All-To-All All processes contribute to the result. All processes receive the result.

- MPI_ALLGATHER, MPI_ALLGATHERV
- MPI_ALLTOALL, MPI_ALLTOALLV, MPI_ALLTOALLW
- MPI_ALLREDUCE, MPI_REDUCE_SCATTER
- MPI_BARRIER

All-To-One All processes contribute to the result. One process receives the result.

- MPI_GATHER, MPI_GATHERV
- MPI_REDUCE

One-To-All One process contributes to the result. All processes receive the result.

- MPI_BCAST
- MPI_SCATTER, MPI_SCATTERV

Other Collective operations that do not fit into one of the above categories.

- MPI_SCAN, MPI_EXSCAN

The data movement patterns of MPI_SCAN and MPI_EXSCAN do not fit this taxonomy.

The application of collective communication to intercommunicators is best described in terms of two groups. For example, an all-to-all MPI_ALLGATHER operation can be described as collecting data from all members of one group with the result appearing in all members of the other group (see Figure 5.2). As another example, a one-to-all MPI_BCAST operation sends data from one member of one group to all members of the other group. Collective computation operations such as MPI_REDUCE_SCATTER have a similar interpretation (see Figure 5.3). For intracommunicators, these two groups are the same. For intercommunicators, these two groups are distinct. For the all-to-all operations, each such operation is described in two phases, so that it has a symmetric, full-duplex behavior.

The following collective operations also apply to intercommunicators:

- MPI_BARRIER,
- MPI_BCAST,
- MPI_GATHER, MPI_GATHERV,
- MPI_SCATTER, MPI_SCATTERV,
- MPI_ALLGATHER, MPI_ALLGATHERV,
- MPI_ALLTOALL, MPI_ALLTOALLV, MPI_ALLTOALLW,
- MPI_ALLREDUCE, MPI_REDUCE,
- MPI_REDUCE_SCATTER.

In C++, the bindings for these functions are in the `MPI::Comm` class. However, since the collective operations do not make sense on a C++ `MPI::Comm` (as it is neither an intercommunicator nor an intracommunicator), the functions are all pure virtual.