Mechanical and Environmental

- Die-Cast Aluminum Enclosure (see Figure 4).
  - ⇒ 20.3 x 35.6 x 7.6 cm.
  - ⇒ 3.6 kg.

- Enclosure mounts below or above the antenna on a 1.5-2.5" (3.8-6.3cm) mast using the mounting kit that comes with the unit, as shown in Figure 4. An optional mounting kit is available that accommodates mast sizes from 1.5-4.5" (3.8-11.4cm).

- Temperature:
  - ⇒ Storage: -40 to +85°C
  - ⇒ Operation: -40 to +60°C

- Gasket-sealed against wind-driven precipitation

- Cable attachments are shown in Figures 3 and 4.
  - ⇒ Grounding lug is a screw terminal
  - ⇒ Antenna cable connections are female bulkhead N connectors, which in turn connect to the internal antenna ports via semi-rigid cables with female SMA connectors

Photo of unit goes here.

Back: *Ground Lug* *Ethernet* *Power*
Front: *5.8 GHz Antenna Port* *2.4 GHz Antenna Port*

Figure 3 Bottom View of Enclosure and Cabling

Photo of unit goes here.

Figure 4 Front View of Enclosure and Cabling

level of management information from which routers, and select community names, user names, and passwords accordingly. FTP/HTTP/Telnet passwords should only be provided to network management staff who are allowed to reconfigure the routers, including making changes to passwords and SNMP access writes. SNMP community names with write access allows limited reconfiguration rights, but does not include the rights to change users, passwords, or community names. SNMP community names with read access do not allow any system configuration changes to be made, but do allow viewing of system usage and error statistics.

Availability

Highly available configurations can be implemented at the cost of deploying redundant hardware routers. Redundant units (and antennas) can be added at the central sites and/or remote sites depending on the availability needs of the applications.

Plan Network

Location of Central Sites

The choice of central site locations is critical for obtaining the highest possible level of system performance. There are several technical considerations for choosing good central site locations, including:

- Clear line-of-sight (LOS) paths exist from the central site to the remote sites
- Distances between central and remote sites allow for good radio path margins
- Number of remotes to be supported is within capacity of central site routers
- 5.8 GHz radio interference should be as low as possible at the central location
- Access to power, and network links to backbone networks or data centers exist.

It is highly recommended to obtain the services of experienced local radio equipment installers.

Number of Central Routers

Up to ten central routers may be co-located at any one central site, when operating using the default (U.S.) frequency band. The number of routers to be used is based on the total network traffic capacity to be supported from the site, and the geographical locations of the remote sites. It may be desirable to increase the number of central routers (beyond the number needed to meet the capacity requirements) in order to allow the use of higher gain sector antenna to increase the radius of the coverage area.

Antenna Considerations

Each central router forms a radio network separate and distinct from each other central router's network. As such, the installer is free to use whatever types of antennas make the most sense for each central router, given the required geographical coverage area for each central radio network. It is allowable to connect more than one antenna to one router's transmit or receive ports. One antenna may be connected to multiple routers' receive ports, or using a splitter/isolator, to multiple routers' transmit ports.

Omnidirectional antennas typically provide between 0 and 12 dBi gain, and are most appropriate when only a few central routers are co-located, and remote routers are spread around a 360° azimuth. A single central router with an omnidirectional antenna can be used to quickly and economically deploy a network.

Sectored antennas typically provide between 12 and 18 dBi gain, and typically cover between a 30° and 120° azimuth. For example, to cover 360° of azimuth using 90° azimuth 16 dBi antennas, one would typically use at least four central routers, each connected to its own sector antenna. Since each central radio forms an independent radio network, sectors may overlap to provide the desired amount of network capacity to any geographical area. To allow for the ability to re-balance remotes routers between multiple central site routers, it may be desirable to implement overlapping sectors, where each remote router is within the beam pattern of more than one central router. For example, using eight 90° sector antennas would allow each remote router to be configured to communicate with one of two different central routers; if one central router became too heavily loaded, some of its remote routers could be reconfigured to use the other central router.

Note that the highest gain antennas will allow for the maximum possible distance, but may not provide good coverage to close-in remotes that are well below the antenna's elevation. Adding a central router that uses a low-gain omnidirectional antenna can cover close-in remotes.

Where their are no regulatory transmit EIRP limits[1], the use of sectored antennas will generally increase the radio path strength, making it possible to reach remotes at greater distances. In countries where there is a transmit EIRP limit, the installer must trade-off between transmitter power and the gain of the installed antenna, which reduces the distance advantage of using sector antennas at the central site. Whenever there are multiple co-located central routers, the use of sectored antennas reduces the level of cross interference between the different radio networks. This is the generally recommended approach, even if it does not yield a radio path distance benefit.

To determine the distance obtainable from various combinations of transmit power and antennas used, first calculate the total RF path available (after allowing for path margins). Note that the gain of the central antenna should be the gain at the lowest point utilized on its azimuth/elevation, which is typically 1 to 4 dB lower than its maximum gain.

[1] The U.S. FCC regulations place a limit of +36 dBm on the combination of transmitter power and antenna gain for point-to-multipoint transmitters. Since the central router transmits to all remotes, the central router and its antenna must meet this limit. Since the remote router transmits only to a single central router, it is a point-to-point link and is not subject to this limit. In the special case that the central router is configured with a single remote in a point-to-point configuration, then the FCC EIRP limit does not apply to either the central or remote router.

Path $_{dB}$	=	**Tx Power** $_{dBm}$	(+24 dBm maximum)
		+ Central Antenna Gain $_{dBi}$	(+7 to +16 dBi typical)
		+ Remote Antenna Gain $_{dBi}$	(+14 to +28 dBi typical)
		- Rx Sensitivity $_{dBm}$	(-88 dBm @ 10^{-6} BER)
		- Antenna Cables Losses $_{dB}$	(.5 to 1 dB for typical 1-2 meter cables)
		- RF Path Margin $_{dB}$	(15 dB recommended)

Assuming a clear line-of-sight path, the following distances should be obtainable (values shown are for 5.8 GHz, since it is the limiting factor):

Path $_{dB}$	**101**	**104**	**107**	**110**	**113**	**116**	**119**	**122**	**125**	**128**	**131**	**134**	**137**	**139**
Distance $_{km}$	0.4	0.6	0.8	1	1.7	2.5	3.5	5	7	10	14	20	27	32

Obstacles nearby the path, even if not directly blocking it, may substantially reduce the obtainable distances. Over-water paths may also result in reduced distances. Experienced RF path planners should be consulted to estimate the obtainable paths based on the facts and circumstances of each situation.

The following distance table assumes a 15 dB path margin.

Central Tx Antenna 2.4 GHz	**Central Rx Antenna 5.8 GHz**	**Remote Antenna (Rx/Tx) 2.4/5.8 GHz**	**Central Tx Power**	**Remote Tx Power**	**Distance**	**Meets U.S. FCC EIRP?**
Omni 8 dBi	Omni 8 dBi	1 Foot Dish 14/21 dBi	+24 dBm	+24 dBm	7 km	Yes
Omni 8 dBi	Omni 8 dBi	2 Foot Dish 21/28 dBi	+24 dBm	+24 dBm	16 km	Yes
90 deg Sector 16 dBi	90 deg Sector 16 dBi	1 Foot Dish 14/21 dBi	+20 dBm	+24 dBm	9 km	Yes
90 deg Sector 16 dBi	90 deg Sector 16 dBi	2 Foot Dish 21/28 dBi	+20 dBm	+24 dBm	20 km	Yes
90 deg Sector 16 dBi	90 deg Sector 16 dBi	1 Foot Dish 14/21 dBi	+24 dBm	+24 dBm	13 km	No
90 deg Sector 16 dBi	90 deg Sector 16 dBi	2 Foot Dish 21/28 dBi	+24 dBm	+24 dBm	29 km	No
1 Foot Dish 14 dBi	(Same as Tx) 21 dBi	1 Foot Dish 14/21 dBi	+24 dBm	+24 dBm	18 km	Yes (If used point-to-point)
2 Foot Dish 21 dBi	(Same as Tx) 28 dBi	1 Foot Dish 14/21 dBi	+24 dBm	+24 dBm	32 km	Yes (If used point-to-point)

Notes: Omni antenna de-rated 1 dB for elevation variations.
Sector antenna de-rated 3 dB for azimuth plus 1 dB for elevation variations.
Distances determined by weaker of central-to-remote or remote-to-central paths.

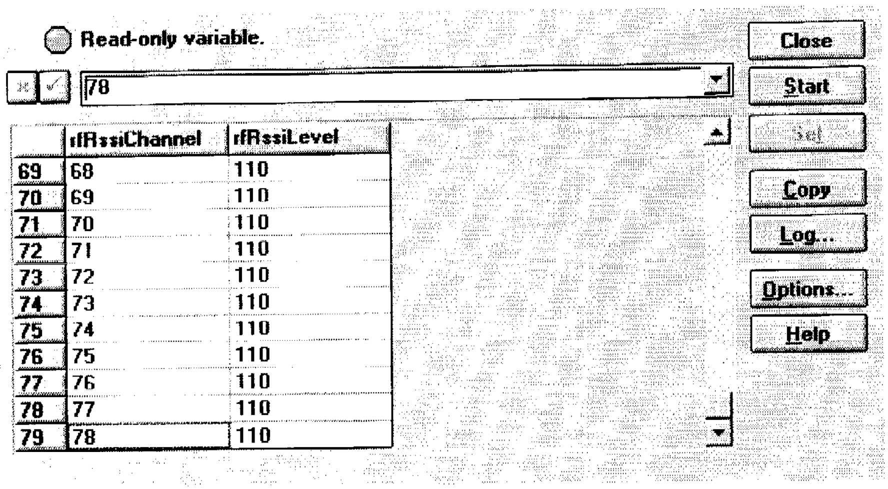
A list of antennas complied with U.S. FCC Type certification is available in Appendix D.

Avoiding Interference Sources

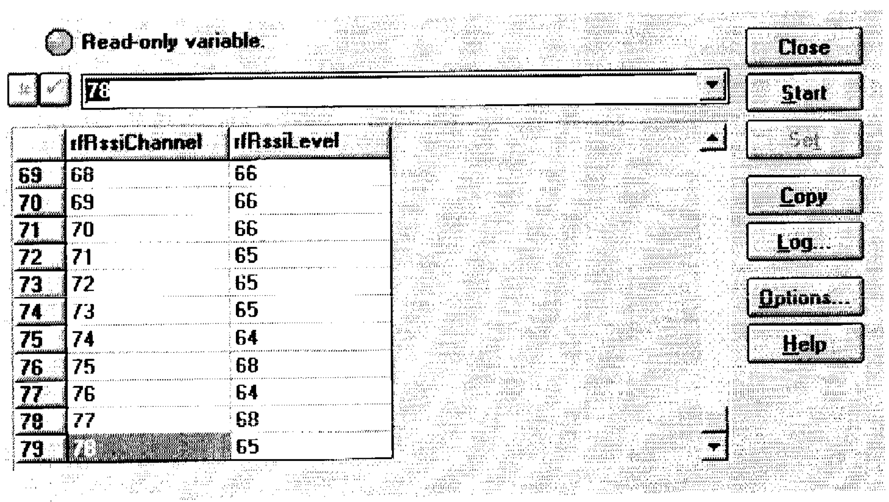
The greatest potential for serious levels of interference is other 2.4 GHz radio equipment that is located at the same site as *WaveNet IP 2458* remote routers, or 5.8 GHz radio equipment that is located at the same site as *WaveNet IP 2458* central routers. Other sources of interference could be other radio equipment operating in the same line of sight as the remote routers, or from nearby microwave ovens or RF-emitting industrial equipment.

A radio spectrum analyzer with a directional antenna can be used to sample the levels of 5.8 GHz interference at a potential central site location, and 2.4 GHz at a potential remote site, prior to final site selection. The product contains a built-in Site Survey tool that can be used to measure the ambient RF levels at potential central and remote sites prior to installation, or as a troubleshooting tool after installation. The Site Survey tool is accessible via SNMP, accessing the enterprise MIB *rfSiteSurvey* group.

At a central site, Site Survey measure the ambient RF level on each channel. This can be used to determine if a particular site is suitable for installing a central or remote unit. It can also be used after installation to determine if interferes not originally in the vicinity have surfaced.



At a remote site, Site Survey measure the RF level it receives from the central on each channel. This can be useful in verify that the receive levels agree with calculated numbers, and it can be used to monitor the system over time to verify the integrity of the link.



Plan Frequency Hopping Sequences

The Hopping Sequence parameter determines which of the 26 different frequency hopping patterns is used by the central router and its associated remote routers.

For operation in countries that only allow the use of a subset of the 2.403-2.481 GHz band, fewer than 26 hopping sequences will be available.

It is required that the central routers at any one site have unique hopping sequences. It is also highly desirable that any other nearby central site routers have unique hopping sequences. It is a good practice to record the frequency hopping planning information with the network map.

Plan Connectivity Between Central Sites

Whenever possible, it is desirable to locate a central site at a backbone network point of presence or the central data server site. It is sometimes possible to arrange for central routers to share a communications tower or building roof-top with existing wireless backbone equipment. Since the line-of-sight requirements for *WaveNet IP 2458* central sites are often more stringent than for point-to-point radio sites, it may not be possible to locate the *WaveNet IP 2458* central sites at existing backbone network access points.

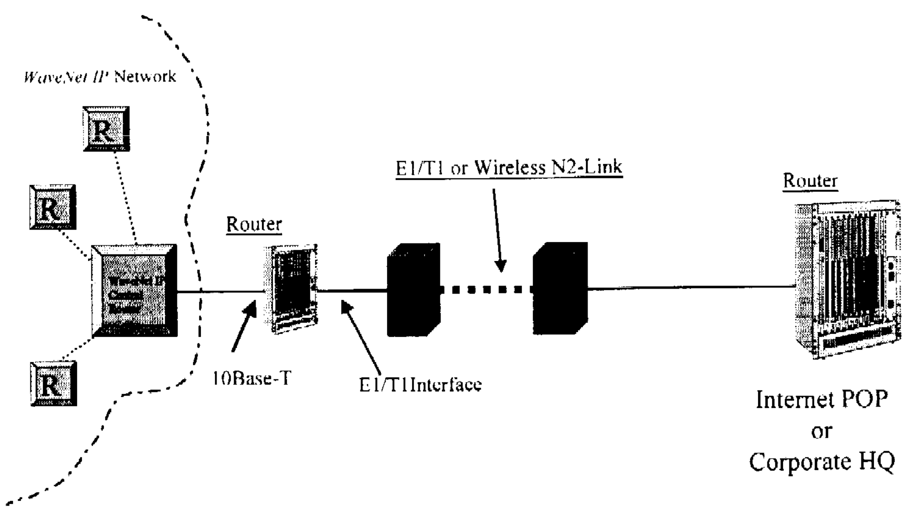


Figure 5 Backhaul to Network Access Point

WaveNet IP 2458 central sites can be connected to a backbone network by a large range of point-to-point network link products, such as N2-Link made by Wireless, Inc. (see Figure 5). While it is best to avoid using 5.8 GHz point-to-point radio links, there are products in the 5.3 GHz and 5.7 GHz NII band, and there are spread spectrum products that operate in the 900 MHz and 5.7 GHz bands, as well as many choices of licensed radio modems operating in millimeter band ranges. For ease of administration and optimal performance, it is generally recommended to use external routers at each end of the point-to-point links connecting central sites to each other and/or exterior networks.

A central site with a single central router can typically be supported by a full-duplex 512-1024 KBPS point-to-point backbone connection, while a central site with ten central routers may require a link speed of up to 4-6 MBPS (full-duplex).

Where there are a small number of *WaveNet IP 2458* central sites, it is simplest to connect each site directly to the backbone network. Where there are many central locations (such as in an extensive cellular configuration), it may make most sense to connect central locations together into a ring or mesh network, which in turn is connected to the backbone network (see Figure 6).

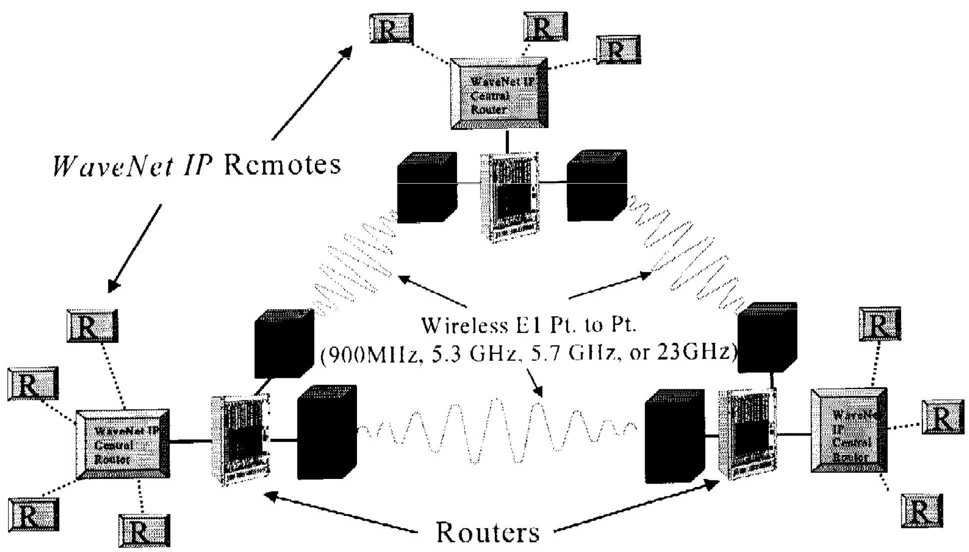


Figure 6 Central Sites in Ring Network

Repeater Configurations

It is possible to use two remote routers in a back-to-back configuration to act as a repeater between two central sites that are located in different directions from the repeater location (see Figure 7). Note that this can use a dedicated central router (as shown) for maximum bandwidth, or can share the same central router as other remotes if there is limited traffic between the networks.

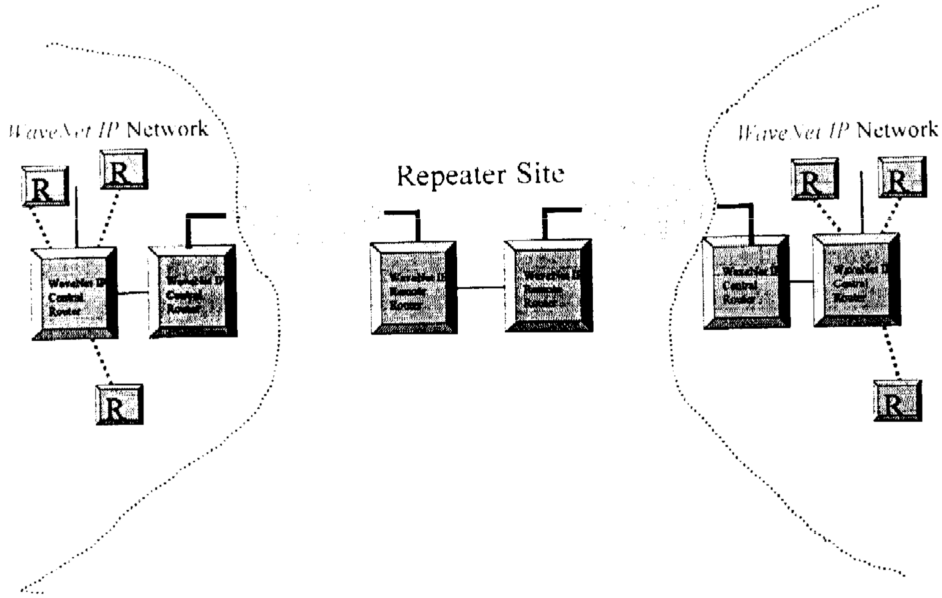


Figure 7 Repeater Using Back-to-Back Remote Routers

Alternatively, a single remote site located beyond the range of the system can be connected to a remote router (within range) by using a pair of N2-Links (see Figure 8).

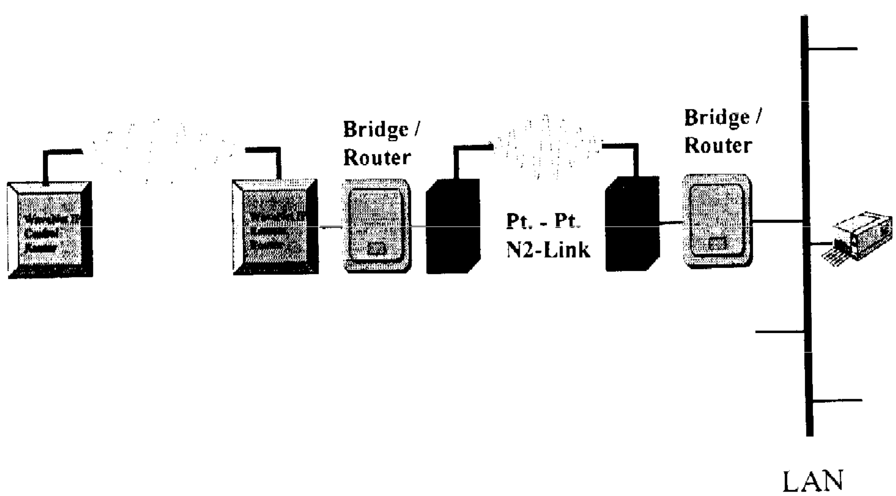


Figure 8 Repeater Using Point-to-Point Radio Link

Plan Connectivity Between Co-Located Central Routers

When there are many remote sites served from multiple central routers located at a single central site, the easiest way to administer the routing between the radio networks is to use an external router connected to the central site that knows the routes to all of the remote sites. It is likely that there is already a backbone router at the central data center that could perform this function. In this way, there are only two route tables to be updated when adding or deleting a remote router: the table belonging to the external router, and the table belonging to the central router on the radio network for that remote router.

The alternative approach is to configure a route for each remote site in the route tables of every central site router that needs connectivity with that remote site. This can be practical when remote routers are added and deleted from the network infrequently, or when the number of central and remote routers is small. In this case, only an Ethernet hub is needed to link the Ethernet interfaces of the central routers.

Plan IP Network Addressing

The radio interfaces on a given central router and its associated remote routers form a unique IP network (or subnetwork), and need to be assigned the same network address, with unique host addresses within this network. This requires allocating a radio IP network address for each central router. To avoid consuming IP addresses for the radio network, it is recommended that you use addresses in the private range of Class C addresses 192.168... The Ethernet interfaces on each central and remote router are assigned host addresses within their Ethernet networks. If the central site is connected to the backbone network by a router (recommended when there are multiple central site routers), then an IP network address must be assigned for the central site routers' Ethernet network. It is a good practice to record the IP address planning information with the network map.

Plan Routing Information

The central and remote routers each contain a Route Table that controls how packets are routed between its Ethernet and radio networks. It is not necessary to add explicit routes for packets destined for the network addresses of either the radio or Ethernet network, since the router will infer these routes from the IP addresses and subnet masks for these interfaces. A Destination IP Address value of "default" will apply to all packets other than those addressed to the local networks of the Ethernet and radio interfaces or those with explicit Route Table entries. The Route Table entries contain:

- Destination Network Address
- Subnet Mask For Destination Network
- Next Hop IP Address (address of next router on the local Ethernet or radio network)

It is common for the remote router's default route to have the Next Hop IP Address be that of the central router's radio interface.

For a central router, there is typically a route to each remote LAN. Where the central router connects to a backbone network router, then it is common for the central router's default route Next Hop IP Address to be the backbone router's interface on the central router's Ethernet network.

If there is more than one co-located central site router, and packets must be routed between the multiple radio networks, then each central site router needs route table entries for all remote networks. Alternatively, a separate Ethernet router (not a *WaveNet IP 2458* router) can be used at the central site to route packets between the central routers, allowing each central router to only need routes to its own remote networks.

Route table entries (other than the default route) apply the subnet mask for the routing decision. Each route table entry can use a unique subnet mask, and CIDR and supernetting are supported.

Plan Individual Sites

This section details the planning that should be done prior to installing equipment at each specific site. Whenever possible, it should be completed prior to actual installation, especially for central site locations. Experienced installers may be able to accomplish these steps at actual remote site installation time if they carry stocks of the various cable, power, and installation material options.

Location of *WaveNet IP 2458* Router

The *WaveNet IP 2458* router is a single outdoor enclosure, designed to be mounted on a 1.5-2.5" (3.8-6.3 cm.) mast. The router is typically installed on a communications tower, on top of a building, or on the side of a building. The router is connected to indoor data and power sources via a custom combined data/power cable. The key factors in selecting the specific installation location are good line of sight between central and remote antennas, and avoiding installations in close proximity to other 2.4 GHz (for remotes) and 5.8 GHz (for centrals) radio equipment.

Power Supply Requirements

The routers accept ± 20 to 41 VDC, or 14 to 29 VAC at the power terminals on the router itself. The router consumes less than 25 watts (peak). If ± 24 VDC or 24 VAC power sources exist near the router, these can be used to directly power the router.

If 110 VAC or 220 VAC is available, then external 24 VAC transformers are used to convert these voltages to a voltage that will be within the router's operating range. The power transformers should be rated to deliver 40 VA. Consult the table below for the acceptable voltage levels at the indoor end of the power cable.

If ± 42 to 60 VDC is available, then an external voltage limiter is available that outputs approximately ± 39 VDC.

The following are the allowable input voltage ranges for each power option using various length power cables:

Power Options→ Cable Length ↓	**110 VAC Transformer**	**220 VAC Transformer**	**± 24 VDC (Native)**	**± 48 VDC Limiter**
0 m. (0 ft.)	88-136	176-265	± 20-41	± 42-60
25 m. (82 ft.)	88-136	176-265	± 21-41	± 42-60
50 m. (164 ft.)	88-136	176-265	± 22-41	± 42-60
100 m. (328 ft.)	103-136	206-265	± 23-41	± 42-60

Antennas and Cables

Antennas are typically mounted above the routers, sharing a common mast. The antennas typically come with their own mast mounting hardware. The remote and central antennas typically come with N-female connector(s), and require separate connector cables with N-male connectors on both ends. The antenna connection cables should be typically less than two meters in length, although longer cables can be used; note that long antenna cable runs will cause substantial loss of signal.

An antenna that operates in the 2.4-2.48 GHz frequency range, and one that operates 5.770-5.848 GHz frequency range, or a single antenna that operates in both band (dual-band) is required on each central and each remote. Wireless, Inc. offers a selection of daul-band directional parabolic dish antennas, single-band panel sector antennas, and single band omni-directional collinear array antennas that can meet most needs.

Data and Power Cable

The cables connecting the router to the indoor Ethernet equipment and power sources is combined into a single physical cable that can be split at both the router and the indoor ends. The cable has an outside plant (OSP) rated polyethylene jacket and is gel-filled to prevent water from entering the cable. The jacket material does not generally meet indoor flammability regulations, and should be terminated or coupled to indoor-rated cable if the indoor cable runs are lengthy. Consult fire and electrical safety regulations for the rules that apply to each installation site[2]. The cable length from the indoor termination to the WaveNet IP 2458 can be up to 100 meters. The data cable distance can be increased (if needed) by using an Ethernet hub/repeater for the 10Base-T connection.

[2] The U.S. National Electrical Code requires that OSP cable be terminated within 50 feet of entering a building.

The power section of the cable consists of a single twisted pair of #16 AWG conductors. It is designed to be connected to an AC or DC source meeting the specifications described above. It comes terminated on the router end with a female plug-able terminal block, and is unterminated at the power source end, since this will typically connect to screw terminals or wire mating crimp connectors. The cable comes with a weather-seal attached on the router end, ready to attach to the router enclosure. The weather-seal also acts as a strain-relief.

The data section of the cable consists of four twisted pairs of #24 AWG conductors meeting Category 3 specifications, gel-filled, and surrounded by foil and braid shields. The cable comes terminated on both ends by an RJ-45 connector wired according to the EIA/TIA T568B standard. To terminate the indoor end at a punch-down block or lightning suppresser, the installer can cut off the connector, and strip the jacket, shields, and conductors as needed. The cable comes with a weather-seal (strain-relief) on the router end that also serves to ground the shield to the enclosure.

Lightning Protection and Grounding System

Grounding is vitally important to protect indoor equipment and personnel from lightning strikes to the outdoor routers, and to generally insure correct operation of the radio and digital circuitry. If a high-quality ground is not available at the planned installation site, it should be constructed prior to equipment installation.

To construct a good ground, ground rods should penetrate to a depth of about two meters (six feet). Where the ground is in rocky terrain, make sure that the ground rods penetrate into loose soil. In sandy soil, use more ground rods to make sure that the ground has sufficient contact with water bearing material.

Use #4-#6 AWG wire to connect each ground rod to the equipment to be grounded. The cables should be free of sharp bends. Each ground cable should be at least two meters in length with at least one meter separation between each.

Refer to local and national electrical codes to determine acceptable grounding methods.

The router enclosure should be directly connected to ground to insure that it functions correctly.

To protect indoor equipment and personnel from lightning strikes to the router or antenna, the data and power portions of the combined data/power cable should be individually protected by the use of lightning suppression equipment at the point where the cables enter the building.

The data portion of the cable has a foil/braid shield that should be directly connected to ground, and the individual conductors should be connected to appropriate lightning suppression equipment, which is in turn connected to ground. Since only conductors 1 (white/orange), 2 (orange), 3 (white/green), and 6 (green) need to be connected to the indoor equipment, only these conductors need be connected to the lightning suppression equipment. The other conductors should terminate prior to entering the building, and ideally should be connected directly to ground. Although the cable shield is grounded to the enclosure at the weather-seal, this ground is not sufficient to provide lightning protection to indoor equipment and personnel.

The power portion of the cable has two conductors, both of which should be connected to an appropriate lightning suppression unit at the point of entry into the building.

To protect the router itself from a lightning strike, it could be placed within a larger metal enclosure that is grounded, and internally contains lightning suppression equipment for the data, power, transmitter coordination, and antenna leads. Alternatively, lightning protection equipment could be installed in the close vicinity of the router, such that only very short cable runs exist between the lightning protection equipment and the router.

Redundant Central Router Configurations

Redundant central site configurations are created by installing two identically-configured physical central routers to implement each logical central router. In an operating network, one physical router (in each logical pair) is powered up and the other one is powered down at any one time. They can share antennas using an antenna cable splitter/isolator (at a loss of about 3-4 dB of radio path), or each can have their own antennas. Upon detecting a failure, power can be switched between the routers manually (if the network manager has physical access to the individual router power supplies), or by way of a remote power controller accessed through the Ethernet data link. Contact Wireless, Inc. for further technical and ordering information regarding the remote power controller system.

4 Pre-Installation Configuration

The objective of these procedures is to complete the configuration of the routers to the extent possible prior to the actual physical installation. This will also make it possible to verify the operation of the unit in a controlled environment, prior to dealing with the unique aspects of the installation site. While it is recommended to complete these steps prior to of the physical installation process, it is possible to execute these procedures as part of physical installation, if necessary.

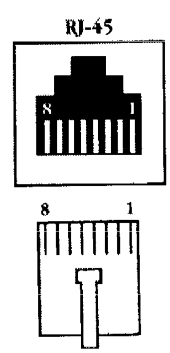
Terminate The Data/Power Cable

If the data/power cable to be used in the installation is available, it is best to use the actual cable for the bench configuration/test. If it is not available, then a separate test cable should be prepared.

The power portion of the cable is terminated on the router end with a female plug-able screw terminal block. The wire leads on the indoor end can be directly attached to the power supply (if it provides screw terminals), or they can be connected to the supply using crimp-on connectors. Either of the wire leads can be connected to either of the power supply terminals for either AC or DC power sources.

The data portion of the cable is terminated on both ends with an RJ-45 connector wired according to the EIA/TIA T568B standard as shown in the table below.

RJ-45 Position	10Base-T Standard T568B	10Base-T Cross-Over
1	White/Orange	White/Green
2	Orange	Green
3	White/Green	White/Orange
4	(Unused)	
5	(Unused)	
6	Green	Orange
7	(Unused)	
8	(Unused)	



If the indoor end is connected directly to an Ethernet hub, then the cable can be used as is. If the indoor end is terminated at a punch-down block, make sure that the wire colors are connected to the block as shown above for the T568B standard mapping onto the RJ-45 positions as defined for that punch-down block.

Installation

If the indoor end is connected in a point-to-point configuration directly to another Ethernet DTE (such as a PC or DTE-configured interface of a bridge or router) without the use of a hub, then the 1/2 and 3/6 conductor pairs must be crossed-over as shown in the "Cross-Over" column above. This is best accomplished by connecting two standard cables to a dual modular jack terminal box, making the cross-over between the two jacks within the terminal box. This avoids the possibility of confusing normal and cross-over wired cables.

The RJ-45 connector used for the indoor end of this cable is designed for large-diameter round cables. If the cable is cut and re-connectorized, be sure to use an appropriate RJ-45 connector, rather than those that are commonly available for use with satin indoor telephone cable. Alternatively, use a modular jack terminal box or punch-down block to terminate the cable to avoid the possibility of a bad connection.

Configure Router

The router is configured using the Web browser over the Ethernet interface. In the following procedures, underlining is used to designate Web page links.

Equipment Needed

- A PC with a 10Base-T Ethernet with Netscape Navigator™ 3.0 (or later) or Microsoft® Internet Explorer 4.0 (or later), and *ping* and *traceroute* utilities.
- A 10Base-T Ethernet hub (disconnected from any other devices), or 10Base-T cross-over dual modular jack terminal box.
- One 10Base-T patch cable
- One *WaveNet IP 2458* combined data/power cable

PC Internetwork Configuration

- IP address: 10.0.0.xxx (where xxx is any number between 2-254)
- Subnet mask: 255.0.0.0

Router Configuration Procedure

Refer to Figures 2.2 and 2.3 when performing the following procedure.

1. Ground the router enclosure at the grounding lug or any other point.

2. Apply an antenna or attenuator to the 2.4 GHz antenna port on a central or the 5.8 GHz antenna port on a remote on the enclosure. **Note that there must always be a load on the transmit antenna port when power is being supplied to the unit. Failure to do so may cause damage to the radio interface.**

3. Open the enclosure door

4. Move the jumper from *Store* to *JP4*.

5. If using the actual data/power cable to be used at the installation site, attach the weather-seal to the enclosure using the supplied lock nuts. If using a temporary test cable, this step can be omitted.

6. Connect the data cable between the router and the Ethernet hub (or cross-over modular jack terminal box), and the power cable to the power supply using the data/power cable. Connect the power supply to the power source.

Identify screen on central:

WaveNet IP

Identify

identify | [illegible] | control | configure | log in

Addresses			
Network Interface	IP Address	Subnet Mask	MAC Address
Ethernet	198.5.6.114	255.255.255.0	00-20-a4-00-05-3c
Radio	198.5.100.17	255.255.255.0	00-20-a4-00-00-05

Radio Configuration and Status				
Radio Type	Tx Power (dBm)	Frequency Range	Hop Sequence	Self Test
Central	15	default, USA	2	Pass

	Model	Revision	Serial Number
Unit	TA109200	1	98102101
Router Hardware	SA100240-11	2	00053C
Radio Hardware	SA100242-01	1	000001
System Software		FWSCXX04	

Identify screen on remote:

WaveNet IP

Identify

identify | [illegible] | control | configure | log in

Addresses			
Network Interface	IP Address	Subnet Mask	MAC Address
Ethernet	198.5.30.100	255.255.255.0	00-20-a4-00-05-aa
Radio	198.5.100.3	255.255.255.0	00-20-a4-00-00-03

Radio Configuration and Status				
Radio Type	Tx Power (dBm)	Self Test	Link Status	Linked To
Remote	15	Pass	Up	00-01-02-00-00-05

	Model	Revision	Serial Number
Unit	TA109201	1	98102002
Router Hardware	SA100240-11	2	0005AA
Radio Hardware	SA100241-01	1	000003
System Software		FWSCXX04	

7. Wait one to two minutes until the router self-test LED stays illuminated. If it fails to light, then see *Interpreting LED Indicators* in Chapter 7.

8. After the router self-test LED lights, replace the jumper to the *Store* position (JP5). The following parameters will now be temporarily set to the values shown below. Note that these values will not overwrite the values displayed on the internet configuration screen, but will be displayed on the identify page.

   - IP address of Ethernet interface: 10.0.0.1; subnet mask: 255.0.0.0
   - IP address of Radio interface: 172.16.0.1; subnet mask: 255.255.0.0

9. Connect the PC to the Ethernet hub (or cross-over modular jack terminal box).

10. From the PC's Web browser, open the router's IP address (URL) "10.0.0.1" and confirm that the router's identify management page is displayed. Note that no network log in is required whenever the router's Ethernet interface IP address is 10.0.0.x, where x=1-254.

    NOTE: IP addresses in the range 10.0.0.1-10.0.0.254 should not be used except for temporary initial configuration.

11. Select configure. Select the link to each of the following Web pages in succession, to configure, or verify the configuration of, the router. Note that on each configuration page there is a *reset* button; this button will reset the parameters to the values that were present upon entering the page. After making configuration changes on any page, click the *submit* button on that page. After completing all desired configuration, select finish. Each of these pages is described in the sections below.

    - radio: Frequency Range, Hop Sequence, RF Net ID, Tx Power, Voice priority, Enable/Disable
    - authentication: Enable/Disable Radio Authentication (central only); MAC Address Table
    - internet: Ethernet and Radio IP Addresses, Subnet Masks, Route Table
    - SNMP: Enable/Disable, Access Table
    - log in: Enable/Disable HTTP and FTP Access, Set User names and Passwords

12. From the finish page, verify that no errors are indicated. If there are, then select the links in error, and correct the configuration information. Click on the *submit configuration* button to make the new configuration active. No configuration changes will take effect until this action is performed. Pending changes that have been configured but not submitted will saved so that they can be submitted at a later time.