



Technical Specifications

This appendix contains the following technical specifications for the Cisco uBR924 cable access router:

- Physical, Power, and Environmental Specifications
- Data Specifications
- Voice Specifications

Physical, Power, and Environmental Specifications

Table A-1 lists the Cisco uBR924 cable access router physical specifications and power requirements.

Table A-1 Cisco uBR924 Cable Access Router Physical Specifications

Description	Specification
Dimensions (H x W x D)	2.30 x 13 x 9.30 in. (5.842 x 33.02 x 24.77 cm)
Weight	3 lb (1.36 kg) 1 lb (0.45 kg) for the AC-input external power supply
AC-input voltage	120 to 240 VAC ¹ wide input with power factor correction
AC-input current rating	1.2A ² maximum at 120 VAC and 0.6A maximum at 240 VAC
AC-input cable	18 AWG ³ three-wire cable, with a three-lead receptacle on the power supply end, and a North American (NEMA 5-15P) plug on the power source end; other country-specific cords are available and supplied as ordered.
Power dissipation	12 to 15W
Frequency	50/60 Hz ⁴
Temperature	32° to 104°F (0 to 40°C) operating; -13° to 158°F (-25° to 70°C) nonoperating
Humidity	5 to 95% noncondensing
Noise level	38 dBA ⁵ maximum at desktop, 43 dBA maximum in an office

Table A-1 Cisco uBR924 Cable Access Router Physical Specifications (continued)

Description	Specification
Software requirement	Cisco uBR924 cable access router software—Cisco IOS Release 12.0(4)XI or higher
Agency approvals	Safety: UL 1950, CSA 22.2 No. 950, EN60950, IEC60950, AS/NZS3260, TS001 EMI: FCC Class A, FCC Class B, CSA Class A, EN60555-2, EN55022 Class B, VCC1 Class 2, AS/NZS 3548 Class A Immunity: IEC-1000-4-2, IEC-1000-4-3, IEC-1000-4-4, IEC-1000-4-5, IEC-1000-4-6, IEC-1000-4-11, IEC-1000-3-2, IEC 60950, AS3260, TS001 See also Appendix C, “Regulatory Compliance and Safety Information.”

1. VAC = volts alternating current.
2. A = ampere.
3. AWG = American Wire Gauge.
4. Hz = hertz.
5. dBa = adjusted decibels.

Data Specifications

Table A-2 lists the specifications for the Cisco uBR924 cable access router's data ports.

Table A-2 Cisco uBR924 Cable Access Router Data Specifications





Description	Downstream Values	Upstream Values
Frequency Range	88 to 860 MHz	5 to 42 MHz
Modulation	64 QAM 256 QAM	QPSK 16 QAM
Data Rate	30 Mbps/64 QAM (27 Mbit/sec after FEC overhead) 42.8 Mbps/256 QAM (36 Mbit/sec after FEC overhead)	QPSK—320 Kbit/sec to 5 Mbit/sec 16 QAM—640 Kbit/sec to 10 Mbit/sec
Bandwidth	6 MHz	200K, 400K, 800K, 1.6M, 3.2 MHz
FEC	RS (122, 128) Trellis	
Signal-to-Noise Ratio (SNR)	<p>64 QAM: >23.5 dB @ BER<10⁻⁸</p> <p>256 QAM*: >30 dB @ BER <10⁻⁸ (For input level between +15 and -8 dBmV, SNR must be greater than 30 dB. For input level between -8 and -15 dBmV, SNR must be greater than 33 dB.)</p> <p> Note These performance numbers are in laboratory-controlled conditions, against statistically pure noise sources (AWGN). Since such conditions do not exist in practise, a 6 or more dB SNR margin is required for reliable operation. Check with your local system guidelines.</p>	<p>QPSK: >15 dB @ BER<10⁻⁸ (QPSK will work at 98% successful ping rate for SNR>13 dB. An SNR of 15 dB will be needed to get almost optimal packets per minute transition.)</p> <p>16 QAM: >22 dB @ BER <10⁻⁸ (For 16 QAM, an SNR>22 dB makes the grade for 98% ping efficiency. To get good packet rate, you need SNR>25 dB)</p> <p> Note These measurements were done for 0 and -10 dBmV input to the CMTS, 1280 ksym/sec and 64 bytes packet size with a Cisco uBR904 and laboratory-controlled conditions.</p>

Table A-2 Cisco uBR924 Cable Access Router Data Specifications (continued)

Description	Downstream Values	Upstream Values
One Channel	Receive level of digital signal -15 to +15 dBmV  Note Most field measurements are of nearby or adjacent analog signal which is normally +6 to +10 dB (system specific) above the digital signal level	QPSK— +8 to +58 dBmV 16 QAM— +8 to +55 dBmV
Security	DES decryption: DOCSIS Baseline Privacy (BPI), 40-bit, 56-bit, and 168-bit DES encryption, as controlled by the headend and configuration files.  Note Cisco IOS images must contain encryption software at both the CMTS and the Cisco uBR924 router. Both routers must be enabled and properly configured to support encryption.	DES encryption

Voice Specifications

Table A-3 lists the specifications for the voice ports on the Cisco uBR924 cable access router.

Table A-3 Cisco uBR924 Cable Access Router Voice Specifications

Metric	Value										
Loss (between DCS and BTI gateway)	Nominal: 4 dB \pm 0.5 dB (off hook) Nominal: 9 dB \pm 0.5 dB (on hook)										
Attenuation distortion: DCS <> BTI (200Hz-3.5kHz) BTI<> DCS (304 Hz-3004Hz) DCS -> BTI (204 Hz-3004 Hz)	Nominal: +1 dB/-3 dB \pm 0.5 dB \pm 0.5 dB										
Idle channel noise	\leq 18 dBmC (noise shall not exceed)										
Signal to C-notched noise	\geq 35 dB										
Inter-modulation distortion: R2 R3	\geq 52 dB \geq 52 dB										
Single frequency interference: 0 to 12 kHz 0 to 4 kHz	\leq -28 dBmO \leq -40 dBmO										
Frequency shift (offset)	\leq \pm 0.2 Hz (max) \leq \pm 0.1 Hz (99.5%)										
Amplitude tracking (input Level, dBmO): -37 to 0 (on-hook) -37 to +3 (off hook) -50 to -37 (off-hook) -55 to -50 (off-hook)	<table border="0"> <thead> <tr> <th>Max Dev.</th> <th>Ave. Dev.</th> </tr> </thead> <tbody> <tr> <td>\leq \pm 0.5 dB</td> <td></td> </tr> <tr> <td>\leq \pm 0.5 dB</td> <td>\leq \pm 0.25 dB</td> </tr> <tr> <td>\leq \pm 1.0dB</td> <td>\leq \pm 0.5 dB</td> </tr> <tr> <td>\leq \pm 3.0 dB</td> <td>\leq \pm 1.5 dB</td> </tr> </tbody> </table>	Max Dev.	Ave. Dev.	\leq \pm 0.5 dB		\leq \pm 0.5 dB	\leq \pm 0.25 dB	\leq \pm 1.0dB	\leq \pm 0.5 dB	\leq \pm 3.0 dB	\leq \pm 1.5 dB
Max Dev.	Ave. Dev.										
\leq \pm 0.5 dB											
\leq \pm 0.5 dB	\leq \pm 0.25 dB										
\leq \pm 1.0dB	\leq \pm 0.5 dB										
\leq \pm 3.0 dB	\leq \pm 1.5 dB										
Crosstalk	\leq -65 dBmO										
Amplitude jitter 20-300 Hz 4-300 Hz	\leq 2.5% Peak \leq 2.9% Peak										
Phase jitter 20 to 300 Hz 4 to 300 Hz	\leq 1.5 P-P \leq 1.8 P-P										
Envelope delay distortion: 1704 Hz to 604 Hz 1704 Hz to 2804 Hz 1704 Hz to 204 Hz 1704 Hz to 3404 Hz	\leq 350 usec \leq 195 usec \leq 580 usec \leq 400 usec										

Table A-3 Cisco uBR924 Cable Access Router Voice Specifications (continued)

Metric	Value
Hybrid balance:	
Echo Return Loss (ERL)	> 26 dB (standard test line) > 14 dB (station off hook)
SRL	> 21 dB (standard test line) > 11 dB (station off hook)
Clipping: Speech segments <5 ms Speech segments > 5ms	< 0.5% 0.0%
Impulse noise: (>= 6 dB below receive signal)	0 in 93% of all 15 min intervals <= 1 count in all 30 min intervals
Phase hits (>= 10 deg)	0 in 99.75% of all 15 min intervals <= 1 count in all 30 min intervals
Gain hits (>= ± 3dB)	0 in 99.9% of all 15 min intervals <= 1 count in all 30 min intervals
Dropouts (>= 12)	0 in 99.9% of all 15 min intervals <= 1 count in all 60 min intervals
Ringer voltage and frequency	52 VRMS (max, short loop, balanced ringing) at a default of 20 Hz—the frequency can be changed using the voice-port ring frequency configuration command.
Port terminating impedance	600 ohms (default)—this can be changed using the voice-port impedance configuration command.