**Title:** Synthesising Full-Information Protocols

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**Abstract:**

We study a communication model based on full-information protocols: whenever a set of processes interacts, each participant reveals its entire current local state (i.e., all information accumulated so far). Communication is controlled by an adversarial, indeterminate environment that decides when a communication event occurs and which processes participate. Consequently, a single interaction may transmit an unbounded amount of information, and the epistemic "information trees" that describe a process's knowledge can have unbounded branching.

We model synchronous distributed systems under this model as infinite games with imperfect information played on finite graphs, where the environment captures scheduling and the processes implement local strategies. Focusing on the synthesis problem in which all other processes are fixed, we consider the task of constructing a process that satisfies an ω-regular specification. The key technical contribution is a finite-state reduction of the unbounded information structure: we build an information-commuting morphism that maps the infinite information tree into a finite graph while preserving the observations and strategic choices relevant to the objective. Rather than relying on intrinsic observational limits, the morphism posits a control-equivalence on information states and quotients the information tree accordingly, yielding a finite graph on which standard ω-regular game-solving techniques apply. This yields a decision procedure for synthesis in the full-information, environment-scheduled model. We also show that the resulting procedure has non-elementary worst-case complexity in the size of the instance, and we establish a matching non-elementary lower bound for the synthesis problem.