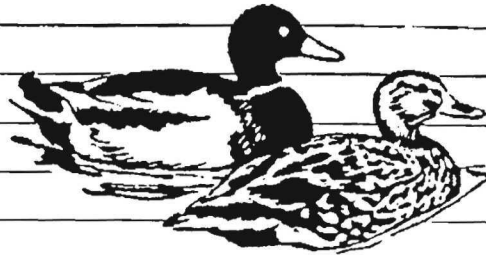


Research



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Remote Communication With Cellular Telephone Modem Link

Cellular telephones provide a valuable wireless communication link that may be enhanced for electronic data transmission with the addition of a cellular interface. Although many researchers have access to cellular telephones and use them for voice communication, they may not be utilizing the technology to maximum potential. Cellular telephones can be used to electronically transmit data within or among cellular service areas.

Cellular Interface Provides Modem Link

The cellular interface is compatible with any hardware that contains a standard RJ-11 jack, including computer modems, telemetry receivers with modems, fax machines, data loggers, and answering machines. We installed an interface (Audiovox Corporation, model STI-85B, Hauppauge, New York 11788) on a cellular telephone (Audiovox Corporation, model Trans 410A, Hauppauge, New York 11788). The RJ-45 cable from the handset cradle on the cellular telephone was removed from the transceiver unit

jack and inserted into the interface; a second RJ-45 cable from the interface was coupled on the transceiver unit jack. A desired RJ-11 hardware device was connected to the interface with a RJ-11 cable (Figure). The system retains the ability to receive and send calls like any other cellular telephone. Only a simple programming modification is required to activate the cellular telephone to automatically answer incoming calls.

The device is 24 mm high × 54 mm wide × 93 mm deep, weighs 59 g, and operates at temperatures of -30 to +60°C. The current drain of the telephone with the interface is approximately 2 mA/h standby and 15 mA/h while in use, with 3 W (50 ohms) of RF power output. This allows 4 h of operation or 8 h of standby power using the standard battery pack (2 A h) in conserve power mode. We connected a cigarette lighter adapter to a 100-A h, 12-V deep-cycle marine battery to obtain a 2-week noninterrupted power supply.

Proper hardware configuration and cellular telephone antenna selection ensures high quality data transmission and are crucial to the success of

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the communication session. The receiving device is more likely to detect ambient system noise resulting in data corruption or complete loss of the transmission session if the signal is weak (indicator value < 80). We used a 9-dB directional yagi antenna (Decibel, Dallas, Texas 75356, model DB498-A) in a field-study in central Louisiana, approximately 20 miles from a cellular tower, and received a consistent signal strength (indicator value \approx 115). Placement of the antenna is critical to ensure an acceptable signal-to-noise ratio during data transmission. The antenna was oriented by directing it at the nearest cellular tower until a maximum signal strength was indicated on the cellular telephone liquid crystal display.

To ensure optimal operation during data transmission, the modem, device, and communication software must be compatible and configured to the same protocols of the receiving microcomputer.

Cellular Phones Used as Computer Link in Field Studies

We have linked portable computer modems to the interface-cellular telephone to electronically transmit data using the communication software program PCAnywhere (Symantec Corp., Cupertino, California 95014). With this arrangement we were able to emulate a host computer attached to a Novell network, and transfer data files and E-mail messages to and from biologists in the office.

We also used a cellular telephone integrated with the cellular interface as a radiotelemetry

receiver modem link. We recently used this configuration to program and download records from a telemetry receiver at a remote receiving station on top of an oil platform in central Louisiana. The microcomputer was located in La Crosse, Wisconsin, and used the communication software program Procomm Plus (Datastorm Technologies Inc., Columbia, Missouri 65205).

The Overall Advantage

The ability of electronically transmitting data from remote locations without relying on land-based telephone systems or the need for direct power makes this system unique. Access to field personnel at remote field study areas by using a microcomputer at the office saved time, allowed immediate access to analysis of raw data, and provided better communication with field personnel. Downloading data was not dependent on weather or time constrictions. For specific system compatibility and information regarding your cellular telephone, contact your cellular carrier technical service representative.

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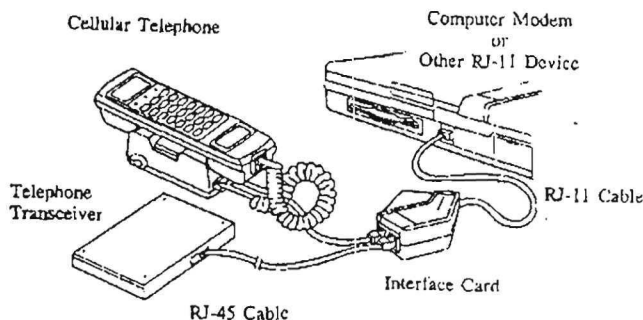


Figure. Connection of the cellular interface card to an RJ-11 device.