

Synchronized Sampling on Startup



Overview

There are any number of situations where deployment of MicroStrain's LXRS™ wireless sensor nodes can be facilitated by utilizing the nodes' **Synchronized Sampling on Startup** function. The typical deployment approach is to install the nodes in situ, turn the nodes on, configure the nodes one by one after installation, and begin data collection by manually starting synchronized sampling. However, it may make more sense to configure all the nodes in the lab, mount (and turn on) the nodes in situ, and begin data collection automatically. The latter approach can be valuable in cases where mounting is precarious, such as a bridge superstructure, or where communications may be spotty or interrupted from time to time, such as in a rain forest.

Synchronized Sampling on Startup Explained

MicroStrain® LXRS™ Wireless Sensor Networks use a TDMA-based beaconing protocol to synchronize precision timekeepers embedded within each wireless sensor node in the network. The beacon emanates from the WSDA®-Base or WSDA®-1000 Wireless Sensor Data Aggregator at 1 Hz.

When a node is configured to normal synchronized sampling, *upon command by Node Commander® software*, it listens for a beacon. If a beacon is found, it immediately begins synchronized sampling, sending time-stamped data packets to either the WSDA®-Base and into Node Commander® for display and file writing, or the WSDA®-1000 for transmission on to SensorCloud™. If a beacon is NOT found (after ~10 seconds), the node goes into a low power mode and wakes up every 2 minutes to listen for a beacon. If the beacon is heard, it begins synchronized sampling.

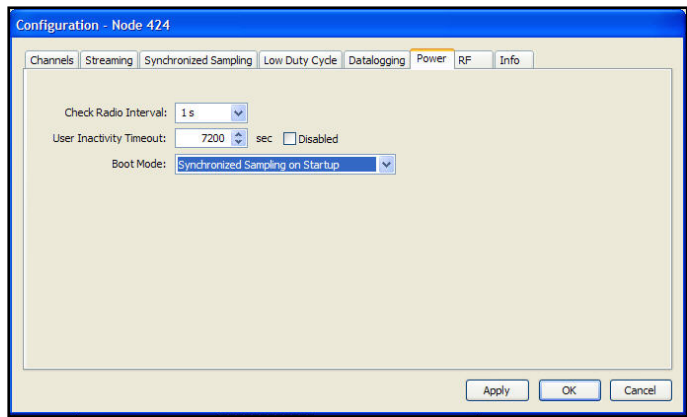
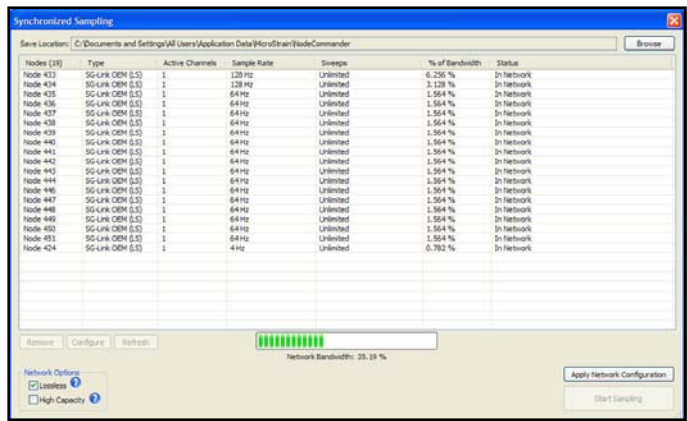
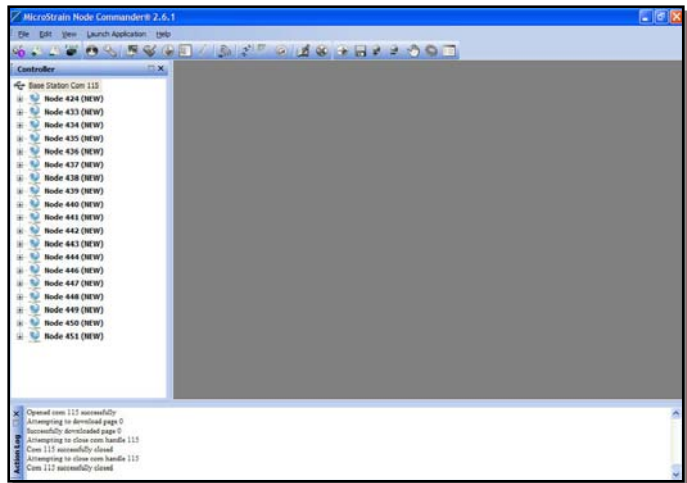
Likewise, when a node is configured to Synchronized Sampling on Startup, *upon power-up*, it listens for a beacon. If a beacon is found, it immediately begins synchronized sampling, sending time-stamped data packets to either the WSDA®-Base and into Node Commander® for display and file writing, or the WSDA®-1000 for transmission on to SensorCloud™. If a beacon is NOT found, the node goes to low power mode as stated above.

Configure Nodes in Lab

If you are using a WSDA®-Base, prepare for Synchronized Sampling on Startup as follows:

- Using Node Commander® software, establish communication between the nodes and base station. In our example screen we see nodes 424 through 451.
- **Note:** Synchronized Sampling requires that all nodes and the base station are on the same radio frequency.
- Click node 424 to highlight it.
- Press and hold the Shift key.
- Click node 451 and all the nodes are now highlighted.
- Release the Shift key.
- Right-click any of the highlighted nodes and a pop-up menu appears.

- Click Sample.
- Click Synchronized Sampling.
- The Synchronized Sampling window will appear and each node will be queried to determine its configuration, the bandwidth it will consume in the network, its TDMA slots and so forth, in preparation for a Synchronized Sampling session.
- **Note:** If we were to proceed with a Synchronized Sampling session at this point, we would click the Apply Network Configuration button and proceed as normal. However, we are using this screen to quickly configure each node for Synchronized Sampling on Startup.
- Double click node 424 and its Configuration window will appear.
- Click the Power tab.
- Click the Boot Mode drop-down and select Synchronized Sampling on Startup.
- Click OK and the Configuration window will disappear.
- Double-click 433 and do the same.
- Double-click each of the rest of the nodes in your network and do the same.
- When complete, click the Apply Network Configuration button and your nodes are now ready to go to the field for deployment.
- Click the red X in the upper right-hand corner to close the Synchronized Sampling window and exit Node Commander®.
- Now simply turn the nodes off and transport them to the installation site.



If you are using a WSDA®-1000 Wireless Sensor Data Aggregator, prepare for Synchronized Sampling on Startup as follows:

- Launch Live Connect and wait for the display to be populated.
- Select the appropriate WSDA®-1000 address, click the View button to open the portal and the WSDA® Control Panel Login window appears.
- Log in and the Control Panel menu appears.

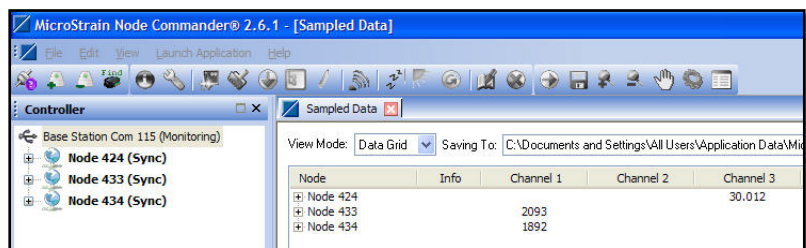
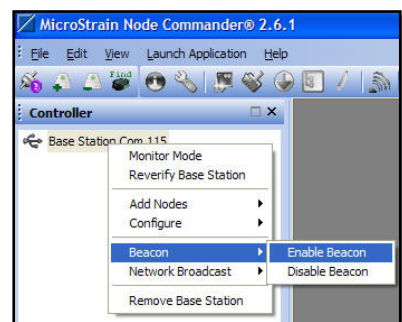
- Click Configuration.
- Select the Live Connect radio button as the WSDA Mode.
- Click the Set button.
- Return to Live Connect and click the Refresh button to update the display; the WSDA[®] status will now display as 'Disconnected'.
- Select the WSDA[®], click the Connect button and the WSDA[®] status will change to 'Established COMx' (where x is a comm port number).
- Launch Node Commander[®] software (remember to set the Extended Timeouts under Edit>Preferences) and the WSDA[®] will display as Base Station Com x.
- Now proceed with preparing your nodes for Synchronized Sampling on Startup as described above.
- When completed, 1) close Node Commander[®] and 2) close Live Connect.
- Return to the WSDA[®] Control Panel.
- Set the WSDA Mode back to Aggregate Data Mode.
- Insure that the Aggregate Data Beacon is ON.
- Insure that the Aggregate Data Channel is set to the same channel (frequency) as the nodes.
- Click the Set button.
- Close the WSDA[®] Control Panel.
- Now simply turn the nodes off and transport them to the installation site.

Install Nodes In Situ and Begin Data Collection Automatically

As indicated above, Synchronized Sampling on Startup works with MicroStrain's WSDA[®]-Base as well as its WSDA[®]-1000 Wireless Sensor Data Aggregator (and SensorCloud[™]).

If you are using a WSDA[®]-Base, prepare for Synchronized Sampling on Startup as follows:

- Install your base station and host computer.
- Using Node Commander[®] software, establish communication with the base station. In our example screen we see Base Station Com 115.
- Right-click on Base Station 115 and a popup menu will appear.
- Click Beacon.
- Click Enable Beacon and the base station will begin sending its synchronizing beacon every 1 second.
- Again, right-click on Base Station 115 and a popup menu will appear.
- Click Monitor Mode and the Sample Data tab will appear.
- Now begin installing your nodes. As you install each node, simply turn it on.
- Momentarily that node will appear in the Sample Data tab indicating data collection has begun.
- Install the next node, turn it on and data collection will begin.



- Complete installation of the rest of your nodes and your network will be fully functional!

If you are using a WSDA[®]-1000 Wireless Sensor Data Aggregator, prepare for Synchronized Sampling on Startup as follows:

- Install your WSDA[®]-1000 and turn it on as normal. Because it was pre-configured, it will begin beaconing and listening for data packets.
- Begin installing your nodes. As you install each node, simply turn it on. Each node will begin transmitting data packets which will be captured by the WSDA[®]-1000 and sent on to SensorCloud[™].
- Complete installation of the rest of your nodes and your network will be fully functional!

Adding nodes to the Network

If you have started up a network using this Synchronized Sampling on Startup method, and you want to add an additional node or nodes, you must stop all the nodes in the network and run through the setup process again. This is required because a new TDMA time slot structure needs to be programmed by Node Commander[®].

Support

MicroStrain support engineers are always available to expand on this subject and support you in any way we can.

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