



CM

Digital Microwave Radios

**Operating at 6, 7, 8 & 11 GHz
With Capacities of 4, 8, 16E1
E3, STM-1 & 2x100BaseT**

The CM offers bandwidth efficient long haul data transmission for common carrier, cellular and private user networks. Its unique combination of in-field upgrades, high system gain, rugged modular construction and powerful anti-fade mechanisms ensures years of reliable service.

The CM Series flagship product, providing reliable long haul data transmission at rates from 4E1 to STM-1 in a single platform. In-field data rate upgrades, multiple system gain options, bandwidth efficiency, and a variety of protection configurations ensure that the CM is the cost effective solution for your current requirements with the flexibility to grow. All CM radios share a common architecture, regardless of data rate, protection configuration, or frequency. The design centers around a rack mounted chassis that houses a Customer Access Panel, a Signal Processing Card section, an RF Waveguide Filter compartment, and an RF Module section. This unique design allows simple data rate upgrades from the lowest to highest capacity by simply exchanging plug-in Signal Processing cards. The field-tunable synthesized RF transmitter and receiver modules are common to all data rates.

Reliable

- 100% in-factory testing over temperature
- No active single point of failure in protected systems
- Multiple switching levels in protected terminals
- Thousands deployed around the world
- State of the art design

Flexible

- In-field data rate and protection configuration upgrade
- Signal processing common to all frequency bands
- RF transmitters and receivers common to all data rates
- Multiple system gain options
- Standard Automatic Transmit Power Control
- Non-protected, Space Diversity, Frequency Diversity, 1+1 Protected configurations

Customer Satisfaction

Low Maintenance

- Fewer spares due to module commonality
- BER monitor, G.826 statistics
- Tributary, IF and RF loopback
- On-board alarm log
- SNMP or TeleScan Network Management
- All front access, hot-swappable modules

Upgrades

- 4E1 to STM-1 upgrade in the same platform
- Data rate upgrades require front access only
- Non-protected to Protected upgrade
- Protected to Space Diversity upgrade
- Minimum down time during upgrade

Technical Specifications

System Parameters

Operating Frequencies (Channel Plans)	5.925 - 7.125 GHz (ITU Rec. 383-5) 7.125 - 7.9 GHz (ITU Rec. 385-6) 7.9 - 8.5 GHz (ITU Rec. 386-5) 10.7 - 11.7 GHz (ITU Rec. 387-7)
Transmitter Source	Synthesized VCO - $\pm 0.001\%$
Receiver Local Oscillator	Synthesized VCO - $\pm 0.001\%$
Intermediate Frequency	70 MHz
Residual BER	$< 10^{-13}$

Service Channel

Data Channels (RS-232/RS-422)	
Quantity	2
Data Rate	19.2 kbps, async
Audio Channels	
Quantity/Frequency	2 x 300-3400 Hz
I/O Impedance	4-wire, 600 Ω
Input Level	-3.5 or -16 dBm
Output Level	-3.5 or +7 dBm

Orderwire (Optional)

Frequency	300-3400 Hz
Signaling	DTMF (Allows all-call, group and local)
Features	Talk Switch, 4-way/4-wire bridge

Wayside Traffic Unit (Optional)

(E3, SDH, 100BaseT only)	
Wayside Traffic Channel	2 (E3), 1(SDH, 100 BaseT)
Data Rate	2.048 Mbps
Connector	BNC (E3), RJ-11 (SDH, 100 BaseT)

External Alarms/Controls (Additional with NMU)

External Alarms	4 x TTL (4 x TTL w/ P4 NMU)
External Control	4 x Form C dry contact (4 x TTL w/ P4 NMU)

Additional Branching Losses

Configuration	TX A	TX B	RX A	RX B
1 + 1 Protected	0 dB	1 dB	0.5 dB	10.5 dB
1 + 1 Space Diversity	0 dB	1 dB	0 dB	0 dB
1 + 1 Frequency Diversity	0 dB	0 dB	0 dB	0 dB

Interface Parameters

Digital Interface	
E1	2.048 Mbps, HDB3 75 Ω unbalanced, BNC connector 120 Ω balanced, 50-pin connector
E3	34.368 Mbps, HDB3 75 Ω unbalanced, BNC connector
STM-1o	155.52 Mbps, 1310 nm SC connector, multimode standard, single mode optional
STM-1e	155.52 Mbps, CMI 75 Ω unbalanced, BNC connector
10/100BaseT	Up to 100 Mbps, IEEE 802.3 2 x RJ-45 jack
Network Management	
SNMP	10BaseT, RJ-45 jack
P4-TeleScan	19.2 kbps RS-485, RJ-11 jack
Local Access	19.2 kbps RS-232, DB-9 jack

2 x 100BaseT + E3

Channels	2 x 10/100BaseT auto-negotiating
Connector	2 x RJ-45 per channel, bridged
Bandwidth Priority	Channel 1 priority or No priority
Wayside	1 x E3 in-band (can be disabled) 1 x E1 out-of-band (optional)
Data Rate	155.52 Mbps

Electrical

Power Consumption (Non-protected / Hot standby)

APC High	Std Pwr	High Pwr	Double HP
CM6	105 / 195 W	160 / 315 W	180 / 320 W
CM7/8	125 / 205 W	220 / 335 W	235 / 350 W
CM11	130 / 235 W	190 / 355 W	n/a

APC Low

CM6	90 / 175 W	130 / 255 W	135 / 260 W
CM7/8	115 / 195 W	160 / 280 W	175 / 290 W
CM11	110 / 195 W	150 / 280 W	n/a

Input Voltage ± 19 to ± 60 Vdc

Mechanical

Height	84.5 cm. (19 RMUs)
Width	43.8 cm. (19" rack)
Depth	26 cm.
Weight	55 kg.

Operating Environment

Altitude	4,500m
Ambient Temperature	0° to +50°C
Humidity	95% (no condensation)

Technical Specifications

System Gain (dB)	4E1	8E1	E3	E3N	STM-1	2 x 100BaseT + E3
CM6	125.0	122.0	119.0	114.0	101.0	101.0
CM7/8	125.0	122.0	119.0	114.0	102.0/101.0	102.0/101.0
CM11	119.0	116.0	113.0	110.0	98.0	98.0
Transmitter						
			All capacities, synthesized VCO			
Modulation	QPSK	QPSK	QPSK	16 QAM	128 QAM	128 QAM
Channel Bandwidth (MHz)	7.0	14.0	28.0	14.0	28.0	28.0
Aggregate Data Rate (Mbps)	9.3	18.6	40.8	40.8	166.77	166.77
Emission Designator	7M0D7W	14M0D7W	28M0D7W	14M0D7W	28M0D7W	28M0D7W
Output Power (dBm) ¹						
Standard Power (ATPC high)						
CM6	23.5	23.5	23.5	22.5	20.5	20.5
CM7/8	28.0	28.0	28.0	27.0	23.0	23.0
CM11	23.0	23.0	23.0	22.0	22.0	22.0
High Power (ATPC high)						
CM6	29.0	29.0	29.0	29.0	28.0	28.0
CM7/8	33.0	33.0	33.0	30.0	28.0	28.0
CM11	28.0	28.0	28.0	28.0	28.0	28.0
DHP						
CM6	33.0	33.0	33.0	31.0	30.0	30.0
CM7/8	N/A	N/A	N/A	31.0	31.0/30.0	31.0/30.0
CM11	N/A	N/A	N/A	N/A	N/A	N/A
Receiver						
			All capacities, synthesized VCO			
10 ⁻⁶ BER Threshold (dBm) ¹						
CM6	-90.0	-87.0	-84.0	-81.0	-69.0	-69.0
CM7/8	-90.0	-87.0	-84.0	-81.0	-69.0	-69.0
CM11	-89.0	-86.0	-83.0	-80.0	-68.0	-68.0
10 ⁻³ BER Threshold (dBm) ¹						
CM6	-92.0	-89.0	-86.0	-83.0	-71.0	-71.0
CM7/8	-92.0	-89.0	-86.0	-83.0	-71.0	-71.0
CM11	-91.0	-88.0	-85.0	-82.0	-70.0	-70.0
Dispersive Fade Margin (dB)						
10 ⁻³ BER, w/ATDE	64.0	56.0	51.5	51.5	49.0	49.0

Footnotes:

1) Measured at the antenna port. These are typical specifications for non-protected systems and are subject to change without notice.

Data I/O Connections
50-pin AMP, BNC, SC-type optical and RJ45
10BaseT Ethernet connectors

Network Management Port

DC Power Fuses
19 Vdc to 60 Vdc, + or - ground

Auxiliary Channel Access
DTMF audio and RS-232 digital service
channels

Local Access Port
Menu driven terminal and link
diagnostics and monitoring

Access Panel
As few as two different access panels provide total
capacity coverage from 4E1 to STM-1, including
100Base-T, simplifying capacity upgrades.

Signal Processing
In addition to data processing and multiplexing, the
CM signal processing suite offers internal IF
loopback, tributary loopback, errorless diversity
switching, forward error correction, and ATDE.
Redundancy of all signal processing cards, multiple
levels of protection switching and no single point of
failure in the signal path ensure extremely high
reliability.

RF Waveguide Filters
Front accessible filter stack for non-protected, hot-
standby, and space or frequency diversity allows easy
frequency changes. The transmitter filter includes a
calibrated SMA on-line transmitter
monitor port.

RF Modules
Wide band synthesized transmitter and
receiver modules cover all data rates.
Modular transmitter, receiver and power
supplies are hot-swappable for easy in-field
maintenance. Automatic Transmit Power
Control (ATPC) reduces average power
consumption and increases service life.

RF Loopback Ports
Allows local RF loopback to assist in
equipment setup and
troubleshooting.



