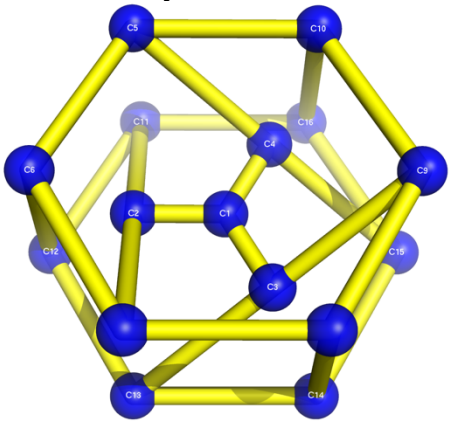
Problem 1.2

In the following 3D graph, the 16 blue balls are considered as identical vertices and the lines are considered as bi-directional edges. Now, you need to broadcast N floating-point numbers from the central vertex (C1) to the entire system of 16 vertices including the source.



Please complete the following:

(1) Design algorithm(s) to quickly complete the broadcast of $N = 10^6$;
(2) Implement your algorithm(s), collect timing results, on a supercomputer by imitating the above given network topology with the basic non-collective light-weight basic single-sided MPI functions: MPI_Graph_create(), MPI_Isend(), MPI_Irecv() and a few other supporting functions.
(3) Call the MPI-provided MPI_Bcast() to carry out the broadcast and collect timing results.
(4) Repeat the above two steps for $N = 10^7$ and $N = 10^8$;
(5) Construct a table as follows and make comments:

N	My_BCast() Time (T1)	MPI_Bcast() Time (T2)	T1/T2
10^6			
10^7			
10^8			