Implementing Mother and Baby Ducks in HYPACK® for Autonomous Vehicles

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Many HYPACK® users who possess autonomous vehicles may be excited to try out a new driver combination that allows you to simultaneously track more than one vehicle. By using the Matrix Send and Receive drivers, multiple vehicles share matrix updates and HYPACK® displays the combined image in real time. The setup is comprised of one manned vessel and one or more autonomous vehicles, which we call the mother duck and baby duck(s). From each autonomous vehicle, the matrix is sent using the Matrix Send driver (MTeXsend.dll), which shares the information via network so there are no configuration parameters or communication settings to worry about. On the receiving vessel, the Matrix Receive driver (MTeXreceive.dll) is used to collect all of the sender's data and it adds it to the local copy of the matrix.

Here is an example of how to set up HYPACK Combined Hardware to implement the Mother Duck/Baby Duck(s) in your project so you can try it out yourself.

Starting with the Mother Duck's (manned vessel) configuration shown in Figure 1, there is the main vessel and then separate mobiles for each baby duck. The mother duck has its own position, motion, and sonar devices added to it, and the baby ducks receive matrix and position info over network connection from the Matrix Receive driver and Position Input driver.

Figure 1: Mother Duck Hardware
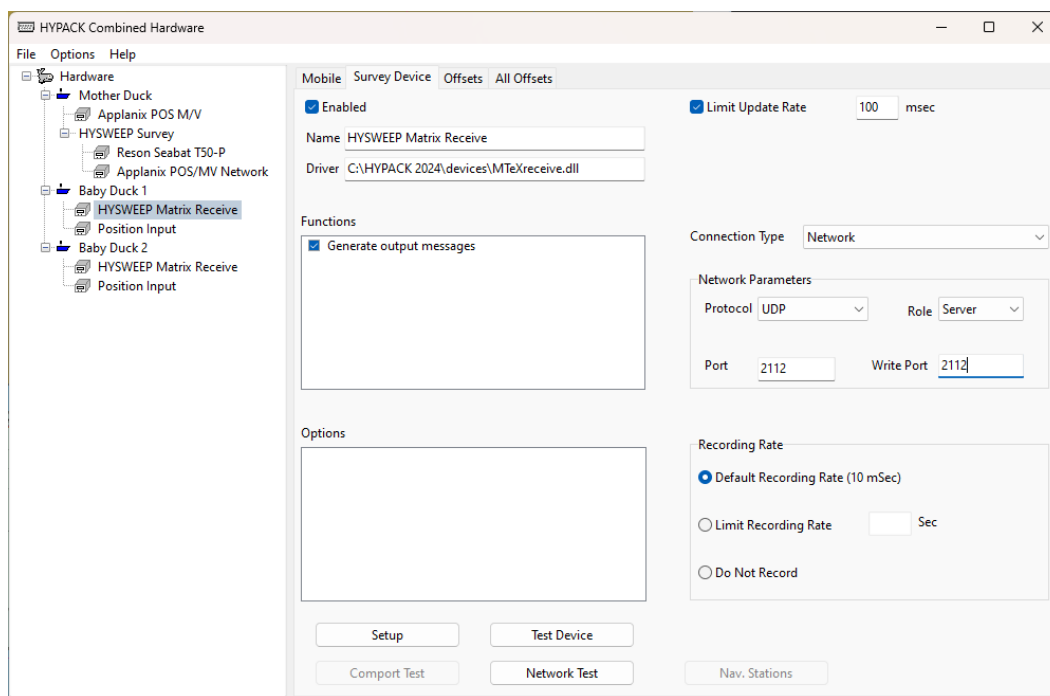
For the hardware of the Baby Ducks, also give them their own position, motion, and sonar devices. The Matrix Send Driver will send the matrix info and NMEA Output will report the position to the mother duck. Finally, depending on your autonomous vehicle, add the corresponding navigation driver. In this case MAVLINK was used.

Figure 2: Baby Duck Hardware Setup
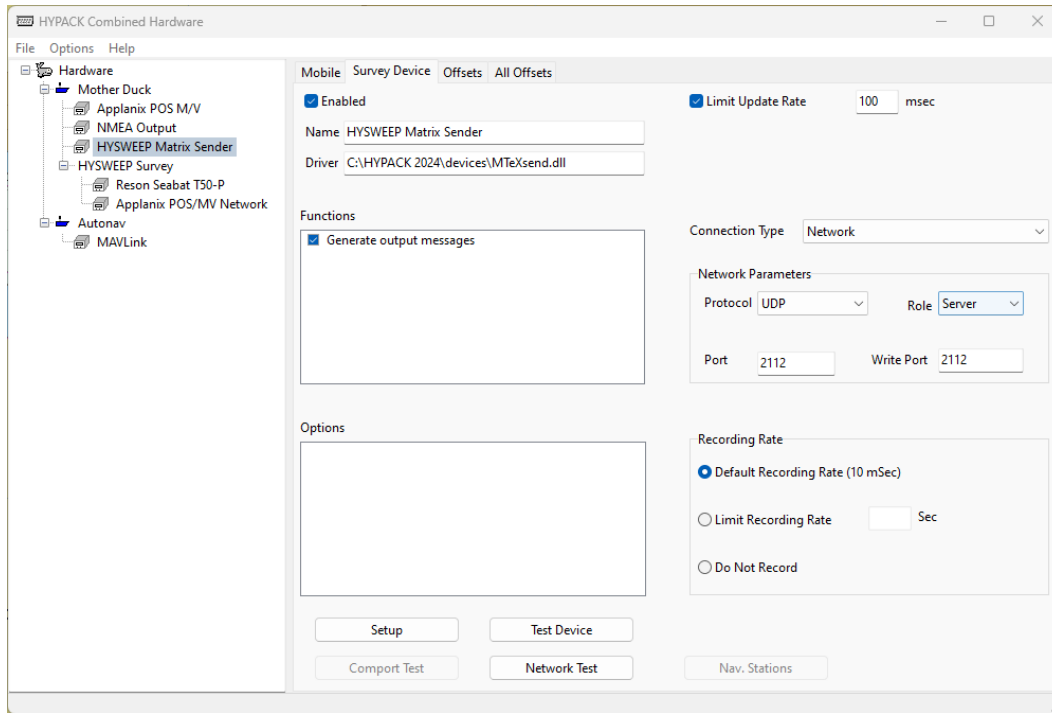
Once you start surveying, the send and receive drivers will display messages with the information being shared, and the send driver will give you the option to only send while logging data if you prefer.

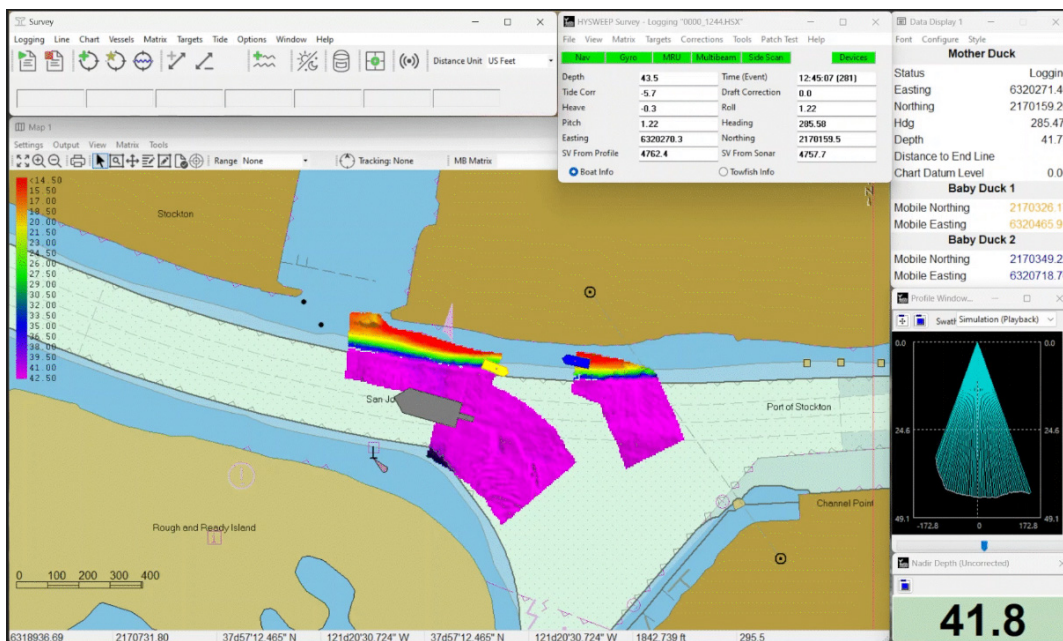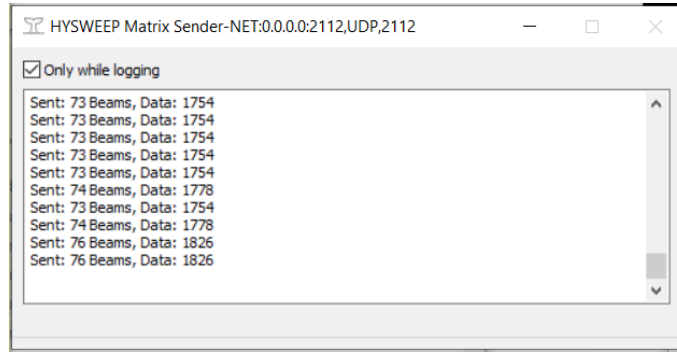*Figure 3: Mother Duck's Survey with Matrix Including Two Baby Ducks*

There are many benefits of implementing the setup and the drivers. With more survey vessels driving at the same time, a greater area can be covered in a shorter amount of time. Surveys completed more quickly also cost less, and swapping in autonomous vehicles lowers the number of crew necessary on site. Additionally, having the visual display of the real time coverage of all the vehicles at once ensures no unexpected gaps are left in the data only to be found at the end, requiring the boats to go back out and the survey to be less efficient than it could be.