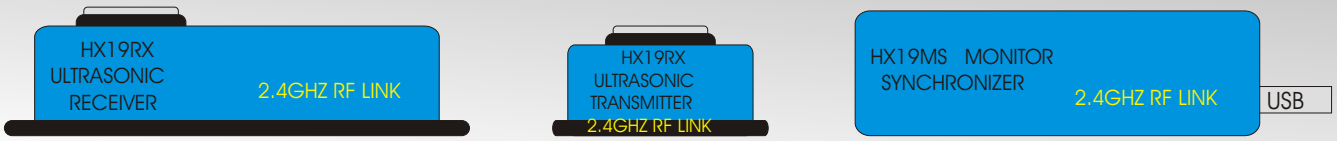
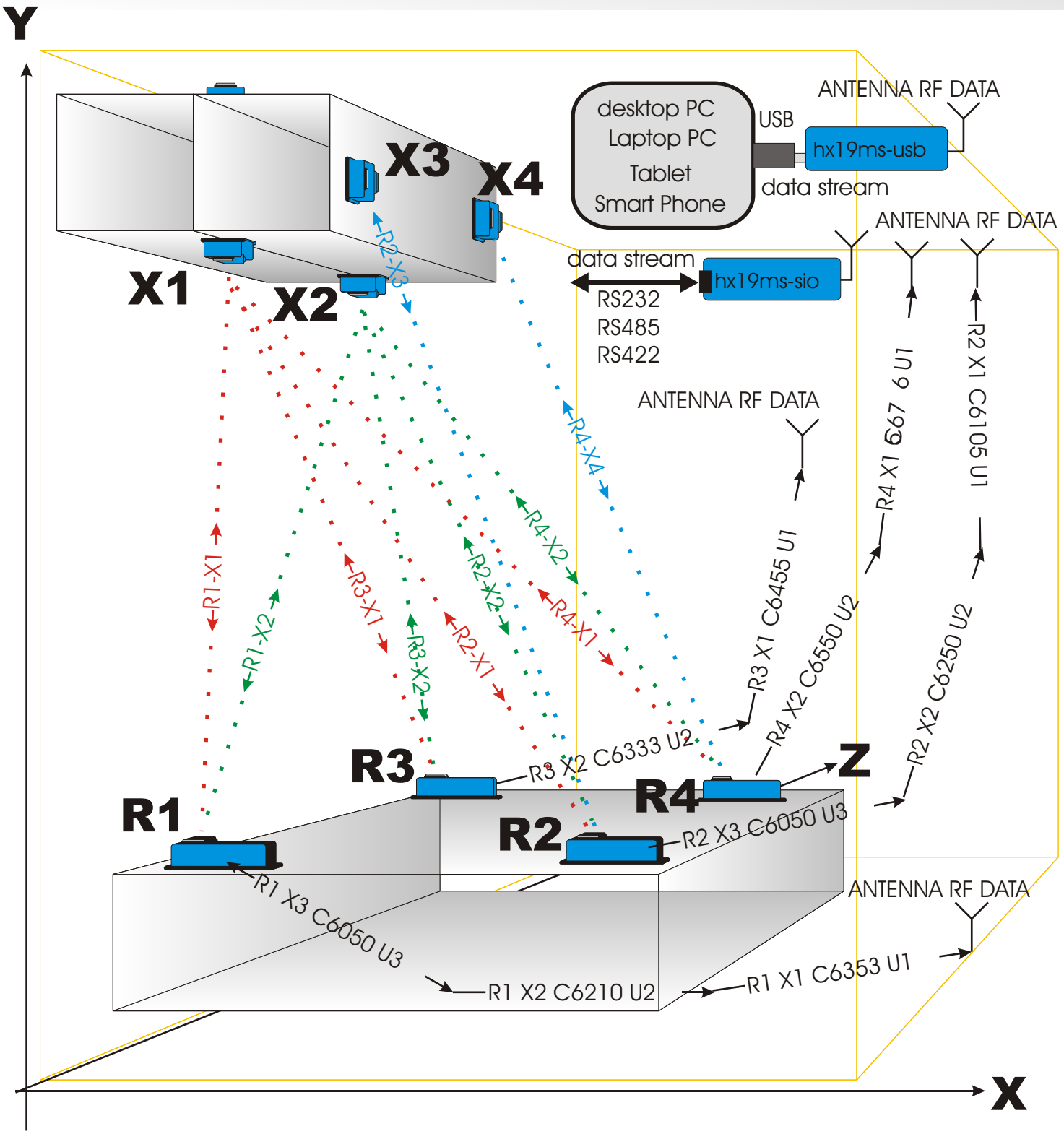
THE THREE BASIC COMPONENTS OF THE HX19 POSITIONING SYSTEM



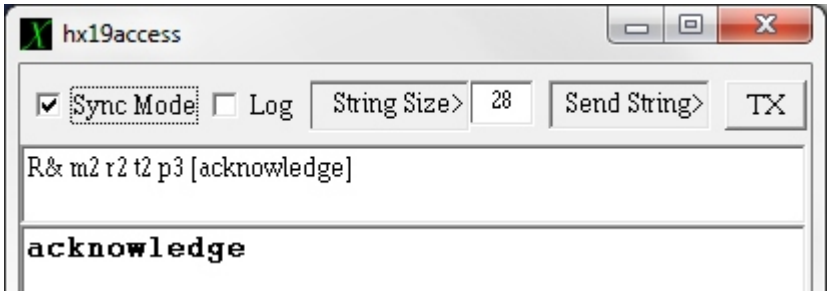


Previous image depicts one possible application for the hx19; once set up; select the hx19 access "Sync Mode" option, and distance data should be streaming at rates up to 16s/s through the USB port. Default factory settings should suffice for this application, no need to study the following. For educational purposes, reviewing the following can be helpful.

Use the access program. Given that the synchronizer is labeled 1 or M1, type the command **M1& m0 r2 t2 p3,** and click the TX button to send the command from the PC to the synchronizer. This command sequence puts the synchronizer into mode 0. In this mode it broadcasts all, except that which is addressed to it specifically. It receives RF on channel 2 (r2) and transmits RF on channel 2(t2) at maximum power(p3).

After the "M1& m0 r2 t2 p3" command is sent from the PC to the "M1" synchronizer; the synchronizer will acknowledge receipt, by sending back "M1#"; which should appear in the hx19access text window.
Commands not addressed to "M1" are RF broadcasted upon receipt, and not acknowledged.

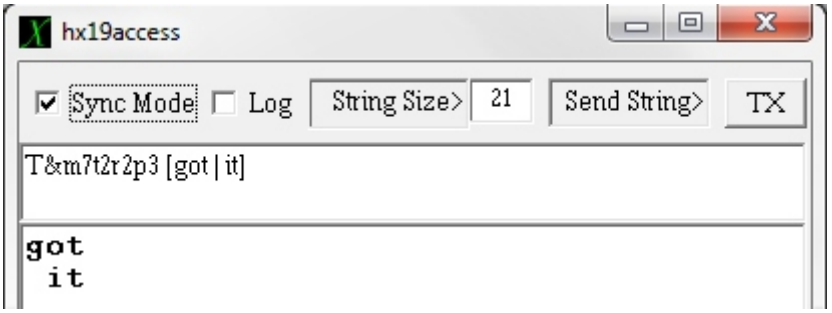
In case the receivers and/or the transmitters, are running battery mode, the devices are likely asleep. To awaken the devices select hx19access **Sync Mode** and wait. It can take up to 60 seconds for the tags (transmitters), and receivers to wake up from deep sleep. Given that the LED indicator on the devices have not been disabled; the LED on the transmitter and the receiver, should flash in harmony with the sync, by default 16 flashes per second. Once a device LED is flashing, the device can be configured. If receivers are not in battery mode, they can be configured with or without the flashing **Sync Mode**.



Click TX, to RF broadcast R& m2 r2 t2 p3 [acknowledge], to all receivers. Once the commands are received and executed, receivers in range will nearly simultaneously broadcast "acknowledge". This is most unfortunate, since it can result in data collision and thus, scramble the acknowledge received by the synchronizer.

To avoid data collision, the receivers can be set to transmit on different frequencies. Or they can be set privately one by one, which of course requires more work. Another option is to send R&m2r2t2p3, which is executed by all receivers but not acknowledged at all.

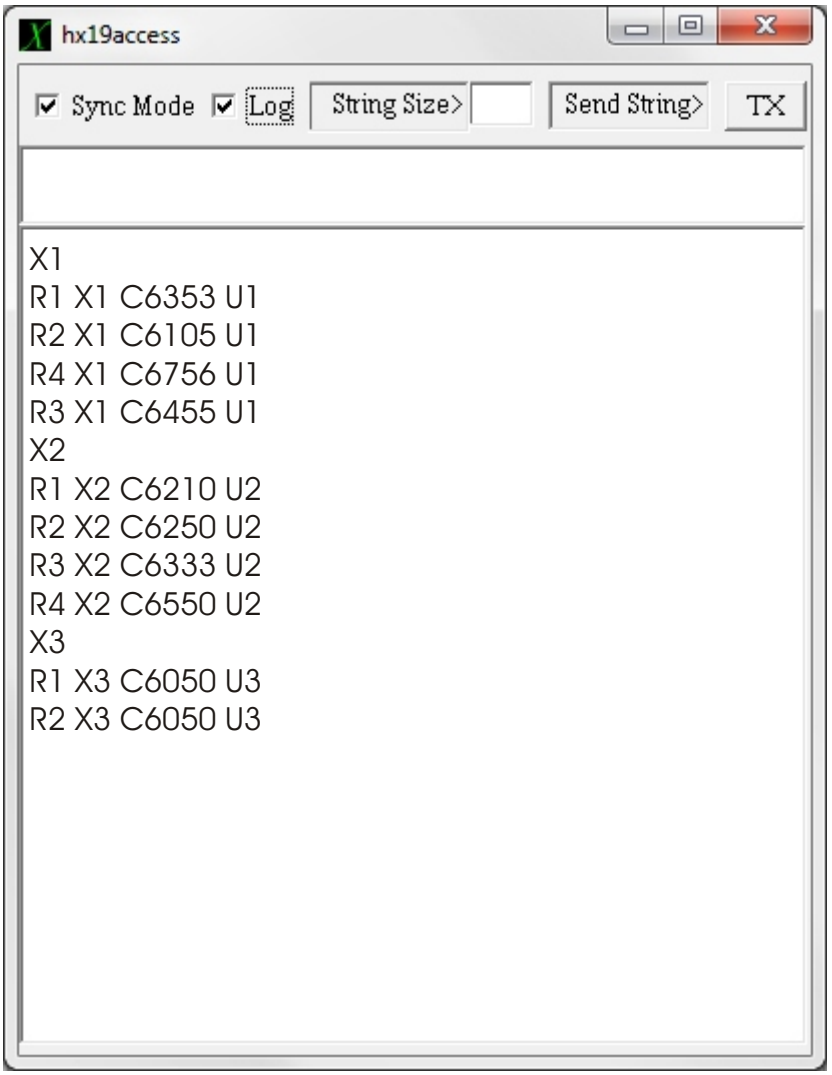
Once the transmitter has been awakened, and its enabled LED is flashing. Sending "T&m7t2r2p3 [got | it]" will place these; the same default settings loaded during startup, back into the work registers.



T&m6 will turn the tag's flashing LED down, and T&m7 will turn the LED back on. This for the skeptic, is further verification, that an actual transmitter communication is taking place. Since the address is general, or just "T" all transmitters in range must comply.

The | symbol in [got | it] signifies a carriage return, so the message echoed back by the transmitter will be as shown on the left.

Keep in mind that the communication is simplex, i.e. the device cannot receive while transmitting



By default all devices are tuned to the same receive and transmit RF channel, or channel 2. Therefore all airborne RF transmissions are reported on channel 2 by the hx19ms. But the devices can be set to a different channel by the user. In this case the arrangement displayed below can be different. If the receiver is instructed to transmit on channel 3, with the command "R&t3". Then only "X1" transmission from tag would exist on channel 2 and be displayed below.

X1	"transmitted by tag 1"
R1 X1 C6353 U1	"transmitted by receiver 1"
R2 X1 C6105 U1	"transmitted by receiver 2"
R4 X1 C6756 U1	"transmitted by receiver 4"
R3 X1 C6455 U1	"transmitted by receiver 3"

The leading X1 in the first line, is coming directly from the hx19t series # 1. It is picked up by the hx19ms and displayed. This X1 is also picked up by the receiver hx19r series. At the arrival of X1 the receiver clears its timer, and starts counting. the count is stopped when the USID U1 arrives. The timing; is converted to millimeters, based on speed of sound at room temperature.

Streaming data allows 3D-time computation for objects relative to each. For a simple 3D position, 3 to 1 receivers to tags or vice versa. More are needed for both position and orientation.