No Wires Needed

WB-S1100 / WB-C1100
Wireless LAN to LAN bridge

User Manual

Version 1.0.0 – July 1999



User manual

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Wireless LAN to LAN bridge

No Wires Needed
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Version 1.0.0 – July 1999

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Printed in Amsterdam, July 1999

Warranty

NWN undertakes a Product Warranty of 12 months from the date of Invoice. Within the warranty period NWN repairs a faulty device free of charge or replaces it in case of irreparable damage.

Excluded from the warranty are malfunctions caused by operation outside the intended usage; by misuse or abuse; by service modifications or repairs performed by unauthorised persons or by other conditions not arising from defects in Product materials or workmanship.

The costs associated with physically replacing the defective part and re-installing are to be borne by the Buyer.

Statement of Year 2000 Compliance

Detailed information about our statement is published on our website.

http://www.nwn.com

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with the minimum distance between your body and the antenna as shown in the table below:

Low gain indoor antennas (≤6dBi)	4.5cm (1.8 inches)
High gain outdoor antennas (>6dBi)	30cm (12 inches)

Warning: It is the responsibility of the professional installer to ensure that when using the outdoor antenna kits in the United States (or where FCC rules apply), only these antennas mentioned in this manual are used. The use of any antenna other than those listed is expressly forbidden in accordance with the FCC rules CFR47 part 15.204.

***Note**: Detached antennas, whether installed indoors or out, should be installed ONLY by experienced antenna installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities.*

Failure to do so may void the No Wires Needed Product Warranty and may expose the end user to legal and financial liabilities. No Wires Needed and its resellers or distributors are not liable for injury, damage or violation of government regulations associated with the installation of detached antennas.

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1.0 Introduction

Thank you for purchasing the No Wires Needed Wireless LAN to LAN Bridge. This manual will assist you with the installation and use of the bridge.

The package you have received contains the following items:

- WB-S1100 and/or WB-C1100
- User manual
- Diskette containing Bconfig™ software
- Antenna (if ordered)

A wireless bridge is used to create either a point-to-point or a point-to-multipoint link between two or more local area networks.
An minimal set-up consists of:

- 1 WB-S1100 (server)
- 1 WB-C1100 (client)

Due to the complexity of installing a wireless bridge always make sure a professional installer installs the bridge link. A professional installer not only provides you with an optimal link, he also supplies you with a professional mechanical installation.
The professional installer covers the following areas:

- Network link installation
- Mechanical installation
- Weather resistant installation
- Lightning proof installation

By covering all these areas the installer will provide you with a link that has the highest possible uptime. He will also take away every possible chance of damaging your network.

In order to establish a link between two or more networks it is essential that the antenna of the server and the antenna of the client are in a line of sight.
This not only means that there are no obstacles allowed between the two antennas. Chapter 2 will define line of sight in depth and explains the installation of the antennas.

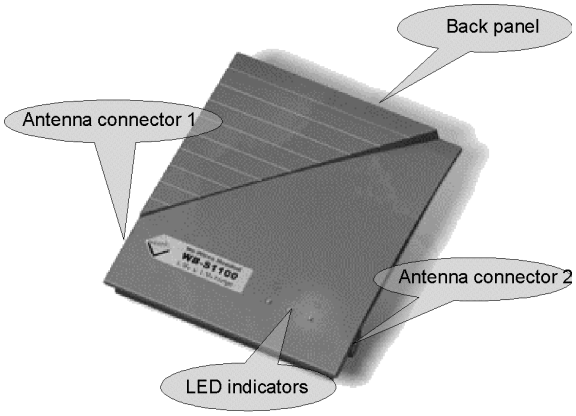


Figure 1:The bridge, the connectors and indicators

HINT: Before you start, write down the MAC addresses of both units. These addresses are located on the backside of the unit and are difficult to access after installation.

2.0 Hardware installation

This chapter describes:

- The installation of the antennas
- The installation and configuration of the WB-S1100 and the WB-C1100 units
- Connecting the antennas to the units

Before starting the installation, some understanding of antennas and their behaviour is necessary. In the following chapter the most important characteristics are explained. If you are not familiar with antenna technology please take a few minutes to read this information and understand more about antenna installation.

2.1 The antenna installation

2.1.1 radiation diagram

The bridge units are supplied with a choice out of 3 different antennas. Depending on the type of link (point-to-point or point-to-multipoint) and the required range the antenna needs to be chosen. All antennas are directional by nature. They cannot be made to radiate uniformly in all directions. Therefore, antennas are designed with controlled properties to guide available RF energy into the desired direction. This directivity multiplied by antenna efficiency is gain. Gain is expressed in decibels relative to a hypothetical isotropic source that radiates uniformly over a spherical surface. Figure 1.1 displays this diagram versus the isotope. The gain of the isotropic source is the unity or zero decibels. Depending on this directive behaviour of an antenna and the site requirements the type of antenna is chosen.
This diagram displays the radiation power versus the direction. Figure 1.1 displays the radiation diagram of a patch antenna.

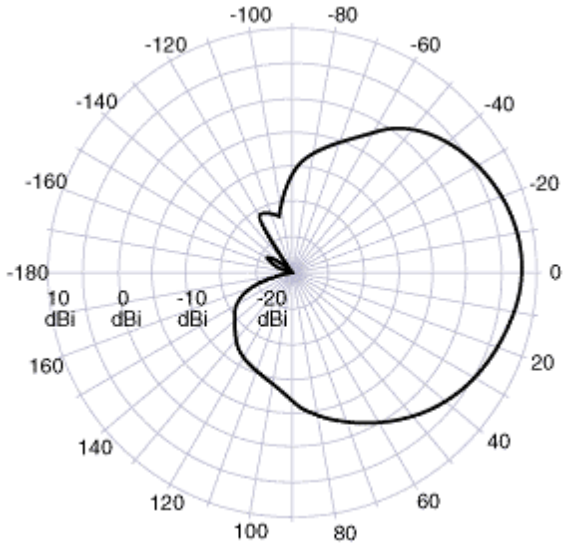


Figure 2.1,The radiation diagram of a patch antenna

The more directive an antenna is the more gain an antenna has in one specific direction.
Installing an omni directional antenna for a point-to-point link is useless, unless the range between the two antennas is short. In such a case the choice for an omni-directional antenna is a pure economical one.

2.1.2 Multi path

DSSS is more sensitive for multi-path effects than the traditional Frequency hopping. Multi-path effects can be explained as coherent signals (signals from the same source) arriving at the antenna at different times because of the difference in path length. Several signals from the same source meeting at the receiving antenna can arrive in phase, out of phase or in between.
When the level of each incoming signal is included, the effects can be any of the following:

Level	**Phase**	**Result**
Equal	In	Strong reception
Unequal	In	Good results
Equal	Out	Possible loss of receiption
Random	Random	Variable levels

The conductivity of the reflector and polarisation of the wave before reflection primarily affect the level of reflected signals. Horizontal polarised signals, which are parallel to the reflecting surface, will reflect almost totally without appreciable loss at the point of bounce. Vertically polarised signals, which are perpendicular to the reflecting surface, will be either totally reflected from a perfect conductor or will propagate along the surface, depending on the angle of arrival of the energy. Since radiated waves penetrate lossy materials, energy can be lost to heat generation.

Refraction
The velocity of RF energy is delayed with prolonged paddage through dielectric materials that are denser than dry air. This is refraction, or the change of direction of propagation. The time spent in the denser material controls the degree of refraction and the resulting direction of the emerging wave.

Diffraction
Perfect shadows that are cast by RF-opaque structures or objects are rare at wireless system frequencies. Because of diffraction, energy scatters at the edges of the obstruction. Diffraction is more pronounced in sharp or knife edged corners. According to field theory, edges cause secondary radiation when illuminated. This is generally independent of polarisation when the scatterer is much longer than the impinging signal's wavelength.

Diffraction forms a fuzzy signal source at the edges, which tends to fill in the shadowed regions. The signal levels are low but often usable. These edges can be corners of a building, window frames or large vehicles. Diffraction also figures significantly in scattering at hilltops lying in the propagation path.

A choice of three antennas can be made; the table below describes the characteristics.

	Omni antenna	Sector antenna	Dish antenna
Gain	8 dBi	18 dBi	24 dBi
Alignment accuracy	Low	Medium	High
Multipath sensitivity	High	Low	Low
Size	Small	Medium	Large
Costs	Low	Medium	Medium
Range	1Km	3Km	6Km

The gain of the antenna is direct linked to the range. Out of the table it becomes very clear that only a dish should be chosen when a distance of 3km or more needs to be covered.

Locating the antenna

Free space radiation patterns are the baseline performance criteria before installation in the real world environment. Since sites are located on rooftops or on the side of buildings, many opportunities exists for interference from chimneys, walls, masts, towers and other antennas. Although it is difficult to predict level changes you can take steps to minimise pattern distortion.

Obstructions are either conducting of non-conducting. Conducting objects create the most severe disturbances. Those near the resonant length of the antennas, such as other antennas, behave as the parasitic elements of an uncontrolled array, producing random nulls and lobes. Larger conducting structures causes severe shadowing. The closer the spacing, the larger the shadow.

2.1.3 Free space losses

Spreading is the principal contributor to signal loss for line of sight propagation. As a signal radiates, it spreads, or expands, into a spherical surface. The available RF power is distributed over this surface and weakens with increasing range. The signal is reduced by 6 dB for every doubling distance from the source. We compute the loss path between the source radiators with spherical patterns using the following equation:

Lp(dB)= 36.6 + 20log10 F+20 LOG10d

Lp= Path loss
F= frequency in MHz
dB= decibels
d= Distance in miles

2.1.4 Line of sight

Line of Sight (LOS) means a bit more than the words say. Of course the first condition for a LOS link is that the two antennas can be connected with an imaginary string. But just as important is the clearance above and below the signal path. This to avoid reflections (multipath). A thumb rule for this clearance above and below the signal path is that for every 1.5 km a clearance of 4 meter is necessary. A result of this rule is that large distances need great heights.

Think about the following things if you have to determine the line of site:

- Trees grow leaves
- Make sure you have enough height

2.1.5 Mechanical installation of the antenna

A solid mechanical installation of the antenna is the base of a quality link. An outdoor mounted antenna is exposed to extreme weather circumstances. Metal brackets oxidise and vibrations will cause slack on connections. It is therefore that the mechanical connection between the antenna and its carrier needs to be solid. Use locktite on screws. The connector between the cable and the antenna needs to be sealed with treading tape. Corrosion on the connector will cause signal losses due to changing impedance of the connection.

Outside mounted antenna are lightning strike sensitive. Lighting strikes always in the highest and smallest possible point. This is typically an antenna. The antenna cable will then conduct the enormous amount of energy towards the bridge. If no lightning arrestor is placed in-between the antenna cable the bridge unit will be damaged, or worse, set it to fire. Therefore always use a lightning arrestor.

When placing the antennas the following points should be kept in mind.

- Place an omni antenna always risen above conducting objects.
- Place a flat panel and Yagi antenna always on the edge of a roof or mounted on a wall.
- With an outdoor installation of the antenna always use a lightning arrestor
- Make sure that the mounting of the antenna can handle high forces. Wind can cause misalignment or even permanent damage.
- Keep the cable length between the antenna and the bridge limited to the minimum. Every meter of cable causes signal loss.

2.1.6 Step by Step installation

1. Determine the antenna locations.
- Line of sight
- Make sure your antenna fits the range
- No large conducting objects in the area
- No other antennas close
- When mounting on a pole: Let the antenna rise above the pole
- Remember that trees grow and get leaves!!!

2. Mount the antenna
- It can never be too solid
- Use Locktite with screws
- Seal connectors with treading tape
- Use a lightning arrestor

3. After installation
- Double check

2.1.7 Lighting protection

Lighting strikes can cause major damage on equipment and buildings. An antenna placed on al roof is often the place of strike. Dish antennas mounted against a wall are less risky. The cable conducts the lighting into the building. Due to this behaviour an antenna installation requires a dual protection. The antenna needs to be grounded and the cable requires a surge protection.

Contact a local lighting specialist for advise on grounding. Below you find some general hints on lighting protection:

- Never mount an antenna though the roof, only on the roof
- Keep the antenna cable as much as possible out door
- The cable shield needs to be grounded on the highest possible point and at the point of entering the building.
- Place a surge protection on the antenna connection at the bridge and on the power supply of the bridge

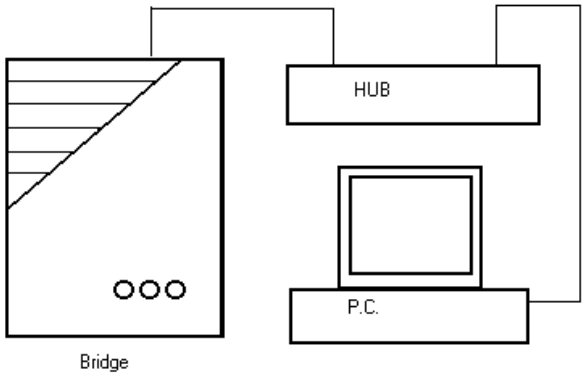
Lighting protection is a profession. A specialist supplies a professional installation that reduces the risks of damage at lighting strike to a minimum.
No Wires Needed advises to use always a professional lighting specialist.

2.2 Basic Alignment of the antenna

Due to its directive behaviour an antenna needs to be aligned. Alignment is done by maximising the antenna signal and by minimising phase noise. The phase noise directly influences bit error rate. The alignment is essential because weather circumstances can degrade the signal strength. To avoid link dropouts with bad weather the antennas need to receive the strongest signal possible with the lowest possible phase noise. In most situations a high signal level means a low bit error rate, but it does not go without saying. In some cases the lowest Bite Error Rate is reached at a signal strength level that is not the highest possible.

The bridge has got a Radio Signal Strength Indicator (RSSI) and a SQ2 indicator. These indicators need to be used for the alignment. Both indicators are displayed at the same time.
To be able to read the RSSI and SQ2 the bridge needs to be connected to a computer via a small hub. This computer needs to be equipped with an Ethernet card.

The set-up depicted in figure 2.2 needs to be made.



Picture 2.2 Interconnection during installation

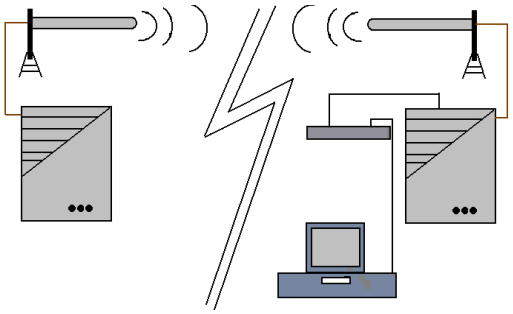


Picture 2.3. The power connector



Picture 2.4. The Ethernet connector

On the other side of the bridge, connect the antenna and bridge unit in a regular way. Always use the antenna connector 1 for this. The network does not have to be connected to it. If you have a directive antenna, aim it on the other antenna.



This drawing is based on a 10Base-T (RJ-45) connection. This connector is located on the back side of the bridge unit. Picture 2.4 shows the Ethernet connector. After interconnecting the units, they can be powered up. The power switch is next to the power connector. See picture 2.3.

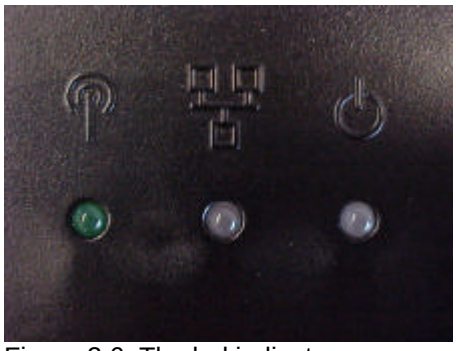


Figure 2.6. The led indicators

The LED indicators (fig.2.6) display the status of the bridge. The power LED, most right one, displays the power status. Green means a correct power feed. Red indicates wrong firmware or power failure.

The LED in the middle displays the network status. If the bridge is connected to a network it will light-up green, otherwise it will be red or off.

NOTE: The bridge unit is equipped with two antenna connectors (1 & 2). Always use connector 1, Connector 2 is only used for very special cases by very experienced installers. For information about using a second antenna option please contact No Wires Needed.

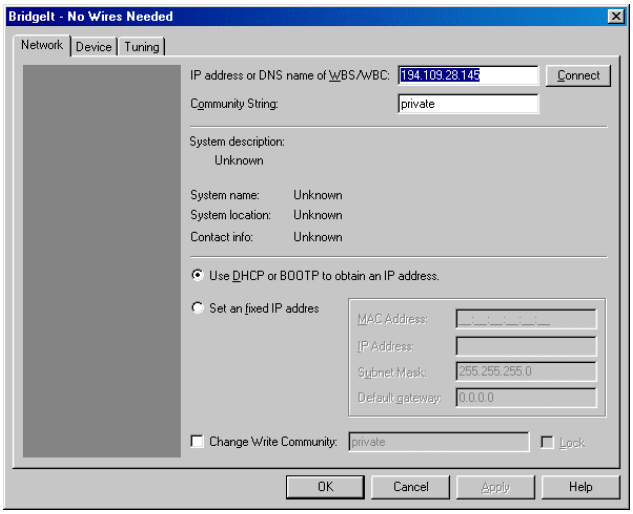
The most left LED displays the radio link status. The client function of this LED differs from the server. **The radio link LED of the server will blink as soon as it is transmitting a beacon, this is approx. 10 times per second regardless if there is a connection. The client will blink as soon as it receives a beacon.**

It is this function that is used for the first alignment. First place the server side of the bridge. Aim the server antenna (unless it is an onmi antenna) towards the client side of the bridge. Then power up the server side. Next, the client side needs to be installed. Aim the client antenna towards the server side and power-up the client unit. This should result in a blinking radio link LED at the client side. Please remember the server radio link LED will always blink, the client LED as soon as it receives a beacon. If the client radio link LED is not blinking realign the antennas (both server and client side).

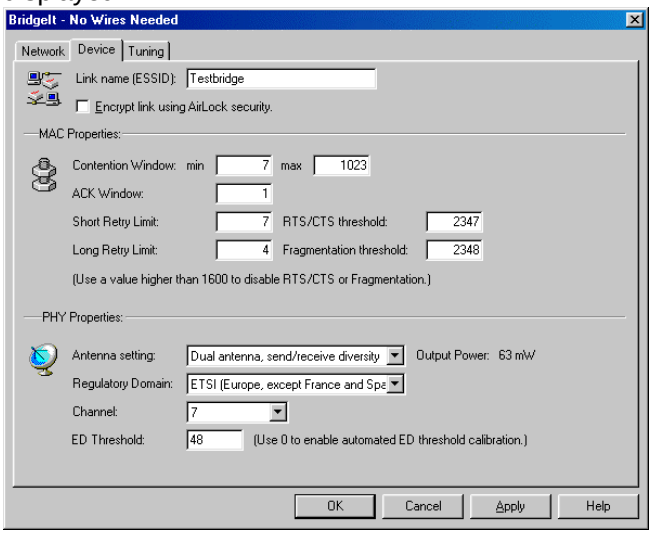
2.3 Configuration of the bridge units

This chapter describes the configuration of the bridge during the alignment. This means that certain settings or parameters are not mentioned because they do no effect the alignment of the antennas. Chapter 3 will give a clear description of the meaning of every option and when to change or use that option.

Start the Bconfig program. After starting up the MAC address of the bridge unit connected to the antenna needs to be entered. This MAC address can be found on the backside label.



If the bridge is powered up for the first time the top IP address field is empty. To set a IP address select ‘set a fixed IP address’, then enter the MAC address, enter the IP address, enter the Subnet mask and finally the default gateway. If you have a DHCP server within your network you can select the DHCP option, then an IP address is automatically assigned. When you prefer to use DHCP because of its centralised administration, but want a fixed IP address for the bridge unit, you can make a reservation for the MAC address in the DHCP server.
After this info is entered press the Connect button. Then the system description will display the bridge name and firmware version.
After entering this information select the Device tab. The following screen will be displayed.



In this menu the radio settings can be set. It contains the following options:

- SSID (name of the link, both sides need the same name)
- Encrypt using AirLock™
- MAC properties
    - Contention window (use if more data goes upstream than downstream)
    - ACK window (use when large distances need to be covered)
    - Short retry limit
    - RTS/CTS threshold
    - Long retry limit
    - Fragmentation threshold
- Physical properties:
    - Antenna settings
    - Regulatory domain
    - Channel
    - ED threshold

Most of these settings do not require any change in normal operations. Point-to-point links up to 3 km do not need any change from the default MAC settings. If the distances exceeds 3 km, increase the minimum of the ACK window to 10.

A new installation does require the SSID, Regulatory domain and Channel to be set.

The SSID
This is the name of the bridge link. The client and the server need to have the same name in this field. And that is the only restriction for this setting.

The Regulatory domain
Some counties have the ETSI rules applied with some minor changes. These changes are often made on the channels that are allowed.

Channel
This setting also need to be the same on both sides of the bridge. This setting becomes important if more bridge links are installed. It could be that one bridge link will interfere with the other bridge link. By choosing another channel interference can be avoided. Within ETSI the available channel settings are channel 1, 7, and 13. These channels are not interfering and need to be used when bridges are co-located.

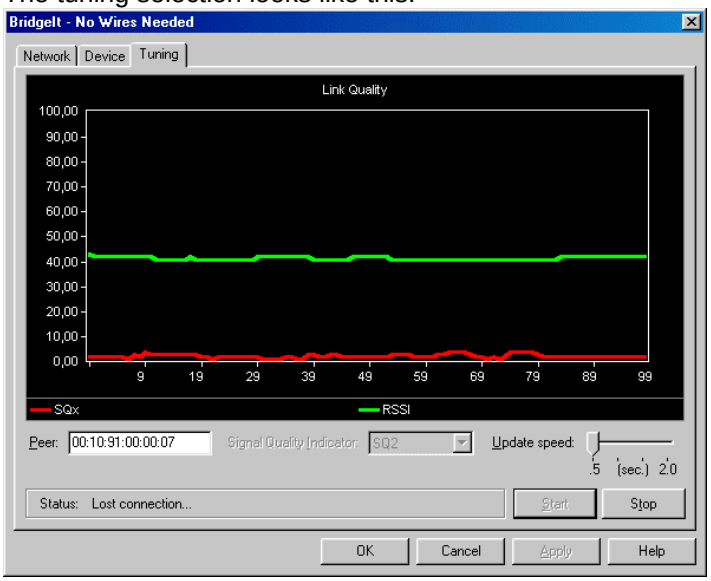
The other settings are described in chapter 3. These do not need to be changed for normal use. If you, however, for some reason change the settings and it has got a negative effect on the link quality, the settings can be changed back to the original values without damaging the bridge.

2.4 Fine tuning of the bridge Link

The link quality is measured at the Tuning tab. Two quality indicators are displayed. These are:

- RSSI (radio signal strength indicator)
- SQ2 (indication for quality of received signal)

The tuning selection looks like this:

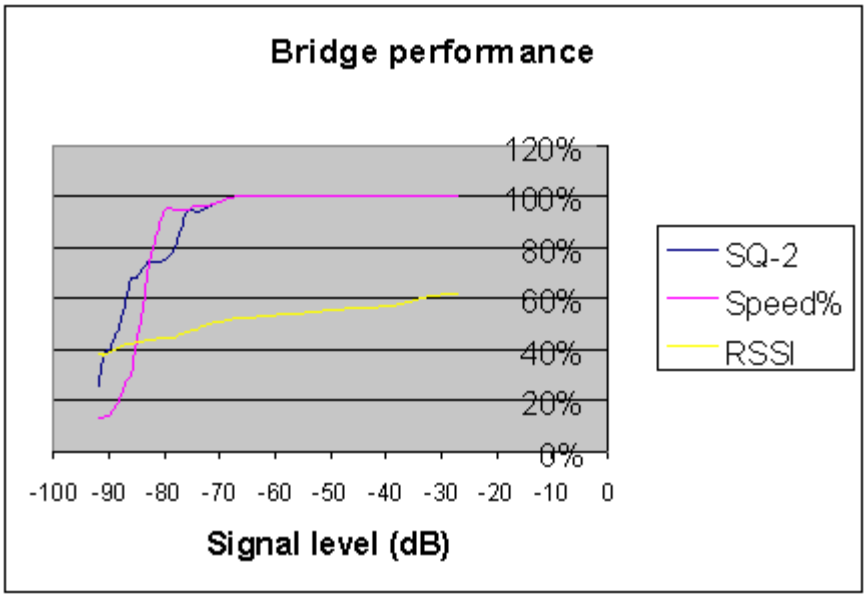


Two lines are displayed. The top one (green) represents the radio signal strength indicator (RSSI), the other (red) represents the signal quality (SQ2).
Before the signal quality measurement can be started, the MAC address of the other side of the bridge needs to be entered at the PEER field.
It is also possible to change the update speed of the measurements.
Remember: If this measurement is activated no normal IP traffic is possible. So this mode can only be used during trouble-shooting and installation.

The status bar at the bottom of the screen shows the current status of the link.

The alignment
The alignment is done by maximising the radio signal strength and minimising the SQ2 indicator. Slowly turn the antenna left/right and up and down will monitor the RSSI. You will see that this will influence the RSSI level.
Now start to peak this level.
After finding the peak level, monitor the SQ2 indicator. This indicator displays the multipath effects. Now try to peak this indicator by again turning the antenna very slowly in all directions. Once you have found the signal peak, monitor the RSSI indicator again. Verify if this indicator is still on an acceptable level.
Repeat this procedure on both sides of the bridge several times.

The chart below displays the signal level versus the RSSI, SQ2, and the speed. Speed is displayed as a percentage of the maximum. If SQ2 displays 100%, the red line in the tuning screen displays 0. You can use this graph to determine if the throughput fits the RSSI and SQ-2 value the tuning function displays.



2.5 Installing the bridge unit

Installing the bridge unit should be done on a dry and temperature controlled location. The bridge units should not be exposed to hostile environments. Temperature should not drop below zero or exceed fifty degrees Celsius. Preferably mount the unit inside, if that is not possible use the outdoor housing. The housing supplied/advised by No Wires Needed contains a heating element and a sensor.
The antenna is supplied with an antenna cable. Use this cable with your installation. If for some reason this cable is too short, consult No Wires Needed for another cable. If the cable is too long, do not cut the cable or roll the cable. The length of the cable determines the characteristics of the system.

Note:
If you cut the antenna cable the system will not perform anymore according to the specs and therefore NWN will not provide warranty on the installation anymore. If for some reason changing the antenna cable is unavoidable please contact NWN.

3.0 BConfig configuration program

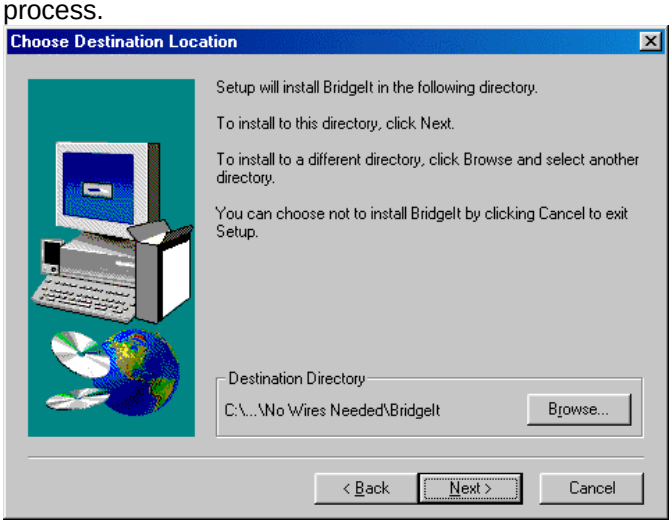
This chapter describes the configuration program of the bridge. This program allows you to install and maintain your bridge link. It contains an excellent performance monitor for fine-tuning and troubleshooting.

Within this chapter all options in the program are described together with the circumstances it is useful to use these setting.

3.1 Installation

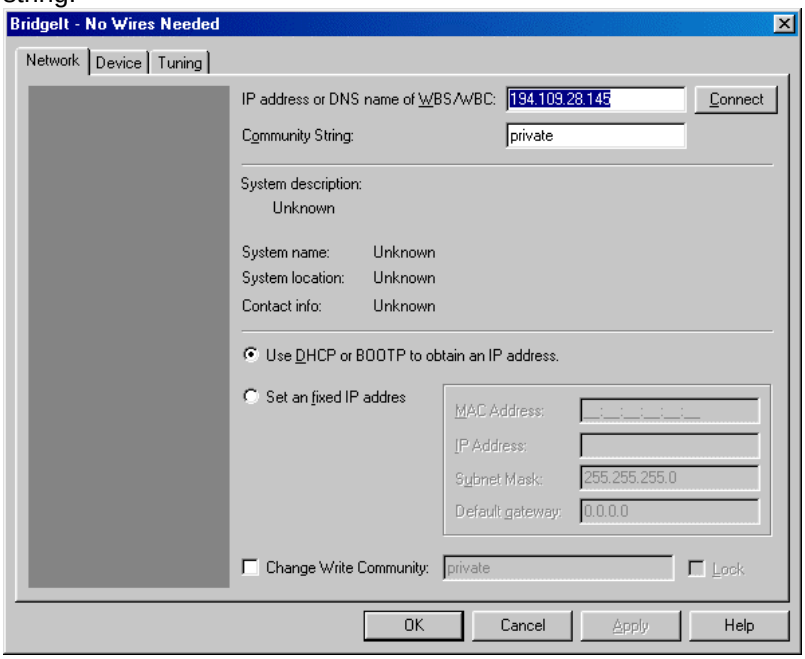
Bconfig runs on any Windows 95/ 98 or Windows NT machine with TCP/IP installed.

To install the Bconfig program insert the disk #1 into your disk drive and run the Bconfig setup.exe. The set-up wizard will guide you through the installation process.



Select the directory you want to install BConfig in.

After installation is finished you can start up the BConfig program. It will start up in the network screen. The network screen allows you to enter the MAC address or the IP number of the bridge. It also allows you to set or change the community string.



3.2 The network configuration

The Network configuration screen

The bridge can be configured before it is actually installed. The configuration consists of two parts, the wireless settings and the network settings.

The network settings contain the following parameters:

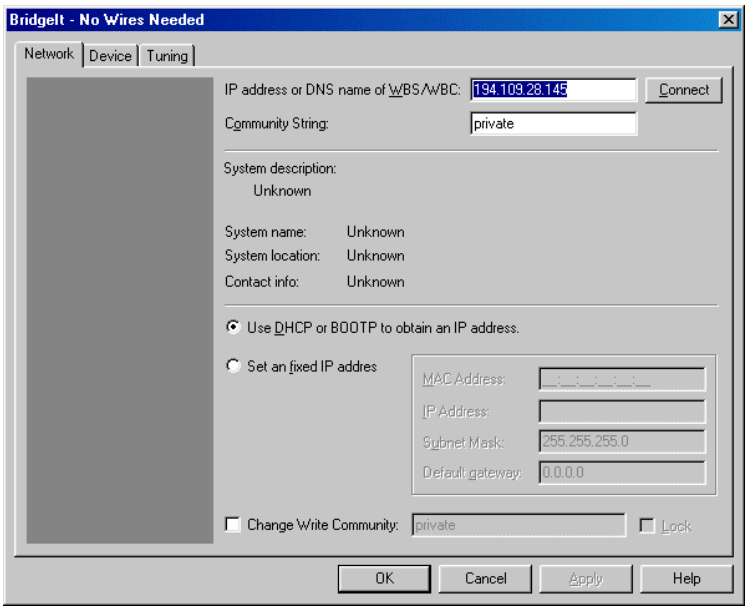
- IP address (DHCP or manual)
- Sub-net mask
- Default route/ gateway
- Community string (password)
- Lock (remote management on/off)

If an IP address is already set, only the IP address needs to be entered at the top field (IP address or DNS name of WBS/WBC). After that click the Connect button. This will show the system description, the MAC address etc.

If the bridge is connected for the first time two situations are possible. The first situation is when you have the bridge connected to a network without a DHCP server, and the second situation is where there is a DHCP server installed in the network.

If a DHCP server is used in the network the bridge is installed in, first check the IP address it has been assigned. Then enter that number at the network screen and press connect. This will display the MAC address, sub-net mask and default gateway.

If no DHCP server is running select ‘Set an fixed IP address’. Then enter the MAC address and the IP address manually. Then also the sub-net mask and default gateway have to be entered. After this press connect. The network side of the bridge unit is now configured. Repeat this procedure on both sides of the bridge.



Below you find a summary of all settings in the network settings part.

IP address or DNS name of WBS/WBC:
The configured bridge can be accessed via this field.

Community string
The password protection on the bridge settings

Use DHCP or BOOTP to obtain an IP address.
If a DHCP server is installed, an IP address can automatically be assigned to the bridge.

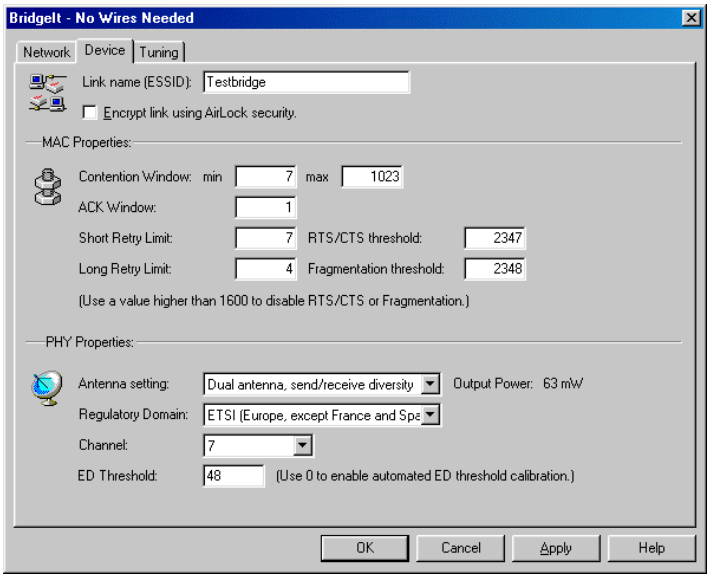
Set a fixed IP address
With this option an IP address can be manually set. First the MAC address needs to be entered. If an IP address is already configured, it will appear after entering the MAC address. Sub-net mask and default gateway can also be entered in to this field.

Change write community
This option allows you to change the Password of the bridge unit. If the LOCK field is flagged, the bridge can not be accessed via the network. It can only be configured directly.

3.3 The device settings

In the Device tab the following parameters can be set:

- SSID (name of the link)
- Security algorithm used (AirLock™ or none)
- Radio channel (preferred 1, 7 or 13)
- Bit rate (Auto, 2 Mbps, 5,5 Mbps, 10 Mbps)
- Antenna settings
- Access control setting (MAC address client)



Link Name (ESSID)
The link name is the link ID. Both sides of the bridge need to have the same name. This name can be considered the general link name.

Encrypt link using AirLock™ security
This option allows you to switch the security on or off. It is advised to have AirLock™ always switched on. Airlock™ provides you superior security and protects you against preaking, eavesdrops, hacking etc. The appendix contains the AirLock™ white paper.

Contention window
The contention window default are 31 to 1023. This is the back-of window expressed in slot time. 1 means 1slot time, which equals 20 microsecond. This parameter may need to be manipulated when the traffic is out of balance. Out of balance means more data upstream then downstream, or vice versa.

ACK window
This is the waiting time for the acknowledgement, again expressed in slot time. 1 unit is 1slot time (roundtrip) and represents 3 km. Increase this number for large distances. 2 represents 6 km, 3 represents 9 km etc. It will not harm the link if the ACK window is larger than the corresponding distance. To fine tune the throughput, increase the number, measure the throughput, and then start to decrease the ACK window while monitoring the throughput. **An excellent way of measuring the throughput is the program called 'Bricks'.**

Short retry limit
The short retry limit sets the number of retries for packets smaller than the number defined in the RTS/CTS threshold field.

RTS/CTS threshold
Packages longer then this value will be transmitted via 'request to send/ clear to send' routine. This method of transmitting provides an extreme secure and reliable link, but will slow it down significant. Since the reliability of the link without RTS/CTS communication is already outstanding it is advised to use this option only if complex and hostile environments.

Long retry limit
The long retry limit sets the number of retries for packets longer than the number defined in the RTS/CTS threshold field.

Fragmentation threshold
This value sets the threshold where above which the packets will be fragmented.

Antenna settings
The bridge contains two antenna ports. With this option you can select the following options:

- Receive and send on antenna 1
- Receive and send on antenna 2
- Receive on 1 send on 2
- Antenna diversity

Regulatory domain
A few countries have adapted the ETSI regulations with a few changes. Examples are France and Spain. In these countries some channel settings are not allowed.

Regulatory Domain	Area	Permissible Channels	Bridge predefined channels
FCC	United States	1 – 11	1, 6, 11
DOC	Canada	1 – 11	1, 6, 11
ETSI	Europe except Spain and France	1 – 13	1, 7, 13
SPAIN	Spain	10	10
FRANCE	France	10	10
MKK	Japan	14	14

Channel
The options displayed in this field are the allowed channel with in the chosen regulatory domain. Use this option if multiple bridges are co-located or an indoor wireless network is installed. With the channel settings, interference of other equipment working in the same frequency band can be avoided.

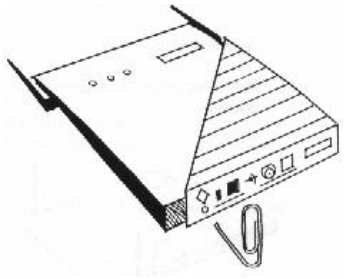
ED Threshold

ED threshold allows you to kill background noise. If there is interference of other weaker signals on the same frequency, the ED threshold can be used for reducing the influence of this noise. If the is set to 0, the unit will adjust itself. 64 represents the highest sensitivity possible. 1 represents the lowest sensitivity. Make sure the ED Threshold is set just below the RSSI value displayed in the tuning screen. For example RSSI displays an average of 45, then set the ED Threshold to 40. As the noise level goes up, the ED threshold needs to go down.

3.4 Resetting the bridge

You can reset the wireless bridge unit's settings to factory defaults by pushing a paperclip in the little hole, next to the power switch, while switching the bridge unit on.

When you push a paperclip in the reset hole while the bridge unit is switched on, only the lock set by BConfig is deactivated.



4.0 Troubleshooting

Problem: No connection between the networks

If the radio LED of the client is not blinking:

- Check if both sides are powered up.
- Check if the distance range no exceed the range
- Check if the channel settings on both sides are the same
- Check if antenna is connected or cable is not broken
- Check if antennas are in line of sight (NO obstacles are allowed!!)
- Check if no other device is transmitting on the same frequency. You can do this by changing the frequency settings on both sides.
- Bring the ED threshold down

If the radio LED of the client is blinking:

- Check if the SSID of both bridges are the same

Problem: Can not access the bridge settings via network

- Check if Subnet mask and default gateway is set according the network the bridge is connected to. (to do this you need to connect direct to the unit, see configuration for alignment)
- Check if the unit has got an IP address (again use the first alignment setup)

Problem: Low throughput on the link

- Check if the average of SQ2 is below 5 (go to monitor screen in Bconfig setting)
- Check if the ACK time fits the range.
- Check if the network card of the PC you are measuring with can handle the throughput.

Problem: Link drops away every now and then

- Check the antenna alignment
- Check the line of sight (trees)
- Check antenna mounting

5.0 Specs

5.1 Bridge specs

Standards compliance:

- IEEE 802.11 standard for wireless LAN
- Compliant with ETS 300 328 and ETS 300 826
- (CE marked)
- in USA compliant with FCC (47 CFR) Part15C, Section 15.247
- all major networking standards (including IP, IPX)

Security:

- AirLock™ Access control, 128 bit encryption, No key management

Radio/ modem:

- Frequency range: 2.4-2.483,5 GHz
- Supported bit rates: 11 Mbps / 5.5 Mbps (as well as interoperable with IEEE 802.11 Direct Sequence Spread Spectrum compliant devices that support1 Mbps and 2 Mbps)
- Modulation:
  1.0Mbps DBPSK
  2.0 Mbps DQPSK
  5.5 / 11 Mbps CCK
- Number of Channels:
  Europe: 13 (3 non-overlapping)
  US: 11 (3 non-overlapping)
  France: 4 (1 non-overlapping)
- Transmit power:
  Maximum 18dBm
- Range:
  Max. 6km @ 11 Mbps (using the dish antenna)
- ASBF™ Automatic link speed optimiser.

Wireless LAN interface:

- Standards: IEEE 802.11CSMA /CA

Network Interfaces:

- Standards: IEEE 802.3
- Connection type: 10Base2 (BNC) and 10Base-T(RJ-45)
- Mobility: Seamless roaming across cell boundaries

Mechanical:

- Dimensions: 180 x 220 x 40 mm

Environmental:

- Temperature Range: 0 - 40 °C operating
  Temperature 95% humidity (non-condensing)
  (US) AC 110V 60 Hz to 9VDC converter Included
  (Europe) AC 240V 50Hz to 9VDC converter Included

Management and configuration

- *Network:SNMP agent with support for MIB-II and IEEE 802.11MIB*
- LEDs: -Ethernet connection
  -RF activity
  -Power

5.2 Omni antenna specs (art number 10380125)

Due to ETSI limitations the Omni antenna can only be used with the following bridges within Europe:

- WB-S1100 standard range Art code: 10370225 & 10370124
- WB-C1100 standard range Art code: 10370125 & 10370226

Features

- Light weight – slim profile
- Patented Printed circuit technology
- Watertight Ultrasonic and O-ring sealed
- Groundplane Independent
- Stainless steel hardware

Description

The omni antenna consists of vertical polarised collinear arrays utilising a patented printed circuit technology for the radiating elements. This rugged antenna is housed in a UV stable ultrasonically bonded polycarbonate random. Installation is easy due to the small footprint, mounting system and the convenient pigtail connection. The Omni antenna is groundplane independent and can be mounted in any direction. Mounting bracket and cable is included.

Specifications

Frequency	2400- 2500 Mhz
Peak gain	7 dBi typical
Beamwidth – 3dB	22 degrees
Polarisation	Vertical
Nominal impedance	50 Ohm
VSWR	2.0:1 Max
RF power average	50 W
Length	40 cm
Pigtail	12” N-female

5.3 Sector antenna specs (Art number 10380114)

Due to ETSI limitations the sector antenna can only be used with the following bridges within Europe:

- WB-S1100 Medium range Art code: 10370214 & 10370113
- WB-C1100 Medium range Art code: 10370114 & 10370215

Features

- UV stable material
- Maximum gain
- Low profile housing
- Sable performance across the band
- Easy mounting

Description

The sector antenna is designed to cover frequencies between 2300 and 2500 MHz with a VSWR of less that 1.5:1. The small and low profile housing provides a maximum gain of 13 dBi. Easy mounting allows you to apply the antenna in a wide variety of locations.

Specifications

Frequency	2300- 2500 Mhz
Peak gain	13 dBi typical
Beamwidth – 3dB H	35 degrees
Polarisation	Vertical
Nominal impedance	50 Ohm
VSWR	1.5:1 Max
RF power average	20 W
Dimentions	220 x 200 x 28 mm
Pigtail	Female TNC

5.4 Dish antenna specs (Art number 10380103)

Due to ETSI limitations the dish antenna can only be used with the following bridges within Europe:

- WB-S1100 long range Art code: 10370102 & 10370203
- WB-C1100 long range Art code: 10370103 & 10370204

Features

- Strong and recyclable ABS
- Metal parts are stainless steel
- Exceptional design
- Increased performance in bandwidth and gain
- Fast and easy installation

Description

The dish antenna is optimised for use with the No Wires Needed wireless LAN to LAN bridge. It can withstand the harshest environments of snow, wind, rain, and ice. The dish is supplied with galvanised clamps for pole mount or wall mount.

Specifications

Frequency	2300- 2500 Mhz
Peak gain	22,2 dBi typical
Beamwidth – 3dB	13,8 degrees
Polarisation	Linear
Nominal impedance	50 Ohm
VSWR	1,8:1 Max
RF power average	50 W
Dish diameter	620mm
Pigtail	Female N
Dish material	ABS plast UV resistant
Radome material	ABS plast UV resistant
Metal hardware	Stainless steel
Temperature	-40 to +80 degrees
Weight	2,5 Kg

5.5 power supply specifications

- AC input range 90~264VAC/0.5A
- Inrush current cold start,<60A peak @ 230VAC
- Hold up time 10ms @ full load, nominal line
- Overload protection pulsing mode, auto recovery
- Over voltage protection 110%~145%
- Operating temperature 0-30°C @ 100%, 40°C @ 50% load
- Withstand voltage I/P-O/P:3KVAC, I/P-FG:1.5KVAC, 1min.
- Safety standards UL 1950, CSA 22.2, TUV EN60950
- EMC standards EN55022, EN50082-1
- Humidity 20%~90% RH
- Length of output cable 120cm (typical)
- Plug of DC output 5.5φx2.1φx11mm, center “+”
- Type No. MA15-090,
- Output 9V, 1.67A,
- Tol. ±5%,
- R&N 90mV
- Eff. 70%,
- P.p. 26