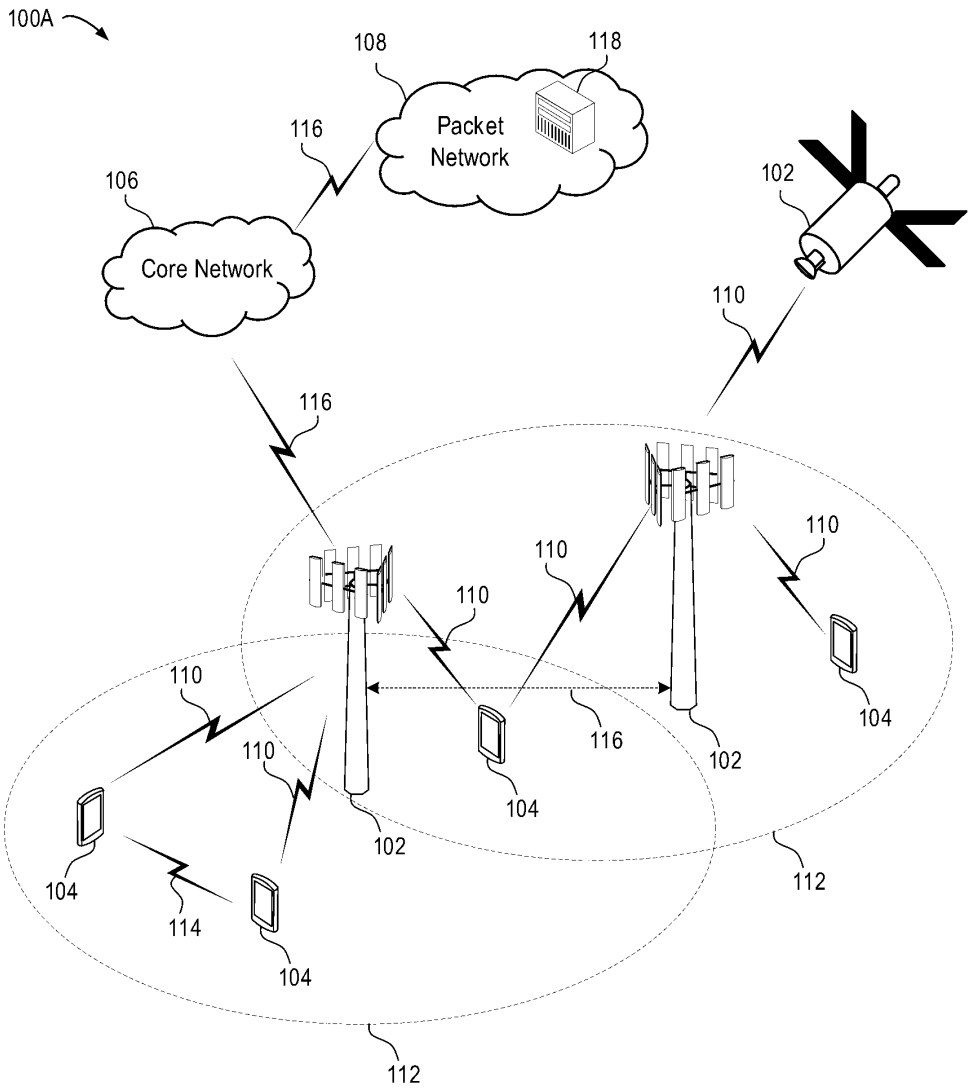

100A
108
118
Packet Network
116
106
Core Network
102
110
116
110
110
110
110
116
102
104
110
110
102
104
104
114
104
112
112

Fig. 1A

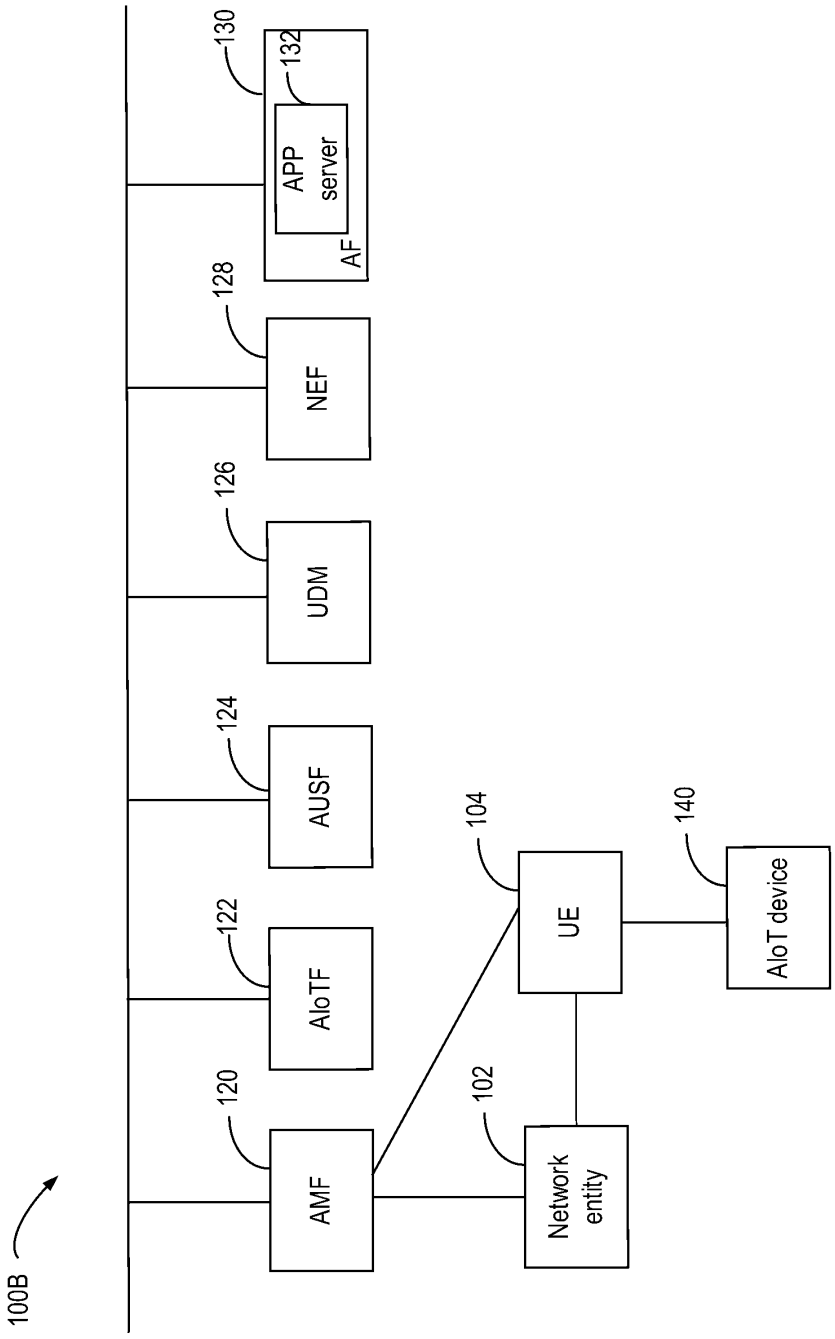

100B
AMF
120
AIoTF
122
AUSF
124
UDM
126
NEF
128
AF
APP server
132
130
Network entity
102
UE
104
AIoT device
140

Fig. 1B

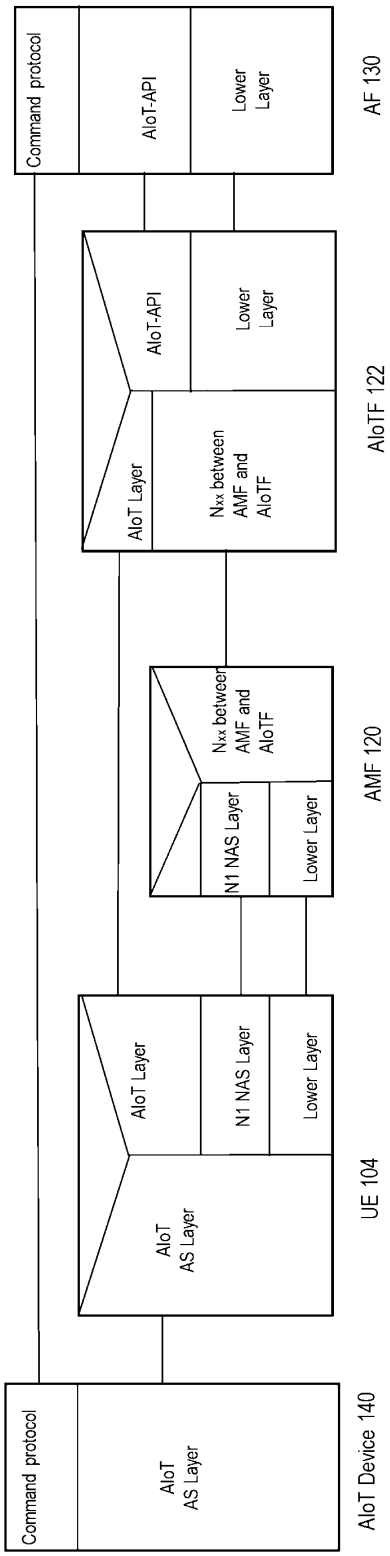

Command protocol
AIoT-API
Lower Layer
AF 130
AIoT-API
Lower Layer
AIoT Layer
Nxx between AMF and AIoTF
AIoTF 122
Nxx between AMF and AIoTF
N1 NAS Layer
Lower Layer
AMF 120
AIoT Layer
N1 NAS Layer
Lower Layer
AIoT AS Layer
UE 104
Command protocol
AIoT AS Layer
AIoT Device 140

Fig. 2

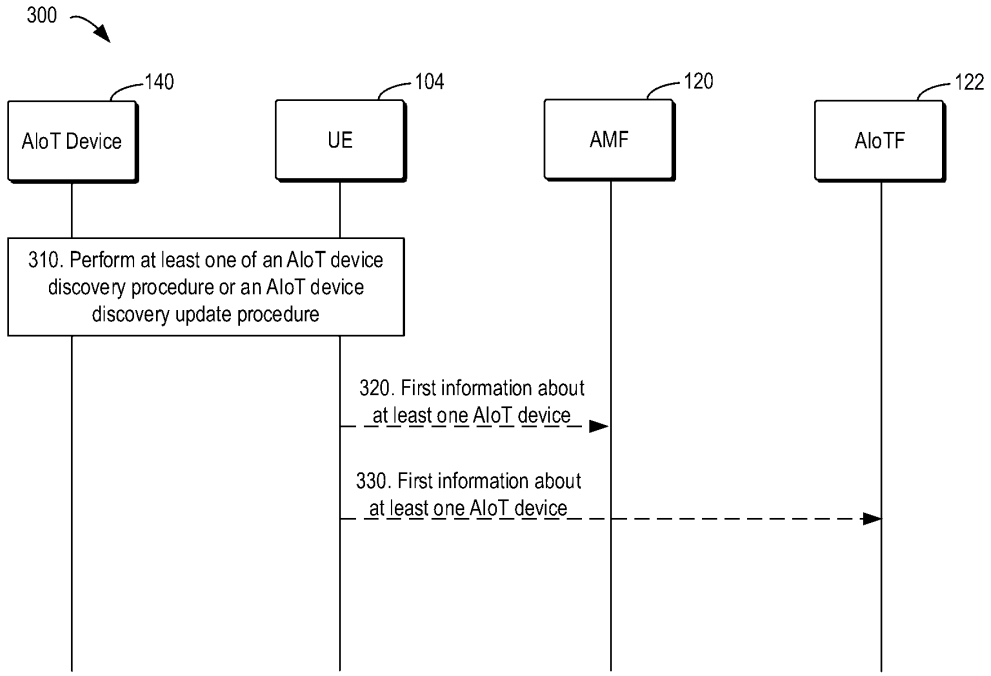

300
140
AIoT Device
104
UE
120
AMF
122
AIoTF
310. Perform at least one of an AIoT device discovery procedure or an AIoT device discovery update procedure
320. First information about at least one AIoT device
330. First information about at least one AIoT device

Fig. 3

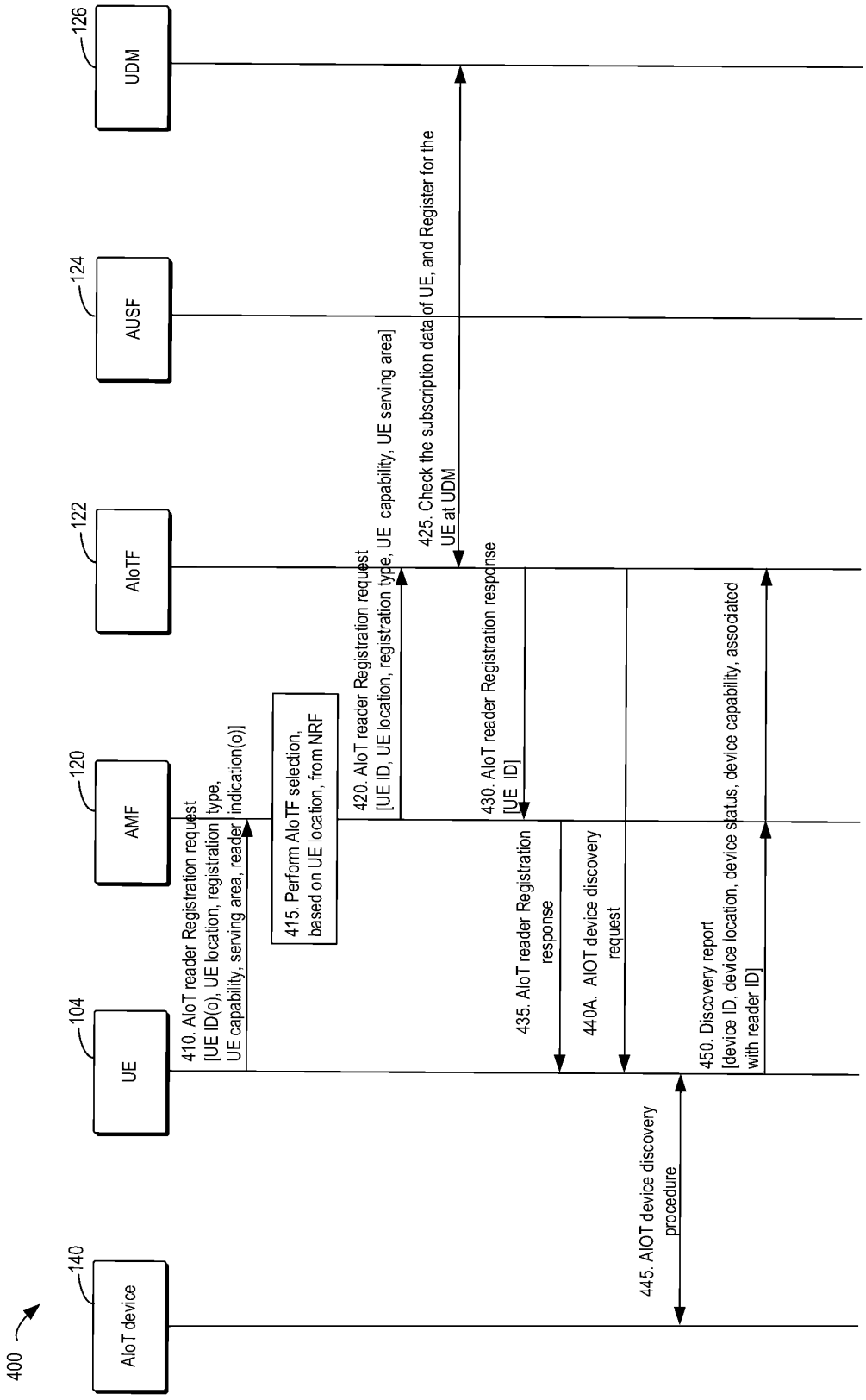

400
AIoT device
140
UE
104
AMF
120
AIoTF
122
AUSF
124
UDM
126
410. AIoT reader Registration request [UE ID(o), UE location, registration type, UE capability, serving area, reader indication(o)]
415. Perform AIoTF selection, based on UE location, from NRF
420. AIoT reader Registration request [UE ID, UE location, registration type, UE capability, UE serving area]
425. Check the subscription data of UE, and Register for the UE at UDM
430. AIoT reader Registration response [UE ID]
435. AIoT reader Registration response
440A. AIOT device discovery request
445. AIOT device discovery procedure
450. Discovery report [device ID, device location, device status, device capability, associated with reader ID]

Fig. 4

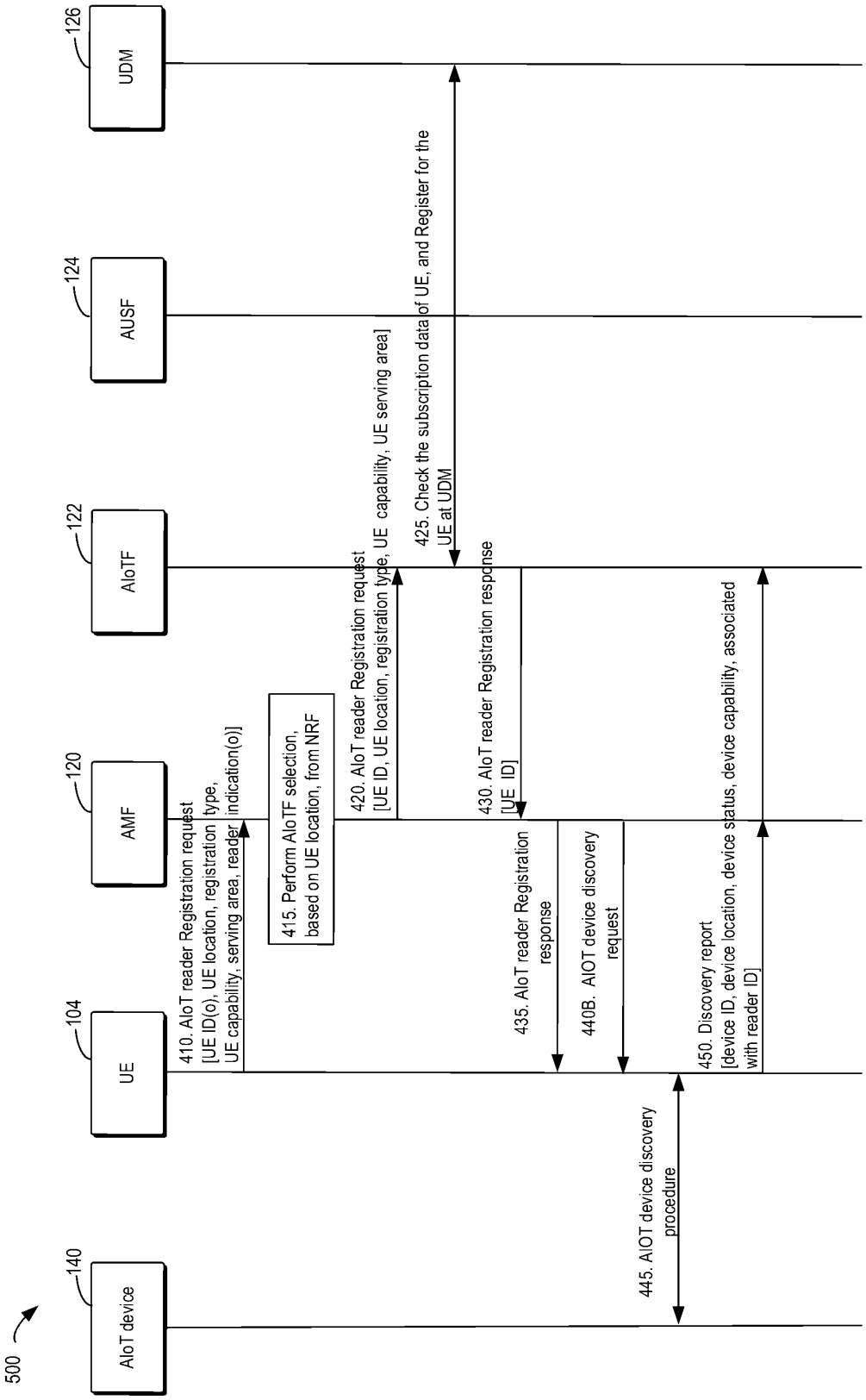

500
AIoT device
140
UE
104
AMF
120
AIoTF
122
AUSF
124
UDM
126
410. AIoT reader Registration request [UE ID(o), UE location, registration type, UE capability, serving area, reader indication(o)]
415. Perform AIoTF selection, based on UE location, from NRF
420. AIoT reader Registration request [UE ID, UE location, registration type, UE capability, UE serving area]
425. Check the subscription data of UE, and Register for the UE at UDM
430. AIoT reader Registration response [UE ID]
435. AIoT reader Registration response
440B. AIOT device discovery request
450. Discovery report [device ID, device location, device status, device capability, associated with reader ID]
445. AIOT device discovery procedure

Fig. 5

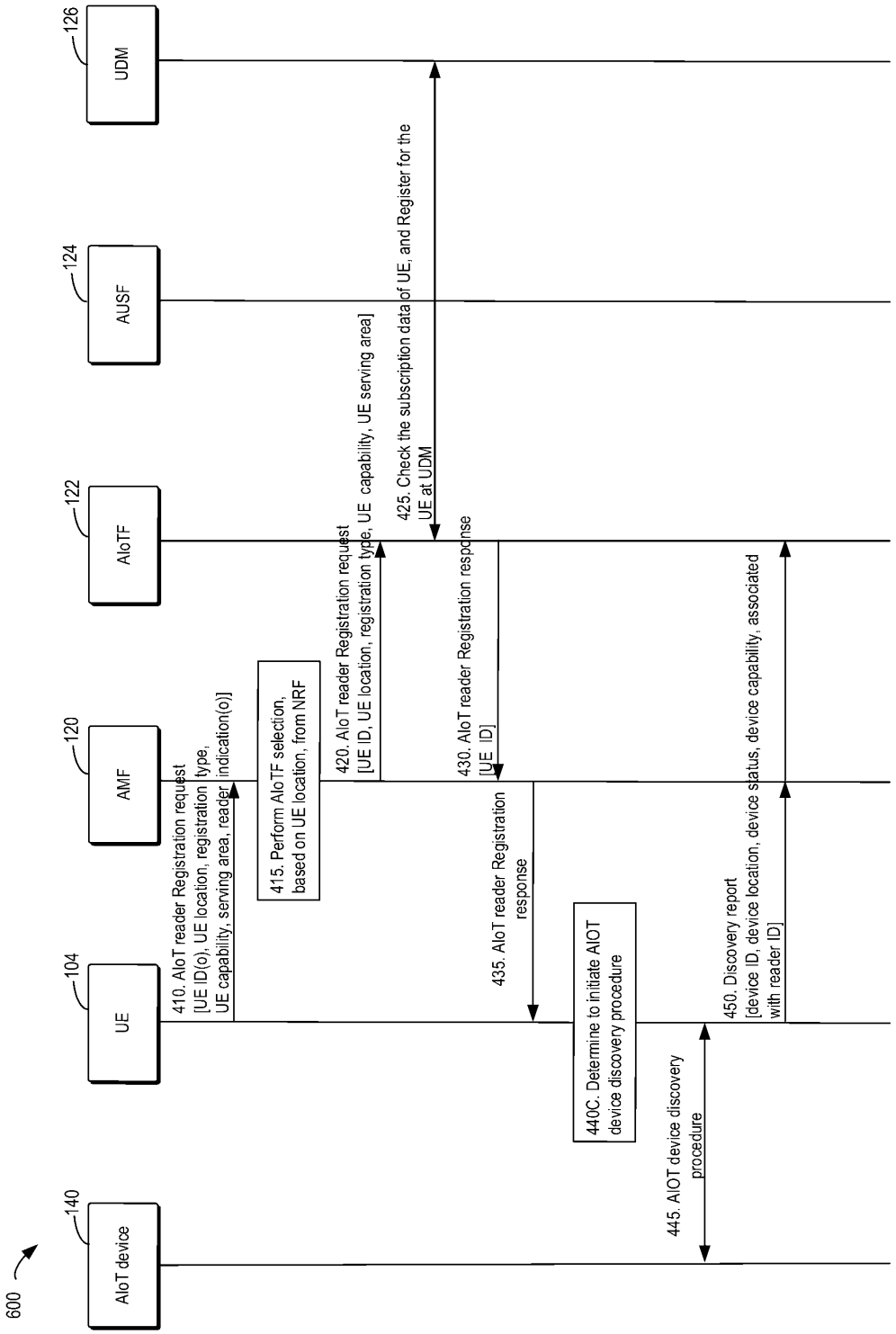

600
AIoT device
140
UE
104
AMF
120
AIoTF
122
AUSF
124
UDM
126
410. AIoT reader Registration request
[UE ID(o), UE location, registration type,
UE capability, serving area, reader indication(o)]
415. Perform AIoTF selection,
based on UE location, from NRF
420. AIoT reader Registration request
[UE ID, UE location, registration type, UE capability, UE serving area]
425. Check the subscription data of UE, and Register for the
UE at UDM
430. AIoT reader Registration response
[UE ID]
435. AIoT reader Registration
response
440C. Determine to initiate AIOT
device discovery procedure
445. AIOT device discovery
procedure
450. Discovery report
[device ID, device location, device status, device capability, associated
with reader ID]

Fig. 6

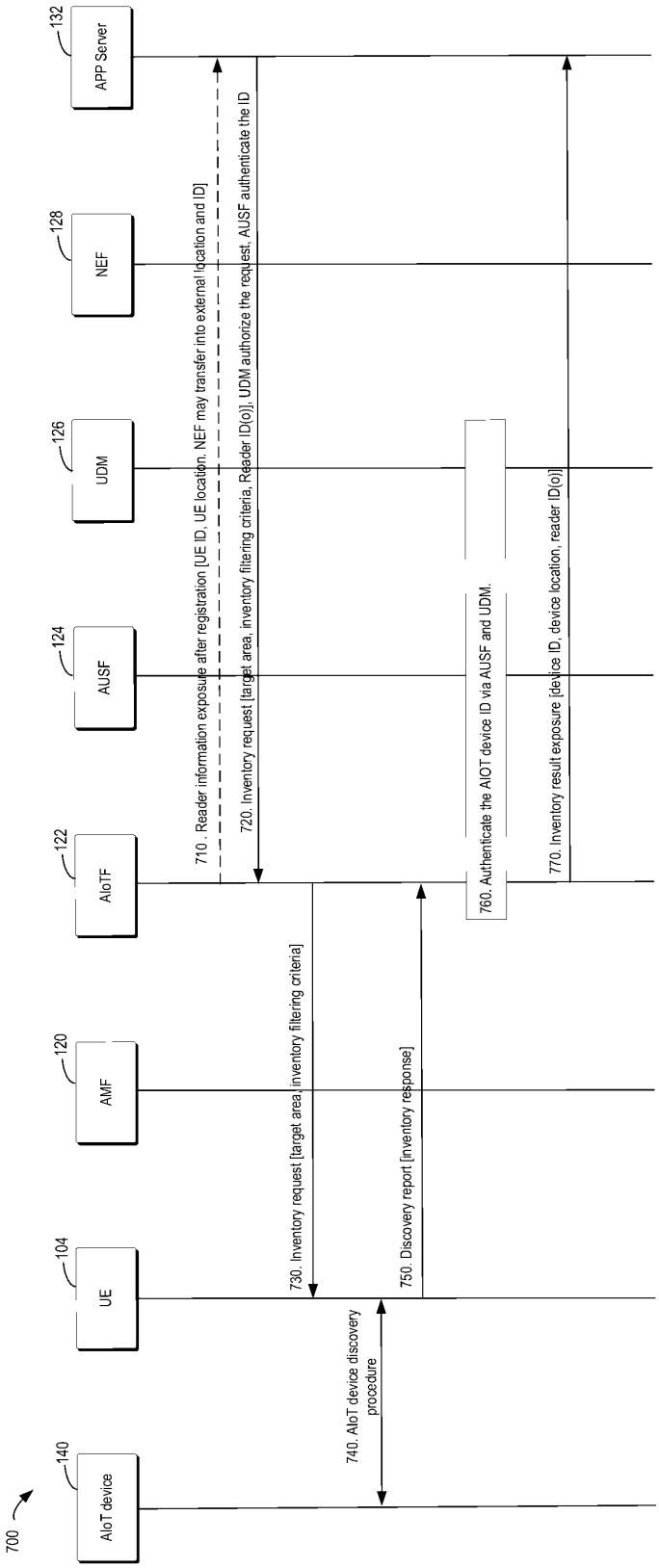

700
AIoT device
140
UE
104
AMF
120
AIoTF
122
AUSF
124
UDM
126
NEF
128
APP Server
132
710. Reader information exposure after registration [UE ID, UE location. NEF may transfer into external location and ID]
720. Inventory request [target area, inventory filtering criteria, Reader ID(o)], UDM authorize the request. AUSF authenticate the ID
730. Inventory request [target area, inventory filtering criteria]
740. AIoT device discovery procedure
750. Discovery report [inventory response]
760. Authenticate the AIOT device ID via AUSF and UDM.
770. Inventory result exposure [device ID, device location, reader ID(o)]

Fig. 7

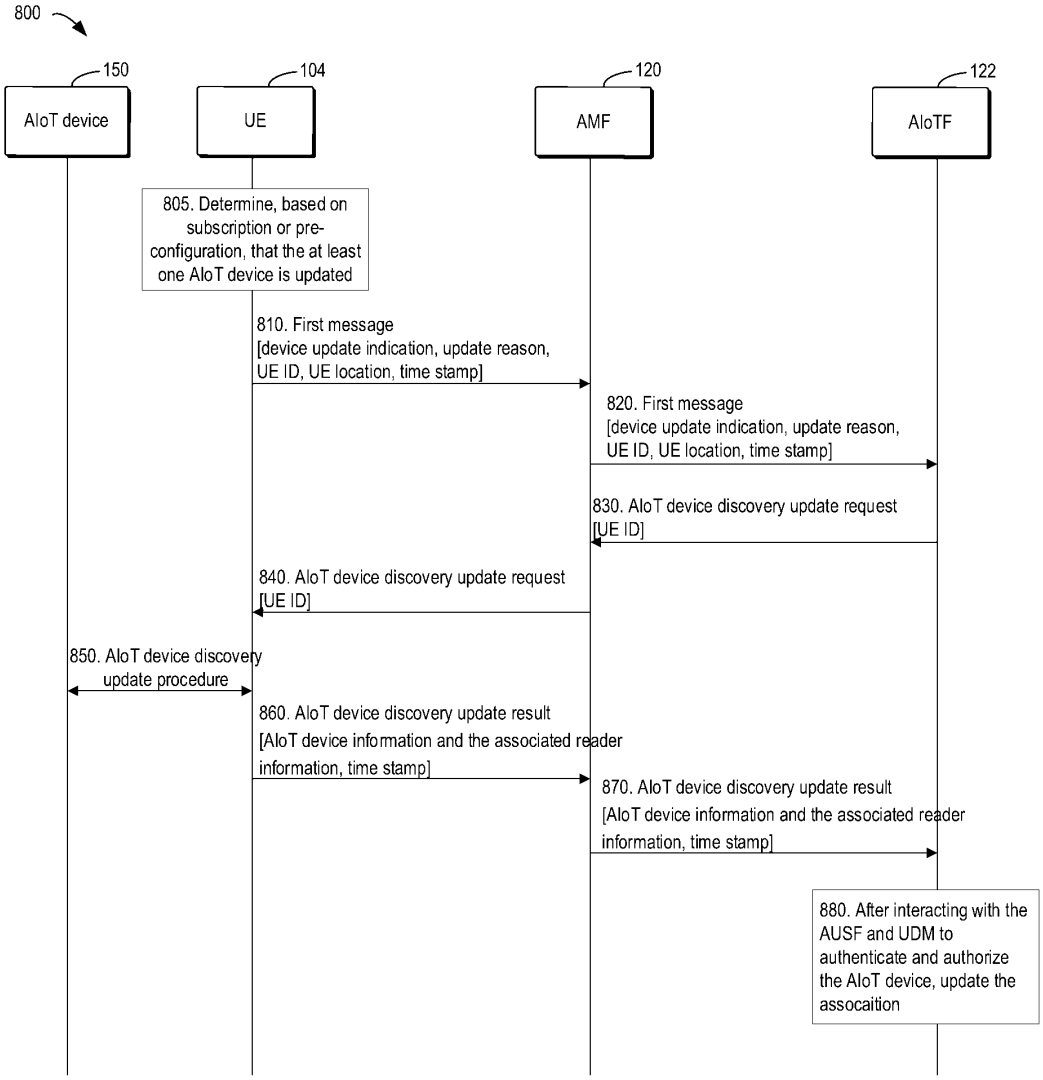

800
150
AIoT device
104
UE
120
AMF
122
AIoTF
805. Determine, based on subscription or pre-configuration, that the at least one AIoT device is updated
810. First message [device update indication, update reason, UE ID, UE location, time stamp]
820. First message [device update indication, update reason, UE ID, UE location, time stamp]
830. AIoT device discovery update request [UE ID]
840. AIoT device discovery update request [UE ID]
850. AIoT device discovery update procedure
860. AIoT device discovery update result [AIoT device information and the associated reader information, time stamp]
870. AIoT device discovery update result [AIoT device information and the associated reader information, time stamp]
880. After interacting with the AUSF and UDM to authenticate and authorize the AIoT device, update the assocaition

Fig. 8

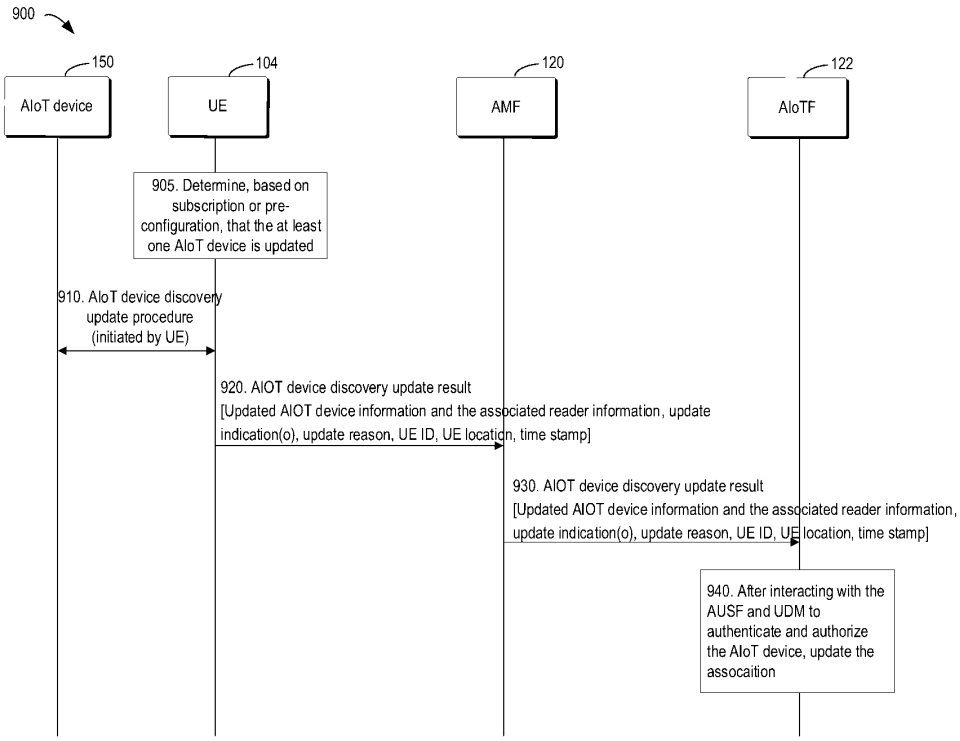

900
150
AIoT device
104
UE
120
AMF
122
AIoTF
905. Determine, based on subscription or pre-configuration, that the at least one AIoT device is updated
910. AIoT device discovery update procedure (initiated by UE)
920. AIOT device discovery update result
[Updated AIOT device information and the associated reader information, update indication(o), update reason, UE ID, UE location, time stamp]
930. AIOT device discovery update result
[Updated AIOT device information and the associated reader information, update indication(o), update reason, UE ID, UE location, time stamp]
940. After interacting with the AUSF and UDM to authenticate and authorize the AIoT device, update the assocaition

Fig. 9

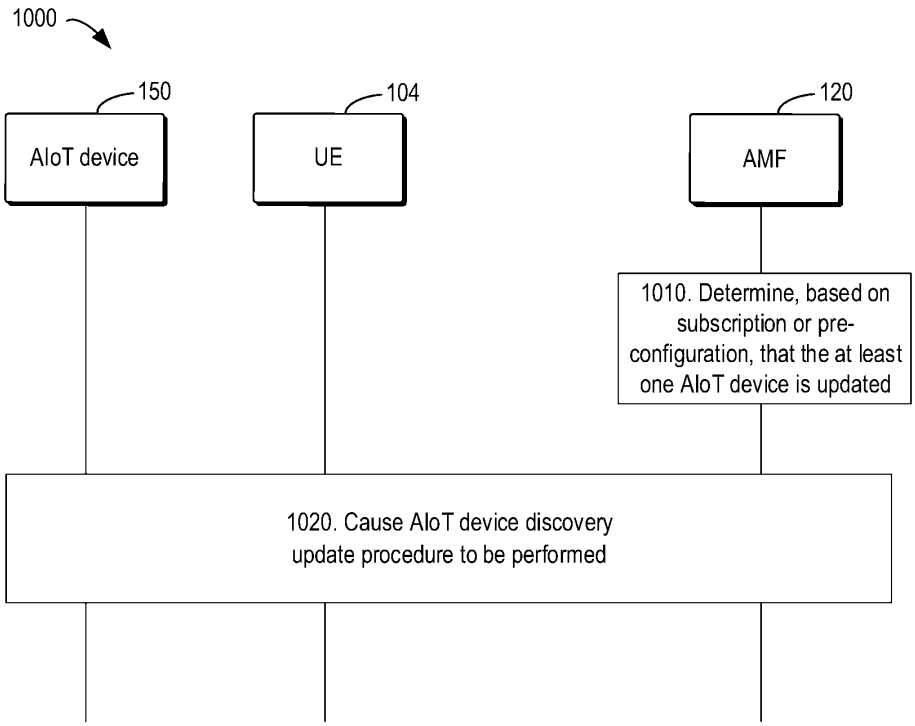

1000
150
AIoT device
104
UE
120
AMF
1010. Determine, based on subscription or pre-configuration, that the at least one AIoT device is updated
1020. Cause AIoT device discovery update procedure to be performed

Fig. 10

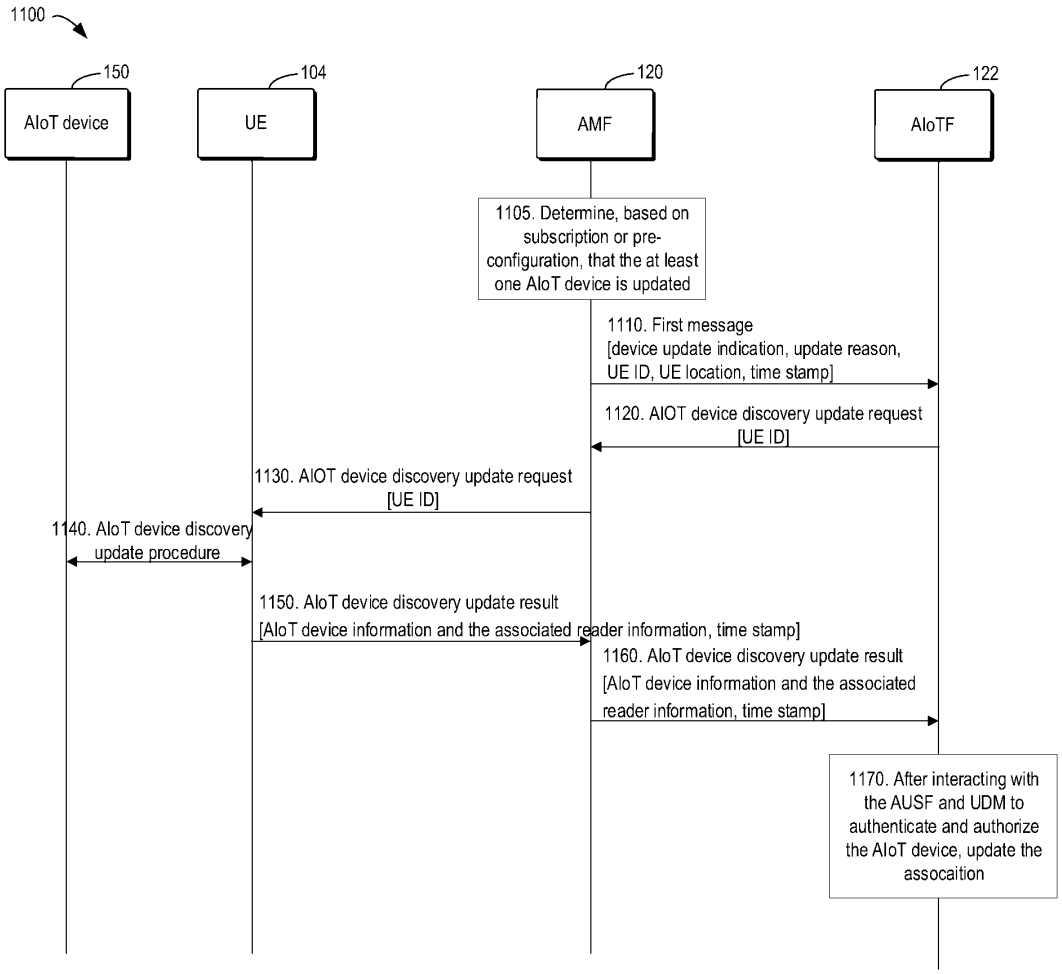

1100
150
AIoT device
104
UE
120
AMF
122
AIoTF
1105. Determine, based on subscription or pre-configuration, that the at least one AIoT device is updated
1110. First message [device update indication, update reason, UE ID, UE location, time stamp]
1120. AIOT device discovery update request [UE ID]
1130. AIOT device discovery update request [UE ID]
1140. AIoT device discovery update procedure
1150. AIoT device discovery update result [AIoT device information and the associated reader information, time stamp]
1160. AIoT device discovery update result [AIoT device information and the associated reader information, time stamp]
1170. After interacting with the AUSF and UDM to authenticate and authorize the AIoT device, update the assocaition

Fig. 11

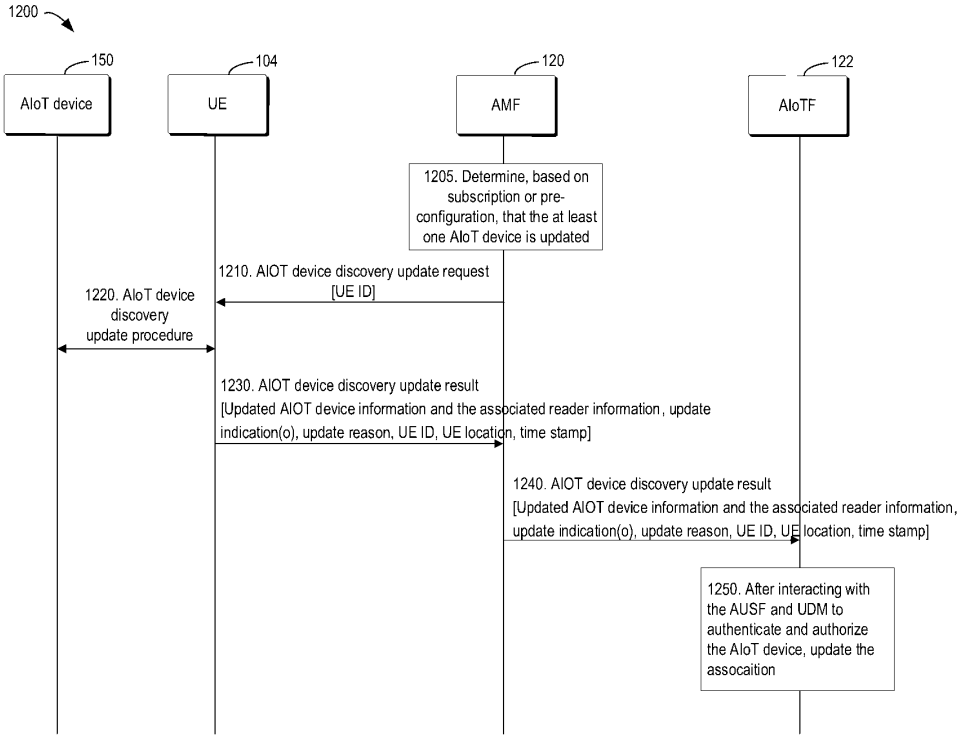

1200
150
AIoT device
104
UE
120
AMF
122
AIoTF
1205. Determine, based on subscription or pre-configuration, that the at least one AIoT device is updated
1210. AIOT device discovery update request [UE ID]
1220. AIoT device discovery update procedure
1230. AIOT device discovery update result [Updated AIOT device information and the associated reader information, update indication(o), update reason, UE ID, UE location, time stamp]
1240. AIOT device discovery update result [Updated AIOT device information and the associated reader information, update indication(o), update reason, UE ID, UE location, time stamp]
1250. After interacting with the AUSF and UDM to authenticate and authorize the AIoT device, update the assocaition

Fig. 12

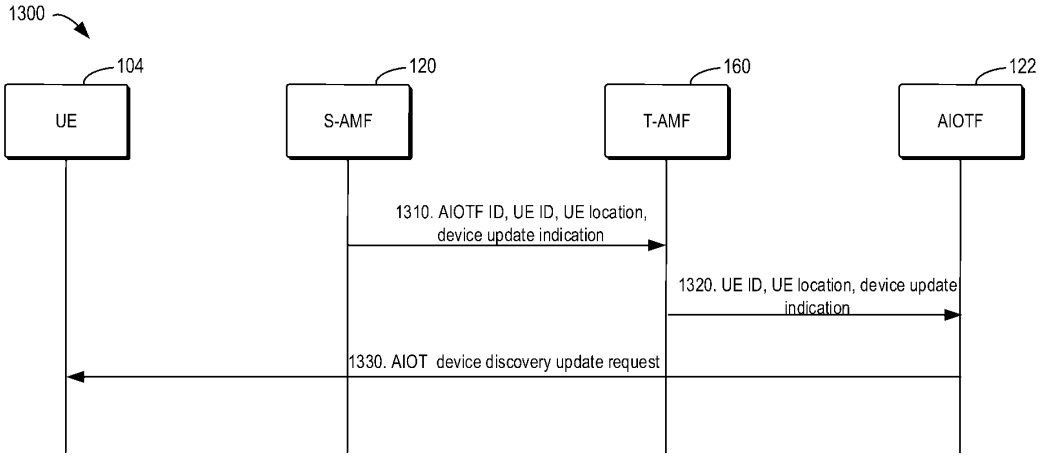


Fig. 13

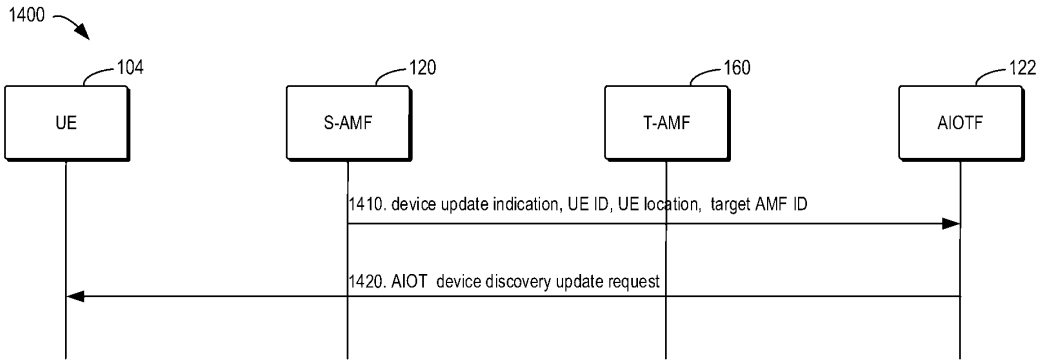


Fig. 14

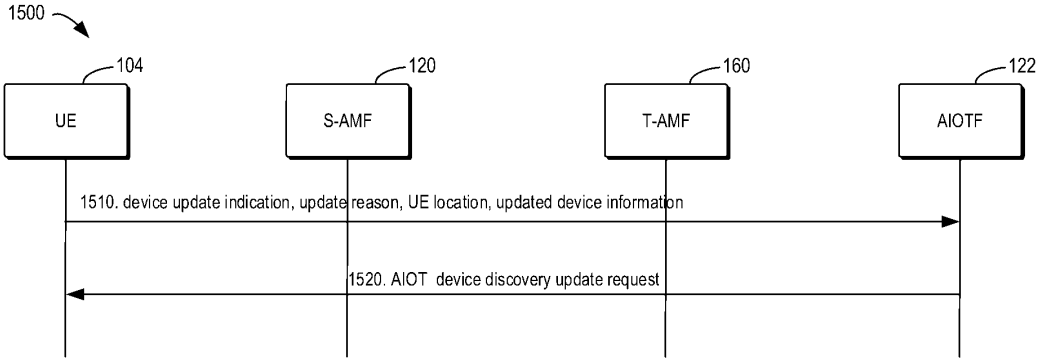


Fig. 15

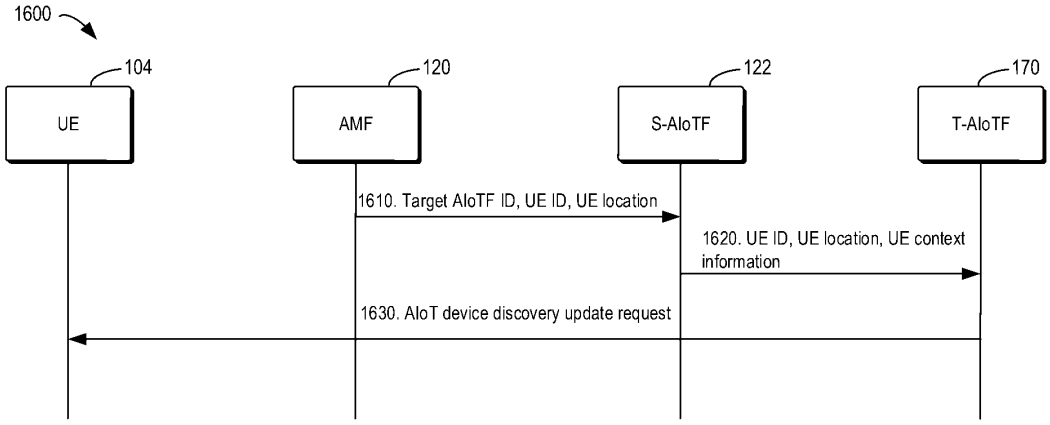


Fig. 16

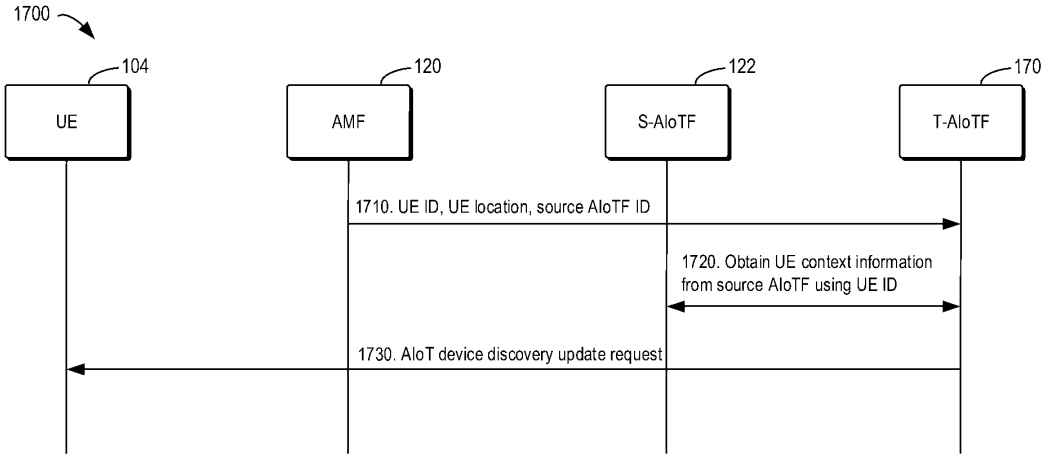


Fig. 17

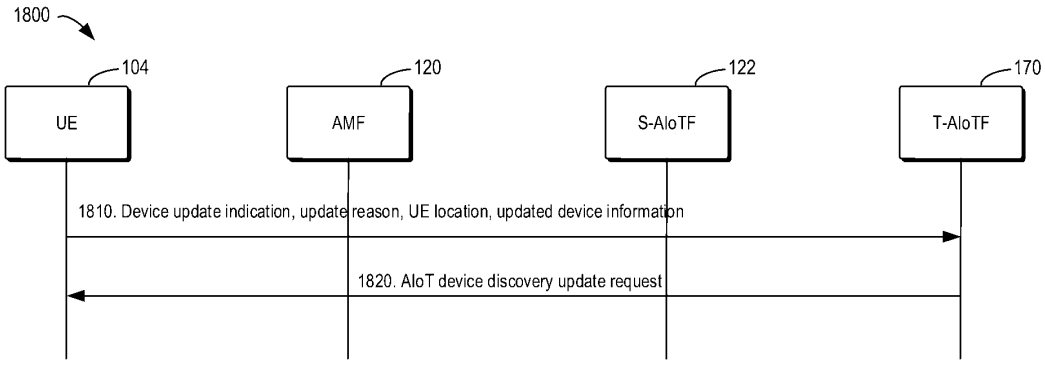


Fig. 18

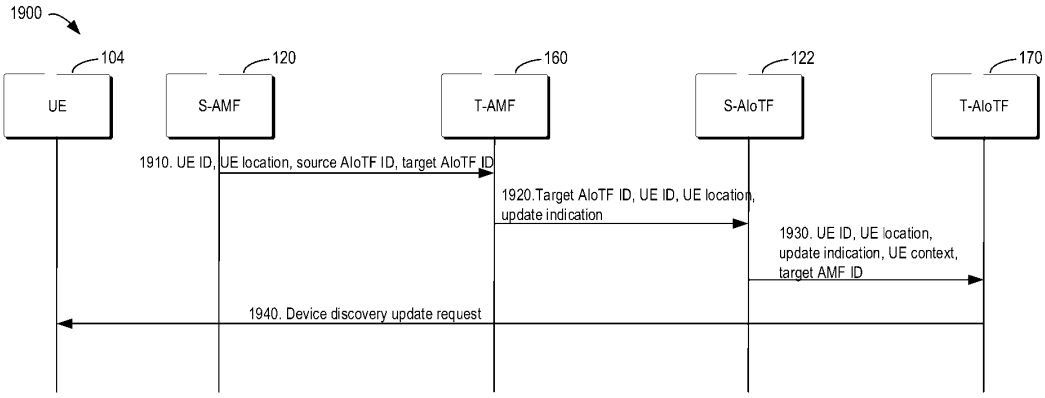


Fig. 19

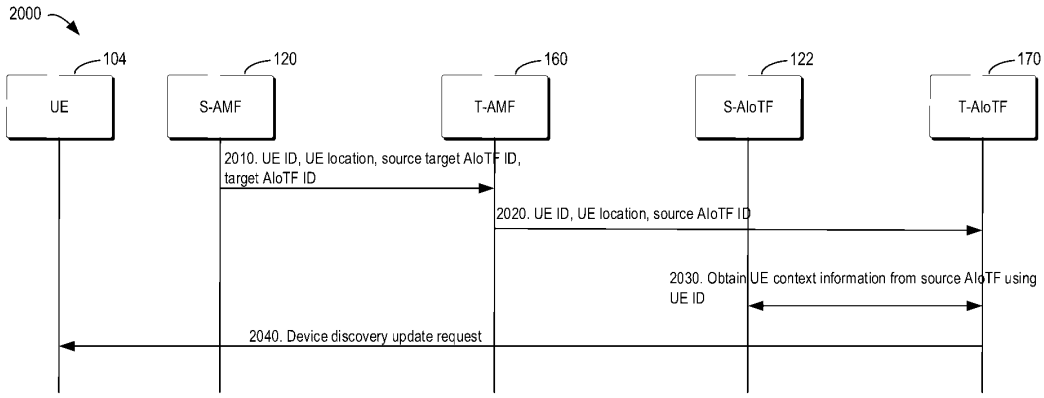


Fig. 20

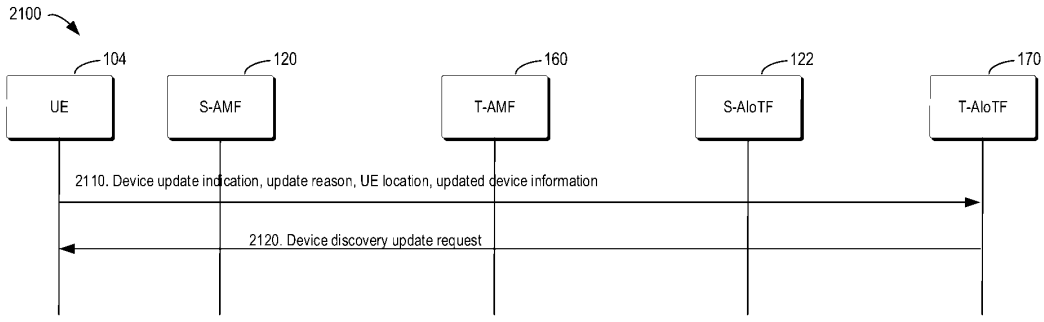


Fig. 21

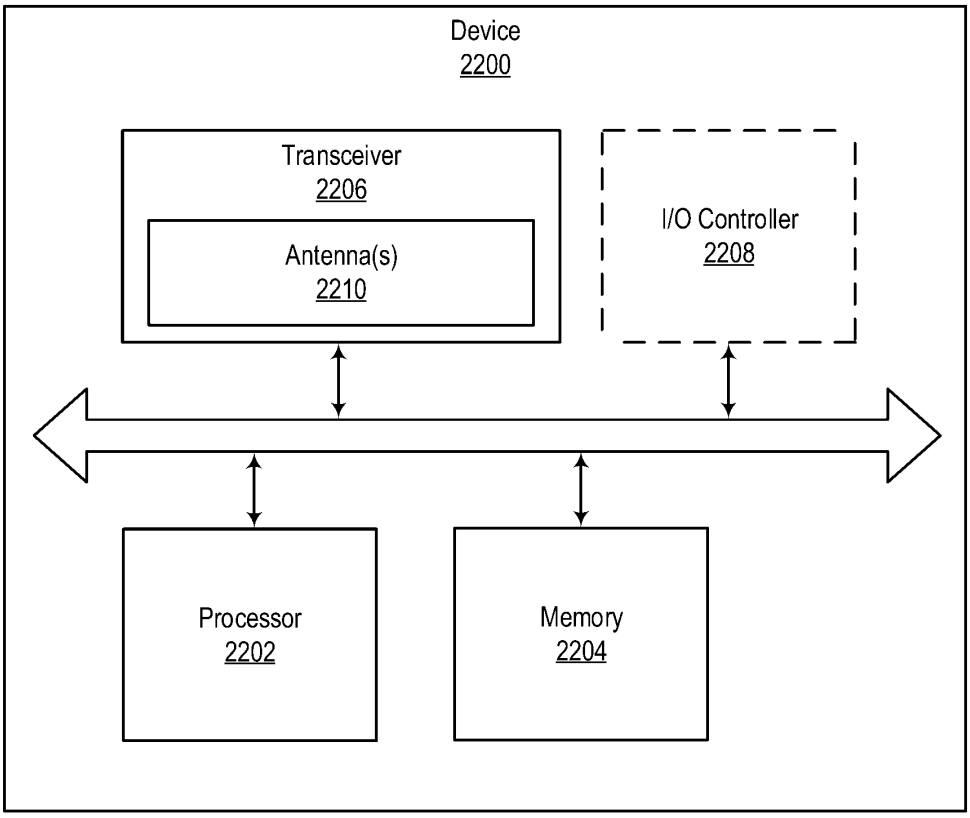

Device
2200
Transceiver
2206
Antenna(s)
2210
I/O Controller
2208
Processor
2202
Memory
2204

Fig. 22

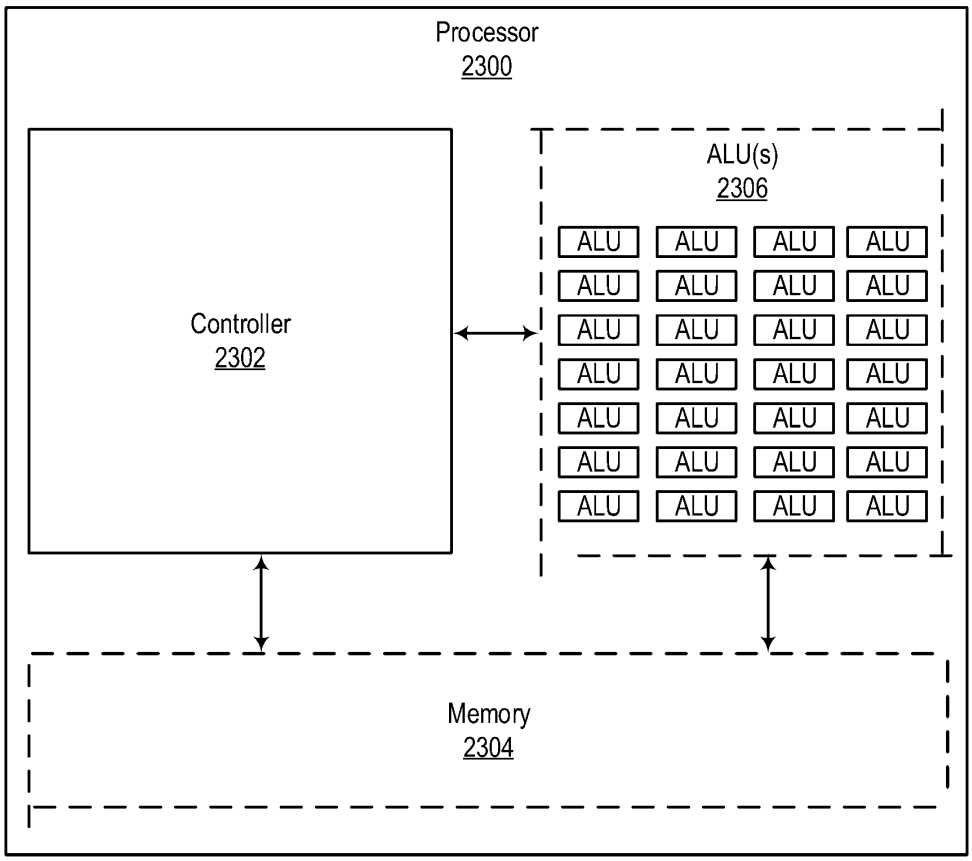


Fig. 23

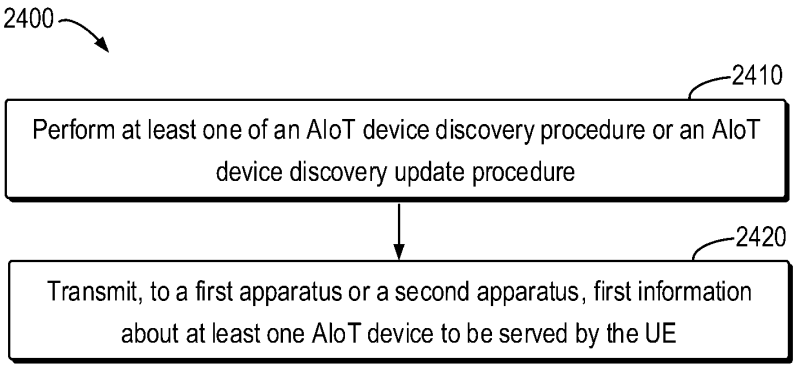

2400
2410
Perform at least one of an AIoT device discovery procedure or an AIoT device discovery update procedure
2420
Transmit, to a first apparatus or a second apparatus, first information about at least one AIoT device to be served by the UE

Fig. 24

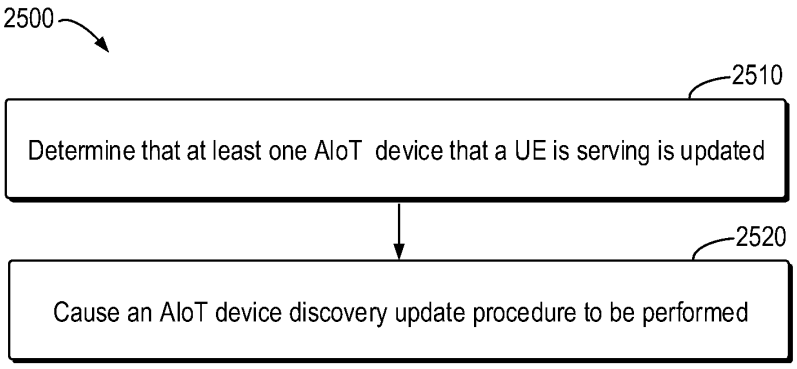

2500
2510
Determine that at least one AIoT device that a UE is serving is updated
2520
Cause an AIoT device discovery update procedure to be performed

Fig. 25

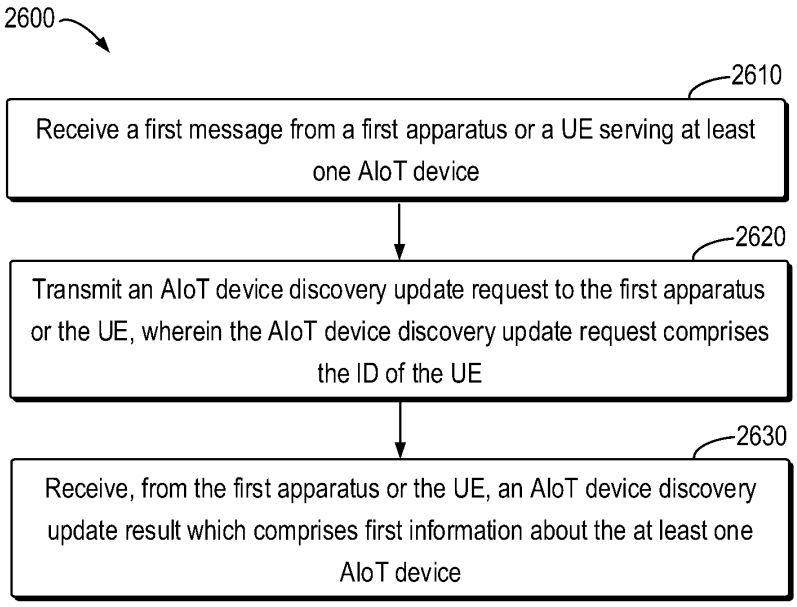

2600
2610
Receive a first message from a first apparatus or a UE serving at least one AIoT device
2620
Transmit an AIoT device discovery update request to the first apparatus or the UE, wherein the AIoT device discovery update request comprises the ID of the UE
2630
Receive, from the first apparatus or the UE, an AIoT device discovery update result which comprises first information about the at least one AIoT device

Fig. 26