Alcatel-Lucent MDR-8000

2.4 GHz LICENSED AND UNLICENSED DIGITAL RADIOS

OVERVIEW

The MDR-8X02 is Alcatel-Lucent's premier digital microwave radio for long-haul, point-to-point wireless communications. The flexible platform offers features designed to provide robust operation, while also reducing your total cost of ownership. With a common platform that supports virtually all frequency bands from 2-11 GHz, the MDR-8X02 specifically operates in both the 2.450 - 2.483 GHz (FCC Part 101) and 2.400 - 2.483 (FCC Part 15) bands. Operating in either the unlicensed (Part 15) or licensed (Part 101) portion of the 2.4 GHz frequency band, the MDR-8X02 offers unique networking options. In licensed operation, the higher power transmitters and direct modulation blast through interference and improve overall system performance. Unlicensed operation offers the same spectral efficiency and provides an option for transporting up to 16 DS1s or 24 Mb/s of Ethernet traffic. High system gain coupled with excellent RF propagation at 2 GHz make this radio an ideal choice for difficult links to remote locations.

These bands also offer unique opportunities for network operators. In many cases, the MDR-8X02 enables 2.4 GHz spread-spectrum users and/or 2.1 GHz licensed users to upgrade radio capabilities without touching the tower, antenna, or transmission line. Reuse of existing antenna systems and tower structures provides a definite cost savings and reduction in cutover time. Furthermore, operators can take advantage of lightweight grid antennas and coaxial transmission line to limit tower loading concerns and minimize environmental impact issues. Also, the 2.4 GHz band can be used to place new links in service, thereby taking advantage of the excellent propagation and low-impact antenna configurations allowed by this frequency range. The MDR-8X02 offers customers transmission capacity from 2-16 DS1s, and 10/100/1000 Base-T Ethernet, with the ability to upgrade capacity simply by changing Capacity Keys™.

Compact mechanical dimensions and low power consumption allow operators to place the MDR-8X02 in cramped spaces without sacrificing system performance and availability. This flexible and scalable architecture provides reliable wireless backbone communications for cellular operators, public safety agencies, railways, pipelines, utilities, local exchange carriers, television stations, and private enterprise.

COST-SAVING FEATURES

- Industry-high system gain
  - ¬ Allows longer paths, potentially avoid repeater sites
  - ¬ Allows smaller antennas
    - • Lower purchase price
    - • Reduces tower loading & rent
  - ¬ Improves path availability
- Common platform for all frequency bands & capacities
  - ¬ Simplifies training and maintenance
  - ¬ Minimizes spares
- In-service capacity upgrades
  - ¬ Graceful migration to higher capacities
  - ¬ No stranded investment
- Flexible Ethernet options
  - ¬ Provision bandwidth dynamically, as needed
  - ¬ Combined data throughput of 48 Mb/s using dual channel mode
  - ¬ Auto-sensing simplifies installation and turn-up
- Low power consumption
  - ¬ Reduces size of DC power plant and batteries
  - ¬ Reduces cost of HVAC
- Small size
  - ¬ Reduces amount of rack space needed

PERFORMANCE-ENHANCING FEATURES

- All-indoor operation
  - ¬ No tower-mounted electronics
  - ¬ Simplifies maintenance and troubleshooting
- Industry-leading receiver selectivity and interference rejection
  - ¬ Allows coordination in frequency congested areas
  - ¬ Speeds up licensing
- Full range of configurations
  - ¬ Nonstandby, hot-standby, space diversity
  - ¬ Provides full equipment protection
  - ¬ Used to overcome poor path conditions
- Robust multipath countermeasures
  - ¬ Used to overcome propagation problems

MDR-8502 Licensed - Maximum System Gain

EQUIPMENT IDENTIFIER	MDR-8502-2	MDR-8502-4
Frequency Band (GHz)	2.450 - 2.483	2.450 - 2.483
RF Channel Bandwidth (MHz)	1.25	2.5
Capacity per RF Channel (DS1s)	2	4
Modulation Type (TCM)	32	32
Radio Data Rate (Mb/s)	3.09	6.18
System Gain (BER = 10^{-6}) @ 31 dBm (dB)*	118	115
Transmitter Power Output (dBm)	14	14
Optional Power Amplifier Outputs (dBm)	31	31
Receiver Threshold (BER = 10^{-6}) (dBm)*	-87	-84
Maximum RSL for 10^{-6} BER (dBm)*	-17	-17
Dispersive Fade Margin for 10^{-3} BER (dB)	80	80
Threshold/Interference		
Cochannel (dB)	28	28
Adjacent Channel (dB)	-8	-8

MDR-8702 Licensed - Maximum Spectral Efficiency

EQUIPMENT IDENTIFIER	MDR-8702-4	MDR-8702-8
Frequency Band (GHz)	2.450 - 2.483	2.450 - 2.483
RF Channel Bandwidth (MHz)	1.25	2.5
Capacity per RF Channel (DS1s)	4	8
Modulation Type (TCM)	128	128
Radio Data Rate (Mb/s)	6.18	12.4
System Gain (BER = 10^{-6}) @ 31 dBm (dB)*	111	108
Transmitter Power Output (dBm)	14	14
Optional Power Amplifier Outputs (dBm)	31	31
Receiver Threshold (BER = 10^{-6}) (dBm)*	-80	-77
Maximum RSL for 10^{-6} BER (dBm)*	-17	-17
Dispersive Fade Margin for 10^{-3} BER (dB)	80	80
Threshold/Interference		
Cochannel (dB)	34	34
Adjacent Channel (dB)	-8	-8

MDR-8502u Unlicensed - Maximum System Gain

EQUIPMENT IDENTIFIER	MDR-8502u-4	MDR-8502u-8
Frequency Band (GHz)	2.400 - 2.483	2.400 - 2.483
RF Channel Bandwidth (MHz)	2.5	3.75
Capacity per RF Channel (DS1s)	4	8
Modulation Type (TCM)	32	32
Radio Data Rate (Mb/s)	6.18	12.4
System Gain (BER = 10^{-6}) @ 30 dBm (dB)*	114	111
Transmitter Power Output (dBm)	14	14
Optional Power Amplifier Outputs (dBm)	30	30
Receiver Threshold (BER = 10^{-6}) (dBm)*	-84	-81
Maximum RSL for 10^{-6} BER (dBm)*	-17	-17
Dispersive Fade Margin for 10^{-3} BER (dB)	80	80
Threshold/Interference		
Cochannel (dB)	28	28
Adjacent Channel (dB)	-8	-8

MDR-8702u Unlicensed - Maximum Spectral Efficiency

EQUIPMENT IDENTIFIER	MDR-8702u-4	MDR-8702u-8	MDR-8702u-16
Frequency Band (GHz)	2.400 - 2.483	2.400 - 2.483	2.400 - 2.483
RF Channel Bandwidth (MHz)	1.25	2.5	5
Capacity per RF Channel (DS1s)	4	8	16
Modulation Type (TCM)	128	128	128
Radio Data Rate (Mb/s)	6.18	12.4	24.7
System Gain (BER = 10^{-6}) @ 30 dBm (dB)*	110	107	104
Transmitter Power Output (dBm)	14	14	14
Optional Power Amplifier Outputs (dBm)	30	30	30
Receiver Threshold (BER = 10^{-6}) (dBm)*	-80	-77	-74
Maximum RSL for 10^{-6} BER (dBm)*	-17	-17	-17
Dispersive Fade Margin for 10^{-3} BER (dB)	80	80	66
Threshold/Interference			
Cochannel (dB)	34	34	34
Adjacent Channel (dB)	-8	-8	-8

MDR-8X02E Licensed- Ethernet Radios

EQUIPMENT IDENTIFIER	MDR-8502E-8	MDR-8702E-12
Ethernet Specifications		
Ethernet Forwarding Capacity	Up to 8 Mb/s	Up to 12 Mb/s
	14,585 pps	21,611 pps
Ethernet Latency (S/F)	265-1270 µs	185-1180 µs
RF Specifications		
Frequency Band (GHz)	2.450 - 2.483	2.450 - 2.483
RF Channel Bandwidth (MHz)	2.5	2.5
TDM Lines Capacity	8xDS1	16xDS1
Modulation Type (TCM)	32	128
Radio Data Rate (Mb/s)	9.093	13.135
System Gain (BER = 10^{-6}) @ 31 dBm (dB)*	115	108
Transmitter Power Output (dBm)	14	14
Optional Power Amplifier Outputs (dBm)	31	31
Receiver Threshold (BER = 10^{-6}) (dBm)*	-84	-77
Maximum RSL for 10^{-6} BER (dBm)*	-17	-17
Dispersive Fade Margin for 10^{-3} BER (dB)	80	80
Threshold/Interference		
Cochannel (dB)	28	34
Adjacent Channel (dB)	-8	-8

MDR-8702Eu Unlicensed - Ethernet Radios

EQUIPMENT IDENTIFIER	MDR-8702Eu-12	MDR-8702Eu-24
Ethernet Specifications		
Ethernet Forwarding Capacity	Up to 12 Mb/s	Up to 24 Mb/s
	21,611 pps	44,448 pps
Ethernet Latency (S/F)	185-1180 µs	95-575 µs
RF Specifications		
Frequency Band (GHz)	2.400 - 2.483	2.400 - 2.483
RF Channel Bandwidth (MHz)	2.5	5
TDM Lines Capacity	8xDS1	16xDS1
Modulation Type (TCM)	128	128
Radio Data Rate (Mb/s)	13.135	26.27
System Gain (BER = 10^{-6}) @ 30 dBm (dB)*	107	104
Transmitter Power Output (dBm)	14	14
Optional Power Amplifier Outputs (dBm)	30	30
Receiver Threshold (BER = 10^{-6}) (dBm)*	-77	-74
Maximum RSL for 10^{-6} BER (dBm)*	-17	-17
Dispersive Fade Margin for 10^{-3} BER (dB)	80	66
Threshold/Interference		
Cochannel (dB)	34	34
Adjacent Channel (dB)	-8	-8

*Typical values as measured at the antenna port for nonstandby and hot-standby/space diversity configurations. Hot-standby configurations will have 1 dB less receiver threshold on the A side and 10 dB less receiver threshold on the B side.

Note: These specifications are subject to change without notice.

TECHNICAL SUMMARY

Power Requirements

- Input voltage: +/- 20 V dc to +/- 60 V dc
- Typical power consumption per T/R @ 14 dBm:
  - ¬ MDR-8X02 (DS1): 66 Watts
  - ¬ MDR-8X02E (Ethernet): 71 Watts

Mechanical Dimensions & Interfaces

- Size: 12.25 x 19.0 x 16.25 in.
- Weight (1+1): 70 lb.
- RF interface: SMA (female) – other RF interfaces available
- DS1 interface: 37 pin D-type
- Ethernet interface: RJ-45 standard data connector or optical SFP
- Orderwire handset interface: RJ-11 standard telephone handset jack
- Alarm/Management interfaces:
  - ¬ SNMP = RJ-48, 10 Base-T
  - ¬ USI = RS-232
  - ¬ MCS-11 = RS-422
  - ¬ TBOS = RS-485
  - ¬ Parallel = Form A relays

Environmental

- Ambient temperature:
  - ¬ Specification compliant: 0° to +50° C
  - ¬ Operating without failure: -20° to +65° C
  - ¬ Storage: -40° to +80° C
- Relative humidity: 5 to 95% noncondensing
- Altitude:
  - ¬ Operating: -350 to 16,500 ft.
  - ¬ Storage: -350 to 40,000 ft.

Note: These specifications are subject to change without notice.

ABOUT ALCATEL-LUCENT WIRELESS TRANSMISSION:

With more than 50 years of experience in wireless transmission, Alcatel-Lucent provides the solid foundation for your mission-critical network, and continually fosters visions for the future. As a pioneer in point-to-point microwave radios, Alcatel-Lucent has demonstrated leadership in wireless technology.

Our history of design innovation began when the former Collins Radio Company developed the first commercial microwave radios in the 1950s. Alcatel-Lucent maintains the Collins tradition, setting the industry standard for microwave communications all over the world with scalable, reliable, economical and readily deployable wireless backbone communications systems.

In the last five years, Alcatel-Lucent has installed more than 300,000 microwave radios in more than 150 countries. For more information, visit www.alcatel-lucent.com/microwave or call 1-800-ALCATEL.

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