

NCL1170

WaveRider NCL1170 Wireless Bridge/Router

WaveRider's new NCL1170 Bridge/Router sets the standard for performance, robustness, and dependability in wireless broadband communication. The NCL1170 enables reliable broadband connections between two or more corporate computer networks, outlying offices, and the Internet. Employing several key technical innovations, this newest offering in the WaveRider NCL family is the feature and performance leader in license-exempt wireless connectivity for LAN-to-Internet and LAN-to-LAN applications.

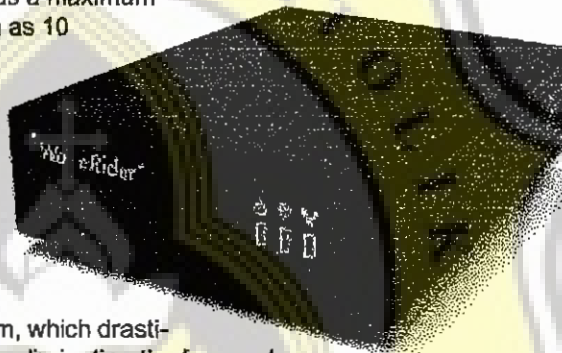
Using Direct Sequence Spread Spectrum modulation in the license-exempt 2.4 GHz ISM band, the NCL1170 can be deployed quickly and easily without applying for regulatory approvals, and without incurring any licensing or service charges. Compared to traditional leased lines, NCL1170 wireless links typically deliver ROI payback in less than twelve months.

Best-in-Class Radio Performance

The NCL1170 uses WaveRider's proprietary new radio which has a maximum transmit power of +25 dBm (where regulations permit), as much as 10 times higher than competitive products. Combined with a receive sensitivity of -84 dBm, the NCL1170 can connect sites as far away as 7 miles (11 km) with an omnidirectional antenna, or up to 10 miles (16 km) with a 120° sector antenna. The NCL1170 also offers exceptional performance in environments with heavy EM interference, and in near-line-of-sight applications.

Best-in-Class Data Throughput

The NCL1170 features WaveRider's proprietary polling algorithm, which drastically improves performance in point-to-multipoint applications by eliminating the frequent packet collisions inherent with CSMA/CA. The NCL1170 provides peak data rates of up to 3 Mbps for up to 30 users per base station, while eliminating the potential for individual users to consume disproportionate bandwidth. In point-to-point mode, the NCL1170 is capable of data throughput rates in excess of 8 Mbps. The over-the-air data rate of the NCL1170 is 11 Mbps.



NCL1170 at a glance

- High transmit power (25 dBm where regulations permit) and excellent receive sensitivity eliminate the need for expensive external amplifiers
- Maintains optimal links up to 10 miles (16 km) with 120° sector antennas, or 7 miles (11 km) with omnidirectional antennas
- Delivers over-the-air data rates of 11 Mbps, and up to 8 Mbps of data throughput
- Supports both point-to-point and point-to-multipoint applications maintaining maximum throughput
- Operates in the 2.4 GHz ISM band, license-exempt in the U.S., Canada, and many other countries
- Direct Sequence Spread Spectrum delivers high-speed throughput and ensures secure, reliable communication
- Forwarding Modes: Bridging (default Learning Bridge) and IP Routing (RIP v2 and default Static Routing)
- Front-mounted RSSI (Receive Signal Strength Indicator) LED
- PC-based GUI (Graphical User Interface), Command Line Interface, and Web Browser-based for programming and monitoring RF and IP network conditions
- Built-in SNMP functionality ensures trouble-free integration and management with existing networks
- Built-in RF Network Management and Diagnostic tools, and RSL (Receive Signal Level) monitor

For more information on the NCL family of products, please visit our website.

www.waverider.com

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NCL1170 TECHNICAL SPECIFICATIONS

Model Number: NCL1170
Order Number (SKU): 100-1170

Radio Specifications

Operating Frequency: 2.4000 to 2.4835 GHz
Radio Type: Direct Sequence Spread Spectrum (DSSS)
Radio Modulation: CCK (Complementary Code Keying) @ 11, 5.5 Mbps
QPSK (Quadrature Phase Shift Keying) @ 2 Mbps
BPSK (Binary Phase Shift Keying) @ 1 Mbps
Tx Output Power: High setting: +25 dBm
Low setting: +20 dBm
Rx Threshold (<8% PER): -84 dBm
Minimum Center Channel Frequency: 2.412 GHz
Maximum Center Channel Frequency: 2.462 GHz
Channel Bandwidth: 22 MHz
Center Frequency Spacing Increment: 5 MHz
Orthogonal Channels: 3
Orthogonal Channel Separation: 25 Mhz
Orthogonal Channel Set: Channels 1, 6, and 11
Orthogonal Channel Set Center Frequencies: 2.412 GHz, 2.437 GHz, 2.462 GHz
Adjacent Channel Isolation Requirement: 64 dB
Adjacent Channel Isolation Requirement (with optional cavity filters): 24 dB
Antenna Connector: WaveRider Proprietary

Radio Performance

Average-the-Air Raw Data Rate: 11 Mbps (5.5 Mbps, 2 Mbps, 1 Mbps)
Raw Data Rate: Up to 8 Mbps
Maximum Link Path Distance: Up to 10 miles (16 km)
System Capacity: 30 Stations per Master

Interfaces

Network Interface: Ethernet 10BaseT RJ-45
Configuration/Setup Port: RS-232C DB9 DCE

Power Specifications

Power Supply Input: Auto-sensing 90 - 260 VAC, 50/60 Hz
Power Supply Output: 7.5 VDC, 4 A max
Power Consumption (typical): 15 W

Environmental Specifications

Operating Temperature: 32° F to 131° F (0° C to 55° C)
Operating Humidity: 10% to 80% Relative Humidity (non-condensing)
Product Weight: 2.5 lbs (1.2 kg) excluding power supply
Shipping Weight: 3 lbs (1.4 kg)
Physical Dimensions: 7.5" L x 2" H x 5.9" W (19 cm x 5 cm x 15 cm)

Regulatory Approvals

Radio Transmitter: FCC Class A, CFR 47 Part 15
Industry Canada RSS-102 and RSS-139
Safety: CSA (pending)
UL (pending)

Warranty

1 Year limited parts and labor
(refer to WaveRider Warranty Agreement)

Note: WaveRider's Continuous Improvement Policy means that specifications are subject to change without notice.

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NCL Interfaces



**Antenna
Connector
(WAN Port)**

**RS232
Console
(Config Port)**

**10bT ENet
Connector
(LAN Port)**

**D.C.
Power**

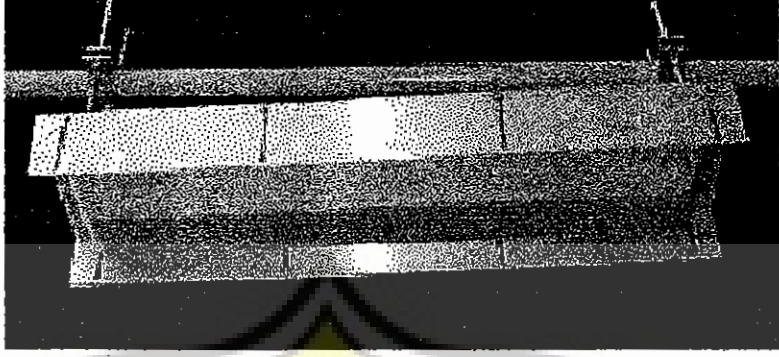
Omni

- used at the CCU or Master NCL for wide coverage
- typical gains of 3 to 10 dBi



Sectoral

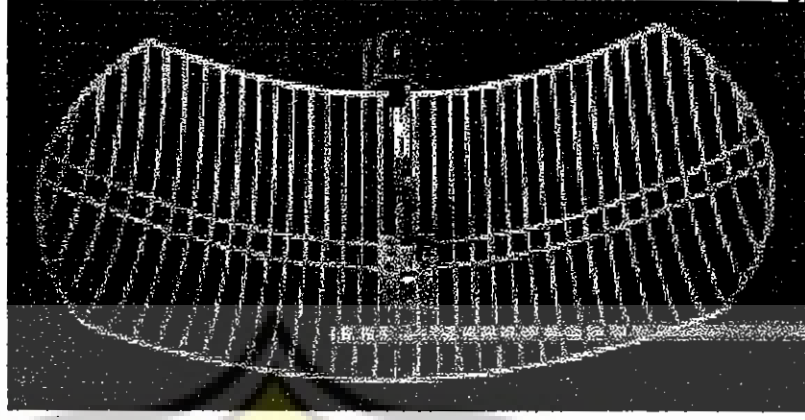
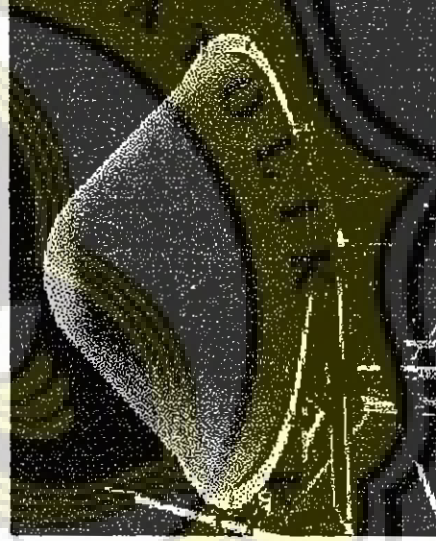
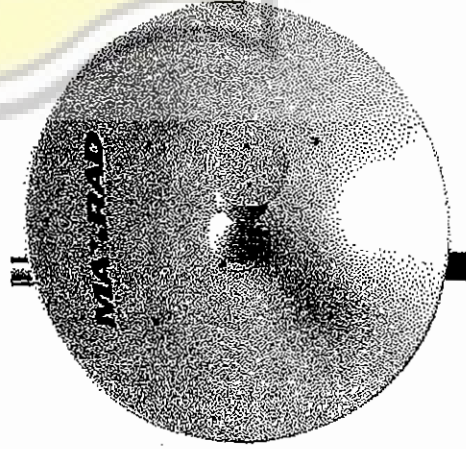
- directional in nature, but can be adjusted anywhere from 45° to 180°
- typical gains vary from 10 to 19 dBi



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Parabolic

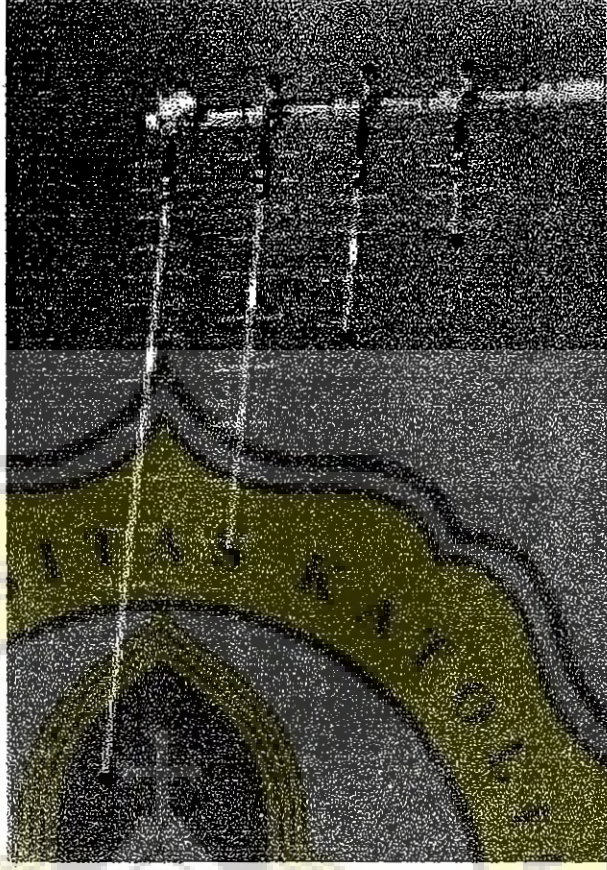
- used in medium to long links
- gains of 18 to 28 dBi
- most common



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Yagi

- better suited for shorter links
- lower dBi gain; usually between 7 and 15 dBi



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Free Space Loss :

Adalah rugi-rugi (loss) dalam decibel, yang disebabkan oleh penyebaran (spreading) gelombang ketika ia merambat ke luar dari sumber, dikenal dengan rugi jalur transmisi (L).

$$L = (32,5 + 20 \log_{10} d + 20 \log_{10} f)_{dB}$$

$$P_{Di} = \frac{P_T}{4\pi d^2} \text{ W/m}^2 \dots\dots\dots 1$$

P_T = daya rata-rata yang terpancar sama ke semua arah (isotropis)

P_{Di} = kerapatan daya isotropik

$$P_D = P_{Di} G_T$$
$$= \frac{P_T G_T}{4\pi d^2} \dots\dots\dots 2$$

P_D = kerapatan daya radiasi maksimum sepanjang arah

G_T = perolehan keterarahan maksimum antenna pemancar

P_R = daya yang diberikan oleh antenna ke beban (penerima)

G_R = perolehan keterarahan maksimum antenna penerima

$$P_R = P_D A_{eff}$$
$$= \frac{P_T G_T}{4\pi d^2} A_{eff} \dots\dots\dots 3$$

$$\frac{A_{eff}}{G_R} = \frac{\lambda^2}{4\pi} \dots\dots\dots 4$$

λ = panjang gelombang dari gelombang yang dipancarkan

$$\lambda = \frac{c}{f}$$

$$P_R = P_D A_{eff}$$
$$= \frac{P_T G_T}{4\pi d^2} \times \frac{G_R \lambda^2}{4\pi}$$

$$\frac{P_R}{P_T} = G_T G_R \left(\frac{\lambda}{4\pi d} \right)^2 \dots\dots\dots 5$$

