Fig. 1

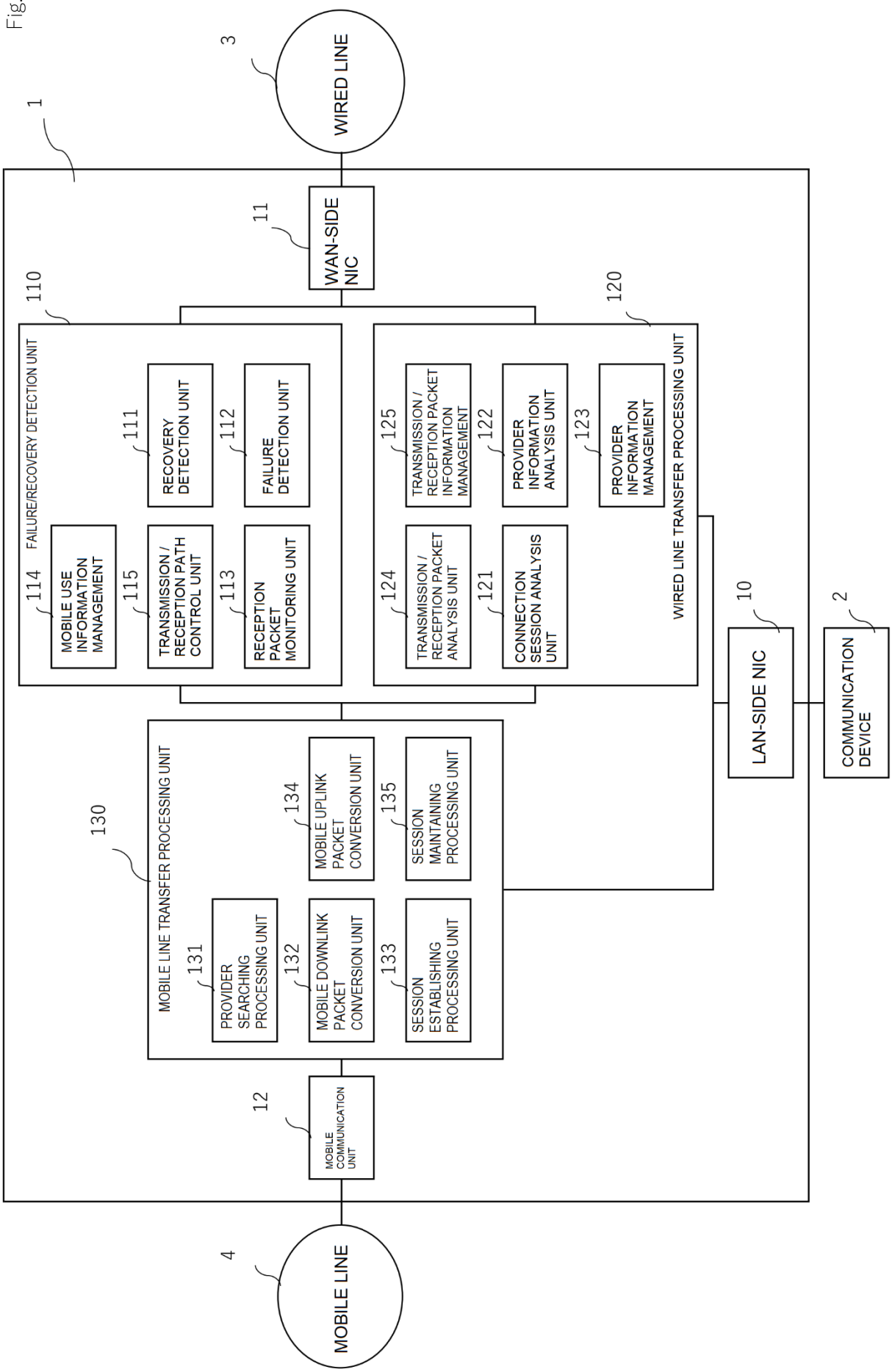

1
3
WIRED LINE
11
WAN-SIDE NIC
110
FAILURE/RECOVERY DETECTION UNIT
111
RECOVERY DETECTION UNIT
112
FAILURE DETECTION UNIT
114
MOBILE USE INFORMATION MANAGEMENT
115
TRANSMISSION / RECEPTION PATH CONTROL UNIT
113
RECEPTION PACKET MONITORING UNIT
120
WIRED LINE TRANSFER PROCESSING UNIT
125
TRANSMISSION / RECEPTION PACKET INFORMATION MANAGEMENT
122
PROVIDER INFORMATION ANALYSIS UNIT
123
PROVIDER INFORMATION MANAGEMENT
124
TRANSMISSION / RECEPTION PACKET ANALYSIS UNIT
121
CONNECTION SESSION ANALYSIS UNIT
10
LAN-SIDE NIC
2
COMMUNICATION DEVICE
130
MOBILE LINE TRANSFER PROCESSING UNIT
131
PROVIDER SEARCHING PROCESSING UNIT
132
MOBILE DOWNLINK PACKET CONVERSION UNIT
133
SESSION ESTABLISHING PROCESSING UNIT
134
MOBILE UPLINK PACKET CONVERSION UNIT
135
SESSION MAINTAINING PROCESSING UNIT
12
MOBILE COMMUNICATION UNIT
4
MOBILE LINE

Fig. 2

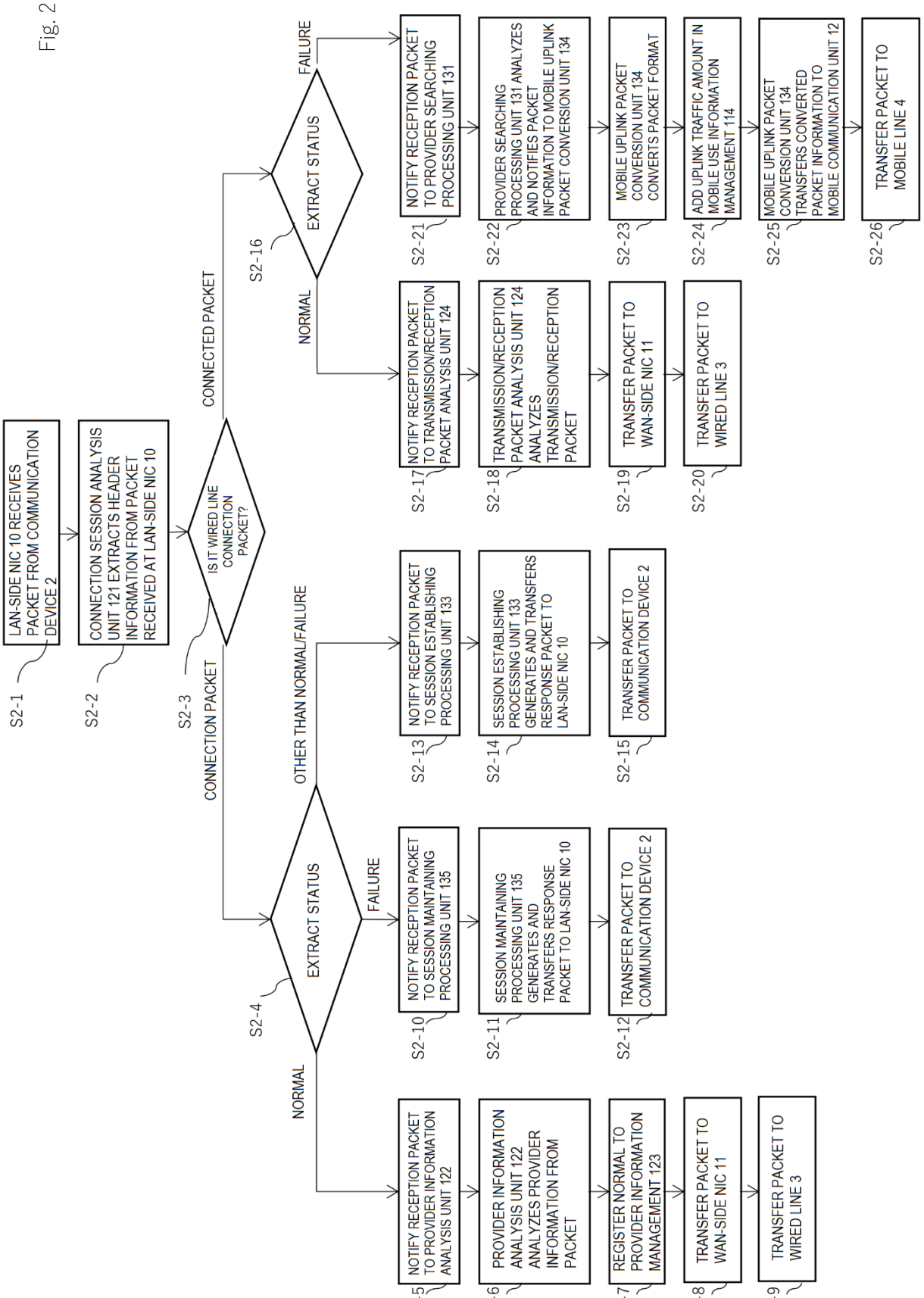

S2-1
LAN-SIDE NIC 10 RECEIVES PACKET FROM COMMUNICATION DEVICE 2
S2-2
CONNECTION SESSION ANALYSIS UNIT 121 EXTRACTS HEADER INFORMATION FROM PACKET RECEIVED AT LAN-SIDE NIC 10
S2-3
IS IT WIRED LINE CONNECTION PACKET?
CONNECTION PACKET
CONNECTED PACKET
S2-4
EXTRACT STATUS
NORMAL
OTHER THAN NORMAL/FAILURE
FAILURE
S2-5
NOTIFY RECEPTION PACKET TO PROVIDER INFORMATION ANALYSIS UNIT 122
S2-6
PROVIDER INFORMATION ANALYSIS UNIT 122 ANALYZES PROVIDER INFORMATION FROM PACKET
S2-7
REGISTER NORMAL TO PROVIDER INFORMATION MANAGEMENT 123
S2-8
TRANSFER PACKET TO WAN-SIDE NIC 11
S2-9
TRANSFER PACKET TO WIRED LINE 3
S2-10
NOTIFY RECEPTION PACKET TO SESSION MAINTAINING PROCESSING UNIT 135
S2-11
SESSION MAINTAINING PROCESSING UNIT 135 GENERATES AND TRANSFERS RESPONSE PACKET TO LAN-SIDE NIC 10
S2-12
TRANSFER PACKET TO COMMUNICATION DEVICE 2
S2-13
NOTIFY RECEPTION PACKET TO SESSION ESTABLISHING PROCESSING UNIT 133
S2-14
SESSION ESTABLISHING PROCESSING UNIT 133 GENERATES AND TRANSFERS RESPONSE PACKET TO LAN-SIDE NIC 10
S2-15
TRANSFER PACKET TO COMMUNICATION DEVICE 2
S2-16
EXTRACT STATUS
NORMAL
FAILURE
S2-17
NOTIFY RECEPTION PACKET TO TRANSMISSION/RECEPTION PACKET ANALYSIS UNIT 124
S2-18
TRANSMISSION/RECEPTION PACKET ANALYSIS UNIT 124 ANALYZES TRANSMISSION/RECEPTION PACKET
S2-19
TRANSFER PACKET TO WAN-SIDE NIC 11
S2-20
TRANSFER PACKET TO WIRED LINE 3
S2-21
NOTIFY RECEPTION PACKET TO PROVIDER SEARCHING PROCESSING UNIT 131
S2-22
PROVIDER SEARCHING PROCESSING UNIT 131 ANALYZES AND NOTIFIES PACKET INFORMATION TO MOBILE UPLINK PACKET CONVERSION UNIT 134
S2-23
MOBILE UPLINK PACKET CONVERSION UNIT 134 CONVERTS PACKET FORMAT
S2-24
ADD UPLINK TRAFFIC AMOUNT IN MOBILE USE INFORMATION MANAGEMENT 114
S2-25
MOBILE UPLINK PACKET CONVERSION UNIT 134 TRANSFERS CONVERTED PACKET INFORMATION TO MOBILE COMMUNICATION UNIT 12
S2-26
TRANSFER PACKET TO MOBILE LINE 4

Fig. 3

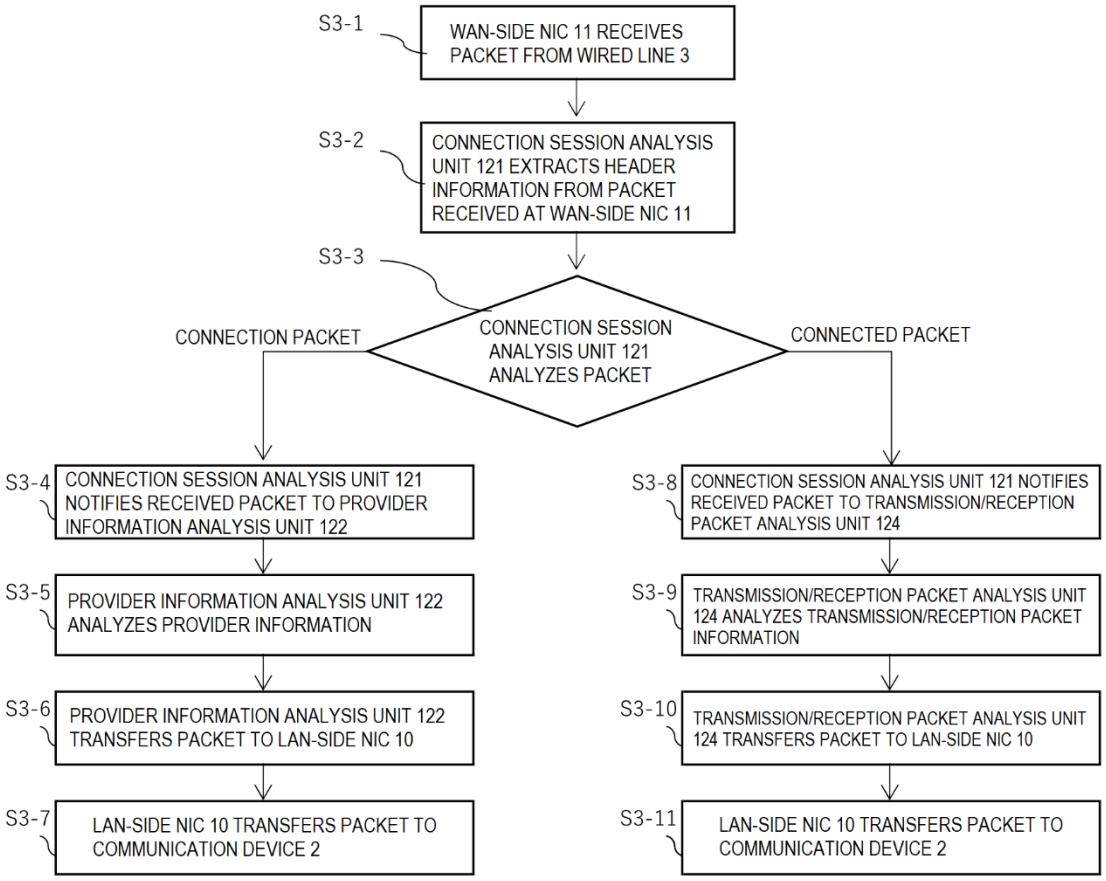

S3-1
WAN-SIDE NIC 11 RECEIVES PACKET FROM WIRED LINE 3
S3-2
CONNECTION SESSION ANALYSIS UNIT 121 EXTRACTS HEADER INFORMATION FROM PACKET RECEIVED AT WAN-SIDE NIC 11
S3-3
CONNECTION SESSION ANALYSIS UNIT 121 ANALYZES PACKET
CONNECTION PACKET
CONNECTED PACKET
S3-4
CONNECTION SESSION ANALYSIS UNIT 121 NOTIFIES RECEIVED PACKET TO PROVIDER INFORMATION ANALYSIS UNIT 122
S3-5
PROVIDER INFORMATION ANALYSIS UNIT 122 ANALYZES PROVIDER INFORMATION
S3-6
PROVIDER INFORMATION ANALYSIS UNIT 122 TRANSFERS PACKET TO LAN-SIDE NIC 10
S3-7
LAN-SIDE NIC 10 TRANSFERS PACKET TO COMMUNICATION DEVICE 2
S3-8
CONNECTION SESSION ANALYSIS UNIT 121 NOTIFIES RECEIVED PACKET TO TRANSMISSION/RECEPTION PACKET ANALYSIS UNIT 124
S3-9
TRANSMISSION/RECEPTION PACKET ANALYSIS UNIT 124 ANALYZES TRANSMISSION/RECEPTION PACKET INFORMATION
S3-10
TRANSMISSION/RECEPTION PACKET ANALYSIS UNIT 124 TRANSFERS PACKET TO LAN-SIDE NIC 10
S3-11
LAN-SIDE NIC 10 TRANSFERS PACKET TO COMMUNICATION DEVICE 2

Fig. 4

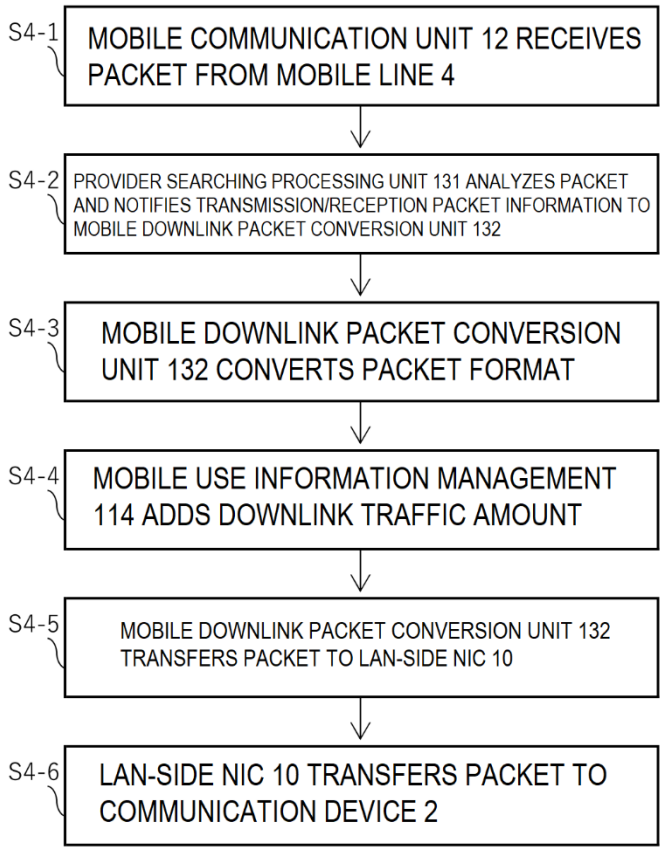

S4-1
MOBILE COMMUNICATION UNIT 12 RECEIVES PACKET FROM MOBILE LINE 4
S4-2
PROVIDER SEARCHING PROCESSING UNIT 131 ANALYZES PACKET AND NOTIFIES TRANSMISSION/RECEPTION PACKET INFORMATION TO MOBILE DOWNLINK PACKET CONVERSION UNIT 132
S4-3
MOBILE DOWNLINK PACKET CONVERSION UNIT 132 CONVERTS PACKET FORMAT
S4-4
MOBILE USE INFORMATION MANAGEMENT 114 ADDS DOWNLINK TRAFFIC AMOUNT
S4-5
MOBILE DOWNLINK PACKET CONVERSION UNIT 132 TRANSFERS PACKET TO LAN-SIDE NIC 10
S4-6
LAN-SIDE NIC 10 TRANSFERS PACKET TO COMMUNICATION DEVICE 2

Fig. 5A

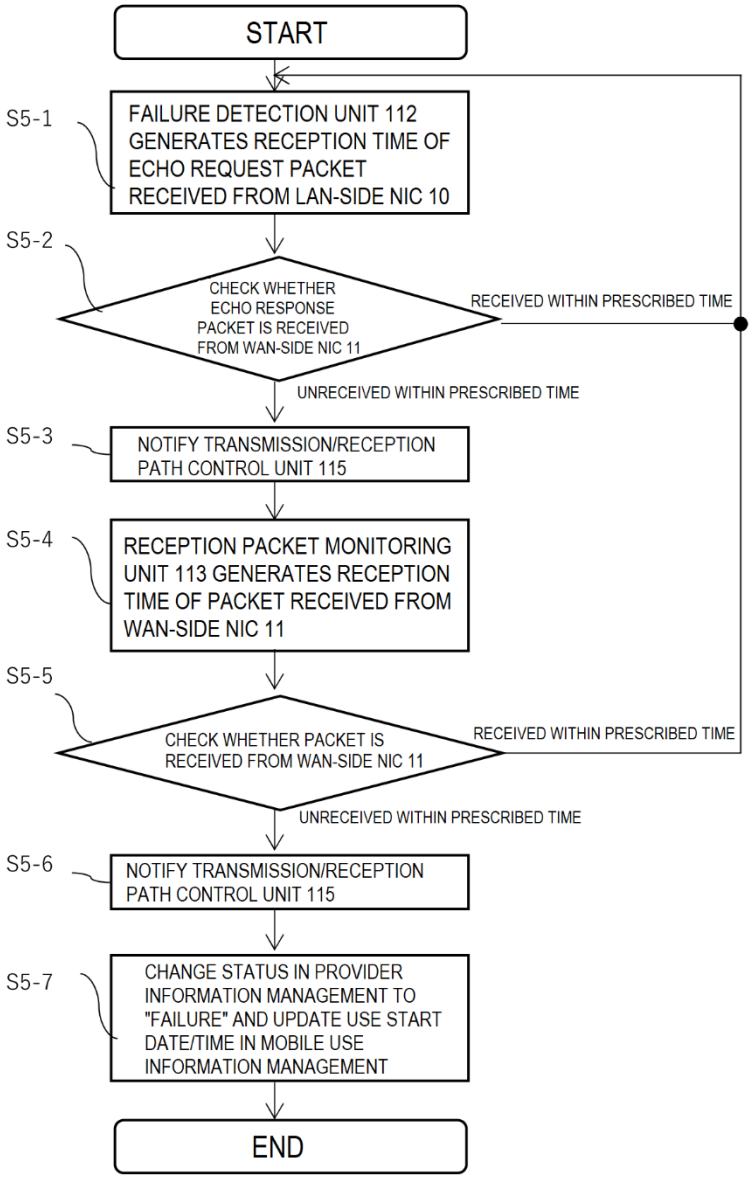

START
S5-1
FAILURE DETECTION UNIT 112 GENERATES RECEPTION TIME OF ECHO REQUEST PACKET RECEIVED FROM LAN-SIDE NIC 10
S5-2
CHECK WHETHER ECHO RESPONSE PACKET IS RECEIVED FROM WAN-SIDE NIC 11
RECEIVED WITHIN PRESCRIBED TIME
UNRECEIVED WITHIN PRESCRIBED TIME
S5-3
NOTIFY TRANSMISSION/RECEPTION PATH CONTROL UNIT 115
S5-4
RECEPTION PACKET MONITORING UNIT 113 GENERATES RECEPTION TIME OF PACKET RECEIVED FROM WAN-SIDE NIC 11
S5-5
CHECK WHETHER PACKET IS RECEIVED FROM WAN-SIDE NIC 11
RECEIVED WITHIN PRESCRIBED TIME
UNRECEIVED WITHIN PRESCRIBED TIME
S5-6
NOTIFY TRANSMISSION/RECEPTION PATH CONTROL UNIT 115
S5-7
CHANGE STATUS IN PROVIDER INFORMATION MANAGEMENT TO "FAILURE" AND UPDATE USE START DATE/TIME IN MOBILE USE INFORMATION MANAGEMENT
END

Fig. 5B

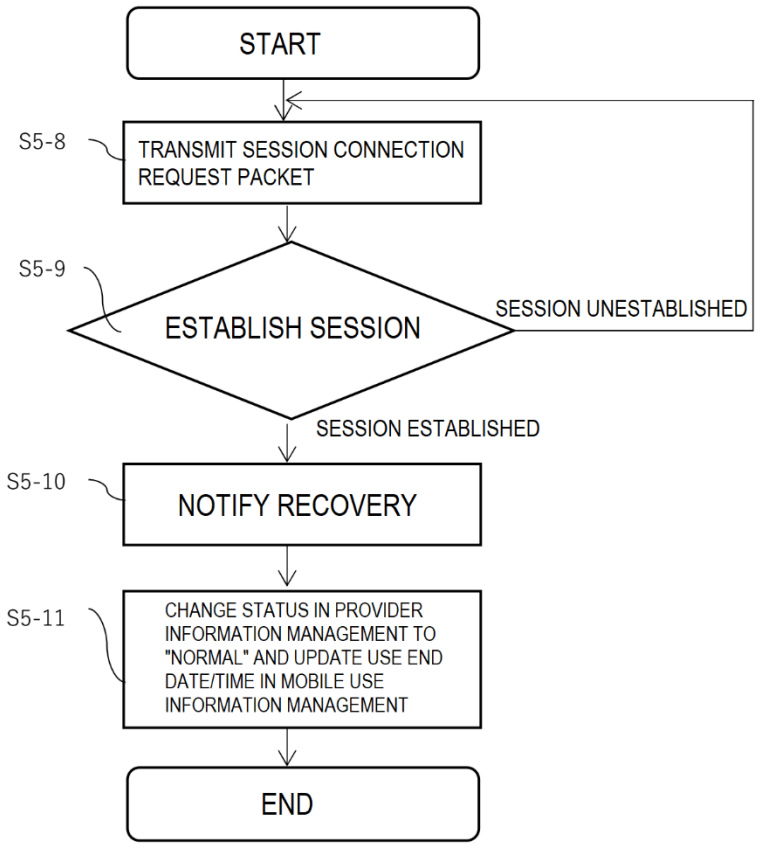

START
S5-8
TRANSMIT SESSION CONNECTION REQUEST PACKET
S5-9
ESTABLISH SESSION
SESSION UNESTABLISHED
SESSION ESTABLISHED
S5-10
NOTIFY RECOVERY
S5-11
CHANGE STATUS IN PROVIDER INFORMATION MANAGEMENT TO "NORMAL" AND UPDATE USE END DATE/TIME IN MOBILE USE INFORMATION MANAGEMENT
END

Fig. 6

CONNECTION-DESTINATION PROVIDER	ACCOUNT	PASSWORD	AUTHENTICATION METHOD	IP ADDRESS	PROVIDER SESSION ID	STATUS
AAA.aaa.ne.jp	○○○	△△△	CHAP	10.10.10.254	1	NORMAL
BBB.bbb.ne.jp	□□□	× × ×	CHAP	20.20.20.1	2	FAILURE

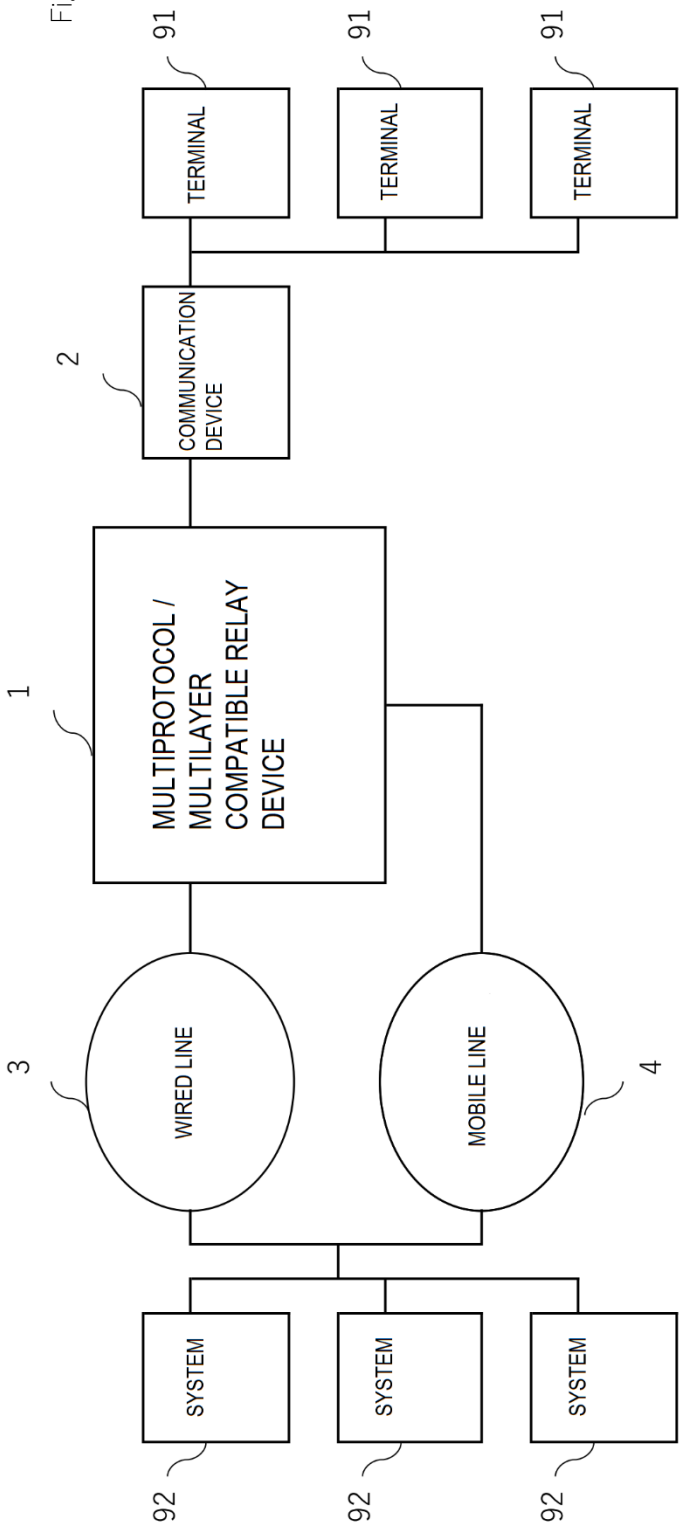
Fig. 7

PROVIDER SESSION ID	SOURCE IP ADDRESS	DESTINATION IP ADDRESS	PROTOCOL	SOURCE PORT AFTER CONVERSION
1	192.168.1.1	10.10.0.1	TCP	100
2	192.16.1.1	20.20.2.1	UDP	100

Fig. 8

CONNECTION-DESTINATION PROVIDER	USE START DATE/TIME	USE END DATE/TIME	UPLINK TRAFFIC AMOUNT	DOWNLINK TRAFFIC AMOUNT
AAA.aaa.ne.jp	20220921 10:30	20220921 14:30	200	6000

Fig. 9


MULTIPROTOCOL / MULTILAYER COMPATIBLE RELAY DEVICE
1
COMMUNICATION DEVICE
2
WIRED LINE
3
MOBILE LINE
4
TERMINAL
91
TERMINAL
91
TERMINAL
91
SYSTEM
92
SYSTEM
92
SYSTEM
92