Let, degree of $p^x(\cdot), p^y(\cdot) < s$ where $p^x(\cdot)$ and $p^y(\cdot)$ are encodings of x and y respectively, where $x = (x_1, \ldots, x_l)$ and $y = (y_1, \ldots, y_l)$.
Let, $S = \{\eta_1, \ldots, \eta_{2s}\}$. Consider $3l < s$ and $t < \frac{N}{3}$. $S_1, \ldots, S_N$ is a partition of S.
For the privacy, $t.|S_i| < s - l$, to choose a partition such that S_i such that $|S_i| < \frac{2s}{N}$.
Let P_i is the i^{th} prover contains a share of $p^x(\cdot)$ and $p^y(\cdot)$, say $p^{x_i}(\cdot)$ and $p^{y_i}(\cdot)$. The provers do the following protocol to get the share of the polynomial $p^{xy}(\cdot) = p^x(\cdot).p^y(\cdot)$:

- P_i evaluates $p^{x_i}(\eta)$ and $p^{y_i}(\eta)$ and sends this to P_j if $\eta \in S_j$
- P_j computes $\sum_{i\in[N]} p^{x_i}(\eta) = p^x(\eta)$ and $\sum_{i\in[N]} p^{y_i}(\eta) = p^y(\eta)$ $\forall \eta \in S_j$
- P_j computes $p^x(\eta).p^y(\eta) = p^{xy}(\eta)$ $\forall \eta \in S_j$
- P_j construct shares $p^{xy}(\eta)_1, \ldots, p^{xy}(\eta)_N$ such that $p^{xy}(\eta) = \sum_{i\in[N]} p^{xy}(\eta)_i$ and sends $p^{xy}(\eta)_i$ to P_i.

Privacy: If t corrupted provers come together they can get the evaluation of p^{x_i} on $t \times \frac{2s}{N} < \frac{N}{3} \times \frac{2s}{N} = \frac{2s}{3} < \frac{3s-3l}{3} = s - l$