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**Datasheet for the decision
of 22 December 2020**

Case Number: T 2030/17 - 3.5.05

Application Number: 10799373.5

Publication Number: 2456130

IPC: H04L12/42

Language of the proceedings: EN

Title of invention:

SYSTEM FOR NETWORK DEPLOYMENT AND METHOD FOR MAPPING AND DATA FORWARDING THEREOF

Applicant:

ZTE Corporation

Headword:

Distributed mapping database/ZTE

Relevant legal provisions:

EPC Art. 56, 84

Keyword:

Inventive step - (no)
Claims - clarity (no)

Decisions cited:

Catchword:



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Chambres de recours

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Case Number: T 2030/17 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 22 December 2020

Appellant: ZTE Corporation
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 11 April 2017
refusing European patent application No.
10799373.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair A. Ritzka
Members: P. Cretaine
F. Blumer

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division posted on 11 April 2017 refusing European patent application No. 10799373.5. The application was refused for lack of clarity (Article 84 EPC) and lack of inventive step (Article 56 EPC) of independent claims 1 and 4 over the disclosure of:

D4: L. Mathy et al.: "LISP-DHT: Towards a DHT to map identifiers onto locators; draft-mathy-lisp-dht-00", IETF, 25 February 2008,

and of independent claim 5 over the disclosure of:

D3: X. XU HUAWEI X: "Routing Architecture for the Next generation Internet (RANGI); draft-xu-rangi-01.txt", IETF, 13 July 2009.

II. Notice of appeal was received on 19 June 2017, and the appeal fee was paid on the same day. With the statement setting out the grounds of appeal, received on 16 August 2017, the appellant submitted a set of claims 1 to 4 and requested that the decision under appeal be set aside and that a patent be granted on the basis of these claims. In the alternative, oral proceedings were requested.

III. A summons to oral proceedings was issued on 8 June 2020. In a communication pursuant to Article 15(1) RPBA sent on 29 June 2020, the board gave its preliminary opinion that the claims did not meet the requirements of Article 84 EPC and Article 56 EPC in light of the disclosure of D3 (for claim 4) and D4 (for claims 1 to 3).

- IV. In a letter of response dated 6 July 2020, the appellant withdrew its request for oral proceedings and requested a decision based on the state of the file.
- V. By communication dated 9 July 2020, the board announced that the oral proceedings were cancelled.
- VI. Claim 1 of the sole request reads as follows:

"A system for network deployment of a distributed mapping database, characterized by comprising: Distributed Hash Table (DHT) servers and DHT border servers, wherein at least one DHT border server and one DHT server are connected to form one of server rings which constitutes a distributed mapping database, based on a DHT algorithm, used for storing a mapping relationship between Endpoint Identifiers (EIDs) and Routing Locators (RLOCs), and the server rings are connected with each other through the DHT border servers, wherein the DHT border server is configured to notify prefix information of the EIDs in a present sever ring to other server rings and monitor DHT messages of the distributed mapping database; wherein the DHT border server comprises: an encapsulation module, configured to encapsulate packets coming from the DHT border servers in other domains and forward the encapsulated packets to an Egress Tunnel Router (ETR) in the present domain according to a RLOC encapsulated in the encapsulated packet; wherein when there is a new EID having been monitored, the DHT border server will converge the new EID with the local EID prefix and notify the converged EID prefix to DHT border server devices in other-domains through a BGP routing protocol."

Independent claim 3 of the sole request reads as follows:

"A method for identifier and locator mapping, characterized by comprising:
a Distributed Hash Table (DHT) server receiving Endpoint Identifier (EID) information from a Egress Tunnel Router (ETR) in a present domain;
the DHT server storing mapping relationships between EIDs and Routing Locators (RLOCs) to a distributed mapping database based on a DHT algorithm, wherein the distributed mapping database is a server ring formed by connecting at least one DHT border server with one DHT server;
the DHT border server aggregating newly-registered EID information with EID information stored in the distributed mapping database when the newly-registered EID information has been monitored; and
the DHT border server notifying DHT border servers in other domains of the prefix information of the aggregated EID
wherein the DHT border server further configured to encapsulate packets coming from the DHT border servers in other domains and forward the encapsulated packets to the ETR in the present domain according to a RLOC encapsulated in the encapsulated packet;
wherein when there is a new EID having been monitored, the DHT border server will converge the new EID with the local EID prefix and notify the converged EID prefix to DHT border server devices in other-domains through a BGP routing protocol."

Independent claim 4 of the sole request reads as follows:

"A method for data forwarding, characterized by comprising:

- an Ingress Tunnel Router (ITR) of the first domain receiving an Internet Protocol (IP) packet from a first host of a first domain;
- the ITR determining whether the IP packet is an initial packet, and if the determination result is NOT, encapsulating the IP packet; wherein, encapsulating the IP packet comprises: the ITR will additionally encapsulate a layer of IP packet header outside the IP packet header, wherein the destination IP address in the outer IP packet header is the RLOC address of the DHT border server and the source IP address is the RLOC address of the ITR;
- the ITR forwarding the encapsulated IP packet to a Distributed Hash Table (DHT) border server of the first domain according to the destination RLOC in the outer IP packet header;
- the DHT border server of the first domain decapsulating the encapsulated IP packet, and forwarding the decapsulated IP packet to a DHT border server of a second domain; wherein the DHT border server of the first domain decapsulating the encapsulated IP packet, and forwarding the decapsulated IP packet to a DHT border server of a second domain comprises: the data packet arrives at the DHT border server of the second domain, the DHT border server of the first domain performs decapsulation on the DHT border server by decapsulating the outer IP packet header, and searches the destination EID address which is matched with the BGP routing table, and then forwards the decapsulated packet to the DHT border server of the domain in which a second host of the second domain is located according to the destination EID;
- the DHT border server of the second domain encapsulating the received decapsulated IP packet, and

forwarding the IP packet encapsulated by the DHT border server of the second domain to an Egress Tunnel Router (ETR) of the second domain; wherein the DHT border server of the second domain encapsulating the received decapsulated IP packet, and forwarding the IP packet encapsulated by the DHT border server of the second domain to an Egress Tunnel Router (ETR) of the second domain comprises: the RLOC information corresponding to the EID of the second host is to be searched on the DHT border server, after the RLOC information is found, the IP packet encapsulation will be performed again, wherein the source IP address and the destination address of the outer IP packet header are the RLOC address of the DHT border server and the RLOC corresponding to the EID of the second host of the second domain respectively, and the inner IP packet header maintains unchanged, and then the DHT border server performs routing according to the RLOC encapsulated in the outer IP packet and forwards to the ETR of the second domain; and the ETR of the second domain decapsulating the IP packet encapsulated by the DHT border server of the second domain, and forwarding the decapsulated IP packet to a second host of the second domain."

Reasons for the Decision

1. The appeal is admissible (see point II).
2. In its response dated 6 July 2020 to the summons of the board, the appellant withdrew its request for oral proceedings and did not make any further submissions. The oral proceedings scheduled for 4 September 2020 were then cancelled.

In deciding not to attend oral proceedings, the appellant has chosen not to make any further submissions during any such proceedings held. As a consequence, the oral proceedings were cancelled by the board, and the duly summoned appellant has thus to be treated as relying only on its written case.

3. Article 84 EPC

3.1 Claim 1

Claim 1 defines that DHT server rings, each comprising at least one DHT server and one DHT border server, are connected by their DHT border servers. From the description, the board understands that a DHT server ring represents a domain. Claim 1 further defines that a server ring constitutes a distributed mapping database based on a DHT algorithm. The use of a DHT distributed database for storing EID-to-RLLOC mapping in a network is known in the art. However, in the present case, it is not clear from the wording of claim 1 whether the DHT distributed mapping database defined in claim 1 is built on all the servers of the different rings or is specific to a single server ring.

The feature of claim 1 stating that the DHT border server monitors DHT messages of the distributed mapping database is not clear since neither the DHT messages nor the monitoring functionality of the DHT border server are defined. The board was also not able to find explanations on this in the description.

It is not clear from the wording of claim 1 whether the "present domain" defined in claim 1 relates to the

domain served by the DHT border server defined in the claim.

Claim 1 further defines that the DHT border server forwards encapsulated packets according to an RLOC encapsulated in the packet. However, it is not clear how this RLOC is issued and set in the encapsulated packet. In particular, it is not clearly defined whether this RLOC is identified by using the mapping between EIDs and RLOCs defined previously in the claim.

Furthermore, claim 1 is unclear on the determination of the converged EID prefix based on the new EID and the local EID prefix. In addition, it is not clear whether the converged EID prefix is related to the prefix information of the EIDs defined previously in the claim.

The board further notes that claim 1 does not define any involvement of the converged EID prefix and the prefix information of the EIDs in the packet forwarding process.

3.2 Claim 3

Claim 3 relates to a method which appears to correspond in substance to the system claimed in claim 1.

Claim 3 defines that a DHT server ring, comprising at least one DHT server and one DHT border server, is connected to DHT border servers in other domains. From the description, the board understands that a DHT server ring represents a domain. Claim 3 further defines that the server ring constitutes a distributed mapping database based on a DHT algorithm. The use of a DHT distributed database for storing EID-to-RLOC

mapping in a network is known in the art. However, in the present case, it is not clear from the wording of claim 3 whether the DHT distributed mapping database defined in claim 3 is built on all the servers of the different domains or is specific to a single server ring.

It is not clear from the wording of claim 3 whether the "present domain" defined in claim 3 relates to the domain served by the DHT border server defined in the claim.

Claim 3 further defines that the DHT border server forwards encapsulated packets according to an RLOC encapsulated in the packet. However, it is not clear how this RLOC is issued and set in the encapsulated packet. In particular, it is not clearly defined whether this RLOC is identified by using the mapping between EIDs and RLOCs defined previously in the claim.

Furthermore, claim 3 is unclear on the determination of the prefix information of the aggregated EID based on the newly registered EID and the EID information stored in the distributed mapping database. In addition, it is not clear whether the converged EID prefix is related to the prefix information of the aggregated EID defined previously in the claim.

The board further notes that claim 3 does not define any involvement of the converged EID prefix and the prefix information of the aggregated EID in the packet forwarding process.

3.3 Claim 4

The wording "searches the destination EID address which is matched with the BGP routing table" is not clear since the destination EID address is usually included in the packet sent by a source host and not issued by a routing protocol. Moreover, the establishment of a BGP routing table is not defined in the claim.

3.4 Therefore the board holds that independent claims 1, 3 and 4 do not meet the requirements of Article 84 EPC.

4. Article 56 EPC

4.1 In the board's view, the subject-matter of independent claims 1, 3 and 4, as far as it can be understood despite the numerous, above-mentioned clarity objections, does not involve an inventive step for the following reasons.

4.2 Prior art

D4 relates to the Locator/ID Separation Protocol (LISP) used in an internet architecture. This protocol ensures that a packet issued by a host having a source identifier (EID) and intended for a host having a destination identifier (EID) in the LISP domain is sent to an Ingress Tunnel Router (ITR) of this domain which determines the identifier (RLOC) of the Egress Tunnel Router (ETR) associated with the destination EID according to an EID-to-RLOC mapping table. D4 discloses using DHT servers to store the EID-to-RLOC mapping (see page 3, lines 9 to 19). D4 further discloses that EIDs allocated to hosts in a domain have the same EID prefix (see page 3, lines 28 to 32, and page 5, lines 24 to 33). D4 also teaches that the nodes supporting the DHT database are organised in a ring (see page 4, lines 10 to 14).

D3 relates to a routing architecture on the internet based on the ID/locator split, whereby mapping from host identifiers to locators may be stored in a distributed database, e.g. a DHT ring system (see section 2.4). Forwarding of a packet from a source host to a destination host is based on a look-up of the locator of the destination through the ID/locator mapping system and tunnelling the packet by encapsulation/decapsulation processes through the intermediate transit networks (section 2.5.4). Figure 5 of D3 shows that an IPv4 encapsulated packet is sent from host A to border router BR1, that BR1 decapsulates the packet and sends it to a border router BR2, and that BR2 encapsulates the packet again.

4.3 The subject-matter of claim 1 as understood by the board differs from the disclosure of D4 only in that multiple server rings are connected with each other through the DHT border servers, whereby a DHT border server is configured to monitor the DHT messages of the distributed mapping database and to notify the prefix information of EIDs in one ring to other server rings via a BGP routing protocol.

Neither the DHT messages of the distributed mapping database nor their monitoring are defined in the claim. Moreover, the use of the, known per se, prefix information of the EIDs in other server rings is also not defined in the claim. Thus, the technical effect of the above-mentioned technical features can only be seen in the interconnection of different domains by DHT border servers in order to scale the network. Since scaling a network by interconnecting domains using border servers is a common measure in the field of communication networks, claim 1 does not meet the

requirements of Article 56 EPC, having regard to the disclosure of D4.

Independent claim 3 is a method claim but corresponds in substance to system claim 1. Therefore, claim 3 also does not meet the requirements of Article 56 EPC, having regard to the disclosure of D4.

4.4 Independent claim 4 is identical to claim 5 on which the decision under appeal is based.

Claim 4 defines a method for forwarding a packet from a host in a first domain to a host in a second domain of a network, the network operating under EID/RLOC separation, and the first and second domains being connected by DHT border servers.

The subject-matter of claim 4, as understood by the board, differs in substance from the disclosure of D3 only in that an Ingress Tunnel Router ITR and an Egress Tunnel Router ETR are used to connect the source and destination hosts to the first and second domains, respectively, instead of a host being directly connected to a border router, as in D3 (see Figure 5: hosts A and B are connected to border routers BR1 and BR3, respectively).

However, the use of an ITR and an ETR is a common measure implemented in LISP-based networks. Thus, it would have been obvious for the skilled person to use it in the network of D3, which is a network based on the same locator/ID paradigm as a LISP network.

Therefore, claim 4 does not meet the requirements of Article 56 EPC, having regard to the disclosure of D3.

5. Conclusion

The claim set is not allowable under both Articles 84 and 56 EPC.

There being no further requests, the appeal has to be dismissed.

6. Procedural issues

About one week after the board issued its communication pursuant to Article 15(1) RPBA on 29 June 2020, the appellant withdrew its request for oral proceedings in its letter of 6 July 2020. The oral proceedings were then cancelled (see Facts and Submissions, points III to V). The conditions for a partial reimbursement at 25% pursuant to Rule 103(4)(c) EPC are therefore fulfilled.

Order

For these reasons it is decided that:

1. The appeal is dismissed.
2. The appeal fee shall be reimbursed at 25%.

The Registrar:

The Chair:



A. Chavinier-Tomsic

A. Ritzka

Decision electronically authenticated