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Federal Supreme Court

on behalf of the people

Judgment

X ZR 4/20

Published on:
January 11, 2022
Anderer
court clerk as clerk
of the court registry

in the patent nullity case

ecli:en:bgh:2022:110122uxzr4.20.0

The X. Civil Senate of the Federal Supreme Court, at the oral hearing on January 11, 2021, by the Presiding Judge Dr. Bacher, Judges Hoffmann and Dr. Deichfuß, Judge Dr. Kober-Dehm, and Judge Dr. Crummenerl,

found to be right:

On the appeals of the parties, the judgment of the 5th Senate (nullity senate) of the Federal Patent Court of December 12, 2019, is amended and the further appeals are dismissed.

European patent 2,178,232 is declared partially invalid with effect for the Federal Republic of Germany by giving the claims the following wording:

1. A mobile station apparatus comprising:
a mapping unit (307) configured to map a sounding reference signal (SRS) to a subframe; and
a transmitting unit (309) configured to transmit the mapped sounding reference signal (SRS);
characterized in that
said mapping unit (307) is adapted to map the sounding reference signal (SRS) in a guard time of the subframe in which a random access preamble is transmitted,
the guard time during which nothing is transmitted being added to the random access preamble,
wherein the guard time is added after the random access preamble, and
said mapping unit (307) is adapted to map the sounding reference signal (SRS) in the tail end of the subframe,
and

wherein the random access preamble is transmitted from another mobile station apparatus.

2. The mobile station apparatus according to claim 1, wherein said mapping unit (307) is adapted to map the sounding reference signal (SRS) such that a time gap between the sounding reference signal (SRS) and the random access preamble is maximized.

3. The mobile station apparatus according to one of claims 1 to 2, wherein the random access preamble is transmitted from a mobile station apparatus, which is non-synchronized in an uplink.

4. The mobile station apparatus according to one of claims 1 to 3, wherein said transmitting unit (309) is adapted to transmit the sounding reference signal (SRS) at a constant period.

5. The mobile station apparatus according to one of claims 1 to 4, wherein said transmitting unit (309) is adapted to transmit the sounding reference signal (SRS) at a period which is m/n times of a period at which a random access preamble is transmitted, wherein m and n are positive integers.

6. The mobile station apparatus according to one of claims 1 to 5, wherein said transmitting unit (309) is adapted to transmit the sounding reference signal (SRS) at a constant period in at least part of subframes, in which random access preambles are transmitted.

7. The mobile station apparatus according to one of claims 1 to 6, wherein said transmitting unit (309) is adapted to transmit the sounding reference signal (SRS) at a constant period in subframes including a subframe, in which a random access preamble is transmitted.

8. The mobile station apparatus according to one of claims 4 to 7, wherein the period is defined by a number of subframes.

9. The mobile station apparatus according to one of claims 1 to 8, wherein said transmitting unit (309) is adapted to transmit the sounding reference signal (SRS) using a frequency hopping.

10. The mobile station apparatus according to one of claims 1 to 9 further comprising a receiving unit (302) configured to receive control information related to a time resource of the sounding reference signal (SRS), wherein said transmitting unit (309) is adapted to transmit the sounding reference signal (SRS) based on the control information.

11. A transmitting method comprising:
mapping a sounding reference signal (SRS) to a subframe; and
transmitting by a mobile station apparatus the mapped sounding reference signal (SRS);
characterized by
mapping the sounding reference signal (SRS) in a guard time of the subframe in which a random access preamble is transmitted,

the guard time during which nothing is transmitted being added to the random access preamble,
wherein the guard time is added after the random access preamble, and
said sounding reference signal (SRS) is mapped in the tail end of the subframe, and
wherein the random access preamble is transmitted from another mobile station apparatus.

In all other respects, the complaint is dismissed.

The plaintiffs shall each bear two-fifths and the defendant one-fifth of the costs of the proceedings.

By law

Facts:

The defendant is the owner of European patent 2 178 232 (patent in suit), which was granted with effect for the Federal Republic of Germany, was filed on August 7, 2008, claiming the priority of a Japanese patent application of August 8, 2007, and relates to an apparatus and a method for allocating and transmitting a sounding reference signal in a mobile communication system.

Patent claim 1, to which eleven further claims are referred back, and patent claim 13 are in the procedural language:

1. A mobile station apparatus comprising:
a mapping unit (307) configured to map a sounding reference signal (SRS) to a subframe; and
a transmitting unit (309) configured to transmit the mapped sounding reference signal (SRS);
characterized in that said mapping unit (307) is adapted to map the sounding reference signal (SRS) in a guard time of the subframe in which a random access preamble is transmitted,
the guard time during which nothing is transmitted being added to the random access preamble.

13. a transmitting method comprising:
mapping a sounding reference signal (SRS) to a subframe; and
transmitting the mapped sounding reference signal (SRS);
characterized by mapping the sounding reference signal (SRS) in a guard time of the subframe in which a random access preamble is transmitted, the guard time during which nothing is transmitted being added to the random access preamble.

The plaintiffs have argued that the subject matter of the patent in suit goes beyond the content of the documents originally filed and is not patentable. The plaintiff at 1 also argued that the invention was not disclosed in such a way that a person skilled in the art could carry it out. The defendant defended the patent in suit as granted and with twenty-five auxiliary requests.

The Patent Court declared the patent in suit invalid to the extent of claims 1 to 12 and dismissed the complaint. The appeals of the plaintiffs and the defendant, who continue to pursue their requests at first instance, are directed against this.

Reasons for Decision:

The appeals are admissible. The defendant's appeal is well founded with respect to the first auxiliary request. The plaintiff's appeal is successful insofar as it is directed against the granted version of claim 13. The further appeals are unfounded.

I. The patent in suit relates to a mobile station and a method for transmitting a sounding reference signal (SR signal) within a mobile communication system.

1. The starting point of the invention is the expected use of an SR signal in the fourth-generation mobile communications standard (Long Term Evolution, LTE) under development on the priority date (para. 2).

According to the description of the patent in suit, the SR signal is to be used for estimating the channel quality for frequency planning (scheduling), for detecting the time of reception and for controlling the transmission power in the uplink (i.e., in the communication path from the mobile stations to the base station) according to the considerations of the standardization bodies (para. 2).

Such an SR signal could, for example, consist of a long block (LB) with a length of 71.4 microseconds and include a cyclic prefix (CP) and the actual reference signal. The mobile station could transmit such signals periodically, for example at intervals corresponding to the length of a subframe, i.e. at intervals of one millisecond each (par. 3).

In three contributions to the responsible working group, including one by T. (Improved Non-Synchronized Random Access structure for E-UTRA, R1-063213, NK17/K19), it is proposed that the SR signal always be transmitted to the base station in the first long block of a subframe on the PUSCH (Physical Uplink Shared Channel) channel. Alternatively, in the contributions of N. (UL sounding reference signal for EUTRA TDD, R1072989, NK9/K7), S. (Sounding RS Multiplexing in E-UTRA-UL - Interaction with PUCCH, R1-073092, NK10/K14) and C. (Uplink Sounding Reference Signals for TDD with Alternative Frame Structure, R1-071879, NK11/K15), it is discussed to place the SR signal in the last long block of a subframe (para. 6).

Both proposals are problematic. As the number of mobile stations in a cell increases, the long block reserved for transmitting the SR signal is used correspondingly frequently. Other mobile stations would then no longer be able to use this resource to transmit data, resulting in reduced efficiency (Par. 7).

Furthermore, the use of a random access preamble for the first access of a mobile station to the network, the update of the transmission time and the determination of the channel quality in the uplink is being investigated for LTE. This preamble is a signal that contains identification features of the mobile station. Like the SR signal, the preamble is transmitted periodically on the instructions of the base station. According to previous considerations, the duration of the preamble is one millisecond, which corresponds to the length of a subframe or fourteen long blocks. In addition to the actual identification feature, the preamble includes a cyclic prefix and a guard time (GT) (Par. 4).

The guard period is a non-transmission period (para. 4). It is required to avoid interference due to signal overlap with data of the next subframe. This could

occur because the signal from a mobile station not synchronized with the base station could arrive with a delay (Par. 5).

2. Against this background, the patent in suit is based on the technical problem of enabling a more efficient transmission of the SR signal.

3. To solve this, the patent in suit proposes a mobile station and a method in claims 1 and 13, the features of which can be broken down as follows (the Patent Court's feature analysis, which differs in one detail, is indicated in square brackets):

a) Claim 1:

1.	A mobile station apparatus comprising	Mobilstationsvorrichtung umfassend:
1.1	a mapping unit (307)	eine Abbildungseinheit (307),
1.1.1	configured to map a sounding reference signal (SRS) to a subframe	die konfiguriert ist zum Abbilden eines SR-Signals auf einem Teilrahmen,
1.1.2	said mapping unit (307) is adapted to map the sounding reference signal (SRS) in a guard time of the subframe in which a random access preamble is transmitted,	und eingerichtet ist zum Abbilden des SR-Signals in einem Schutzzeitintervall des Teilrahmens, in dem eine Random-Access-Präambel gesendet wird,
1.1.3	the guard time during which nothing is transmitted being added to the random access preamble; [1.1.2]	wobei das Schutzzeitintervall, während dem kein Signal gesendet wird, zu der Random-Access-Präambel hinzugefügt wird;
1.2	a transmitting unit (309)	eine Sendeeinheit (309),
1.2.1	configured to transmit the mapped sounding reference signal (SRS).	die zum Senden des zugeordneten SR-Signals konfiguriert ist.

b) Claim 13:

13.	A transmitting method comprising:	Sendeverfahren umfassend:
13.1	mapping a sounding reference signal (SRS) to a subframe; and	Abbilden eines SR-Signals auf einem Teilrahmen,
13.2	mapping the sounding reference signal (SRS) in a guard time of the subframe in which a random access preamble is transmitted,	und zwar in einem Schutzzeitintervall des Teilrahmens, in dem eine Random-Access-Präambel gesendet wird,
13.3	the guard time, during which nothing is transmitted being added to the random access preamble;	wobei das Schutzzeitintervall, während dem kein Signal gesendet wird, zu der Random-Access-Präambel hinzugefügt wird;
13.4	transmitting the mapped sounding reference signal (SRS).	Senden des abgebildeten SR-Signals.

4. According to the correct statements of the Patent Court, which are not objected to by the parties, a person skilled in the art is an engineer of communications technology who has several years of professional experience in the development and standardization of mobile radio systems.

This person skilled in the art is, as the Patent Court also rightly assumed, familiar with the current version and the essential suggestions for improvement of the LTE mobile radio standard under development at the priority date of the patent in suit. The fact that the development of this standard was being followed and discussed in the technical world on the priority date is also clear from the description of the patent in suit.

5. Some features require further consideration:

a) Claims 1 and 13 do not provide for a limitation to LTE or other cellular standards.

The proposed solution is indeed oriented to the special features of LTE. However, this is expressed in the claims only to the extent that SR signals and subframes with a random access preamble and a guard interval are provided. The more detailed design of these elements is not limited to the special specifications provided by the LTE standard in this respect.

b) Features 1.1.1 and 13.1 do not specify in detail how an SR signal is composed.

aa) As already explained above, according to the description (para. 2), an SR signal is used in LTE systems to estimate the channel quality for frequency planning (scheduling), to detect the time of reception and to control the transmission power in the uplink.

This definition shall govern the interpretation of features 1.1 and 13.1.

Claim 1 does not refer to a specific mobile radio standard. However, it is based on the above understanding of an SR signal.

bb) The more detailed design of such a signal, on the other hand, is left to the discretion of the person skilled in the art.

In particular, it is not necessary that the SR signal corresponds to a signal as used in LTE systems for the purposes mentioned.

cc) Against this background, the relevant definitions in the LTE standard cannot be used to interpret the term "subframe" either.

Accordingly, a subframe within the meaning of claim 1 is any structure which is suitable for the arrangement of a random access preamble including a guard time interval and which in turn is part of any larger structure. How these structures are designed in detail is left to the person skilled in the art.

dd) Features 1.1.1 and 13.1 do not require that the mobile station mapping and sending the SR signal is already synchronized with the base station and that the random access preamble is sent by another mobile station.

In this context, it is irrelevant whether sending both signals through the same mobile station in an LTE network is technically possible and reasonable. Claims 1 and 13 are not limited to such networks and also do not provide for any limitations with regard to the questions relevant here.

Such limitations are provided only in claims 4 and 5. According to claim 4, the random access preamble must be sent by a non-synchronized mobile station. According to claim 5, this must be a different mobile station than the one that maps and sends the SR signal.

c) The mapping of the SR signal in a guard time interval provided for in features 1.1.2 and 1.1.3 or 13.2 and 13.3 is of central importance for the desired objective of efficiency.

aa) According to features 1.1.3 and 13.3, a guard period is a period of time added to a random access preamble during which no signals are transmitted.

As already explained above, such an interval in LTE systems takes into account the fact that signals from a mobile station that has not yet been synchronized may arrive at the base station with a certain time delay because the distance between the mobile station and the base station is not yet known and the mobile station cannot therefore take into account the propagation time required for the signal to arrive at the base station. This can lead to interference with subsequent signals from other mobile stations. This can be avoided if the mobile station that has not yet been synchronized does not transmit any signals at certain intervals.

However, this purpose is not reflected in claims 1 and 13. These claims do not specify the LTE standard and do not assign any particular functions to the guard interval. As has already been explained, they also do not mandatorily provide that the random access preamble is transmitted by a non-synchronized mobile station and the SR signal is transmitted by another synchronized mobile station.

A protected time interval within the meaning of the patent in suit therefore already exists if the two conditions mentioned at the beginning are fulfilled -- irrespective of the purpose for which the transmission of signals is omitted.

bb) The insertion of guard time intervals has the consequence that the resources available for signal transmission are not fully utilized. The patent in suit uses a part of these unused resources to transmit SR signals and thus enables an increase in efficiency.

As a result, the interval added to the random access preamble during which no signals are transmitted is shortened because this interval is at least partially used to transmit an SR signal.

This approach increases the risk of interference, which the insertion of the guard time intervals is intended to counteract. According to the description of the patent in suit, however, this danger can be minimized by certain measures and even completely eliminated for mobile stations that are not too far away from the base station (par. 53 et seq.). However, claims 1 and 13 do not contain any limitations in this respect. They leave open the extent to which the period during which no signals are transmitted is shortened by mapping the SR signal and even allow the possibility of this period being completely filled by the SR signal.

cc) It is not clear from features 1.1.3 and 13.3 where the guard interval is to be inserted in the subframe for the random access preamble.

The formulation used in these features that the guard period interval is to be added to the random access preamble does not result in any requirements in this respect. It is possible to add it both before and after the preamble. It is also possible to provide a guard period interval both before and after the preamble, as is done in one of the embodiments described in the description (paras. 69 et seq.).

In this respect, patent claim 2 provides for further requirements. According to this claim, the SR signal must be placed at the end of a subframe. It follows that the guard interval in which the SR signal is mapped according to feature 1.1.2 must also be located at the end of the subframe.

d) Features 1.2.1 and 13.4 do not specify how often and over which channel the SR signal is transmitted.

In this respect, too, it is irrelevant which time intervals and channels were customary in the prior art. Claims 1 and 13 do not contain any specification of a particular standard.

e) The mobile station protected in claim 1 shall have facilities suitable to perform the functions provided in features 1.1.1, 1.1.2 and 1.2.1.

aa) The features of a device claim have the function of describing the protected object as such, so that the object defined in this way - regularly in spatial-physical terms - is protected irrespective of how it was manufactured and for what purpose it is actually used (see Federal Supreme Court (BGH), judgment of June 7, 2006 - X ZR 105/04, GRUR 2006, 923, 925 - Luftabscheider für Milchsammelanlage; judgment of December 13, 2005 - X ZR 14/02, GRUR 2006, 399, 401 - Rangierkatze).

This does not mean, however, that indications of purpose, effect or function contained in the claim are meaningless per se. Rather, as components of the claim, they can participate in its task of defining and thus at the same time limiting the protected subject matter, if they define the device element to which they refer as such, which must be designed in such a way that it can fulfill the relevant function (established case law, most recently Federal Supreme Court (BGH), judgment of November 3, 2020 - X ZR 85/19, GRUR 2021, 462 para. 49 - Fensterflügel; judgment of April 24, 2018 - X ZR 50/16, GRUR 2018, 1128 para. 12 - Gurtstraffer).

bb) According to these principles, features 1.1.1 and 1.1.2 require that the mobile station is designed to map an SR signal in the guard time interval of a subframe in which a random access preamble is transmitted.

(1) As the Patent Court did not fail to recognize in its approach, it is not sufficient for this purpose if the mobile station can be set up by programming in such a way that it can perform the aforementioned function.

According to the description of the patent in suit, the functions can be realized either with specially configured integrated circuits (paragraph 102) or with universally applicable processors (paragraph 103). Even in the latter case, however, it is not sufficient if the mobile station can be made capable of performing the required functions by installing suitable software or other configuration measures. Rather, it must already be configured accordingly, i.e. it must already include suitable software or other means that enable the realization of these functions in corresponding operating situations.

(2) This does not preclude the process steps completed on the mobile station from being called up and controlled by the base station or other external components. However, even in this case, the mobile station must at least be set up in such a way that it can interpret and process corresponding calls and control commands. This is not the case, for example, if the mobile station first has to be reprogrammed or equipped with additional or modified hardware components.

(3) Contrary to the Patent Court's opinion, on the other hand, it is not excluded that the mobile station (also) maps the SR signal on the basis of "its own freedom of decision", i.e., independently of the base station's specifications.

In this context, it is irrelevant whether and to what extent such an approach is technically possible and useful in an LTE network or other common mobile networks. Claim 1 does not specify a particular system.

(4) The minor difference in the wording of features 1.1.1 (configured) and 1.1.2 (adapted) does not lead to differences in content.

Both features require that the mobile station be capable of performing the appropriate functions without reprogramming or adding or modifying hardware components, as detailed above.

cc) Correspondingly, the mobile station according to feature 1.2.1 must be designed to be able to send the assigned SR signal.

f) According to claim 13, the process steps provided for in corresponding features 13.1, 13.2 and 13.4 must actually be carried out. The Patent Court and the parties correctly assume that this is done in the mobile station.

The latter requirement is not expressly provided for in the wording of claim 13. However, it results from the circumstance already shown above that an SR signal is used to define parameters in the uplink. It can be inferred from this circumstance that the signal must be formed and sent by a mobile station. The fact that this process is triggered and controlled by the base station is also neither excluded nor mandatory in this context.

II. In justifying its decision, the Patent Court essentially stated, insofar as is relevant to the appeal proceedings:

The subject matter of the patent in suit did not go beyond the content of the documents originally filed. These also disclosed embodiments in which the mobile station exclusively implemented the specifications of the base station. Also disclosed was a mapping unit. The terms "to arrange" and "arrangement" used in the application documents included the terms "to map" and "mapping" used in the

patent in suit. These described a minimum design and had already been used before the priority date for arranging an SR signal in a subframe.

The subject matter of the granted version of claim 1 was fully anticipated by NK9/K7. This contribution dealt only with the imaging and transmission of an SR signal, but not with a random access preamble. However, a mobile station designed in accordance with the proposals from NK9/K7 would be able to map an SR signal in the guard interval of a subframe for a random access preamble, because according to NK9/K7 it must be possible to place the SR signal in the first or in the last long block of each subframe. That this suitability could only be achieved by further measures in the mobile station was not recognizable.

For corresponding reasons, the subject matter of patent claim 1 defended by auxiliary requests 1, 2, 2A, 3, 3A, 5A, 6, 7, 8 and 9 was also unpatentable. In the version according to auxiliary requests 4 and 5, patent claim 1 is inadmissibly extended.

In contrast, the subject-matter of claim 13, defended in isolation by auxiliary request 10, was patentable.

The actual mapping of the SR signal in the guard time interval of a subframe for a random access preamble is neither anticipated nor suggested by NK9/K7. Such a procedure is also suggested by the contribution of T. (Random Access preamble design for E-UTRA, R1-061392, K9). K9 did not deal with the transmission of an SR signal from a synchronized mobile station. Feature 1.1.1, on the other hand, presupposed that the mobile station that reproduced the SR signal was already synchronized in the uplink. The same applied with regard to two further proposals of T. (Synchronized Random Access structure for EUTRA, R1-063215, K18; Preamble Based Scheduling Request: a Generic Structure, R1-072193, ZP21); in addition, no guard time interval was provided

there. The international patent application 2007/126793 (K12) as well as the contributions NK10/K14 and NK11/K15 did not disclose to map a SR signal in a guard time interval. The same applied to US patent specification 6 381 229 (K13), the disclosure content of which did not go beyond that of K9.

The subject matter of claim 13 was also not obvious from NK9/K7 in combination with the technical specification 3GPP TS 36.211 V1.2.0 (2007-06) (NK19/K8). NK9/K7 did not show any reference to a random access preamble. In addition, the skilled person would take from NK19/K8 that the guard time interval of the random access preamble should be kept free of data transmission. The contrary does not follow from the fact that from K18, a further Contribution by T. (Synchronized Random Access structure and performance for E-UTRA, 3GPP, R1-061750, K20) and ZP21, the indication that other signals can also be transmitted in a PRACH channel. This does not suggest that an SR signal should be arranged in the guard interval of a random access preamble, which is free of transmission according to the state of the art.

III. This assessment does not fully withstand appellate review.

1. The Patent Court correctly decided that the subject matter of claims 1 and 13 does not go beyond the content of the originally filed documents.

a) As already explained, claims 1 and 13 leave open whether the mapping of the SR signal is implemented exclusively on the basis of system specifications or at least partially on the basis of the mobile station's own "decision-making authority".

b) Contrary to the opinion of the plaintiffs, this can already be inferred from the original application documents as belonging to the invention.

Contrary to the plaintiffs' view, the terms used in the application disclose not only mobile stations which retain at least a certain degree of their own freedom of decision in the arrangement of the SR signal, but also those in which these operations are controlled by the base station.

aa) The claims 13 and 14 formulated in the original documents concern a mobile station with a functional scope as also defined in features 1.1.1, 1.1.2 and 1.1.3. The fact that the mobile station according to claims 13 and 14 of the application carries out the relevant process steps, whereas the patent in suit only provides that the mobile station is configured or set up accordingly, does not establish a relevant difference.

It can be left open whether the claims formulated in the application are directed only to those devices in which the specified functions are actually performed. Even if this question were to be answered in the affirmative, it would be sufficiently clear from the fact that the application seeks protection for a device that this request also relates to such devices which have a corresponding suitability.

bb) The fact that the application uses the terms "to arrange" and "arrangement section" instead of the terms "to map" and "mapping unit" used in the patent specification also does not constitute a substantive deviation.

Even if it were to be assumed with the Patent Court that the term "to arrange" also includes procedures with own decision-making authority, while the term "to map" is limited to the implementation of external specifications, it would

only result from the fact that the application uses the further term that an independent procedure of the mobile station is not excluded. Neither the wording of the claims nor the other contents of the application, however, indicate that this possibility must necessarily be realized.

(1) As the Patent Court correctly stated; the term "to arrange" in any case also includes an externally controlled approach in the sense of "to map".

(2) Contrary to the opinion of the plaintiffs, no further requirements result from the examples of embodiments described in the application - as well as in the patent in suit (NK2/K2 para. 45 et seq.).

However, these explanations only describe process steps in which the mobile station determines the relevant process parameters and arranges the signals accordingly. However, it is envisaged that the mobile station will receive specifications for the relevant time intervals (Paragraph 57 et seq.). This leaves open the possibility that the mobile station will arrange the signals exclusively on the basis of such specifications.

Even if it were to be inferred from the embodiment examples that the mobile station has its own scope for decision-making, it could not be inferred from the application against this background that such a design is mandatory, i.e. that deviating designs are not part of the invention.

The fact that all embodiments described in an application have a certain feature does not preclude claiming protection for embodiments without that feature if no concrete relationship between the feature in question and the means provided in the claim for solving a described technical problem can be inferred

from the content of the application (see Federal Supreme Court (BGH), judgment of November 7, 2017 - X ZR 63/15, GRUR 2018, 175 para. 35 - Digitales Buch).

In the case in dispute, it cannot be inferred from the documents originally submitted that an at least partial freedom of decision for the mobile station for the disclosed procedure and the solution of the technical problem of transmitting an SR signal as efficiently as possible is associated with advantages. Such advantages are also not shown by the plaintiffs.

2. Furthermore, the Patent Court assumed with correct reasoning that the subject matter of the patent in suit is disclosed in such a way that a person skilled in the art can carry it out. The plaintiffs do not raise any objections in this respect in their appeal.

3. Contrary to the Patent Court's view, the subject matter of claim 1 is not fully disclosed in NK9/K7.

a) NK9/K7, which is cited as prior art in the patent in suit (para. 6), ties in with the LTE mobile communications standard currently under development and deals with a possible arrangement of SR signals in the uplink.

In NK9/K7, it is stated that according to the considerations to date, a long block is planned for the transmission of the SR signals in the uplink. However, the placement of the SR signal in the frame is still open (p. 1 no. 1).

The framework structure for time division duplex (TDD) provides for the use of an SR signal at least for channel-dependent scheduling in the uplink. For this purpose, a long block per transmission time interval (TTI) is to be used. The frequency of the transmission would be specified by the base station. If such channel dependent scheduling is supported, it is essential that the mobile station

has the ability to transmit an uplink SR signal in each subframe, regardless of the number of uplink subframes (p. 1 n. 2). The final summary therefore proposes that each uplink subframe should have uplink sounding capability (p. 2 n. 3).

Because of the reciprocity of the channels in time division duplexing, the SR signal could also be used to support certain functions in the downlink (p. 1 no. 2).

For the placement of the SR signal, it has been proposed so far to place it either in the first or in the last long block of a subframe. If the SR signal is used to support downlink functions, the question of the placement of the SR signal is of greater importance with regard to channel reciprocity (p. 1 no. 2).

The possible arrangements of an SR signal at the beginning or at the end of an uplink subframe would result from the figures 1 and 2 reproduced below concerning a TDD frame of type 2.

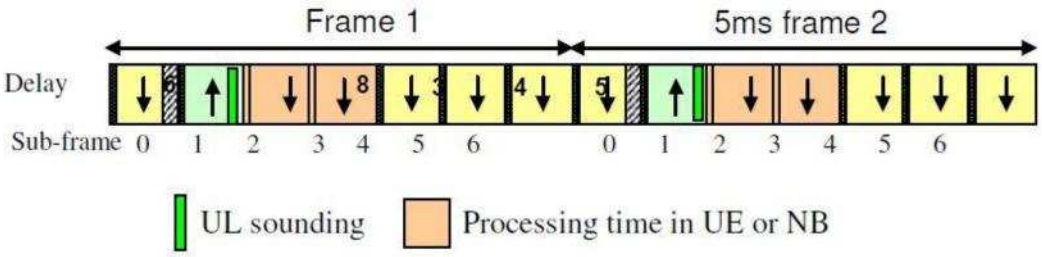

Figure 1: TDD Type 2 frames with 6DL/1UL. Sounding S-RS is placed in last LB.

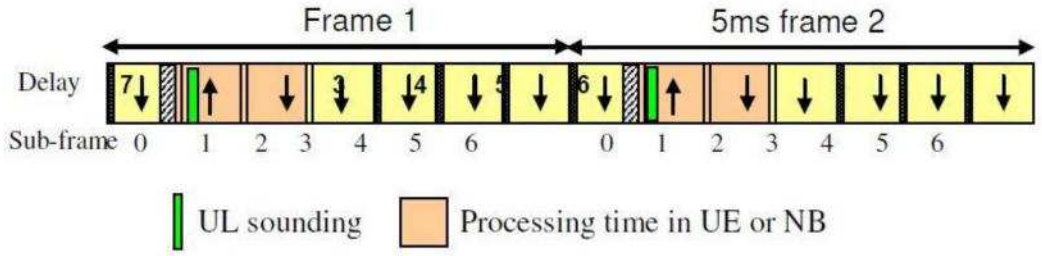

Figure 2: TDD Type 2 frames with 6DL/1UL. Sounding S-RS is placed in first LB.

Figure 1 shows the arrangement of an SR signal (colored green) in the last long block of an uplink subframe, which is indicated by an arrow pointing upwards. Figure 2 shows the arrangement of the SR signal in the first long block of an uplink subframe (p. 1 no. 2 below).

If SR signals were also used to support downlink functions, placement of the SR signal at the end of the subframe would be preferable because this would allow the use of a channel with the shortest possible delay in the downlink (p. 2 above). To support uplink functions, the placement issue is less significant. However, a placement in the last long block would allow a higher accuracy of the channel assignment (p. 2 before no. 3).

Finally, NK9/K7 points out that the conclusions drawn on the basis of type 2 TDD frameworks are also valid for type 1 TDD frameworks (p. 2 n. 3).

b) Thus, there is no disclosure of feature 1.1.2.

aa) Anticipated are, as also the defendant does not doubt, the features 1, 1.1, 1.1.1 and 1.2.

bb) Feature 1.1.2 is not disclosed.

(1) As the Patent Court also did not fail to recognize in approach, NK9/K7 does not disclose the arrangement of SR signals in a subframe for a random access preamble.

NK9/K7 deals only with the transmission of SR signals and, with regard to the structure of the frames used for this purpose, is based on the state of the art at the time, which provided for two different types of TDD frames.

(2) These structures are shown in the NK19/K8 specification, which also dates from June 2007.

(a) The TDD type 1 frame structure is shown in Figure 1 reproduced below.

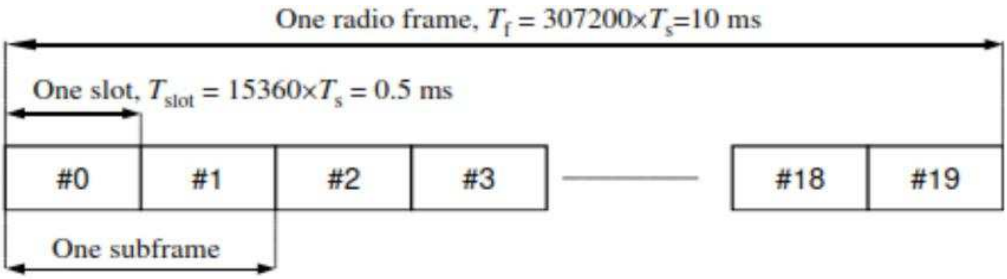

Figure 1: Frame structure type 1.

Such a frame has a duration of ten milliseconds. Each frame consists of twenty slots (0 to 19) of half a millisecond each. A subframe consists of two consecutive slots (section 4.1).

The structure of a random access preamble for TDD frames of type 1 is shown in Figure 19 reproduced below.

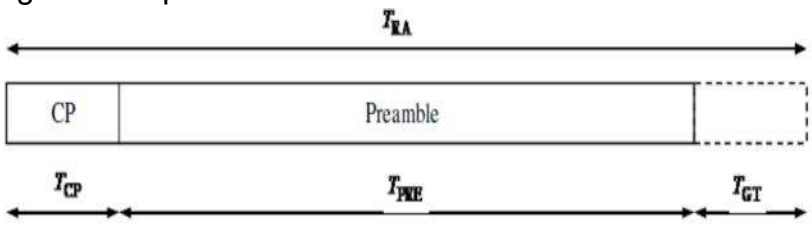

Figure 19: Random access preamble format (frame structure type 1).

The total duration T_{RA} is specified in Table 20 as one millisecond, i.e. the duration of a subframe. Of this, 0.8 milliseconds are allotted to the actual preamble and around 0.1 milliseconds each to a cyclic prefix (CP) and a guard interval (TGT). The latter is defined as a period during which nothing is transmitted (Section 6.7.1).

(b) A TDD type 2 frame structure is shown in Figure 2 reproduced below.

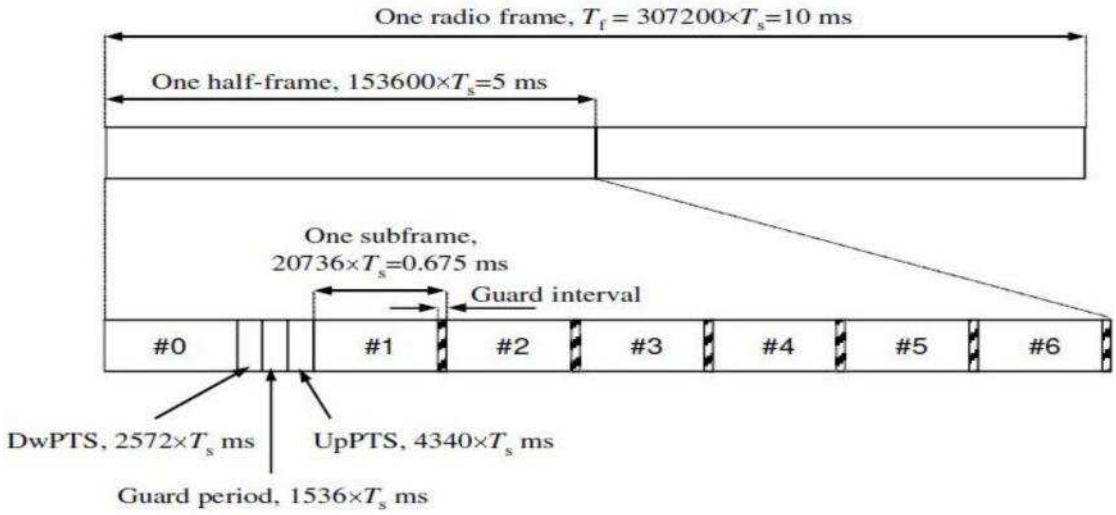

Figure 2: Frame structure type 2.

Such a frame also has a duration of ten milliseconds and is divided into two half frames, each with a length of five milliseconds. Each half frame consists of seven slots (0 to 6) of 0.675 milliseconds each (i.e. a total of 4.725 milliseconds) and three special fields. A subframe is formed by one slot each. No signal is transmitted in the last part of subframes 1 to 6. This creates a guard interval. The special field UpPTS and subframe 1 are always reserved for transmission in the uplink (section 4.2).

A random access preamble is mapped in this frame structure in the special field UpPTS (Section 6.7.1, Table 20). The guard interval then covers a period of about 0.008 milliseconds (244 or 256 x TS; with TS = 1/30720 millisecond, cf. figures 1 and 2 above and section 4).

This structure corresponds to the structure shown in Figures 1 and 2 of NK9/K7. This shows a hatched area for the special fields after subframe 0 in each case.

(3) As also the Patent Court did not fail to recognize, also against this background the proposal to arrange SR signals in the protection interval of a subframe for a random access preamble does not result from NK9/K7.

In the type 2 TDD frames shown in NK9/K7, the SR signals are not arranged in the special fields after the first subframe, but in the second subframe following it. Even if it were assumed that the requirement defined in NK9/K7 that the mobile station must be able to arrange an SR signal in each subframe also refers to the special fields, it would follow that this possibility is not used for type 2 frames.

With regard to TDD frames of type 1, there is no further disclosure content. The general reference at the end of NK9/K7 that the same applies to these frames as to type 2 frames indicates at most that the SR signal should also be located in the first subframe for the uplink in type 1 frames. However, the note

cannot provide any information about the location of random access preambles because the special fields provided for this purpose in type 2 are not available in type 1. NK19/K8 also does not contain any specifications in this respect.

(4) Contrary to the opinion of the Patent Court, it cannot be assumed against this background that a mobile station which fulfills the requirements from NK9/K7 is suitable without further ado for mapping the SR signal in the guard time interval of a subframe for a random access preamble.

In this context, it can be assumed with the Patent Court that the required suitability would exist if a mobile station set up in accordance with the requirements of NK9/K7 were to execute the command to map the SR signal in any subframe specified by the base station, regardless of all other circumstances. In any case, such a configuration of the mobile station cannot be clearly inferred from NK9/K7.

(a) The requirements formulated in NK9/K7 that the mobile station must be able to transmit an uplink SR signal in each subframe and that each uplink subframe should have the uplink sounding capability could, however, be understood in isolation to mean that this applies without any restriction, i.e. also to uplink subframes in which a random access preamble with a guard interval arranged at the end is included.

(b) However, these requirements could only be realized if not only the concept for SR signals dealt with in NK9/K7 were changed, but in addition also the framework structure given in NK19/K8.

For frames of type 2, this already results from the fact that in the special field UpPTS provided for the random access preamble, only about 0.008 milliseconds are available for a guard interval, but an SR signal requires about 0.07 milliseconds, i.e. about nine times the time period.

In the case of type 1 frames, the structure defined in NK19/K8 would have to be modified at least to the extent that the area provided for the guard interval of the random access preamble is at least partially used for the transmission of signals, contrary to the specification from NK19/K8.

(c) A clear and direct instruction to modify the framework structure given in NK19/K8 cannot be inferred from NK9/K7.

As already explained above, NK9/K7 refers to the state of development work at that time, as documented in NK19/K8, because of the framework structure. There are no indications in the article that this structure also requires adaptation. Instead, a solution is proposed for type 2 frames that fits into the existing structures, and the assessment is expressed that this approach is also suitable for type 1 frames.

(d) With this initial situation, it cannot be assumed that a handset configured according to the specifications from NK9/K7 is capable of mapping an SR signal in the guard time interval of a subframe for a random access preamble.

The reference in NK9/K7 to the specified frame structure rather leads to the expectation that a handset is configured in such a way that it also satisfies the requirements from NK19/K8, i.e., that it does not transmit signals in areas intended for guard intervals. Such a handset would not be able to map an SR signal in such areas without changes to the software or hardware. Consequently, it would not be able to execute a corresponding command from the base station.

(e) Contrary to the plaintiffs' view, NK9/K7 also does not disclose that, in order to implement the requirements stated therein, a mobile station must be designed in such a way that it exclusively follows instructions from the base station when mapping an SR signal at the end of a subframe and can implement such instructions without further ado even if they conflict with specifications arising from other parts of the specification.

NK9/K7 does not contain any further explanations on the question of how the requirements formulated there are to be technically implemented in a mobile station. An unambiguous disclosure on this question could therefore at most be inferred from the statement of opposition if the procedure postulated by the plaintiffs on the priority date had represented the only possibility from a technical point of view to fulfill the requirements mentioned.

Contrary to the plaintiffs' view, this requirement is not met.

In this respect, the defendant has stated without contradiction that the requirements of NK9/K7 can also be implemented in such a way that the base station on the one hand provides the mobile station with the abstract rule that an SR signal is always transmitted at the end of each uplink subframe, but on the other hand informs the mobile station which resources are reserved for the transmission of random access preambles, and that the mobile station implements these divergent requirements in such a way that an SR signal is not arranged in subframes that are reserved for random access preambles. In this embodiment, the mobile station does not implement feature 1.1.2.

The contested judgment proves to be correct in result with regard to the granted version of claim 1 for other reasons (Sec. 119 (1) Patent Act).

Contrary to the opinion of the Patent Court, the subject-matter of claim 13 is not new. No different assessment results for claim 1.

1. The subject matter of claim 13 is not new.

a) As the Patent Court decided with correct reasoning, the subject matter of claim 13 is not completely anticipated by NK9/K7.

NK9/K7 does not disclose features 13.2 to 13.4.

As already stated in connection with claim 1, NK9/K7 cannot be unambiguously and directly used to instruct the user to map and transmit an SR signal in the guard interval of a subframe for a random access preamble.

b) Whether the subject-matter of claim 13 is anticipated by the further documents, in particular by K9 and a synopsis of K18 to K20, can be left open, because its subject-matter is in any case completely anticipated by K13.

aa) K13 concerns data transmission by a mobile station, in particular in a wideband code division multiple access (WCDMA) communication system.

In the system described, a mobile station sends a preamble and a signature for initial access to the network. At the same time, the transmission of a data part is provided. The signal to be sent is spread widely so that it assumes a large bandwidth. With the reception of the preamble and the signature, the base station can allocate in particular the so-called rake fingers in order to enable the subsequent processing of the data parts by the rake receiver unit (Column 3 lines 36-47; column 8 lines 7 et seq., column. 10 lines 23 et seq.).

However, processing the preamble and the signature in the base station takes time. Therefore, the base station may have to buffer the received signals (column 4 line 8-25).

To solve this problem, K13 proposes with reference to the parallel US patent application 09/079438 to start the data transmission after the transmission of preamble and signature only with a time delay (Sp. 4 line 31 et seq.). Such an arrangement is shown in Figure 4, which is reproduced below.

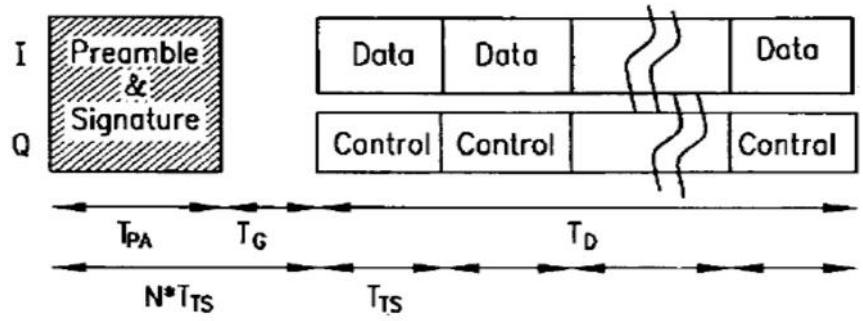

FIG. 4

The frame structure is equipped with a separate preamble and data part. A guard interval (T_G) is preferably inserted between the preamble and the data parts (column 7 line 29 et seq., column 6 line 24 and line 62 et seq.). This is a transmission interruption to achieve a time offset for the reception of the data parts (column 4 line 32). The duration or length of the new frame results from the addition of the lengths of the preamble (TPA), the guard time (TG) and the data part (column 7 line 53 et seq.).

This solution is problematic if a short guard interval is generated, especially if the time required to switch the power amplifier of the mobile station on and off is of the same order of magnitude as the guard interval (Column 4 line 44 et seq.).

For improvement, K13 proposes not to interrupt or turn down the transmission power of the transmitter, but to transmit filling symbols without changing the transmission power (column 4 lines 61-63; column 12 line 55). This is shown in figure 10 reproduced below.

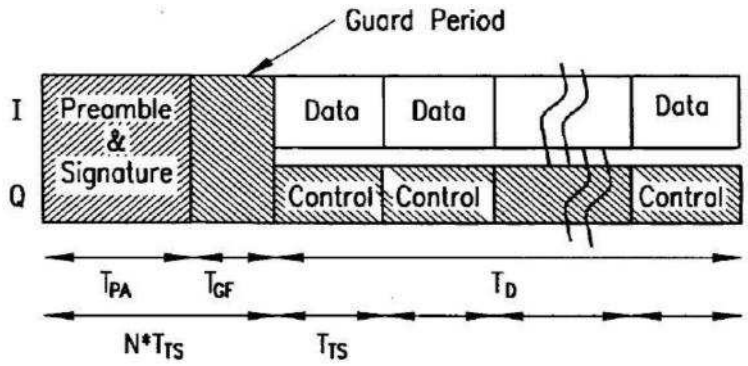

FIG. 10

To achieve this, K13 suggests as an example that the mobile station transmits so-called dummy chips during the guard interval, which are used as filler material that the base station does not have to detect (column 5 line 1 et seq.). Alternatively, the mobile station could also spread and transmit symbols to generate the guard interval in the random access frame. If necessary, such signals could be detected in the base station and used, for example, as pilot signals for channel estimation (column 5 lines 5-10, column 13 lines 7-15).

bb) Features 13 and 13.1 are thus disclosed.

(1) The pilot signals transmitted by the mobile station in K13 are SR signals within the meaning of feature 13.1 because they enable channel estimation. Whether they are used by the base station for this purpose is irrelevant because claim 1 does not contain any specifications in this respect.

(2) The structure shown in figure 10 contains subframes in the sense of feature 13.1.

A subdivision of the frames used for transmission into subframes is not mentioned in K13. In view of the fact that K13 concerns a different mobile communications standard, it cannot be assumed that the structure shown corresponds to the frames and subframes of an LTE network. However, as already explained above, feature 13.1 does not contain any further requirements for the structure of a subframe because claim 13 does not specify a particular mobile communications standard.

Against this background, it is sufficient for the disclosure of feature 13.1 that special substructures are defined in Figure 10 for the user data as well as for the preamble and the guard time interval. Due to the ultimately arbitrary arrangement of the substructures within the superordinate frame structure, the time interval consisting of the preamble and the guard interval and defined in Figure 10 as $N * T_{Ts}$ can also be regarded as a subframe in this sense.

cc) Also disclosed are features 13.2 to 13.4.

(1) Contrary to the view of the defendant, the protection time shown in figure 10 is a protection time interval within the meaning of features 13.2 and 13.3.

According to the Patent Court's findings, it is true that in WCDMA systems a guard time interval is not absolutely necessary to avoid interference because a preamble is widely spread and therefore less susceptible to narrowband interference. However, as already explained above, it is not necessary for the guard time interval to serve to avoid interference in order to implement features 13.2 and 13.3.

According to this, it is sufficient that it is an interval assigned to the random access preamble in which no signals are transmitted. This requirement is met for the structure shown in Figure 10.

(2) The pilot signal suitable for channel estimation is mapped in this guard time interval.

As in the patent in suit, a period during which no signals are transmitted for certain reasons is used for the transmission of a signal that serves other purposes and does not diametrically oppose the achievement of the objective sought by the protected time interval.

This is true even if one assumes with the defendant that according to Figure 10 the preamble and the protection time are not part of the same structure, but are each arranged in separate structures. For claim 12 of K13 also discloses an embodiment in which the protection time is contained in the preamble part.

2. The method according to claim 13 simultaneously discloses a mobile station according to claim 1. Therefore, the patent in suit as granted cannot be maintained with respect to both claims.

V. In contrast, the subject matter defended by auxiliary request 1 is patentable.

1. According to auxiliary request 1, claims 2 and 5 are to be deleted. Claim 1 is to contain the following additional features:

1.1.4	wherein the guard time is added after the random access preamble,	wobei das Schutzintervall nach der Random-Access-Präambel hinzugefügt wird und
1.1.5	and said mapping unit is adapted to map the sounding reference	die Abbildungseinheit so eingerichtet ist, dass sie das SR-Signal

	signal in the tail end of the sub-frame,	am Ende des Teilrahmens abbildet,
1.1.6	and wherein the random access preamble is transmitted from another mobile station apparatus	und wobei die Random-Access-Präambel von einer anderen Mobilstationsvorrichtung gesendet wird

Corresponding process steps are also to be included in the process claim provided as patent claim 11 in this version.

1. the subject matter thus permissibly defended is patentable.

a) It is new.

aa) In K13, features 1.1.6 and 11.6 are not disclosed.

The random access preamble and the pilot signal are transmitted there by the same mobile station.

The circumstance cited by the second plaintiff in this context, namely that the structure disclosed in K13 can be transmitted in parallel in a network by several mobile stations, could only lead to a different assessment if the pilot signal of a mobile station were transmitted in the same structure as the random access preamble of another mobile station. There are no indications of this in K13.

bb) The subject matter defended by auxiliary request 1 is also not fully anticipated by K9.

(1) K9 addresses the possible construction of a random access preamble transmitted by a mobile station not yet synchronized in the uplink to the base station in an LTE network.

The paper focuses on a TDM/FDM (Time Division Multiplexing, Frequency Division Multiplexing) scheme or a pure FDM scheme and the channels provided for it (p. 1 no. 1).

A random access preamble would be used by the base station to detect the mobile station's direct access attempt and to estimate the packet round-trip time. The exact design of the preamble was still open (p. 1 no. 1, p. 1 no. 2).

The investigation of various bandwidths of a random access preamble with a view to optimum detection performance by the base station had shown that the preamble should be allocated a narrow bandwidth of no more than 2.5 MHz. The remaining frequency resource could be allocated either to other random access preambles or - optionally in the case of TDM/FDM - to other planned data (p. 2 No. 2).

However, in the case of a narrowband preamble, further means of estimating the channel frequency response would be required (p. 5 n. 4).

For this purpose, K9 proposes to attach (attached) or embed (embedded) so-called wideband pilots to the preamble, as shown in Figure 3 reproduced below.

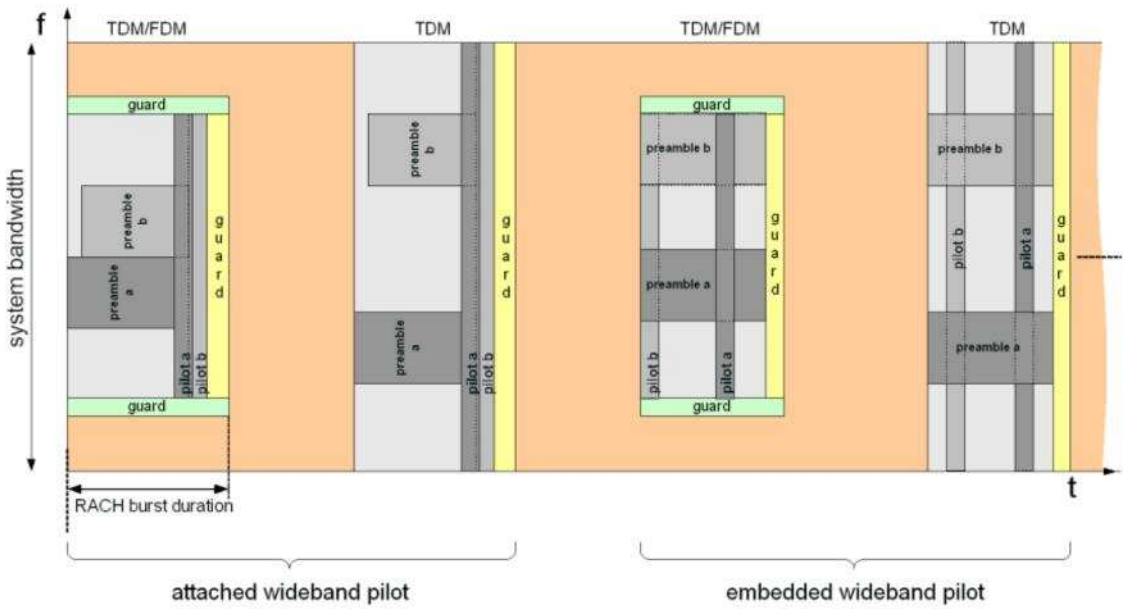

Figure 3: Random access preamble with attached (left) or embedded (right) wideband pilot in FDM/TDM and TDM multiplexing options

In the variant of the attached wideband pilot shown on the left, the mobile station transmits a signal consisting of preambles a and b, two wideband pilots a and b, and a guard time.

In the variant of the attached broadband pilot, its interference with preambles of other mobile stations is limited to an overlapping area as shown in Figure 3 (p. 4 No. 4.1). This would require a small overhead, while the embedded broadband pilot would have no overhead (p. 5 no. 4.3 table 3).

(2) Features 1 and 11 are thus disclosed.

K9 deals with the transmission from a mobile to a base station and thus also concerns a transmission method.

(3) Contrary to the view of the defendant, features 1.1.1 and 11.1 are also disclosed.

(a) The defendant is correct in its initial point in not challenging the Patent Court's finding that the pilot signals a and b disclosed in K9 are to be regarded as SR signals.

The pilot signals provided in addition to the actual (narrowband) random access preamble contain additional information about the channel quality of the intended connection in the uplink. This corresponds to a possible function of the SR signal provided in claims 1 and 11.

(b) These SR signals are mapped to a subframe according to the disclosure content of K9.

K9 does not deal in detail with the structure of frames or subframes. - However, it follows directly and clearly from the reference in the introduction to the LTE standard under development that the proposed approach is to take place within the structures that were intended for this standard at the time.

The term "RACH burst" used there is linked, as the plaintiffs have argued uncontradicted and convincingly, to the term "random access burst", which is used, for example, in K11 referred to in K9.

In K11, which is thus already to be used as a supplement in the novelty test, it is intended to transmit a random access burst in a subframe (p. 66). More is not required for the disclosure of feature 11.1.

(4) Whether features 1.1.2 and 11.2 and 1.1.6 and 11.6 are fully disclosed does not need to be decided in the dispute. In any case, K9 does not disclose mapping the pilot signals a and b in the guard time interval at the end of a subframe, as provided for by features 1.1.5 and 11.5.

(a) However, under the premise postulated by the plaintiffs that the signal shown in Figure 3 as "RACH burst duration" is always of a fixed length, the time interval provided in Figure 3 after the attached broadband pilot a can be regarded as a transmission-free time interval within the meaning of the patent in suit.

If preamble b arrives on time, this area remains transmission-free as a result for a fixed length of the "RACH burst duration". If preamble b is transmitted late, on the other hand, this area is at least partially used for the broadband pilot assigned to this preamble.

This corresponds to the arrangement of an SR signal in a guard period according to features 1.1.2 and 11.2.

(b) Even under this premise, however, there is no arrangement of pilot b at the end of a subframe as provided by feature 1.1.5.

At the end of a subframe, according to the illustration in Figure 3, there is not a wideband pilot but a (further) guard interval.

cc) The subject matter of auxiliary request 1 is also not anticipated by a synopsis of documents K18, NK17/K19 and K20.

It can be left open whether a person skilled in the art would consider these three documents as a joint publication, as the second plaintiff claims. Even under this premise, features 1.1.2 and 11.2 are not disclosed.

(1) K18 addresses the structure of a synchronized random access preamble (SRA) for LTE.

The synchronized random access preamble is sent by a mobile station that is already synchronized in the uplink but has not yet been allocated any transmission resources (p. 1 no. 2).

In K18, one of the methods proposed for such cases is the transmission of an SRA burst by the mobile station with a structure shown in Figure 1 reproduced below.

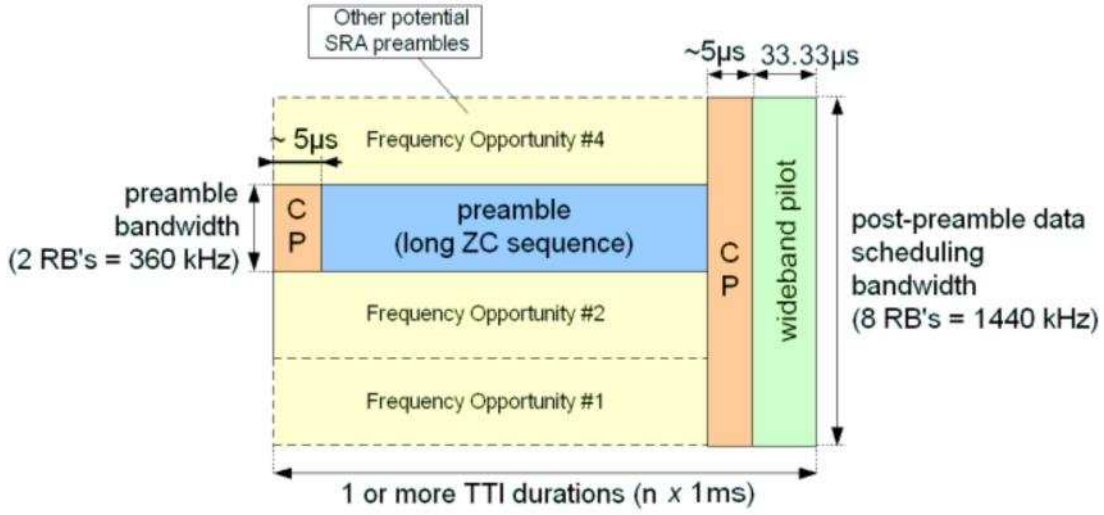

Figure 1: Synchronized RA burst with preamble structure: 1 TTI burst

The signal consists of a cyclic prefix (CP), the actual preamble sequence, another cyclic prefix and a wideband pilot. The slot in which the signal is transmitted consists of four frequency blocks. The first cyclic prefix and the preamble occupy only one of these frequency blocks. Additional synchronized random access preambles can be transmitted in the remaining blocks. In contrast, the second cyclic prefix and the wideband pilot occupy all four frequency blocks. With regard to a possible multiplexing of different pilots of further preambles, K18 refers to other documents from the prior art (p. 1 No. 3).

The wideband pilot provides the frequency planner with means for channel sounding. Transmitting and receiving the wideband pilot is therefore identical to transmitting and receiving the reference signal used for channel probing in a regular uplink subframe short block (p. 3 no. 6).

K18 also deals with optimization possibilities for larger cells. For this purpose, it is proposed to double the length of the individual SRA bursts and to halve the number of frequency blocks (p. 5 no. 11 with figure 4).

(2) K20 is a predecessor version of K18.

In this respect, K18 states that the structure provided for in K20 had to be adapted due to the decision of the standardization body to increase the transmission time interval (TTI) to one millisecond and to make changes to the available carrier symbols (K18 p. 1 no. 1).

In addition to the considerations in K18, K20 takes a closer look at the random access channel planned for LTE. This is a conflict-based channel that is multiplexed with scheduled data in a TDM/FDM process. It is available during random access slots with a duration t_{ra} and a period T_{ra} (K20 p. 1 no. 2).

This setup is shown in Figure 1 of K20 for synchronized random access slots reproduced below.

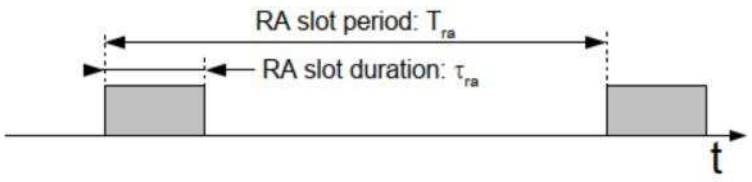

Figure 1: Synchronized RA slots

In order to reduce the overhead for the additional data compared to the planned (useful) data, K20 suggests that synchronous and non- synchronous

random access slots could be merged. Within a slot, the bandwidth resource could be shared between synchronous and asynchronous random access preambles in proportion to their relative expected load (p. 1 n. 2).

(3) NK17/K19, which is cited as prior art in the patent in suit (para. 6), on the other hand, deals with an improved structure of a non-synchronous random access preamble (NSRA) that a mobile station not synchronized in the uplink transmits to the base station for an initial access to the network.

According to previous considerations, such an NSRA burst consists of a cyclic prefix (CP), the actual preamble and a guard time (GT) to isolate the NSRA slot from previous and upcoming subframes synchronized in the uplink (p. 1 no. 2). Such a structure is shown in Figure 1 reproduced below.

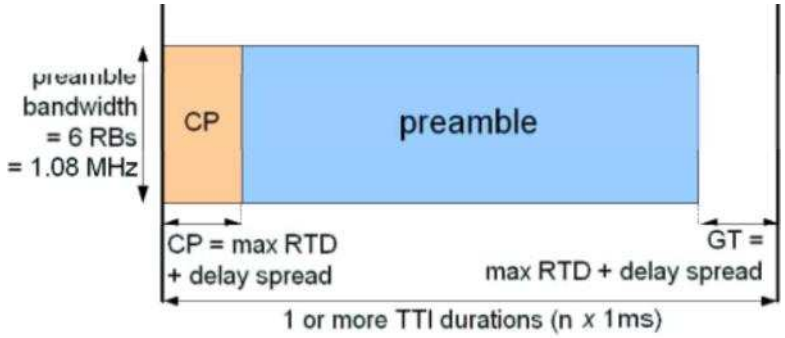

Figure 1: Non-synchronized RA burst structure: 1 TTI burst

On this basis, K19 proposes minor changes regarding the duration of the cyclic prefix and the guard time (cf. Figure 4).

(4) Features 1 and 11 are thus disclosed.

All contributions deal with the transmission of random access preambles from a mobile station to a base station and thus concern a transmission method.

(5) Whether features 1.1.1 and 11.1 are also disclosed does not require a final decision. In any case, features 1.1.2 and 11.2 are not disclosed.

(a) A guard time interval is disclosed only in NK17/K19, but not in K18 and K20.

This is logical because K18 and K20 deal with mobile stations that are already synchronized, where a guard time interval is not required for the purpose stated in the description of the patent in suit.

(b) Contrary to the opinion of the second plaintiff, there is no indication of a protection period interval from the explanations of the structure of the preamble sequence contained in K18.

In K18, it is stated that the preamble sequence proposed there is also intended for the non-synchronized random access preamble according to the considerations of the standardization bodies to date (No. 4).

These comments refer only to the actual preamble. They do not indicate that the structures of a non-synchronized preamble should also be adopted with regard to other aspects.

(c) Contrary to the opinion of the second plaintiff, the proposal contained in K20 to merge synchronized and non-synchronized random access preambles does not result in any further disclosure content.

K20 does not specify the manner in which the proposed combination will occur. Therefore, it cannot be assumed that the different preambles will be combined so that the broadband pilot disclosed in K18 and K20 will be ordered in the protection time interval of the preamble disclosed in NK17/K19.

b) The subject matter defended by auxiliary request 1 was also not suggested by the prior art.

aa) Based on K13, there was no suggestion for this.

At least in NK9/K7, NK18, NK17/K19 and NK20 and possibly also in K9, a random access preamble and the broadband pilot are indeed transmitted by different mobile stations. However, the combination of one of these citations with K13 was not obvious, as the Patent Court correctly pointed out, because K13 has other technical starting conditions in mind. In contrast to LTE, interference caused by narrowband signals is precisely not to be expected in WCDMA due to the strong spreading of the signals.

bb) Also on the basis of NK9/K7, there was no reason from the general technical knowledge to further develop the teaching disclosed there in the direction of the subject matter of patent claims 1 and 11 according to auxiliary request 1.

In particular, there is no indication from NK9/K7 to change the transmission of a random access preamble of a non-synchronized mobile station by special fields (type 2) or by a fully utilized subframe (type 1), which is particularly standardized in the prior art also for the TDD frame structure, and to nevertheless provide the transmission-free guard interval for the transmission of an SR signal.

cc) The combination of NK9/K7 with NK19/K8 or the technical report 3GPP TR 25.814 V7.1.0 (2006-09) (NK23) additionally asserted by the plaintiffs in this regard does not suggest that a mobile station should be designed in such a way that it can nevertheless use the transmission-free guard time of a subframe for a random access preamble to transmit an SR signal.

dd) This also applies with regard to document NK23, which was particularly highlighted by the second plaintiff.

(1) In NK23, the problem that interference with the data transmission of other mobile stations may occur during the transmission of a random access burst of an unsynchronized mobile station is explicitly addressed (p. 82 par. 9.1.2.1.1). Accordingly, the function of the guard period of a random access burst is also emphasized, namely the avoidance of uncertainties in uplink timing (p. 83 Par. 9.1.2.1.1.1). It would be in contradiction to this if signals were nevertheless transmitted during this period.

(2) Contrary to the opinion of the plaintiff to 2, the opposite does not result from figure 9.1.2.1.1.-1 reproduced below.

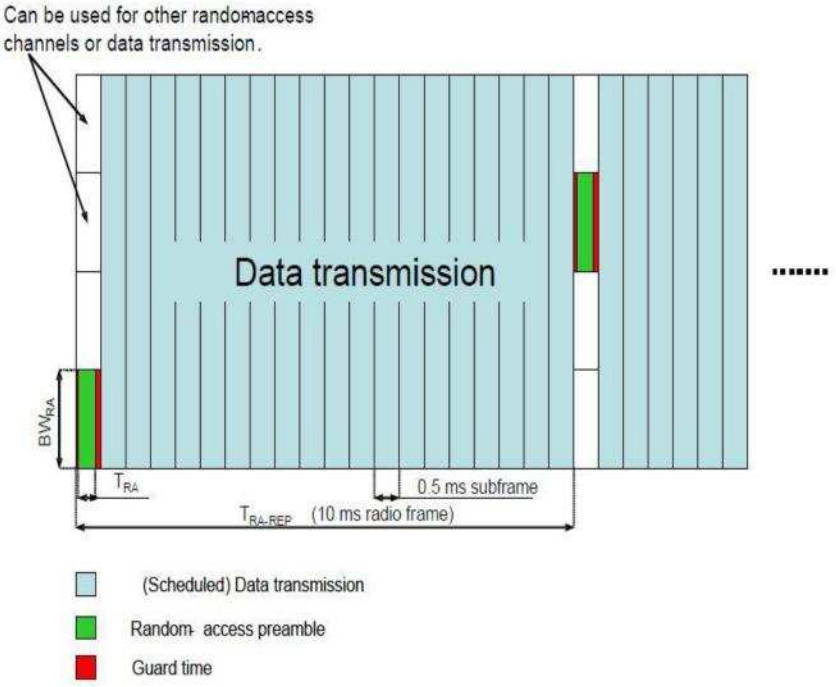

Figure 9.1.2.1.1.1-1 TDM/FDM option example using 1 sub-frame and preamble-only transmission in the random access burst

This figure shows that the guard interval marked in red after the random access preamble (T_{RA}) must be kept free before the start of the next subframe. This corresponds to the explanation in NK23 reproduced above. The units marked with the abbreviation BWRA and a vertical double arrow describe the bandwidth with which the preamble is transmitted (p. 82 last paragraph).

Contrary to the opinion of the second plaintiff, the fact that, according to Figure 1, the additional frequency resources marked with arrows can be used for the transmission of other random access channels or for data transmissions also does not suggest that the guard interval attached to the random access preamble should be used for data transmission. The reference to the possibility of transmitting additional channels or data precisely does not refer to the frequency resource used for the random access preamble.

ee) The subject matter of auxiliary request 1 was also not suggested on the basis of K9.

In this respect, no suggestion is apparent to develop the subject matter of K9 in the sense of the subject matter of auxiliary request 1. Rather, in K9 the area intended as a protected time at the end of the partial frame is just kept free. At most, K9 discloses the possibility of making available an upstream transmission-free period of a subframe of a random access preamble sent late, whereby the broadband pilot can shift into it.

Based on this, there is no suggestion to provide just the area of the guard period at the end of the subframe, which is particularly relevant for avoiding interference with the data of the next subframe, for the arrangement of an SR signal.

ff) No further suggestions arise from documents K18 with NK17/K19 and K20.

As already explained, a synopsis of the documents does not lead to anticipation of the subject-matter of claims 1 and 11. Suggestions to further develop the teaching of these documents in the sense of the patent in suit are neither shown nor otherwise apparent.

c) The other documents are further off and do not lead to a different assessment.

II. The decision on costs is based on Sec. 121 (2), second sentence, Patent Law, Sec. 92 (1) and Sec. 100 (1) Code of Civil Procedure (ZPO).

Bacher Hoffmann Deichfuß

Kober-Dehm Crummenerl

Lower court:
Federal Patent Court, decision of 12.12.2019 - 5 Ni 42/16 (EP) -