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RF-6000E Repeater

Microwave RF Repeater Systems

Applications

- Low-cost, highly reliable 6-GHz microwave through repeater for extending range of or clearing obstructed microwave radio paths.
- Excellent performance with digital, or video microwave radios; channel capacity to 2688 PCM (4 DS3 or 180 Mb/s), OC-3, STS-3, STM-1 (155.52 Mb/s), Internet Protocol (200 Mb/s), multiple video or mixed traffic.
- Compatible with any manufacturer's 6-GHz radio terminal.
- Solar and wind power compatible -- economical in light to heavy routes and remote locations.

Features

- Power Amplifier RF output power up to +30 dBm, 1.0 Watt.
- Power consumption only 30 Watts, solar rated, at +12 VDC for 2-amplifier, standard-power, duplex operation.
- Solar powered, hybrid solar and wind powered, ac powered, or other alternative energy electrical power sources.
- Compact and lightweight -- ideally suited for remote sites that do not have access roads or commercial power.
- Environmentally protected aluminum, weathertight, lockable cabinet. No extra environmental shelter required in most installations. Suitable for use at unimproved sites anywhere in the world -- Alaska to Saudi Arabia.
- Internally protected duplex (FDD), frequency diversity, space diversity and three-way or "Y junction" system configurations are available.
- Only one active element per channel, the internally redundant linear amplifier.
- AGC/ALC provided to correct input fades, regulate output power and reduce overload.
- Adaptable to new radio modulations and capacities as technology advances.
- RMAS-120 Alarm system (optional) can remotely monitor repeater.
- Equipped with directional couplers for in-service RF output power measurements.
- No frequency conversion -- received signal is filtered, amplified, and re-radiated.
- Very reliable, greater than 85,000 hours MTBF for 1+0 duplex.
- Available as a self-contained RF repeater for use with customer-furnished antenna and power equipment or as a complete package including repeater, antenna, photovoltaic modules, battery charger and batteries.



Figure 1 RF-6000E Solar Powered Repeater



Figure 2 RF-6000E with Weathertight Enclosure



Figure 3 RF-6000E Y-Junction Repeater, 3-Hops

An RF-6000E-99 repeater is used to provide links to two end terminals located in a mountainous region. The repeater site's high elevation provides a vantage point where clear, line-of-sight paths to each microwave terminal exist. A photovoltaic and wind turbine power system operates the repeater at this remote location. Site access is by four wheel drive vehicle.

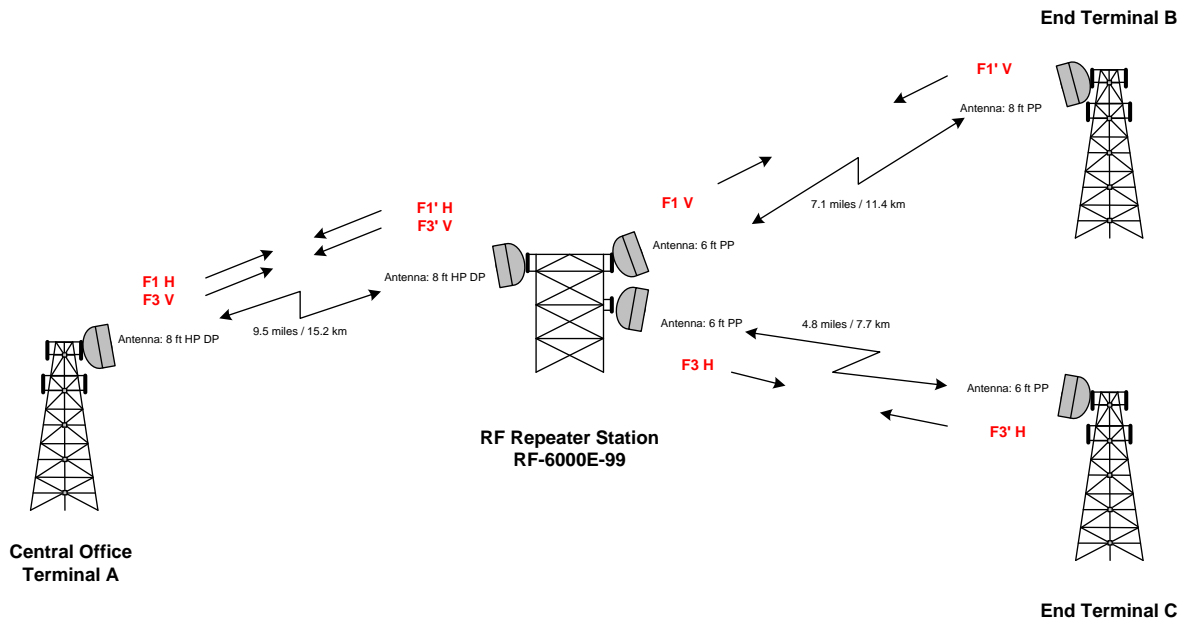


Figure 4 Y-Junction Repeater Network

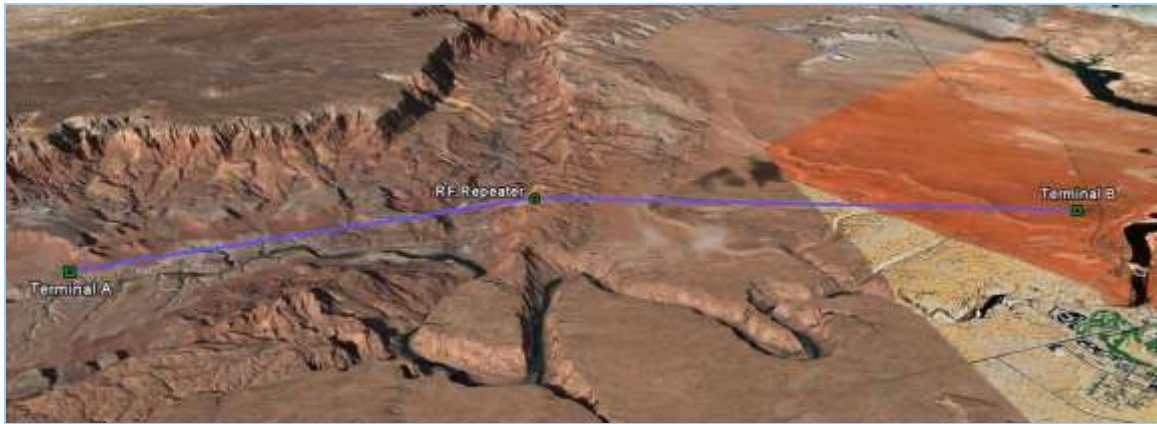


Figure 5 RF Repeater Clearing an Obstructed Path, 2-Hops

The path between Terminal A and Terminal B is obstructed by a ridge at the edge of a canyon. An RF-6000E repeater is located on the ridge where line-of-sight paths to both terminals exist. The repeater site is isolated, requiring four wheel drive vehicles for access. Photovoltaic system provides operating power for the repeater. The repeater site in this example is shown in the figure below.



Figure 6 RF Repeater Installation with Solar Power

RF-6000E Microwave RF Repeater

General

Frequency Range	5.925 ~ 7.125 GHz
Linear Amplifier Gain, L1 ¹	58 dB typ., 56 dB min.
Linear Amplifier Gain, L2 ¹	63 dB typ., 61 dB min.
AGC/ALC	15 dB down, 5 dB up fade
Noise Figure ¹	5 dB at max gain
Antenna Ports	WR137 waveguide

W/G Flange	CPR137G
Return Loss	≥ 26 dB

Nominal Transmit Power^{1,2}

Modulation	Level 1	Level 2
FM/FSK/MSK	26.0 dBm	30.0 dBm
4QAM/QPSK/OQPSK	24.0	28.0
16QAM	20.0	24.0
32QAM	18.0	22.0
64QAM/64TCM	16.0	20.0
128QAM/128TCM	14.0	18.0
256QAM	13.0	17.0
512QAM	12.0	16.0
32TCM	17.0	21.0
256TCM	12.0	16.0

Frequency Plan

Channel Bandwidth	30 MHz – High Capacity 15 MHz – Low ~ Medium ³
T-R Spacing	80 MHz, min.
T-T Spacing*	57 MHz, min

* on common feeders

¹: Not including branching losses, see Operations Manual.

²: See Operations Manual for more details. Modulations listed are a sample only, contact PESi for more.

³: RF-6000EL – Low ~ Medium Capacity

Channel Response: High Capacity, Equalized

Amplitude	± 0.5 dB, $f_0 \pm 15$ MHz
Group Delay	4 nsec P-P, $f_0 \pm 15$ MHz

Channel Response: High Capacity, Un-Equalized

Amplitude	± 1.0 dB, $f_0 \pm 15$ MHz
Group Delay	15 nsec P-P, $f_0 \pm 15$ MHz

Channel Response: Low ~ Medium Capacity, Un-Equalized³

Amplitude	± 1.0 dB, $f_0 \pm 7.5$ MHz
Group Delay	15 nsec P-P, $f_0 \pm 7.5$ MHz

Power Requirements: Duplex, 2 Amplifiers

Nominal Voltage	+12 VDC (+24 VDC Optional)
Voltage Range	+11 ~ +16 VDC
Power Consumption, Level 1	30 W, Solar Rated
Power Consumption, Level 2	35 W, Solar Rated
Polarity	Negative Ground

Dimensions: 1+0, 1+1 and 2+0 Configurations

Height	36.74 in, 933 mm
Width	23.25 in, 591 mm
Depth	22.82 in, 580 mm
Weight	99 lb, 45 kg – 1+0 120 lb, 54.5 kg – 1+1, 2+0 128 lb, 58 kg – 2+0 4-Port

Reliability

MTBF	85,000 hours
MTTR	30 minutes, on-site

Environmental

Ambient Temperature	-40° C ~ +60° C
Relative Humidity	90% - Housing Internal

Altitude	15,000 feet, 4600 meters
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Enclosure Housing	Weathertight Aluminum
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