TEK5010 Multiagent systems

Lecture 11: Auction

Exercise: Auctions 1

Question 1

3 agents $Ag = \{1,2,3\}$ are to decide on the allocation of 3 different resources (or perhaps tasks?) $\mathcal{Z} = \{a, b, c\}$. They decide that a combinatorial auction is the preferred mechanism that they will use in order to distribute the resources among themselves.

a) Agents/bidders are making XOR bids representing their valuation function:

$\beta_1 = (\{a\}, 3)XOR(\{c\}, 1)XOR(\{a, b\}, 5)XOR(\{a, b, c\}, 7)$
$\beta_2 = (\{c\}, 5)XOR(\{a, b\}, 6)XOR(\{a, b, c\}, 14)$
$\beta_3 = (\{b\}, 3)XOR(\{c\}, 4)XOR(\{a, b\}, 11)XOR(\{b, c\}, 15)$

Could you evaluate the valuation functions for the agents in terms of the following bundles:

$v(\{a\}), v(\{b\}), v(\{c\})$
$v(\{a, b\}), v(\{a, c\}), v(\{b, c\})$
$v(\{a, b, c\})$

b) Determine the winner in this auction assuming the auctioneer is maximizing social welfare. (Hint, since there is a limited number of possible outcomes you could enumerate and evaluate all bundles in a comparative analysis.)

c) Could you explain the VCG-mechanism? What are the pros and cons of using the VCG-mechanism in auctions?

d) What is the price each agent has to pay if we use the VCG-mechanism for evaluating the given auction?