PROBLEM OF THE WEEK #2
(Spring 2024)

In a certain network of sensors, each sensor station includes a screen meant to display the readings that are being observed at all stations. But the data on the display will go out of date if the sensors don't communicate.

Each station can connect to one other station at a time; it takes $1\,\mu$s for a pair of stations to connect, exchange all the information they currently have, then disconnect.

If the network has 4 stations $\{A, B, C, D\}$, then a complete network update takes $2\,\mu$s. For example, in the first microsecond, A and B can share their current observations while C and D do the same; then in the next microsecond, A can send C the previous microsecond's readings from A and B and receive the readings from C and D, while B and D make a similar exchange.

It might be a surprise that if the network has only 3 stations $\{A, B, C\}$, then a complete network update will take at least $3\,\mu$s. [Suppose A and B share information in microsecond 1; C has no partner with which to communicate at the same time, and can't send its reading to both A and B in microsecond 2.]

If the network has 10 stations, how quickly can a complete network update be performed?

[Please fully explain your answer.]

Email solutions to `kwonmi@uwplatt.edu` by 2:00pm on Wednesday, February 7, 2024.

Every week, the best solution submitted earns a \$10 Platteville gift certificate; the top scorer each semester also wins a cash award. Good luck!

You can always see the Problem of the Week (and complete rules) online at: