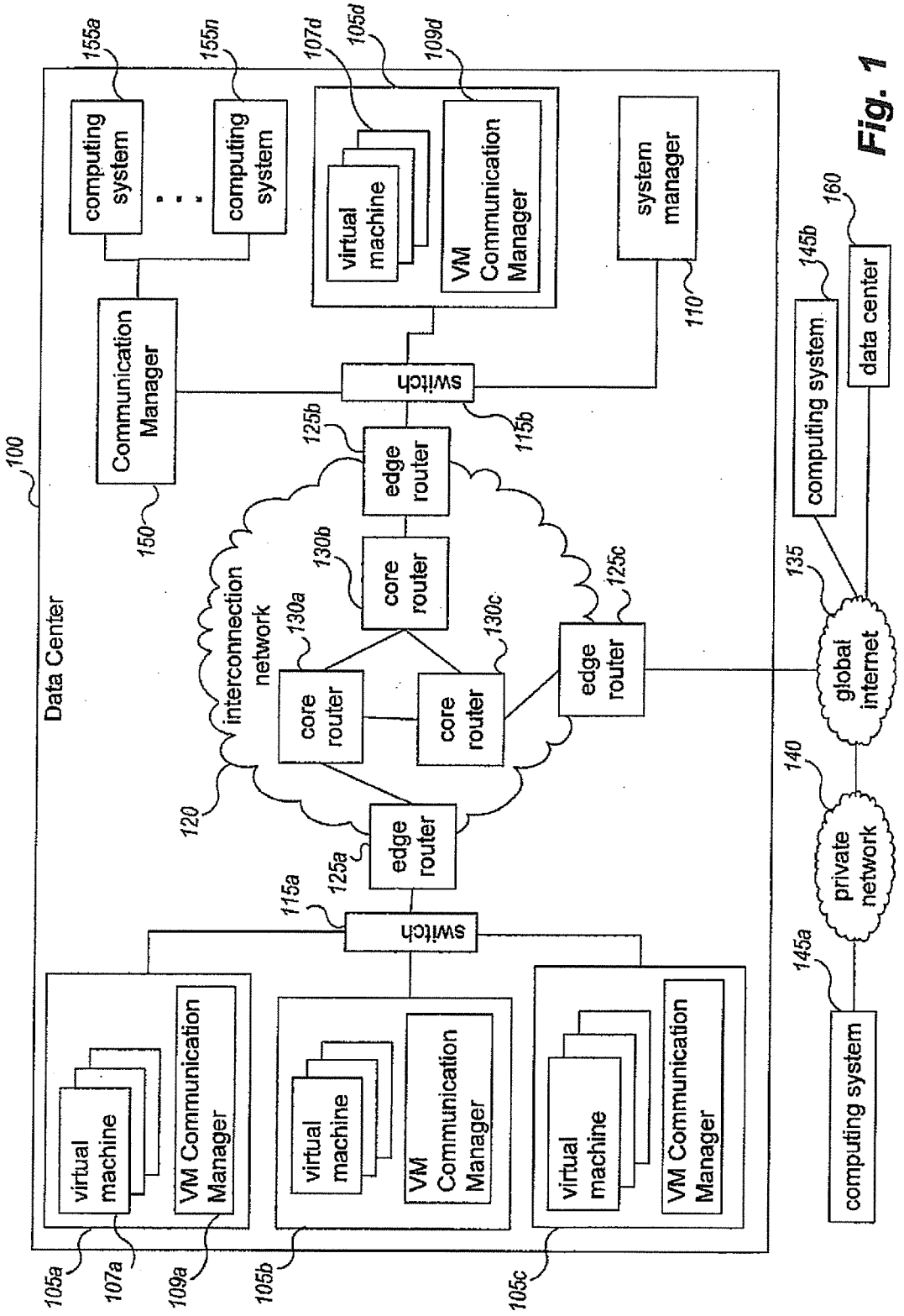

100
Data Center
155a
155n
107d
105d
109d
computing system
computing system
virtual machine
VM Communication Manager
system manager
110
Communication Manager
150
switch
115b
125b
edge router
core router
130b
130a
130c
core router
core router
125c
edge router
interconnection network
120
edge router
125a
115a
switch
virtual machine
VM Communication Manager
virtual machine
VM Communication Manager
virtual machine
VM Communication Manager
105a
107a
109a
105b
105c
160
data center
145b
computing system
135
global internet
140
private network
145a
computing system

Fig. 1

Fig. 2A

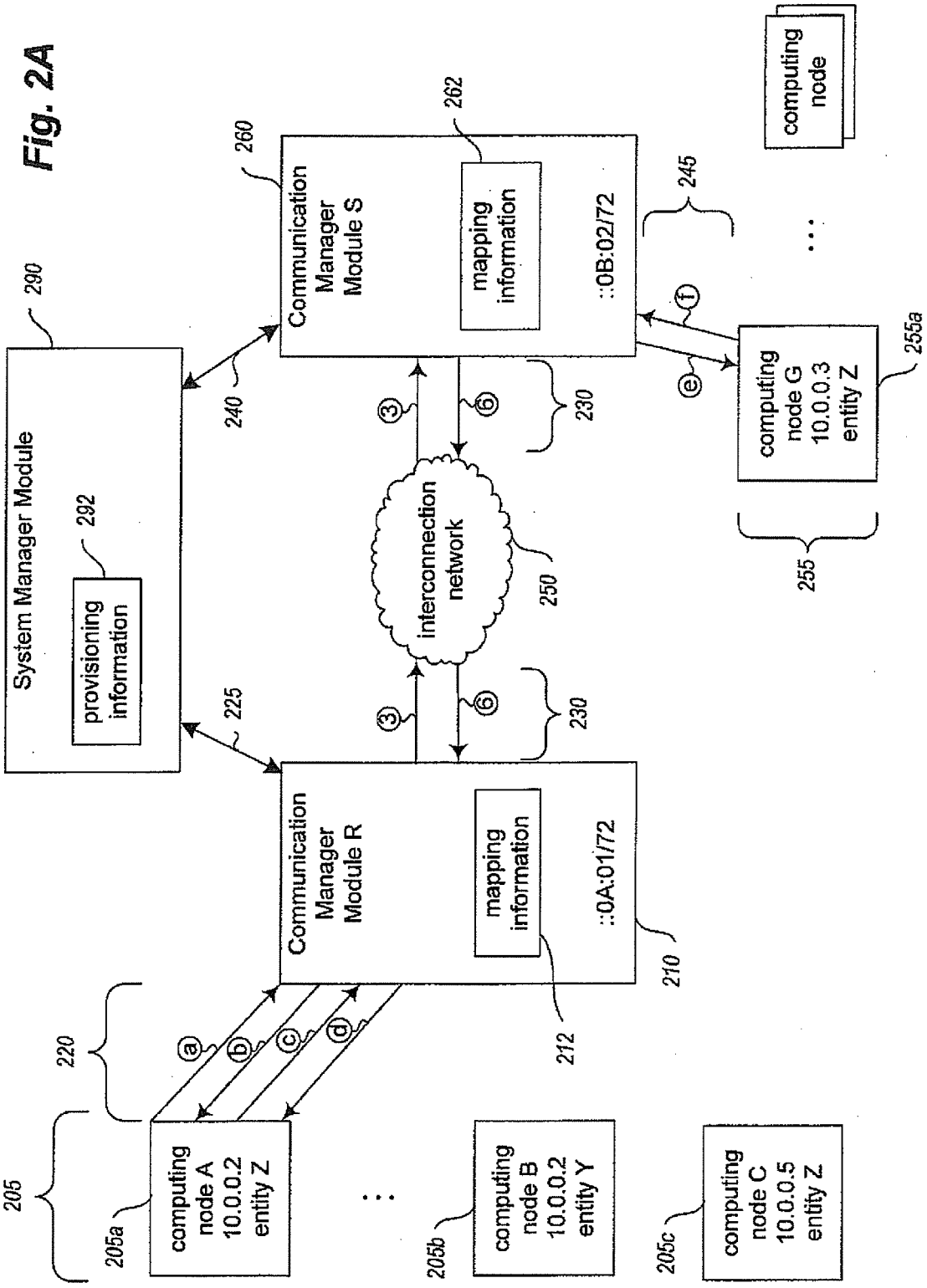
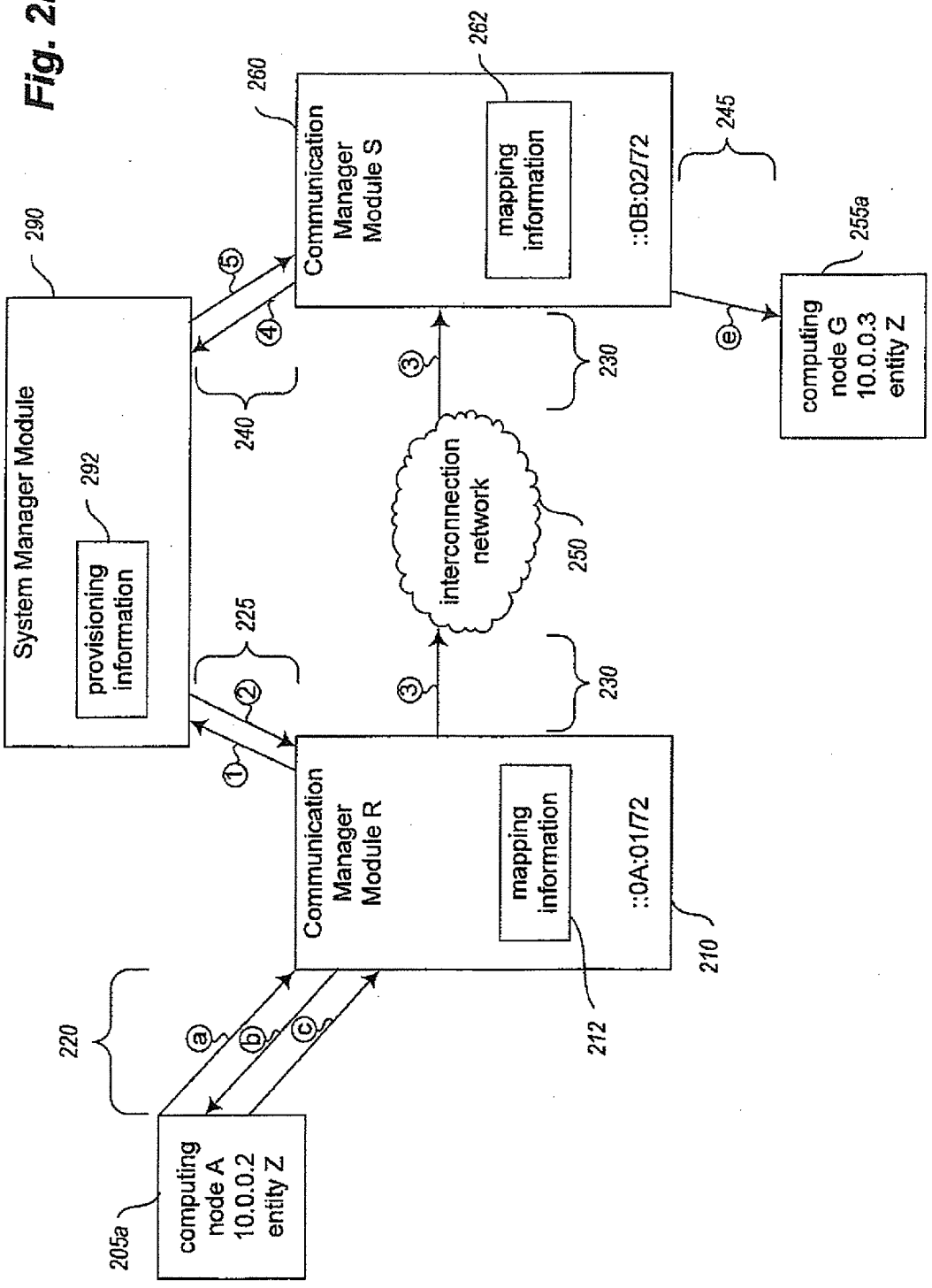

System Manager Module
290
provisioning information
292
225
240
Communication Manager Module R
mapping information
212
::0A:01/72
210
Communication Manager Module S
260
mapping information
262
::0B:02/72
245
computing node
computing node G 10.0.0.3 entity Z
255a
255
230
230
interconnection network
250
220
205
computing node A 10.0.0.2 entity Z
205a
computing node B 10.0.0.2 entity Y
205b
computing node C 10.0.0.5 entity Z
205c
a
b
c
d
e
f
3
6
3
6

Fig. 2B


System Manager Module
provisioning information
290
292
Communication Manager Module R
mapping information
::0A:01/72
210
212
Communication Manager Module S
mapping information
::0B:02/72
260
262
245
interconnection network
250
computing node A 10.0.0.2 entity Z
205a
computing node G 10.0.0.3 entity Z
255a
220
225
230
240
①
②
③
④
⑤
ⓐ
ⓑ
ⓒ
ⓔ

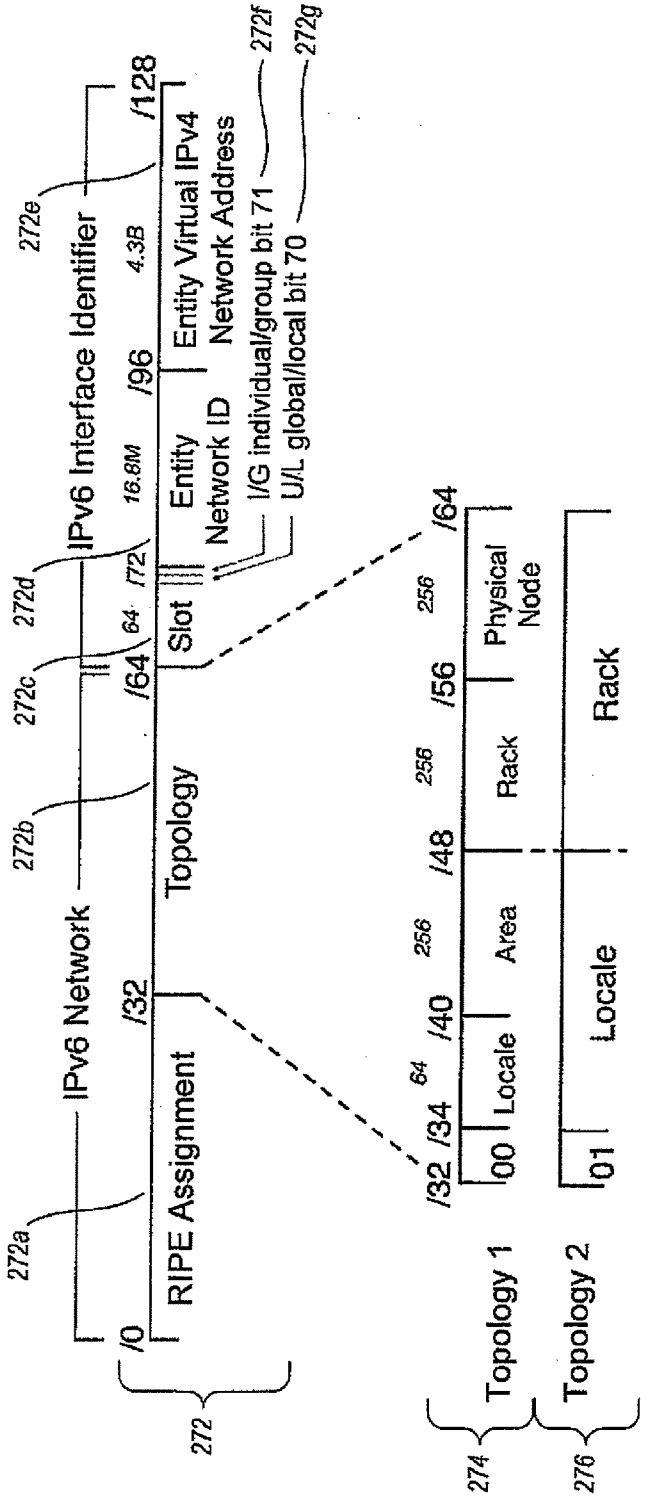

IPv6 Network
IPv6 Interface Identifier
RIPE Assignment
Topology
Slot
Entity Network ID
Entity Virtual IPv4 Network Address
I/G individual/group bit 71
U/L global/local bit 70
/0
/32
/64
/96
/128
/72
16.8M
4.3B
272a
272b
272c
272d
272e
272f
272g
272
Topology 1
Topology 2
274
276
/32
/34
/40
/48
/56
/64
00
01
Locale
Area
Rack
Physical Node
Locale
Rack
64
256

Fig. 2C

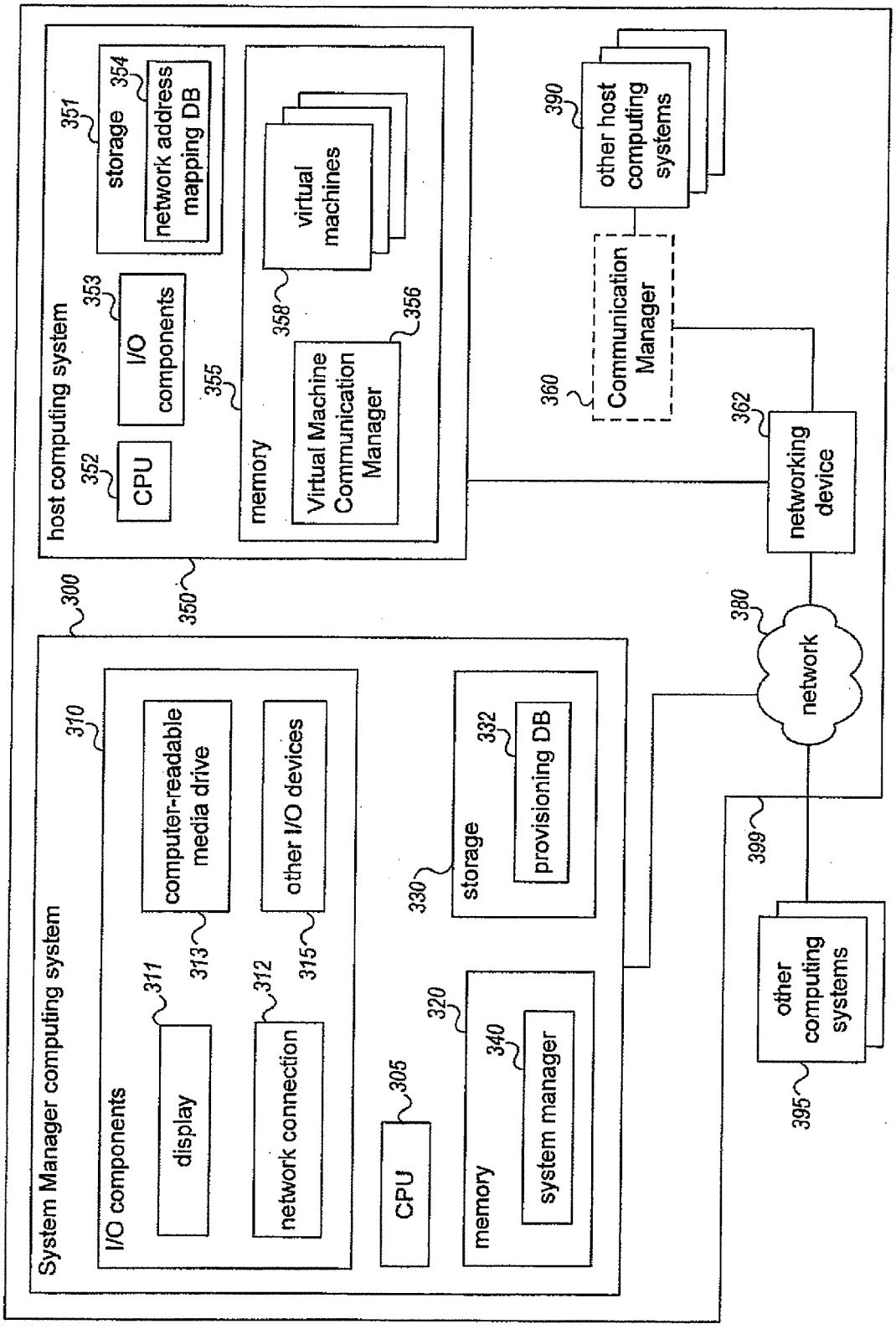

System Manager computing system
300
I/O components
310
display
311
network connection
312
computer-readable media drive
313
other I/O devices
315
CPU
305
memory
320
system manager
340
storage
330
provisioning DB
332
host computing system
350
CPU
352
I/O components
353
memory
355
Virtual Machine Communication Manager
356
virtual machines
358
storage
351
network address mapping DB
354
Communication Manager
360
networking device
362
network
380
other host computing systems
390
other computing systems
395
399

Fig. 3

Fig. 4

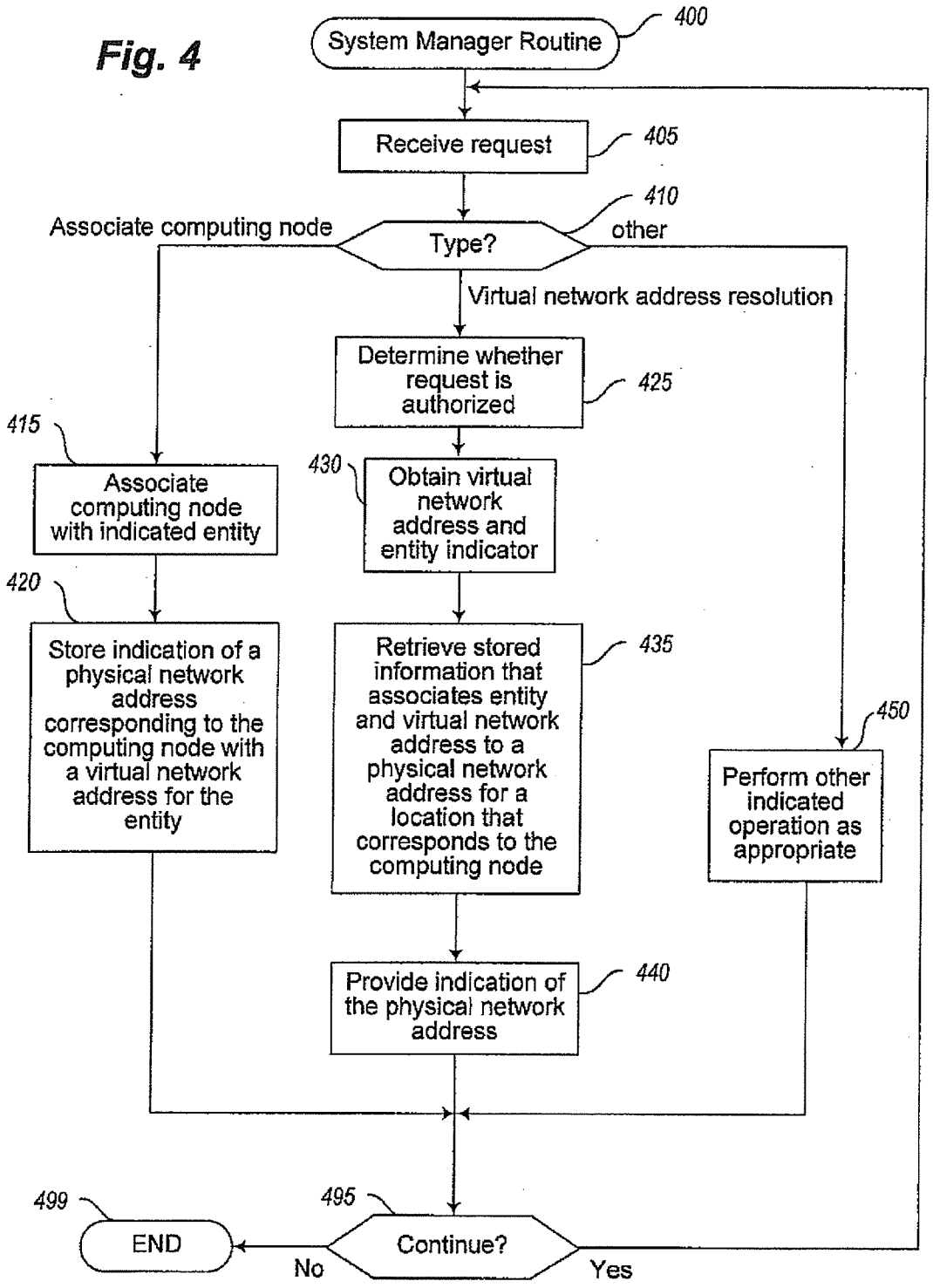
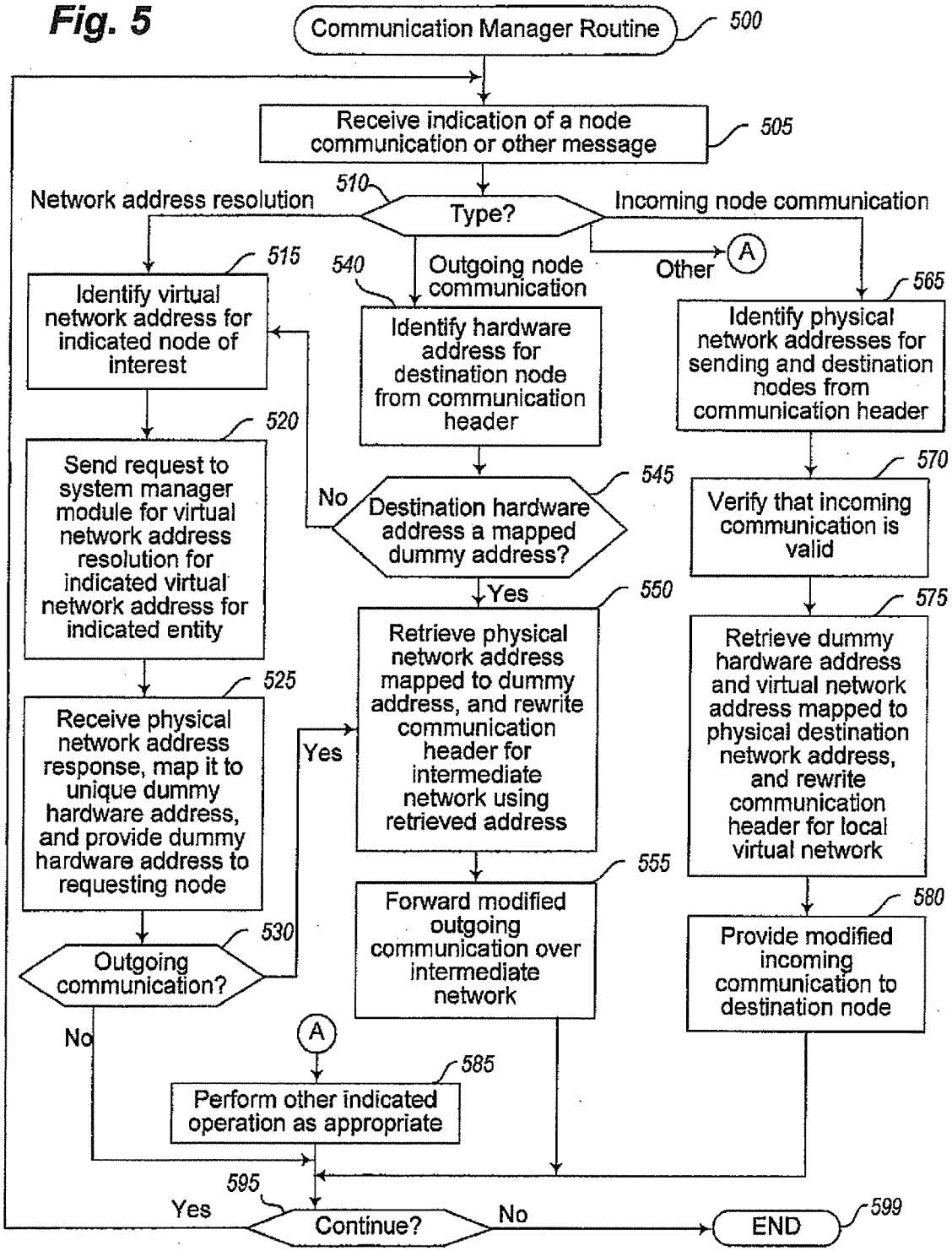

System Manager Routine
400
Receive request
405
Type?
410
Associate computing node
other
Virtual network address resolution
Determine whether request is authorized
425
415
Associate computing node with indicated entity
430
Obtain virtual network address and entity indicator
420
Store indication of a physical network address corresponding to the computing node with a virtual network address for the entity
Retrieve stored information that associates entity and virtual network address to a physical network address for a location that corresponds to the computing node
435
450
Perform other indicated operation as appropriate
Provide indication of the physical network address
440
499
END
495
Continue?
No
Yes

Fig. 5


Communication Manager Routine
500
Receive indication of a node communication or other message
505
510
Type?
Network address resolution
Incoming node communication
Other
A
515
Identify virtual network address for indicated node of interest
520
Send request to system manager module for virtual network address resolution for indicated virtual network address for indicated entity
525
Receive physical network address response, map it to unique dummy hardware address, and provide dummy hardware address to requesting node
530
Outgoing communication?
Yes
No
540
Outgoing node communication
Identify hardware address for destination node from communication header
545
Destination hardware address a mapped dummy address?
No
Yes
550
Retrieve physical network address mapped to dummy address, and rewrite communication header for intermediate network using retrieved address
555
Forward modified outgoing communication over intermediate network
565
Identify physical network addresses for sending and destination nodes from communication header
570
Verify that incoming communication is valid
575
Retrieve dummy hardware address and virtual network address mapped to physical destination network address, and rewrite communication header for local virtual network
580
Provide modified incoming communication to destination node
A
585
Perform other indicated operation as appropriate
595
Yes
Continue?
No
599
END