Radio Port (RP) B1990

RP Functions

The RP provides the link between Subscriber Unit (SU) and Radio Port Control Unit (RPCU).

Extremely compact and lightweight, Syncomm's RP is economical to purchase and can be installed outdoors for excellent coverage. The following are basic RP functions:

- **Link between SU and RPCU**

  Whether in making a phone call or receiving an alerting message, the user's SU communicates with the wireline network element (RPCU) through the RP which functions as a RF modem over the air interface.

- **Transmission/reception of radio signals**

  Each RP transmitter takes a framed and encoded signal from the modulator and converts it to the appropriate carrier frequency. The RP transmitter then transmits a $\pi/4$ DQPSK(Differentially encoded Quadrature Phase Shift Keying) signal with a TDM radio channel structure out to the SUs. The uplink TDMA bursts are transmitted by the SUs arrive at the RP, where the TDMA signals are amplified, translated in frequency, demodulated, diversity combined, synchronized, decoded, and converted to a TDM line interface signal for transmission to the RPCU.

- **Channel coding/decoding for error detection and burst synchronization**

  The burst is synchronized between RP and SU. Error detection is employed to mitigate the errors induced during transmission. Because the entire burst is only 120 bits long, synchronization and error detection processes are combined. Placing the burst encoding/decoding circuitry at the RP helps to minimize the RP-to-RPCU transmission requirements.

- **Synchronization**

  The local reference clock at the RP will extract the timing from the transmission wireline facility (e.g., HDSL) to synchronize itself to the network and may reference all transmit and receive frequencies to the same oscillator, that is, to maintain the stability of transmit and receive frequencies.

- **Termination of air interface**

  Message sets, measurement and performance monitoring data, signaling information and operations data are combined with the 384Kbps RF channel data to make up the transmission facility (e.g., HDSL).

- **Mapping of radio channel bit rate(384kbps) to standard HDSL line rate**

  The radio channel bit stream is mapped into a HDSL line rate by bit stuffing, and then the unchannelized HDSL signal is transported over a wireline network facility to the RPCU. The purpose is to provide a standard physical level line interface.

- **Performing Self-diagnostics, remote tests and maintenance checks**

  The RP is equipped with self-diagnostic capabilities that are executed at power up or upon receiving designated test commands. The RP continuously monitors its hardware and its environment; alarms are generated if any fault is detected. The RP collects QI, WEI, RSSI, and performance of RP circuitry information and passes it to the RPCU. The RP utilizes the loopback function to determine if the RP electronics are in proper working order. This test can be administered remotely via data links.

- **Word Error Indication(WEI) measurement**

  The RP performs WEI measurement and forwards detected error indications to the RPCU for further processing. The uplink WEI is automatically sent back to the SU on the next downlink as well.

- **Received Signal Strength Indication(RSSI) measurement**

  The RP determines the strength of signals received in each burst and forwards those measurements to the RPCU for further processing

- **Quality Indication(QI) measurement**

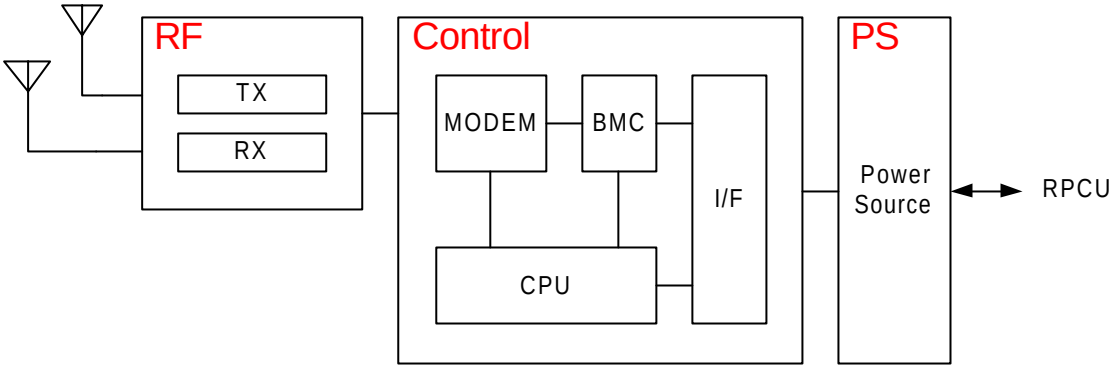
  While in communication with the SU, the RP continuously monitors the receive signal quality of the radio link between itself and the SU by measuring the signal-to-impairment ratio. Impairments include thermal noise and interference. This information, used as the input to the uplink power control procedure, is transmitted back to the RPCU for processing.

Function Specifications

Basic Functions	
● Operating Frequency band	Transmit 1930.5-1989.6 MHz Receive 1850.5-1909.6 MHz
● Air Interface Standard	JTC (J-STD-014)
● Access Method	TDM/TDMA
● Time Slots/Carrier	8
● Channel Spacing	300 kHz
● Modulation Scheme	π/4 DQPSK
● Frequency Assignment	QSAFA
● Frame Length	2.5 ms
● Operating Temperature	-20 °C to +50°C
Interface with RPCU	
● P-interface	Connect to RPCU via P-interface using HDSL transmission. The P-interface carries an embedded operations channel (EOC) which conveys commands for performing QSAFA.

● Performance Monitoring	The overall status of the RP is reported back to the RPCU when a failure occurs.
Transmission Characteristics	
● RF Output Power at antenna terminal	800 mW (+29 dBm). The output power is controllable in four steps, from 0 mW to 800 mW.
● Adjacent channel power emission	Less than 8 µW at +/- 600 kHz Less than 2.5 µW at +/- 900 kHz
● Spurious Emission	Less than -13 dBm on transmission band Less than -74 dBm on receiving band Complies to FCC standard on other band
● Output Impedance	50 ohms (nominal)
Receive Characteristics	
● Receiving sensitivity	Better than -101 dBm at 25^{o}C (WER :3%, static)
● Selectivity	More than 0 dB at +/- 300 KHz at 25^{o}C More than 50 dB at +/- 600KHz at 25^{o}C
● Antenna diversity	2-branch antenna selection diversity. One antenna supports duplex receive and transmit. The other only supports receive.
Mechanical Specifications (Reference Only)	
● Dimensions	39 cm (W) X 25 cm (H) X 9 cm (D)
● Weight	Less than 10 kg (doesn't include antenna and cable)
● Power supply	Line Powered from RPCU. No Separate Battery Backup

Block Diagram



- Controller
  - Handling the handshaking among RF, Encoding/Decoding, Radio Channel Measurements and Line Interface Module
  - Processing the Layer-2 and Layer-3 protocol between RP and RPCU.
  - The wireline transport between an RP and RPCU can be provided by HDSL line interfaces. The RP shall convert the RF channel rate of 384Kbps into the appropriate line transmission bit rate.
- RF
  - The channel spacing shall be 300KHz. The port shall receive on the low band, 1850 to 1910MHz, and transmit on the high band, 1930 to 1990MHz of the duplex frequency allocation.
  - By performing the diversity combining or selection at the RP, the line transmission rate to the network can be at the channel rate. Diversity selection is performed after decoding both branches. The error free word is chosen, with the corresponding received power and quality indicator used for power control. If there is a tie, then the branch with the higher power shall be selected.
  - The transmit and receive frequencies shall be synthesizer-controllable, with the frequency specified by the control signaling.
- Power Source
  - Power Source can convert line power to 5Vdc to power up the RP and let RP work properly.
  - Power Source can split the HDSL signaling and Power from line input.
- Antenna

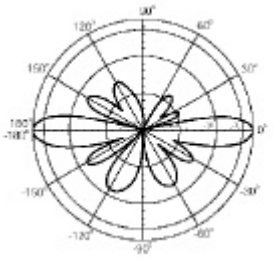
- Omni-directional antenna for PACS

- Electrical Specification

Frequency range/MHz	1850-1990MHz
Gain/dBi	8.0dBi
VSWR Max.	1.5
Polarization	Linear vertical
3dB beamwidth/H-plane	360 degree
3dB beamwidth/E-plane	15 degree
Power handling	200W
Impedance	50 Ohms
Connector Type	N-female

- Environmental & Mechanical Characteristics

Survival wind speed	180km/hr; max
Temperature	-40 ^{o}C to +85 ^{o}C
Humidity	100% @ 25 ^{o}C
Lightning Protection	DC ground
Radome color	Gray-White
Radome material	Fiberglass
Radiator material	Copper & Brass
Weigh	1kg



- Dimensions(mm)