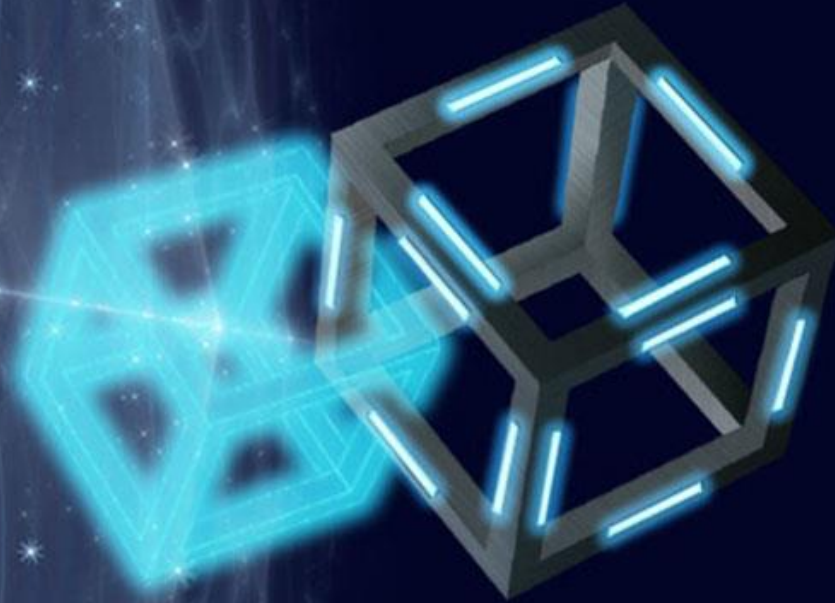


# MATHEMATICS

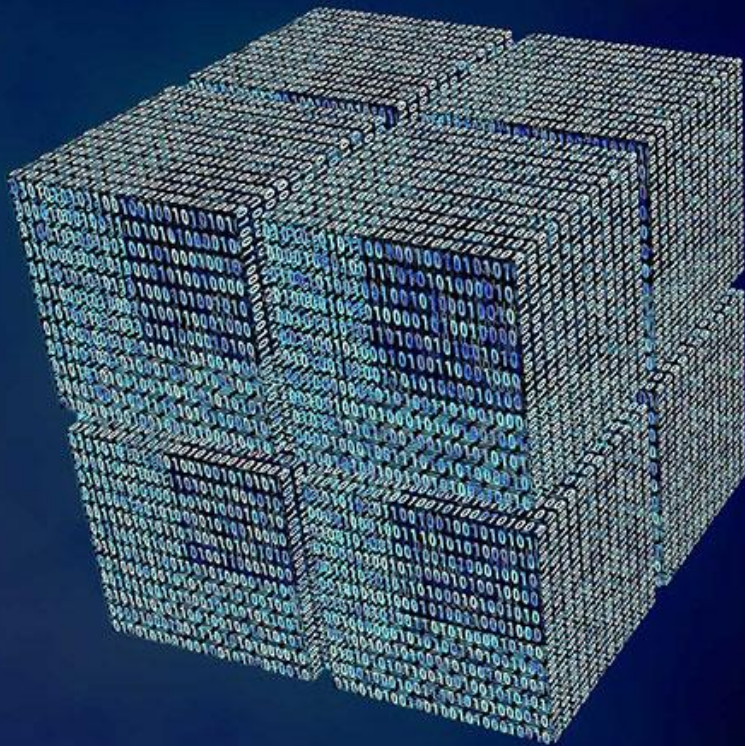
Construct and Analyze a Game Tree



A telecom company is considering upgrading their infrastructure in your city and they have hired G&B Consulting. The telecom company would be willing to invest in upgraded lines that offer higher speeds and bandwidth, but it is costly to do so and they are afraid they might make the investment but not have customers willing to upgrade their services which would be needed to recoup their profits. The alternative would be to keep the old infrastructure, but there are already a high amount of service complaints from the customer base. The telecom company needs to determine if investing in the improved service will pay off for them by having a sufficient amount of customers buy the upgraded service. You have been tasked with helping them determine their optimum strategy.



- ☐ Explain why a game tree must be used in this scenario instead of a payoff matrix.
- ☐ Identify who will go first in the game



**Since this is a sequential transfer game in which the Telecom provider must go first, a game tree must be used . This is due to the fact that they must first plan to update their substructure before they can provide any new services for customers to purchase.**



Telecom  
company

UPGRADE

DON'T UPGRADE

CUSTOMER

CUSTOMER

BUY

DON'T BUY

BUY

DON'T BUY

(4,4)

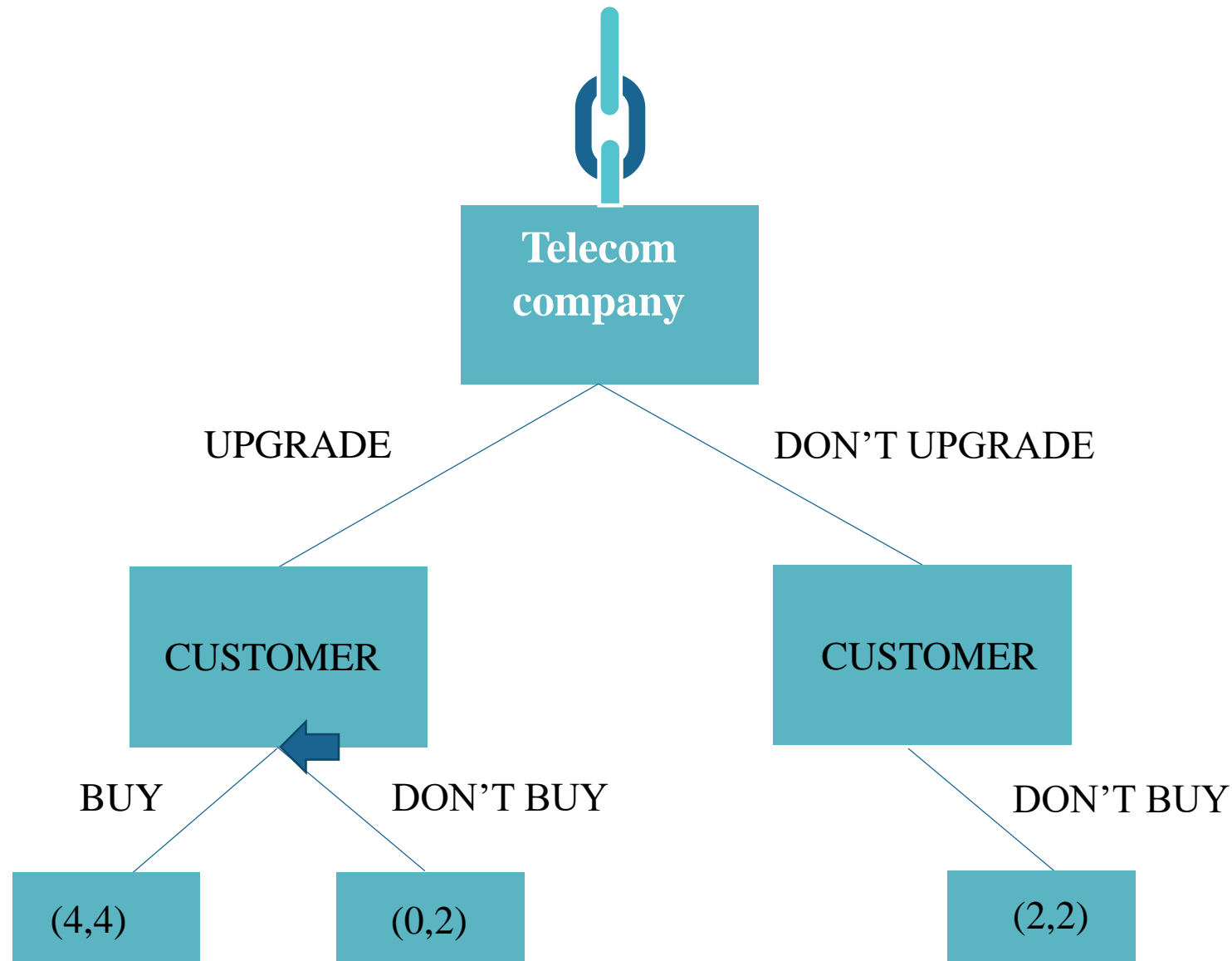
(0,2)

(6,0)

(2,2)



A credible danger is a telecom company that must first attempt to update its networks before the customer has the option of paying, indicating that (Don't upgrade, Buy) is a non credible threat. If no new services are provided, the user is unable to purchase.



- ❑ Redraw the game tree with any non-credible threats removed.
- ❑ Identify and explain where the first step of backwards induction will occur.

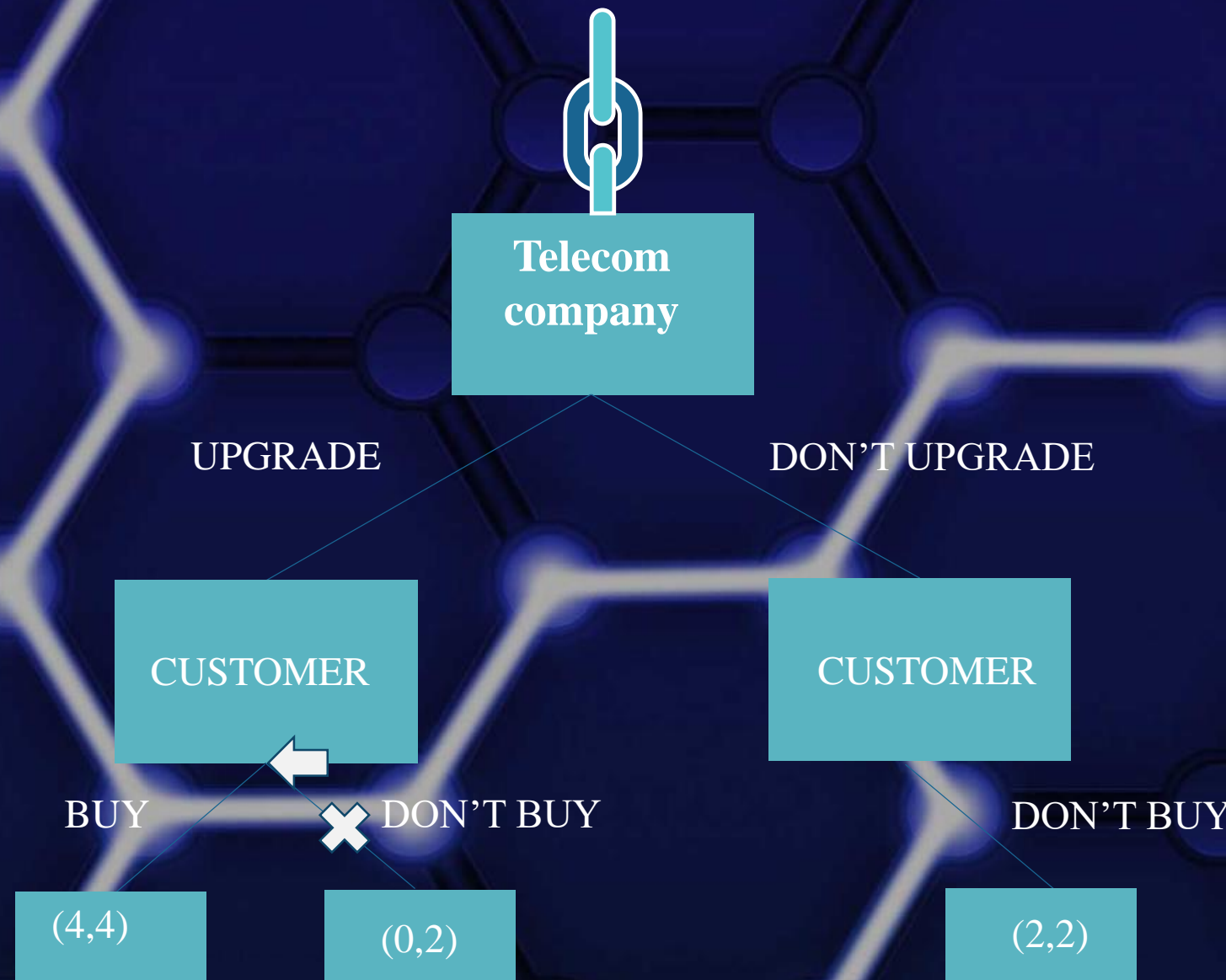
The first phase of backward induction will arise as the customer goes after the Telecom provider, so we continue by evaluating the Customer decisions, but since we eliminated the non-credible hazard, the only way the customer has a decision to analyze is when the Telecom Company decides to update.

- ❑ Using the game tree from slide 3, perform the first step of backwards induction.
- ❑ Explain your reasoning behind the step you took.

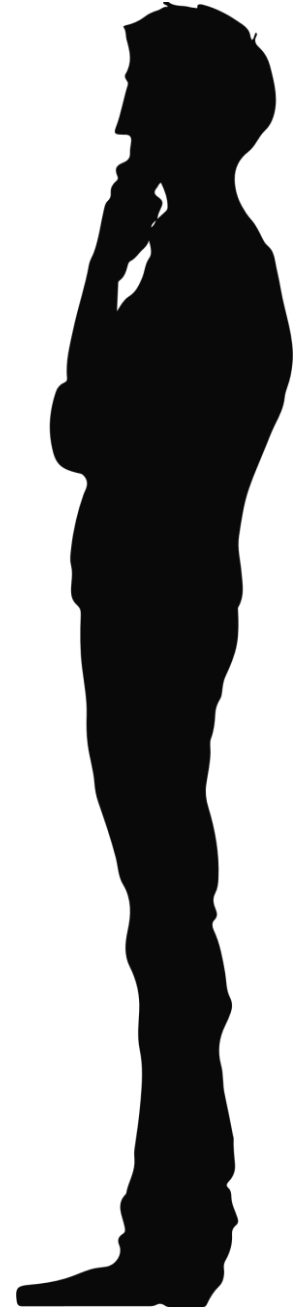
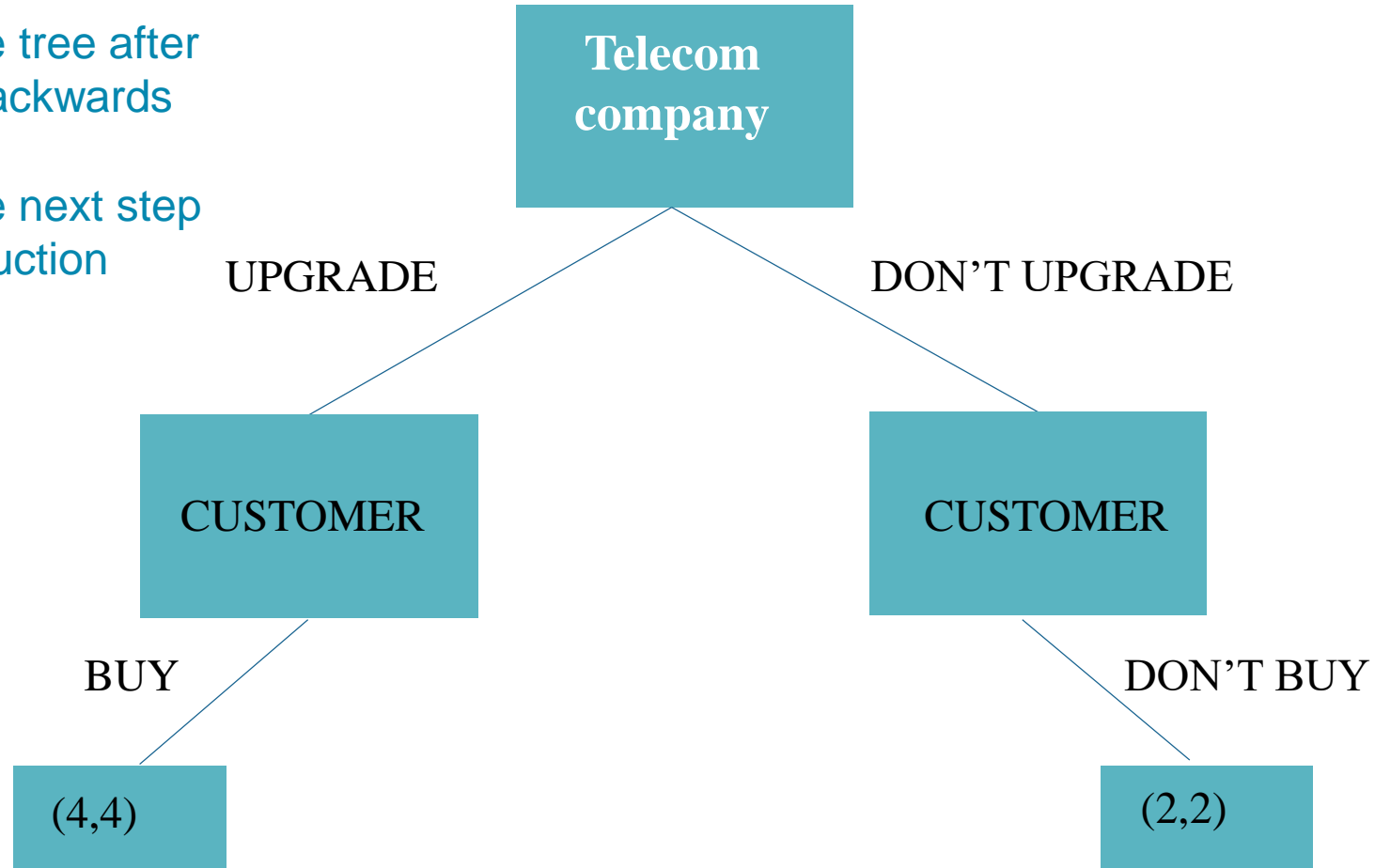
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To explain the moves, we first compared the Customer's payoffs from when the Telecom Company chooses upgrade, and discovered that the Customer's first preference will be Buy for the higher payout ( $4 > 2$ ).

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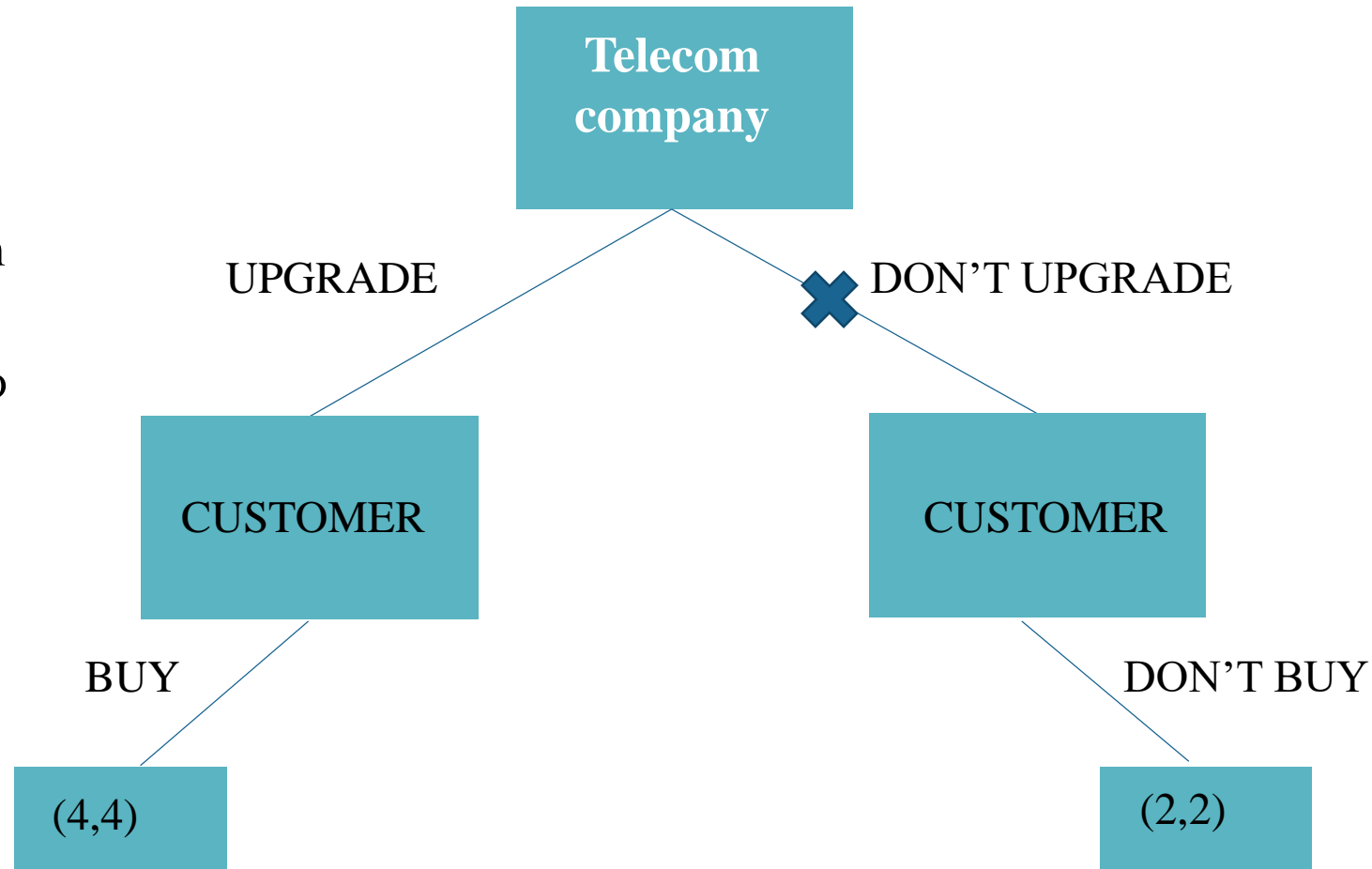
- ❑ Redraw the game tree after the first step of backwards induction.
- ❑ Identify where the next step of backwards induction occurs.



Since we know the Customer will like one of the Telecom Company's options, it's time to assess the Telecom Company's options.

- ❑ Using the game tree from slide 5, perform the next step of backwards induction.
- ❑ Explain your reasoning behind the step you took.

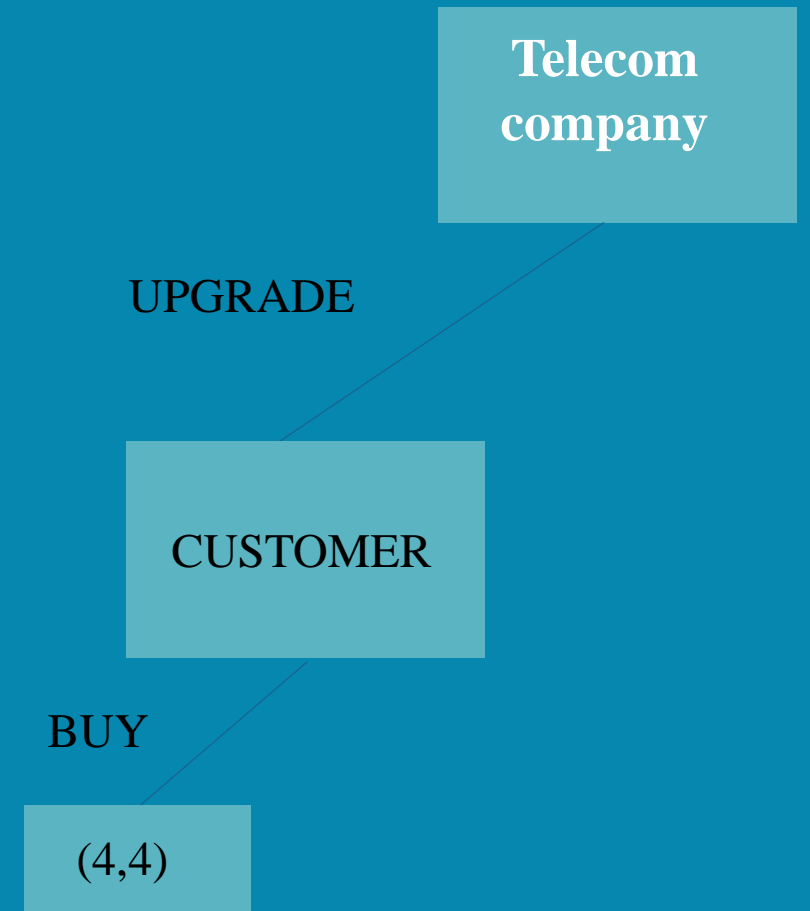
It is obvious that the Telecom Company will benefit more from upgrading ( $4 > 2$ ), so we can exclude the Don't Upgrade branch.





- ❑ Redraw the game tree after the step you took in slide 6.
- ❑ Identify the optimum strategy of the game.

**Finally, the best approach for the game is (Upgrade, Buy). That is, the telecom company can update their networks first, and only the customer will decide whether or not to use the new service.**



The background is a complex, abstract pattern of concentric circles. Each circle is composed of small, blue, three-dimensional squares that are slightly offset from each other, creating a sense of depth and movement. The squares are arranged in a way that they seem to spiral inward toward the center. The overall color palette is a range of blues, from deep navy to a lighter, almost white blue at the edges.

**THANK YOU**