

# Decidable Topologies for Communicating Systems

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Communication protocols are often modelled as systems of finite state machines communicating over unbounded FIFO channels. Verification problems are undecidable for communicating finite state machines (CFSMs): a Turing machine can be simulated by a single process that sends to and receives from the same channel. Several restrictions of CFSMs have been proposed that have decidable reachability. One particular approach is to restrict the communication topology.

- For general CFSMs, reachability is decidable if and only if the communication topology is an undirected forest [3]. It is even the case when (restricted) synchronization is allowed [1].
- A characterization of decidable topologies is also known when perfect and unreliable channels are mixed [2], and when FIFO and multiset channels are mixed [4].

The goal is to understand the characterizations given in [2, 4]. The characterization in [2] is given as an algorithm that tries to reduce a given topology into basic decidable topologies, and that succeeds if and only if the given topology is decidable. A second objective is to investigate if a declarative characterization of decidable topologies can be derived from the algorithm.

## References

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