Alcatel-Lucent MDR-8000

2 GHz FEDERAL 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 1.755-1.850 GHz and 2.200-2.290 GHz bands used by agencies of the United States Government. 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 both DoD and non-DoD operators. Agencies accomodating new AWS operators don't have to relocate to 4 or 8 GHz or opt out for questionable – and expensive – leased lines. Staying in the 2 GHz range may even allow reuse of existing antenna systems and tower structures – 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. Existing 1700 MHz links may often be replaced without having to touch the tower. The MDR-8X02 offers customers transmission capacity from 4-32 DS1s, 1 DS3, and 10/100/1000 Base-T Ethernet, with the ability to upgrade capacity simply by changing Capacity Keys™. Wayside capacity provides an additional DS1 per each DS3-equivalent provided in the system.

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 U.S. Government Agencies.

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 100 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
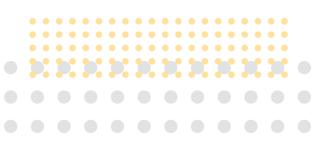 - ¬ Used to overcome propagation problems

MDR-8502 - Low to Medium Capacity (1755 - 1850 MHz)

EQUIPMENT IDENTIFIER	MDR-8502-4	MDR-8502-8	MDR-8502-16
Frequency Band (GHz)	1.755 - 1.850	1.755 - 1.850	1.755 - 1.850
RF Channel Bandwidth (MHz)	2.5	3.5	7.5
Capacity per RF Channel (DS1s)	4	8	16
Modulation Type (TCM)	32	32	32
Radio Data Rate (Mb/s)	6.18	12.4	24.7
System Gain (BER = 10^{-6}) @ 31 dBm (dB)*	117	114	111
Transmitter Power Output (dBm)	15	15	15
Optional Power Amplifier Outputs (dBm)	31	31	31
Receiver Threshold (BER = 10^{-6}) (dBm)*	-86	-83	-80
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)	28	28	28
Adjacent Channel (dB)	-8	-8	-8

MDR-8502 - Low to Medium Capacity (2200 - 2290 MHz)

EQUIPMENT IDENTIFIER	MDR-8502-4	MDR-8502-8	MDR-8502-16
Frequency Band (GHz)	2.200 - 2.290	2.200 - 2.290	2.200 - 2.290
RF Channel Bandwidth (MHz)	2.5	3.5	7.5
Capacity per RF Channel (DS1s)	4	8	16
Modulation Type (TCM)	32	32	32
Radio Data Rate (Mb/s)	6.18	12.4	24.7
System Gain (BER = 10^{-6}) @ 33 dBm (dB)*	119	116	113
Transmitter Power Output (dBm)	15	15	15
Optional Power Amplifier Outputs (dBm)	33	33	33
Receiver Threshold (BER = 10^{-6}) (dBm)*	-86	-83	-80
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)	28	28	28
Adjacent Channel (dB)	-8	-8	-8

MDR-8X02 - High Capacity (1755 - 1850 MHz)

EQUIPMENT IDENTIFIER	MDR-8702-32	MDR-8602-45
Frequency Band (GHz)	1.755 - 1.850	1.755 - 1.850
RF Channel Bandwidth (MHz)	10	10
Capacity per RF Channel	32xDS1	1xDS3
DS1 Wayside Line Capacity	N/A	1xDS1
Modulation Type	128 TCM	64 QAM
Radio Data Rate (Mb/s)	58.996	46.3
System Gain (BER = 10^{-6}) @ 31 dBm (dB)*	105	106
Transmitter Power Output (dBm)	15	15
Optional Power Amplifier Outputs (dBm)	31	31
Receiver Threshold (BER = 10^{-6}) (dBm)*	-74	-75
Maximum RSL for 10^{-6} BER (dBm)*	-17	-17
Dispersive Fade Margin for 10^{-3} BER (dB)	64	67
Threshold/Interference		
Cochannel (dB)	34	34
Adjacent Channel (dB)	-8	-8

MDR-8X02 - High Capacity (2200 - 2290 MHz)

EQUIPMENT IDENTIFIER	MDR-8702-32	MDR-8602-45
Frequency Band (GHz)	2.200 - 2.290	2.200 - 2.290
RF Channel Bandwidth (MHz)	10	10
Capacity per RF Channel	32xDS1	1xDS3
DS1 Wayside Line Capacity	N/A	1xDS1
Modulation Type	128 TCM	64 QAM
Radio Data Rate (Mb/s)	58.996	46.3
System Gain (BER = 10^{-6}) @ 33 dBm (dB)*	106	107
Transmitter Power Output (dBm)	15	15
Optional Power Amplifier Outputs (dBm)	33	33
Receiver Threshold (BER = 10^{-6}) (dBm)*	-73	-74
Maximum RSL for 10^{-6} BER (dBm)*	-17	-17
Dispersive Fade Margin for 10^{-3} BER (dB)	64	67
Threshold/Interference		
Cochannel (dB)	34	34
Adjacent Channel (dB)	-8	-8

MDR-8X02E - Ethernet Radios (1755 - 1850 MHz)

EQUIPMENT IDENTIFIER	MDR-8502E-8	MDR-8502E-12	MDR-8702E-12	MDR-8502E-24	MDR-8702E-24	MDR-8702E-50
Ethernet Specifications						
Ethernet Forwarding Capacity	Up to 8 Mb/s	Up to 12 Mb/s	Up to 12 Mb/s	Up to 24 Mb/s	Up to 24 Mb/s	Up to 50 Mb/s
	14,585 pps	21,611 pps	21,611 pps	44,448 pps	44,448 pps	91,910 pps
Ethernet Latency (S/F)	265-270 μs	185-1180 μs	185-1180 μs	95-575 μs	95-575 μs	194-425 μs
RF Specifications						
Frequency Band (GHz)	1.755 - 1.850	1.755 - 1.850	1.755 - 1.850	1.755 - 1.850	1.755 - 1.850	1.755 - 1.850
RF Channel Bandwidth (MHz)	2.5	3.5	2.5	7.5	5	10
TDM Lines Capacity	5xDS1	8xDS1	8xDS1	16xDS1	16xDS1	32xDS1
Modulation Type (TCM)	32	32	128	32	128	128
Radio Data Rate (Mb/s)	9.093	13.135	13.135	26.27	26.27	58.996
System Gain (BER = 10^{-6}) @ 31 dBm (dB)*	117	114	110	111	107	105
Transmitter Power Output (dBm)	15	15	15	15	15	15
Optional Power Amplifier Outputs (dBm)	31	31	31	31	31	31
Receiver Threshold (BER = 10^{-6}) (dBm)*	-86	-83	-79	-80	-76	-74
Maximum RSL for 10^{-6} BER (dBm)*	-17	-17	-17	-17	-17	-17
Dispersive Fade Margin for 10^{-3} BER (dB)	80	80	80	66	66	64
Threshold/Interference						
Cochannel (dB)	28	28	34	28	34	34
Adjacent Channel (dB)	-8	-8	-8	-8	-8	-8

MDR-8X02E - Ethernet Radios (2200 - 2290 MHz)

EQUIPMENT IDENTIFIER	MDR-8502E-8	MDR-8502E-12	MDR-8702E-12	MDR-8502E-24	MDR-8702E-24	MDR-8702E-50
Ethernet Specifications						
Ethernet Forwarding Capacity	Up to 8 Mb/s	Up to 12 Mb/s	Up to 24 Mb/s	Up to 24 Mb/s	Up to 24 Mb/s	Up to 50 Mb/s
	14,585 pps	21,611 pps	44,448 pps	44,448 pps	44,448 pps	91,910 pps
Ethernet Latency (S/F)	265-1270 μs	185-1180 μs	95-575 μs	95-575 μs	95-575 μs	194-425 μs
RF Specifications						
Frequency Band (GHz)	2.200 - 2.290	2.200 - 2.290	2.200 - 2.290	2.200 - 2.290	2.200 - 2.290	2.200 - 2.290
RF Channel Bandwidth (MHz)	2.5	3.5	7.5	7.5	5	10
TDM Lines Capacity	5xDS1	8xDS1	16xDS1	16xDS1	16xDS1	32xDS1
Modulation Type (TCM)	32	32	128	32	128	128
Radio Data Rate (Mb/s)	9.093	13.135	26.27	26.27	26.27	58.996
System Gain (BER = 10^{-6}) @ 33 dBm (dB)*	118	116	112	113	109	106
Transmitter Power Output (dBm)	15	15	15	15	15	15
Optional Power Amplifier Outputs (dBm)	33	33	33	33	33	33
Receiver Threshold (BER = 10^{-6}) (dBm)*	-85	-83	-80	-80	-76	-73
Maximum RSL for 10^{-6} BER (dBm)*	-17	-17	-17	-17	-17	-17
Dispersive Fade Margin for 10^{-3} BER (dB)	80	80	66	66	66	64
Threshold/Interference						
Cochannel (dB)	28	28	34	28	34	34
Adjacent Channel (dB)	-8	-8	-8	-8	-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 @ 15 dBm:
  - ¬ MDR-8502 (DS1): 69 Watts
  - ¬ MDR-8602 (DS3): 74 Watts
  - ¬ MDR-8702E (Ethernet): 71 Watts
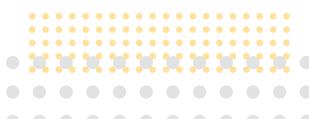
Mechanical Dimensions & Interfaces
- Size: 12.25 x 19.0 x 16.25 in.
- Weight (1+1): 70 lb.
- RF interface: SMA (female) - other RF interfaces available

- DS1 interface: 37 pin D-type
- DS3 interface: BNC 75 Ohm
- Ethernet interface: RJ-45 standard data connector or optical SFP
- Wayside DS1 interface: Two 9 pin D-type (one TX, one RX)
- 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: 0º to +50º C
  - ¬ Operating without failure: -20º to +65º C
  - ¬ Storage: -40º to +80º 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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