Annex II

Procedure for the award of the newly available mobile radio frequencies: auction rules

Version – July 2018

1 General

1.1 Overview of the procedure

1.1.1 Frequency blocks in the 700 MHz, 1400 MHz, 2.6 GHz and 3.6 GHz bands are being put up for auction. The auction will be conducted the form of a clock auction.

1.1.2 ComCom designates an auctioneer responsible for the implementation of the procedure (and one or more substitutes). The auctioneer will be responsible for taking all decisions necessary for the orderly implementation of the procedure.

1.1.3 The award procedure comprises the following phases:

- an application phase in which interested parties submit their application to participate. This phase concludes with authorisation of the successful applicants to participate in the subsequent phases of the procedure. For detailed rules see section 2.
- a clock phase in which bidders submit bids for the available frequency blocks (lots) over a number of rounds. For detailed rules on this see section 3.
- Under certain circumstances an additional bidding phase in which the bidder can submit bids for any frequency blocks not assigned after the clock phase. For detailed rules on this see section 4.
- an assignment phase in which specific frequencies within the respective bands are assigned to the winners of frequency blocks. For detailed rules see section 5.

1.1.4 The clock phase will only take place if on the basis of the application phase there is excess demand in at least one of the lot categories. An additional bidding phase will run only if there are frequency blocks which have not been awarded after a clock phase and ComCom is of the opinion that the implementation of such an additional bidding phase is favourable to the efficient allocation of frequencies. The decision whether an additional bidding phase will be held is exclusively at ComCom's discretion.

1.1.5 The procedure will be implemented via an electronic auction platform. A user manual for the auction software will be made available to bidders in good time before the beginning of the clock phase, and bidders will have an opportunity to acquaint themselves with the system in the run-up to the auction through a bidder seminar and a mock auction.

1.1.6 Communication with the auctioneer takes place via the electronic auction system or by other channels of communication as described in the user manual.

1.2 Available frequency blocks

1.2.1 A total of 43 frequency blocks in seven lot categories are available for sale by auction.

1.2.2 Table 1 gives an overview of the available lots with information about the bandwidth, the minimum bid, the number of eligibility points per lot and the number of lots available in each category.

1.2.3 All lots in categories A, B, C1, C2, C3 and E will initially be auctioned as abstract frequency blocks, i.e. both the application and the bids relate to the bandwidth of the respective lots, not to specific frequencies in the respective bands. The assignment of the specific frequencies to successful bidders will take place in a separate stage.

1.2.4 The frequency block in category D (2.6 GHz) will be auctioned as a frequency-specific block.

Table 1: Available lots

Category	Duration	Bandwidth per lot	Minimum bid per lot	Eligibility points per lot	Number of lots
A: 700 MHz FDD	15 years	2 x 5 MHz	CHF 16.8 million	2	6
B: 700 MHz SDL	15 years	1 x 5 MHz	CHF 4.2 million	1	3
C1: 1400 MHz SDL, lower sideband	15 years	1 x 5 MHz	CHF 4.2 million	1	5
C1: 1400 MHz SDL, core band	15 years	1 x 5 MHz	CHF 4.2 million	1	8
C1: 1400 MHz SDL, upper sideband	15 years	1 x 5 MHz	CHF 4.2 million	1	5
D: 2.6 GHz FDD	10 years - 31.12.2028	2 x 5 MHz	CHF 5.8 million	1	1
E: 3.5 – 3.8 GHz TDD	15 years	1 x 20 MHz	CHF 1.68 million	2	15

1.3 Spectrum caps

1.3.1 Individual bidders' bids are subject to the following spectrum caps:

- a maximum of three blocks in category A (i.e. a maximum of 2x15 MHz FDD spectrum in the 700 MHz band);
- a maximum of five blocks across categories B and C2 (i.e. a maximum of 25 MHz SDL spectrum in the 700 MHz band and in the 1400 MHz core band); and
- a maximum of six blocks in category E (i.e. a maximum of 120 MHz TDD spectrum).

1.3.2 Furthermore, in the clock phase a cumulative bidding restriction applies which ensures that two bidders together cannot acquire more than five blocks in category A (i.e. a maximum of 2x25 MHz FDD spectrum in the 700 MHz band), provided there is at least one other bidder who is interested in a block in this band.

1.4 Collusion and cancellation of the procedure

1.4.1 See section 7.1 of the tender documents.

1.5 Infringement of the auction rules

1.5.1 See sections 7.1 to 7.5 of the tender documents.

1.6 Exceptional circumstances

1.6.1 In exceptional circumstances the auctioneer may, during any phase of the auction and at their discretion:

- postpone the end of a current round or the publication of the results of the round;
- postpone subsequent rounds;
- cancel a round which is still in progress or for which the results have not yet been made known and set a new date for this round;
- declare one or more rounds and bids submitted therein as invalid and resume the auction from an earlier round;
- declare all bids submitted during the auction to be invalid and either cancel or restart the auction.

1.6.2 It is the auctioneer's responsibility to decide whether an exceptional circumstance exists. Significant technical problems or a suspicion of collusion between bidders could, for example, constitute such exceptional circumstances.

2 Application phase

2.1 Application for frequencies

2.1.1 As part of their application, an applicant must specify how much spectrum in the different bands it would like to acquire. To this end, a completed frequency application form (Annex III of the tender documents) must be attached to the application. This should indicate how many lots the applicant would like to acquire in each category. The relevant spectrum caps in accordance with rule 1.3.1 must be complied with.

2.1.2 The frequency application form represents a binding and irrevocable offer to acquire the specified number of frequency blocks in the respective lot category at the respective minimum bid if it turns out not to be necessary to run through the clock phase.

2.1.3 The quantities specified in the frequency application form likewise determine the initial eligibility for the first clock round.

2.2 Bank guarantee

2.2.1 Each candidate must submit a valid bank guarantee by 30.09.2019. The amount of the bank guarantee must correspond to the total value of the frequency blocks chosen by the applicant in its application form, valued at the applicable minimum bid.

2.2.2 On conclusion of each bidding round in the clock phase the auctioneer may demand an extension of the validity as well as an increase in the amount of the bank guarantee, so that the total amount of each bidder's bank guarantee never drops below 50% of the respective bidder's highest bid.

2.2.3 If the auctioneer requires an increase in the bank guarantee, he shall communicate the time by which the correspondingly increased bank guarantees should be submitted. The bidding process will be suspended until this period has expired.

2.2.4 If a bidder does not submit the higher bank guarantee as required, it will be excluded from the remainder of the auction. The rules under section 7.1 to 7.5 of the tender documents shall apply to these excluded bidders and their bids.

2.3 Evaluation of the applications and information about the subsequent procedure

2.3.1 When the application period has expired, OFCOM examines the applications received. Authorised candidates will be designated as bidders. The withdrawal of applications is not permitted.

2.3.2 After the examination of the applications, ComCom informs each bidder about the following, by way of an official decision:

- whether the candidate has been authorised to take part in the auction;
- whether a clock phase is necessary;
- the initial eligibility (number of eligibility points) of the bidder in the first clock round (if necessary) and
- the number of available round extension rights (if necessary);

2.3.3 A clock phase is necessary if the total number of blocks required by all authorised bidders in a category exceeds the available supply in at least one of the categories.

2.3.4 If a clock phase is not necessary, each bidder receives the frequency blocks it has applied for and is obliged to pay the corresponding minimum bids. The procedure is then continued with the assignment phase (section 5 below).

3 Clock phase

3.1 General

3.1.1 The clock phase consists of one or more clock rounds.

3.1.2 A clock round is a time period, set by the auctioneer and extendable by the bidder through the exercise of a round extension right (see section 3.8), within which bidders submit their bids.

3.1.3 In each clock round, for each lot category the auctioneer specifies a price per lot (the clock price), which determines the maximum amount winners of frequency blocks would have to pay for each of the blocks in this category if the clock phase were to end after the respective clock round. Clock prices are specified as multiples of CHF 1000.

3.1.4 The clock phase ends after a clock round in which the demand for frequency blocks, aggregated over the clock bids of all bidders, does not in any lot category exceed the available supply and the bidding restriction according to rule 1.3.2 is complied with. If, in at least one lot category, the aggregated demand is greater than the available supply (i.e. there is excess demand in a category), or if the cumulative bidding restriction set out in rule 1.3.2 is violated, then another clock round is held.

3.1.5 If another clock round is required, the auctioneer increases the clock price for each lot category with excess demand or, for lot category A, if the bidding restriction according to rule 1.3.2 is violated.

3.2 Timing

3.2.1 The timing of the clock rounds is at the auctioneer's discretion. In particular, the auctioneer is free to set the duration of rounds and the interval between rounds in a manner it considers appropriate for an orderly and speedy conduct of the auction. It is not expected, however, that a clock round will last less than 15 minutes or more than two hours.

3.2.2 Clock rounds do not commence before 09:00 hours and not after 17:00 hours on normal working days in Switzerland. The number of clock rounds per day is not limited – however the presumption is that no more than eight clock rounds per day will be held.

3.2.3 The auctioneer informs bidders about the starting time of a clock round at least 15 minutes in advance of the scheduled start. At the same time the auctioneer also informs each bidder about:

- the length of the planned clock round;
- the clock price for each lot category;
- the bidder’s eligibility; and
- the number of round extension rights remaining to the bidder.

3.2.4 The auctioneer also informs bidders at the end of each auction day about the provisional round schedule for the next day. This schedule is not binding and may be changed by the auctioneer, though the auctioneer will not run more rounds than have been notified.

3.3 Determination of the clock prices

3.3.1 The decision about the amount by which the clock price for lot categories with excess demand increases (the price increment) is at the auctioneer's discretion.

3.3.2 The auctioneer will determine the price increments in such a way as to ensure an orderly and speedy conduct of the auction. However, the clock price will not rise by more than 15% from one clock round to the next. Price increments may vary across the lot categories.

3.3.3 The auctioneer informs bidders at the end of each auction day provisionally of the price increments that it intends to apply on the following day. Such information is not binding, and the auctioneer is free to set different price increments. However, the auctioneer will not set higher increments than have been provisionally notified.

3.4 Bids and submission of bids

3.4.1 All bids are submitted using the auction software. The process for submitting bids is described in detail in the user manual for the auction software, which will be made available to bidders in good time before the beginning of the clock phase.

3.4.2 Submission of bids by telephone is permissible only in exceptional circumstances (e.g. if technical problems arise that preclude submission of bids using the auction software). It is up to the auctioneer to decide whether an exceptional circumstance exists. More detailed rules for telephone bidding will be communicated to bidders before the beginning of the clock phase.

3.4.3 In each clock round, a bidder can submit a maximum of one clock bid and, where appropriate, one or more exit bids.

Clock bids

3.4.4 A clock bid specifies the number of lots in each lot category that the bidder would like to acquire at the respective clock price. The clock bid may also be a zero bid, i.e. a clock bid which does not specify a positive number of blocks for any of the lot categories.

3.4.5 If a bidder does not submit a clock bid before the expiry of the clock round or within a round extension triggered by the bidder, it will be automatically assumed that the bidder has submitted a zero bid.

3.4.6 The sum of the eligibility points of the lots specified in the clock bid defines the activity level of the clock bid.

3.4.7 The bidder is free to specify the number of lots in each category, subject to:

- complying with the individual spectrum caps according to rule 1.3.1 (i.e. in each category the number of lots may not exceed the number of blocks on which a bidder can bid in this category); and
- the activity level of the clock bid in the round is not greater than the bidder's eligibility at the beginning of the round.

Exit bids

3.4.8 If the activity of the clock bid is less than the bidder's eligibility at the beginning of the clock round, the bidder may submit one or more exit bids.

3.4.9 Exit bids play no part in determining demand or excess demand. They are taken into consideration only if in the category for which they have been submitted there is excess supply after the last clock round, and then only to the extent to which such excess supply exists.

3.4.10 The condition for submission of exit bids implies that the bidder has reduced its demand in at least one lot category relative to its clock bid in the previous round. Exit bids give the bidder an opportunity to specify the prices at which it would request more blocks than in the current clock bid.

3.4.11 A bidder may submit exit bids for each lot category in which it has reduced demand, and specify a price for each reduction step (i.e. the maximum possible number of exit bids in a round depends on the number of lot categories in which the bidder has reduced its demand, on the extent of the respective reductions in demand and on the extent of the bidder's bidding entitlement at the beginning of the round). Prices specified in exit bids are subject to restrictions which imply that exit bids can be submitted only for lots in categories in which there was excess demand in the preceding round and consequently the clock price has increased.

3.4.12 The following rules apply specifically to exit bids:

- Let n_t be the number of lots in a specific category in the bidder's clock bid in round t and $\mathrm{p_t}$ be the corresponding clock price.
- For a category in which the bidder has reduced its demand ($\mathrm{n_t} > \mathrm{n_{t+1}}$) an exit bid is a price-quantity pair $(\mathrm{p_a}, \mathrm{n_a})$ with $\mathrm{p_{t+1}} > p_\mathrm{a} \geq \mathrm{p_t}$ and $\mathrm{n_{t+1}} < \mathrm{n_a} \leq \mathrm{n_t}$ which specifies the price $\mathrm{p_a}$ up to which the bidder would demand $\mathrm{n_a}$ lots.
- If a bidder reduces the demand in a lot category by m blocks, then under certain circumstances he can submit multiple exit bids $(\mathrm{p_a^1}, \mathrm{n_a^1}) \ldots (\mathrm{p_a^m}, \mathrm{n_a^m})$ for this lot category, where $\mathrm{n_a^i} > \mathrm{n_a^j} \Longrightarrow \mathrm{p_a^i} \leq \mathrm{p_a^j}$, i.e. the demand expressed in the exit bids cannot rise with a rising price.
- In each individual category the maximum quantity that the bidder can specify in an exit bid is restricted in that the activity associated with the remaining clock bids and this quantity must not exceed the eligibility at the beginning of the round. This restriction is relevant if a bidder simultaneously increases its demand in other lot categories, thereby increasing its activity, but is below its bidding eligibility in the round. The restriction applies only to each lot category individually, but not across multiple lot categories. This means that a bidder who reduces its demand in several lot categories and demands more in at least one other lot category, may under certain circumstances submit exit bids in several lot categories which with the other clock bids imply an activity level which exceeds the bidder's bidding eligibility. Which of the exit bids are applied in this case is decided according to rule **Fehler! Verweisquelle konnte nicht gefunden werden.**.

3.4.13 Exit bids in a category can be renewed (extended) in the next clock round, as long as

- The clock price in this category does not increase in the subsequent auction procedure; and
- The bidder does not further reduce its demand in this category.

If the price increases in a lot category (implying excess demand on the basis of the clock bids), then all exit bids submitted for this category are void. All exit bids by a bidder in a category in which it further reduces its demand are likewise void.

3.4.14 Extension of exit bids requires an explicit decision by the bidder and does not take place automatically. To clarify: exit bids cannot be changed and cannot be selectively extended within a category (i.e. if a bidder has reduced demand in a category by more than one block in a round, and then submitted multiple exit bids, these can be extended only in their entirety, not individually).

3.5 Activity rule

3.5.1 The eligibility of a bidder in the first clock round corresponds to the sum of the eligibility points associated with the requested frequencies.

3.5.2 In each subsequent clock round, the bidder's eligibility is equal to the activity level of the bidder's clock bid in the previous round.

3.5.3 This means that a bidder can maintain or reduce its eligibility in the course of the clock phase, but cannot increase it. It also means that a bidder who has submitted a zero bid cannot submit any more bids in the subsequent course of the clock phase.

3.6 Application of the cumulative spectrum cap in accordance with rule 1.3.2

3.6.1 The cumulative spectrum cap is applied in the first clock round, in which only two bidders submit clock bids that include frequency blocks in category A **and** at least one other bidder has submitted an exit bid for a single frequency block in this category. For clarification: the price of the last round in which a bidder has bid on blocks in category A before he reduces his demand in this category to zero does not automatically count as an exit bid for a block.

3.6.2 In this case a frequency block in category A is provisionally awarded to the bidder with the highest exit bid for a block in this category at the price specified in the corresponding exit bid. This provisional award lapses if in the subsequent clock phase more than two bidders submit clock bids that include lots in category A. The price for the provisional award has no effect on the price for the other blocks in this category.

3.7 End of the clock phase

3.7.1 The clock phase ends after a round in which the aggregated demand from all bidders does not exceed the available supply in any lot category.

3.7.2 In each lot category in which the demand aggregated over the clock bids of all bidders exactly corresponds to the available supply, the active bidders win the respective quantities they have specified in their clock bids. The price at which these blocks are awarded is the current clock price in the respective category.

3.7.3 If, within one or more lot categories, the demand aggregated over the clock bids of all bidders is less than the available supply, the rules apply – generally 3.7.4.

3.7.4 The auctioneer determines whether the exit bids submitted or extended in the last clock round (active exit bids) can be used to allocate the surplus lots. In the process, the following rules apply:

a) The auctioneer takes into account only those exit bids from a bidder that, together with the clock bids submitted by this bidder in the other categories, imply an activity level that does not exceed the eligibility of the respective bidder at the beginning of the round in which the oldest still active exit bid was submitted.

b) If exit bids by different bidders could be used, or if there are multiple exit bids for one bidder that could potentially be used, the auctioneer identifies the combination of exit bids that generates the greatest total value. If there are several exit bids or combinations that generate the same greatest total value, then one combination will be chosen at random.

c) For lot categories (apart from category A) in which exit bids are accepted, the price at which the lots will be awarded to all bidders is the lowest price specified in

an accepted exit bid. If a block in category A has been provisionally awarded on the basis of an exit bid, its price does not determine the price for the other blocks in the category).

3.7.5 If all lots cannot be awarded even when exit bids are taken into account and if individual frequency blocks are not awarded at the end of the clock phase, it is up to ComCom whether these should be offered in an additional bidding phase or be retained for future award procedures.

3.8 Round extension rights

3.8.1 The exercise of a round extension right gives a bidder more time to submit a bid.

3.8.2 If a bidder with eligibility greater than zero and remaining round extension rights fails to submit a clock bid within the round time set by the auctioneer, the round is automatically extended by up to 30 minutes. As a consequence, the bidder loses one of its round extension rights, but obtains additional time for submission of a bid.

3.8.3 A round extension ends automatically when all bidders who have triggered a round extension have submitted their bids, or after 30 minutes, whichever is the earlier.

3.8.4 For clarification: bidders who have not submitted a bid within the regular round time, and who for their part no longer have any round extension rights, cannot submit any bids in the round extension. A zero bid is automatically registered for such bidders.

3.8.5 Every bidder is entitled to two round extension rights at the beginning of the auction. The auctioneer may at its discretion grant further round extension rights, though only between clock rounds and not during a clock round.

3.9 Information at the end of the clock rounds

3.9.1 At the end of each clock round, the auctioneer communicates the following information to each bidder:

- for each lot category, the aggregated demand (i.e. the sum of the number of blocks in this category specified in the clock bids of all bidders;
- the bids submitted by the respective bidder and the associated activity level;
- whether the bidder has been provisionally awarded a single block in lot category A, and the respective price, or whether such a provisional award has lapsed.
- the number of round extension rights remaining to the bidder.

3.9.2 At the end of the last clock round the auctioneer communicates the following information to each bidder:

- The number of frequency blocks awarded to the bidder in the respective lot category and the respective price;
- Whether there are any lots not awarded.

4 Additional bidding phase

4.1 General

4.1.1 After the end of the clock phase, ComCom will inform bidders whether an additional bidding phase will be held for lots which have not been awarded.

4.1.2 The decision concerning the implementation of an additional bidding phase for assignment at the end of the clock phase of any frequency blocks not awarded and the specification of the corresponding conditions is at ComCom's discretion. It will carry out such a bidding phase if it assumes that allocation of these non-awarded blocks within the framework of the current procedure improves the efficiency of the frequency allocation.

4.1.3 The decisions on the authorisation of bidders, the determination of minimum prices for the additional bidding phase and on whether any applicable spectrum caps are to be eased or suspended will be taken by ComCom at its own discretion. In the process, it will take into consideration the history of the clock rounds.

4.2 Form of the additional bidding phase

4.2.1 The additional bidding phase will be conducted as a sealed first price auction in which the bidders authorised for this bidding phase can submit bids for various combinations of blocks which have not been awarded, and the auctioneer determines the combination of bids which together have the greatest value and which can be satisfied with the non-awarded lots (a maximum of one bid per bidder is accepted). Successful bidders pay the amount of their respective successful bids.

4.2.2 Bids are submitted electronically within a timeframe set by the auctioneer. There are no round extension rights. Submission of bids by telephone is possible only in exceptional cases (e.g. if technical problems arise). It is up to the auctioneer to decide whether such an exceptional case applies.

4.2.3 The auctioneer will inform bidders of the details rules for the additional bidding phase with at least **ten** working days' notice.

5 Assignment phase

5.1 General

5.1.1 The purpose of the assignment phase is to decide on the allocation of specific frequencies to the winners of frequency blocks.

5.2 Assignment of frequencies in category D

5.2.1 The corresponding frequencies are assigned to the winner of this block; an assignment phase is not necessary in this category.

5.3 Assignment of frequencies in categories A, B, C1, C2, C3 and E

Assignment options

5.3.1 On conclusion of the clock phase and where applicable of the additional bidding phase, the auctioneer informs all winners of spectrum of any assignment options relevant to them, which are the possible assignment of specific frequencies that ensure that:

- the number of frequency blocks corresponds to the number of abstract frequency blocks won by the respective bidder in the respective category in the clock phase;
- the frequency assignments to a bidder within a band are contiguous;
- no option excludes the assignment of contiguous frequency blocks to other bidders, or the acquisition of any non-awarded blocks as a contiguous block at the upper or lower end of the respective band; and
- as far as possible, bidders who have been awarded the frequencies in categories C1 and C2 or C2 und C3 respectively are assigned contiguous frequencies in the core band and the respective contiguous sideband.[1]
- any blocks not awarded are placed as contiguous blocks at the upper or lower end of the band.

Bidding procedure for the assignment of specific frequencies

5.3.2 The assignment of frequencies in categories A, B (if there is more than one winner or blocks not awarded in this category), C and E takes place by means of a sealed bid procedure with a second-price rule, i.e. bidders submit sealed bids for the assignment options available to them. These assignment bids must be submitted simultaneously for all bands in which relevant assignment options exist, but they are evaluated separately for each band.

5.3.3 Bids are submitted electronically within a timeframe set by the auctioneer. There are no round extension rights. Submission of bids by telephone is possible only in exceptional circumstances (e.g. if technical problems arise). It is up to the auctioneer to decide whether an exceptional circumstance exists.

5.3.4 The auctioneer will inform bidders of the detailed provisions for the submission of assignment bids at least one day in advance of the bidding round.

[1] This is possible, for example, if one bidder respectively has won frequencies in categories C1 and C2 and in categories C2 and C3. For these bidders the allotment of frequencies is clearly defined: in each case they receive the frequencies at the upper end of the lower sideband and at the lower end of the core band, or at the upper end of the core band and the lower end of the upper sideband.

Assignment bids

5.3.5 If there is only one assignment option for a bidder in a category, no bid is necessary. The bidder is automatically assigned the corresponding frequency blocks. Bidders, for whom there are zero or one assignment options in a category, are not entitled to submit assignment bids for this category.

5.3.6 An assignment bid specifies the maximum amount a bidder is prepared to pay for an assignment option, and which it is assigned in the frequencies specified in the assignment option.

5.3.7 Bid amounts for the individual assignment options can be freely selected (in whole CHF). The minimum bid in the assignment phase is 0 CHF for each assignment option. There is no upper limit on bids.

5.3.8 If a bidder does not submit a bid for a possible assignment option available to it, a corresponding bid with a bid amount of zero will automatically be generated. If a bidder does not submit assignment bids by the set time, a bid with a bid amount of zero is generated for each assignment option.

Determining the winners

5.3.9 For each category in which at least one bidder has been able to bid on several assignment options, the auctioneer determines the combination of successful assignment bids according to the following rules:

a) For each category exactly one bid per bidder is taken into consideration.

b) The assignment of frequency blocks associated with the bids is mutually compatible and the frequency assignment is unambiguous. This means that the assignment results in a band plan in which each bidder is assigned specific frequencies equal to the amount of spectrum the bidder has won after the clock phase in each category and no frequencies have been assigned to more than one bidder.

c) The sum of the bid amounts is not less than the sum of any alternative combination of bids which meets the first two conditions.

5.3.10 If only one combination of assignment bids satisfies these conditions, this is the combination of successful bids.

5.3.11 If multiple combinations of assignment bids meet the conditions in section 5.3.9, the combination of successful assignment bids is selected at random.

5.3.12 Each bidder is assigned the respective frequency blocks specified in its bid in the successful combination of bids and pays the supplemental price determined in accordance with rule 5.3.13.

Determination of prices

5.3.13 For each successful assignment bid, an additional price to be paid by each successful bidder in the assignment phase is determined. Additional prices are determined jointly for all bidders and must meet the following conditions:

a) The additional price of any successful bid cannot be negative and cannot be higher than the bid amount of this bid.

b) The additional prices must be sufficiently high to ensure that there is no bidder and no group of bidders who would be prepared to pay more than the respective winners for the assignment of the corresponding frequencies. If there is only one combination of additional prices that meets this and the preceding condition, this determines the additional prices to be paid by bidders.

c) If there are multiple combinations of additional prices that meet the two preceding conditions, the combination which minimises the sum of all additional prices to be

paid by the bidders is selected. If there is only one combination that minimises this sum, this determines the additional prices to be paid by bidders.

If there are multiple combinations of additional prices that result in the same minimum sum across all winners, the combination that minimises the sum of squared differences between the additional prices and the bidder-specific opportunity costs will be chosen. The bidder-specific opportunity costs for a bidder are given by the difference between the sum of the successful assignment bids which would be obtained if all assignment bids made by that bidder were set to zero, and the sum of the successful assignment bids less the bidder's actual supplemental bid.

End of the assignment phase

5.3.14 After the auctioneer has determined the successful supplemental bids and the additional prices to be paid, all bidders are informed about the specific frequency assignments in each of the bands.

5.3.15 Each bidder is also informed about the additional price it has to pay.

Examples

The following examples are intended to illustrate the auction sequence and in particular the evaluation of exit bids.

Example 1: Clock rounds without exit bids

The following simple example shows the course of clock rounds with three bidders (X, Y and Z) without submission of exit bids.

- In the first clock round there is excess demand in lot categories A, B and E, and the prices for these categories rise.
- In the second round, bidder Y reduces its demand in category A and B and switches from category B to category C. There is still excess demand in A and E, but no longer in B. Demand in C however now exceeds the available supply.
- In the third round, Z reduces its demand in A and C2, and uses the eligibility points released to increase demand in E. X reduces demand in E. Now the total demand in all categories is equal to the available supply, and the clock rounds end.

	Lot category	**A**	**B**	**C1**	**C2**	**C3**	**D**	**E**
	Supply	6	3	5	8	5	1	15
	Eligibility points	2	1	1	1	1	1	2
Round 1	Prices	100	50	50	50	50	50	100
	Bid X	3	3	5	2	0	1	7
	Bid Y	3	3	0	2	0	0	5
	Bid Z	2	3	0	2	5	0	5
	Total demand	8	9	5	6	5	1	17
	Excess demand?	Y	Y	N	N	N	N	Y
Round 2	Prices	110	55	50	50	50	50	110
	Bid X	3	3	5	2	0	1	7
	Bid Y	2	0	0	5	0	0	5
	Bid Z	2	0	0	2	5	0	5
	Total demand	7	3	5	9	5	1	17
	Excess demand?	Y	N	N	Y	N	N	Y
Round 3	Prices	120	55	50	55	50	50	120
	Bid X	3	3	5	2	0	1	4
	Bid Y	2	0	0	5	0	0	5
	Bid Z	1	0	0	1	5	0	6
	Total demand	6	3	5	8	5	1	15
	Excess demand?	N	N	N	N	N	N	N

The bidders win the following packages at the following prices:

	Price/block							
	120	55	50	55	50	50	120	
Bidder	**A**	**B**	**C1**	**C2**	**C3**	**D**	**E**	**Price**
X	3	3	5	2	0	1	4	1,415
Y	2	0	0	5	0	0	5	1,115
Z	1	0	0	1	5	0	6	1,145

Example 2: Clock rounds with application of the cumulative spectrum cap

Unlike in the previous example, bidder Z starts with a bid for a block in category A and submits an exit bid for this block at 105.

As a result of this, excess demand in category A has been eliminated, and no price increase would be necessary. On the basis of the cumulative spectrum cap, however, the price for this category needs to increase. At the same time the bidder is provisionally awarded a lot in this category (1@105).

	Lot category	**A**	**B**	**C1**	**C2**	**C3**	**D**	**E**
	Supply	6	3	5	8	5	1	15
	Eligibility points	2	1	1	1	1	1	2
Round 1	Prices	100	50	50	50	50	50	100
	Bid X	3	3	1	2	0	1	7
	Bid Y	3	3	0	2	0	0	5
	Bid Z	1	3	0	2	5	0	5
	Total demand	7	9	5	6	5	1	17
	Excess demand?	Y	Y	N	N	N	N	Y
Round 2	Prices	110	55	55	50	55	50	110
	Bid X	3	3	5	2	0	1	7
	Bid Y	3	0	0	5	0	0	5
	Bid Z	0 (1@105)	0	0	2	5	0	5
	Total demand	6	3	5	9	5	1	17
	Excess demand?	Y*	N	N	Y	N	N	Y
Round 3	Prices	120	55	50	55	50	50	120
	Bid X	3	3	5	2	0	1	5
	Bid Y	2	0	0	5	0	0	5
	Bid Z	0 (1@105)	0	0	1	5	0	5
	Total demand	5	3	5	8	5	1	15
	Excess demand?	N	N	N	N	N	N	N

*Excess demand exists here because as a result of the application of the cumulative spectrum cap only five blocks are available to bidders X and Y.

The bidders win the following packages at the following prices:

	Price/block							
	120	55	50	55	50	50	120	
Bidder	**A**	**B**	**C1**	**C2**	**C3**	**D**	**E**	**Price**
X	3	3	5	2	0	1	5	1,535
Y	2	0	0	5	0	0	5	1,115
Z	1 @ 105	0	0	1	5	0	5	1,010

The price to be paid by bidder Z includes the award of a lot in category A at the exit bid 105.

If the bidder had not submitted an exit bid for a block in category A, but instead, for example, switched demand into lot category E, then the cumulative spectrum cap would not have been triggered.

Example 3: Clock round with straightforward exit bids

In the following example we consider the actions of an individual bidder (taking aggregated demand from the other bidders as given).

- In the first clock round the bidder submits a bid for two lots in category A, three lots respectively in category B and C, and seven lots in category E. The activity level of this clock bid is 24.
- Assuming that other bidders' bids are such that there is excess demand only in categories A and E, the prices rise accordingly.
- Now assume that the bidder reduces its demand in these two categories and now bids only for one block in category A and four blocks in category E. The activity level of this bid is now 16. The bidder has reduced its activity and can now submit exit bids. Specifically, the bidder can specify the price at which it would be interested in two blocks in category A, and the prices up to which it also would take seven blocks in category E or, alternatively, reduce demand to six or five blocks. Assume that the bidder submits the exit bids below.
- We further assume that the other bidders maintain their demand unchanged. In this case the clock phase ends, since there is no longer excess demand in any category. In categories A to D the aggregated demand from the clock bids matches the demand exactly. In category E, however, there is now excess supply. Because the bidder has specified demand for the number of lots which balances supply and demand, the corresponding exit bid for five lots is accepted and all bidders win their lots in this category at the price of the accepted exit bid, i.e. 106, instead of the clock price (110).

	Lot category	A	B	C1	C2	C3	D	E
	Supply	6	3	5	8	5	1	15
	Eligibility points	2	1	1	1	1	1	2
Round 1	Prices	100	50	50	50	50	50	100
	Clock bid (activity: 24)	2	3	0	3	0	0	7
	Other bidders' bids	5	0	5	5	5	1	10
	Total demand	7	3	5	8	5	1	17
	Excess demand / Excess supply?	+1	0	0	0	0	0	+2
Round 2	Prices	110	50	50	50	50	50	110
	Clock bid (activity: 16)	1	3	0	3	0	0	4
	Other	5	0	5	5	5	1	10
	Total demand	6	3	5	8	5	1	14
	Excess demand / Excess supply?	0	0	0	0	0	0	-1
	Exit bids	2 @ 105						**5 @ 106** 6 @ 104 7 @ 102

The bidder wins the following package at the following prices:

Price/block							
110	50	50	50	50	50	106	
A	**B**	**C1**	**C2**	**C3**	**D**	**E**	**Price**
1	3	0	3	0	0	5	940

Variation A: If the bidder had not submitted an exit bid for five blocks but only exit bids for six or seven blocks, then it would not be possible to accept an exit bid. In this case the clock rounds would end with the clock prices, and one lot in category E would still not be awarded at the end of the clock phase.

Variation B: If another bidder had reduced its demand for lots in category E by one block and had submitted a corresponding exit bid for the additional lot, then the amount of the exit bid decides which exit bids are accepted. If the other bidders had, for example, submitted an exit bid for the additional lot at 105, then both this exit bid and the exit bid by our bidder for five lots would be accepted. The end price for lots in this category would then be 105. However, if the other bidder had submitted an exit bid at a price of 103, then this would not be accepted; the exit bid for six lots by our bidder would be used to balance supply and demand.

Example 4: Exit bids with an increase in demand in other categories

In this example the bidder reduces its demand in lot categories A and E and at the same time increases its demand across the other lot categories. Because the bidder's eligibility decreases, he can submit exit bids and specify the price up to which it would take a larger quantity of frequency blocks in those categories in which it reduces its demand. These exit bids, however, cannot all be satisfied, because owing to the increase in demand in other categories this would mean that the activity associated with the bidder's winning bids exceeds its eligibility.

Assume that the bidder submits the following clock bids and exit bids, and that the other bidders reduce their demand so that the clock phase ends with excess supply in categories A and E.

	Lot category	**A**	**B**	**C1**	**C2**	**C3**	**D**	**E**
	Supply	6	3	5	8	5	1	15
	Eligibility points	2	1	1	1	1	1	2
Round 1	Prices	100	50	50	50	50	50	100
	Clock bid (activity: 20)	2	1	0	3	0	0	6
	Other bidders' bids	5	3	5	5	5	1	10
	Total demand	7	4	5	8	5	1	16
	Excess demand Excess supply?	+1	+1	0	0	0	0	+1
Round 2	Prices	110	55	50	50	50	50	110
	Clock bid (activity: 16)	1	0	0	3	0	0	4
	Other	4	3	5	5	5	1	9
	Total demand	5	3	5	8	5	1	13
	Excess demand / Excess supply?	-1	0	0	0	0	0	-2
	Exit bids	2 @ 105						**5 @ 105** 6 @ 104

Given the excess supply (and on the assumption that none of the other bidders has submitted an exit bid), the bidder's maximum exit bids could be accepted, i.e. two blocks in A and 6 blocks in E. However, together with the six blocks in category E the activity level of such a winning bid (22) would exceed the bidder's eligibility (20).

If the exit bid in category A is accepted, then the bidder can acquire a maximum of five blocks in category E. If the exit bid for six blocks in category E is accepted, then the bidder can only win its clock bid in category A.

Which of these bids is accepted depends on which generates the greatest total value (we can neglect all categories in which in both cases the clock bid of the bidder would be accepted). In this case this is the bid which allocates all lots in category A.

		A	B	C1	C2	C3	D	E	Total value
6E @ 104	Qty	1	0	0	3	0	0	6	734 (884 with C2)
	Price	110	55	50	50	50	50	104	
2A @105, 5E @ 105	Qty	2	0	0	3	0	0	5	**735** **(885 with C2)**
	Price	105	55	50	50	50	50	105	