
Wireless LAN

This appendix describes Wireless LAN features and TOSHIBA Wireless LAN card specifications. For details on Wireless LAN settings, refer to the LAN Card Settings and Client Manager help file. These references have the latest information.

About TOSHIBA Wireless solution

The Wireless LAN card Kit enables you to:

- Connect your computer to a peer-to-peer workgroup of Wireless computing devices.
- Connect your computer to a Local Area Network (LAN) Infrastructure that includes Wireless LAN Access Points, or other IEEE802.11 compliant LAN systems.
- Expand the capabilities of your Wireless LAN Access Points, to support Wireless devices that have been equipped with Wireless LAN card.

NOTE: *The internal Wireless LAN card can't be used with the TOSHIBA Wireless LAN PC card.*

Peer-to-peer workgroup

The peer-to-peer workgroup configuration enables you to quickly set up a small Wireless workgroup, where the workgroup participants can exchange files using features such as *Files and Printer Sharing* as supported by Microsoft Networking.

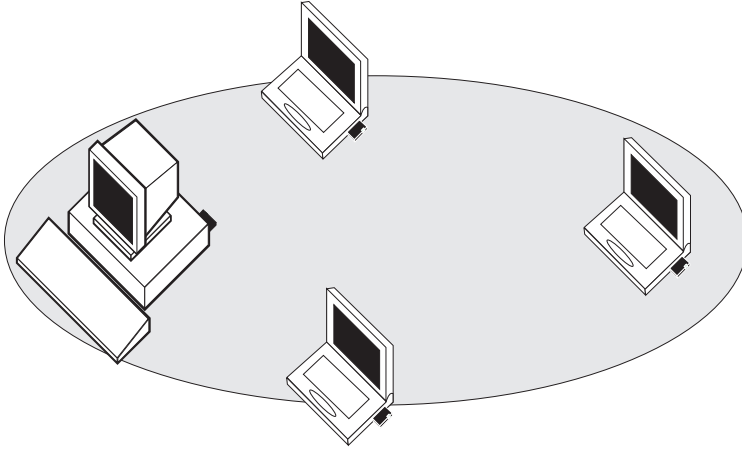


Figure G-1 Peer-to-peer Wireless workgroup

You can use this option to set up a temporary or ad-hoc network in environment where no access points are available, for example in Small Office/Home Office (SOHO) environments.

As long as the stations are within range of one another, this is the easiest and least expensive way to set up a Wireless network.

Enterprise networking

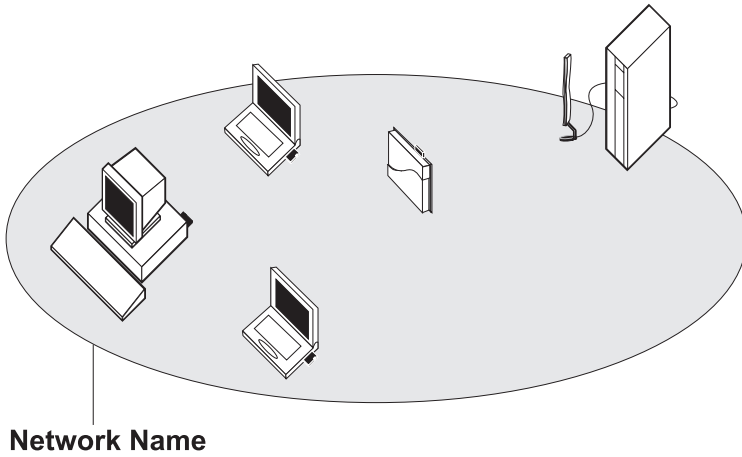


Figure G-2 Stand-alone Wireless LAN

With the Wireless LAN Access Points you can connect to a corporate Local Area Network (LAN) infrastructure to have Wireless access to all network facilities. LAN Infrastructures may either be.

- Stand-alone Wireless LANs as pictured in Figure G-2

- ❑ Wireless network infrastructures connected to an existing Ethernet network as pictured in Figure G-3.

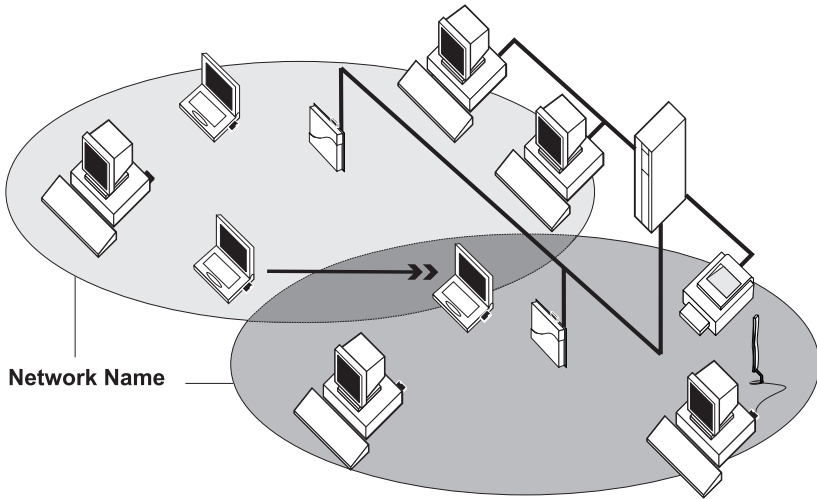


Figure G-3 LAN Infrastructure

Configuration

The Wireless LAN card functions like any standard wired Ethernet card except it gives you the freedom of Wireless connections.

Where an Ethernet card requires a cable connection to a hub and/or patch panel, the cable physically limits the location of the wired connection.

A Wireless LAN allows you connect your computer to a Local Area Network (LAN) from anywhere within the Wireless coverage area.

***NOTE:** The Wireless LAN card is a radio product. Refer to the flyer Information to the User for regulatory information that may apply in your country/region.*

Wireless LAN card features

The TOSHIBA Wireless LAN mini-PCI card is a Wireless network card that fits into a mini-PCI Type IIIA slot.

Wireless LAN card types

The Wireless LAN card is a Wireless network card that complies with the IEEE 802.11 standard on Wireless LANs (Revision B). The Wireless LAN card supports data rates up to 11 Mbit/s.



This logo is a Certification Mark of the Wireless Ethernet Compatibility Alliance, Inc.

- Wi-Fi (Wireless Fidelity) certified by the Wireless Ethernet Compatibility Alliance (WECA). This means that your Wireless hardware will communicate with other vendors' IEEE 802.11 compliant Wireless LAN products. The above indicated mark is a Certification Mark of the Wireless Ethernet Compatibility Alliance, Inc.,
- Fully compatible with any other Wireless LAN system based on Direct Sequence Spread Spectrum (DSSS) radio technology that complies with the IEEE 802.11 standard on Wireless LANs (Revision B).

Wireless LAN cards

The Wireless LAN card supports the following Wireless LAN features:

- Automatic Transmit Rate Select mechanism in the transmit range of 11, 5.5, 2 and 1 Mbit/s.
- Frequency Channel Selection (2.4 GHz).
- Roaming over multiple channels.

- ❑ Card Power Management.
- ❑ Wired Equivalent Privacy (WEP) data encryption, based on the 128 bit RC4 encryption algorithm.

Card specifications

Table G-1 Physical specifications

| | | |
|--------------------------|--------------------|-----------------------------|
| Form Factor | Mini-PCI Type IIIA | |
| Dimensions | | |
| Weight | | |
| Temperature and Humidity | | |
| Operation | 0 to 55 C | Maximum humidity 95% |
| Transit | -20 to 70 C | 15 to 95% (no condensation) |
| Storage | -10 to 60 C | 10 to 90% (no condensation) |

Although the card may still operate in the range of -20 to 70 C, operation outside the range of 0 to 55 C may no longer be according to specifications.

Table G-2 Power Characteristic

| | |
|---------------|-------|
| Doze Mode | 45mA |
| Receive Mode | 250mA |
| Transmit Mode | 350mA |
| Power Supply | 3.3V |

Table G-3 Networking Characteristics

| | |
|--------------------------|--|
| Compatibility | <ul style="list-style-type: none">■ IEEE 802.11 Standard for Wireless LANS (DSSS)■ Wi-Fi (Wireless Fidelity) certified by the Wireless Ethernet Compatibility Alliance (WECA) |
| Network Operating System | <ul style="list-style-type: none">■ Microsoft Windows® Networking |

| | |
|-----------------------|--|
| Host Operating System | Microsoft Windows® XP ■ NDIS5.1 Miniport Driver |
| Media Access Protocol | CSMA/CA (Collision Avoidance) with Acknowledgment (ACK) |
| Data Rate | <ul style="list-style-type: none"> ■ High 11 Mb/s ■ Medium 5.5 Mb/s ■ Standard 2 Mb/s ■ Low 1 Mb/s <p>The cards use an automatic Transmit Rate Select mechanism.</p> |

Radio characteristics

Radio characteristics of Wireless LAN cards may vary according to:

- Country/region where the product was purchased
- Type of product

Wireless communication is often subject to local radio regulations. Although Wireless LAN networking products have been designed for operation in the license-free 2.4 GHz band, local radio regulations may impose limitations on the use of Wireless communication equipment.

***NOTE:** Refer to the flyer Information to the User for regulatory information that may apply in your country/region.*

Table G-4 Radio characteristics

| | | | | |
|----------------------|--|--------------|----------------|-----------|
| R-F Frequency Band | 2.4GHz (2400-2483.5 MHz) | | | |
| Modulation Technique | Direct Sequence Spread Spectrum | | | |
| | <ul style="list-style-type: none"> ■ CCK for High & Medium Transmit Rate ■ DQPSK for Standard Transmit Rate ■ DBPSK for Low Transmit Rate | | | |
| Spreading | 11-chip Barker Sequence | | | |
| Bit Error Rate (BER) | Better than 10^{-5} | | | |
| Nominal Output Power | 15 dBm | | | |
| Transmit Rate | High Speed | Medium Speed | Standard Speed | Low Speed |
| | 11 Mb/s | 5.5 Mb/s | 2 Mb/s | 1Mb/s |

| | | | | |
|---------------------------------|---------|---------|---------|---------|
| Receiver Sensitivity | -83 dBm | -87 dBm | -91 dBm | -94 dBm |
| Delay Spread (at FER of <1%) | 65 ns | 225 ns | 400 ns | 500 ns |

The range of the Wireless signal is related to the Transmit Rate of the Wireless communication. Communications at lower Transmit range may travel longer distances.

***NOTE:** The range values listed in Table G-4 are typical distances as measured at the TOSHIBA Wireless LAN laboratories. These values provide rule-of-thumb guides. They may vary according to the actual radio conditions at the location where the Wireless LAN product is installed.*

- The range of your Wireless devices can be affected when the antennas are placed near metal surfaces and solid high-density materials.
- Range is also affected by obstacles in the signal path of the radio that may either absorb or reflect the radio signal.

Table G-4 lists the typical ranges when used indoors in office environments such as the following:

- In **Open Office environments**, where antennas can see each other, i.e. there are no physical obstructions between them.

- ❑ In **Semi-open Office environments**, where work space is divided by shoulder-height, hollow wall elements; antennas are at desktop level.
- ❑ In **Closed Office environments**, work space is separated by floor-to-ceiling solid walls.

Supported frequency sub-bands

Subject to the radio regulations that apply in your country/region, your Wireless LAN card may support a different set of 2.4 GHz channels (see Table G-5).

Consult your Authorized Wireless LAN or TOSHIBA Sales office for information about the radio regulations that apply in your country/region.

Table G-5 Wireless IEEE 802.11 Channels Sets

| Frequency Range | 2400-2483.5 MHz |
|-----------------|-----------------|
| Channel ID | |
| 1 | 2412 |
| 2 | 2417 |
| 3 | 2422 |
| 4 | 2427 |
| 5 | 2432 |
| 6 | 2437 |
| 7 | 2442 |
| 8 | 2447 |
| 9 | 2452 |
| 10 | 2457* |
| 11 | 2462 |

* Factory-set default channels

When installing Wireless LAN cards, the channel configuration is managed as follows:

- ❑ For Wireless clients that operate in a Wireless LAN Infrastructure, the Wireless LAN card will automatically start operation at the channel identified by the Wireless LAN Access Point. When roaming between different access points the station can dynamically switch to another channel if required.
- ❑ For Wireless LAN cards installed in Wireless clients operating in a peer-to-peer mode, the card will use the default channel 10.
- ❑ In a Wireless LAN Access Point, the Wireless LAN card will use the factory-set default channel (printed in bold), unless the LAN Administrator selected a different channel when configuring the Wireless LAN Access Point device. **G-9**

Bluetooth Brand

As for the standard of Bluetooth™, research development and decision of a standard is performed by the Bluetooth™ SIG (Special Interest Group).

Bluetooth™ SIG is the joint achievements of nine leading companies, Toshiba , Ericsson, Nokia, Intel, IBM, 3Com, Lucent Technologies, Microsoft, Motorola. More than 1300 other manufacturers, from all parts of the world and various field of business, have now also joined the Bluetooth™ family. Toshiba Personal Computer that integrates Bluetooth device passed Bluetooth™ Qualification Program and it is accepted to use the Bluetooth trademark.

For more information on Bluetooth™ SIG, please refer to the Bluetooth™ Official site. (<http://www.bluetooth.com/>)

Bluetooth Technical Facts

A tiny Bluetooth™ microchip, incorporating a radio transceiver, is built into digital devices. The Bluetooth™ technology makes all connections instantly and without an inch of cable. It facilitates fast and secure transmissions of both voice and data, even when the devices are not within line-of-sight. The radio operates in a globally available frequency band, ensuring compatibility worldwide.

Also, the radio operates in the 2.45GHz band, which is license-free and available to any radio system in the world. A Bluetooth radio link has a maximum data transfer rate of 724kbit/s. The normal range of the Bluetooth radio is either 10 meters or 100 meters, depending on your Bluetooth equipment.