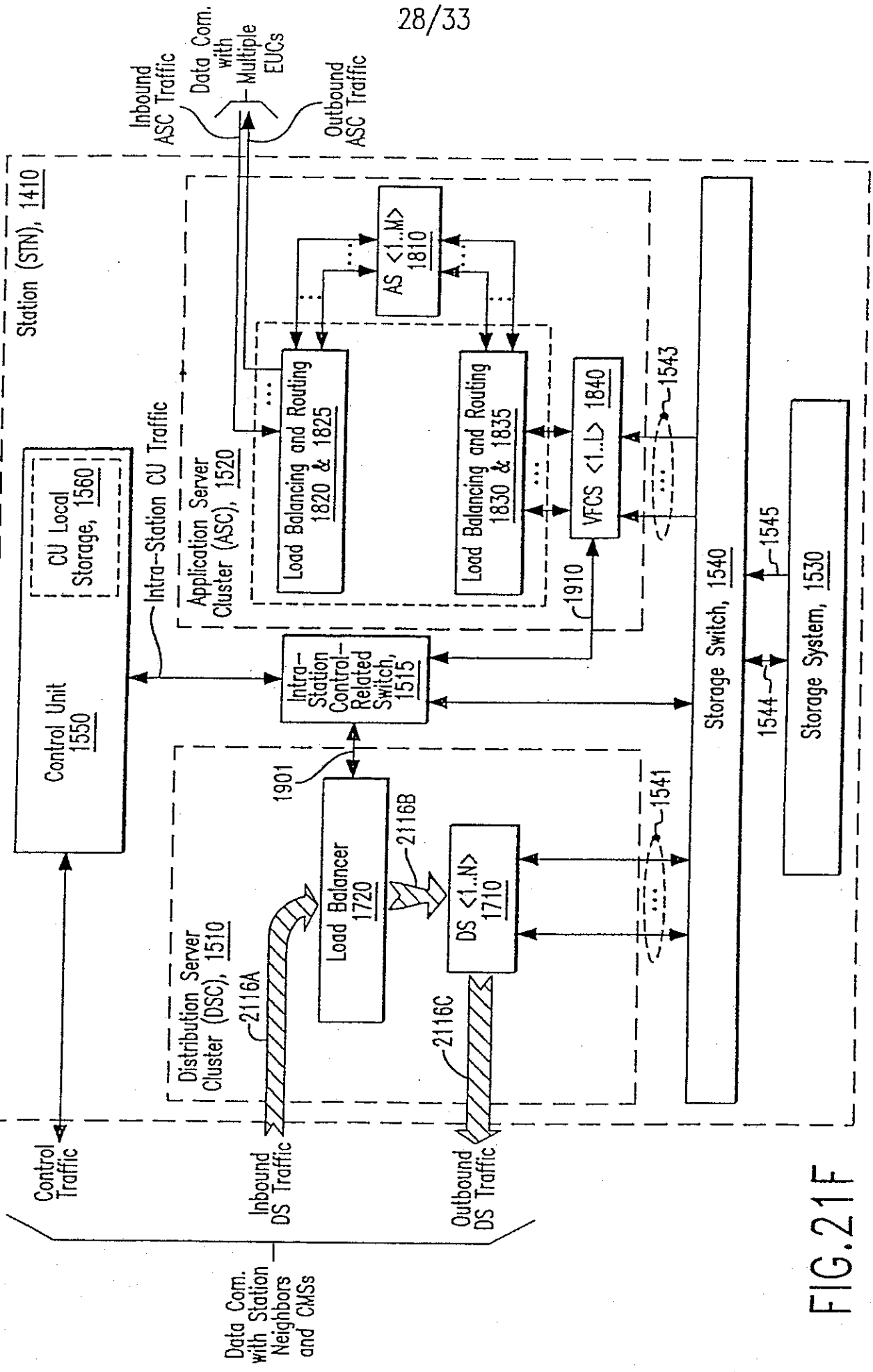

Inbound ASC Traffic
Data Com. with Multiple EUCs
Outbound ASC Traffic
Station (STN), 1410
AS <1..M> 1810
Load Balancing and Routing 1820 & 1825
Load Balancing and Routing 1830 & 1835
VFCS <1..L> 1840
1543
Application Server Cluster (ASC), 1520
CU Local Storage, 1560
Intra-Station CU Traffic
1910
Control Unit 1550
Intra-Station Control-Related Switch, 1515
Storage Switch, 1540
1545
Storage System, 1530
1544
1901
1541
2116B
Load Balancer 1720
DS <1..N> 1710
Distribution Server Cluster (DSC), 1510
2116A
2116C
Control Traffic
Inbound DS Traffic
Outbound DS Traffic
Data Com. with Station Neighbors and CMSs

FIG.21F

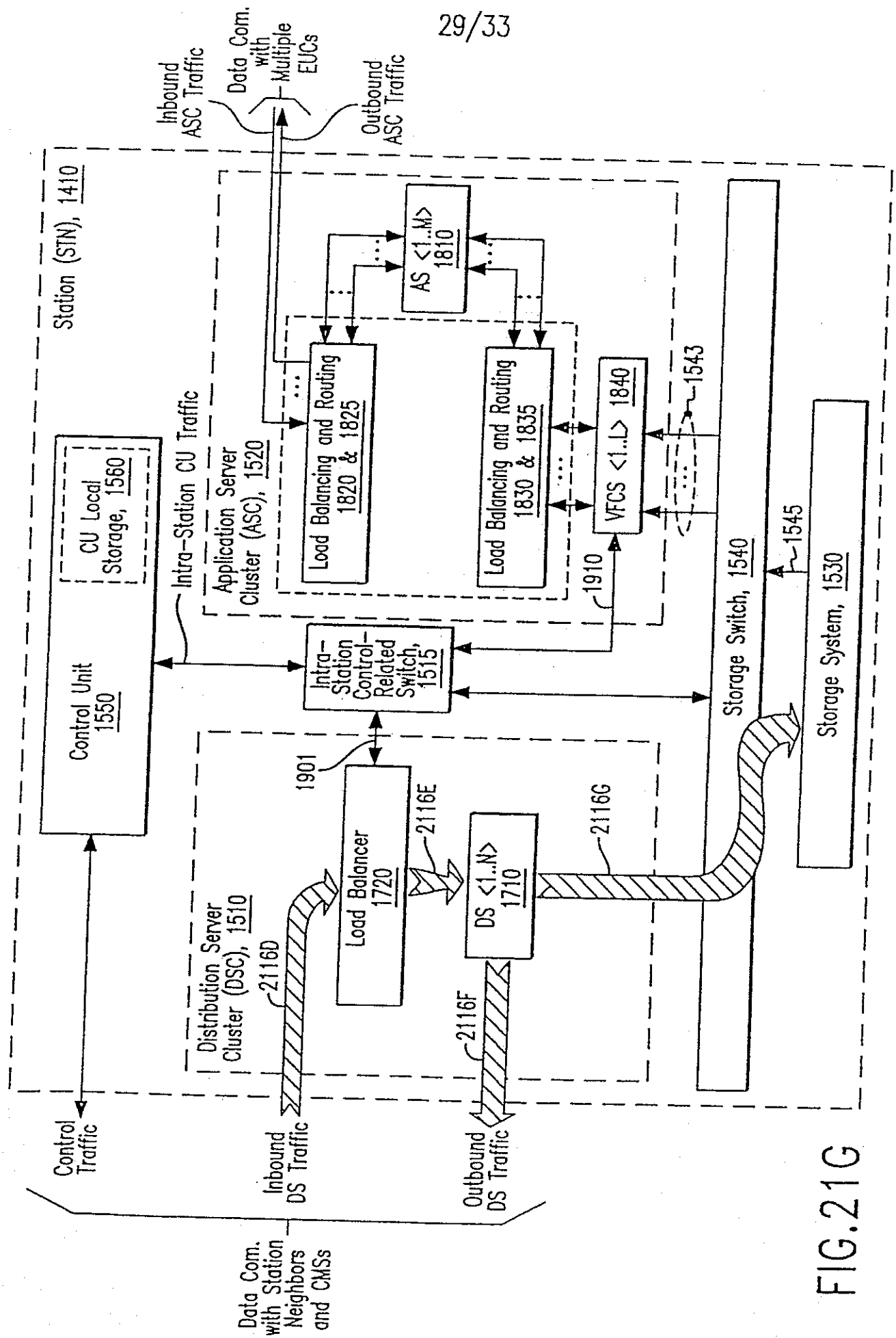

Station (STN), 1410
Inbound ASC Traffic
Data Com. with Multiple EUCs
Outbound ASC Traffic
AS <1..M> 1810
Load Balancing and Routing 1820 & 1825
Load Balancing and Routing 1830 & 1835
VFCS <1..L> 1840
1543
1545
1910
Application Server Cluster (ASC), 1520
Intra-Station CU Traffic
CU Local Storage, 1560
Control Unit 1550
Intra-Station Control-Related Switch, 1515
Storage Switch, 1540
Storage System, 1530
1901
Load Balancer 1720
2116E
DS <1..N> 1710
2116G
Distribution Server Cluster (DSC), 1510
2116D
2116F
Control Traffic
Inbound DS Traffic
Outbound DS Traffic
Data Com. with Station Neighbors and CMSs

FIG.21G

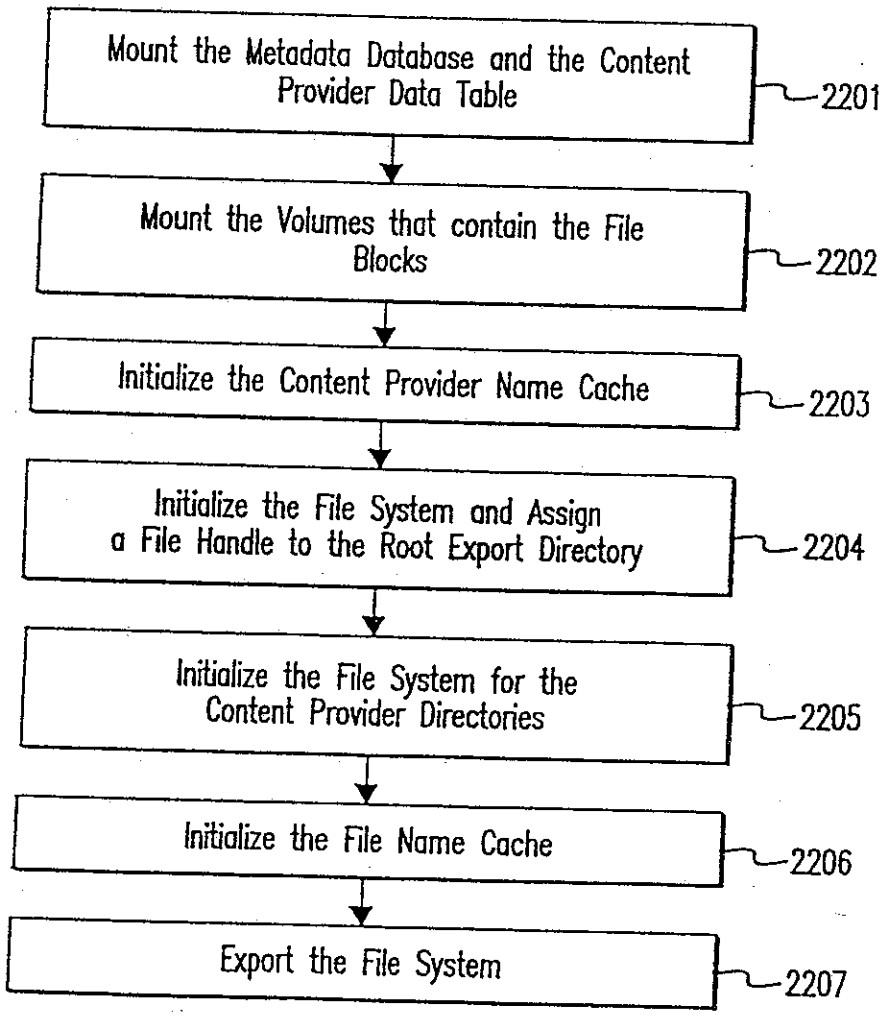

Mount the Metadata Database and the Content Provider Data Table
2201
Mount the Volumes that contain the File Blocks
2202
Initialize the Content Provider Name Cache
2203
Initialize the File System and Assign a File Handle to the Root Export Directory
2204
Initialize the File System for the Content Provider Directories
2205
Initialize the File Name Cache
2206
Export the File System
2207

FIG.22

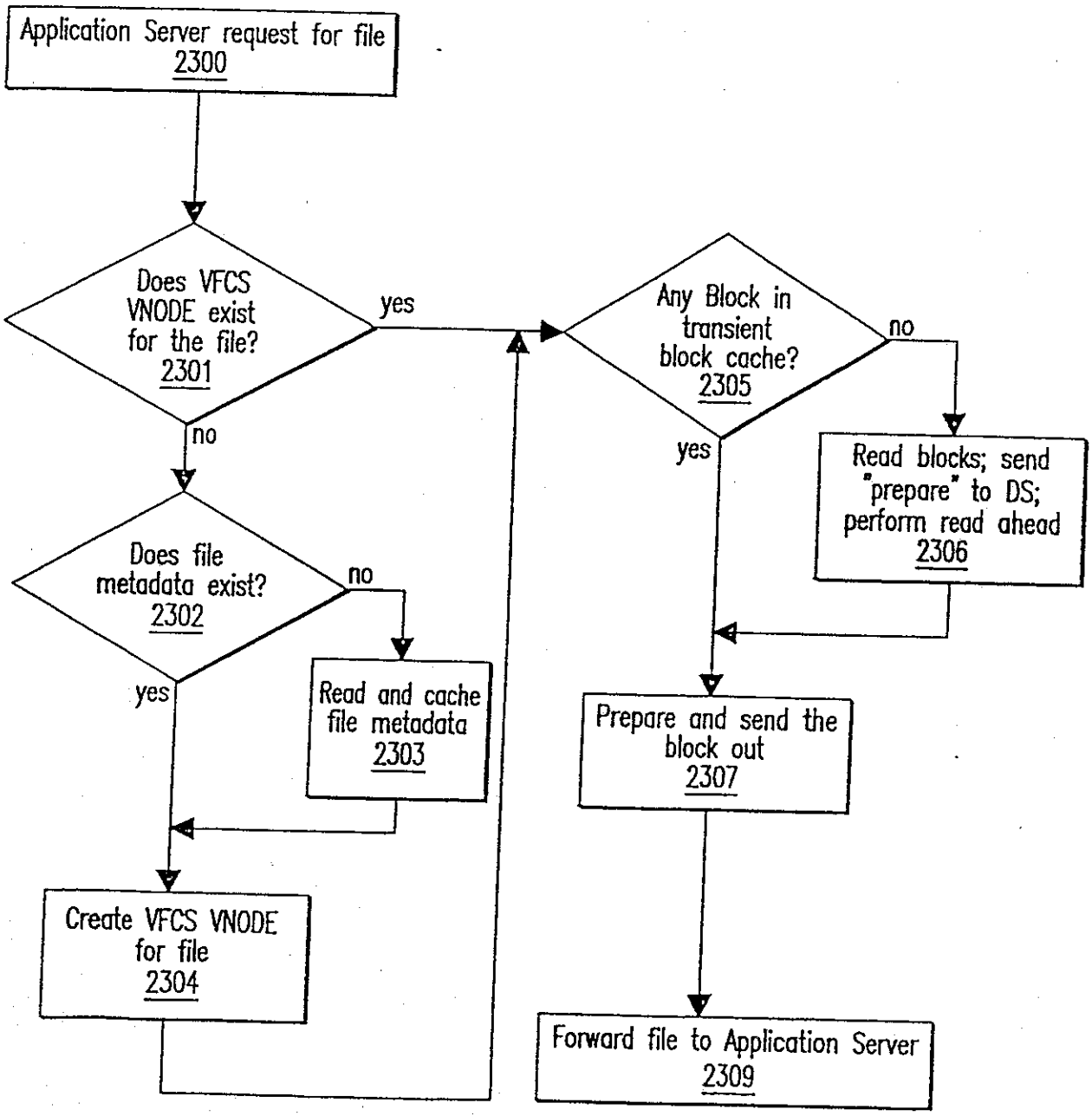

Application Server request for file
2300
Does VFCS VNODE exist for the file?
2301
yes
no
Does file metadata exist?
2302
no
yes
Read and cache file metadata
2303
Create VFCS VNODE for file
2304
Any Block in transient block cache?
2305
no
yes
Read blocks; send "prepare" to DS; perform read ahead
2306
Prepare and send the block out
2307
Forward file to Application Server
2309

FIG.23

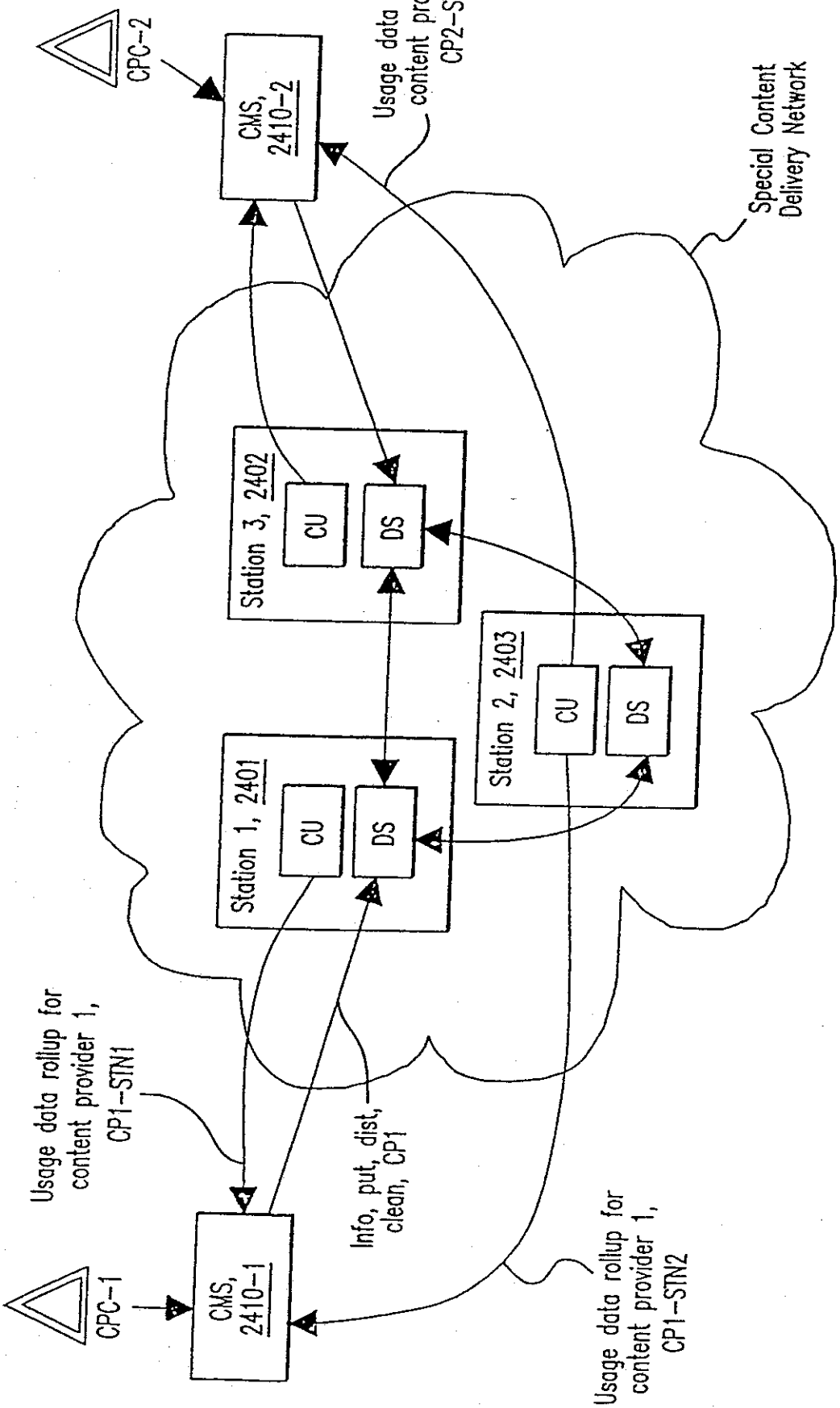

CPC-2
CMS, 2410-2
Usage data rollup for content provider 2, CP2-STN2
Special Content Delivery Network
Station 3, 2402
CU
DS
Station 2, 2403
CU
DS
Station 1, 2401
CU
DS
Usage data rollup for content provider 1, CP1-STN1
Info, put, dist, clean, CP1
Usage data rollup for content provider 1, CP1-STN2
CPC-1
CMS, 2410-1

FIG.24

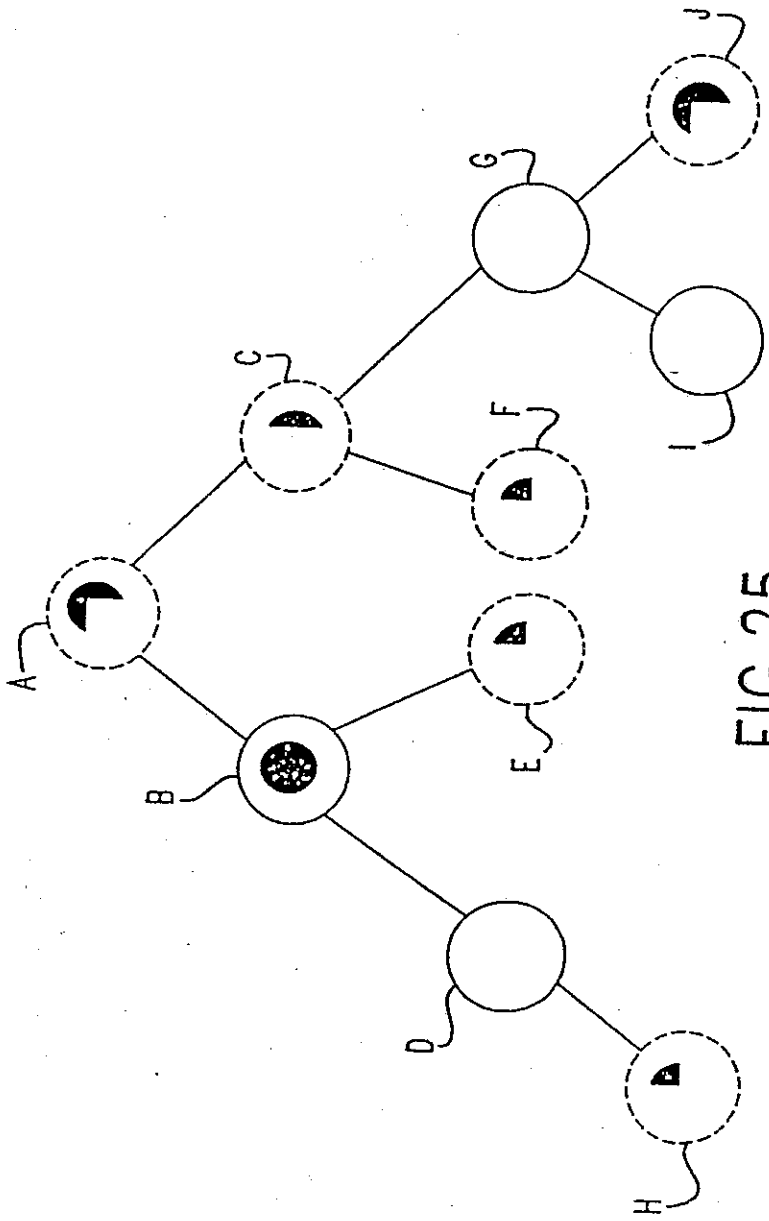


FIG.25