(from MPI documentation: [MPI: A Message-Passing Interface Standard](https://www.mpi-forum.org/docs/mpi-3.1/mpi31-report.pdf#60))

3.4 Communication Modes

Message bu ering decouples the send and receive operations. A blocking send can complete as soon as the message was buffered, even if no matching receive has been executed by the receiver. On the other hand, message buffering can be expensive, as it entails additional memory-to-memory copying, and it requires the allocation of memory for bu ering. MPI o ers the choice of several communication modes that allow one to control the choice of the communication protocol. The send call described in Section 3.2.1 uses the standard communication mode. In this mode, it is up to MPI to decide whether outgoing messages will be buffered. MPI may buffer outgoing messages. In such a case, the send call may complete before a matching receive is invoked. On the other hand, buffer space may be unavailable, or MPI may choose not to buffer outgoing messages, for performance reasons. In this case, the send call will not complete until a matching receive has been posted, and the data has been moved to the receiver.

*Rationale.* The reluctance of MPI to mandate whether standard sends are buffering or not stems from the desire to achieve portable programs. Since any system will run out of buffer resources as message sizes are increased, and some implementations may want to provide little buffering, MPI takes the position that correct (and therefore, portable) programs do not rely on system buffering in standard mode. Buffering may improve the performance of a correct program, but it doesn’t affect the result of the program. If the user wishes to guarantee a certain amount of buffering, the user provided buffer system of Section 3.6 should be used, along with the buffered-mode send. (*End of rationale*).