Overcoming False-Name Bids in Spectrum Auctions and Sharing Bids Equally.

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ABSTRACT

In this paper, we extended a ALETHIA concept to overcome the False-name bids, and also we introduced a feature of sharing the bids among bidders. These sharing of bids is done only, when two bidders bid same amount for a spectrum during the Auction. The main reason to use ALETHIA concept is that, Existing auction mechanisms are mainly strategy-proof to stimulate bidders to reveal their valuations of spectrum truthfully. However, they can suffer significantly from a new cheating pattern, named false-name bids, where a bidder can manipulate the auction by submitting bids under multiple fictitious names. We show such false-name bid cheating is easy to make but difficult to detect in dynamic spectrum auctions. To address this issue, we used ALETHEIA, a novel flexible, false-name-proof auction framework for large-scale dynamic spectrum access. ALETHEIA not only guarantees strategy-proofness but also resists false-name bids. Moreover, ALETHEIA enables spectrum reuse across a large number of bidders, to improve spectrum utilization. The sharing of bids is done during the auction based on the bid price of bidders, if they two bidders bid same price for a spectrum, then the spectrum is shared equally by the two bidders.

RELATED WORK

Spectrum allocation mechanisms have been extensively studied in recent years. A number of auction designs have been proposed to improve spectrum utilization and allocation efficiency. VERITAS [29] is one of the pioneer auction designs with strategy-proofness that exploits the spectrum reusability in radio spectrum. Later, the work is extended to consider double spectrum auctions [30]. Jia et al. [11] and Al-Ayyoub et al. [3] design spectrum auctions to maximize the expected revenue by assuming that the bids of the secondary users follow a certain distribution. SMALL [24] is designed for the scenario where the primary user sets a reserved price for each channel.

LITERATURE SURVEY:

S.no	Title	Issued	Advantages	Disadvantages	Techniques used
1	Breaking bidder collusion in large-scale spectrum auctions	11th ACM Int. Symp. Mobile Ad Hoc Netw. Comput., 2010, pp. 121–130	This Athena framework overcomes the disadvantage of a bidder collusion in large scale spectrum auctions which is the huge advantage of this concept. Athena enables spectrum reuse across bidders, achieves soft collusion resistance against any form of collusive bidding strategy	This framework works quite efficiently for one channel request spectrums and when it comes to multi-channel request it lacks the efficiency.	Athena, a new collusion-resistant auction framework for large-scale dynamic spectrum auction
2	Truthful spectrum auctions with approximate revenue	IEEE INFOCOM, 2011, pp. 2813– 2821.	One advantage in this model is that the spectrum auctions that are conducted with approximate revenues which in turn makes the cost evaluation process as a simpler.	Since, it uses an approximate revenues for evaluation, the perfection or exact data of revenue is always doubtful.	Polynomial-time spectrum auction mechanism that is truthful *and* yields an allocation with $O(1)$-approximate expected revenue, in the Bayesian setting.
3	Demand reduction in multi-unit auctions with varying numbers of bidders: Theory and field experiments	Int. Econ. Rev., vol.47, No.1,pp. 203-231,2006.	In Multi-Unit Auctions, it reduces the demand reduction in a more efficient manner than the other strategies or the methods that are in existence for the demand reduction, it is one of the most promising demand reduction technique that present now, which is huge advantage of this concept. Demand reduction should decrease with an increase in the number of bidders	Even though it reduces the demands, it causes a changes in the bidding price, which leads to a ununiformed price manner of the bidding objects in the auction	Demand Reduction Mechanism

4	The effect of false-name bids in combinatorial auctions: New fraud in internet auctions	Games Econ. Behavior, vol. 46, no. 1, pp. 174–188, 2004.	This paper is based on the new fraud system False-name Bids, it gives a theoretical report of that new cheating system, which will be useful for others to overcome this problem in future by using this paper as a reference for them in their project.	Since, it is a theoretical report there is no disadvantage in this paper, it just gives awareness of a new cheating system names as False-name Bids.	Vickrey-Clarke-Groves (VCG) mechanism,
5	Revenue Generation for Truthful Spectrum Auction in Dynamic Spectrum Access	10th ACM Int. Symp. Mobile Ad Hoc Netw. Comput., 2009, pp. 3–12.	In this paper, the advantage present is that these concepts use some mechanisms to analyze the live auctions and it monitoring the auction throughout for a revenue generation in dynamic spectrum access	Since, it uses a secondary Spectrum market and wireless services which leads to more cost exploitation that the required which was main disadvantage of this concept.	It uses a Secondary spectrum market and secondary wireless service to analyze the live auctions and it also uses the Vickrey-Clarke-Groves (VCG) mechanism
6	Robust double auction protocol against false-name bids	Decision Support Syst., vol.39, no. 2, pp. 241–252, 2005.	This paper introduced a new protocol which is to overcome the disadvantage of an existing PMD protocol for avoiding the false-name bids in robust double auction protocols.	TPD protocol is much more efficient than the existing PMD protocol but it also slightly lacks in exactly identifying the false-name bids in auctions	Threshold Price Double auction (TPD) protocol
7	Robust multi- unit auction protocol against false-name bids	17th Int. Joint Conf. Artificial Intell., 2001, pp. 1089–1094	The proposed IR protocol does the good job of demand reduction in multi-unit auction which was a main advantage of this paper. It exactly identifies the false-name bids in the multi-unit auctions.	There is no major disadvantage present in this concept, since it is proven to be a one of the most consistent protocols against the false name bids in multi-unit auctions.	This paper presents a new multi-unit auction protocol (IR protocol) that is robust against false-name bids
8	Next generation/dynamic spectrum access/cognitive radio wireless networks: A survey	Comput. Netw., vol. 50, no. 13, pp. 2127–2159, 2006.	This paper provides a survey of a next generation or dynamic spectrum auction, which will be more useful for the upcoming researchers to work on this concept. It has analyzed and reported a good awareness about the next generation or dynamic spectrum access in cognitive radio networks.	Since, this paper just gives us a survey of next generation, there is no disadvantages are that to mention in it.	It analyses and predicts the future of dynamic spectrum access in cognitive radio networks

9	Incentive compatible multi unit combinatorial auctions	9th Conf. Theoretical Aspects Rationality knowl., 2003, pp. 72–87.	This paper gives a ratio of approximate for each bidders to buy each unit of a good which is very close in reality to predict the auction result very early which is also a advantage of this incentive compatible mechanism	It gives a approximate evaluations, so it may vary accordingly during the auction and we can't say it is always going to be work, sometime it works and sometimes it won't in a predicted way.	Incentive Compatible Mechanism
10	False-name-proof multi-unit auction protocol utilizing greedy allocation based on approximate evaluation values	2nd Int. Joint Conf. Autonomous Agents Multiagent Syst., 2003, pp. 337–344.	This newly developed GAL protocol is easier to use than the IR, since the auctioneer does not need to set the reservation price nor any other parameters. The evaluation results show that the GAL protocol can obtain a social surplus that is very close to Pareto efficient. The obtained social surplus and seller's revenue are much better than those of the IR protocol even if the reservation price is set optimally.	It also some issues and lacks while identifying the participant in the auction, but we have to admit it that it overcomes the difficulty of IR protocol.	Greedy ALlocation (GAL) protocol
11	Characterizing false-name-proof allocation rules in combinatorial auctions	8th Int. Conf. Autonomous Agents Multiagent Syst., 2009, pp. 265–272.	This is the first attempt to characterize false-name-proof allocation rules. We can utilize this characterization for developing a new false-name-proof mechanism, since we can concentrate on designing an allocation rule	Since this is the first attempt in identifying false name bids in combinatorial auctions, it doesn't produces the result that we expected but it executes partially as expected one.	It identifies a condition called sub-additivity which characterizes false-name-proof allocation rules.
12	SMALL: A strategy-proof mechanism for radio spectrum allocation	IEEE INFOCOM, 2011, pp. 81–85.	An important advantage of SMALL is we model the radio spectrum allocation problem as a sealed-bid reserve auction. SMALL, this strategy proof mechanism analyses the spectrum available, and how to efficiently allocate it in more an efficient manner. we extend SMALL to adapt to multi-radio spectrum buyers, which can bid for more than one radio.	As an initial work, it does a fair job for what is introduced, but when it comes to the perfection or the expectation of the result, it disappoints us it's not performing up to the predicted mark which was slight disadvantage of this concept.	SMALL, Strategy-proof Mechanism for radio spectrum ALLocation

13	Robust combinatorial auction protocol against false-name bids	Artificial Intell., vol. 130, no. 1, pp. 167–181, 2002.	Newly developed Leveled Division Set (LDS) protocol, which is a modification of the GVA, utilizes reservation prices of auctioned goods for making decisions on whether to sell goods in a bundle or separately. The LDS protocol satisfies individual rationality and incentive compatibility even if agents can submit false-name bids, although it is not guaranteed to achieve a Pareto efficient social surplus.	It is far better than the exisiting GVA protocol, but the LDS protocol lacks behind in some aspects in combinatorial auctions against false-name bids. The spectrum allocation and reuse, the availability are not measured exactly and it's not up to the mark.	Leveled Division Set (LDS) protocol
14	A Truthful QoS-Aware Spectrum Auction with Spatial Reuse for Large-Scale Networks	IEEE Trans. Parallel Distrib. Syst., vol. 46, no. 1, pp. 2499–2508, 2014.	The newly Introduced TRUMP achieves the truthfulness and individual rationality with polynomial-time complexity. Both QoS demands and spectrum spatial reuse, which can drastically improve spectrum utilization. It does a great job in utilizing a spectrum in a very efficient manner.	The TRUMP mechanisms works as expected and there is no major disadvantages in it to mention, it is one of the efficient mechanisms used in the large-scale spectrum auctions	TRUMP, A truthful spectrum auction mechanism..
15	The Effect of False-name Declarations in Mechanism Design: Towards Collective Decision Making on the Internet	20th Int. Conf. Distrib. Comput. Syst., 2000, pp. 146–453.	This paper shows a sufficient condition where the Clarke mechanism is robust against false-name declarations (the concavity of the maximal total utility of agents). When false-name declarations and hiding are possible,	This provides a report of decision making of false-name declarations on the internet auctions, since it is just like a survey there is no disavantages in to mention.	Developing a format model of mechanism design to identify false-name declarations. Clarke mechanism

				we show that there exists no auction protocol that achieves Pareto efficient allocations in a dominant strategy equilibrium for all cases.		

CONCLUSION

In this paper, we have studied the new type of cheating named false-name bids, in large-scale spectrum auctions. We demonstrated that false-name bid cheating is easy to form in existing strategy-proof spectrum auctions and can severely impair the auction revenue. We further devised ALETHEIA, the first false-name-proof design for spectrum auction that nullifies the possibility of increasing profits by submitting false-name bids. It achieves high spectrum redistribution efficiency and low computational overhead, and is flexible to support diverse request formats of bidders. And we also introduced a new feature that is to share the bids equally to the bidders that asked for same price.

FUTURE WORK

In our future work, we will analyze how the cheating patterns affect the auction results and solve the topic where bidders are allowed to misreport its total demand and valuation function simultaneously.

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