

Frequency Band Conversions

Beginning in SyncMesh™ version 1.5, SkyPilot customers can follow a process to convert certain SkyGateway and SkyExtenders to a different frequency band than the frequency band specified at the time of shipment. For example, a SkyGateway SP-1000, which by default supports the UNII High (5.725-5.850 GHz) frequency band, may be able to be converted to a SkyGateway SP-1100, which by default supports the ETSI (5.470-5.725 GHz) frequency band.

This feature was designed to provide customers with the flexibility to convert existing products to newly opened frequency bands or alternative frequencies that may be less used (and with less interference) than their existing frequency bands. The post-purchase conversion can reduce the time and cost of swapping out hardware in the field; however, this feature is not available with all products and there are certain limitations and restrictions for this frequency band conversion that are itemized below.

Legal Disclaimer

When converting frequencies, each customer must agree not to modify frequency bands or transceiver power settings except in compliance with all statutes and regulations applicable in the jurisdictions in which the device will be operated (for example, the Federal Communications Commission in the United States) and agree to indemnify SkyPilot from all costs and liabilities arising from my failure to comply with this obligation.

Limitations and Restrictions

- **Not applicable to first-generation hardware (-01 versions).** Due to an internal hardware component (ceramic filter) in the following products,

Part Number	Product
715-00011-01	SkyGateway, 5.725-5.850GHz
715-00111-01	SkyGateway, 5.725-5.850GHz, Australia
715-00008-01	SkyExtender, 5.725-5.850GHz
715-00108-01	SkyExtender, 5.725-5.850GHz, Australia

the transmit power at lower frequencies (4.9GHz to 5.7GHz) is drastically reduced making the product unusable at those frequencies.

- **Only applicable in the backhaul frequency band (4.940-5.850 GHz).** The frequency conversion is only applicable for the mesh backhaul frequency. It is not applicable to the Wi-Fi access frequency on DualBands or TriBands at either 2.4 GHz or 4.9 GHz.
- **Only applicable to SkyGateways and SkyExtenders.** The mesh backhaul frequency conversion is only available on SkyGateways and SkyExtenders (including the 4.940-5.850 GHz mesh backhaul portion of DualBands and TriBands).



- **NOT applicable to SkyConnectors and SkyAccess DualBands.** Since the 4.940-5.850 GHz backhaul connection on the SkyConnectors and SkyAccess DualBands is dedicated to a single purpose-built antenna, it is specifically tuned to a narrow frequency range. Therefore, the backhaul frequency of the SkyConnectors and SkyAccess DualBands cannot take advantage of this frequency band conversion feature.
- **Lack of FCC DFS support.** Currently, the 5.470-5.725 GHz frequency band is NOT available for use in the USA due to the Dynamic Frequency Selection (for Radar Detection) criteria. DFS support will be added to a future SkyPilot software release. See http://www.elliottlabs.com/documents/dynamic_frequency_selection_and_5ghz_band.pdf for more information on DFS.

Conversion Process

The following steps must be completed in order to modify the frequency range (or node type, see other document):

1. Send email to support@skypilot.com requesting a Frequency Band Conversion certificate. Please specify how many devices you wish to convert.
2. Visit the certificate redemption page at <http://www.skypilot.com/support/register/> and specify the MAC address(es) of the affected device(s). See **Figure 1** for details.
3. SkyPilot Customer Support will process this request and forward an email including the text-based key for each MAC address. See **Figure 2** for details.
4. Either through the local serial port or remotely via Telnet, access the CLI of the unit(s) and issue the `set nodetype` command.
5. You will be prompted to enter a key. Simply cut and paste from the key related to the unit that was received via email.
6. The CLI will display the current and new Frequency Region and Node Type. You will then be prompted to confirm the change and the device will reboot automatically.
7. After the device has rebooted, we recommend you confirm the new node type via the `show version` command.

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Below you can see an example of the CLI commands used to change a SkyGateway to a SkyExtender and the Frequency Region from Australia High Band, which is in the 5.725-5.850 GHz range, to ETSI, which is in the 5.470-5.725 GHz band.

```
> set nodetype

-> Enter Key:
455elfcaa0a8e6c68e73c118da46f3ade210b6acf6f160f54f1b9d0e5dcd683198356614e8ef
ac80f724896fff26f3a1ddb5c65b823ed1f988f6637fee32ab8a4b98b65c6167e6f648d4be9
94506c84686e46ccb195e4e44b8d4ac6dbd735c3aled13ad4b338578b6755b0116b5aec3992e7
blab7fbb7264e42f03695a888ccc6394d63db142bbd9c35f5373bb842fd2cecf7b4ba71c2fa2c33
185fa68d2bc4ed0bf5b4558f14056d3a297ad4aba83d9b94aa0d4492cce1a4bd90de9ae20ec90a592c
fca361a870aaf245a3462af62c1ef7a9583afa9a353790830452542e9a14a6c301e98dd67d5c
bf3ed1186e4c2777a353bc58d31e26f881d1dd8f3c8f15

                Current                New
                -----                ---
Frequency Region  Australia High Band  ETSI

-> Would you like to change the frequency region to ETSI? The node will reboot
automatically for the setting to take affect.
Would you like to continue? yes, no <y | n>: y
frequency region changed to ETSI
```

Figure 1

The registrant enters the license key on the device to convert the frequency region. A sample license identification number is shown below:
GVCW-L7OP-J3QT-1

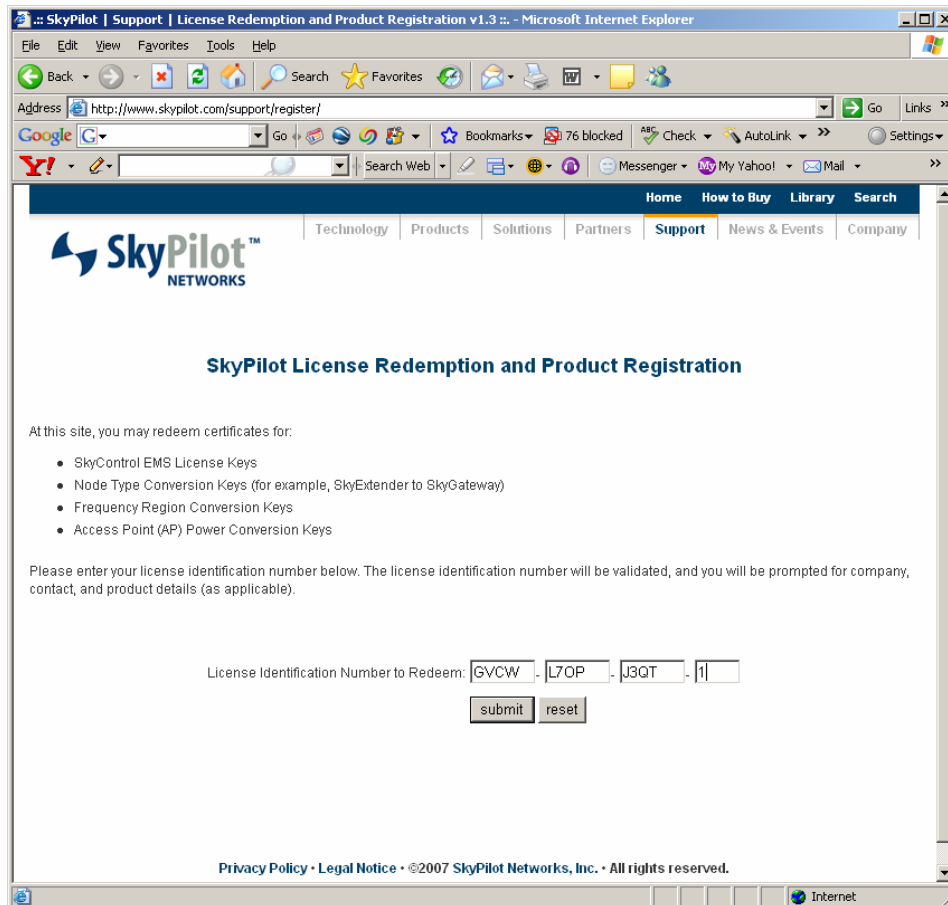


Figure 2

Sample auto email sent out from support@skypilot.com to the registrant.

From: support@skypilot.com [mailto:support@skypilot.com]
Sent: Tuesday, April 10, 2007 10:32 AM
To: Joe Smith
Subject: SkyPilot Networks frequency region key generation complete

Joe Smith,

Thank you for redeeming a SkyPilot frequency region change certificate. Your key(s) are included below, and may also be obtained by re-entering your certificate number on the web at:

<http://www.skypilot.com/support/register/>

Device MAC Address: 00:0a:db:01:07:bc Frequency Region: FCC High Low Band (USA)
Key:

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```
aea5fb5e7ebc9095ca1f4dbc49098e158df11f7a880f30c0cf72b000cdd5ad77b5dc11801687ebbb98
b148141f2ac9a2c85bac7b0462c16c501e6733a5fde099393786ff41c5071b08de8dd2bcf19b7360f0
f7b36da740256ff839e812c5357b52d90280bbd586519d9172031d3b33a41eb748f5d8f472836c20fd
84352554e8d33aacf7fe3c42a702da0c0b0603ac7c3c16c07adc96d12a1a35c0eaf1a58f1ea3af6095
509ba3794006545750bd80e8912c7e08a5ee8bc3f6e64ba0blecd020894e7a99d89e3fdd94af21de67
8aal1d134e3c3e2731fd0aa469ee98c7b7b0ddde4616e2f954e306843fd9a16b843ebeabaa072de232b
e7a6d342e6f6f9493425
```

Installation Instructions:

To change your node type, telnet or gain serial access to the device, and enter the following command: "set nodetype"

The SkyPilot device will then prompt for the conversion key. Type or copy and paste the 512 character key above into your telnet or serial session, and press Enter. You will be prompted for confirmation, and the node type will be changed. Please note that after changing then node type, a reboot is mandatory.

See below for example output from the node type change procedure:

```
000ADB01072C> set nodetype
```

```
-> Enter Key: [Paste Key Here]
```

	Current	New
	-----	---
Frequency Region	Australia High Band	ETSI

```
-> Would you like to change the frequency region to ETSI? The node will reboot
automatically for the setting to take affect.
```

```
Would you like to continue? yes, no <y | n>: y
```

```
frequency region changed to ETSI
```

Thank You,

SkyPilot Networks Support

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SkyPilot Frequency Regions

Supported Regions	SkyPilot Software Region Choices	Spectral Range (Edge to Edge)	Non-overlapping Center Channels	Configurable Center Channels	Default Power (EIRP)	Power Range (EIRP)
High Band 5.725 - 5.850						
UNII (Rest of World)	UNII High	5.725 - 5.850	5735 5755 5775 5795 5815 5835	5735 5740 5745 5750 5755 5760 5765 5770 5775 5780 5785 5790 5795 5800 5805 5810 5815 5820 5825 5830 5835 5840	4W Average	1W Avg
						2W Avg
FCC (US)	US High	5.725 - 5.850	5.745 5.765 5.785 5.805 5.825	5745 5750 5755 5760 5765 5770 5775 5780 5785 5790 5795 5800 5805 5810 5815 5820 5825 5830 5835	4W Average	4W Avg
United Kingdom	UK High	5.725 - 5.795 5.815 - 5.850	5.735 5.755 5.775 5.835	5735 5740 5745 5750 5755 5760 5765 5770 5775 5780 5785 5825 5830 5835 5840	2W Average	28.2W Peak (5W Avg)
ACA (AUS)	UNII High	5.725 - 5.850	5.735 5.755 5.775 5.795 5.815 5.835	5735 5740 5745 5750 5755 5760 5765 5770 5775 5780 5785 5790 5795 5800 5805 5810 5815 5820 5825 5830 5835 5840	4W Peak	4W Peak
						1W Avg
						2W Avg
						4W Avg
Mid Band						
ETSI (EU)	EU Mid Band	5.470 - 5.725	5480 5500 5520 5540 5560 5580 5660 5680 5700	5480 5500 5520 5540 5560 5580 5660 5680 5700	1W Average	1W Avg
						2W Avg
						4W Avg
						28.2W Peak (5W Avg)

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SkyPilot Frequency Regions (cont.)

Low Band							
UNII Low Band (Rest of World)	UNII Low	4.940 - 5.330	4950 4970 4990 5110 5130 5150 5170 5190 5210 5230 5250 5270 5290 5310 5330	4950 4955 4960 4965 4970 4975 4980 4985 4990 4995 5000 5005 5010 5015 5020 5025 5030 5035 5040 5045 5050 5055 5060 5065 5070 5075 5080 5085 5090 5095 5100 5105 5110 5115 5120 5125 5130 5135 5140 5145 5150 5155 5160 5165 5170 5175 5180 5185 5190 5195 5200 5205 5210 5215 5220 5225 5230 5235 5240 5245 5250 5255 5260 5265 5270 5275 5280 5285 5290 5295 5300 5305 5310 5315 5320 5325 5330 5335 5340	4W Average	200mW Avg 1W Avg 2W Avg 4W Avg 28.2W Peak	
UNII Low Band (Rest of World)	US Low Low	4.940 - 5.150	4950 4970 4990 5110 5130	4950 4955 4960 4965 4970 4975 4980 4985 4990 4995 5000 5005 5010 5015 5020 5025 5030 5035 5040 5045 5050 5055 5060 5065 5070 5075 5080 5085 5090 5095 5100 5105 5110 5115 5120 5125 5130 5135 5140			
UNII Low Band (Rest of World)	US High Low	5.150 - 5.350	5160 5180 5200 5220 5240 5260 5280 5300 5320 5340	5160 5165 5170 5175 5180 5185 5190 5195 5200 5205 5210 5215 5220 5225 5230 5235 5240 5245 5250 5255 5260 5265 5270 5275 5280 5285 5290 5295 5300 5305 5310 5315 5320 5325 5330 5340			
ETSI (EU) Low Band	EU Low	5.150 - 5.350	5180 5200 5220 5240 5260 5280 5300 5320	5180 5200 5220 5240 5260 5280 5300 5320			
Public Safety	PS	4.940 - 4.990	4950 4970	4950 4955 4960 4965 4970 4975 4980			

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FAA Low Band	FAA	4.995 - 5.150	5005 5025	5005 5010 5015 5020		
			5045 5065	5025 5030 5035 5040		
			5085 5105	5045 5050 5055 5060		
			5125	5065 5070 5075 5080		
				5085 5090 5095 5100		
				5105 5110 5115 5120		
				5125 5130 5135 5140		

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Leading the Mesh Revolution

2055 Laurelwood Road
Santa Clara, CA 95054-2747
408.764.8000
US Toll Free 866 SKYPILOT
sales@skypilot.com