**CLAIMS**

1. A multiprotocol/multilayer compatible relay device that relays, to a second communication line, which is a mobile line, connection of a communication device that is connected to a first communication line, which is a wired line, the multiprotocol/multilayer compatible relay device comprising:

a WAN-side NIC as an interface that houses the first communication line;

a mobile communication unit as an interface that houses the second communication line;

a LAN-side NIC as an interface connecting to the communication device;

a failure/recovery detection unit that detects a failure and recovery of the first communication line;

a transmission/reception path control unit that sets a switching control value for performing mutual switching control of a transmission/reception path between the first communication line and the second communication line in accordance with a detection result acquired by the failure/recovery detection unit;

a first communication line transfer processing unit that: transfers a packet received from the communication device to the WAN-side NIC; and transfers a packet received from the WAN-side NIC to the communication device; and

a second communication line transfer processing unit that: converts a format of the packet received from the communication device and transfers the packet to the mobile communication unit; and converts a format of the packet received from the mobile communication unit and transfers the packet to the communication device,

wherein the first communication line transfer processing unit comprises a provider information analysis unit that analyzes a connection-destination provider of the first communication line; a connection session analysis unit that analyzes a connection session with the first communication line; and a transmission/reception packet analysis unit that analyzes a packet notified from the connection session analysis unit; and

wherein the second communication line transfer processing unit comprises a provider searching processing unit that searches for a provider; a session establishing processing unit that establishes an Internet connection from the communication device to the first communication line when there is a failure in the first communication line; a session maintaining processing unit that maintains the Internet connection of an Internet-connected session; a mobile uplink packet conversion unit that converts a format of a transmission/reception packet that varies between a case of using the first communication line and a case of using the second communication line, and transfers the transmission/reception packet to the mobile communication unit; and a mobile downlink packet conversion unit that

converts a format of a transmission/reception packet that varies between the first communication line and the second communication line, and transfers the transmission/reception packet to the LAN-side NIC;

wherein the failure/recovery detection unit comprises: a reception packet monitoring unit that monitors the packet from the first communication line; a failure detection unit that detects a failure of the first communication line; a recovery detection unit that detects recovery of the first communication line; a mobile use information management unit that manages use information of the second communication line; and

wherein the transmission/reception path control unit is configured to:

relay connection of the communication device to the second communication line by switching the transmission/reception path from the first communication line to the second communication line based on the switching control value set by the transmission/reception path control unit, when failure is detected by the failure detection unit; and

relay connection of the communication device to the first communication line by switching the transmission/reception path from the second communication line to the first communication line based on the switching control value set by the transmission/reception path control unit, when recovery from the failure is detected by the recovery detection unit.

2. The multiprotocol/multilayer compatible relay device according to claim 1, wherein:

the failure detection unit generates a session maintaining request packet reception time from a latest session maintaining request packet received from the communication device, and when a session maintaining response packet is not received from the first communication line within a prescribed time with respect to the session maintaining request packet reception time, detects and notifies non-reception to the transmission/reception path control unit;

the reception packet monitoring unit: generates a packet reception time from a latest packet received from the first communication line, and when a packet is not received from the first communication line within a prescribed time with respect to the packet reception time, detects and notifies non-reception to the transmission/reception path control unit;

the transmission/reception path control unit has a function of determining a failure based on the notification from the failure detection unit and the notification from the reception packet monitoring unit; and

the recovery detection unit has a function of detecting recovery of the first communication line by trying to establish a session through requesting session connection to each of the connection-destination providers of the first communication line.

3. The multiprotocol/multilayer compatible relay device according to claim 2, wherein

the first communication line transfer processing unit comprises provider information management unit and transmission/reception packet information management unit;

the provider information analysis unit: analyzes a packet exchanged between the communication device and a connection-destination provider of the first communication line; and extracts provider information including connection-destination provider name, connection-destination account and password, connection authentication method, and IP address assigned from the provider;

the transmission/reception packet analysis unit: analyzes a packet transmitted/received between the communication device and the connection-destination provider of the first communication line; and extracts transmission/reception packet information including connection protocol information, source IP address, destination IP address, and port number;

the provider information management unit manages the provider information for each of the connection-destination providers of the first communication line; and

the transmission/reception packet information management unit manages the transmission/reception packet information for each of the connection-destination providers of the first communication line.

4. The multiprotocol/multilayer compatible relay device according to claim 3, wherein

the session maintaining processing unit comprises a session maintainer configured to maintain a session through giving a session maintaining response in a pseudo manner for a session maintaining request given to the first communication line from the communication device, when a failure of the first communication line is detected; and

the session establishing processing unit comprises a session establisher configured to establish, in a pseudo manner, an Internet-connection session from the communication device to the first communication line by giving a session connection response in response to a new session connection request from the communication device to the first communication line based on information including connection-destination provider, account, password, authentication method, and IP address.

5. The multiprotocol/multilayer compatible relay device according to claim 4, wherein

the mobile uplink packet conversion unit comprises a converter configured to convert a packet format of a communication packet transmitted from the communication device on the session that is established in a pseudo manner upon detecting the failure of the first communication line into a packet format of a case that uses the second communication line based on information including source IP address, destination IP address, protocol, and port number transmitted/received with the provider; and

the mobile downlink packet conversion unit comprises a converter configured to convert a packet format of a communication packet transmitted from the second communication line into a packet format from the connection-destination provider of the first communication line based on the information including the source IP address, the destination IP address, the protocol, and the port number transmitted/received with the provider.

6. The multiprotocol/multilayer compatible relay device according to claim 5, wherein the mobile use information management unit holds information including use start date/time and use end date/time of the second communication line as well as a traffic amount of the second communication line.

7. A multiprotocol/multilayer compatible relay program for relaying, to a second communication line, which is a mobile line, connection of a communication device that is connected to a first communication line, which is a wired line, the multiprotocol/multilayer compatible relay program causing a computer to execute:

a failure/recovery detection function that detects a failure and recovery of the first communication line;

a transmission/reception path control function that sets a switching control value for performing mutual switching control of a transmission/reception path between the first communication line and the second communication line in accordance with a detection result acquired by the failure/recovery detection function;

a first communication line transfer processing function that: transfers a packet received from the communication device to a WAN-side NIC as an interface that houses the first communication line; and transfers a packet received from the WAN-side NIC to the communication device; and

a second communication line transfer processing function that: converts a format of the packet received from the communication device and transfers the packet to a mobile communication unit as an interface that houses the second communication line; and converts

a format of the packet received from the mobile communication unit and transfers the packet to the communication device,

wherein the first communication line transfer processing function comprises:

a provider information analysis function that analyzes a connection-destination provider of the first communication line;

a connection session analysis function that analyzes a connection session with the first communication line; and

a transmission/reception packet analysis function that analyzes a packet notified from the connection session analysis function, and the second communication line transfer processing function comprises:

a provider searching processing function that searches for a provider;

a session establishing processing function that establishes an Internet connection from the communication device to the first communication line when there is a failure in the first communication line;

a session maintaining processing function that maintains the Internet connection of an Internet-connected session;

a mobile uplink packet conversion function that converts a format of a transmission/reception packet that varies between a case of using the first communication line and a case of using the second communication line, and transfers the transmission/reception packet to the mobile communication unit; and

a mobile downlink packet conversion function that converts a format of a transmission/reception packet that varies between the first communication line and the second communication line, and transfers the transmission/reception packet to a LAN-side NIC as an interface connecting to the communication device,

wherein the failure/recovery detection function comprises:

a reception packet monitoring function that monitors packets on the first communication line;

a failure detection function that detects a failure of the first communication line;

a recovery detection function that detects recovery of the first communication line;

a mobile use information management function that manages use information of the second communication line; and

wherein the transmission/reception path control function is configured to:

relay connection of the communication device to the second communication line by switching the transmission/reception path from the first communication line to the second communication line based on the switching control value set by the

transmission/reception path control function, when failure is detected by the failure detection function; and

relay connection of the communication device to the first communication line by switching the transmission/reception path from the second communication line to the first communication line based on the switching control value set by the transmission/reception path control function, when recovery from the failure is detected by the recovery detection function.

8. A multiprotocol/multilayer compatible relay method for relaying, to a second communication line, which is a mobile line, connection of a communication device that is connected to a first communication line, which is a wired line, the multiprotocol/multilayer compatible relay method comprising:

a failure/recovery detection step of detecting a failure and recovery of the first communication line;

a transmission/reception path control step of setting a switching control value for performing mutual switching control of a transmission/reception path between the first communication line and the second communication line in accordance with a detection result acquired by the failure/recovery detection step;

a first communication line transfer processing step of transferring a packet received from the communication device to a WAN-side NIC as an interface that houses the first communication line; and transferring a packet received from the WAN-side NIC to the communication device; and

a second communication line transfer processing step of: converting a format of the packet received from the communication device and transferring the packet to a mobile communication unit as an interface that houses the second communication line; and converting a format of the packet received from the mobile communication unit and transferring the packet to the communication device, wherein the first communication line transfer processing step comprises:

a provider information analysis step of analyzing a connection-destination provider of the first communication line;

a connection session analysis step of analyzing a connection session with the first communication line; and

a transmission/reception packet analysis step of analyzing a packet notified from the connection session analysis step, and the second communication line transfer processing step comprises:

a provider searching processing step of searching for a provider;

a session establishing processing step of establishing an Internet connection from the communication device to the first communication line when there is a failure in the first communication line;

a session maintaining processing step of maintaining the Internet connection of an Internet-connected session;

a mobile uplink packet conversion step of converting a format of a transmission/reception packet that varies between a case of using the first communication line and a case of using the second communication line, and transferring the transmission/reception packet to the mobile communication unit; and

a mobile downlink packet conversion step of converting a format of a transmission/reception packet that varies between the first communication line and the second communication line, and transferring the transmission/reception packet to a LAN-side NIC as an interface connecting to the communication device,

wherein the failure/recovery detection step comprises:

a reception packet monitoring step of monitoring packets on the first communication line;

a failure detection step of detecting a failure of the first communication line;

a recovery detection step of detecting recovery of the first communication line; and

a mobile use information management step of managing information of the second communication line;

wherein the transmission/reception path control step comprises:

relaying connection of the communication device to the second communication line by switching the transmission/reception path from the first communication line to the second communication line based on the switching control value set by the transmission/reception path control step, when failure is detected by the failure detection step; and

relaying connection of the communication device to the first communication line by switching the transmission/reception path from the second communication line to the first communication line based on the switching control value set by the transmission/reception path control step, when recovery from the failure is detected by the recovery detection step.