

Appendix F – '249 Patent Obviousness References Claim Chart

ADDITIONAL REFERENCES AND OBVIOUSNESS CHART FOR U.S. PATENT NO. 9,900,249

For the reasons explained in more detail in the cover pleading to Dell's Invalidity Contentions, to the extent a primary reference does not disclose one or more of the elements of the asserted claims, a person of ordinary skill in the art would be motivated to combine the primary reference with any other primary reference(s) that disclose that limitation or with the knowledge of one of ordinary skill in the art, including admitted prior art, and/or one or more of the references listed in the charts below or in the cover pleading to Dell's Invalidity Contentions. For clarity, obviousness grounds for each dependent claim incorporate obviousness grounds for the claim(s) from which it depends in addition to any obviousness grounds identified in the charts for the dependent claim. References to figures, drawings, and the like refer to the cited items as well as any accompanying or related text.

The prior art references included below are the following:

- U.S. Patent Publ. No. 2005/0111453 ("Mizutani")
- U.S. Patent Publ. No. 2009/0135823 ("Liu")
- RFC 2471 ("RFC") <https://datatracker.ietf.org/doc/html/rfc4271>

Asserted Claims	Obviousness References
[1.pre] 1. A packet forwarding node, comprising:	<i>See, e.g.:</i> Mizutani at Fig. 1:

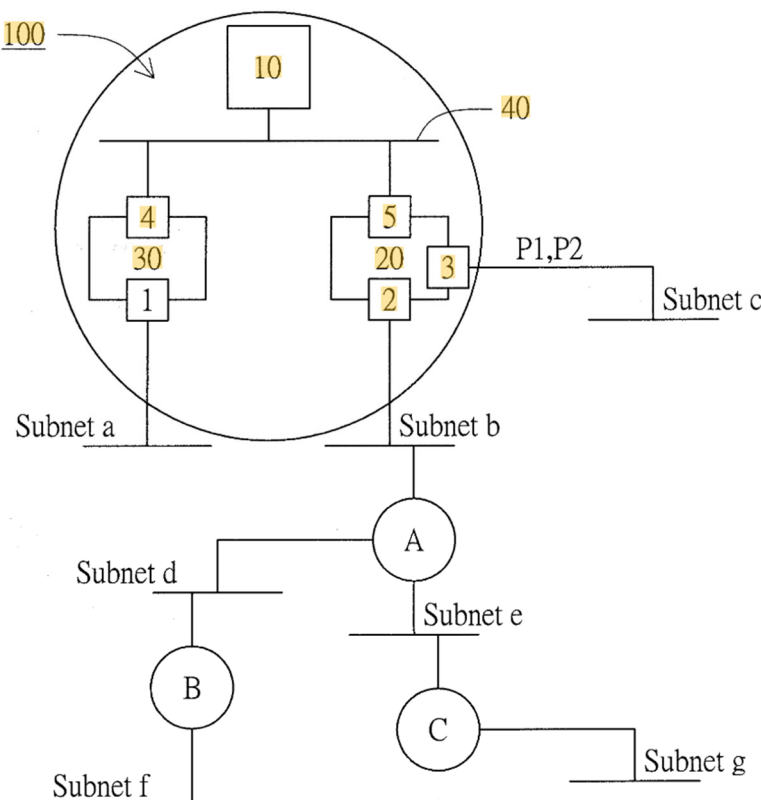
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Asserted Claims	Obviousness References
	FIG.1 The diagram, labeled FIG.1, illustrates an L7 MULTICAST DOMAIN (100). An L7 MULTICAST PACKET SENDER (101) is connected to an L7 MULTICAST PACKET FORWARDER (103) via a bidirectional arrow (103). This forwarder (103) is part of a mesh of four forwarders within the domain: 103, 104, 105, and 106. Forwarders 103 and 104 are connected by a bidirectional arrow (104). Forwarders 103 and 105 are connected by a bidirectional arrow (105). Forwarders 104 and 106 are connected by a bidirectional arrow (107). Forwarders 105 and 106 are connected by a bidirectional arrow (106). Forwarder 103 is also connected to forwarder 105 via a bidirectional arrow (105). Forwarder 106 is connected to forwarder 104 via a bidirectional arrow (107). Forwarder 105 is connected to forwarder 106 via a bidirectional arrow (106). Forwarder 103 is connected to an L7 PACKET RECEIVER (102a) via a bidirectional arrow (108). Forwarder 104 is connected to an L7 PACKET RECEIVER (102b) via a bidirectional arrow (109). Forwarder 105 is connected to an L7 PACKET RECEIVER (102c) via a bidirectional arrow (110). Forwarder 106 is connected to an L7 PACKET RECEIVER (102d) via a bidirectional arrow (111). The domain is also labeled with 1a, 1b, 1c, 1d, and 1e, which appear to be sub-domains or specific nodes within the domain. Mizutani at Fig. 12:

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	FIG.12 Liu at Fig. 1:

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	 FIG. 1 Liu at [0006]:

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Asserted Claims	Obviousness References												
	The invention is directed to a routing system, a control element, a routing method and a forming method for an exchanging table and a forwarding table. A label is obtained from the forwarding table of a first forwarding element according to a destination address of a packet, and it is detected whether to directly output the packet from the first forwarding element to the destination address or from a second forwarding element according to the label. The second forwarding element receives the packet and the label, and then obtains a next forwarding path from the exchanging table according to the label to forward the packet.												
[1.a] a storage unit including a non-transitory computer readable medium configured to store a packet forwarding table used for forwarding a packet based on an identifier which identifies a link between nodes on a packet forwarding path; and	See, e.g.: Mizutani at Fig. 3: FIG.3 301 302 305 303 <table><tr><td>MULTICAST DESTINATION ADDRESS</td><td>SOURCE ADDRESS</td><td>OUTPUT PORT ID</td></tr><tr><td>L7-mc1</td><td>ADDRESS 1</td><td>LOGICAL PORT 1</td></tr><tr><td>L7-mc2</td><td>ADDRESS 2</td><td>LOGICAL PORT 2</td></tr><tr><td>⋮</td><td>⋮</td><td>⋮</td></tr></table> 304 306	MULTICAST DESTINATION ADDRESS	SOURCE ADDRESS	OUTPUT PORT ID	L7-mc1	ADDRESS 1	LOGICAL PORT 1	L7-mc2	ADDRESS 2	LOGICAL PORT 2	⋮	⋮	⋮
MULTICAST DESTINATION ADDRESS	SOURCE ADDRESS	OUTPUT PORT ID											
L7-mc1	ADDRESS 1	LOGICAL PORT 1											
L7-mc2	ADDRESS 2	LOGICAL PORT 2											
⋮	⋮	⋮											

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Asserted Claims	Obviousness References
	Mizutani at Fig. 12: FIG.12 The diagram illustrates a network switch system. At the top, a 'FORWARDING CONTROL UNIT' (40) contains an 'L7 MULTICAST FORWARDING TABLE' (50). Below this, a central 'SWITCH' (20) is connected to an 'INPUT PORT' block (10) on the left and an 'OUTPUT PORT' block (30) on the right. The input port block contains multiple 'INPUT PORT' units (11-1, 11-2, ..., 11-n) receiving data from sources (12-1, 12-2, ..., 12-n). The output port block contains multiple 'OUTPUT PORT' units (31-1, 31-2, ..., 31-n) sending data to destinations (32-1, 32-2, ..., 32-n). A 'DATA PROCESSING UNIT' (60) is connected to the switch and a 'STORAGE UNIT' (2) at the bottom. Control signals (dashed lines) connect the forwarding control unit to the input/output port blocks and the data processing unit. Data flow (solid lines) connects the input/output port blocks to the switch and the data processing unit to the storage unit. A legend indicates that solid arrows represent 'DATA FLOW' and dashed arrows represent 'CONTROL SIGNAL'. Mizutani at Fig. 19:

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	FIG.19 <table><tr><td>1901</td><td>1902</td><td>1905</td><td>1903</td></tr><tr><td>MULTICAST DESTINATION ADDRESS</td><td>SOURCE ADDRESS</td><td></td><td>NEXT HOP ADDRESS</td></tr><tr><td>1904 NSA1</td><td>nsa1</td><td></td><td>/home 1906</td></tr><tr><td>NSA2</td><td>nsa2</td><td></td><td>0xbfbfd9e0</td></tr><tr><td>⋮</td><td>⋮</td><td></td><td>⋮</td></tr></table> Mizutani at Fig. 20:	1901	1902	1905	1903	MULTICAST DESTINATION ADDRESS	SOURCE ADDRESS		NEXT HOP ADDRESS	1904 NSA1	nsa1		/home 1906	NSA2	nsa2		0xbfbfd9e0	⋮	⋮		⋮
1901	1902	1905	1903																		
MULTICAST DESTINATION ADDRESS	SOURCE ADDRESS		NEXT HOP ADDRESS																		
1904 NSA1	nsa1		/home 1906																		
NSA2	nsa2		0xbfbfd9e0																		
⋮	⋮		⋮																		

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	FIG.20 L7 MULTICAST PACKET SENDER L7 MULTICAST PACKET FORWARDER SERVER OR STORAGE SWITCH STORAGE SYSTEM Liu at Figs. 2-4A:

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	<table><tr><th>Element symbol</th><th>Connection port symbol</th><th>Outward or inward</th></tr><tr><td>Second forwarding element</td><td>1</td><td>Outward</td></tr><tr><td>Second forwarding element</td><td>4</td><td>Inward</td></tr><tr><td>First forwarding element</td><td>2</td><td>Outward</td></tr><tr><td>First forwarding element</td><td>3</td><td>Outward</td></tr><tr><td>First forwarding element</td><td>5</td><td>Inward</td></tr></table> 50 FIG. 2 <table><tr><td></td><td>51</td><td>52</td><td>53</td></tr><tr><td></td><td>} Routing subnet field</td><td>} Routing interface field</td><td>} Routing gateway field</td></tr><tr><td>50(1) ~</td><td>a</td><td>1</td><td>*</td></tr><tr><td>50(2) ~</td><td>b</td><td>2</td><td>*</td></tr><tr><td>50(3) ~</td><td>c</td><td>3</td><td>*</td></tr><tr><td>50(4) ~</td><td>d</td><td>2</td><td>A</td></tr><tr><td>50(5) ~</td><td>e</td><td>2</td><td>A</td></tr><tr><td>50(6) ~</td><td>f</td><td>2</td><td>A</td></tr><tr><td>50(7) ~</td><td>g</td><td>2</td><td>A</td></tr></table> 60 FIG. 3 <table><tr><td></td><td>61</td><td>63</td><td>64</td><td>62</td></tr><tr><td></td><td>} Subnet field</td><td>} Interface field</td><td>} Gateway field</td><td>} Label field</td></tr><tr><td>60(1) ~</td><td>a</td><td>5</td><td>4</td><td>1</td></tr><tr><td>60(2) ~</td><td>b</td><td>2</td><td>*</td><td>0</td></tr><tr><td>60(3) ~</td><td>c</td><td>3</td><td>*</td><td>0</td></tr><tr><td>60(4) ~</td><td>d</td><td>2</td><td>A</td><td>0</td></tr><tr><td>60(5) ~</td><td>e</td><td>2</td><td>A</td><td>0</td></tr><tr><td>60(6) ~</td><td>f</td><td>2</td><td>A</td><td>0</td></tr><tr><td>60(7) ~</td><td>g</td><td>2</td><td>A</td><td>0</td></tr></table> FIG. 4A Liu at Figs, 4B-5B:	Element symbol	Connection port symbol	Outward or inward	Second forwarding element	1	Outward	Second forwarding element	4	Inward	First forwarding element	2	Outward	First forwarding element	3	Outward	First forwarding element	5	Inward		51	52	53		} Routing subnet field	} Routing interface field	} Routing gateway field	50(1) ~	a	1	*	50(2) ~	b	2	*	50(3) ~	c	3	*	50(4) ~	d	2	A	50(5) ~	e	2	A	50(6) ~	f	2	A	50(7) ~	g	2	A		61	63	64	62		} Subnet field	} Interface field	} Gateway field	} Label field	60(1) ~	a	5	4	1	60(2) ~	b	2	*	0	60(3) ~	c	3	*	0	60(4) ~	d	2	A	0	60(5) ~	e	2	A	0	60(6) ~	f	2	A	0	60(7) ~	g	2	A	0
Element symbol	Connection port symbol	Outward or inward																																																																																																		
Second forwarding element	1	Outward																																																																																																		
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Asserted Claims	Obviousness References																																																																
	70 71 73 74 72 <table><tr><td></td><td>Subnet field</td><td>Interface field</td><td>Gateway field</td><td>Label field</td></tr><tr><td>70(1)</td><td>a</td><td>1</td><td>*</td><td>0</td></tr><tr><td>70(2)</td><td>b</td><td>4</td><td>5</td><td>1</td></tr><tr><td>70(3)</td><td>c</td><td>4</td><td>5</td><td>3</td></tr><tr><td>70(4)</td><td>d</td><td>4</td><td>5</td><td>2</td></tr><tr><td>70(5)</td><td>e</td><td>4</td><td>5</td><td>2</td></tr><tr><td>70(6)</td><td>f</td><td>4</td><td>5</td><td>2</td></tr><tr><td>70(7)</td><td>g</td><td>4</td><td>5</td><td>2</td></tr></table> FIG. 4B 80 81 82 83 <table><tr><td></td><td>Label field</td><td>Interface field</td><td>Gateway field</td></tr><tr><td>80(1)</td><td>1</td><td>2</td><td>*</td></tr><tr><td>80(2)</td><td>2</td><td>2</td><td>A</td></tr><tr><td>80(3)</td><td>3</td><td>3</td><td>*</td></tr></table> FIG. 5A 90 91 92 93 <table><tr><td></td><td>Label field</td><td>Interface field</td><td>Gateway field</td></tr><tr><td>90(1)</td><td>1</td><td>1</td><td>*</td></tr></table> FIG. 5B Liu at Figs. 6-7:		Subnet field	Interface field	Gateway field	Label field	70(1)	a	1	*	0	70(2)	b	4	5	1	70(3)	c	4	5	3	70(4)	d	4	5	2	70(5)	e	4	5	2	70(6)	f	4	5	2	70(7)	g	4	5	2		Label field	Interface field	Gateway field	80(1)	1	2	*	80(2)	2	2	A	80(3)	3	3	*		Label field	Interface field	Gateway field	90(1)	1	1	*
	Subnet field	Interface field	Gateway field	Label field																																																													
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70(2)	b	4	5	1																																																													
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70(6)	f	4	5	2																																																													
70(7)	g	4	5	2																																																													
	Label field	Interface field	Gateway field																																																														
80(1)	1	2	*																																																														
80(2)	2	2	A																																																														
80(3)	3	3	*																																																														
	Label field	Interface field	Gateway field																																																														
90(1)	1	1	*																																																														

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Asserted Claims	Obviousness References
	Control element 10 11 Forwarding table forming unit 12 Exchanging table forming unit FIG. 6 START Form each piece of exchanging data according to whether a connection port recorded in a routing interface field of each piece of routing data pertains to a second forwarding element S610 Form each piece of forwarding data according to whether the connection port recorded in the routing interface field of each piece of routing data pertains to a first forwarding element S620 END FIG. 7 Mizutani at [0045]:

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Asserted Claims	Obviousness References
	The packet is composed of a header section and a data section 203. The header section is composed of a destination address (DA) 201 of the L7 multicast represented by an identifier to identify the information of the application layer and a source address (SA) 202 to identify a source of the L7 multicast address. The destination address retrieving process of the packet in the multicast determines an entry in which the destination address (DA) 201 and the source address (SA) 202 are coincident with each other, as the destination of a next hop, from the table entry registered in the forwarding table. Mizutani at [0046]: FIG. 3 is a configuration block diagram of the forwarding table (L7 multicast forwarding table) used by the L7 packet forwarder, in the first embodiment of this invention. Mizutani at [0047]: The L7 multicast forwarding table includes: a multicast destination address 301 that is an identifier of L7; an L7 network address (source address) 302 that is an identifier of the source; and an output port ID 303 that is representation of a next destination of the L7 multicast group. Mizutani at [0048]: The multicast destination address 301 and source address 302 which are located at the entry of the L7 multicast forwarding table are addresses (304, 305) both identified on the logical network in the application layer. The multicast destination address 301 is such that the L7 network addresses which can be singly identified on the network are grouped. Also,

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	the output port ID 303 is an identifier (306) of a logical port number to transmit the data packet to a next forwarder. This identifier uses a port name, or a physical or logical network address of a port and the like. Liu at [0007]: According to a first aspect of the present invention, a routing system including a control element, a first forwarding element and a second forwarding element is provided. The control element forms a forwarding table and an exchanging table according to a routing table. The first forwarding element receives a packet, obtains a corresponding label from the forwarding table according to a destination address of the packet, and determines whether to output the packet directly from the first forwarding element to the destination address of the packet according to the label. The second forwarding element receives the packet and the label outputted from the first forwarding element and obtains a next forwarding path from the exchanging table according to the label to forward the packet if the packet is to be outputted from the second forwarding element. Liu at [0008]: According to a second aspect of the present invention, a control element applied to a routing system is provided. The control element includes a forwarding table forming unit and an exchanging table forming unit. The forwarding table forming unit forms a forwarding table of a first forwarding element according to a routing table. The first forwarding element receives a packet and obtains a corresponding label from the forwarding table according to a destination address of the packet. The exchanging table forming unit forms an exchanging table of a second forwarding element according to the routing table. The second forwarding element receives the packet and the label outputted

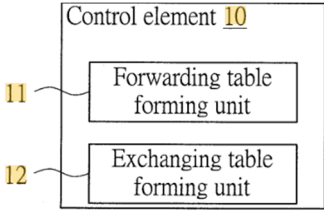
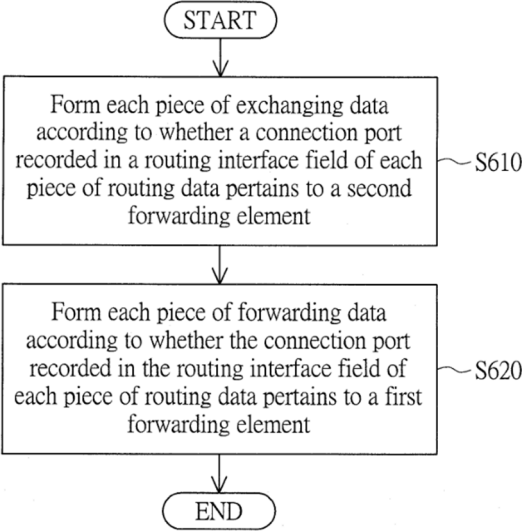
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Asserted Claims	Obviousness References
	from the first forwarding element, and obtains a next forwarding path from the exchanging table according to the label to forward the packet.
[1.b] at least one processor configured to execute program instructions to provide a forwarding unit configured to:	See, e.g.: Mizutani at Fig. 6: FIG. 6 The diagram illustrates a network switch architecture. At the top, a FORWARDING CONTROL UNIT (40) contains an L7 MULTICAST FORWARDING TABLE (50). Below this unit is a central SWITCH (20). To the left of the switch is an INPUT PORT block (10) containing multiple individual input ports (11-1, 11-2, ..., 11-n). To the right of the switch is an OUTPUT PORT block (30) containing multiple individual output ports (31-1, 31-2, ..., 31-n). External inputs (12-1, 12-2, ..., 12-n) enter the input ports. External outputs (32-1, 32-2, ..., 32-n) exit the output ports. Solid arrows represent DATA FLOW, and dashed arrows represent CONTROL SIGNAL. Control signals 801, 802, and 803 connect the forwarding control unit to the input, switch, and output port blocks, respectively. Mizutani at Fig. 12:

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Asserted Claims	Obviousness References
	FIG.12 Liu at Figs. 6-7:

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Asserted Claims	Obviousness References
	 Control element 10 11 Forwarding table forming unit 12 Exchanging table forming unit FIG. 6 <pre>graph TD; START([START]) --> S610[Form each piece of exchanging data according to whether a connection port recorded in a routing interface field of each piece of routing data pertains to a second forwarding element]; S610 --> S620[Form each piece of forwarding data according to whether the connection port recorded in the routing interface field of each piece of routing data pertains to a first forwarding element]; S620 --> END([END]);</pre> FIG. 7 Liu at [0008]: According to a second aspect of the present invention, a control element applied to a routing system is provided. The control element includes a forwarding table forming unit

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	and an exchanging table forming unit. The forwarding table forming unit forms a forwarding table of a first forwarding element according to a routing table. The first forwarding element receives a packet and obtains a corresponding label from the forwarding table according to a destination address of the packet. The exchanging table forming unit forms an exchanging table of a second forwarding element according to the routing table. The second forwarding element receives the packet and the label outputted from the first forwarding element, and obtains a next forwarding path from the exchanging table according to the label to forward the packet.
[1.c] receive an incoming packet including a plurality of the identifiers;	<i>See, e.g.:</i> Mizutani at Fig. 8:

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	FIG.8 <pre>graph TD; 801[801 RECEIVE PACKET] --> 802[802 EXTRACT HEADER]; 802 --> 803{803 IS THE PACKET FOR L7 MULTICAST FORWARDING?}; 803 -- N --> 810[810 TRANSMIT PACKET WITH NETWORK LAYER PROCESSING]; 803 -- Y --> 804{804 DOES THE PACKET MEET THE FORWARDING CONDITION?}; 804 -- N --> 809[809 DELETE PACKET]; 804 -- Y --> 805[805 RETRIEVE DESTINATION FROM L7 MULTICAST FORWARDING TABLE]; 805 --> 806{806 CAN THE DESTINATION BE FOUND IN THE FORWARDING DIRECTION?}; 806 -- N --> 809; 806 -- Y --> 807[807 PERFORM HEADER PROCESSING]; 807 --> 808[808 TRANSMIT PACKET]; 808 --> END([END]); 809 --> END; 810 --> END;</pre> Mizutani at Fig. 17:

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Asserted Claims	Obviousness References			
	FIG.17 1701 1702 1703 <table><tr><td>DESTINATION ADDRESS</td><td>SOURCE ADDRESS</td><td>TRANSMISSION CONTROL SIGNAL ID REQUESTED PACKET ID</td></tr></table> Liu at Fig. 8:	DESTINATION ADDRESS	SOURCE ADDRESS	TRANSMISSION CONTROL SIGNAL ID REQUESTED PACKET ID
DESTINATION ADDRESS	SOURCE ADDRESS	TRANSMISSION CONTROL SIGNAL ID REQUESTED PACKET ID		

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Asserted Claims	Obviousness References
	<pre>graph TD; START([START]) --> S611{Judge whether a connection port recorded in a routing interface field of each piece of routing data pertains to a second forwarding element}; S611 -- NO --> END([END]); S611 -- YES --> S612{Judge whether the routing interface field and a routing gateway field have a corresponding label}; S612 -- YES --> END; S612 -- NO --> S613[Record a label field of the piece of exchanging data as another label]; S613 --> S614[Record an interface field of the piece of exchanging data as a connection port recorded in the routing interface field of the piece of routing data, and record a gateway field of the piece of exchanging data as a next hop recorded in the routing gateway field of the piece of routing data]; S614 --> END;</pre> FIG. 8 Mizutani at [0041]: The L7 multicast sender 101, the L7 packet forwarder 1, and the receiver 102 use the identifiers singly represented on the network in the application layer as the L7 network

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	address. The L7 multicast sender 101, the L7 packet forwarder 1, and the receiver 102 are connected to each other by using the network, such as a physical line of Ethernet and the like, a wireless LAN, and logically identified connection ports. The network topology in the application layer is logically configured independently of the network establishment in the conventional network layer. The configuration may be different from the topology represented by the protocol of a lower layer. Mizutani at [0042]: Each of the logical connection ports contained by the L7 packet forwarders 1 a to 1 e has an L7 network address represented by an identifier of an application layer (L7). Each of the L7 packet forwarders 1 a to 1 e holds in the device an L7 forwarding table based on the L7 network address information. The information of the L7 network addresses is informed through the L7 packet forwarders 1 a to 1 e to each other, or set for the respective L7 packet forwarders 1 a to 1 e by a manager. Mizutani at [0043]: The data (content) held in the L7 multicast sender 101 is fragmented into necessary packet sizes, and the header for the L7 multicast domain is added thereto, and it is transmitted to the L7 packet forwarder 1 in the L7 multicast domain. The L7 packet forwarders 1 a to 1 e receiving the data packet having the L7 multicast address, refer to an L7 forwarding table of the self-device, and transmit the data packet to the receiver 102 belonging to a multicast group that is a destination of the data packet. Mizutani at [0044]: FIG. 2 is a configuration block diagram of an L7 multicast data packet according to the first embodiment of this invention.

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Asserted Claims	Obviousness References
	Mizutani at [0045]: The packet is composed of a header section and a data section 203. The header section is composed of a destination address (DA) 201 of the L7 multicast represented by an identifier to identify the information of the application layer and a source address (SA) 202 to identify a source of the L7 multicast address. The destination address retrieving process of the packet in the multicast determines an entry in which the destination address (DA) 201 and the source address (SA) 202 are coincident with each other, as the destination of a next hop, from the table entry registered in the forwarding table. Mizutani at [0062]: As shown in FIG. 2, the header necessary for the multicast forwarding includes: an L7 multicast group address that is an identifier on the logical network composed of the application layers; and a source network address that is an identifier of the source sender at Layer 7. Moreover, examples of the information indicating the content of the data packet include a data ID that is an identifier of transmission data and a sequence number of a packet to be identified on the network. Mizutani at [0064]: In the forwarder 1, the input ports 11-1 to 11-n receive the data packet through logical lines 12-1 to 12-n (801). The input unit 10 extracts the header from the received data packet (802). Next, with reference to the extracted header, whether or not the data packet is the packet of the target of the L7 multicast forwarding is judged (803). If it is not the packet of the target of the multicast, the transmitting process in the usual network layer, or the transmitting process of the higher layer by using the network address defined in the application layer is carried out (810), and the process is ended. If the received data packet

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Asserted Claims	Obviousness References
	is the data packet of the target of the multicast, the flow of the process proceeds to a step 804. Liu at [0035]: After receiving the packet from the external network, the first forwarding element 20 obtains the label from the forwarding table 60 according to the destination address of the packet, and determines whether the packet is to be directly outputted from the first forwarding element 20 to the destination address of the packet according to the label. If the packet is to be outputted from the second forwarding element 30, the second forwarding element 30 receives the packet and the label, and obtains a next forwarding path from the exchanging table 90 according to the label, wherein the packet is forwarded by the next forwarding path. In this embodiment, the method of determining whether the packet is to be outputted from the first forwarding element 20 or the second forwarding element 30 is to judge whether the label is a specific value. When the label is not the specific value, the first forwarding element 20 outputs the packet and the label to the second forwarding element 30. When the label is the specific value, the first forwarding element 20 directly outputs the packet to the external network according to other field information of the forwarding table 60. Liu at [0042]: As shown in FIG. 4A, the forwarding table 60 of the first forwarding element 20 includes several pieces of forwarding data 60(1) to 60(7). Each piece of forwarding data includes a subnet field 61, a label field 62, an interface field 63 and a gateway field 64. The subnet field 61 is designated as the subnets a to g. The label field 62 has labels corresponding to the subnets a to g designated in the subnet field 61. The label is the specific value or is not the specific value. The specific value is a constant set in advance, for example. In this embodiment, the specific value is set as "0". However, the specific value may also be set as any other constant. The interface field 63 records one of the connection ports of the first

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Asserted Claims	Obviousness References
	forwarding element 20, and the first forwarding element 20 outputs the packet according to the connection port recorded in the interface field 63. The gateway field 64 has a next hop from the connection port recorded in the interface field 63 to the subnet recorded in the subnet field 61. Liu at [0070]: In order to forward the label between the first forwarding element 20 and the second forwarding element 30, the label may be carried within the routing system 100 according to the virtual local area network tag (VLAN tag), the multi-protocol label switching (MPLS) or any other method, which is applied to the internal network 40 without influencing the forwarding function. Liu at [0071]: In this embodiment, the method of carrying the label in the packet is to record the label to the VLAN tag of the packet. FIG. 10 is a schematic illustration showing a packet having a VLAN tag. When the packet carries the label, it is a packet satisfying the 802.1Q protocol and includes an Ethernet header 15, a VLAN tag 13 and an Ethernet payload 19. Compared with the typical Ethernet packet, the packet further includes the VLAN tag 13, which includes a VLAN protocol identifier (VLAN protocol ID) 16 and tag control information 17. Liu at [0072]: When the VLAN protocol ID 16 is recorded as the value of 0x8100, it represents that the packet satisfies the 802.1Q protocol. The tag control information 17 records the information of the virtual local area network and includes a priority field 17 a, a canonical format indicator (CFI) 17 b and a VLAN indicator 17 c. The priority field 17 a designates

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Asserted Claims	Obviousness References
	the priority order of the packet. The CFI 17 b is designated as “0” to represent that the packet does not include the routing information field (RIF). In the specification of the VLAN, the VLAN indicator 17 c designates which VLAN the packet pertains to. In this embodiment, the VLAN indicator 17 c records the label of the packet so that the packet carries the label. The Ethernet payload 19 includes an IP header 18 and data 14. The content of the packet is recorded in the data 14. Liu at [0074]: In addition, the IP header 18 of the packet includes a time-to-live (TTL) parameter 18 a for recording a limit period time of the packet. When the TTL parameter 18 a is descended till 0, it represents that the forwarding path of the packet is too long, and the packet should be discarded. Liu at [0075]: FIG. 11 is a flow chart showing a routing method. Referring to FIG. 11 in conjunction with the element symbols in FIGS. 1, 4A and 5B, the method includes the following steps. First, as shown in step S710, the forwarding table forming unit 11 of the control element 10 forms the forwarding table 60 of the first forwarding element 20 according to the routing table 50, and the exchanging table forming unit 12 of the control element 10 forms the exchanging table 90 of the second forwarding element 30 according to the routing table 50. Liu at [0076]: Next, as shown in step S720, the first forwarding element 20 receives the packet from the external network.

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Asserted Claims	Obviousness References
	Liu at [0077]: Then, as shown in step S730, the first forwarding element 20 obtains the corresponding label from the forwarding table 60 according to the destination address of the packet, and determines to output the packet from the first forwarding element 20 or the second forwarding element 30 according to the label. If the packet is to be outputted from the first forwarding element 20, the packet is directly outputted to the destination address of the packet. Liu at [0078]: Next, as shown in step S740, if the packet is to be outputted from the second forwarding element 30, the second forwarding element 30 receives the packet and the label from the internal network 40. The label is recorded to the VLAN tag of the packet so that the packet can carry the label. However, the packet may also carry the label according to the MPLS format. Liu at [0079]: Then, as shown in step S750, the second forwarding element 30 obtains the next forwarding path from the exchanging table 90 according to the label so that the packet can be forwarded by the next forwarding path. Liu at [0080]: FIG. 12 is a detailed flow chart showing the routing method of FIG. 11. Please refer to FIG. 12 in conjunction with the element symbols in FIGS. 1, 4A and 5B. The steps S710,

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Asserted Claims	Obviousness References
	S720, S740 and S750 in FIG. 12 are the same as the steps S710, S720, S740 and S750 in FIG. 11, so detailed descriptions thereof will be omitted. RFC at Pgs.13-14: Rekhter, et al. Standards Track [Page 13] RFC 4271 BGP-4 January 2006 Time. The calculated value indicates the maximum number of seconds that may elapse between the receipt of successive KEEPALIVE and/or UPDATE messages from the sender. BGP Identifier: This 4-octet unsigned integer indicates the BGP Identifier of the sender. A given BGP speaker sets the value of its BGP Identifier to an IP address that is assigned to that BGP speaker. The value of the BGP Identifier is determined upon startup and is the same for every local interface and BGP peer. Optional Parameters Length: This 1-octet unsigned integer indicates the total length of the Optional Parameters field in octets. If the value of this field is zero, no Optional Parameters are present. Optional Parameters: This field contains a list of optional parameters, in which each parameter is encoded as a <Parameter Type, Parameter Length, Parameter Value> triplet. 01 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 +--+--+--+--+--+--+--+--+--+--+--+--+--+--+... Parm. Type Parm. Length Parameter Value (variable) +--+--+--+--+--+--+--+--+--+--+--+--+--+--+... Parameter Type is a one octet field that unambiguously identifies individual parameters. Parameter Length is a one octet field that contains the length of the Parameter Value field in octets. Parameter Value is a variable length field that is interpreted according to the value of the Parameter Type field. [RFC3392] defines the Capabilities Optional Parameter. The minimum length of the OPEN message is 29 octets (including the message header).

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Asserted Claims	Obviousness References
	RFC at Pgs. 14-15: RFC 4271 BGP-4 January 2006 information loops and some other anomalies may be detected and removed from inter-AS routing. An UPDATE message is used to advertise feasible routes that share common path attributes to a peer, or to withdraw multiple unfeasible routes from service (see 3.1). An UPDATE message MAY simultaneously advertise a feasible route and withdraw multiple unfeasible routes from service. The UPDATE message always includes the fixed-size BGP header, and also includes the other fields, as shown below (note, some of the shown fields may not be present in every UPDATE message): <pre>+-----+ Withdrawn Routes Length (2 octets) +-----+ Withdrawn Routes (variable) +-----+ Total Path Attribute Length (2 octets) +-----+ Path Attributes (variable) +-----+ Network Layer Reachability Information (variable) +-----+</pre> Withdrawn Routes Length: This 2-octets unsigned integer indicates the total length of the Withdrawn Routes field in octets. Its value allows the length of the Network Layer Reachability Information field to be determined, as specified below. A value of 0 indicates that no routes are being withdrawn from service, and that the WITHDRAWN ROUTES field is not present in this UPDATE message. Withdrawn Routes: This is a variable-length field that contains a list of IP address prefixes for the routes that are being withdrawn from service. Each IP address prefix is encoded as a 2-tuple of the form <length, prefix>, whose fields are described below: <pre>+-----+ Length (1 octet) +-----+ Prefix (variable) +-----+</pre> Rekhter, et al. Standards Track [Page 15]

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Asserted Claims	Obviousness References
	RFC at Pgs. 15-16: Path Attributes: A variable-length sequence of path attributes is present in every UPDATE message, except for an UPDATE message that carries only the withdrawn routes. Each path attribute is a triple <attribute type, attribute length, attribute value> of variable length. Attribute Type is a two-octet field that consists of the Attribute Flags octet, followed by the Attribute Type Code octet. <pre> 0 1 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 +-+--+--+--+--+--+--+--+--+--+--+ Attr. Flags Attr. Type Code +-+--+--+--+--+--+--+--+--+--+--+ </pre> The high-order bit (bit 0) of the Attribute Flags octet is the Optional bit. It defines whether the attribute is optional (if set to 1) or well-known (if set to 0). Rekhter, et al. Standards Track [Page 16]
[1.d] determine a direction to forward the incoming packet;	See, e.g.: Mizutani at Fig. 8:

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Asserted Claims	Obviousness References
	FIG.8 <pre> graph TD 801[801 RECEIVE PACKET] --> 802[802 EXTRACT HEADER] 802 --> 803{803 IS THE PACKET FOR L7 MULTICAST FORWARDING?} 803 -- N --> 810[810 TRANSMIT PACKET WITH NETWORK LAYER PROCESSING] 803 -- Y --> 804{804 DOES THE PACKET MEET THE FORWARDING CONDITION?} 804 -- N --> 809[809 DELETE PACKET] 804 -- Y --> 805[805 RETRIEVE DESTINATION FROM L7 MULTICAST FORWARDING TABLE] 805 --> 806{806 CAN THE DESTINATION BE FOUND IN THE FORWARDING DIRECTION?} 806 -- N --> 809 806 -- Y --> 807[807 PERFORM HEADER PROCESSING] 807 --> 808[808 TRANSMIT PACKET] 808 --> END([END]) 809 --> END 810 --> END </pre> Mizutani at Fig. 13:

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Asserted Claims	Obviousness References
	FIG.13 <pre> graph TD 1201[RECEIVE PACKET] --> 1202[EXTRACT HEADER] 1202 --> 1203{IS THE PACKET FOR L7 MULTICAST FORWARDING?} 1203 -- N --> 1211[TRANSMIT PACKET WITH NETWORK LAYER PROCESSING] 1211 --> END1([END]) 1203 -- Y --> 1204{DOES THE PACKET MEET THE FORWARDING CONDITION?} 1204 -- N --> 1210[DELETE PACKET] 1204 -- Y --> 1205[RETRIEVE THE DESTINATION FROM L7 MULTICAST FORWARDING TABLE] 1205 --> 1206{CAN THE DESTINATION BE FOUND IN THE FORWARDING DIRECTION?} 1206 -- N --> 1210 1206 -- Y --> 1207{IS FREE STORAGE SPACE ENOUGH FOR STORING THE RECEIVED DATA?} 1207 -- Y --> 1204_2[STORE THE DATA] 1207 -- N --> 1208[PERFORM HEADER PROCESSING] 1204_2 --> 1208 1208 --> 1209[TRANSMIT PACKET] 1209 --> END2([END]) 1210 --> 1209 </pre>
[1.e] determine whether to forward to an external network;	<i>See, e.g.:</i> Mizutani at Fig. 8:

Appendix F – '249 Patent Obviousness References Claim Chart

Asserted Claims	Obviousness References
	FIG.8 <pre> graph TD 801[801 RECEIVE PACKET] --> 802[802 EXTRACT HEADER] 802 --> 803{803 IS THE PACKET FOR L7 MULTICAST FORWARDING?} 803 -- N --> 810[810 TRANSMIT PACKET WITH NETWORK LAYER PROCESSING] 803 -- Y --> 804{804 DOES THE PACKET MEET THE FORWARDING CONDITION?} 804 -- N --> 809[809 DELETE PACKET] 804 -- Y --> 805[805 RETRIEVE DESTINATION FROM L7 MULTICAST FORWARDING TABLE] 805 --> 806{806 CAN THE DESTINATION BE FOUND IN THE FORWARDING DIRECTION?} 806 -- N --> 809 806 -- Y --> 807[807 PERFORM HEADER PROCESSING] 807 --> 808[808 TRANSMIT PACKET] 808 --> END([END]) 809 --> END 810 --> END </pre> Mizutani at Fig. 13:

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Asserted Claims	Obviousness References
	FIG.13 <pre> graph TD 1201[RECEIVE PACKET] --> 1202[EXTRACT HEADER] 1202 --> 1203{IS THE PACKET FOR L7 MULTICAST FORWARDING?} 1203 -- N --> 1211[TRANSMIT PACKET WITH NETWORK LAYER PROCESSING] 1211 --> END1([END]) 1203 -- Y --> 1204{DOES THE PACKET MEET THE FORWARDING CONDITION?} 1204 -- N --> 1210[DELETE PACKET] 1204 -- Y --> 1205[RETRIEVE THE DESTINATION FROM L7 MULTICAST FORWARDING TABLE] 1205 --> 1206{CAN THE DESTINATION BE FOUND IN THE FORWARDING DIRECTION?} 1206 -- N --> 1210 1206 -- Y --> 1207{IS FREE STORAGE SPACE ENOUGH FOR STORING THE RECEIVED DATA?} 1207 -- Y --> 1204_STORE[STORE THE DATA] 1207 -- N --> 1208[PERFORM HEADER PROCESSING] 1204_STORE --> 1208 1210 --> 1208 1208 --> 1209[TRANSMIT PACKET] 1209 --> END2([END]) </pre> Mizutani at [0065]: In the multicast transmitting of the IP network, the function of limiting the arrival range of the multicast packet (for example, the arrival limit based on the number of effective next

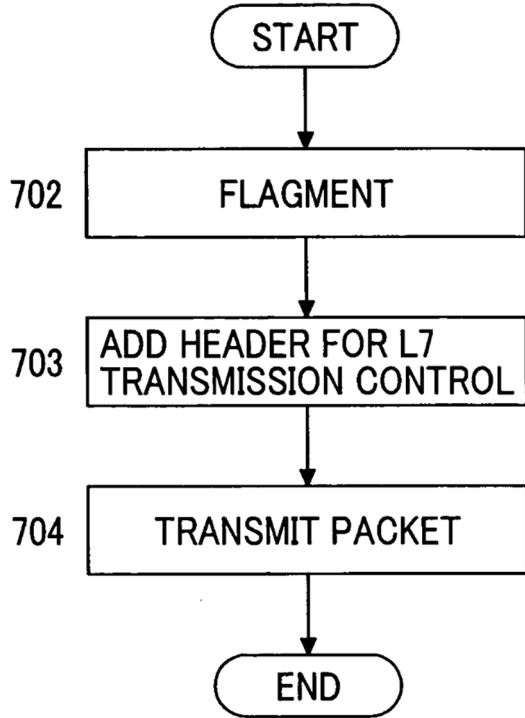
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Asserted Claims	Obviousness References
	hops or VPN) is used so as not to increase the traffic on the network unnecessarily. Even the case of the multicast in the application layer in this invention is similarly processed. That is, the forwarding limit information to limit the arrival range is given to the header. Then, whether or not the header has the forwarding limit information is judged. Specifically, whether or not the forwarding limit exceeds the defined number of the hops and the data packet can be forwarded to a next hop is judged (804). When judged that the data packet that cannot be forwarded exists because the packet already exceeds the defined number of the hops or other reasons, the received data packet and the information with regard to the data packet are deleted, and the forwarding process is ended (809). Mizutani at [0066]: At the step 804, when the data packet is judged to be forwarded, with reference to the L7 multicast forwarding table 50 of the forwarding control unit 40, the destination group address and the source L7 network address are retrieved from the header, and the destination port is determined (805). When it is judged as the retrieved result of the L7 multicast forwarding table 50 that the destination information of the data packet cannot be obtained or the destination of the terminal or the like belonging to the multicast group address does not exist in the destination of the self-device, the received data packet and the information with regard to the data packet are deleted, and the forwarding process is ended (809). When the destination of the data packet is judged to exist, the necessary process of the header and the duplicating process of the packet corresponding to the number of the destinations are carried out (807). Then, from the output port corresponding to the destination, the data packet is transmitted to the node that is the next hop (the L7 packet forwarder 1, the receiver 102, and the like) (808), and the forwarding process is ended.
[1.f] add to path or link information when the incoming packet is not forwarded to the external network;	<i>See, e.g.:</i> Mizutani at Fig. 4:

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Asserted Claims	Obviousness References
	FIG.4 Mizutani at Fig. 7:

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Asserted Claims	Obviousness References
	FIG.7  <pre> graph TD START([START]) --> 702[702 FLAGMENT] 702 --> 703[703 ADD HEADER FOR L7 TRANSMISSION CONTROL] 703 --> 704[704 TRANSMIT PACKET] 704 --> END([END]) </pre> Mizutani at Fig. 16:

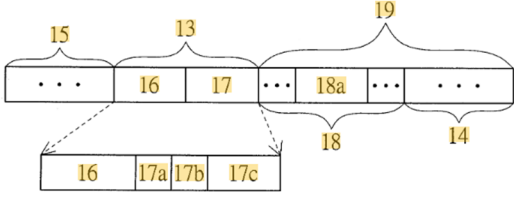
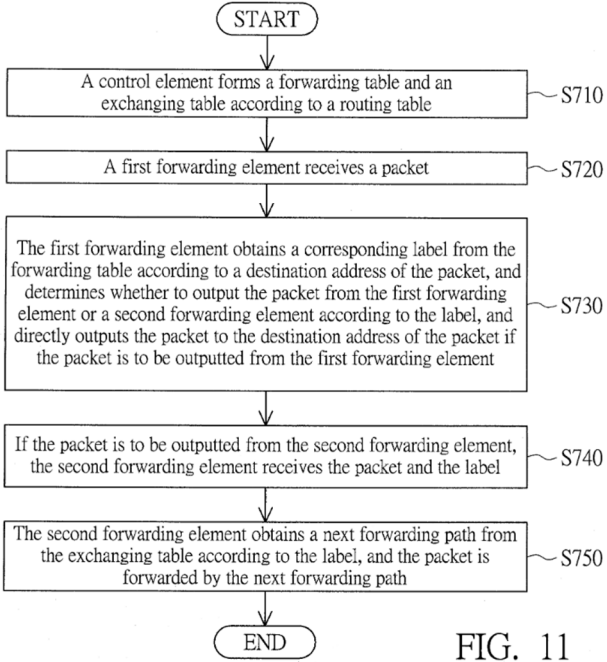
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Asserted Claims	Obviousness References
	FIG.16 <pre> graph TD 1601[RECEIVE REQUEST FOR RETRANSMISSION] --> 1602{IS A COPY OF TRANSMIT-FAILED PACKET IN THE STORAGE?} 1602 -- N --> 1611[REQUEST FOR PACKET RETRANSMISSION TO AN UPPER STREAM NODE] 1611 --> 1612[RECEIVE AND STORE THE PACKET] 1602 -- Y --> 1603{IS A SESSION BETWEEN REQUEST-SENDER AND RECEIVER AVAILABLE?} 1603 -- N --> 1610[ESTABLISH SESSION] 1603 -- Y --> 1604[READOUT DATA AND GENERATE PACKET] 1610 --> 1604 1612 --> 1604 1604 --> 1606[ADD HEADER] 1606 --> 1607[RETRANSMIT BY REQUESTED ROUTE] 1607 --> 1608{SUCCESS?} 1608 -- N --> 1610 1608 -- Y --> 1609[DELETE THE PACKET INFORMATION FROM MEMORY] 1609 --> END([END]) </pre> Mizutani at Fig. 17:

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Asserted Claims	Obviousness References			
	FIG.17 1701 1702 1703 <table><tr><td>DESTINATION ADDRESS</td><td>SOURCE ADDRESS</td><td>TRANSMISSION CONTROL SIGNAL ID REQUESTED PACKET ID</td></tr></table> Liu at Fig. Fig 11:	DESTINATION ADDRESS	SOURCE ADDRESS	TRANSMISSION CONTROL SIGNAL ID REQUESTED PACKET ID
DESTINATION ADDRESS	SOURCE ADDRESS	TRANSMISSION CONTROL SIGNAL ID REQUESTED PACKET ID		

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Asserted Claims	Obviousness References
	 FIG. 10  FIG. 11
[1.g] remove path or link information header when the incoming packet is forwarded to the external network; and	<i>See, e.g.:</i> Mizutani at Fig. 8:

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Asserted Claims	Obviousness References
	FIG.8 <pre> graph TD 801[801 RECEIVE PACKET] --> 802[802 EXTRACT HEADER] 802 --> 803{803 IS THE PACKET FOR L7 MULTICAST FORWARDING?} 803 -- N --> 810[810 TRANSMIT PACKET WITH NETWORK LAYER PROCESSING] 803 -- Y --> 804{804 DOES THE PACKET MEET THE FORWARDING CONDITION?} 804 -- N --> 809[809 DELETE PACKET] 804 -- Y --> 805[805 RETRIEVE DESTINATION FROM L7 MULTICAST FORWARDING TABLE] 805 --> 806{806 CAN THE DESTINATION BE FOUND IN THE FORWARDING DIRECTION?} 806 -- N --> 809 806 -- Y --> 807[807 PERFORM HEADER PROCESSING] 807 --> 808[808 TRANSMIT PACKET] 808 --> END([END]) 809 --> END 810 --> END </pre> Liu at [0073]: The VLAN tag 13 only exists in the packet when the packet is forwarded in the routing system 100. That is, when the first forwarding element 20 or the second forwarding

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Asserted Claims	Obviousness References
	element 30 receives the packet from the external network, the packet only has the Ethernet header 15 and the Ethernet payload 19. When the packet is forwarded from the first forwarding element 20 to the second forwarding element 30, or from the second forwarding element 30 to the first forwarding element 20, the VLAN protocol ID 16 and the tag control information 17 are added to the packet so that the label is carried. When the packet is directly forwarded from the first forwarding element 20 or the second forwarding element 30 to the external network, the packet only has the Ethernet header 15 and the Ethernet payload 19. Consequently, the method of carrying the label by the packet does not influence the forwarding way and format of the packet between the external networks.
[1.h] forward the incoming packet by using a path or link that corresponds to the identifier from among the plurality of the identifiers.	<i>See, e.g.:</i> Mizutani at Fig. 8:

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Asserted Claims	Obviousness References
	FIG.8 <pre>graph TD; 801[801 RECEIVE PACKET] --> 802[802 EXTRACT HEADER]; 802 --> 803{803 IS THE PACKET FOR L7 MULTICAST FORWARDING?}; 803 -- N --> 810[810 TRANSMIT PACKET WITH NETWORK LAYER PROCESSING]; 803 -- Y --> 804{804 DOES THE PACKET MEET THE FORWARDING CONDITION?}; 804 -- N --> 809[809 DELETE PACKET]; 804 -- Y --> 805[805 RETRIEVE DESTINATION FROM L7 MULTICAST FORWARDING TABLE]; 805 --> 806{806 CAN THE DESTINATION BE FOUND IN THE FORWARDING DIRECTION?}; 806 -- N --> 809; 806 -- Y --> 807[807 PERFORM HEADER PROCESSING]; 807 --> 808[808 TRANSMIT PACKET]; 808 --> END([END]); 809 --> END;</pre> Mizutani at Fig. 9:

Appendix F – '249 Patent Obviousness References Claim Chart

Asserted Claims	Obviousness References
	FIG. 9 Mizutani at Fig. 10:

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Asserted Claims	Obviousness References
	FIG.10 The diagram illustrates a sequence of operations involving an L7 Multicast Packet Sender and multiple L7 Multicast Packet Forwarders (1000a, 1000b, 1000c). The process begins with the sender transmitting a packet to forwarder 1000a. Forwarder 1000a then receives the packet (1012), stores it (1013-1), and establishes an L7 transmission control session (1014-1). This process is repeated for forwarders 1000b and 1000c. Forwarder 1000a then transmits the packet (1015) and closes the session (1015-1). Forwarders 1000b and 1000c then establish their own L7 transmission control sessions (1021, 1023-1) and transmit the packet (1021, 1023-1). Mizutani at Fig. 12:

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Asserted Claims	Obviousness References
	FIG.12 Mizutani at Fig. 18:

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Asserted Claims	Obviousness References
	FIG.18 <pre> graph TD 1801[1801 RECEIVE PACKET] --> 1802[1802 EXTRACT HEADER INCLUDING NSA] 1802 --> 1803{1803 IS THE RECEIVING NODE IN THE MULTICAST GROUP OF THE PACKET?} 1803 -- N --> 1804{1804 STORE?} 1803 -- Y --> 1804 1804 -- N --> 1804 1804 -- Y --> 1805{1805 IS ENOUGH STORAGE SPACE AVAILABLE?} 1805 -- N --> 1804 1805 -- Y --> 1806[1806 STORE THE PACKET] 1806 --> 1807[1807 RETRIEVE THE DESTINATION FROM L7 MULTICAST FORWARDING TABLE] 1807 --> 1808[1808 TRANSMIT PACKET] 1808 --> 1809[1809 PERFORM DATA RECONSTRUCTION OR PROTOCOL PROCESSING IF NEEDED] 1809 --> END([END]) </pre> Mizutani at Fig. 21

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Asserted Claims	Obviousness References
	FIG.21 <pre> graph TD 2101[RECEIVE PACKET] --> 2102[EXTRACT HEADER] 2102 --> 2103{IS THE PACKET FOR L7 MULTICAST FORWARDING?} 2103 -- N --> 2112[TRANSMIT THE PACKET WITH NETWORK LAYER PROCESSING] 2103 -- Y --> 2104{DOES THE PACKET MEET THE FORWARDING CONDITION?} 2104 -- N --> 2111[DELETE PACKET] 2104 -- Y --> 2105[RETRIEVE THE DESTINATION FROM L7 MULTICAST FORWARDING TABLE] 2105 --> 2106{CAN THE DESTINATION BE FOUND IN THE FORWARDING DIRECTION?} 2106 -- N --> 2111 2106 -- Y --> 2107[PERFORM HEADER PROCESSING] 2107 --> 2108[SEND THE DATA PROPERTY TO THE CONTROL UNIT PATH] 2108 --> 2109[PERFORM PATH CONTROL LOWER LAYER PROTOCOL INFORMATION REFERING] 2109 --> 2110[TRANSMIT PACKET] 2110 --> END([END]) 2111 --> END 2112 --> END </pre> Mizutani at Fig. 22:

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Asserted Claims	Obviousness References
	FIG.22 <pre> graph TD START([START]) --> 2201[2201 RETRIEVE THE DESTINATION
FROM L7 MULTICAST
FORWARDING TABLE] 2201 --> 2202{2202 MULTI ROUTES AVAILABLE?} 2202 -- N --> 2205[2205 ESTABLISH SESSION] 2202 -- Y --> 2203[2203 REFER THE DATA PROPERTY
AND LOWER LAYER
PROTOCOL INFORMATION] 2203 --> 2204[2204 SELECT THE MOST
SUITABLE ROUTE] 2204 --> 2205[2205 ESTABLISH SESSION] 2205 --> 2206[2206 TRANSMIT PACKET] 2206 --> END([END]) </pre> Liu at Fig. 8:

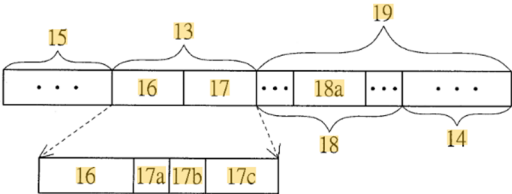
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Asserted Claims	Obviousness References
	<pre> graph TD START([START]) --> S611{Judge whether a connection port recorded in a routing interface field of each piece of routing data pertains to a second forwarding element} S611 -- NO --> END([END]) S611 -- YES --> S612{Judge whether the routing interface field and a routing gateway field have a corresponding label} S612 -- YES --> END S612 -- NO --> S613[Record a label field of the piece of exchanging data as another label] S613 --> S614[Record an interface field of the piece of exchanging data as a connection port recorded in the routing interface field of the piece of routing data, and record a gateway field of the piece of exchanging data as a next hop recorded in the routing gateway field of the piece of routing data] S614 --> END </pre> FIG. 8 Liu at Fig. 9:

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Asserted Claims	Obviousness References
	<pre>graph TD START([START]) --> S621{Judge whether a connection port recorded in a routing interface field of each piece of routing data pertains to a first forwarding element} S621 -- NO --> S622[] S621 -- YES --> S621_1[If the connection port recorded in the routing interface field of the routing data pertains to the first forwarding element, an interface field and a gateway field of the piece of forwarding data are recorded as the routing interface field and a routing gateway field respectively, and a label field of the piece of forwarding data is recorded as a specific value] S622 --> S623[If the connection port recorded in the routing interface field pertains to a second forwarding element, the label field of the piece of forwarding data is recorded as the label corresponding to an interface field and a gateway field in the exchanging data obtained according to the piece of routing data] S623 --> S624[If the connection port recorded in the routing interface field pertains to the second forwarding element, the interface field of the piece of forwarding data is recorded as the connection port of the first forwarding element connected to an internal network] S624 --> S625[If the connection port recorded in the routing interface field pertains to the second forwarding element, the gateway field of the piece of forwarding data is recorded as the connection port of the second forwarding element connected to the internal network] S625 --> S626[Record a subnet field of the piece of forwarding data as a subnet corresponding to the piece of routing data] S626 --> END([END])</pre> FIG. 9 Liu at Fig. Fig 11:

Appendix F – '249 Patent Obviousness References Claim Chart

Asserted Claims	Obviousness References
	 FIG. 10 START A control element forms a forwarding table and an exchanging table according to a routing table S710 A first forwarding element receives a packet S720 The first forwarding element obtains a corresponding label from the forwarding table according to a destination address of the packet, and determines whether to output the packet from the first forwarding element or a second forwarding element according to the label, and directly outputs the packet to the destination address of the packet if the packet is to be outputted from the first forwarding element S730 If the packet is to be outputted from the second forwarding element, the second forwarding element receives the packet and the label S740 The second forwarding element obtains a next forwarding path from the exchanging table according to the label, and the packet is forwarded by the next forwarding path S750 END FIG. 11 Liu at Fig. 12:

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Asserted Claims	Obviousness References
	<pre>graph TD; START([START]) --> S710[A control element forms a forwarding table and an exchanging table according to a routing table ~S710]; S710 --> S720[A first forwarding element receives a packet ~S720]; S720 --> S731[The first forwarding element obtains a corresponding label from the forwarding table according to a destination address of the packet ~S731]; S731 --> S732{Judge whether the label is a specific value ~S732}; S732 -- YES --> S733[Directly forward the packet from the first forwarding element to an external network ~S733]; S732 -- NO --> S740[A second forwarding element receives the packet and the label ~S740]; S733 --> END([END]); S740 --> S750[The second forwarding element obtains a next forwarding path from the exchanging table according to the label, and the packet is forwarded by the next forwarding path ~S750]; S750 --> END;</pre> FIG. 12 Mizutani at [0054]: The forwarding control information (logical topology information) including the address information in the application layer 504 is informed between the L7 packet forwarders 1

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Asserted Claims	Obviousness References
	(505). The transmission control of the packet may be attained in the application layer 504, or by a communication 506 between existing transport layers 503. The data packet received through the physical line is protocol-processed in the order of the data link layer 501, the network layer 502, the transport layer 503, and the application layer 504. Then, after the route is selected in the application layer 504, in the process opposite to the receiving case, it is transmitted to a next L7 packet forwarder 1. This forwarding control is independently executed in the application layer 504, and this has no influence on the other existing layer processes. In this way, the linkage of the processes between the respective layers attains the flexibility and high reliability of the forwarding control between the different protocols. Mizutani at [0057]: The input unit 10 extracts the L7 header including the destination group information from the L7 multicast packets received by the input ports 11-1 to 11-n, and informs it to the forwarding control unit 40. The forwarding control unit 40 retrieves the L7 multicast forwarding table 50 on the basis of the header, and correlates the input ports 11-1 to 11-n to the output ports 31-1 to 31-n on the basis of the retrieved result. Then, the correlated connection information is informed to the switch unit 20. The switch unit 20 switches the connection among the ports according to the connection information informed from the forwarding control unit 40. Consequently, the data packet received by the input unit 10 is transmitted to the output unit 30. The output unit 30 carries out the header processing (for example, the change of the destination or the source identifier) as necessary according to the connection information from the forwarding control unit 40, and transmits the data packet from the output ports 31-1 to 31-n through transmission lines 32-1 to 32-n. Mizutani at [0058]: As the retrieved result of the L7 multicast forwarding table 50, if a plurality of sources are judged to exist, the forwarding control unit 40 instructs at least one of the input unit 10 and

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	the output unit 30 to duplicate the data packet on the basis of the control signal of the connection information. Liu at [0009]: According to a third aspect of the present invention, a routing method is provided. First, a control element forms a forwarding table and an exchanging table according to a routing table. Next, a first forwarding element receives a packet. Then, the first forwarding element obtains a corresponding label from the forwarding table according to a destination address of the packet, and determines whether to output the packet from the first forwarding element or a second forwarding element according to the label. The packet is outputted to the destination address of the packet directly if the packet is to be outputted from the first forwarding element. If the packet is to be outputted from the second forwarding element, the second forwarding element receives the packet and the label. Next, the second forwarding element obtains a next forwarding path from the exchanging table according to the label to forward the packet. The control element, the first forwarding element and the second forwarding element constitute a routing system. Liu at [0010]: According to a fourth aspect of the present invention, a forming method for an exchanging table and a forwarding table of a control element is provided. The control element forms the forwarding table and the exchanging table according to a routing table. The routing table has a plurality of pieces of routing data. Each of the pieces of routing data has a routing interface field and a routing gateway field. The exchanging table has a plurality of pieces of exchanging data, and the forwarding table has a plurality of pieces of forwarding data. The forming method includes the following steps. First, each of the pieces of exchanging data is formed according to whether a connection port recorded in the routing interface field of each of the pieces of routing data pertains to a second forwarding element. Next, each of the pieces of forwarding data is formed according to whether the

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	connection port recorded in the routing interface field of each of the pieces of routing data pertains to a first forwarding element. The control element, the first forwarding element and the second forwarding element constitute a routing system. The first forwarding element receives a packet, obtains a corresponding label from the forwarding table according to a destination address of the packet, and determines whether the packet is to be directly outputted to the destination address of the packet from the first forwarding element according to the label. The second forwarding element receives the packet and the label outputted from the first forwarding element and obtains a next forwarding path from the exchanging table according to the label to forward the packet if the packet is to be outputted from the second forwarding element.
2. The packet forwarding node according to claim 1, wherein the storage unit stores the table used for forwarding the packet based on the identifier which uniquely identifies the link within a predetermined domain.	<i>See claim 1.</i>
3. The packet forwarding node according to claim 1, wherein the storage unit stores the table used for forwarding the packet based on the identifier which uniquely identifies the link within a predetermined local domain.	<i>See claim 1.</i>
4. The packet forwarding node according to claim I [sic], wherein the storage unit stores the table used for forwarding the packet based on the identifier which uniquely identifies the link within the packet forwarding node.	<i>See claim 1.</i>

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5. The packet forwarding node according to claim 1, wherein the storage unit stores the table used for forwarding the packet based on the identifier which unique identifies the link among the packet forwarding nodes.	<i>See claim 1.</i>
[6.pre] 6. A packet forwarding node, comprising:	<i>See claim 1.pre.</i>
[6.a] a storage unit including a non-transitory computer readable medium configured to store a packet forwarding table used for forwarding a packet based on an identifier which identifies an interface of a packet forwarding node; and	<i>See claim 1.a.</i>
[6.b] at least one processor configured to execute program instructions to provide a forwarding unit configured to receive an incoming packet including a plurality of identifiers, determine a direction to forward the incoming packet, determine whether to forward to an external network, add to path or link information when the incoming packet is not forwarded to the external network, remove path or link information header when the incoming packet is forwarded to the external network, and to forward the	<i>See claims 1.b–1.h.</i>

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incoming packet by using a path or link that corresponds to the identifier from among the plurality of identifiers.	
7. The packet forwarding node according to claim 6, wherein the storage unit stores the table used for forwarding the packet based on the identifier which uniquely identifies the link within a predetermined domain.	<i>See claims 2, 6.</i>
8. The packet forwarding node according to claim 6, wherein the storage unit stores the table used for forwarding the packet based on the identifier which uniquely identifies the link within a predetermined local domain.	<i>See claims 3, 6.</i>
9. The packet forwarding node according to claim 6, wherein the storage unit stores the table used for forwarding the packet based on the identifier which uniquely identifies the link within the packet forwarding node.	<i>See claims 4, 6.</i>
10. The packet forwarding node according to claim 6, wherein the storage unit stores the table used for forwarding the packet based on the identifier which uniquely identifies the	<i>See claims 5, 6.</i>

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link among the packet forwarding nodes.	
[11.pre] 11. A packet forwarding node, comprising:	<i>See claim 6.pre.</i>
[11.a] a memory storing a program;	<i>See claim 1.pre, 1.a.</i>
[11.b] at least one processor configured to execute the program to provide:	<i>See claim 1.b.</i>
[11.c] a communication unit configured to communicate with a server for receiving a plurality of identifiers, each of which identifies a link between nodes on a packet forwarding path; and	<i>See claim 1.a</i>
[11.d] a forwarding unit configured to:	<i>See claim 1.b.</i>
[11.e] receive an incoming packet including the plurality of the identifiers,	<i>See claim 1.c.</i>
[11.f] determine a direction to forward the incoming packet,	<i>See claim 1.d.</i>
[11.g] determine whether to forward to an external network,	<i>See claim 1.e.</i>
[11.h] add to path or link information when the incoming packet is not forwarded to the external network,	<i>See claim 1.f.</i>

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[11.i] remove path or link information header when the incoming packet is forwarded to the external network, and	<i>See claim 1.g.</i>
[11.j] forward the incoming packet by using a path or link that corresponds to an identifier from among the plurality of identifiers.	<i>See claim 1.h.</i>
12. The packet forwarding node according to claim 11, wherein the forwarding unit forwards the packet based on the identifier which uniquely identifies the link within a predetermined domain.	<i>See claims 2, 7, 11.</i>
13. The packet forwarding node according to claim 11, wherein the forwarding unit forwards the packet based on the identifier which uniquely identifies the link within a predetermined local domain.	<i>See claims 3, 8, 11.</i>
14. The packet forwarding node according to claim 11, wherein the forwarding unit forwards the packet based on the identifier which uniquely identifies the link within the packet forwarding node.	<i>See claims 4, 9, 11.</i>
15. The packet forwarding node according to claim 11, wherein the forwarding unit forwards the packet based on the identifier which uniquely	<i>See claims 5, 10, 11.</i>

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identifies the link among the packet forwarding nodes.	
[16.pre] 16. A packet forwarding node, comprising:	<i>See claim 6.pre.</i>
[16.a] a communication unit configured to communicate with a server for receiving a plurality of identifiers, each of which identifies an interface of the packet forwarding node; and	<i>See claims 6.a, 11.c.</i>
[16.b] at least one processor configured to execute program instructions to provide a forwarding unit configured to receive an incoming packet including a plurality of identifiers, determine a direction to forward the incoming packet, determine whether to forward to an external network, add to path or link information when the incoming packet is not forwarded to the external network, remove path or link information header when the incoming packet is forwarded to the external network, and forward the incoming packet by using a path or link that corresponds to an identifier from among the plurality of identifiers.	<i>See claims 1.b–1.h.</i>
17. The packet forwarding node according to claim 16, wherein the	<i>See claims 2, 7, 12, 16.</i>

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forwarding unit forwards the packet based on the identifier which uniquely identifies the link within a predetermined domain.	
18. The packet forwarding node according to claim 16, wherein the forwarding unit forwards the packet based on the identifier which uniquely identifies the link within a predetermined local domain.	<i>See claims 3, 8, 13, 16.</i>
19. The packet forwarding node according to claim 16, wherein the forwarding unit forwards the packet based on the identifier which uniquely identifies the link within the packet forwarding node.	<i>See claims 4, 9, 14, 16.</i>
20. The packet forwarding node according to claim 16, wherein the forwarding unit forwards the packet based on the identifier which uniquely identifies the link among the packet forwarding nodes.	<i>See claims 5, 10, 15, 16.</i>
[21.pre] 21. A server, comprising:	<i>See claim 1.pre.</i>
[21.a] a memory storing a computer program;	<i>See claim 11.a.</i>
[21.b] at least one processor configured to execute the computer program to provide:	<i>See claim 11.b.</i>

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[21.c] a first unit configured to determine a plurality of identifiers, each of which identifies a link between nodes on a packet forwarding path; and	<i>See</i> claims 1.a, 1.c.
[21.d] a second unit configured send information elements to a packet forwarding node which is capable of receiving an incoming packet including a plurality of identifiers, determining a direction to forward. the incoming packet, determining whether to forward to an external network, adding to path or link information when the incoming packet is not forwarded to the external network, removing path or link information header when the incoming packet is forwarded to the external network, and forwarding the incoming packet by using a path or link, that corresponds to an identifier from among the plurality of identifiers.	<i>See</i> claims 1.b–1.h.
22. The packet forwarding node according to claim 1, wherein the storage unit stores the table used for forwarding the packet based on the identifier which identifies the link between adjacent nodes on a packet forwarding path.	<i>See</i> claim 1.a.

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23. The packet forwarding node according to claim 6, wherein the storage unit stores the packet forwarding table used for forwarding the packet based on the identifier which identifies the link between adjacent nodes on a packet forwarding path.	<i>See claims 6, 22.</i>
24. The packet forwarding node according to claim 11, further comprising a storage unit that stores a table used for forwarding the packet based on an identifier which identifies the link between adjacent nodes on a packet forwarding path.	<i>See claims 11, 22.</i>
25. The packet forwarding node according to claim 16, further comprising a storage unit that stores a table used for forwarding the packet based on an identifier which identifies the link between adjacent nodes on a packet forwarding path.	<i>See claims 16, 22.</i>
[26.a] 26. The server according to claim 21, further comprising a storage unit to store a packet forwarding table used for forwarding the incoming packet based on the identifier which identifies the link between nodes on the packet forwarding path,	<i>See claims 1.a, 21.</i>

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[26.b] wherein the storage unit stores the table used for forwarding the packet based on the identifier which identities a link between adjacent nodes on a packet forwarding path.	<i>See claim 22.</i>
27. The packet forwarding node according to claim 1, wherein when the forwarding unit receives the incoming packet including the identifier for the link connecting nodes on the packet forwarding path, the forwarding unit forwards the incoming packet based on the identifier included the received incoming packet from among the plurality of the identifiers.	<i>See claim 1.</i>