Buy

\[ \text{AND} \]

\[ S_0 \quad S_0 \]

\[ \text{AND} \]

\[ A \quad B \]

\[ \text{OR} \]

\[ S_0 \quad A \]

\[ B \quad 100 \]

\[ \text{XOR} \]

\[ S_0 \quad A \]

\[ B \quad 100 \]

\[ \text{XOR} \]

\[ S_0 \quad S_0 \]

\[ A \quad B \]

Buy a bundle

Buy any number

Buy at most one

Pay same for any one
"Sell all but one."

Cost to sell A $150
B $150
AB $150

"Sell all but one."

Cost to sell A $50
B 100
AB 150

"Sell any number."

"Sell at most one."

[A constraint on the sellers to do this]
Proposal:

Add a new hard constraint to OR nodes, to use on real size and for mixed binary/integer, to say "at least M of these children must be satisfied."

\[ \text{OR} \]
\[ \begin{array}{c}
A \\
\quad \rightarrow \\
B
\end{array} \]

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Buy/Sell

Buy A Sell B $50.

\[ v(x) = \infty \]
\[ v(A) \leq 50 \]
\[ v(B) \leq 50 \]
\[ v(AB) \leq 50 \]

"Swap"

Buy AB Sell CD

Either have CD value unchanged
or have AB value $100
Sell CD, or not.

Buy A or Sell B

Buy A xor Sell B $50 $100

"de-coupled"

\[ v(A) = 50 \]
\[ v(CAB) = 100 \]
\[ v(B) = 100 \]
\[ v(D) = ? \]

⇒ Sell B $100 xor
Swap (A, B) for $50
Buy A xor Sell B
$100 $20

\[ V(\emptyset) = \emptyset \]
\[ V(A) = \emptyset \]
\[ V(B) = 20 \]
\[ V(AB) = 120 \]

\[ \text{AND} \]$100

\[ \text{VALUE B ALONE} \]

Buy AB xor Sell CD
$100 $20

\[ \text{AND} \]

\[ \text{AND} 20 \]

Buy AB Sell CD xor Buy EF Sell GH