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**Datasheet for the decision
of 3 May 2023**

Case Number: T 0298/21 - 3.5.05

Application Number: 17724892.9

Publication Number: 3440808

IPC: H04L12/715, H04L12/24

Language of the proceedings: EN

Title of invention:
VIRTUAL INFRASTRUCTURE

Applicant:
Alcatel Lucent

Headword:
Network infrastructure virtualization/ALCATEL

Relevant legal provisions:
EPC Art. 56, 123(2)

Keyword:
Inventive step - (no)
Amendments - added subject-matter (yes)

Decisions cited:



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Case Number: T 0298/21 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 3 May 2023

Appellant: Alcatel Lucent
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 19 November
2020 refusing European patent application No.
17724892.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair A. Ritzka
Members: P. Cretaine
K. Kerber-Zubrzycka

Summary of Facts and Submissions

I. This appeal is against the examining division's decision posted on 19 November 2020 refusing European patent application No. 17724892.9. The application was refused on the grounds that a main request and auxiliary requests 1 to 5 did not meet the requirements of Article 56 EPC in view of the disclosure of:

D1: US 2012/158938

In addition, auxiliary requests 2 to 5 were found to be non-compliant with the requirements of Articles 84 and 123(2) EPC.

II. Notice of appeal was received on 17 December 2020, and the appeal fee was paid on the same date. The statement setting out the grounds of appeal was received on 19 March 2021. The appellant requested that the decision be set aside and that a patent be granted on the basis of a main request or auxiliary requests 1 to 5 filed with the statement setting out the grounds of appeal, identical to the main request and auxiliary requests 1 to 5, respectively, on which the decision was based. Oral proceedings were requested as an auxiliary measure.

III. A summons to oral proceedings was issued on 5 July 2022. In a communication pursuant to Article 15(1) RPBA, sent on 14 March 2023, the board gave its preliminary opinion that the main request and auxiliary requests 1 to 5 did not meet the requirements of Article 56 EPC in view of D1. Furthermore, the board stated that auxiliary requests 2 to 5 did not meet the

requirements of Article 84 EPC and that auxiliary requests 3 to 5 did not meet the requirements of Article 123(2) EPC.

- IV. By letter dated 4 April 2023, the appellant submitted new auxiliary requests 2bis, 3bis, 4bis and 5bis and requested that these requests be admitted into the appeal proceedings in replacement of auxiliary requests 2 to 5.
- V. Oral proceedings were held on 3 May 2023. The appellant requested that the decision under appeal be set aside and a patent be granted based on the main request or auxiliary request 1 on which the decision under appeal was based (both requests submitted with the statement setting out the grounds of appeal), or one of auxiliary requests 2bis, 3bis, 4bis and 5bis (submitted with the letter of 4 April 2023). The board's decision was announced at the end of the oral proceedings.
- VI. Claim 1 of the main request reads as follows:

"An apparatus, comprising:
at least one processor; and
at least one memory including computer program code;
wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to:
receive infrastructure information describing infrastructure resources (111) of a network infrastructure of a communication network (110), wherein the infrastructure resources (111) comprise network resources (112) and service resources (113);
process the infrastructure information, based on a set of infrastructure virtualization data structures (135), to provide virtualized infrastructure information

describing virtualized infrastructure resources (131) of a virtualized network infrastructure of the communication network (110), wherein the virtualized infrastructure resources (131) comprise virtualized network resources (132) representing virtualization of the network resources (112) and virtualized service resources (133) representing virtualization of the service resources (113); and manage the virtualized infrastructure resources (131) based on the virtualized infrastructure information describing the virtualized infrastructure resources (131),

characterized in that the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus in managing the virtualized infrastructure resources (131) to control allocating by one or more owners virtualized infrastructure resources (131) allocated to said one or more owners to one or more tenants based on an hierarchical arrangement of the one or more owners and the one or more tenants."

Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the wording "based on an hierarchical arrangement of the one or more owners and the one or more tenants" at the end of the claim has been replaced with the wording "at one or more hierarchical levels of tenants."

Claim 1 of auxiliary request 2bis differs from claim 1 of auxiliary request 1 in that the wording "and further to control allocating by one or more of the tenants to which virtualized infrastructure resources (131) had been allocated virtualized infrastructure resources (131) to one or more further tenants of the one or more tenants" is added at the end of the claim.

Claim 1 of auxiliary request 3bis differs from claim 1 of auxiliary request 2bis in that the wording

":

in processing the infrastructure information to provide virtualized infrastructure information based on at least one infrastructure virtualization data structure (135) including:

a first set of fields configured to support management of the virtualized infrastructure resources (131) by a set of multiple owners;

and

a second set of fields configured to support hierarchical management of the virtualized infrastructure resources (131) by a set of multiple tenants; and"

is inserted after the wording "characterized in that the at least one memory and the computer program code are configured to, with at least one processor, cause the apparatus".

Claim 1 of auxiliary request 4bis differs from claim 1 of auxiliary request 3bis in that the wording "based on association of respective ones of the fields of the second set of fields with respective levels of a tenant hierarchy for the set of multiple tenants" is inserted after the wording "a second set of fields configured to support hierarchical management of the virtualized infrastructure resources (131) by a set of multiple tenants".

Claim 1 of auxiliary request 5bis differs from claim 1 of auxiliary request 4bis in that the wordings "by a set of multiple owners" and "by a set of multiple tenants" have been replaced by the wordings "by one or more owners" and "by one or more tenants", respectively.

Each request contains further independent claims directed to a corresponding management system (claim 10), a computer program medium (claim 11), a method (claim 12) and a network element (claim 13).

Reasons for the Decision

1. Prior art

D1 represents the closest prior art to the subject-matter of all requests.

D1 discloses a system and a method for providing by a control server a virtual infrastructure based on an infrastructure of physical resources (see the abstract). In Figure 1, for instance, reference signs 16n1 to 16n3 represent virtual objects for controlling a physical resource 18n (see paragraphs [0031] and [0032]), i.e. they are a virtualisation of physical resources. In the same way, references 191, 192, ... 19n in Figure 2 represent infrastructure resources, i.e. network resources and service resources, controlled, i.e. virtualised, by the virtual objects 161, 162, ... 16n. High level virtual objects provided by the virtual infrastructure are able to control in a hierarchical relationship low level virtual objects (see paragraph [0073]).

2. Main request

2.1 It was common ground in oral proceedings that claim 1 differs from the disclosure of D1 by the features of

the characterising portion, namely in that in substance the apparatus manages the virtualised infrastructure resources to control allocating by one or more owners virtualised infrastructure resources allocated to the one or more owners to one or more tenants based on a hierarchical arrangement of the one or more owners and the one or more tenants.

2.2 The board agrees with the decision in point 9.2 that the classification of owner or tenant assigned to parties being allocated virtualised infrastructure resources is not a technical feature of the parties but rather a mere administrative/business feature. This is corroborated by the description on pages 33 and 34 which describes tenants as, *inter alia*, business unit tenants, wholesale unit tenants and retail business units. Moreover, the board considers that due to the broad and vague definitions of owners and tenants in the application, their functionality can be seen in the functionality of the virtual device providing units 161,...16n and the virtual infrastructure providing units 151,...15m, respectively, in Figure 1 of D1. These entities are organised hierarchically, the virtual device providing units allocating virtual objects to the virtual infrastructure providing units (see, for instance, paragraphs [0042], [0060] and [0077]).

Therefore, the subject-matter of claim 1 does not involve an inventive step having regard to the disclosure of D1.

2.3 The appellant argued that a technical difference between claim 1 and D1 is that, in claim 1, the virtualised resources are first allocated by the apparatus providing these resources to parties,

designated as owners, which in turn can allocate some of these virtualised resources to other parties, designated as tenants. According to the appellant, the apparatus is a supervisor which has an overview of all owners, but the owners have the primary decision power on which tenants they allocate the resources to. Instead, according to the appellant, all virtual resources in D1 are allocated directly by the control server.

The board is not convinced by this line of argument. Firstly, D1 teaches that virtual device providing units provide virtual objects, i.e. virtualised infrastructure resources, to virtual infrastructure providing units (see, for instance, paragraphs [0033] and [0042]). The virtual device providing units in D1 are admittedly comprised in the control server. However, the allocation of the virtualised resources is performed by the virtual device providing units. Secondly, the board notes that claim 1 of the current application defines that the allocation of virtualised resources by an owner to a tenant is controlled by the server providing the virtualised resources (see "cause the apparatus.. to control allocating..." in claim 1). Therefore, in claim 1, an allocation by a party to another party cannot be done without the involvement of the providing apparatus. There is thus no complete delegation of power from the providing apparatus to a party for the allocation of resources.

3. Auxiliary request 1

Claim 1 of this request differs in substance from claim 1 of the main request in that the hierarchy only refers to tenants and not to both tenants and owners. Therefore, the scope of this claim 1 is broader than

the scope of claim 1 of the main request and, as a consequence, it does not meet the requirements of Article 56 EPC for the same reasons as expressed above for the main request.

4. Auxiliary request 2bis

This request was filed in response to the board's communication. The board decided in oral proceedings to admit this request into the appeal proceedings under Article 13(2) RPBA, taking into account that the claims present minor amendments compared to the claims of previous auxiliary request 2.

Claim 1 adds in substance to claim 1 of auxiliary request 1 that the apparatus controls allocation of virtualised infrastructure resources by some tenants to other tenants.

As detailed in points 2.2 above, the board considers that due to the broad and vague definitions of owners and tenants in the application, their functionality can be seen in the functionality of the virtual device providing units 161,...16n and the virtual infrastructure providing units 151,...15m, respectively, in Figure 1 of D1. These entities are organised hierarchically, the virtual device providing units allocating virtual objects, i.e. virtual infrastructure resources, to the virtual infrastructure providing units (see, for instance, paragraphs [0042], [0060] and [0077]). Moreover, the virtual infrastructure providing units in D1 may themselves allocate virtual objects to other virtual infrastructure providing units (see Figure 1 and paragraphs [0060] and [0077]). The above-mentioned additional feature is thus derivable from D1.

For these reasons, claim 1 does not meet the requirements of Article 56 EPC having regard to the disclosure of D1.

5. Auxiliary requests 3bis, 4bis and 5bis

5.1 These requests were filed in response to the board's communication. The board decided in oral proceedings to admit these requests into the appeal proceedings under Article 13(2) RPBA, taking into account that the claims of auxiliary requests 3bis, 4bis and 5bis present minor amendments compared to the claims of previous auxiliary requests 3, 4 and 5, respectively.

5.2 All these requests contain in substance in their respective independent claim 1 the additional feature that the infrastructure virtualisation data structure includes a first set of fields and a second set of fields configured to support management of the virtualised infrastructure resources by owners and tenants, respectively.

The appellant has argued that this feature is supported by Figures 6A, 6B, 7A and 7B and the passages on page 6, lines 7 to 15, page 26, lines 11 to 12, page 27, lines 20 to 23, page 29, line 4, page 30, lines 6 to 10 and 17 to 20, page 32, lines 2 to 6, and page 33, lines 16 to 17.

However, the board notes that although the above mentioned figures and passages teach that fields of the data structure are associated with owners and tenants identified in the structure, none of them teaches that these fields are configured to support management of

the resources by the owners and tenants. Therefore, the skilled person would not be able to find in the combination of the numerous quoted figures and passages unambiguous support for the above-mentioned additional features.

For these reasons, auxiliary requests 3bis, 4bis and 5bis do not comply with Article 123(2) EPC.

6. Conclusion

The main request and auxiliary requests 1 and 2bis are not allowable under Article 56 EPC.

Auxiliary requests 3bis, 4bis and 5bis are not allowable under Article 123(2) EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chair:



K. Götz-Wein

A. Ritzka

Decision electronically authenticated