

# Spectrum-DMR4X

## STM4, N x STM1, GigE, Ethernet, V.35 and E1 Radio System

### High Capacity SDH Microwave Radio Links

(5.8, 6, 7/8, 11, 13, 15, 18, 23, 26, 38GHz)

**Spectrum DMR4X** is a compact (only 2U), high density and carrier-class multi-service Microwave Radio System. It's mainly designed to fully utilize the present SDH network resource to provide heavy traffic service access for the Operator. Its service interfaces cover the standard STM-1/STM-4, Ethernet, E1, E3/DS3, V.35 and etc. Ethernet interface supports GFP framing protocol, VCAT and LCAS functionalities which comply with G.704 1 ITU-T standard.

**Spectrum DMR4X** provides wireless transmission of data, video, voice and etc. The system can connect with fibre networks to provide hitless SDH interface, work with other access network equipments, 3G mobile cellular base station, switch and router to form the network via PDH and Ethernet interfaces.

**Spectrum DMR4X** can support various capacity configurations, software controlled frequency and transmit power functionalities, which make it adaptive to global applications.

**Spectrum DMR4X** supports N+0, N+N N:1 and ring configurations. The modem and power supply functions utilize replaceable plug-in modules which makes onsite upgrade and maintenance easy and convenient.



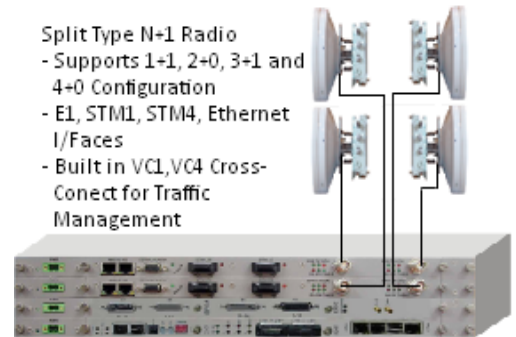
### Applications

- Wideband wireless access, wireless local loop (WLL) and access market
- Mobile cellular network, which require higher capacity due to an increase in subscriber, cell sites and data application
- Back up network for fiber optic trunk links.
- Private and Enterprises network such as educational institutions, financial institution and utility companies providing voice ATM & IP private networks

### Product Features

- Frequency: 5.8GHz~40GHz
- Single IDU. transmission capacity up to 622Mbps (28MHz)/ 1.2Gbps (56MHz\*)
- Standard STM-1/STM-4, Ethernet, E1, E3/DS3 and V35 interfaces with service aggregation function
- Adaptive Modulation Control (\*AMC) and bandwidth capacity controlled by software. (\*AMC is only available in Ethernet mode)
- N+0, N+N, N:1, multi-direction, Mesh, ring application, MSP & SNCP
- Up to 300-meter separation between IDU and ODU
- Built-in BER monitor, FEC, ATPC and RF, analog, and digital loopback functions
- SNMP, various optional NMS modes; selectable DCC channel transmission, DCN network access and private VC12/E1 channel transmission
- Ethernet port-GFP encapsulated protocol, VCAT (Virtual Concatenation) and LCAS (Link Capacity Adjustment Scheme) which are compliant with G.7041
- Easy operation, convenient maintenance, high reliability, low CAPEX and OPEX

Split Type N-1 Radio  
- Supports 1+1, 2+0, 3+1 and 4+0 Configuration  
- E1, STM1, STM4, Ethernet I/Faces  
- Built in VC1, VC4 Cross-Connect for Traffic Management



# Configuration Options

## DMR4X Multi-Service Radio System

- DMR4X ODU: Up to 1×STM-1 (28MHz) and 2×STM-1 (56MHz)
- DMR4X IDU Chassis:
  - \*Two card slots available, capacity up to 4×STM-1(28MHz), 4×STM-1 or GE ports, or up to 8×STM-1(56MHz), 4×GE ports
  - \*Two MUX cards or 1each MUX card and 1each PDH card
  - \*One MUX card- capacity up to 2×STM-1 (28MHz), 2×STM-1 or GE ports; or up to 4×STM-1 (56MHz) and 2×GE ports
  - \*One Super PDH module-capacity up to 48E1, 4×FE ports
- DMR4X Extension Unit: up to 2×STM-4 ports, 10×STM-1 ports, 96×E1 ports, 4×E3 ports, 16×FE ports or 4×GE ports

## DMR4X SDH Radio System

- DMR4X ODU: Up to 1×STM-1 (28MHz) and 2×STM-1 (56MHz)
- DMR4X IDU Chassis:
  - Up to 4×STM-1 (28MHz) with 4×STM1 or GE interfaces; Up to 8×STM-1 (56MHz) with 4×GE interfaces

## DMR4X Super PDH Compact Radio System

- DMR4X ODU: Up to 1×STM-1 (28MHz) or 2×STM-1 (56MHz)
- DMR4X IDU Chassis:
  - Up to 2×STM-1 (28MHz) with 2×STM-1 or GE interfaces; Up to 4×STM-1 (56MHz) with 2×GE interfaces
- DMR4X Extension Unit: up to 2×STM1 interfaces, 48×E1 interfaces, 4×FE interfaces or 2×GE interfaces

## DMR4X Super PDH Radio System

- DMR4X ODU: Up to 1×STM-1 (28MHz) or 2×STM-1 (56MHz)
- DMR4X IDU Chassis:
  - Up to 4×STM-1 (28MHz) with 4×STM-1 or GE interfaces; Up to 8×STM-1 (56MHz) with 4×GE interfaces
- DMR4X Extension Unit: Up to 2×STM-4 interfaces, 10×STM-1 interfaces, 96×E1 interfaces, 4×E3 interfaces, 16×FE interfaces or 4×GE interfaces

# Technical Specifications (ODU)

ODU- Technical Specification												
Frequency Standard	5.8GHz	6GHz	7/8GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	26 GHz	38 GHz		
RF output power (dBm)	ETSI/ITU/FCC											
	128QAM	0+20	0+20	0+20	0+16	0+17	0+16	0+15	0+15	0+14	0+11	
	64QAM	0+21	0+21	0+21	0+17	0+19	0+17	0+16	0+16	0+15	0+12	
	32QAM	0+22	0+22	0+22	0+19	0+20	0+18	0+17	0+17	0+16	0+13	
	16QAM	0+23	0+23	0+23	0+20	0+21	0+20	0+18	0+18	0+17	0+14	
	QPSK	0+27	0+27	0+27	0+24	0+25	0+23	0+22	0+22	0+21	0+18	
Accuracy (dB)	+/-2											
Tuning Increment (dB)	1											
RX at BER=10 <sup>-6</sup> (dBm)	56MHz / 40MHz	128QAM	-66	-66	-66	-65	-65	-65	-64	-64	-64	-63
		64QAM	-69	-69	-69	-68	-68	-68	-67	-67	-67	-66
		32QAM	-72	-72	-72	-71	-71	-71	-70	-70	-70	-69
		16QAM	-75	-75	-75	-74	-74	-74	-73	-73	-73	-72
		QPSK	-78	-78	-78	-77	-77	-77	-76	-76	-76	-75
	28MHz / 20MHz	128QAM	-69	-69	-69	-68	-68	-68	-67	-67	-67	-66
		64QAM	-72	-72	-72	-71	-71	-71	-70	-70	-70	-69
		32QAM	-75	-75	-75	-74	-74	-74	-73	-73	-73	-72
		16QAM	-78	-78	-78	-77	-77	-77	-76	-76	-76	-75
		QPSK	-81	-81	-81	-80	-80	-80	-79	-79	-79	-78
	14MHz / 10MHz	128QAM	-72	-72	-72	-71	-71	-71	-70	-70	-70	-69
		64QAM	-75	-75	-75	-74	-74	-74	-73	-73	-73	-72
		32QAM	-78	-78	-78	-77	-77	-77	-76	-76	-76	-75
		16QAM	-81	-81	-81	-80	-80	-80	-79	-79	-79	-78
		QPSK	-84	-84	-84	-83	-83	-83	-82	-82	-82	-81
	7MHz / 5MHz	128QAM	-75	-75	-75	-74	-74	-74	-73	-73	-73	-72
		64QAM	-78	-78	-78	-77	-77	-77	-76	-76	-76	-75
		32QAM	-81	-81	-81	-80	-80	-80	-79	-79	-79	-78
		16QAM	-84	-84	-84	-83	-83	-83	-82	-82	-82	-81
		QPSK	-87	-87	-87	-86	-86	-86	-85	-85	-85	-84
	3.5MHz / 2.5MHz	128QAM	-78	-78	-78	-77	-77	-77	-76	-76	-76	-75
		64QAM	-81	-81	-81	-80	-80	-80	-79	-79	-79	-78
		32QAM	-84	-84	-84	-83	-83	-83	-82	-82	-82	-81
		16QAM	-87	-87	-87	-86	-86	-86	-85	-85	-85	-84
QPSK		-90	-90	-90	-89	-89	-89	-88	-88	-88	-87	
Flange	N-type	N-type	UBR84	UBR100	UBR140	UBR140	UBR220	UBR220	UBR220	UBR320	UBR320	
System Capacity (Single ODU) / Mbps	3.5MHz/2.5MHz		7MHz/5MHz		14MHz/10MHz		28MHz/20MHz		56MHz/40MHz			
	128QAM		40		80		160		320			
	64QAM		30		60		130		260			
	32QAM		25		50		100		210			
	16QAM		20		40		80		160			
	QPSK		10		20		40		80			
IF Interface	For 50Ω coaxial ODU N/IDU TNC connector, Female					RSSI		Output voltage vs. RSL : 0V vs. -70V -25dBm				
Frequency Stability	±5ppm					RSL Accuracy		±2 dB				

## DMR4X Multi-Service Configuration

IDU- Technical Specification				
IDU MUX Module	Interface Type	2×STM-1 or GE		
	Interface Spec.	SC, S-1 for STM-1 or RJ45 for GE		
IDU Super PDH Module	Interface Type	48×E1 and 4×FE		
	Interface Spec.	50 pins for E1 and RJ45 for FE		
Extension Unit- Technical Specification				
SDH Interface	Maximum	STM-1	10	
		STM-4	2	
	Interface Type	SC/PC or FC/PC		
	Interface Spec.	S-1.1, L-1.1, L-1.2, S4.1, L4.1		
Service Module	PWR	-48VDC/220V AC Power Supply Unit 1+1 Hot Standby		
	NM01	EMS Network Management Unit (NCU)		
	OX01	Double STM-1 OMU		
	OX04	Double STM-4 OMU		
	OS01	Double STM-1 Branch Unit		
	EP01	24×E1 (75Ω or 120Ω)		
	EP03	12×E1 (75Ω or 120Ω)		
	EP02	1×E3/DS3		
	EP04	3×E3/DS3		
	FE01	4 FE over 4 VCG trunks (EoS)		
	FE02	4 Fx over 4 VCG trunks (EoS)		
	FE04	4 FE over 1~16E1 (EoE)		
	FE05	4 Fx over 1~16E1 (EoE)		
	ED01	2×V.35 unit 1 frame/unframe 1		
	DX02	64E1 Timeslot Cross Unit (2048×2048 64K)		
	GX01	GE interface		
	FE06	Ethernet Aggregation Unit, built-in layer 2 switching function		
LA01	Order wire Unit			
PDH Interface	E1 Interfaces	Maximum: 96ea		
	E3/DS3 Interfaces	Maximum: 4ea		
Ethernet Interface	Interface rate	10/100Base-Tx or 1000Base-Tx, compliant with IEEE 802.3		
	Maximum interface quantity	16×FE 4×GE		
	Encapsulation	Compliant with ITU-T G.7041 (VCAT, GFP, LCAS)		
V.35 Interface	Maximum interface quantity	8		
Cross Connection Capacity	High Order	32×32VC4 96×96VC3s		
	Low Order	2016×2016VC12s		
Network Management Interface	Interface	10/100 Base-T (stackable)		
Order Wire Interface	Interface	Standard RJ11		
System-Environmental, Power Supply and Mechanical Specification				
System Configuration	Space Diversity, Frequency Diversity, N+0, N+N, N:1, Multi Direction or Ring		Network Management	SNMP or Telnet
Temperature	IDU: -5~ 55°C; ODU: -35~ +55°C		Humidity	IDU: 0 ~ 95%, no condensation; ODU: all weather
Weight(kg) & Dimension (mm <sup>3</sup> )	IDU: 3.5/445x238.5x44.5 ; ODU: 3.0~3.5/225×225×90; Extension Unit: 3.0/445×238.5×44.5		Elevation	15,000ft / 4572 meters
Power Supply	Input power range	36~72VDC		
	Power consumption	1+0 1 ≤95W	1+1 1 ≤85W	Extension Unit: ≤40W

## DMR4X SDH Configuration Option

IDU- Technical Specification			
SDH Interface	Maximum	4×STM-1	
	Interface type	SC, S-1.1	
Ethernet Interface	Maximum	4×GE	
	Interface type	RJ45	
System- Technical Specification			
System configurations	N+0, N+N, Space Diversity, Frequency Diversity, Multi Direction or Ring		
Network Management	SNMP or Telnet		
Temperature	IDU: -5~ 55°C; ODU: -35~ +55°C	Elevation	15,000ft / 4572 meters
Humidity	IDU: 0 ~ 95%, no condensation; ODU: all weather		
Weight(kg) & Dimension (mm <sup>3</sup> )	IDU: 3.5/445x238.5x44.5 ; ODU: 3.0~3.5/225×225×90		
Power Supply	Input power range	36~72VDC	
	Power consumption	1+0 : ≤55W	1+1 : ≤85W

## DMR4X Super PDH Compact

IDU- Technical Specification			
SDH Interface	Maximum	2×STM-1	
	Interface type	SC, S-1.1	
PDH Interface	Maximum	48×E1	
	Interface type	75Ω or 120Ω	
Ethernet Interface	Maximum	4×FE/GE	
	Interface type	RJ45	
System- Technical Specification			
System Configuration	1+0, 1+1, Space Diversity, Frequency Diversity, Multi Direction or Ring		
Network Management	SNMP or Telnet		
Temperature	IDU: -5~ 55°C; ODU: -35~ +55°C	Elevation	15,000ft / 4572 meters
Humidity	IDU: 0 ~ 95%, no condensation; ODU: all weather		
Weight(kg) & Dimension (mm <sup>3</sup> )	IDU: 3.5/445x238.5x44.5 ; ODU: 3.0~3.5/225×225×90		
Power Supply	Input power range	36~72VDC	
	Power consumption	1+0 1 ≤55W	1+1 1 ≤85W

## DMR4X Super PDH Configuration Option

IDU- Technical Specification			
SDH Interface	Maximum	4*STM-1	
	Interface type	SC, S-1.1	
Ethernet Interface	Maximum	4*GE	
	Interface type	RJ45	
Extension Unit- Technical Specification			
SDH Interface	Max.	STM-1	10
		STM-4	2
	Interface type	SC/PC or FC/PC	
	Interface specification	S-1.1, L-1.1, L-1.2, S4.1, L4.1	
Service Module	PWR	-48VDC/220V AC power supply unit , 1+1 hot standby	
	NM01	EMS network management unit (NCU)	
	OX01	Double STM-1 OMU	
	OX04	Double STM-4 OMU	
	OS01	Double STM-1branch unit	
	EP01	24*E1 (75Ω or 120Ω)	
	EP03	12*E1 (75Ω or 120Ω)	
	EP02	1*E3/DS3	
	EP04	3*E3/DS3	
	FE01	4 FE over 4 VCG trunks (EoS)	
	FE02	4 Fx over 4 VCG trunks (EoS)	
	FE04	4 FE over 1~16E1 (EoE)	
	FE05	4 Fx over 1~16E1 (EoE)	
	ED01	2*V.35 unit ( frame/unframe )	
	DX02	64E1 timeslot cross unit (2048*2048 64K)	
	GX01	GE interface	
	FE06	Ethernet aggregation unit, built-in layer 2 switching function	
LA01	Order wire Unit		
PDH Interface	E1 Interfaces	Maximum quantity: 96	
	E3/DS3 Interfaces	Maximum quantity: 12	
Ethernet Interface	Interface rate	10/100Base-Tx or 1000Base-Tx, compliant with IEEE 802.3	
	Maximum interface quantity	16*FE , 4*GE	
	Encapsulation	Compliant with ITU-T G.7041 (VCAT, GFP, LCAS)	
V.35 Interface	Maximum interface quantity	8	
Cross Connection Capacity	High Order	32*32VC4s ; 96*96VC3s	
	Low Order	2016*2016VC12s	
Network Management Interface	Interface	10/100 Base-T (stackable)	
Order Wire Interface	Interface	Standard RJ11	
System- Technical Specification			
System Configuration	Space Diversity, Frequency Diversity, N+0, N+N,N:1, Multi Direction or Ring	Network Management	SNMP or Telnet
Temperature	IDU: -5~ 55°C; ODU: -35~ +55°C	Humidity	IDU: 0 ~ 95%, no condensation; ODU: all weather
Weight(kg) & Dimension (mm <sup>3</sup> )	IDU: 7.5/445x238.5x89 ; ODU: 3.0~3.5/225*225*90	Elevation	15,000ft / 4572 meters
Power Supply	Input power range	36~72VDC	
	Power consumption	1+0 : ≤95W	1+1 : ≤125W

56MHz BW and AMC function will be available in the 2<sup>nd</sup> half of 2009.

All specifications are typical values and subject to change without prior notice.