ioStar Overview

ioWave's ioStar Point to Multi-Point Digital Microwave Radio Link provides continuous, full duplex, T1 or E1, data connections between a single hub location and up to 3 remote locations. ioStar combines many of the same features, such as digital spread spectrum technology, as ioWave's Point to Point Radio Links and employs the same ISM, 2.4GHz or 5.8 GHz, radios. ioStar is based on its predecessor, ioWave's 4xT1(E1) ioLink4 Synchronous CDMA Point to Point ISM product. Like ioLink4, ioStar uses S-CDMA as its basic DSSS modulation technique.

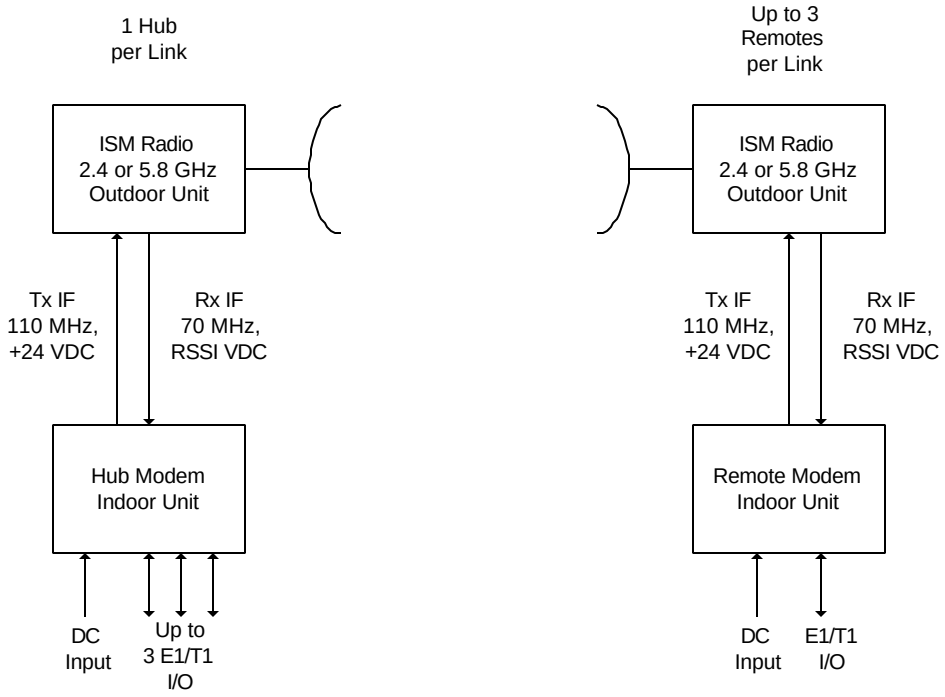

Figure 1 - ioStar's Configuration supports up to three remote locations

The main difference is ioStar's ability to support 3 independent remote subscriber link locations from a single 'hub' location. The downlink (hub to remote) direction uses the same ioLink 4 S-CDMA signal, sent to all three remotes. Each remote only accesses the information intended for its specific location. In order for the hub location to receive information from the three independent remotes using a single RF band, time division multiple access (TDMA) is used on the uplink (remote to hub) direction to separate the signals from the three subscriber locations. A low data-rate management channel is implemented on both ioLink 4 and ioStar. This management channel is used to synchronize uplink transmissions, to exchange status information and to provide a voice order wire capability over the links. The management channel and voice order wire capabilities are especially valuable during initial link installation and setup.

S-CDMA is used to 'stack' the multiple DSSS modulated T1(or E1) data streams into the same modulation bandwidth. The data streams are direct sequence spread, then superimposed into the 22 MHz RF bandwidth of the ioWave radios. The same process is used in ioStar (3 data streams) and ioLink4 (4 data streams). ioStar only uses this process in the downlink direction while ioLink4 uses it in both directions.

ioStar's uplink TDMA uses a fixed repetition pattern, interleaving portions of the data streams from each of the 3 remotes. Each remote transmits a short burst of data, which is modulated using S-CDMA. The burst data from a single remote unit is sent at 4 times the normal data rate, so it is sent in ¼ the normal data time. The 3 remotes, interleaved together, use ¾ of the available time sending data. The remaining ¼ is devoted to inter-burst, time guard bands. The cycle frame time is nominally 2 milliseconds. Buffer First-In-First-Out (FIFO) memory is used to smooth the burst data back to the steady T1 (or E1) rate.

The standard ioWave 2.4 GHz and 5.7 GHz transceiver units have been slightly modified to accommodate the burst mode transmission and reception. Modifications were limited to changing the automatic gain control (AGC) time constants.

ioStar has eliminated the LCD front panel display found on ioLink4. There are front panel status LEDs on ioStar, but the user interface is external using the front panel RS-232 port. A user PC, Palm Pilot, or other Telnet capable device is used to access a menu driven text interface. There are also front panel "I/O Modules" for each data interface. The modem base is physically the same for hub and remote configurations. The hub configuration of the modem unit uses 3 T1 (or E1) I/O Modules, while each remote uses a single I/O Module. Different software and firmware loads are used in the hub and remote modem units to support the different numbers of I/O Modules and the interchanged uplink / downlink functionality.