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| Rules proposal for the 2015-2016 AWS spectrum tender process in Mexico  17 September 2015 |

**Instituto Federal de Telecomunicaciones**

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# Introduction

This document describes the available spectrum and proposed auction rules and procedures for the 2015-2016 award of AWS spectrum in Mexico. Stakeholders are invited to submit comments on any aspect of the proposed award.

**Choice of auction format**

The IFT proposes to use a combinatorial clock auction (CCA[[1]](#footnote-2)) format for the award of available spectrum. This format has been widely used for the 4G spectrum awards in other countries, including auctions in Australia, Canada, Denmark, Ireland, Netherlands, Slovakia, Slovenia, Switzerland and the UK.

The IFT considers that the CCA format offers a number of advantages relative to some or all alternative auction formats:

* The CCA is a multiple round auction format, which supports price discovery and eases common value uncertainty.
* The use of package bidding eliminates aggregation risks, which makes it possible to sell lots in 2x5 MHz units and give bidders substantial flexibility with respect to the packages of spectrum that they can target in the auction.
* The use of generic lots can facilitate assignment of contiguous frequencies, including the potential to reshuffle existing holdings in the AWS-1 band.
* The CCA auction format, including an opportunity cost pricing rule, promotes incentives for bidders to express their full demand for available packages of spectrum, thereby reducing the risk that the spectrum sells at a price below the market level in case of low participation and/or tacitly collusive behavior by bidders.
* The winner determination process of the CCA provides flexibility to incorporate a solution to the current regional fragmentation of the AWS-1 D block.
* The use of clock bidding with categories of generic lots should facilitate a reasonably quick and efficient auction process.

The IFT is aware that this is a new auction format in Mexico and will provide further information and training to help bidders prepare for the auction. Owing to the limited number of lots available (which in turn limits the number of packages that bidders can bid for in the auction), the proposed implementation of the CCA for this award is less complex than implementations in many other countries that have successfully used the CCA format.

The IFT invites stakeholders to comment on its proposal to use a combinatorial clock auction format.

**Spectrum cap**

The IFT proposes to apply a spectrum cap that would be in the range of 2x30 MHz and 2x40 MHz across all AWS holdings, including existing AWS spectrum holdings. The cap range has been set at a level that allows bidders flexibility to bid for different amounts of spectrum, while ensuring that at least two parties will end the auction with substantial holdings of AWS spectrum.

The IFT invites stakeholders to comment on its proposal to apply a cap that would be in the range of 2x30 MHz and 2x40 MHz, including existing AWS spectrum holdings.

**Minimum reference prices**

The minimum reference price for each lot in the auction consists of an annual fee and an upfront reserve price. The annual fee amount for each available lot, except for the AWS-3 extension band (category J), is fixed by law and cannot be changed at this time. On Tuesday, September 8, 2015, the Ministry of Finance (SHCP) sent to Congress an initiative to set the annual fee for the J lot spectrum. Under their proposal, the annual fee is set at the same level as the other AWS spectrum (Article 244-E-1), but no fee will be payable for the period from the award of the license for this spectrum until January 1, 2018 (First Transitory)[[2]](#footnote-3), given the delay in equipment availability for this band.

Given the level of annual fees, the IFT proposes to the upfront reserve price for each available lot at a modest level, sufficient to encourage only serious bidders to participate in the award process. For the AWS-3 lots, the IFT proposes to follow past practice and set starting fees at the same level per MHz as for COFETEL’s Auction 21[[3]](#footnote-4) and the average price set by such auction, after adjusting for inflation and term. For the AWS-1 lots, a higher fee will be applied, so as to differentiate this spectrum from the AWS-3 lots, which are expected to be less valuable owing to delay in equipment availability.

The IFT invites stakeholders to comment on its proposal for setting upfront reserve prices and annual fees.

**Frequency contiguity and national lots**

The IFT has proposed rules to promote assignment of contiguous frequencies and resolve the current situation where D lot spectrum is fragmented regionally between two operators. These rules require that existing holders of AWS-1 spectrum agree that their existing spectrum holdings may be moved and, in the case of those two operators to place their regional spectrum in the auction. The rules are proposed to promote long-term efficient use of the AWS spectrum.

The IFT invites stakeholders to comment on its auction rule proposals for promoting frequency contiguity and eliminating regional lot assignments.

**Available spectrum, detailed auction rules and procedures**

In the following sections, the IFT describes the available spectrum and sets out proposals for the detailed rules and procedures for the AWS auction.

The draft rules cover all the important elements of the auction, including but not limited to:

* a description of the lots that will be available during the auction;
* rules regarding bidder conduct before and during the auction;
* deposit requirements;
* scheduling of rounds and procedures for bid submission;
* setting of prices for lots and packages of lots during the auction;
* activity rules;
* information disclosure;
* winner and price determination; and
* rules for the assignment of frequencies to winning bidders.

The rules have been designed to:

1. promote outcomes that support the efficient use of spectrum and support long-term competition in the market for provision of mobile services;
2. encourage consistent, valuation-based bidding, and (to the extent possible) discourage undesirable behavior, such as gaming or tacitly collusive bidding
3. strike an appropriate balance between revealing information to promote price discovery and restricting information so as to discourage gaming behavior; and
4. ensure a reasonably quick and efficient auction process.

The IFT invites stakeholders to comment on any aspect of its proposed auction rules and procedures, as set out in this document, with reference to the IFT’s objectives for the award.

# Available spectrum

The available frequencies in this auction are located in three sub-bands within the spectrum band known in North America as the Advanced Wireless Service (AWS) band:

* AWS-1: paired spectrum that was not awarded in Auction 21 (2x15 MHz paired).
* AWS-3 core band: paired frequencies from 1755 -1770 MHz / 2155 - 2170 MHz (2x15 MHz paired).
* AWS-3 extension band: paired frequencies from 1770 -1780 MHz / 2170 - 2180 MHz (2x10 MHz paired).

The AWS band plan for Mexico (only uplink frequencies are shown here), including existing operator holdings in the AWS-1 sub-band, is illustrated in Figure 1.

Figure 1: AWS band plan in Mexico



## Promoting spectrum contiguity and national lots

The auction is designed to facilitate reshuffling of existing spectrum holdings in the AWS-1 sub-band, with the objectives that, at the end of the process:

* all bidders who are awarded spectrum in this auction and/or previously won spectrum in AWS-1, will receive contiguous spectrum within each sub-band; and
* all AWS paired spectrum will be assigned on a national basis.

These objectives are considered important to promote efficient use of spectrum and the development of the Mexican mobile broadband market. Accordingly, as a condition of participation in the auction, incumbent operators in the AWS-1 sub-band will be required to make the following commitments with respect to their existing licenses:

* Each operator must confirm that they are prepared to move frequencies within the AWS-1 sub-band. The detailed rules for reshuffling existing holdings are described in Section 4. The rules are designed to minimize the amount of movement by existing holders of AWS-1 spectrum, subject to meeting the objective of contiguous allocations within and, in limited cases, across sub-bands.
* Two operators own spectrum in the AWS-1 D block, which is currently fragmented on a regional basis. If both these bidders participate in the auction, the D block spectrum will be included in the auction. In return, these bidders will be guaranteed to win a larger package of spectrum in the auction comprised of national AWS lots, and will only pay for the incremental spectrum that they acquire in the auction. Specifically, these bidders will each be guaranteed to win either one of their minimum packages or a larger package that is a superset of one of their minimum packages. As part of their applications to participate in the auction, each of these operators must select a set of minimum packages from the following list:
  + SET 1: package with one A lot.
  + SET 2: package with one A lot; or package with one G lot.
  + SET 3: package with one A lot; or package with one G lot; or package with exactly 2 J lots.

No information will be disclosed to other bidders regarding the set of minimum packages selected by these operators.

If an incumbent operator is not qualified to participate in the auction, its existing frequency holdings cannot be reshuffled as part of this auction. The holdings of any other incumbent bidder that participates may still be reshuffled. Please refer to the detailed rules in Section 4 for more information.

If one or both operators that currently hold spectrum in the D lot are not qualified to participate in the auction, then the existing regional assignment of the D block will remain unchanged and there will be no opportunity for such operators to acquire additional regional spectrum in order to create a national lot. In other words, it is no longer possible to select minimum packages in the auction because the D block is no longer included in it.

## Available lots

All lots in the auction will be sold in units of 2x5 MHz. The number of 2x5 MHz lots available for bidding in the Principal Stage of the auction will be either 9 or 8, depending on the participation of incumbent operators that hold spectrum in the AWS-1 D lot:

* **Scenario I:** If both operators that currently hold AWS-1 D lot spectrum are qualified to participate, there will be 9 lots in the auction. In this case, the D lot frequencies are included in the auction, but the auction rules ensure that Telcel and Telefonica will win at least one national lot and that they will not be charged an auction price for the spectrum they already own.
* **Scenario II:** Otherwise, there will be 8 lots in the auction.

The two scenarios for available lots are illustrated in Figure 2.

Figure 2: Spectrum lots available in the auction (uplink frequencies)



Under Scenario I, the 9 lots will be grouped into three categories, one for each sub-band. Within each category, lots are sold on a generic basis, meaning that bidders bid for an amount of spectrum within a sub-band rather than specific frequency ranges. The assignment of specific frequencies to winning bidders takes place after the winning bids have been determined. This approach ensures that it is possible to make certain guarantees regarding the assignment of contiguous spectrum.

Summary information about the lots in each category available under Scenario I is provided in Table 1.

Table 1: Available lots by category under Scenario I

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Sub-band** | **Number of Lots** | **Frequency range\*** |
| A | AWS-1 | 4 | 1710 - 1755 MHz / 2110 - 2155 MHz |
| G | AWS-3 core | 3 | 1755 - 1770 MHz / 2155 - 2170 MHz |
| J | AWS-3 extension | 2 | 1770 - 1780 MHz / 2170 - 2180 MHz |

\*A bidder that wins 2 or more lots within this sub-band is guaranteed to be assigned contiguous frequencies within this range.

The approach under Scenario II with eight lots is identical except that there will only be 3 lots available in Category A.

In the auction, bidders submit bids for packages of lots, not for individual lots. A package may consist of a number of lots in one or more categories. Each bid is for the package of lots specified by the bidder, i.e. it will be considered in its entirety and will not be subdivided.

## Spectrum caps and other bid restrictions

Each bidder that participates in the auction is subject to a cap range between 2x30 MHz and 2x40 MHz on the amount of spectrum in the AWS band that they can acquire. This cap includes each operator’s existing holdings at AWS-1 and all spectrum available in this auction. Bidders cannot bid for packages of lots that are not compatible with the spectrum cap, taking into account their existing AWS-1 holdings.

This cap has the effect of preventing any bidder from bidding on a package containing more than 6 or 8 lots (depends on the cap). Incumbent operators are prohibited from bidding for some larger packages, depending on their existing holdings and the spectrum that they contribute into the auction under Scenarios I or II.

Specifically, as an example using the 2x40 MHz, under Scenario I, each bidder is constrained to bidding on the following packages:

* AT&T: packages with up to 5 lots.
* Telcel: packages with up to 6 lots.
* Telefonica: packages with up to 8 lots.
* Any other bidder: packages with up to 8 lots.

Under Scenario II, each bidder is constrained to bidding on the following packages:

* AT&T: packages with up to 5 lots.
* Telcel: packages with up to 5 lots.
* Telefonica: packages with up to 7 lots.
* Any other bidder: packages with up to 8 lots.

All bids for packages must include either zero or 2 lots in Category J. Package bids containing only 1 lot in category J are not permitted. This rule ensures that winning bidders can always be allocated contiguous spectrum across the entire AWS-3 sub-band.

Under Scenario I only, operators in Block D may be further constrained by their choice of minimum package. Each of these bidders can only submit bids for packages that are in their set of minimum packages or are supersets of one or more of their minimum packages. Specifically, the following restrictions apply depending on their set of minimum packages:

* SET 1: All bids must contain at least one A lot.
* SET 2: All bids must contain at least one A lot or at least one G lot.
* SET 3: No restrictions (as, by definition, any non-zero bid must contain at least one A lot or at least one G lot or at least 2 J lots).

A complete list of permissible package bids is provided in Annex A.

## Minimum reference price

Each lot awarded in the auction will be subject to a minimum reference price. The minimum reference price consists of:

* an annual fee per kHz; and
* a reserve price, which is also the minimum bid amount and minimum upfront fee payable per lot in the auction.

The annual fee for lots in Category A and Category G is the same as for already allocated AWS-1 spectrum. In 2015, the fee was that set in Article 244-E of the “Ley Federal de Derechos[[4]](#footnote-5)”. This fee is adjusted each year to account for inflation. The fee for Category J lots is the same as for Categories A and G except that no fees will be due for the period from the date of license award to 31 December 2017 inclusive, if the Congress determines so..

Table 2 reports the reserve price per each lot for each category.

Table 2: Reserve price by category

|  |  |
| --- | --- |
| **Category** | **Reserve price per lot (MXN)** |
| A | Average price of Cofetel’s award process 21 |
| G | Between the reserve price and the average resulting price of Cofetel’s award process 21. |
| J | Between the reserve price and the average resulting price of Cofetel’s award process 21. |

# Overview of the auction process

## Auction stages

The auction consists of two stages:

* The **Principal Stage** determines the number of lots awarded to each bidder in each category and the auction price for the package of lots that they win. The Principal Stage consists of:
  + one or more **clock rounds**; followed by
  + a single **supplementary round**.
* The **Assignment Stage** determines the specific frequencies that will be assigned to the winning bidders (including any reshuffling of existing AWS-1 holdings if required).

This process is illustrated in Figure 3.

Figure 3: Overview of the auction process



Clock round and supplementary round bids are submitted using the Electronic Auction System (EAS). Each qualified bidder will be supplied with information about how to access and use the EAS, and will have the opportunity to take part in a bidder training session and a mock auction.

## Deposit requirements

The purpose of the deposit is to provide an adequate incentive for bidders not to default on their bids. In order to qualify to participate in the auction, each bidder must submit a deposit in the form of a stand-by letter of credit for MXN$1,800,000,000. There is no link between the level of deposit submitted and the number of lots that a bidder can bid for in the auction.

An initial deposit of MXN$100,000,000 will be made at the beginning of the award process which must be increased to MXN$1,800,000,000 before the auction.

During the auction, the IFT will monitor the level of bids made by each bidder relative to the level of their deposit. The IFT has an option to pause bidding and require bidders to increase the size of their deposit under the following conditions:

1. After the completion of any clock round, if the deposit provided by one or more bidders is less than [50%] of their highest bid amount in that round or any previous round: in this case, bidders may be required to provide a stand-by letter of credit with an amount between 50% and 75% of their highest bid amount, as determined by the IFT.
2. After the submission of supplementary bids, if the deposit provided by one or more bidders covered is less than [50%] of their highest bid amount across both the clock and supplementary bid rounds: In this case, bidders may be required to provide a stand-by letter of credit with an amount between 50% and 75% of their highest bid amount, as determined by the IFT.

IFT will notify bidders if they are required to increase their deposit, and provide a deadline for submission of the bank guarantee. Bidders are free to increase their deposit above the required level in order to reduce the likelihood that they are required to make further deposit increases as the auction progresses. Bidders are also free to increase their deposit at any point during the auction process – and in particular well in advance of any potential required increase – notifying IFT of any deposit increase and providing appropriate proof that the bank guarantee is in place.

If, following the close of a clock round, a bidder fails to increase their deposit as directed by the IFT, that bidder will be excluded from further bidding in the clock bid rounds. However, all bids made by the bidder up to that point will remain valid, and the bidder will be able to submit supplementary bids.

If, following the close of the supplementary round, a bidder fails to increase their deposit as directed by the IFT, all supplementary bids by that bidders will be void. However, all clock bids made by the bidder will remain valid and will be considered in the determination of winners and prices.

## Bidder conduct before and during the auction

The IFT will publish the identity of all bidders qualified to participate in the auction. All qualified bidders are required not to engage in conduct that would be detrimental to the IFT’s ability to run an effective auction process.

In particular, it is the responsibility of the bidders themselves to ensure that:

* they have declared any association with an incumbent operator that has existing frequencies in the AWS-1 band (and will therefore be subject to a spectrum cap that takes account of that operator’s existing holdings);
* they are not associated with any other qualified bidder;
* they do not share confidential information in relation to the auction, including but not necessarily limited to information regarding the bidder’s valuations, bid strategy or bid decisions, with any other qualified bidder;
* no person with access to the bidder’s confidential information has access to another bidder’s confidential information; and
* they do not engage in any action that could be deemed collusion or is otherwise detrimental to the IFT’s ability to run an effective auction process.

Further information regarding the rules for defining associated bidders, confidential information and collusive behavior will be provided in the final auction rules.

## Exceptional circumstances

In the case of exceptional circumstances during the Principal Stage or the Assignment Stage, the IFT has the discretion to:

* postpone the end of a round in progress or the release of results of a round;
* postpone the scheduling of further rounds;
* cancel a round that is either underway or for which round results have not yet been released, and re-schedule the round;
* void one or more rounds and the bids made therein, and resume the auction from an earlier round;
* void all bids received in the auction, and either suspend the auction or start the auction again; and/or
* end the clock rounds early (i.e. while there is still excess demand in at least one category), and proceed directly to the supplementary round.

The IFT determines whether a situation of exceptional circumstances has arisen. Exceptional circumstances could include, for example, widespread technical failure or concern about possible collusion amongst bidders.

# Principal Stage

The purpose of the Principal Stage is to determine the number of lots in each of the sub-band categories that will be awarded to each bidder and the associated auction price. The Principal Stage consists of one or more clock rounds and a single supplementary round.

## Clock rounds

The clock rounds follow a clock auction format. Bidding proceeds in discrete rounds, with all bidders invited to submit bids within the same fixed time window (subject to the provisions for extensions, described below).

Before the start of each clock round, IFT will announce a clock price per lot for each category for that round.

In each clock round, a bidder can submit at most one bid for a single package of lots. A package consists of one or more lots in each of the three categories of lots. The bid amount for the package is determined automatically and is equal to the sum total of the current round clock prices for the lots included in the package.

### Scheduling of clock rounds

Clock rounds are scheduled at IFT’s discretion. All clock rounds will be scheduled to start between 9.30am and 6.00pm on Mexican business days. An indicative schedule for each day’s bidding will be published prior to the opening of the first round of each day. No round will start before the time specified in the indicative schedule, but the start time for a round may be delayed for any reason.

There is no minimum or maximum length for a clock round. However, the IFT does not anticipate running clock rounds shorter than 20 minutes or longer than two hours. The time between clock rounds is also discretionary.

There is no upper bound on the number of clock rounds per day, although IFT does not anticipate running more than 10 clock rounds in a single day.

Bidders will be notified of the start time for a clock round at least 15 minutes before the scheduled round start.

### Bid submission in a clock round

When a clock round is open, bidders may submit a single bid for a package of lots using the EAS. A bid specifies the number of lots in each category that a bidder wishes to acquire at current round clock prices. Each bid must be consistent with the spectrum cap (see Section 2.3) and the activity rules (see Section 4.1.5).

To prepare a bid, the bidder must specify the number of lots in each category it wishes to bid for at current clock prices using the drop down boxes provided on the bid form presented by the EAS.

Bid submission is a two-step process:

* First, the bidder enters the bid into the system, so its validity can be checked:
  + If the bid is compliant with the auction rules, the bidder proceeds to the second step below.
  + If the bid is not compliant with the auction rules, an explanation will be provided and the bidder will be redirected to the bid form so that it can modify the bid.
* Second, a summary of the bid will be presented and the bidder will be asked to confirm submission. Only confirmed bids will be registered by the EAS. A warning will be provided if the bidder is reducing demand.

Once a bidder has confirmed a bid in a clock round, it will not be able to revise or withdraw this bid, or submit any further bids in the round.

A bidder is deemed not to have submitted a bid until such time as confirmation of a valid bid is received at the server that hosts the EAS. Receipt of such confirmation will be communicated to the bidder through the EAS. It is the responsibility of the bidder to submit their bid before the end of a round and to check receipt of the bid confirmation by the EAS. Bidders are advised to alert the IFT immediately if they experience problems with bid submission.

In the first clock round, each bidder must submit a bid for a package containing at least one lot (this can be in any category). A bidder that fails to submit a valid bid at the reserve price in the first round will be excluded from further participation in the auction and will forfeit its deposit.

From round 2 onwards, bidders have the option to submit a ‘zero bid’, i.e. to bid for an empty package containing zero lots in all three categories. In the case that a bidder submits a zero bid, the bidder will no longer be able to bid in further clock rounds but will still be eligible to participate in the supplementary round. In the event that a bidder fails to submit a bid within a round (including the extension period if relevant), the EAS will automatically enter a zero bid on the bidder’s behalf.

In the unlikely event that a bidder experiences problems submitting a clock bid using the EAS, a back-up procedure for bid submission by telephone will be available. Further information about this back-up process will be provided in the EAS manual.

### Extension rights

Each bidder starts the clock rounds with two extension rights for the clock rounds.

An extension right allows a bidder additional time in which to submit a bid during a clock round. In the event that a bidder with one or more extension rights remaining fails to submit a bid during a clock round, the round will automatically be extended for that bidder, and one of its extension rights deducted. The EAS will automatically extend the time within which that bidder can submit a bid by 30 minutes from the scheduled end of the round.

The extension period ends 30 minutes after the scheduled end of the round, or once all bidders who are using extensions have successfully submitted their bids, whichever is the earlier.

Bidders who have already submitted a bid during the round cannot take any further action during the extension period; they will be informed that the round has been extended and should wait for the announcement that the round has closed.

Bidders who have not submitted a bid during the clock round and have no remaining extension rights will not be able to submit a bid during the extension period, and a zero bid will therefore be registered automatically on their behalf.

Additional extension rights for the clock rounds may be granted either to all bidders or to individual bidders at the absolute discretion of the IFT. The IFT does not expect to grant additional extension rights unless it has good reason to believe that one or more bidders faced technical or other problems in bidding that they could not have reasonably anticipated, and that granting additional extensions is in the general interest of running an efficient award process. Additional extension rights can only be granted in the periods between clock rounds. They cannot be granted during a clock round.

A bidder may notify the IFT that it is unable to submit a bid during a clock round and is likely to require an extension period; notification is not mandatory but would assist administration of the process.

### Clock prices

In each clock round, IFT will specify a clock price per lot for each category. This will be an amount in units of [1,000 pesos].

In the first clock round, the clock price for each category will be set equal to the reserve price for that category (see Table 3).

In subsequent clock rounds, the clock price for each category will be increased if there is excess demand. A category is deemed to have excess demand if the aggregate demand for lots in that category across all package bids submitted in the same round by all bidders exceeds the supply of lots in that category. For categories where there is no excess demand, the clock price will remain unchanged. It is not possible for the clock price for any category to fall during the clock rounds.

In each round and for each category, the amount by which a clock price is increased is determined at the discretion of the IFT. There is no minimum or maximum increase in absolute or percentage terms, and the level of increase may vary across categories in the same round. However, in order to provide bidders with reasonable certainty over how prices may change during the auction, the IFT will provide guidelines on its preferred approach prior to the start of the auction. This guidance may include a range for the minimum and maximum price increases that the IFT is likely to apply in each category, expressed as a percentage of the current clock price, and a provisional cap in Mexican pesos on the largest price increase that may be applied per lot per round.

### Activity rules

In each round, a bidder is subject to a maximum number of lots that they can include in their package bid across all three categories. In the first round, this limit is determined by the spectrum cap (which takes into account existing AWS-1 holdings). In subsequent rounds, bidders cannot bid for more lots than they bid for in the previous round across all three categories.

As the clock rounds progress, bidders may switch their activity between categories. Therefore, it is possible that a bidder’s activity in one or more categories may increase, provided that the bidder’s activity in other categories is sufficiently reduced.

### Validity of clock bids

A bid for a package in the clock rounds is valid if it satisfies the following conditions:

* The bidder has not been excluded from the auction;
* The bidder has not been excluded from submitting further bids in the clock rounds;
* The bid was submitted using the EAS (or other process as specified by the IFT) within the round time including any extension period if applicable;
* The total number of lots in the package does not exceed the bidder’s spectrum cap, taking into account their existing AWS-1 holdings;
* If relevant, the bid is for a package in the bidder’s set of minimum packages or is for a package that is a superset of one of the bidder’s minimum packages;
* In any round except the first round:
  + the bidder was active on at least one lot in the previous bid round; and
  + the total number of lots in the package does not exceed the total number of lots in the bidder’s previous round package;
* The number of lots in Category A does not exceed the number available (4 in Scenario I or 3 in Scenario II);
* The number of lots in Category G does not exceed 3; and
* The number of lots in Category J is either zero or 2 lots.

The EAS is designed to block submission of invalid bids. For example: (1) the drop down boxes for selection of bids will not allow the user to select more lots in a category than are available; and (2) the EAS will not allow bidders to submit a bid with activity that exceeds the bidder’s current maximum number of lots.

Each bid submitted in accordance with the auction rules is considered to be a valid bid. A valid bid represents a binding commitment to buy the specified package of lots at a price less than or equal to the specified bid amount.

All valid bids remain valid for the duration of the auction unless they are replaced by a higher bid for the same package by the same bidder in a subsequent clock round or the supplementary round, or they are voided by the IFT (see Section 3.4). All valid bids will be considered in the determination of winners and prices (see Sections 4.2.5 and 4.2.6).

### Information available during the clock rounds

At the end of each clock round, each bidder will be provided with the following information:

* aggregate demand for lots in each category at the applicable clock prices;
* its own bid, including a breakdown of lots and prices by category;
* the maximum number of lots that they it can bid for in the next clock round; and
* the number of extension rights it has remaining for the clock rounds.

Prior to the start of the next clock round, each bidder will be provided with the following information:

* the start time and end time of the next clock round; and
* the clock price for lots in each category in the next clock round.

No information will be released about the bids submitted by other bidders during the clock rounds.

The EAS includes the functionality to view and download information on clock prices, aggregate demand and the bidder’s own bids in previous clock rounds.

### End of the clock rounds

The clock rounds end after a round in which there is no excess demand for lots in any of the three categories. At this point, the IFT will announce that the clock rounds have ended and that the auction will progress to the supplementary round.

In addition, following the close of any clock round, the IFT may announce that it is ending the clock rounds early (i.e. while demand is still above supply in one or more of the categories). In this case, the auction will proceed directly to the supplementary round, and there will be no further clock rounds.

IFT will only terminate the clock rounds early if it believes that proceeding directly to the supplementary round at this time is in the general interest of running an efficient award process.

## The supplementary round

The supplementary round consists of a single round of bidding in which bidders may submit a highest bid amount for each of the packages that the bidder is eligible to bid for in the auction. A bidder may increase its bid amount for a package that it already bid on in the clock rounds and bid for packages that it did not bid for in the clock rounds.

Unlike in the clock rounds, bid amounts are discretionary, subject to certain constraints based on the bidder’s activity during the clock rounds. In particular, all bids are subject to a minimum bid amount and some are also subject to a maximum bid amount (see Section 4.2.2).

All valid bids received in the clock rounds and the valid bids from the supplementary round are considered together to determine the winning bids and the amounts to be paid by winning bidders.

### Schedule for the supplementary round

The start time and duration of the supplementary round will be announced by the IFT after the completion of the clock rounds.

There will be at least two clear business days between the last clock round and the start of the supplementary round.

The IFT has discretion over the time and duration of the round. However, the IFT anticipates that the round will be scheduled to start between 09.30 and 14.00 hours on a single business day, and will last for at least four hours and no more than six hours.

A single extension right will be available to all bidders in the supplementary round. The extension period, if required, will be 30 minutes. A bidder that used all its extension rights in the clock rounds will still be eligible for an extension in the supplementary round.

### Restrictions on bid amounts for supplementary bids

As an example, in case of a 2x40 MHz cap, there will be a total of 39 possible packages under Scenario I and 32 possible packages under Scenario II that bidders may be eligible to bid for in the auction. Bidders that already have AWS-1 holdings or selected minimum packages at application may be prohibited from bidding for some of these packages owing to the spectrum cap and minimum package rules (see Section2.3).

Bidders may submit at most one supplementary bid for each package. It is not obligatory to bid for any package. However, in the case of Scenario I, operators in Block D – based on their application – are deemed to have already committed to submit a bid for each of their minimum packages at reserve price (subject to their bid constraints, they may each bid more than reserve for any of these packages if they want but they are not obliged to do so). Their supplementary bid form in the EAS will be pre-populated with these bids.

Bid amounts are discretionary subject to the following constraints:

1. All bid amounts are subject to a minimum amount. This is the higher of:
   1. The sum of the reserve prices for the lots included in the package; and
   2. The bidder’s highest bid amount for the package in the clock rounds, if any.
2. Each bidder has a ‘final clock package’. This is the package that was the subject of the bidder’s most recent, non-zero clock bid:
   1. If this bid was submitted in the last clock round, there is no maximum limit on the supplementary bid amount that the bidder can submit for this package.
   2. If this bid was submitted in any earlier clock round, then the supplementary bid amount is subject to a cap, which is the sum of the component lot prices in the round immediately following the one in which the bidder submitted its final clock bid.
3. All other packages are subject to a maximum supplementary bid amount, based on a ‘relative cap rule’. The bid amount is limited by the clock prices in the most recent clock round in which the bidder could have made a bid on the package, but chose to bid on a package with fewer lots instead. More specifically, assume that the bidder was last eligible to bid for package X in round n, but chose to bid on a package Y with fewer lots instead. In this case, the supplementary bid for package X cannot exceed the highest bid that the bidder made for package Y (which may be a supplementary bid or a clock round bid if no supplementary bid was made) plus the difference between the price of package X and package Y at the clock prices in round n.
4. All bid amounts must be specified in units of 1,000 pesos.

These rules are intended to ensure that the preferences across different packages expressed through a bidder’s supplementary bids are consistent with the clock bids that the bidder previously made. This, in turn, is intended to provide incentives for consistent valuation-based bidding during the clock rounds.

In particular, the relative cap rule described above limits the amount that a bidder can bid for any package other than a bidder’s final clock package:

* The amount that a bidder can bid for a package that it is no longer eligible to bid for in the final clock round will be limited relative to the amount bid for that package’s ‘constraining package’. For a package X, the constraining package is the package that the bidder bid for in the ‘constraining clock round’, which is the most recent clock round when it was eligible to bid for Package X but did not do so. The amount that the bidder can subsequently bid for X in excess of the amount bid for the constraining package is limited to the price difference between this package at the clock prices in the constraining clock round (which may be negative).
* The amount that a bidder can bid for any other package is also limited relative to the amount bid for the final clock package. Suppose that Y is a package with the same or fewer lots than a bidder’s final clock package. The maximum bid that a bidder can place for package Y is the sum of its bid for the final clock package and the price difference between package Y and the final clock package at the clock prices in the round when the bidder submitted its final clock package (which may be negative).

Note that relative caps arise only as a result of (a) a bidder dropping its demand for lots during the clock rounds; and (b) the bidder having a final clock package. If a bidder does not drop demand and the clock rounds do not end, then no relative caps and no constraining packages are created by its bid in that clock round.

In this way, the maximum bid amount for every package is directly or indirectly (via a number of other packages) linked to the amount bid for the final clock package.

### Bid submission in the supplementary round

The bid entry screen will provide each bidder with the following information:

* A full list of packages that the bidder is eligible to bid for in the auction.
* For each package:
* the number of lots in each category;
* the reserve price
* the bidder’s highest bid amount for that package in the clock rounds
* a minimum bid amount
* a maximum bid amount, if applicable; and
* an input cell, in which the bidder can enter a new bid amount.

In accordance with the rules in Section 3.2.2, a bidder’s maximum bid amount for a package may change depending on the amount bid in the supplementary round for other packages. It will be possible to update the maximum bid amounts using the EAS. The process for updating the maximum bid amount will be described in the EAS manual.

Supplementary bid submission is a two-step process:

* First, the bidder enters a set of supplementary bids into the system, so their validity can be checked:
  + If all the bids are compliant with the auction rules, the bidder proceeds to the second step below.
  + If any of the bids are not compliant with the auction rules, an explanation will be provided and the bidder will be redirected to the bid form so that it can modify its supplementary bids.
* Second, a summary of the supplementary bids will be presented and the bidder will be asked to confirm submission. Supplementary bids will only be registered by the EAS once the confirmation step has been completed.

Once the bidder has confirmed a set of supplementary bids, the bidder will not be able to revise or withdraw these bids, or submit any further supplementary bids in the round.

A bidder is deemed not to have submitted supplementary bids until such time as confirmation of a valid set of bids is received by the EAS. Receipt of such confirmation will be communicated to the bidder through the EAS. It is the responsibility of the bidder to submit their bid before the end of the supplementary round and to check receipt of the bid confirmation by the EAS. Bidders are advised to alert the IFT immediately if they experience problems with bid submission.

In the unlikely event that a bidder experiences problems submitting a set of supplementary bids using the EAS, a back-up procedure for bid submission by telephone will be available. Further information about this back-up process will be provided in the EAS manual.

### Validity of supplementary bids

A supplementary bid is valid if it satisfies the following conditions:

* The bidder has not been excluded from the auction;
* If required, the bidder has increased its bank guarantee to the necessary level;
* The supplementary bid was submitted using the EAS (or other process as specified by the IFT) within the specified round time including any extension period if applicable;
* The bid amount is greater than or equal to the minimum bid amount and less than or equal to the maximum bid amount, according the rules described in Section4.2.2;
* The total number of lots in the package does not exceed the bidder’s spectrum cap, taking into account their existing AWS-1 holdings;
* If relevant, the bid is for a package in the bidder’s set of minimum packages or is for a package that is a superset of one of the bidder’s minimum packages;
* The number of lots in Category A does not exceed the number available (4 in Scenario I or 3 in Scenario II);
* The number of lots in Category G does not exceed 3; and
* The number of lots in Category J is either zero or two lots.

The EAS is designed to block submission of invalid bids. For example, (1) the bid form will only include packages that the bidder is eligible to bid for in the auction; and (2) the EAS will not allow bidders to submit a bid with a bid amount above or below the levels set according to the auction rules.

Each supplementary bid submitted in accordance with the auction rules is considered to be a valid bid. A valid bid represents a binding commitment to buy the specified package of lots at a price less than or equal to the specified bid amount.

### Winner determination

Following the close of the supplementary round, the IFT will proceed to determine the winning bids. To do so, it will consider all valid bids submitted in the auction alongside the ‘reserve price bids’ automatically submitted on behalf of the IFT.

The following bids will be included in the winner determination:

* All valid bids for packages submitted by all bidders during the clock rounds (except those replaced by higher bids for the same package by the same bidder).
* All valid supplementary bids submitted by all bidders.
* A reserve price bid for each lot available in the auction. In Scenario I, there will be 4 separate bids at reserve for Category A lots, 3 lots at reserve for Category G; and one bid for 2 lots for Category J. In Scenario II, the reserve price bids will be the same as for Scenario I except that there will be only 3 separate bids at reserve for Category A lots.

The set of winning bids is the combination of these bids that, taken together, have the greatest total value, subject to the conditions that:

* in each category, no more lots are awarded than are available in that category;
* at most one bid is accepted from each bidder; and
* in Scenario I only, operators in Block D must each win a non-zero package.

The process of identifying the winning bids is equivalent to listing all possible combinations of bids that do not violate any of the criteria above, and identifying the combination(s) that has the highest total value.

If there is more than one set of bids meeting the conditions above that have equal highest value, the following steps will be used to progressively eliminate sets of bids from amongst these combinations until a unique set of winning bids is identified:

1. The set of bids with the fewest number of unallocated lots will be selected;
2. If there is still a tie, the set of bids with the largest number of winning bidders will be selected;
3. If there is still a tie, the set of bids that maximizes the amount of AWS spectrum held by the bidder(s) that will have the smallest allocation will be selected;
4. If there is still a tie, the set of bids that minimizes the amount of AWS spectrum held by the bidder(s) that will have the largest allocation will be selected;
5. If there is still a tie, the winning set of bids will be selected using a process of random selection.

### Determining auction prices

For each winning bid, the EAS will determine an auction price for each winning bidder. This is an overall price for the entire package of lots won by each bidder.

Auction prices are based on the concept of opportunity cost: they are the minimum amount that each winning bidder, and each group of winning bidders jointly, could have bid without changing the outcome of the winner determination process.

The opportunity cost of a bidder, or a group of bidders, is given by the difference between:

* the value of the winning allocation in a scenario where all bids from the bidder(s) in question were excluded, with unallocated lots valued at reserve price; and
* the value of the original winning allocation, excluding the value of the winning bids from the bidder(s) in question, with unallocated lots valued at reserve price.

Auction prices are determined jointly for all winners in a single calculation. A unique set of auction prices is found by applying the following conditions:

1. **First condition:** the auction price for a winning bid must be greater than or equal to the total reserve price of the lots in the winning bid package, but less than or equal to the winning bid amount.
2. **Second condition:** the set of auction prices must be sufficiently high such that the sum of prices to be paid by each possible subset of winners must be at least their joint opportunity cost. If there is only one set of auction prices that meets the first and second conditions, this determines the auction prices.
3. **Third condition:** If there are multiple sets of auction prices that fulfil the first and second conditions, the set(s) of auction prices that minimize(s) the sum of auction prices across winning bidders is selected. If there is only one set of auction prices satisfying the first, second and third conditions, this determines the auction prices.
4. **Fourth condition:** If there are multiple sets of auction prices that satisfy the first three conditions, the set of auction prices that minimize the sum of squares of differences between the auction price and the individual opportunity cost for each winning bidder is selected.

These conditions determine a unique auction price for each winning bidder that is no greater than their winning bid and is no less than the reserve price for that package. Finally, if these auction prices are not amounts in units of 1,000 pesos, they are rounded up to the nearest 1,000 pesos.

## End of the Principal Stage

Once the IFT has determined the winning bids and the auction prices, each bidder will be informed about its own outcome, including:

* the package of lots it has won, if any; and
* the auction price that applies to its winning package.

No information about the outcome of the auction for other bidders will be provided until the completion of the Assignment Stage.

# Assignment Stage

The purpose of the assignment stage is to determine the specific frequencies in each of the sub-bands that will be assigned to the winning bidders. Depending on the outcome of the Principal Stage, it may also be necessary to move the AWS-1 frequency holdings of incumbent operators that qualified to participate in the auction.

An administrative process is used to allocate spectrum within each sub-band. The process rules have been designed to:

1. promote contiguous assignment of spectrum for each operator within the AWS-1 band to the maximum extent possible based on participation by incumbent operators;
2. guarantee contiguous assignment of spectrum for each operator within and across the two AWS-3 sub-bands;
3. promote contiguous assignment of spectrum across the AWS-1 and AWS-3 bands in a limited number of cases;
4. ensure contiguous assignment of unallocated lots, if any, within sub-bands; and
5. minimize requirements for existing operators in the AWS-1 band holding more than 2x5 MHz to move their spectrum holdings.

## Assignment rules for Scenario I

Frequencies in the AWS-1 sub-band will be assigned first. The following steps are applied to determine the assignment of specific frequencies in the AWS-1 sub-band:

1. Any unallocated lots are assigned to frequencies at the bottom of the band.
2. In the case that a New Entrant bidder wins one or more lots in the AWS-1 sub-band, all such spectrum will be contiguous and it will be assigned to the lowest available remaining frequencies. If more than one New Entrant wins spectrum, the bidder assigned first will be determined using a random draw.
3. In the case that Telefonica wins one or more lots in the AWS-1 sub-band, all such spectrum will be contiguous and it will be assigned frequencies with the following position in the band:
   1. If it wins only one AWS-1 lot and no AWS-3 lots, it will be positioned adjacent to and in-between the holdings of Telcel and AT&T.
   2. If it wins only one AWS-1 lot and one or more AWS-3 lots, it will be positioned at the top of the sub-band, adjacent to the boundary with the AWS-3 band.
   3. If it wins two or more AWS-1 lots (regardless of the number of AWS-3 lots that it wins), it will be assigned the lowest available remaining frequencies.
4. AT&T will be assigned to the highest available remaining frequencies. It will always be granted contiguous frequencies, including both its existing holdings plus any additional AWS-1 lots won in the auction.
5. Telcel will be assigned to the remaining frequencies. It will always be granted contiguous frequencies, including both its existing holdings plus any additional AWS-1 lots won in the auction.

The AWS-3 frequencies will be assigned after the AWS-1 frequency assignment has been determined. The following steps are applied:

1. If there is a winner of the two J lots, that bidder will be assigned to the corresponding frequencies.
2. The assignment of frequencies in the G category is determined using the following steps:
   1. If there is a bidder that won 1 or more G lots and also won the J lots, they will be assigned frequencies immediately below and adjacent to the J lots.
   2. If there is a remaining bidder that won 1 or more G lots and has also been assigned to the top end of the AWS-1 sub-band, then they will be assigned frequencies at the bottom of the band immediately above and adjacent to the AWS-1 sub-band.
   3. If there are any remaining bidders, then they will be assigned to the remaining frequencies. If there is any ambiguity over their position, either because there is more than one such winner or there are 1 or more unallocated lot(s), then this will be resolved using a random draw.

## Assignment rules for Scenario II

In the event that one or more AWS-1 incumbent operators are not qualified to participate in the auction, then their existing frequency assignments will not change. In this case, some changes to the assignment rules for AWS-1 may be necessary and it may not be possible to assign contiguous frequencies to all winning bidders.

More specifically:

* If *AT&T do not qualify to participate*, then the option to place Telefonica above them at the top of the AWS-1 sub-band will not be available. This is only relevant in the case that Telefonica wins one AWS-1 lot and one or more AWS-3 lots. In this specific case, Telefonica’s AWS-1 spectrum would instead be positioned adjacent to and in-between the holdings of Telcel and AT&T within the AWS-1 sub-band.
* If *Telefonica do not qualify to participate*, then it will not be possible to award additional AWS-1 spectrum to AT&T that is contiguous with their existing holdings. In this case, AT&T’s existing holdings will not be moved, and any new AWS-1 lots will be assigned to the lowest remaining frequencies after positioning any unallocated lots and New Entrant winners.
* If *Telcel do not qualify to participate*, then it will not be possible to move any incumbent holdings. As above, any unallocated lots would be assigned to the bottom end of the band. Any remaining winning bidders would be assigned to the remaining lots at the bottom end of the band. If there are two or more winning bidders, their specific frequency assignments would be determined using a random draw.

Assignment rules for AWS-3 spectrum are the same as for Scenario I, as the rules are not affected by non-participation of incumbent bidders.

The process of determining assignment positions is expected to take up to 1 full business day, although the IFT has discretion to take more time if needed.

## Upfront fees payable by winning bidders

In parallel with the determination of the assignment outcome, the IFT will also calculate the amount of the upfront fee to be paid by each winning bidder:

* In Scenario I, the upfront fee for all winning bidders except the current operators in Block D is their auction price. The upfront fee amount for these operators will be a proportion of their auction price, as explained below.
* In Scenario II, the upfront fee for each winning bidder is equal to their auction price.

Under Scenario I, current operators in Block D contribute a certain amount of spectrum into the auction and are guaranteed to win a larger amount of spectrum. Accordingly, these operators only pay an auction price for the incremental spectrum that they acquire in the auction.

To determine the upfront fee for each of these bidders in Scenario I, the IFT will undertake the following three steps:

1. *Calculate an average price per lot*. The IFT will divide the bidder’s auction price by the total number of lots in their winning package.
2. *Calculate the value of the spectrum that the bidder contributed to the auction*. The IFT will multiply the average price per lot from Step 1 by a bidder-specific coefficient. The coefficient will be determined using the weights as set out in Table B of article 244-E of the Ley Federal de Derechos.
3. *Calculate the upfront fee*. This is equal to the bidder’s auction price less the value of the spectrum that the bidder contributed to the auction, as determined in Step 2.

## End of auction

Once the assignment of frequencies and upfront fees have been determined, the IFT will provide bidders with the following information:

* the identity of the winning bidders;
* the frequency ranges assigned to each winning bidder (including any changes to existing AWS-1 frequency allocations); and
* the upfront fee to be paid by each winning bidder.

It is the IFT’s intention to release full information about all bids made in the auction. However, this will take place at a later date and is not a requirement under the auction rules.

# Annex 1: Complete lists of permitted packages

## Permitted packages for Scenario I (example)

As an example, the following table describes the permitted packages under a 2x40 MHz cap.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **A** | **G** | **J** | **Entrant** | **Telefonica** | **Telcel** | **AT&T** |
| **1** | 4 | 2 | 2 | Yes | Yes | No | No |
| **2** | 3 | 3 | 2 | Yes | Yes | No | No |
| **3** | 4 | 3 | 0 | Yes | Yes | No | No |
| **4** | 4 | 1 | 2 | Yes | Yes | No | No |
| **5** | 3 | 2 | 2 | Yes | Yes | No | No |
| **6** | 2 | 3 | 2 | Yes | Yes | No | No |
| **7** | 4 | 2 | 0 | Yes | Yes | Yes | No |
| **8** | 4 | 0 | 2 | Yes | Yes | Yes | No |
| **9** | 3 | 3 | 0 | Yes | Yes | Yes | No |
| **10** | 3 | 1 | 2 | Yes | Yes | Yes | No |
| **11** | 2 | 2 | 2 | Yes | Yes | Yes | No |
| **12** | 1 | 3 | 2 | Yes | Yes | Yes | No |
| **13** | 4 | 1 | 0 | Yes | Yes | Yes | Yes |
| **14** | 3 | 2 | 0 | Yes | Yes | Yes | Yes |
| **15** | 3 | 0 | 2 | Yes | Yes | Yes | Yes |
| **16** | 2 | 3 | 0 | Yes | Yes | Yes | Yes |
| **17** | 2 | 1 | 2 | Yes | Yes | Yes | Yes |
| **18** | 1 | 2 | 2 | Yes | Yes | Yes | Yes |
| **19** | 0 | 3 | 2 | Yes | Yes if selected Set 2 or Set 3 † | Yes if selected Set 2 or Set 3 † | Yes |
| **20** | 4 | 0 | 0 | Yes | Yes | Yes | Yes |
| **21** | 3 | 1 | 0 | Yes | Yes | Yes | Yes |
| **22** | 2 | 2 | 0 | Yes | Yes | Yes | Yes |
| **23** | 2 | 0 | 2 | Yes | Yes | Yes | Yes |
| **24** | 1 | 3 | 0 | Yes | Yes | Yes | Yes |
| **25** | 1 | 1 | 2 | Yes | Yes | Yes | Yes |
| **26** | 0 | 2 | 2 | Yes | Yes if selected Set 2 or Set 3 † | Yes if selected Set 2 or Set 3 † | Yes |
| **27** | 3 | 0 | 0 | Yes | Yes | Yes | Yes |
| **28** | 2 | 1 | 0 | Yes | Yes | Yes | Yes |
| **29** | 1 | 2 | 0 | Yes | Yes | Yes | Yes |
| **30** | 1 | 0 | 2 | Yes | Yes | Yes | Yes |
| **31** | 0 | 3 | 0 | Yes | Yes if selected Set 2 or Set 3 † Otherwise no | Yes if selected Set 2 or Set 3 † Otherwise no | Yes |
| **32** | 0 | 1 | 2 | Yes | Yes if selected Set 2 or Set 3 † Otherwise no | Yes if selected Set 2 or Set 3 † Otherwise no | Yes |
| **33** | 2 | 0 | 0 | Yes | Yes | Yes | Yes |
| **34** | 1 | 1 | 0 | Yes | Yes | Yes | Yes |
| **35** | 0 | 2 | 0 | Yes | Yes if selected Set 2 or Set 3 † Otherwise no | Yes if selected Set 2 or Set 3 † Otherwise no | Yes |
| **36** | 0 | 0 | 2 | Yes | Obligatory if selected Set 3 † Otherwise no | Obligatory if selected Set 3 † Otherwise no | Yes |
| **37** | 1 | 0 | 0 | Yes | Obligatory | Obligatory | Yes |
| **38** | 0 | 1 | 0 | Yes | Obligatory if selected Set 2 or Set 3 † Otherwise no | Obligatory if selected Set 2 or Set 3 † Otherwise no | Yes |
| **39** | 0 | 0 | 0 | Yes ǂ | Yes ǂ\* | Yes ǂ\* | Yes ǂ |

NOTES:

† Under the minimum package rule for Scenario 1, Telcel or Telefonica can only bid on these packages if they selected either Set 2 or Set 3. Furthermore, they are only permitted to submit bids for their minimum packages and for packages that are supersets of one or more of their minimum packages.

ǂ A bidder is not permitted to bid for a zero package (package 39) in the first clock round. A bidder may bid for a zero package in any subsequent clock round.

\* Under Scenario I, it is permitted for Telefonica or Telcel to submit a zero bid (package 39) in any clock round except the first clock round, but they cannot actually win this package, owing to the requirement that they win one of their permitted packages.

## Permitted packages for Scenario II

As an example, the following table describes the permitted packages under a 2x40 MHz cap.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **A** | **G** | **J** | **Entrant** | **Telefonica** | **Telcel** | **AT&T** |
| **1** | 3 | 3 | 2 | Yes | No | No | No |
| **2** | 3 | 2 | 2 | Yes | Yes | No | No |
| **3** | 2 | 3 | 2 | Yes | Yes | No | No |
| **4** | 3 | 3 | 0 | Yes | Yes | No | No |
| **5** | 3 | 1 | 2 | Yes | Yes | No | No |
| **6** | 2 | 2 | 2 | Yes | Yes | No | No |
| **7** | 1 | 3 | 2 | Yes | Yes | No | No |
| **8** | 3 | 2 | 0 | Yes | Yes | Yes | Yes |
| **9** | 3 | 0 | 2 | Yes | Yes | Yes | Yes |
| **10** | 2 | 3 | 0 | Yes | Yes | Yes | Yes |
| **11** | 2 | 1 | 2 | Yes | Yes | Yes | Yes |
| **12** | 1 | 2 | 2 | Yes | Yes | Yes | Yes |
| **13** | 0 | 3 | 2 | Yes | Yes | Yes | Yes |
| **14** | 3 | 1 | 0 | Yes | Yes | Yes | Yes |
| **15** | 2 | 2 | 0 | Yes | Yes | Yes | Yes |
| **16** | 2 | 0 | 2 | Yes | Yes | Yes | Yes |
| **17** | 1 | 3 | 0 | Yes | Yes | Yes | Yes |
| **18** | 1 | 1 | 2 | Yes | Yes | Yes | Yes |
| **19** | 0 | 2 | 2 | Yes | Yes | Yes | Yes |
| **20** | 3 | 0 | 0 | Yes | Yes | Yes | Yes |
| **21** | 2 | 1 | 0 | Yes | Yes | Yes | Yes |
| **22** | 1 | 2 | 0 | Yes | Yes | Yes | Yes |
| **23** | 1 | 0 | 2 | Yes | Yes | Yes | Yes |
| **24** | 0 | 3 | 0 | Yes | Yes | Yes | Yes |
| **25** | 0 | 1 | 2 | Yes | Yes | Yes | Yes |
| **26** | 2 | 0 | 0 | Yes | Yes | Yes | Yes |
| **27** | 1 | 1 | 0 | Yes | Yes | Yes | Yes |
| **28** | 0 | 2 | 0 | Yes | Yes | Yes | Yes |
| **29** | 0 | 0 | 2 | Yes | Yes | Yes | Yes |
| **30** | 1 | 0 | 0 | Yes | Yes | Yes | Yes |
| **31** | 0 | 1 | 0 | Yes | Yes | Yes | Yes |
| **32** | 0 | 0 | 0 | Yesǂ | Yesǂ | Yesǂ | Yesǂ |

NOTES:

ǂ A bidder is not permitted to bid for a zero package (package 32) in the first clock round. A bidder may bid for a zero package in any subsequent clock round.

1. English acronym, Combinatorial Clock Auction. [↑](#footnote-ref-2)
2. http://www.ppef.hacienda.gob.mx/work/models/PPEF/2016/docs/paquete/LFD\_2016.pdf [↑](#footnote-ref-3)
3. Auction 21 was administered by the Comisión Federal de Telecomunicaciones (COFETEL), Mexico’s previoustelecommunications regulatory body. The auction was concluded in August 2010. [↑](#footnote-ref-4)
4. http://www.diputados.gob.mx/LeyesBiblio/pdf/107\_301214.pdf. [↑](#footnote-ref-5)