



User Guide

Motorola SURFboard[®]

SB6141 DOCSIS[®] 3.0 Cable Modem





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Safety and Regulatory Information

IMPORTANT SAFETY INSTRUCTIONS

Read This Before You Begin — When using your equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

- Read all of the instructions listed here and/or in the user manual before you operate this device. Give particular attention to all safety precautions. Retain the instructions for future reference.
- This device must be installed and used in strict accordance with manufacturer's instructions, as described in the user documentation that is included with the device.
- Comply with all warning and caution statements in the instructions. Observe all warning and caution symbols that are affixed to this device.
- To prevent fire or shock hazard, do not expose this device to rain or moisture. The device must not be exposed to dripping or splashing. Do not place objects filled with liquids, such as vases, on the device.
- This device was qualified under test conditions that included the use of the supplied cables between system components. To ensure regulatory and safety compliance, use only the provided power and interface cables and install them properly.
- Different types of cord sets may be used for connections to the main POWER supply circuit. Use only a main line cord that complies with all applicable device safety requirements of the country of use.
- Installation of this device must be in accordance with national wiring codes and conform to local regulations.
- Operate this device only from the type of power source indicated on the device's marking label. If you are not sure of the type of power supplied to your home, consult your dealer or local power company.
- Do not overload outlets or extension cords, as this can result in a risk of fire or electric shock. Overloaded AC outlets, extension cords, frayed power cords, damaged or cracked wire insulation, and broken plugs are dangerous. They may result in a shock or fire hazard.
- Route power supply cords so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cords where they are attached to plugs and convenience receptacles, and examine the point where they exit from the device.
- Place this device in a location that is close enough to an electrical outlet to accommodate the length of the power cord.
- Place the device to allow for easy access when disconnecting the power cord of the device from the AC wall outlet.
- Do not connect the plug into an extension cord, receptacle, or other outlet unless the plug can be fully inserted with no part of the blades exposed.
- Place this device on a stable surface.
- Avoid damaging the cable modem with static by touching the coaxial cable when it is attached to the earth-grounded coaxial cable-TV wall outlet.
- Always first touch the coaxial cable connector on the cable modem when disconnecting or reconnecting the Ethernet cable from the cable modem or user's PC.
- It is recommended that the customer install an AC surge protector in the AC outlet to which this device is connected. This is to avoid damaging the device by local lightning strikes and other electrical surges.
- Postpone installation until there is no risk of thunderstorm or lightning activity in the area.
- Do not use this product near water: for example, near a bathtub, washbowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool.
- Do not cover the device or block the airflow to the device with any other objects. Keep the device away from excessive heat and humidity and keep the device free from vibration and dust.
- Wipe the device with a clean, dry cloth. Never use cleaning fluid or similar chemicals. Do not spray cleaners directly on the device or use forced air to remove dust.



- For added protection, unplug the device from the wall outlet and disconnect the cables to avoid damage to this device due to lightning and power surges.
- Upon completion of any service or repairs to this device, ask the service technician to perform safety checks to determine that the device is in safe operating condition.
- Do not open the device. Do not perform any servicing other than that contained in the installation and troubleshooting instructions. Refer all servicing to qualified service personnel.
- This device should not be used in an environment that exceeds 50° C (104° F).

SAVE THESE INSTRUCTIONS

Note to CATV System Installer — This reminder is provided to call the CATV system installer’s attention to Section 820.93 of the National Electric Code, which provides guidelines for proper grounding and, in particular, specifies that the Coaxial cable shield shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

FCC STATEMENTS

FCC Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the device and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

FCC CAUTION: Any changes or modifications not expressly approved by Motorola for compliance could void the user’s authority to operate the equipment.

FCC DECLARATION OF CONFORMITY

Motorola Mobility, Inc, 101 Tournament Drive, Horsham, PA 19044, 1-215-323-1000, declares that the SURFboard SB6141 DOCSIS 3.0 Cable Modem complies with 47 CFR Parts 2 and 15 of the FCC rules as a Class B digital device.

INDUSTRY CANADA (IC) STATEMENT

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

CARING FOR THE ENVIRONMENT BY RECYCLING



When you see this symbol on a Motorola product, do not dispose of the product with residential or commercial waste.

Recycling your Motorola Equipment

Please do not dispose of this product with your residential or commercial waste. Some countries or regions, such as the European Union, have set up systems to collect and recycle electrical and electronic waste items. Contact your local authorities for information about practices established for your region. If collection systems are not available, call Motorola Customer Service for assistance. Please visit www.motorola.com/recycle for instructions on recycling.



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1

Getting Started





The Motorola SURFboard® SB6141 DOCSIS® 3.0 Cable Modem provides high-speed access to the Internet and other online services.

You can use your high-speed cable modem to directly connect one PC in your home or business to the Internet.

This guide provides a product overview and instructions for installing and configuring the SB6141.

Inside the Box

Before installing the modem, check that the following items are included in the box with the modem. If any items are missing, please contact Motorola Broadband Technical Support at **1-877-466-8646**.

ITEM		DESCRIPTION
Power Supply		Provides power to the modem using an electrical outlet
10/100/1000 Base-T Ethernet Cable		Standard Category 5, or higher, cable for connecting to the network
Software License & Regulatory Card		Contains software license, warranty, and safety information for the modem
SB6141 Install Sheet		Provides basic information for connecting the modem

Minimum System Requirements

The SB6141 is compatible with the following operating systems:

- Windows® 7
- Windows Vista™, Service Pack 1 or later
- Windows XP, Service Pack 2 or later
- Mac® 10.4 or later (Ethernet connection only)
- UNIX® (Ethernet connection only)
- Linux® (Ethernet connection only)

Contact Information

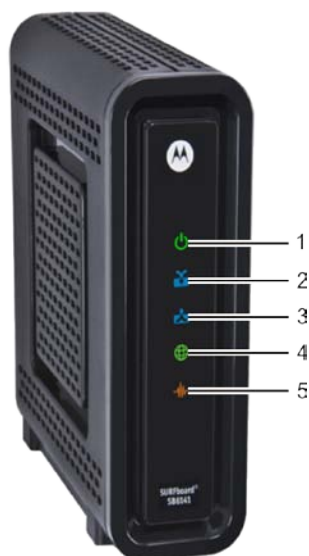
For additional product information, please visit the Motorola support website at www.motorola.com/us/support.








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Product Overview

Front Panel



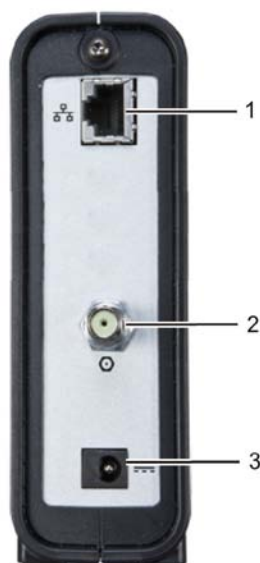
LED ICON	FLASHING	ON
1  POWER	Not applicable — icon does not flash	Green: Power is properly connected
2  RECEIVE	Scanning for a downstream (receive) channel connection	Green: Non-bonded downstream channel is connected Blue*: High-speed Internet connection with bonded downstream channels
3  SEND	Scanning for an upstream (send) channel connection	Green: Non-bonded upstream channel is connected Blue*: High-speed Internet connection with bonded upstream channels
4  ONLINE	Scanning for an Internet connection	Green: Startup process completed
5  LINK	Transmitting or receiving data on Ethernet port	Amber: A device, PC, or hub is connected to the Ethernet (10Base-T) or Fast Ethernet (100Base-T) port Blue*: High-speed Gigabit Ethernet (1000Base-T) connection from the SB6141 to your PC




***Note:** Bonded channel operation is not available in all locations. Your service provider may implement bonded channels for high-speed Internet and Ethernet connections.

Note: To increase the bandwidth available for receiving and transmitting data, your service provider may also implement bonded channels for RECEIVE and SEND channel connections. The LINK icon turns blue when a high-speed Gigabit Ethernet (GigE) connection is made.



Rear Panel



Port Name	Description
1  ETHERNET	Ethernet port for an RJ-45 cable connection A green LED indicates a data connection is made
2  CABLE	Coaxial cable connector
3  POWER	+12VDC Power connector

MAC Label

The SB6141 Media Access Control (MAC) label is located on the bottom of the modem. It contains specific ID information for the modem.

To receive data service, you may have to provide the MAC address (**HFC MAC ID**) and serial number located on the label to your Internet service provider.



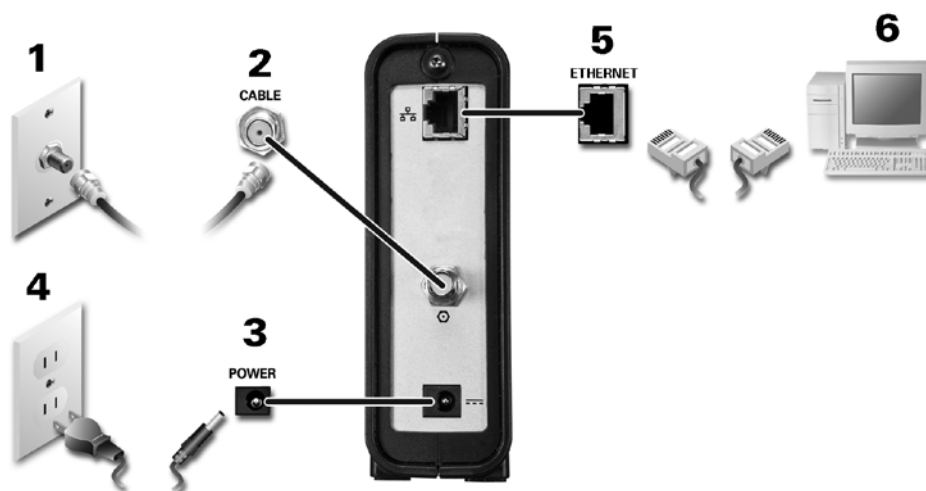
3

Connecting the Modem



This product is for indoor use only. Do not route the Ethernet cable outside of the building. Exposure of the cables to lightning could create a safety hazard and damage the product.

Before installing the modem, choose a location where the PC and modem are preferably near existing cable and electrical wall outlets.



1. Verify that the coaxial cable is connected to a cable outlet or splitter.
2. Connect the other end of the coaxial cable to the Cable connector on the modem. Hand-tighten the connectors to avoid damaging them.
3. Plug the power cord into the Power port on the modem.
4. Plug the other end of the power cord into an electrical outlet.
5. Connect the Ethernet cable to the Ethernet port on the modem.
6. Connect the other end of the Ethernet cable to the Ethernet port on the PC.

Testing the Connections

Perform the following connectivity test to verify that all the components were connected properly:

1. Power on your PC and then log on.
2. Check that the POWER, RECEIVE, SEND, and ONLINE front panel lights on the modem are either ON or FLASHING. See [Front Panel](#) for additional status information.



Wall Mounting the Modem



Before drilling holes in the wall, check the structure for potential damage to water, gas, or electrical lines.

You will need a screwdriver and two M3 (#6) screws.

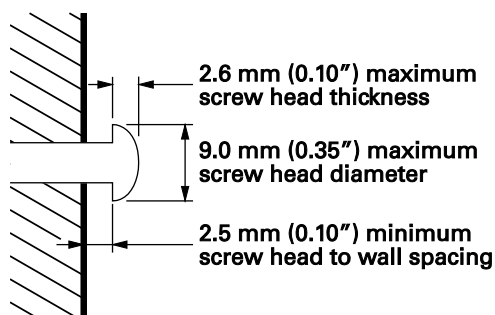
1. Print the [Wall Mounting Template](#).

Note: You can mount the modem horizontally or vertically.

2. Remove all cables (power, coaxial, and Ethernet) from the modem.
3. Select a location to mount the modem.

Notes:

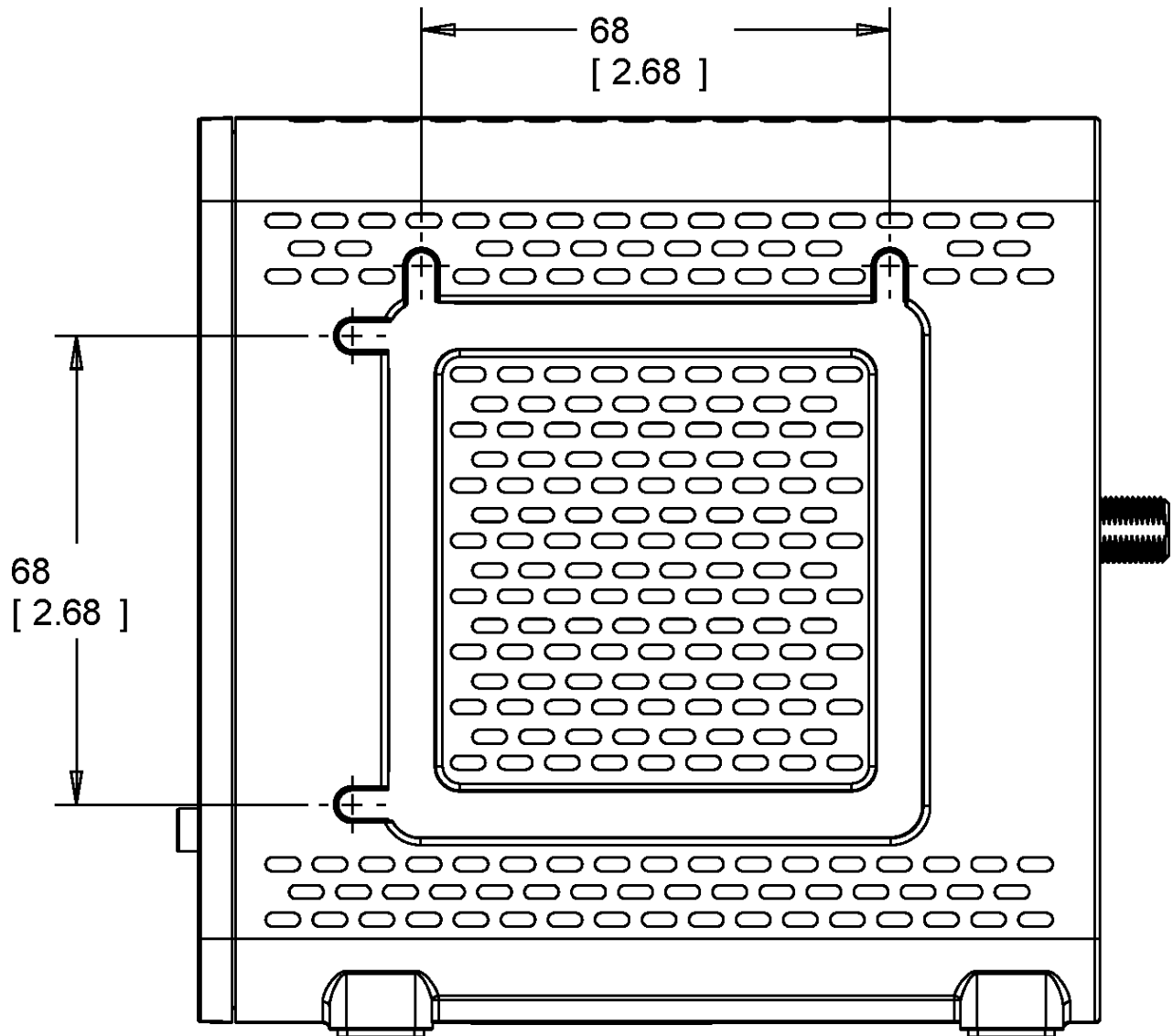
- Locate the unit according to local or national codes governing residential or business cable TV and communications services.
 - Follow all local standards for installing a network interface unit/network interface device (NIU/NID).
 - It is recommended that you mount the modem to concrete, masonry, a wooden stud, or some other solid wall material. Use anchor bolts if necessary (for example, if you mount the unit on drywall).
4. Position and secure the wall mounting template on the wall to mark the holes.



5. Select an appropriate depth and diameter to drill the holes to a depth of at least 1½ inches (3.8 cm).
Note: There must be .10 inch (2.5 mm) between the wall and underside of the screw head.
6. Insert the #6 screws in the holes and then attach the modem.
7. Verify the modem is still securely attached to the wall.
8. Reconnect the coaxial, Ethernet, power cables.
9. Plug the power cord into an electrical outlet.
10. Arrange the cables to prevent any safety hazards.



Wall Mounting Template





4

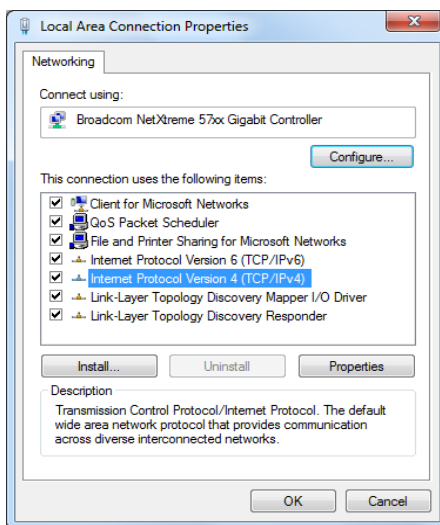
Connecting to the Internet

After installing the modem, you are now ready to connect your PC and other network devices to the Internet. To do this, you may have to enable the network options on your PC to automatically obtain an IP address and DNS server address. Follow the steps in this section for your operating system.

Note: Your PC may already be configured to automatically connect to the Internet. If so, **do not** perform any of the steps in this section.

Configuring TCP/IP for Windows 7

1. Click **Start** button and then select **Network, Properties**.
2. Click **Network and Internet** to open the Network and Internet window.
3. Click **Network and Sharing Center** to open the Network and Sharing Center window.
4. Click **Change adapter settings** to open the Network Connections window.
5. Right-click the network connection for your network interface.
6. Select *Properties* to open the Local Area Connection Properties window.



7. Select *Internet Protocol Version 4 (TCP/IPv4)* and click **Properties** to open the Internet Protocol Properties window.
8. Select *Obtain an IP address automatically* and *Obtain DNS server address automatically*.
9. Click **OK** to save the TCP/IP settings and close the Internet Protocol Version 4 (TCP/IPv4) Properties window.
10. Click **Close** to close the Local Area Connection Properties window.
11. Close the remaining windows and exit the Control Panel.

When you complete the TCP/IP configuration, go to [Verifying the IP Address in Windows 7](#).



Configuring TCP/IP for Windows Vista

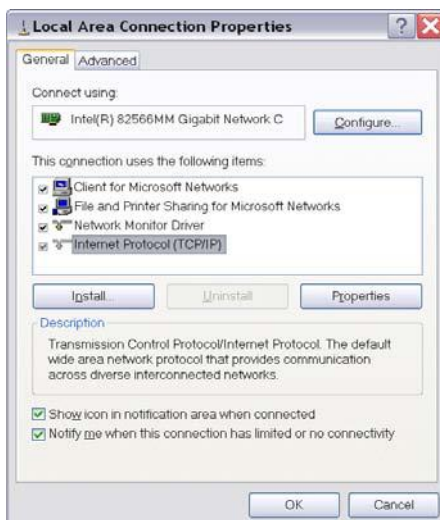
1. Click **Start** button and then right-click **Network**.
2. Click **Network and Internet** to open the Network and Internet window.
3. Click **Network and Sharing Center** to open the Network and Sharing Center window.
4. Click **Manage Network Connections**.
5. Right-click on the Local Area Connection you want to configure (if more than one is listed).
6. Click **Properties** to open the Connection Properties window.
7. Click **Continue**, if prompted for administrator permission.
8. Click **Networking** tab.
9. Select *Internet Protocol Version4 (TCP/IPv4)* and then click **Properties**.
10. Verify that the **Obtain an IP address automatically** and **Obtain DNS server address automatically** options are both selected.
11. Click **Advanced** button. Use the following table to verify the Advanced TCP/IP Settings.

IP Settings Tab	DNS Tab	WINS Tab
<ul style="list-style-type: none">• DHCP Enabled listed IP address box• Default gateways box is empty• Automatic metric is selected	<ul style="list-style-type: none">• DNS server addresses box is empty• Append primary and connection specific DNS suffixes is selected• Append parent suffixes of the primary DNS suffix is checked• Register this connection's addresses in DNS is checked• Append these DNS suffixes (in order) is not selected	<ul style="list-style-type: none">• WINS addresses box is empty• Enable LMHOSTS lookup is checked• Default: Use NetBIOS setting from the DHCP server is selected

12. Click **OK**.
13. Click **Alternate Configuration** and verify that *Automatic private IP address* is selected.
14. Click **OK**. A prompt to restart your PC will display.

Configuring TCP/IP for Windows XP

1. Click **Start** button and then select **Settings** and **Control Panel**.
2. Click **Network and Internet Connections** or **Network Connections** (will vary according to settings).
3. Click **Local Area Connection**.
4. Click **Properties** to open the Local Area Connection Properties window.



5. Verify *Internet Protocol (TCP/IP)* is selected, then click **Properties**.
6. Verify that *Obtain an IP address automatically* and *Obtain DNS server address automatically* are both selected.
7. Click **OK** to save the TCP/IP settings.
8. Click **OK** to exit.

Renewing the IP Address in Windows 7 or Vista

1. Click **Start** button and then click **Start Search**.
2. Type **cmd** and then right-click on **cmd.exe** from the drop-down list.
3. Select *Run as administrator*.
4. Type **ipconfig /renew** and press **Enter**. A new IP address for your PC will display.
5. Type **exit** and press **Enter** to return to Windows.

If you still cannot access the Internet, contact your Internet Service Provider.

Renewing the IP Address in Windows XP

1. Click **Start** button and then click **Run**.
2. Type **cmd** and click **OK** to open a command prompt window.
3. Type **ipconfig /renew** and press **Enter**. A new IP address for your PC will display.
4. Type **exit** and press **Enter** to return to Windows.

If you still cannot access the Internet, contact your Internet Service Provider.

Verifying the IP Address in Windows 7 or Vista

1. Click **Start** button and then click **All Programs**.
2. Click **Accessories**.
3. Click **Run** to open the Run window.
4. Type **cmd** and click **OK** to open a command prompt window.
5. Type **ipconfig** and press **Enter** to display the IP Configuration.



Verifying the IP Address in Windows XP

1. Click **Start** button and then click **Run**.
2. Type **cmd** and click **OK**.
3. Type **ipconfig** and press **Enter** to display your IP configuration.



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Monitoring Your Modem

Use the SB6141 Modem Configuration Manager to view the various configuration settings and operational status of the modem. You can also reset the modem configuration back to the original factory settings.

Starting the Modem Configuration Manager

1. Open any web browser on a PC connected to your modem.
2. In the Address bar, type **http://192.168.100.1** for the Modem Configuration Manager IP address, and then press **Enter**. The following Status page appears when you first log on.

Note: If you cannot access the HTML pages in the Modem Configuration Manager, please contact your service provider for more information.

Cable Modem	
Status	Signal
Addresses	Configuration
Logs	Open Source
Help	

This page provides information about the startup process of the Cable Modem. If there is a problem with the startup, the word "Failed" may appear in the Status column. Should this occur, visit the Help area and perform the Checkup procedures listed there. If the problem continues, click on the word "Failed" for more detailed information about the failure, or call your service provider for assistance.

Task	Status
DOCSIS Downstream Channel Acquisition	Done
DOCSIS Ranging	Done
Establish IP Connectivity using DHCP	Done
Establish Time Of Day	Done
Transfer Operational Parameters through TFTP	Done
Register Connection	Done
Cable Modem Status	Operational
Initiate Baseline Privacy	Skipped

Cable Modem Operation	Value
Current Time and Date	May 19 2011 09:51:16
System Up Time	0 days 0h1m56s

[Status](#) | [Signal](#) | [Addresses](#) | [Configuration](#) | [Logs](#) | [Open Source](#) | [Help](#)



Restoring Your Modem Settings

You can reset your SB6141 modem configuration to the factory default settings.

WARNING: This will delete all of your existing modem configuration settings.

1. Select **Configuration** from the menu bar.

The screenshot shows the 'Cable Modem' configuration interface. The 'Configuration' tab is selected in the top navigation bar. The main content area displays various modem settings in a table-like format. Below the settings, there is a section for 'DHCP Server Enabled' with a detailed note. At the bottom of the configuration area, there are two buttons: 'Reset All Defaults' and 'Restart Cable Modem'. The footer of the page contains a navigation bar with links for 'Status', 'Signal', 'Addresses', 'Configuration', 'Logs', 'Open Source', and 'Help'.

2. Click **Reset All Defaults**.



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Troubleshooting

If the solutions listed here do not solve your problem, contact your service provider.

You may have to reset the SB6141 modem configuration to its original factory settings if the cable modem is not functioning properly.

Your service provider may ask for the status of the icon lights as described in [Front Panel Icons and Error Conditions](#).

Solutions

Table 1 – Troubleshooting Solutions






MODEM PROBLEM	POSSIBLE SOLUTION
Power Icon is OFF	<ul style="list-style-type: none">• Check the cable connections to the modem and electrical outlet.• Check that the electrical outlet is working. Is the outlet controlled by a light switch?
Cannot Send or Receive Data	<ul style="list-style-type: none">• On the front panel, note the status of the icons and refer to Front Panel Icons and Error Conditions to identify the error.• If you have cable television, check your television to ensure your cable service is operating properly.• Check the coaxial cable connection at the SB6141 and cable wall outlet. Hand tighten, if necessary.• Check the IP address. Follow the steps for verifying the IP address for your operating system in Verifying Your IP Address in Windows 7 or Vista or Verifying Your IP Address in Windows XP. Call your service provider if you need an IP address.• Check that the Ethernet cable is properly connected to the SB6141 and the PC.• If a device is connected via the Ethernet port, check that the ONLINE icon is ON to verify connectivity.• Call your service provider for further assistance.



Front Panel Icons and Error Conditions

The SB6141 front panel icons provide status information for the following error conditions:

Table 2 – Front Panel Icons and Error Conditions

ICON	STATUS	IF, DURING STARTUP:	IF, DURING NORMAL OPERATION
 POWER	OFF	SB6141 is not properly plugged into the electrical outlet	SB6141 is unplugged
 RECEIVE	FLASHING	Downstream receive channel cannot be acquired	Downstream channel is lost
 SEND	FLASHING	Upstream send channel cannot be acquired	Upstream channel is lost
 ONLINE	FLASHING	IP registration is unsuccessful	IP registration is lost
 LINK	OFF	No connected device is detected	Device is disconnected



Product Specifications

General

Cable Interface	75 Ω F-connector
CPE Network Interface	10/100/1000Base-T Ethernet (RJ-45)
Data Protocol	TCP/IP
Dimensions	5.7 in H x 5.7 in W x 1.5 in D (146 mm x 146 mm x 38 mm)
Power	12W (nominal)
Input Power	
North America	105 to 125 VAC, 60 Hz
Outside North America	100 to 240 VAC, 50 to 60 Hz
Regulatory	UL listed (U.S. and Canada), CE, unit is RoHS compliant, ENERGY STAR V2, COC V3, Compliant per the "Code of Conduct on Energy Consumption of Broadband Equipment", CMM, MEPS

Environmental

Operating Temperature	32 °F to 104 °F (0 °C to 40 °C)
Storage Temperature	-22 °F to 158 °F (-30 °C to 70 °C)
Operating Humidity	5 to 95% R.H. (non-condensing)

Downstream

Modulation	64 or 256 QAM
Downstream Channel Capture	Dual 96 MHz Tuners
Maximum Theoretical Data Rate*	
DOCSIS	343.072 Mbps (8 channels) / 42.884 (single channel) @ 256 QAM at 5.36 Msym/s
EuroDOCSIS	444.928 Mbps (8 channels) / 55.616 (single channel) @ 256 QAM at 6.952 Msym/s
Bandwidth	
DOCSIS	\leq 48 MHz/2
EuroDOCSIS	\leq 64 MHz/2
Symbol Rate	
DOCSIS	64 QAM 5.057 Msym/s; 256 QAM 5.361 Msym/s
EuroDOCSIS	64 QAM 6.952 Msym/s; 256 QAM 6.952 Msym/s
Operating Level Range	-15 to 15 dBmV
Bonded Channel RF	
Level Tolerance	10dBmV
Input Impedance	75 Ω (nominal)
Frequency Range	DOCSIS and Euro-DOCSIS 108 to 1002 MHz (edge to edge), Optional 91 to 1002 MHz (edge to edge)
Frequency Plan	
EuroDOCSIS	Annex A
DOCSIS	Annex B
Security	DOCSIS 3.0 Security (BPI+, EAE, AES, and SSD)
Network Management	SNMP v2 & v3
Provisioning	Supports IP addressing using IPv4, IPv6, and/or IPv6 (dual stack)



Upstream

Modulation	QPSK and 8, 16, 32, 64, 128 QAM
Maximum Channel Rate*	
DOCSIS	131.072 Mbps (4 channels) / 32.768 Mbps (single channel): @ 128 QAM at 6.4 MHz
EuroDOCSIS	131.072 Mbps (4 channels) / 32.768 Mbps (single channel): @ 128 QAM at 6.4 MHz
Channel Width	200 kHz, 400 kHz, 800 kHz, 1.6 MHz, 3.2 MHz, 6.4** MHz
Symbol Rates	160, 320, 640, 1280, 2560, 5120** ksym/s
Operating Level Range	Level range per channel (Multiple Transmit Channel mode disabled, or only Multiple Transmit Channel mode enabled with one channel in the TCS)
DOCSIS/EuroDOCSIS	
TDMA	Pmin to +57 dBmV (32 QAM, 64 QAM) Pmin to +58 dBmV (8 QAM, 16 QAM) Pmin to +61 dBmV (QPSK)
S-CDMA	Pmin to +56 dBmV (all modulations), where: Pmin = +17 dBmV, 1280 kHz modulation rate Pmin = +20 dBmV, 2560 kHz modulation rate Pmin = +23 dBmV, 5120 kHz modulation rate
Level range per channel (two channels in the TCS)	
TDMA	Pmin to +54 dBmV (32 QAM, 64 QAM) Pmin to +55 dBmV (8 QAM, 16 QAM) Pmin to +58 dBmV (QPSK)
S-CDMA	Pmin to +53 dBmV (all modulations), where: Pmin = +17 dBmV, 1280 kHz modulation rate Pmin = +20 dBmV, 2560 kHz modulation rate Pmin = +23 dBmV, 5120 kHz modulation rate
Level range per channel (three or four channels in the TCS)	
TDMA	Pmin to +51 dBmV (32 QAM, 64 QAM) Pmin to +52 dBmV (8 QAM, 16 QAM) Pmin to +55 dBmV (QPSK)
S-CDMA	Pmin to +53 dBmV (all modulations), where: Pmin = +17 dBmV, 1280 kHz modulation rate Pmin = +20 dBmV, 2560 kHz modulation rate Pmin = +23 dBmV, 5120 kHz modulation rate
Output Impedance	75 Ω (nominal)
Frequency Range	DOCSIS 5-42 MHz (edge to edge), EuroDOCSIS and optional DOCSIS 5 to 65 MHz (edge to edge)
Compatibility	PC: 90496, Pentium, or later; Windows 7, Vista, 2000, or XP or Linux® with Ethernet connection (older versions of Windows, although not specifically supported, will work with this cable modem) Macintosh: Power PC or later; OS 10.4 or higher, Ethernet connection UNIX: Ethernet connection



B

Warranty Information

SURFboard SB6141 DOCSIS 3.0 Cable Modem

Motorola Mobility, Inc. ("Motorola")

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