## Time Multiplexing

To avoid overruns, two tags sharing a receiver, should not to emit USID simultaneously. They can emit a RFID simultaneously if tuned to emit on different channels. The red arrow and green arrow signals below, may overrun if fired within the same acquisition cycle. To avoid these overruns, the tags need to be time multiplexed, and fire in tandem.

Transmitters are set to fire when they detect $# broadcast; "#" must match the last digit in the transmitter (tag's) address. Last digit in case of T11, it is #=1 and for T12 #=2. The hx19ms can be instructed to broacast series of $# in tandem, at set rates, f4 (16s/s), f2 (8s/s) or f1 (4s/s). This can be done by setting the series switch "s" or "M&s#". The hx19ms will scan through 0,1,2...# where the maximum # is 9. This requirement does decrease the sampling rate, for individual points. There are cases, where such multiplexing may not be necessary. See the following group subject cases.
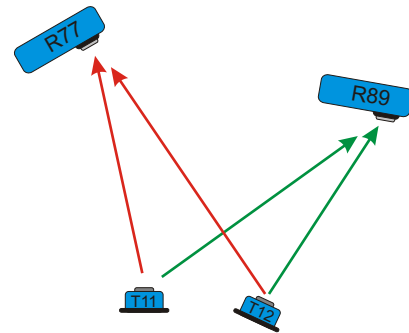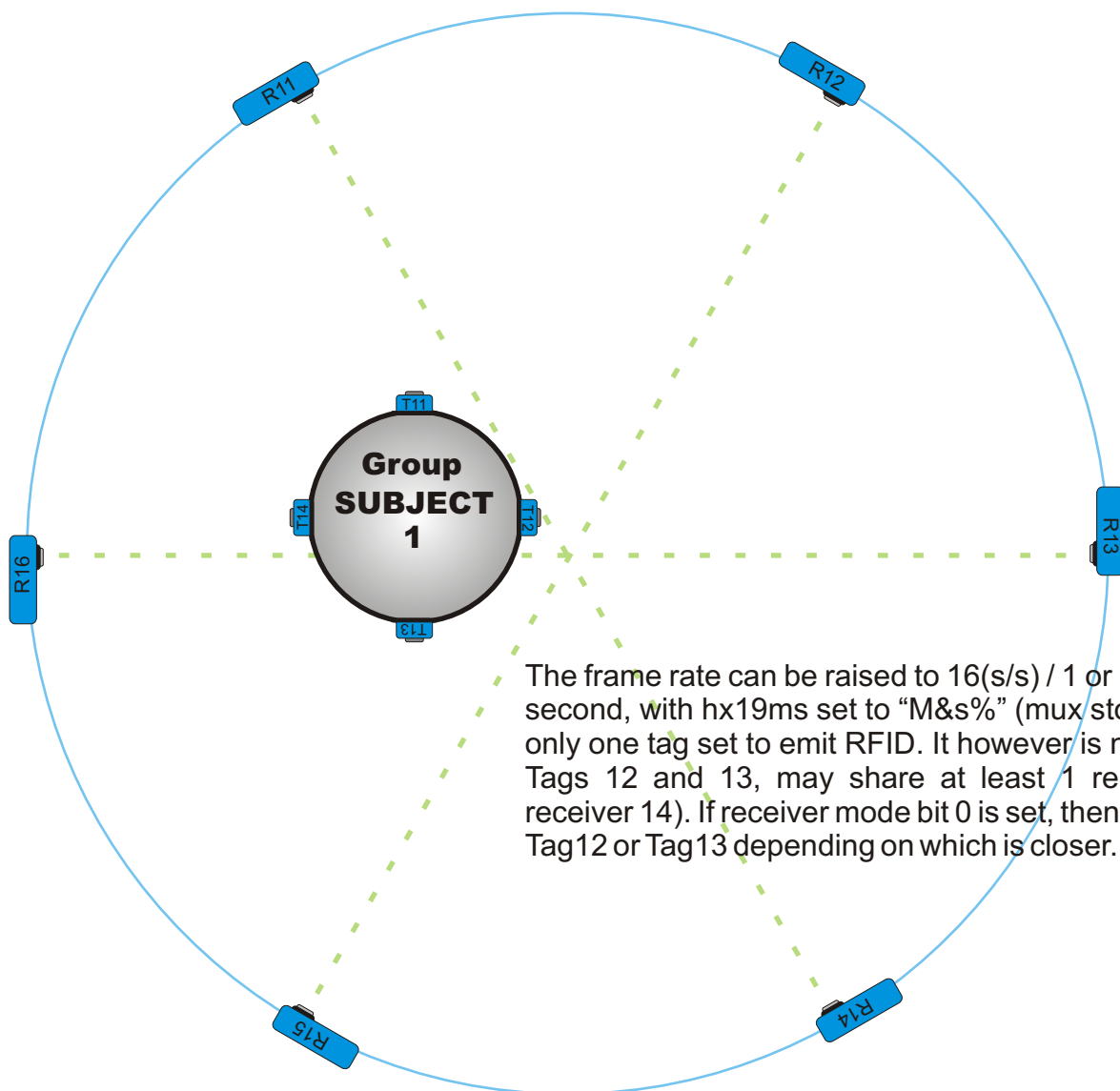
Grouping

The image on the right, shows transmitters grouped on an object. This object could for example be the mast of a boat. T11 and T13 are shown emitting in two opposing directions, and are therefore unable to share a receiver. In this case; there is no need to apply the tandem sequence to these two, they can fire simultaneously. Naturally the same applies to T12 and T14. The following pages; depict group subject surround scenarios.
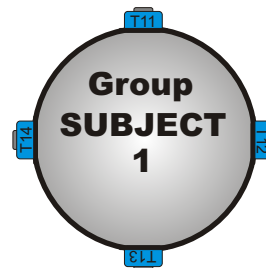
The examples below depict a 2 dimensional surround situation. Adding two more transmitters to the top and bottom, with spherical encapsulation, the whole set becomes 3 dimensional. The radius of the circle or sphere can be expanded to about around 8 meters.

Subject Grouping:

The illustration below, shows 6 receivers labeled R11 through R16, surrounding tags 11, 12, 13 and 14. In the case below, it would be easy enough to set the hx19ms to time multiplex the tags, i.e. to emit in tandem using the command "M&s4". Given that the highest speed has been selected, the maximum frame rate here, is 16 (s/s) / 4 tags or 4 frames per second. It would be utterly harmless to replace tag13, with another tag11. Ultrasonic signals leaving tag 11 and tag 13, go into opposite directions, and can never compete for the same receiver; therefore they can emit simultaneously. Replace tag 14 with another tag12, and now instead of using "M&s4", use "M&s2". This setup will reach rates to 16 (s/s) / 2 tags or 8 frames a second. Make sure only one of the tags, triggering simultaneously, (with the same least significant digits) emits RFID. Disable the RFID emission on at least one of them, with the command "T11&m3".


The frame rate can be raised to 16(s/s) / 1 or 16 frames a second, with hx19ms set to "M&s%" (mux stopped), and only one tag set to emit RFID. It however is not risk free. Tags 12 and 13, may share at least 1 receiver (e.g. receiver 14). If receiver mode bit 0 is set, then R14 will log Tag12 or Tag13 depending on which is closer.

Surrounding multiple group subjects.

The following shows two group subjects, within receiver range. In this case it is absolutely necessary to time multiplex. Hx19ms needs to be set using "M&s2". This will alternate the readings between group subject 1 and 2, at a rate of 8 frames per second; totaling 16 readings per second.

Receiver mode set at R&m7, following is likely to be displayed by hx19accsess

X11 (0 sec)
R11 X11 A#### (North tag)
R12 X11 A#### (N or E tag)
R13 X11 A#### (East tag)
R14 X11 A#### (E or S tag)
R15 X11 A#### (South tag)
R16 X11 A#### (West tag)
X12 (1/16 sec)
R11 X12 A#### Maybe empty
R12 X12 A#### Maybe NE or NW
R13 X12 A#### NE tag
R14 X12 A#### SE tag
R15 X12 A#### SW tag
R16 X12 A#### Maybe empty
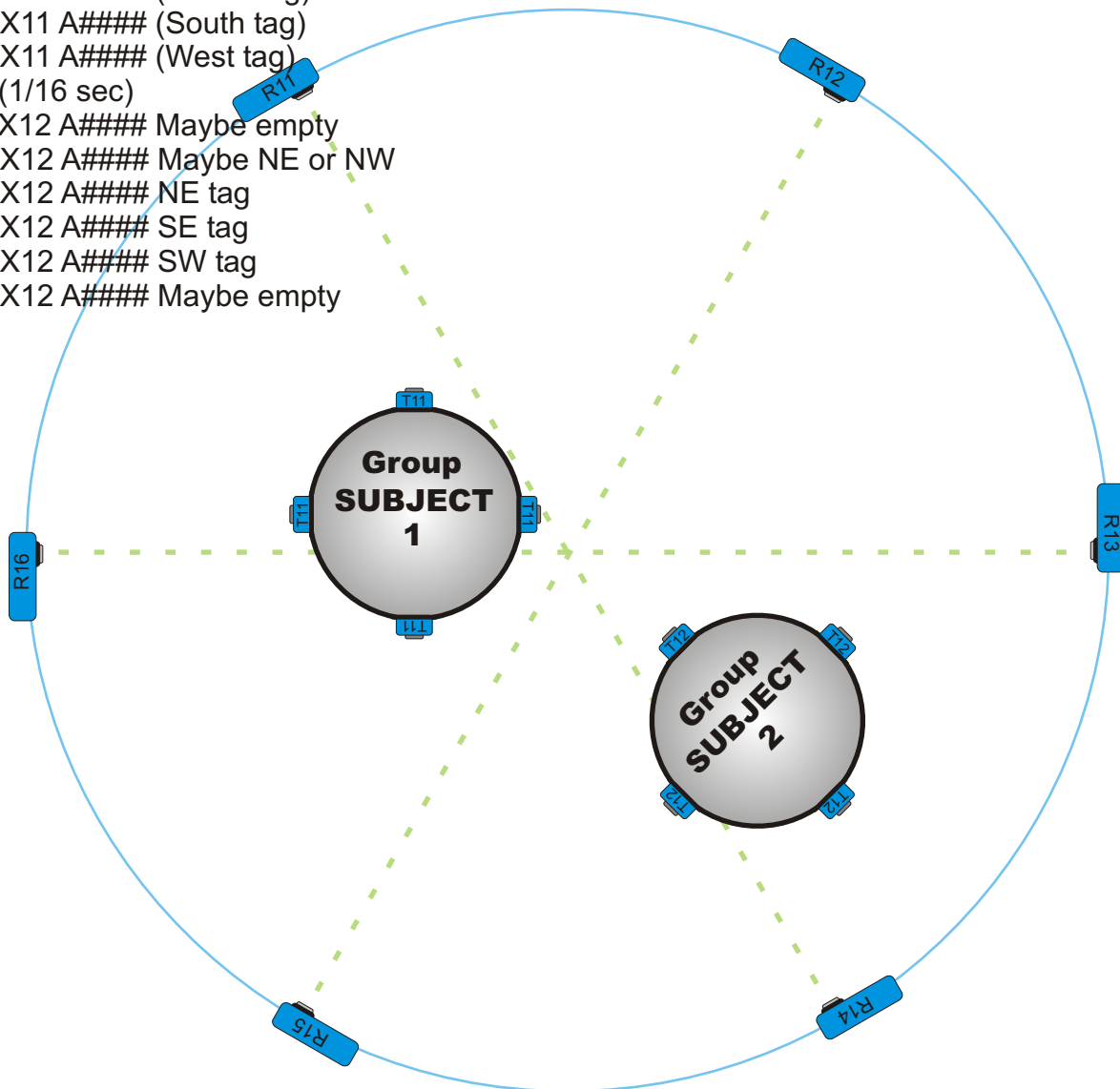
The following describes what is likely to be displayed by the access program for different receiver modes.

Receiver mode bits set by R&m2

X11 Repeated ever 1/16th of a second
R11 C#### U11
R12 C#### U12 possibly U11 or none
R13 C#### U12
R14 C#### U12 possibly U13 or none
R15 C#### U13
R16 C#### U14)

Receiver mode bit is set by R&m3

X11 (0 sec)
R11 X11 A####
R12 X11 A####
R13 X11 empty
R14 X11 empty
R15 X11 empty
R16 X11 empty
X12 (1/16 sec)
R11 X12 empty
R12 X12 A####
R13 X12 A####
R14 X12 A####
R15 X12 empty
R16 X12 empty
X13 (2/16 sec)
R11 X13 empty
R12 X13 empty
R13 X13 empty
R14 X13 A####
R15 X13 A####
R16 X13 empty
X14 (3/16 sec)
R11 X14 empty
R12 X14 empty
R13 X14 empty
R14 X14 empty
R15 X14 empty
R16 X14 A####