

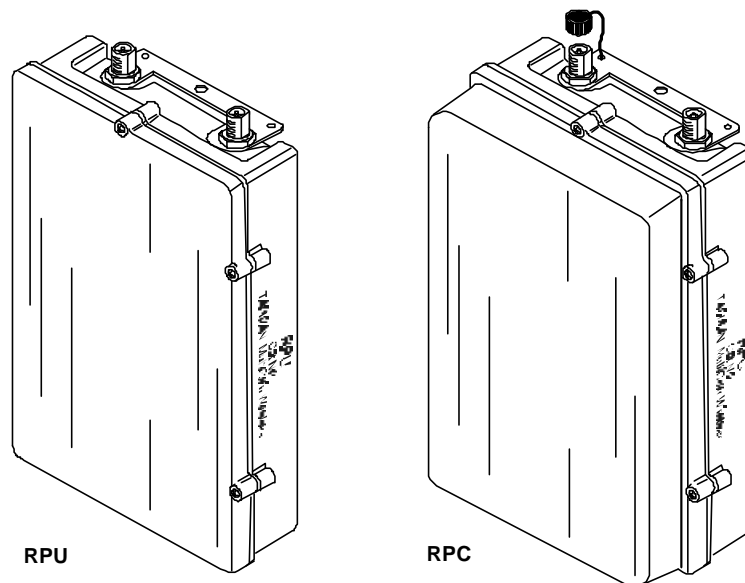
## 1.1 EQUIPMENT DESCRIPTION

### 1.1.1 Equipment Versions

This manual covers the following radio port equipment versions:

- Radio Port Unit, RPU, and the associated antennas and mounting accessories. The RPU can be ordered for operation in the following frequency bands: 2.4 GHz and 3.5 GHz.
- Radio Port Coupler, RPC, performs the RPU functions with an internal antenna. The RPC can be ordered for operation in the following frequency bands: 2.4 and 3.5 GHz.

Figure -1 shows a general view of typical basic RPU and RPC units.



*Figure -1. Typical RPU and RPC Units, General View*

### 1.1.2 RPC Description

#### 1.1.2.1 RPC Functional Description

The RPC is a complete radio port subsystem, which contains the RPU hardware, an internal 60° sectorized antenna and an antenna coupler, that enables connection to another RPC or to an external antenna, for space diversity.

Therefore, the RPC simplifies the installation process, reduces the resources and environmental impact relative to typical RPU-based installations, and improves the appearance of the radio base station.

The RPC is offered in the following version:

- RPC without reflectors for the 2.4 and 3.5 GHz frequency bands.

#### 1.1.2.2 RPC Functional Block Diagram

The functional diagram of the RPC is shown in Figure -2. The RPC uses PLI and PRC modules whose functionality is similar to that of the corresponding RPU modules, an internal antenna, and a PC module that includes the transceiver functions of the PRM module used in the RPU, with the addition of a coupler.

The coupler is used only in the dual-RPC base station configuration (see para. 1.1.2.5), in which the RPC2 connectors of two RPC units heading in the same direction are cross-connected using two coaxial cables. Space diversity is obtained for each RPC by coupling the internal antenna of the other RPC. The dual RPC configuration supports up to 16 simultaneous calls.

### **1.1.2.3 Frequency Oscillators**

The modules of the RPC contain several frequency generation circuits.

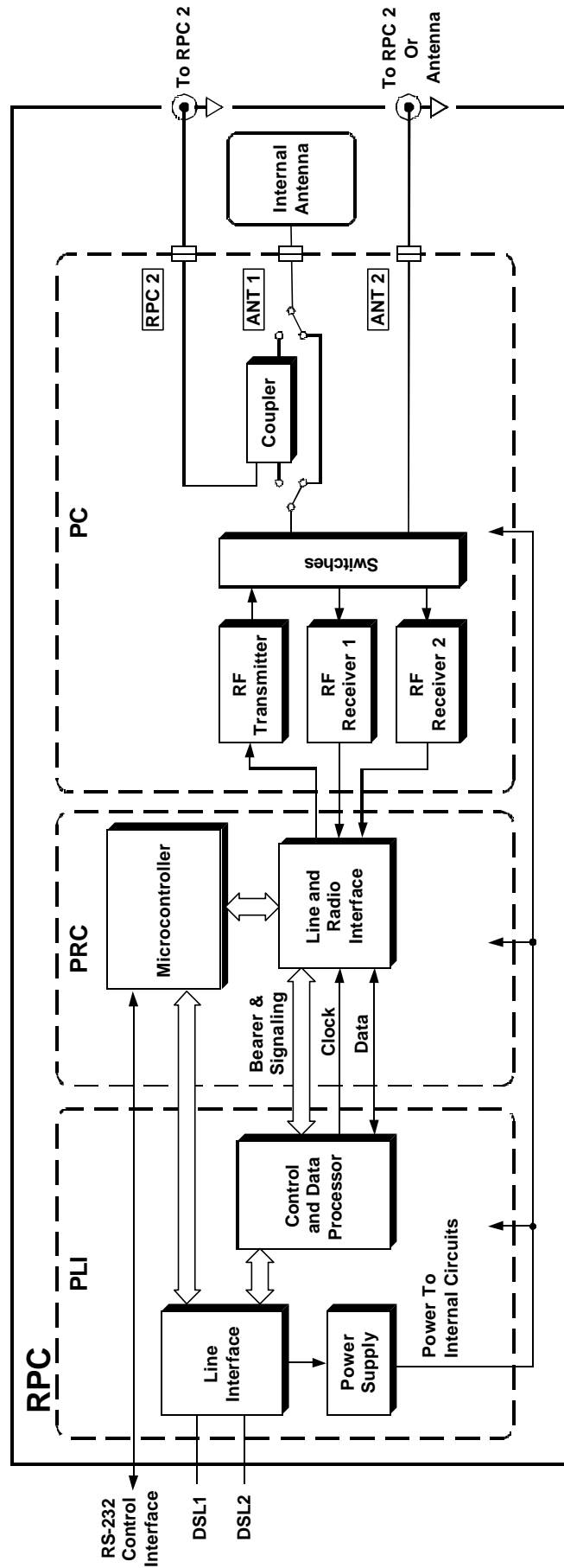
The PLI module contains crystal of 15.36MHz.

The RF Module (namelt the PC module) contains the following crystals: 14MHz, 56.238MHz.

The PRC module contains crystal of 24MHz.

### **1.1.2.4 Hopping Frequencies sequences list**

The RPC operates at pseudorandomly hopping frequencies scenario. Upon installation, desired frequencies are loaded to the frequency table in the radio digital memory. Number of frequencies are any combination of more than 75 frequencies in the range of 2400 MHz to 2480MHz. The system assigns a pseudorandomly frequencies order for the radio hops. The order of hops is kept the same all the time after installation.



*Figure -2. RPC Functional Diagram*

In addition, the RPC can be used with external antennas:

- An additional (standard) RPU antenna can be connected to the second connector of the RPC.
- For special applications, e.g., for omni-directional coverage or when special antennas are needed, or to support antenna diversity when transmitting on a 3.5 GHz RPC, two external antennas shall be used. In this case, the internal antenna of the RPC can be disconnected in the field and the internal connector can be directly connected to one of the external RF connectors.

#### **1.1.2.5 RPC Configurations**

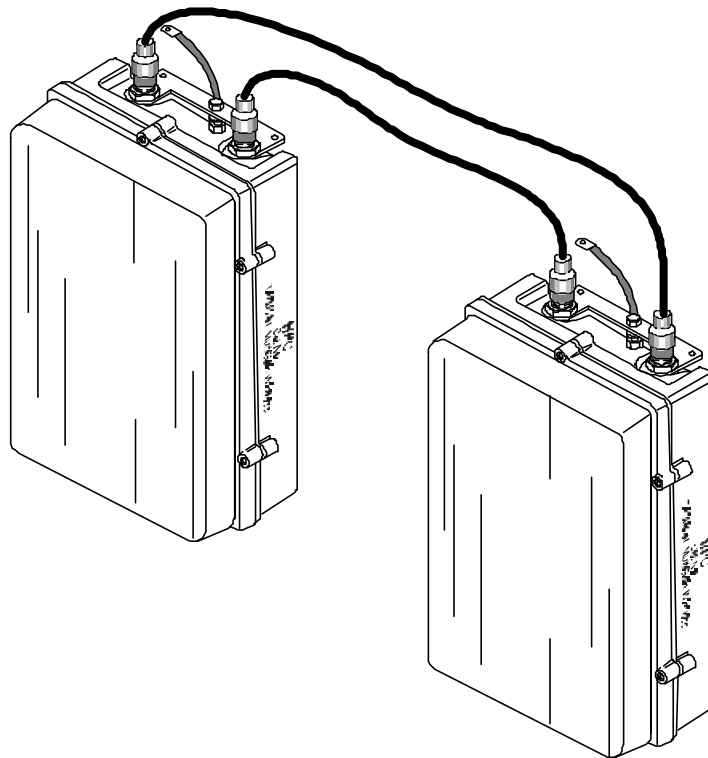
This section presents basic configurations using the RPC capabilities.

##### **1.1.2.5.1 Dual-RPC Radio Base Station**

This configuration, shown in Figure -3, includes two radio base stations, heading in the same direction (Figure -3 shows units without external reflectors: such reflectors are used only with the 1.5 GHz units). The internal antenna of each RPC is used as the second antenna for the other RPC, so that space diversity is obtained for both RPC's.

This configuration, which requires only two units, replaces six units (two RPU's and four antennas). As a result, it is possible to install four RPC-based radio stations on one H-support. Eventually, installation costs are reduced and environmental and aesthetic impact is minimized.

Every installation including multiple radio base stations, heading in the same direction, will include pairs of RPC's connected according to Figure -3.

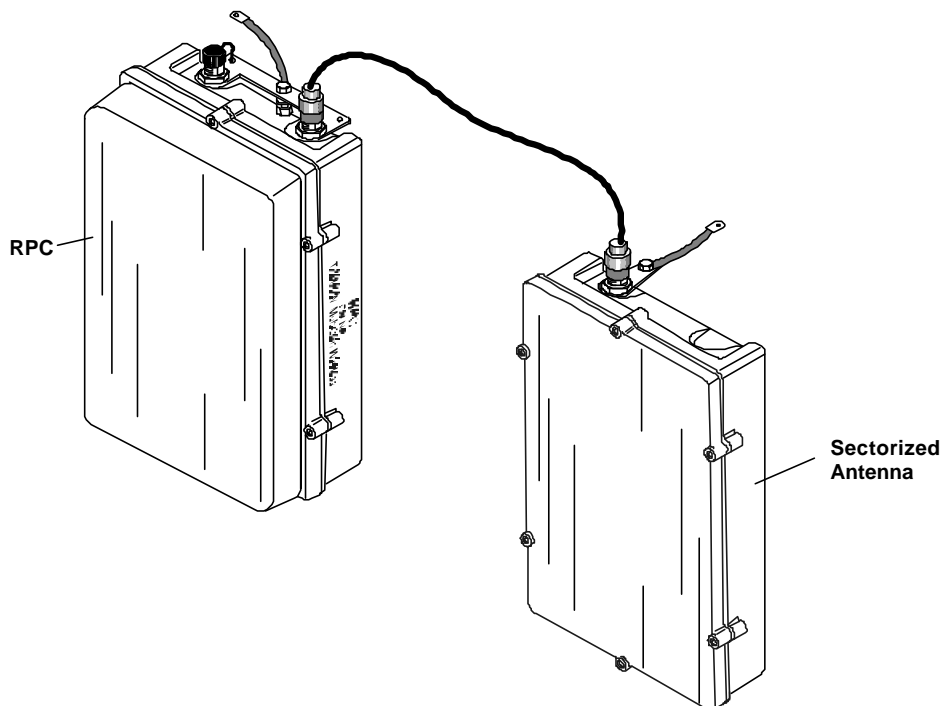


*Figure -3. Dual RPC Configuration*

##### **1.1.2.5.2 Single RPC Radio Base Station with Space Diversity**

A single radio base station with space diversity comprises an RPC and a sectorized antenna. A single cable connects the two units. Both the internal and external antennas are connected via the antenna coupler in the RPC.

Figure -4 shows a typical RPC radio station. This configuration is used for the installation of a single radio base station, and for the single radio base station left at a location that includes an odd number of radio base stations, heading in the same direction.



*Figure -4. Single RPC Radio Station*

#### **1.1.2.5.3 External Antenna Options**

The RPC enables the connection of a pair of external antenna pairs (e.g., omni-directional or wider beam-width antennas), whenever needed. To use this option, it is necessary to change internal connections in the RPC.

External antennas must always be used on a 3.5 GHz RPC, when it is necessary to use antenna diversity in the transmit mode.

## 1.2 Technical Characteristics

### DSL Line Interface (RPCU Interface)

Number of DSL Interfaces	two
Line Interface Type	Based on ANSI T1.600
Basic Line Bit Rate	144 kbps per DSL line
Line Code	2B1Q
Transmit Signal Level	5V peak
Line Nominal Impedance	135 ohm @ 40 kHz
Transmission Media	Unloaded twisted wire pairs

### Air Interface

Frequency Range	<ul style="list-style-type: none"> <li>– 2.4 GHz bands: 2.400 - 2.480 GHz (Us Market)</li> <li style="text-align: center;">or</li> <li style="text-align: center;">2.401 - 2.479 GHz</li> <li style="text-align: center;">(ETS 300-328 version)</li> <li>– 3.5 GHz band: 3.405 - 3.520 GHz</li> </ul>
Spectrum Spreading Method	Frequency Hopping
Channel Access	TDMA/TDM
Duplex Method	TDD
Number of Full Duplex TDMA Slots	Eight per channel
Number of Hopping Frequencies	80 maximum
Channel Spacing	1 MHz
Bit Rate	875 kbps
Dwell Time (hopping rate)	2 msec (500 hops/sec)
Diversity Techniques	<ul style="list-style-type: none"> <li>– ATD (Adaptive Time Diversity)</li> <li>– AD (Antenna Diversity) for the uplink</li> </ul>
Error Detection Technique	CRC (85, 73)
Modulation Method	3-Level Synthesized Response FSK
Frequency Deviation of RF Channel	Maximum 230 kHz
-20 dB Bandwidth of RF Channel	1000 kHz

### RF Transmit Power Level

Typical RF Output Power	<ul style="list-style-type: none"> <li>– +20 dBm</li> <li>– +8 dBm (ETS 300-328 version)</li> </ul>
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<b>RPC Antenna Gain</b> (typical built-in antenna)	— 2.4 GHz band: (ETS 300-328)	11 dBi
	— 3.5 GHz band:	13 dBi
<b>RF Receiver</b>		
Receiver Subsystem	Two receivers with diversity switching	
Adjacent Channel Selectivity	-14 dB	
Sensitivity	— -90 dBm @ WER=10 <sup>-2</sup> (BER=10 <sup>-4</sup> )	
	— -87 dBm @ WER=10 <sup>-4</sup> (BER=10 <sup>-6</sup> )	
Second Channel Selectivity	-40 dB at ± 2 MHz	
<b>Power Supply</b>		
Source	Remote feeding through the DSL from the RPCU or MCX-R	
Nominal Supply Voltage	±60 V DC, ±80 V DC, ±90 V DC, or ±120 V DC	
Typical Feed Range	6 km on 0.5 mm pairs for ±90 V DC feed voltage	
<b>Connectors</b>		
DSL Lines	Terminal strip	
Control Connector	9-pin D-type	
RF Connectors	N-type	
<b>Software Downloading</b>		
Remote software download through the radio link		
<b>Physical Characteristics</b>	<b>RPU</b>	<b>RPC</b>
Dimensions (H × W × D)	320 × 210 × 65 mm	320 × 210 × 103 mm
Weight	1.9 kg	2.6 kg

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**Environmental**

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**Operating Conditions**

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Temperature	-40 to +60°C
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Relative Humidity	10 to 95%
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**Storage and Transportation Conditions**

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Temperature	-40 to +70°C
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Relative Humidity	Up to 95%
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Rain	IEC specification 68-2-18, test Rb, impacting water, method 1
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