Summary of Key Features

The OpenSky Base Station employs a modular design approach. All five functional elements—the BSC, BSX, ISM, AD and HPA--are self-contained within their respective housings. This modular approach offers customers the benefit of ease of service. Replacement of any of the five main functional components can be accomplished in minutes. All five functional elements of the base station are separately mounted within the cell site enclosure, making module substitution a simple matter of a few mounting screws and a couple of cables.

This cell site enclosure also includes the required DC power supply. The division of the five main functional elements and the power supply into separate metal enclosures minimizes spurious emissions and component interaction.

BSC - Base Station Controller: The BSC is the processing engine of the base station. Utilizing software exclusively, the BSC implements all base station network and digital signal-processing functions. These functions include the Physical Layer (PHY), Medium Access Control (MAC), Mobile Data Link Protocol (MDLP), Radio Resource Management (RRM), Network Management (NMS) and Secondary Registration.

BSX - Base Station Transceiver: The BSX consists of a transmitter and receiver section, each of which implements the corresponding RF transmit and receive functions.

As seen in the accompanying figure, during transmission, the BSC generates an In-Phase/Quadrature (IQ) baseband signal that is routed to the baseband input of the BSX transmitter. The BSX transmitter converts this baseband signal to a RF output signal, at the selected SMR channel frequency. The nominal output power of this output signal is 0 dBm when measured into a 50 · load.

The receiver section of the BSX essentially reverses the transmit process. The antenna routes the desired receive signal to the RF input of the BSX. The receiver section converts the signal to a baseband I/Q signal that is routed to the BSC for further processing.

A DC reference signal is also provided by the BSC to the BSX to provide a common reference for both the receive and transmit I/Q baseband signals.

ISM – Industrial, Scientific and Medical Wireless Modem: The ISM is a wireless modem that operates in the 2.4 GHz unlicensed frequency band. It serves as the interconnection between the OpenSky Cell Site Base Station and the OpenSky network.
The use of the ISM eliminates the need for a wireline connection to the cell site and, therefore, the cost of providing a leased line. Eliminated also by the use of the ISM, is the need to route telephone cable through rugged terrain where cell sites are typically deployed.

The ISM connects directly to the network port of the DCX though a RS-232 serial connection. The ISM also requires two antennas for diversity to improve the error rate over the wireless link.

PLNA – Preselector/Low Noise Amplifier: The PLNA serves two functions. First the PLNA provides filtering for the transmit path. Outbound transmit signals are input to the PLNA through the TxIn connector and then fed through the transmit filter to attenuate unwanted spectral components.

The second function provided by the PLNA is used to processing received signals. Inbound receive signals are first shaped by the PLNA's preselection filter and then amplified by the LNA to improve receive sensitivity. Both incoming receive and outgoing transmit signals are served by a common antenna port.

HPA - High Power Amplifier: The HPA produces the high power transmit signal routed to the TxIn port of the PLNA. To generate this transmit signal, the HPA amplifies the nominal 0 dBm RF input provided by the BSX, to generate a maximum output power of 25 Watts.

The HPA also includes an RS-485 communications port that provides control, monitoring, and alarm generation. The HPA's output power is controllable via this RS-485 connection from the BSC. Using this serial connection the BSC can adjust the output power of the HPA from 1 to 25 Watts.

The HPA generates alarms in the case of excessive reflected power or input power, low power output and over-temperature alarms. These alarms are reported to the BSC and subsequently relayed through the NMS interface across the network port.

Signal input power above 6 dBm causes the HPA to generate an input overdrive alarm and de-key the HPA output. Input signal levels below –10 dBm may prevent the HPA from generating full output power. This condition generates a power leveling control loop alarm, which de-keys the HPA.

As described previously, the HPA provides a programmable 1 to 25 watt RF output signal into a 50· load. Output protection insures no damage to the HPA from any mismatch condition. However, a programmable threshold on reflected power would normally de-key the HPA under mismatch conditions.

DC Power Supply The DC power supply is an enclosure-mounted DC/DC converter that provides electrical power to devices requiring +12 VDC within the cell site base station. This 50-Watt power supply converts the +24 VDC supplied to the cell site to +12 VDC. The HPA and PLNA are supplied directly from the +24 VDC input, not via this supply.