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# How to record and analyze disconnect tone to configure WellGate 2540, WellGate 2522 and WellGate 24240, FXO Gateway

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Version 1.0

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## Diagram of basic



Figure 1. System Block Diagram.

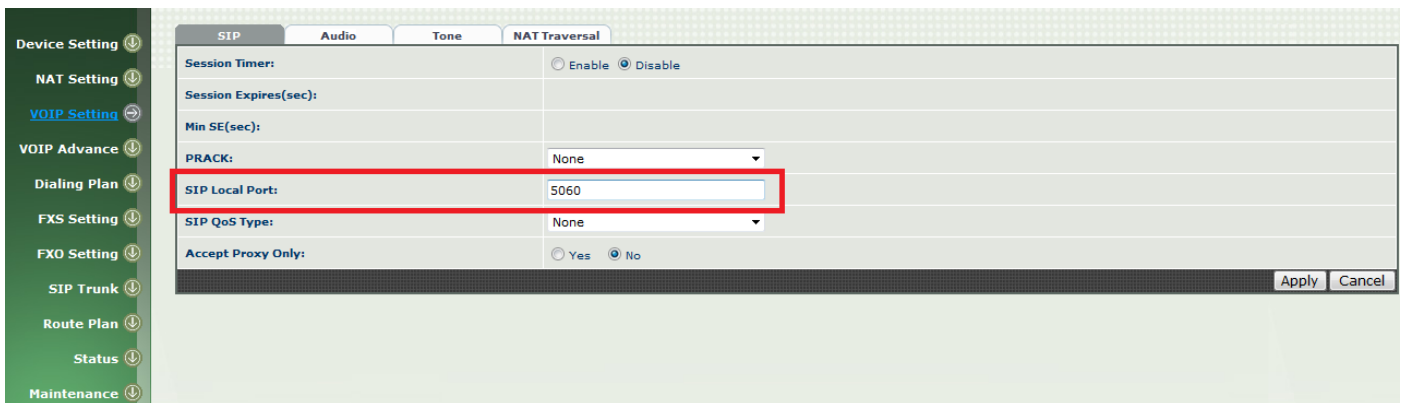
**Note:** Only connect PSTN Line or PABX extension to port 1 of FXO gateway.

### FXO Tone Analyzer

This program can detect disconnection tone, it is suitable for 4 Port FXO gateway (WellGate 2540 and 2522) and 24-port FXO gateway (Wellgate 24240). Follow Figure 1 to install FXO gateway and connect to PABX's extension or PSTN line to detect and analyze its disconnect tone. Download these program from Welltech technical support website and copy to your computer's hard disk. Follow the following steps to capture disconnect tone from PABX or PSTN line and configure to FXO gateway.

### **Warning:**

This program can only installed in **Windows XP** Operating System. It doesn't support other latest version OS. Make sure FXO gateway's SIP local port number is **5060**.



## Step 1 : Set up IP address to your Computer

1. Please put WAN port IP address of FXO Gateway and LAN port IP address of your Computer (PC or laptop) to stay at the same network IP segment. See Figure 1.

**Note:** The default gateway IP address on your computer has to set up properly.

## Step 2 : Run SipAppCtrl.exe

1. Please put PSTN Line to FXO's Line1 and confirm Line1's LED light is dark.
2. Please turn OFF all application program at your computer. And make sure your computer's speaker was installed correctly and turn ON as well.
3. Run [SipAppCtrl.exe program](#) which was installed at your computer in advance.
4. Set up IP address of WAN port at FXO Gateway. See Figure 2.
5. Enter Line1 number of PSTN Line at this screen.
6. Press "start" after finished.
7. Wait for about 5 seconds, the Speaker of your computer will announce [Disconnect tone](#) which was generated from PSTN Line.
8. If you do not hear this tone from Speaker of computer, please repeat from step 1 and check every point in details.
9. press "stop"

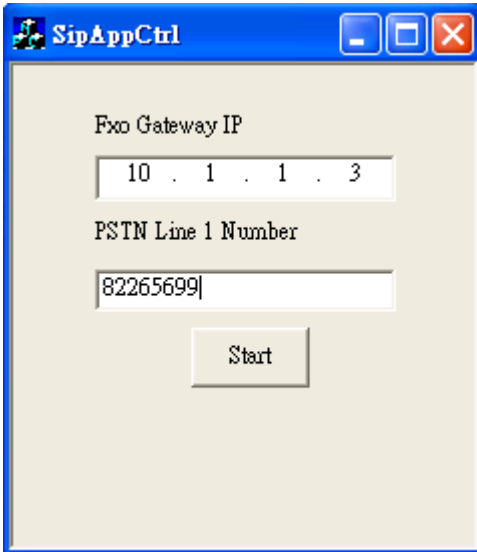


Figure 2. Enter PSTN line number.

### STEP 3: Run audacity.exe

1. Run audacity.exe (see Figure 3) to display screen.
2. Go to **Project** → **Import RAW Data**.

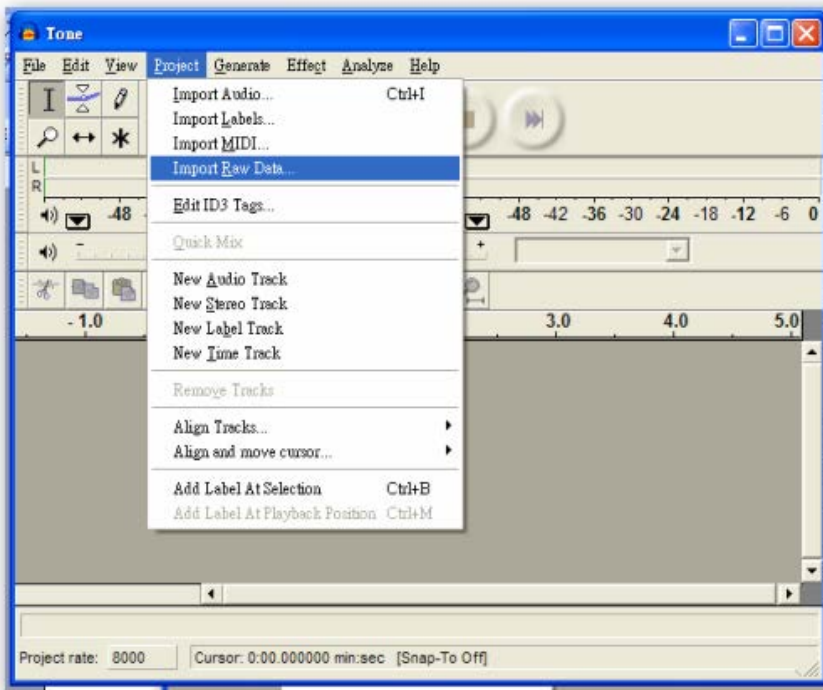


Figure 3. Start to Import Disconnect Tone.

## STEP 4: Select Tone.pcm

After Press Import Raw Data from Figure 3, the screen shows Tone.pcm file folder at Figure 4.

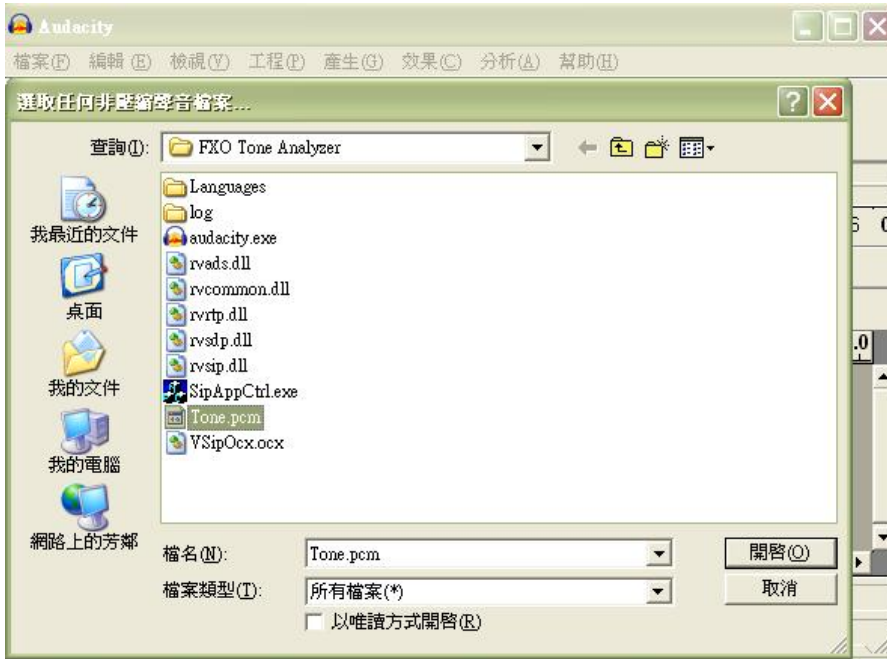


Figure 4. Disconnect Tone file folder.

## STEP 5: Analyze it and configure to WellGate 2540 FXO Gateway

1. Select Tone.pcm file and Open it at Figure 4. The **Import Raw Data** configuration screen appear at Figure 5. Only change **sample rate to 8000** and press Import command. Remain unchanged at other default configuration.

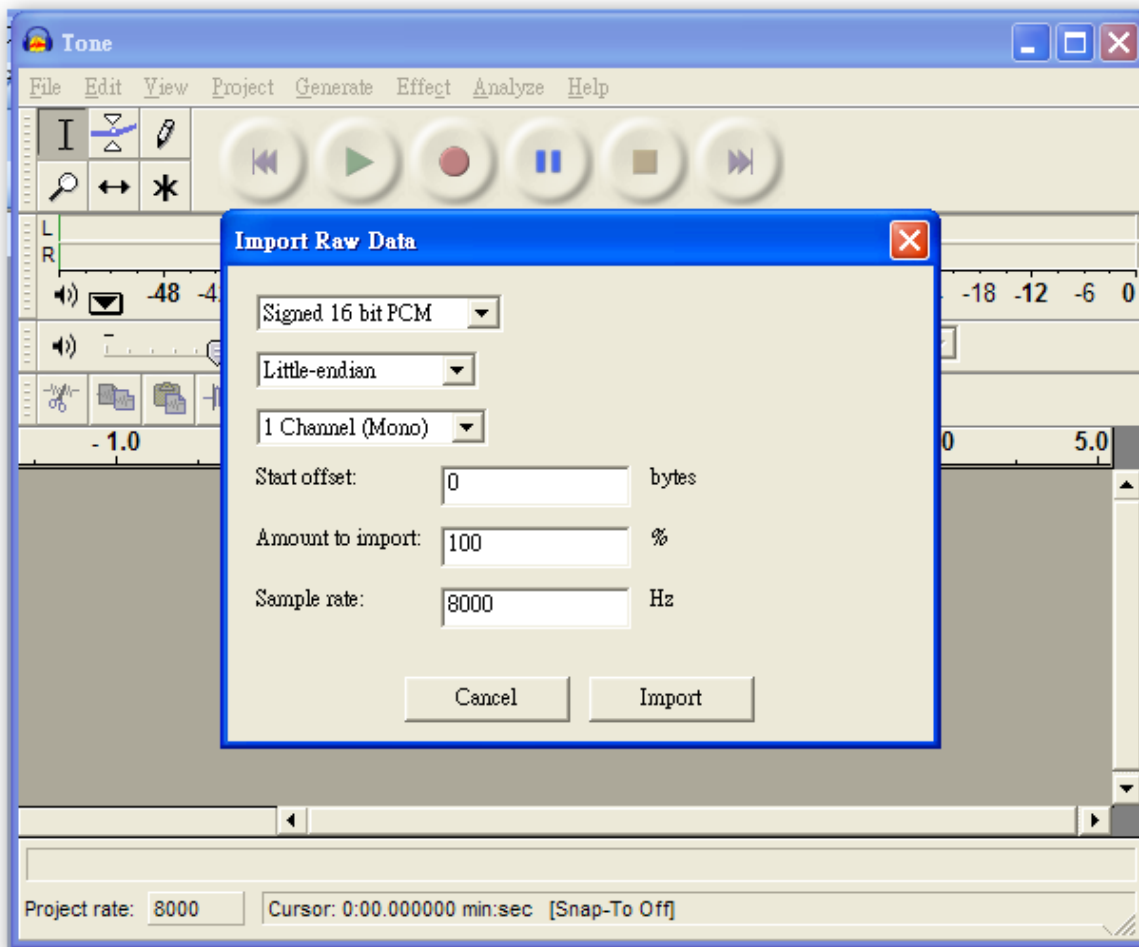


Figure 5. Import Raw Data configuration screen.

2. The screen shows as follows after Imported. (see Figure 6)

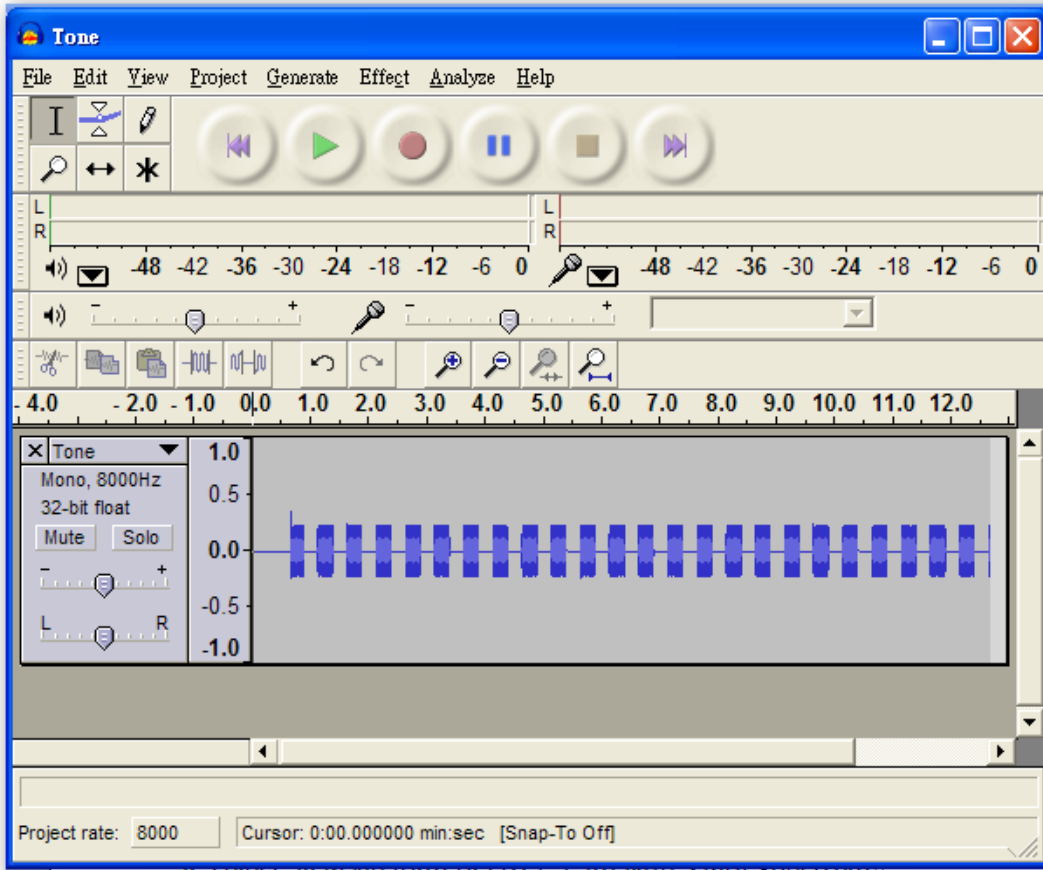


Figure 6. Screen after Import Tone file.

3. Select all wave form or Press **ctrl + a**, go to **Analyze → Plot Spectrum**. (see Figure 7)

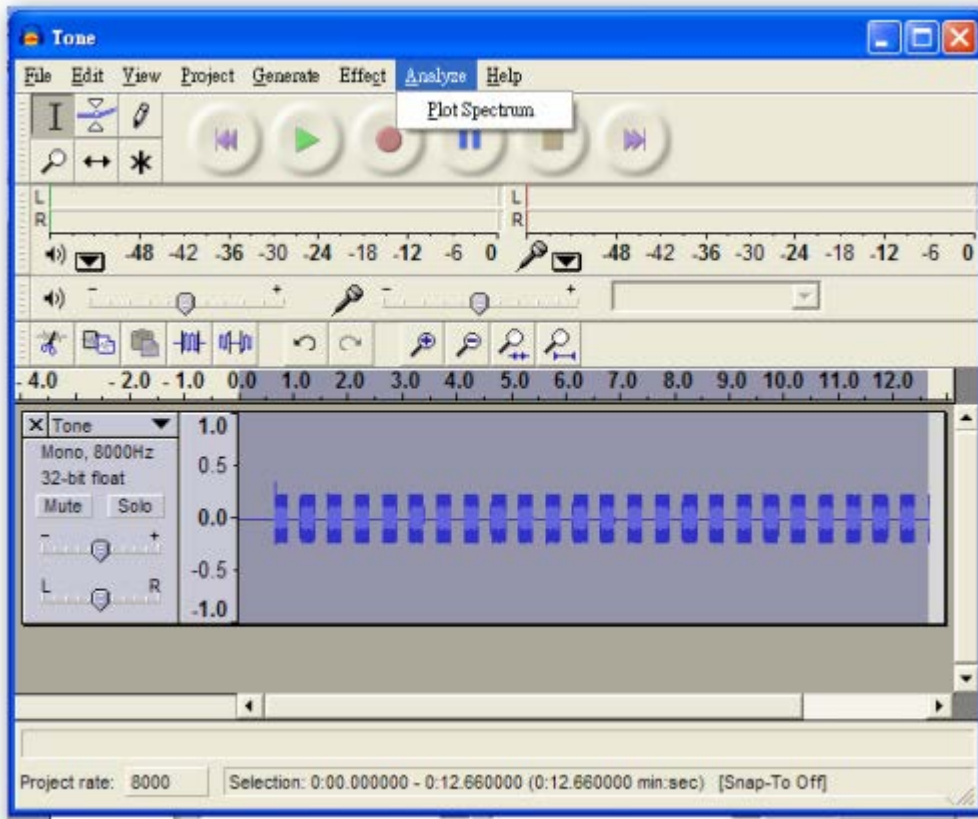


Figure 7. Analyze Tone.

4. Press Plot Spectrum at Figure 7. The screen shows waveform at Figure 8. Move cursor to frequency peak, it will show peak Frequency. (see Figure 8)

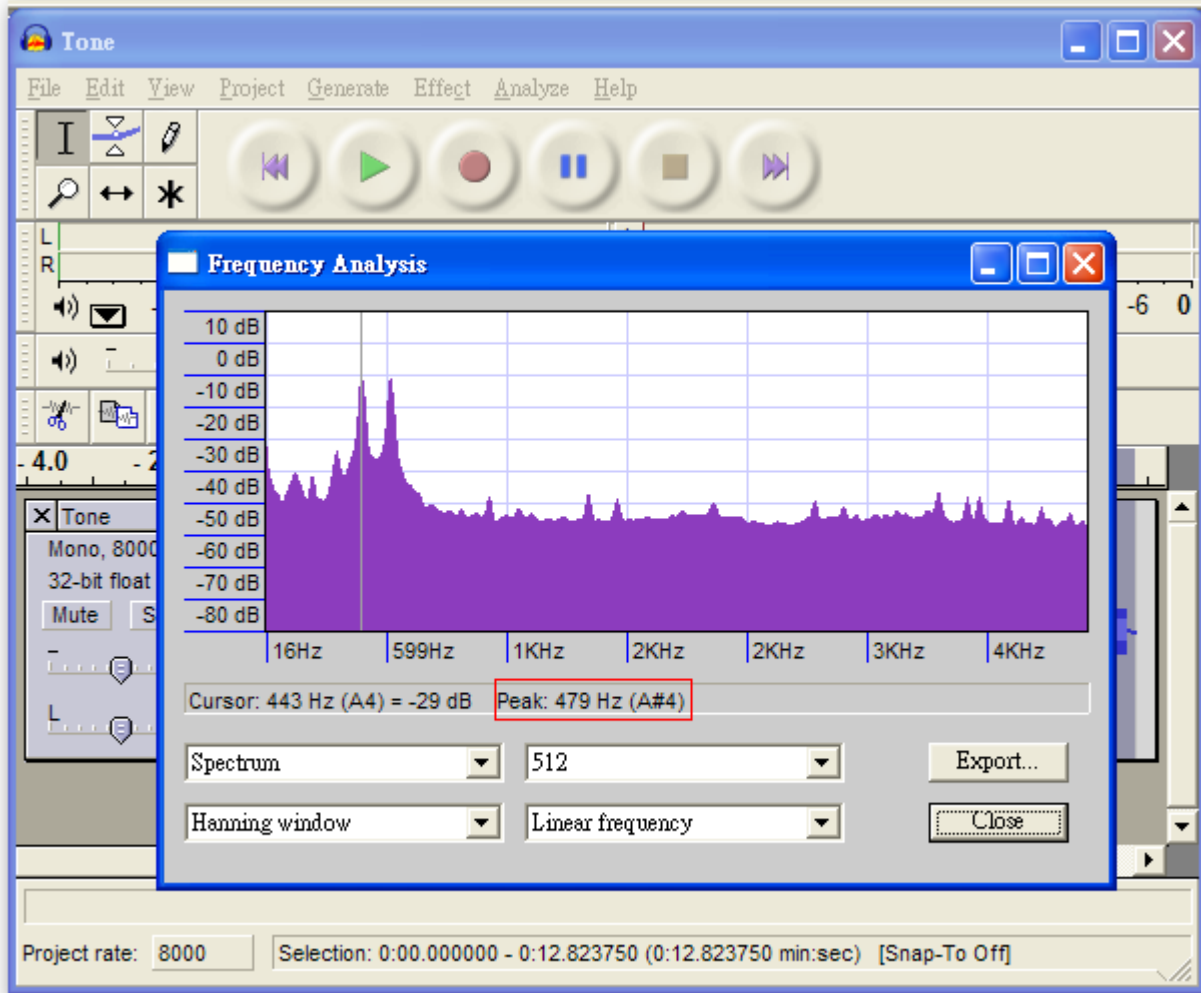


Figure 8. Peak value of Frequency.

5. If this waveform shows the second peak frequency, please move cursor to it and it will show its frequency.(see Figure 9)

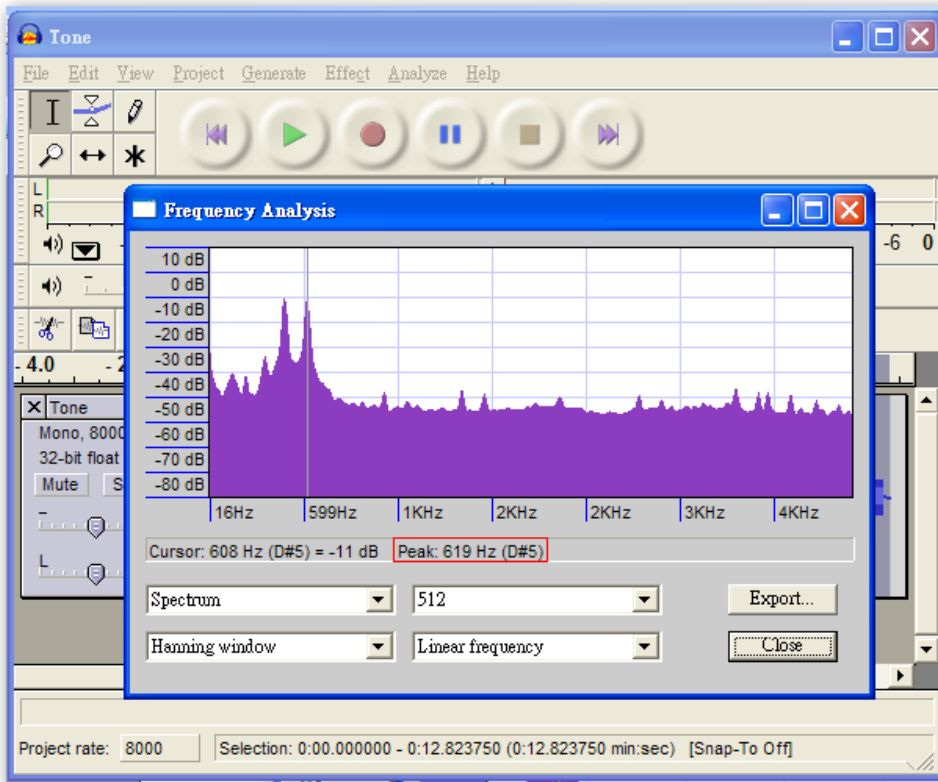


Figure 9. The second peak frequency.

6. Enter both peak values to FXO Gateway's **Tone Setting** → **Disconnect 1**. (see Figure 10)

SIP Audio Tone NAT Traversal										
Country Template	Taiwan	Use								
Tone \ Setting	Signal Type	Freq 1 (0,300~1980Hz)	Freq 2 (0,300~1980Hz)	Level 1 (0~63db)	Level 2 (0~63db)	On 1 (0~10230ms)	Off 1 (0~10230ms)	On 2 (0~10230ms)	Off 2 (0~10230ms)	Deviation (0~30)
Dial	Continuous	350	440	13	13	500	0	0	0	10
Stutter Dial	Cadence	350	440	13	13	1000	100	0	0	10
Ring Back	Cadence	440	480	13	13	1000	2000	0	0	10
Busy	Cadence	480	620	13	13	500	500	500	500	10
Call Waiting	Cadence	350	440	13	13	250	250	250	0	10
ROH	Continuous	1400	1750	13	13	10000	0	0	0	10
Warning	Cadence	900	0	13	13	500	0	0	0	10
Holding	Cadence	900	0	13	13	500	500	0	0	10
Disconnect 1	Cadence	479	619	13	13	500	500	500	500	10
Disconnect 2	Cadence	480	620	13	13	250	250	250	250	10

Figure 10. Configure Disconnect Tone Frequency at FXO Gateway.

7. Go Back to audacity.exe main screen at Figure 11, select ON time wave form from Imported tone frequency. it shows up waveform ON time at 0.27 second (270 msec). See Figure 11.

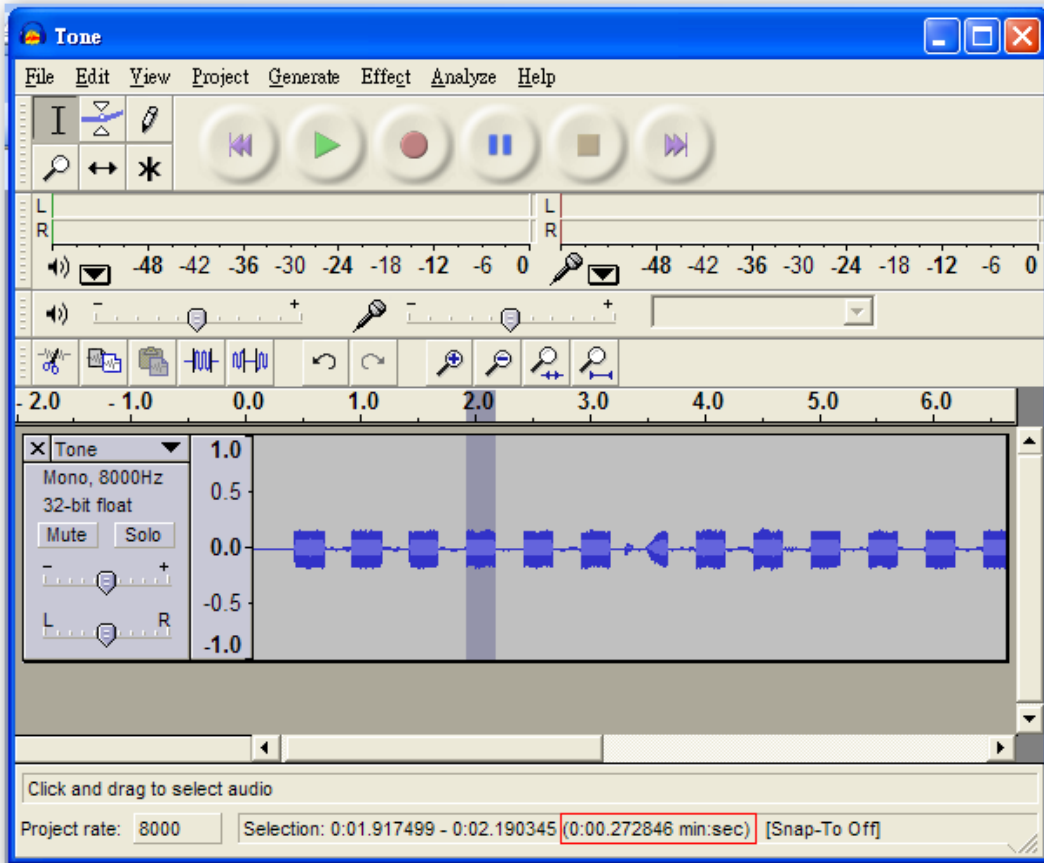


Figure 11. Waveform ON time duration.

8. Select OFF time space between two ON waveform by mouse, it shows OFF time duration at 0.27 second (270msec). See Figure 12.

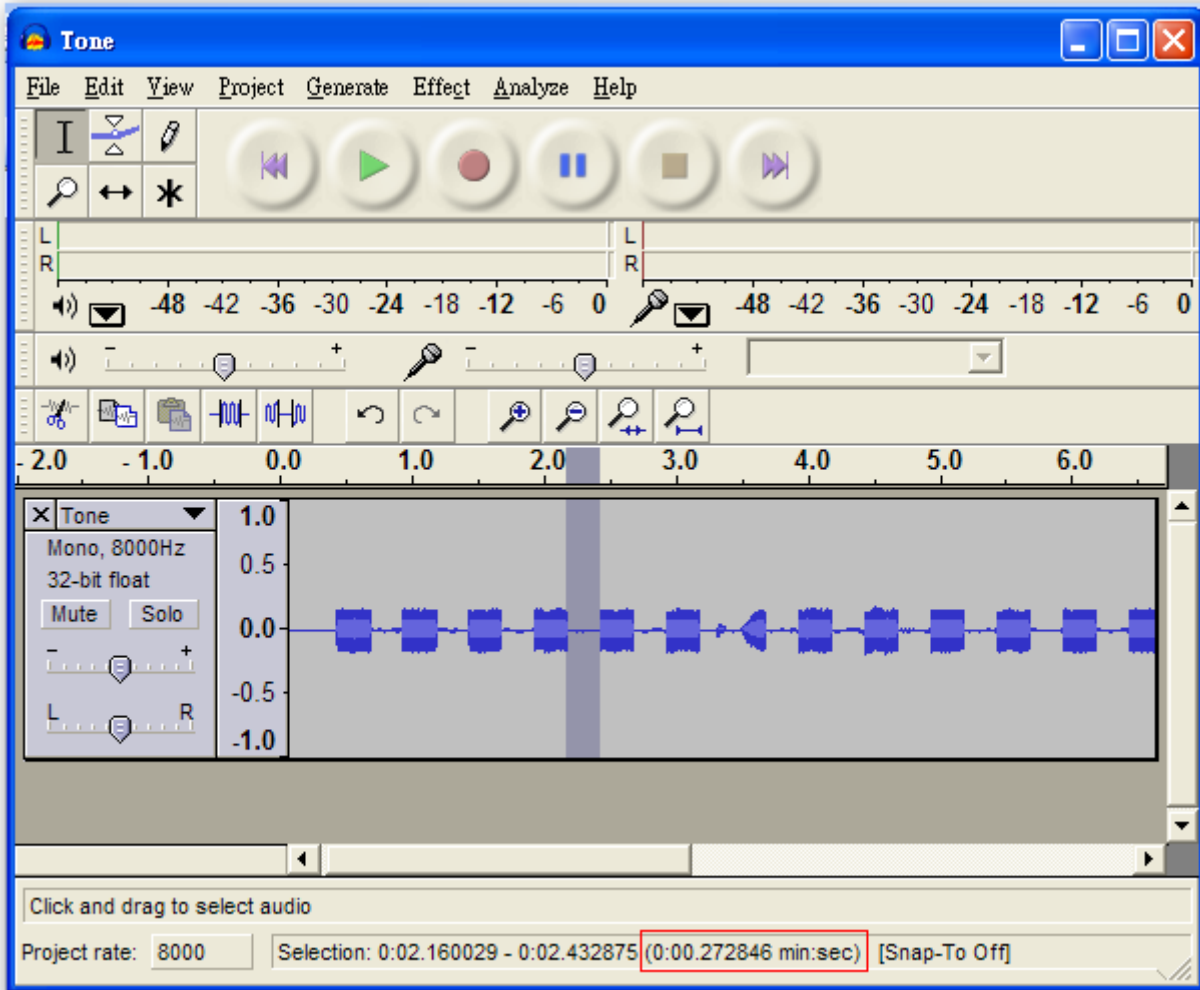
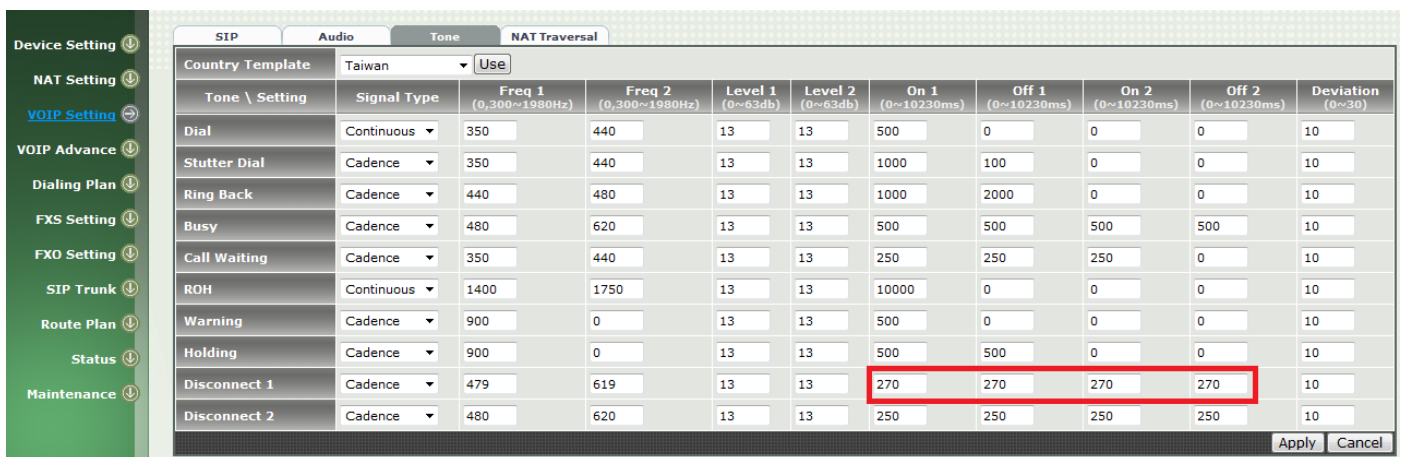


Figure 12. Waveform OFF time duration.

9. Enter these ON and OFF time's value into FXO Gateway at **VOIP Setting → Tone → Disconnect 1, On 1 and Off 1, On 2 and Off 2**. The ON and OFF waveform duratin is 0.27 second which is equal 270 msec. So you need to enter 270 at Disconnect Tone table of FXO gateway. (see Figure 13)

10. After configure Disconnect Tone Frequency at Figure 10 and ON/OFF cadence at Figure13 , FXO gateway should be able to detect Disconnected Tone correctly. If NOT, please enter Frequency High Level (Level 1) and Low Level (Level 2) values. See Figure 13. See next step how to measure Tone Frequency Level.



SIP Audio Tone NAT Traversal										
Country Template	Taiwan	Use								
Tone \ Setting	Signal Type	Freq 1 (0,300~1980Hz)	Freq 2 (0,300~1980Hz)	Level 1 (0~63db)	Level 2 (0~63db)	On 1 (0~10230ms)	Off 1 (0~10230ms)	On 2 (0~10230ms)	Off 2 (0~10230ms)	Deviation (0~30)
Dial	Continuous	350	440	13	13	500	0	0	0	10
Stutter Dial	Cadence	350	440	13	13	1000	100	0	0	10
Ring Back	Cadence	440	480	13	13	1000	2000	0	0	10
Busy	Cadence	480	620	13	13	500	500	500	500	10
Call Waiting	Cadence	350	440	13	13	250	250	250	0	10
ROH	Continuous	1400	1750	13	13	10000	0	0	0	10
Warning	Cadence	900	0	13	13	500	0	0	0	10
Holding	Cadence	900	0	13	13	500	500	0	0	10
Disconnect 1	Cadence	479	619	13	13	270	270	270	270	10
Disconnect 2	Cadence	480	620	13	13	250	250	250	250	10

Figure 13. Fill in Disconnect Tone ON/OFF cadence.

11. Press PLAY button, this program plays Disconnect Tone and you will see left sound channel's highest value at 15 as Figure 14. Enter Frequency Level 1 and Level 2 to 15 at Disconnect Tone table of FXO Gateway at Figure 15.

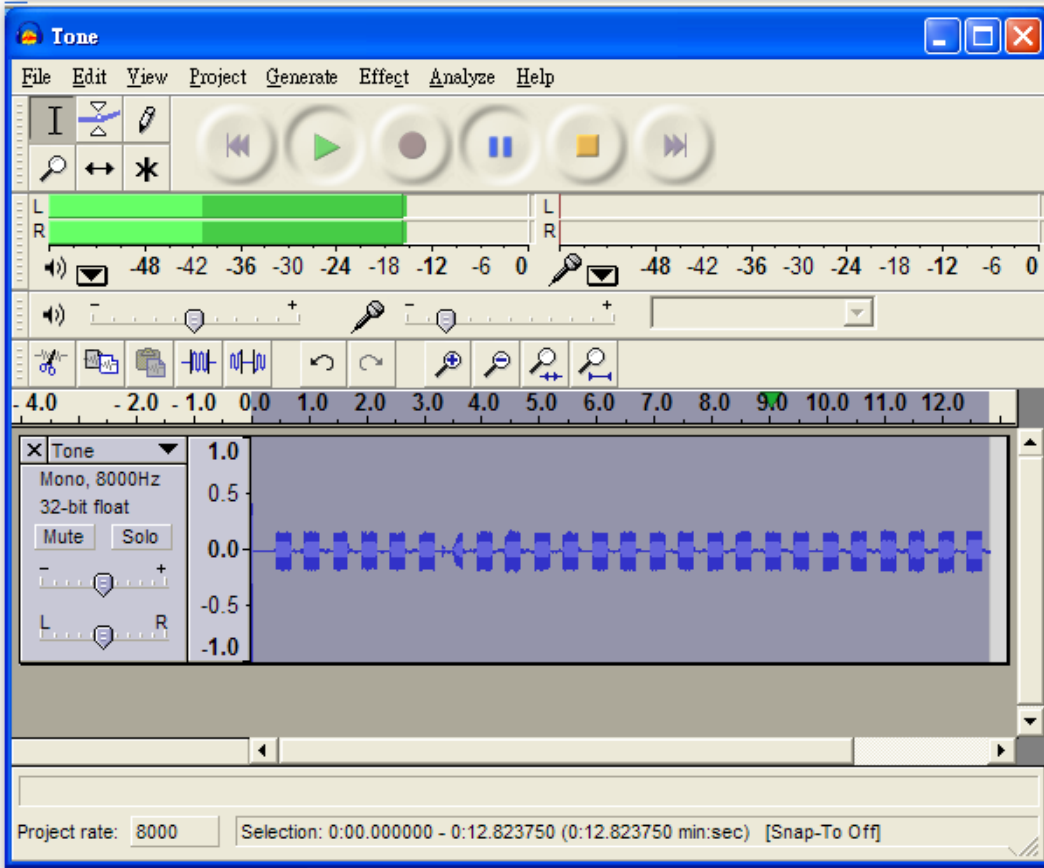


Figure 14. Highest Tone Level Value at 15.

Tone \ Setting	Signal Type	Freq 1 (0,300~1980Hz)	Freq 2 (0,300~1980Hz)	Level 1 (0~63db)	Level 2 (0~63db)	On 1 (0~10230ms)	Off 1 (0~10230ms)	On 2 (0~10230ms)	Off 2 (0~10230ms)	Deviation (0~30)
Dial	Continuous	350	440	13	13	500	0	0	0	10
Stutter Dial	Cadence	350	440	13	13	1000	100	0	0	10
Ring Back	Cadence	440	480	13	13	1000	2000	0	0	10
Busy	Cadence	480	620	13	13	500	500	500	500	10
Call Waiting	Cadence	350	440	13	13	250	250	250	0	10
ROH	Continuous	1400	1750	13	13	10000	0	0	0	10
Warning	Cadence	900	0	13	13	500	0	0	0	10
Holding	Cadence	900	0	13	13	500	500	0	0	10
Disconnect 1	Cadence	479	619	15	15	270	270	270	270	10
Disconnect 2	Cadence	480	620	13	13	250	250	250	250	10

Figure 15. Enter Disconnect Tone level.

## Example 1 : Single frequency of Disconnect Tone

1. Please see the below pictures and analyze frequency and cadence from plot spectrum.
2. Look at all of red frame can find there are two frequency which are very close. They are 425 and 426 Hz. See procedures at Figure 16 to 21.

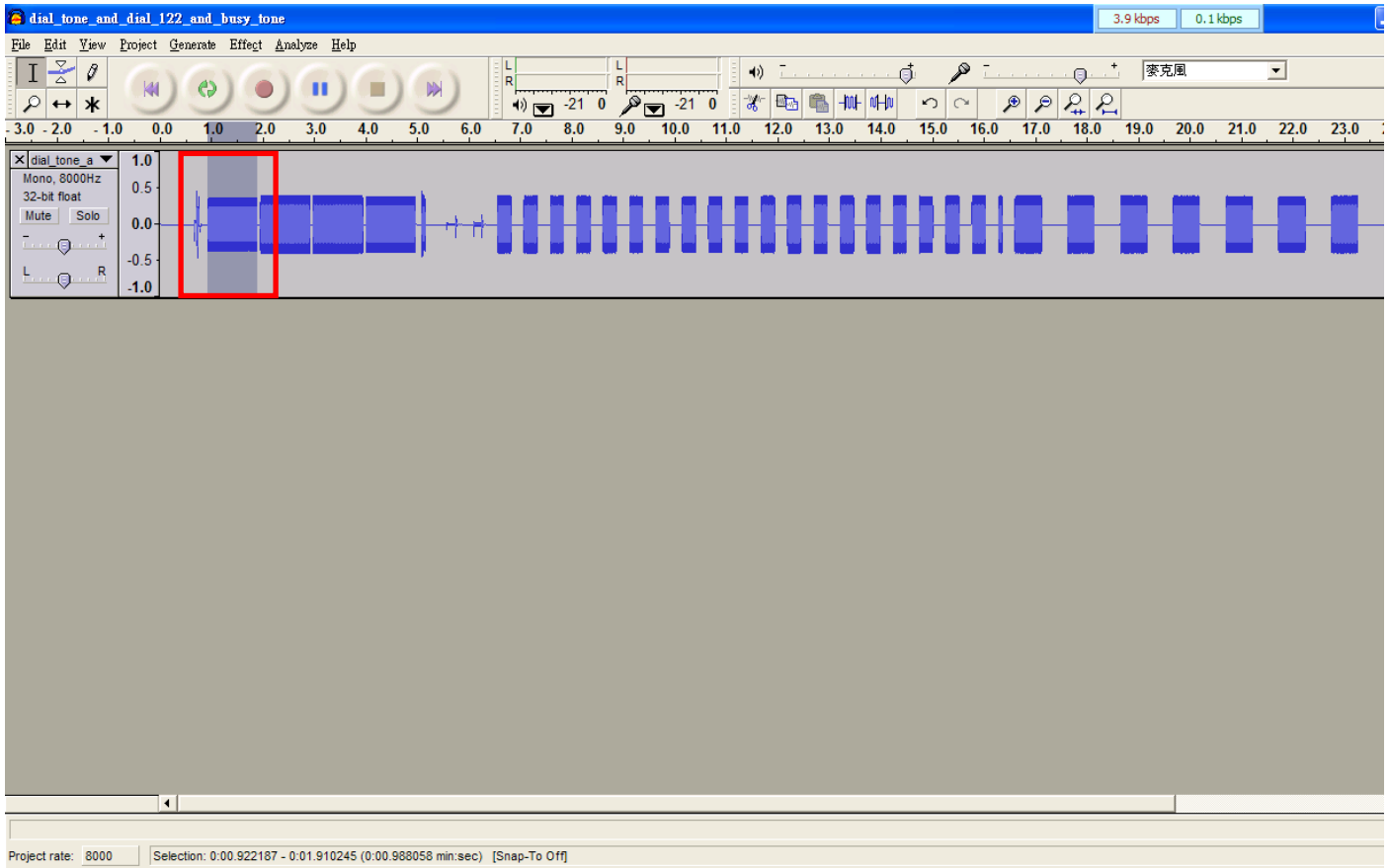


Figure 16. Select one Waveform.

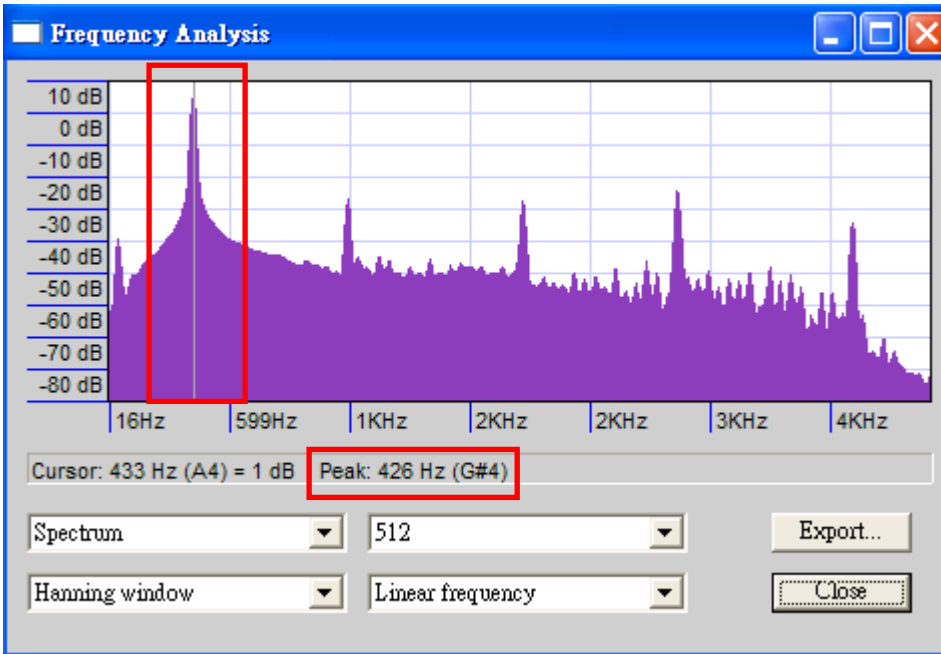


Figure 17. Peak single Frequency at 426 Hz.

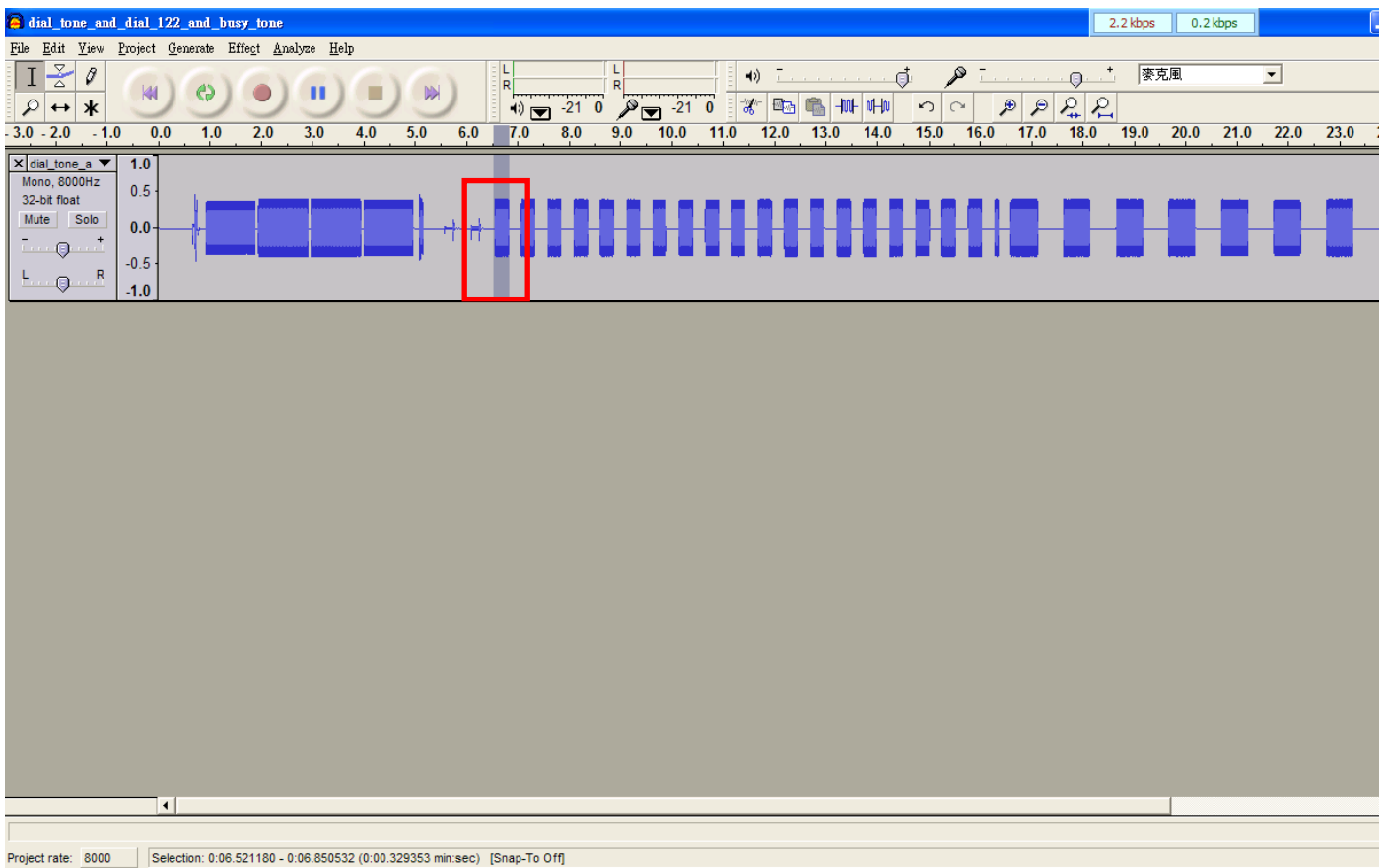


Figure 18. Select another waveform.

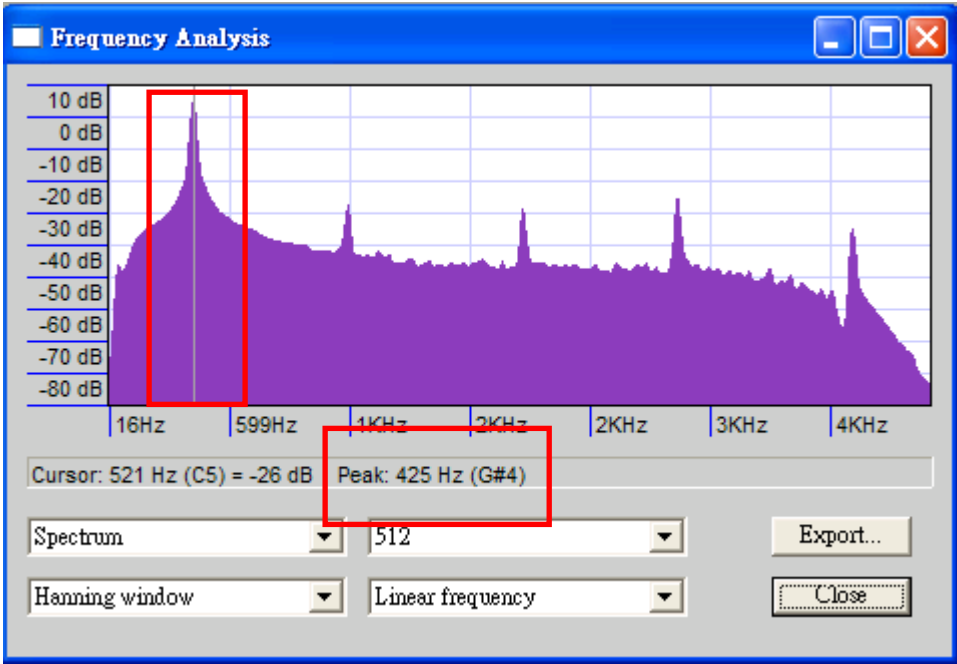


Figure 19. Peak single Frequency at 425 Hz.

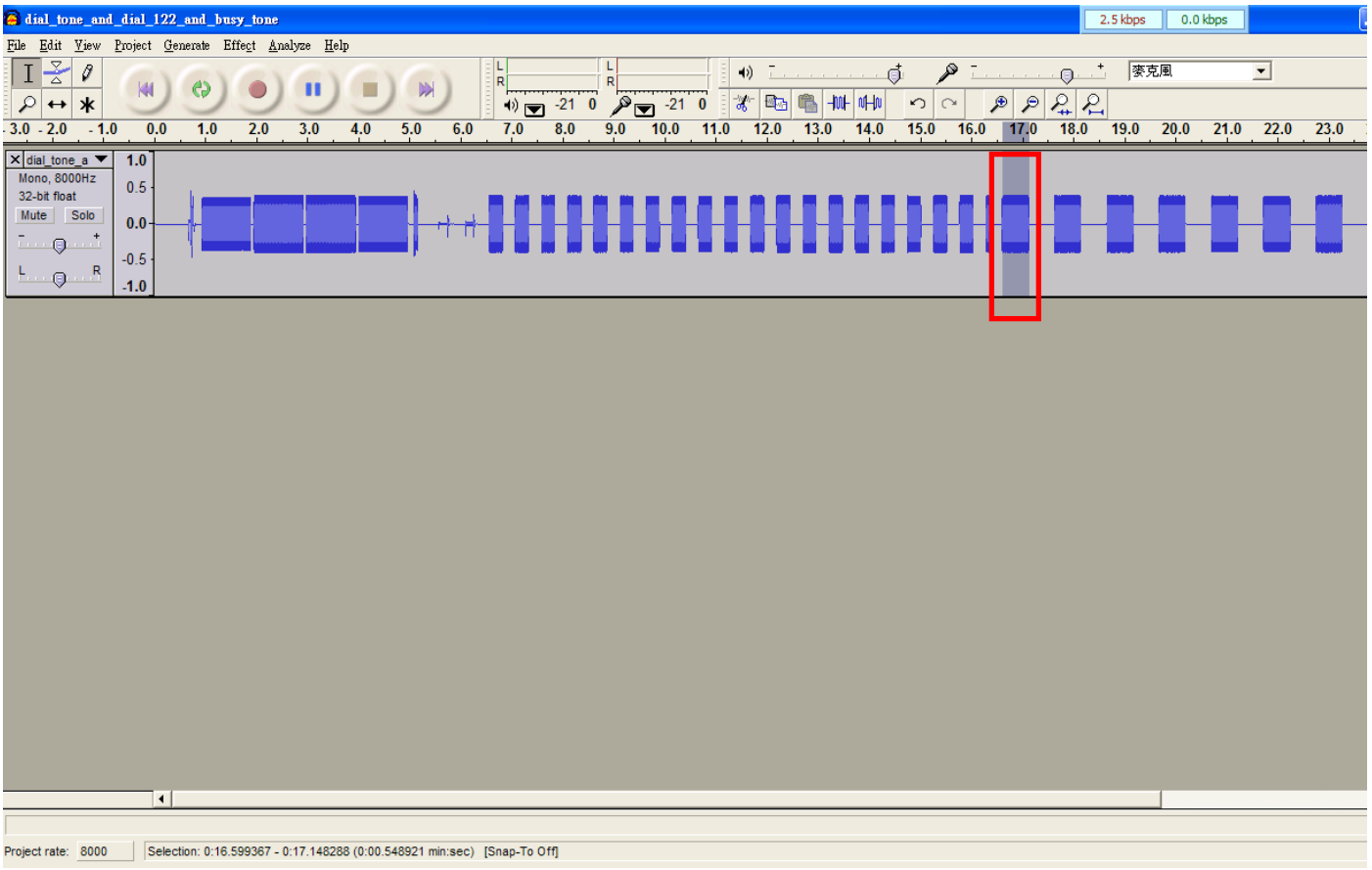


Figure 20. Select another waveform again.

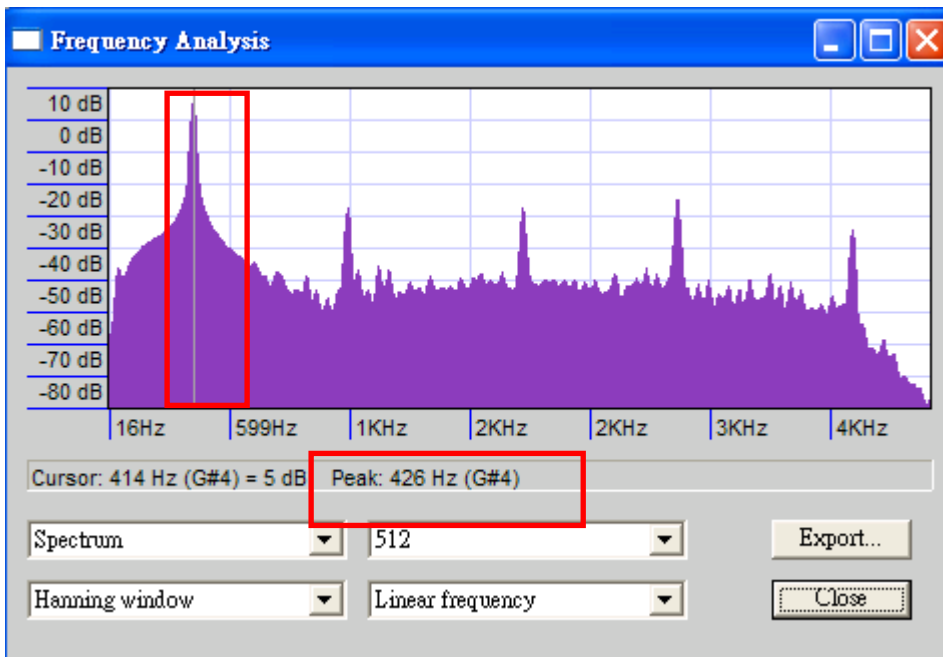


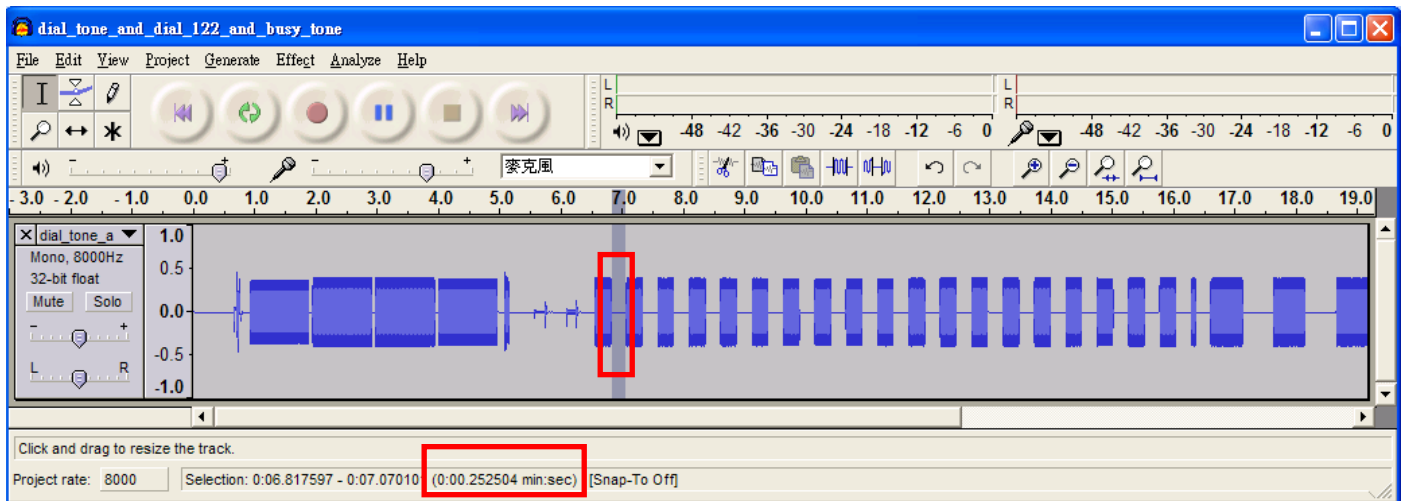
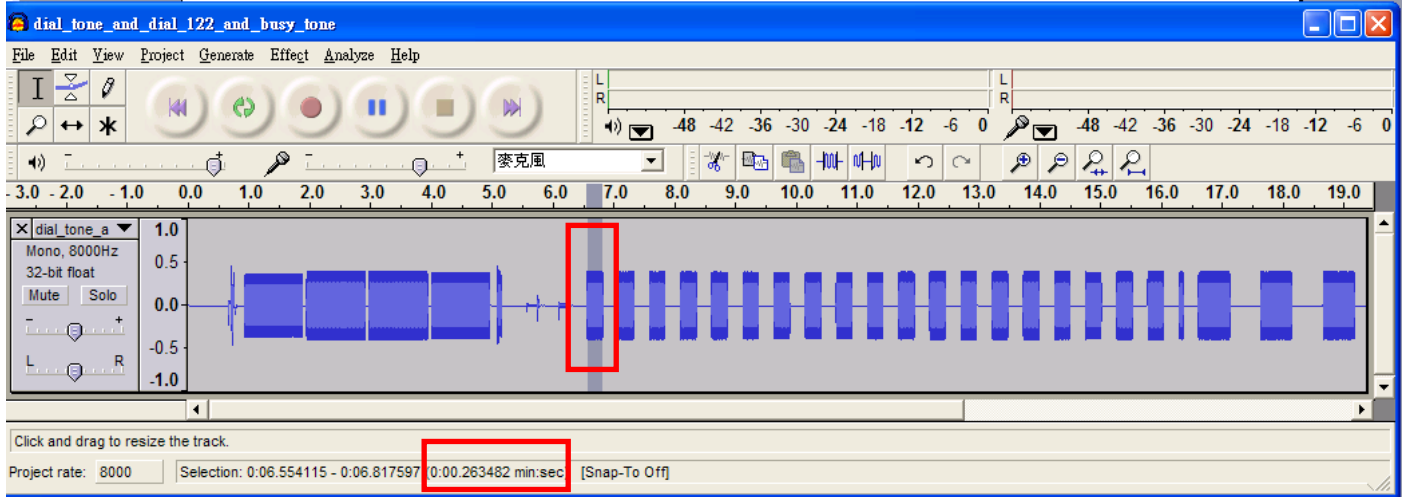
Figure 21. Peak single Frequency at 426 Hz.

3. Please fill in both 425 and 426 frequency to **Freq 1** on both **Disconnect 1** and **Disconnect 2**. Fill in the **Freq 2** to "0" values. See Figure 22.

SIP Audio Tone NAT Traversal										
Country Template Taiwan Use										
Tone \ Setting	Signal Type	Freq 1 (0,300~1980Hz)	Freq 2 (0,300~1980Hz)	Level 1 (0~63db)	Level 2 (0~63db)	On 1 (0~10230ms)	Off 1 (0~10230ms)	On 2 (0~10230ms)	Off 2 (0~10230ms)	Deviation (0~30)
Dial	Continuous	350	440	13	13	500	0	0	0	10
Stutter Dial	Cadence	350	440	13	13	1000	100	0	0	10
Ring Back	Cadence	440	480	13	13	1000	2000	0	0	10
Busy	Cadence	480	620	13	13	500	500	500	500	10
Call Waiting	Cadence	350	440	13	13	250	250	250	0	10
ROH	Continuous	1400	1750	13	13	10000	0	0	0	10
Warning	Cadence	900	0	13	13	500	0	0	0	10
Holding	Cadence	900	0	13	13	500	500	0	0	10
Disconnect 1	Cadence	425	0	15	15	270	270	270	270	10
Disconnect 2	Cadence	426	0	13	13	250	250	250	250	10

Figure 22. Fill in Frequency at Disconnect 1 and 2.

4. Please select part of middle range waveform to analyze its ON time and OFF time. The Left side waveform has very narrow OFF time which can't be detected correctly by FXO gateway. DO NOT select the left side one. See the following three photos at Figure 23.

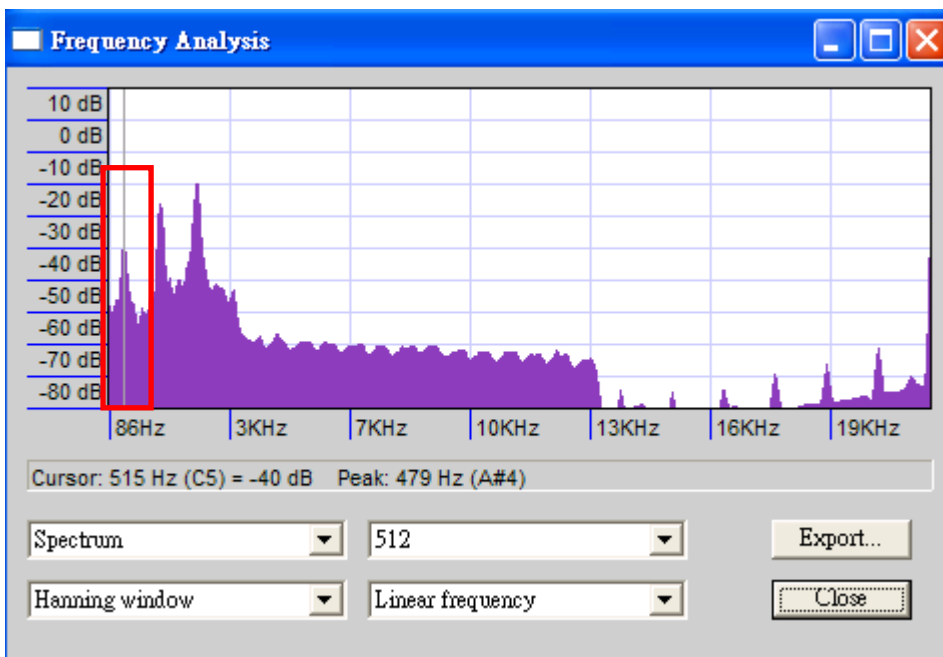
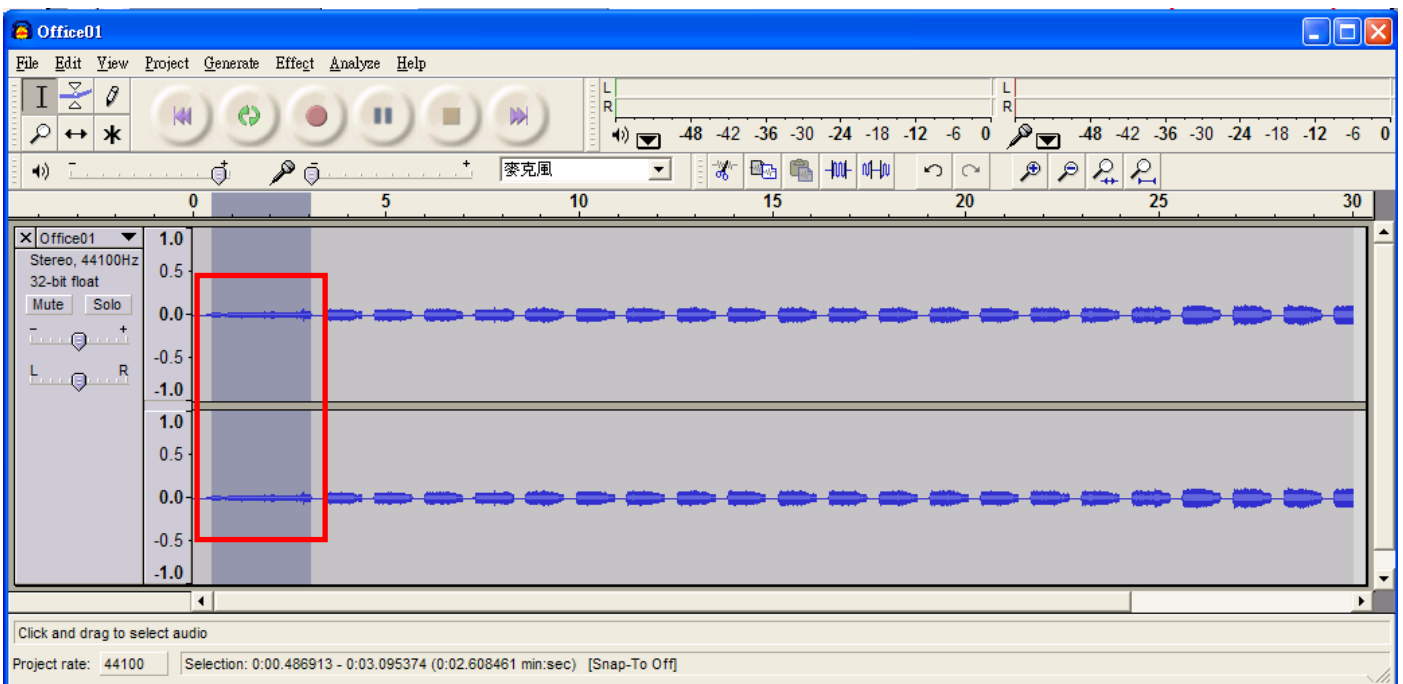


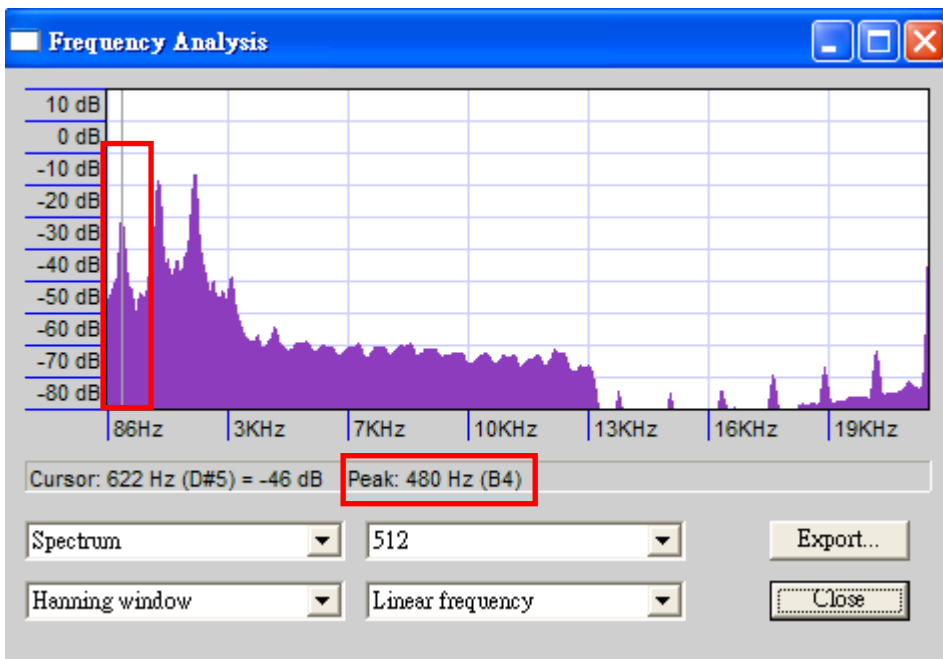
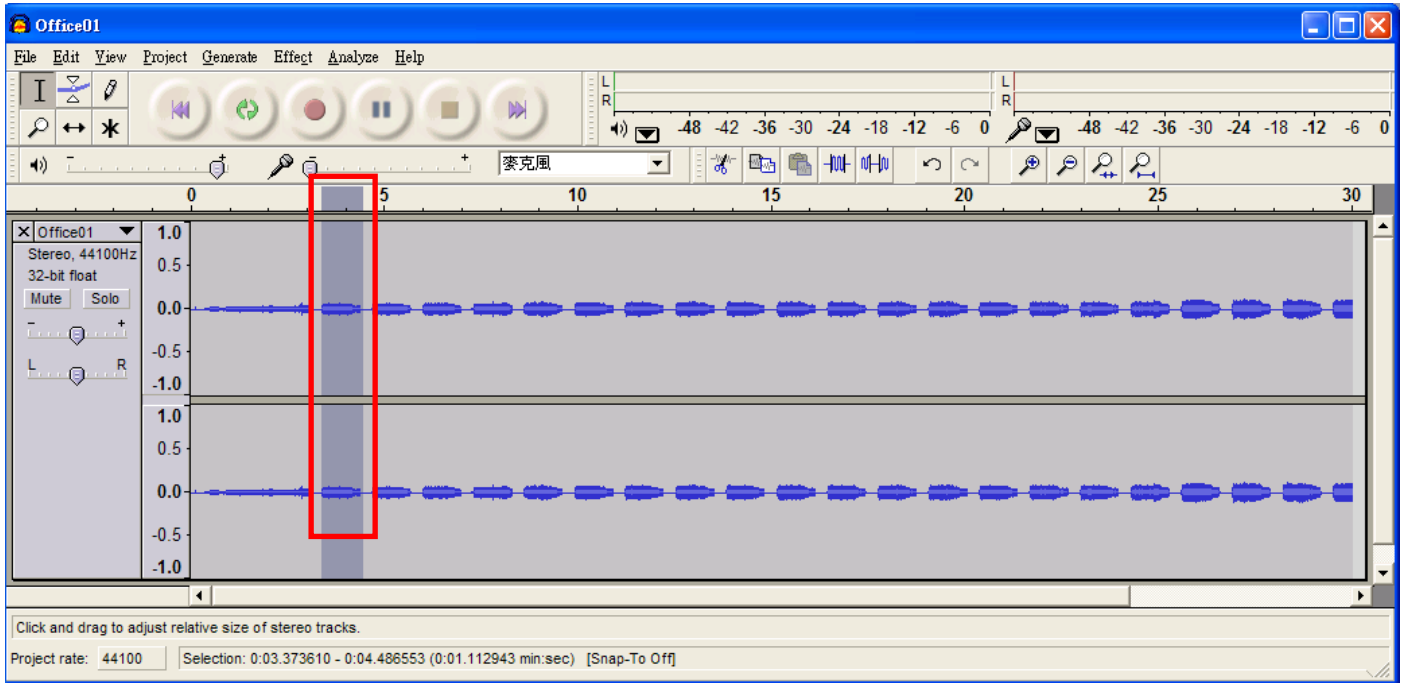
Tone \ Setting	Signal Type	Freq 1 (0,300~1980Hz)	Freq 2 (0,300~1980Hz)	Level 1 (0~63dB)	Level 2 (0~63dB)	On 1 (0~10230ms)	Off 1 (0~10230ms)	On 2 (0~10230ms)	Off 2 (0~10230ms)	Deviation (0~30)
Dial	Continuous	350	440	13	13	500	0	0	0	10
Stutter Dial	Cadence	350	440	13	13	1000	100	0	0	10
Ring Back	Cadence	440	480	13	13	1000	2000	0	0	10
Busy	Cadence	480	620	13	13	500	500	500	500	10
Call Waiting	Cadence	350	440	13	13	250	250	250	0	10
ROH	Continuous	1400	1750	13	13	10000	0	0	0	10
Warning	Cadence	900	0	13	13	500	0	0	0	10
Holding	Cadence	900	0	13	13	500	500	0	0	10
Disconnect 1	Cadence	425	0	15	15	<b>260</b>	<b>250</b>	0	0	10
Disconnect 2	Cadence	426	0	13	13	<b>260</b>	<b>250</b>	0	0	10

Figure 23. Select proper waveform to analyze its ON and OFF time.

## Example 2 : Single frequency of Disconnect Tone.

1. Analyze part of red frame.
2. From the plot spectrum to find frequency (the normal value is between 300 to 1000 Hz).

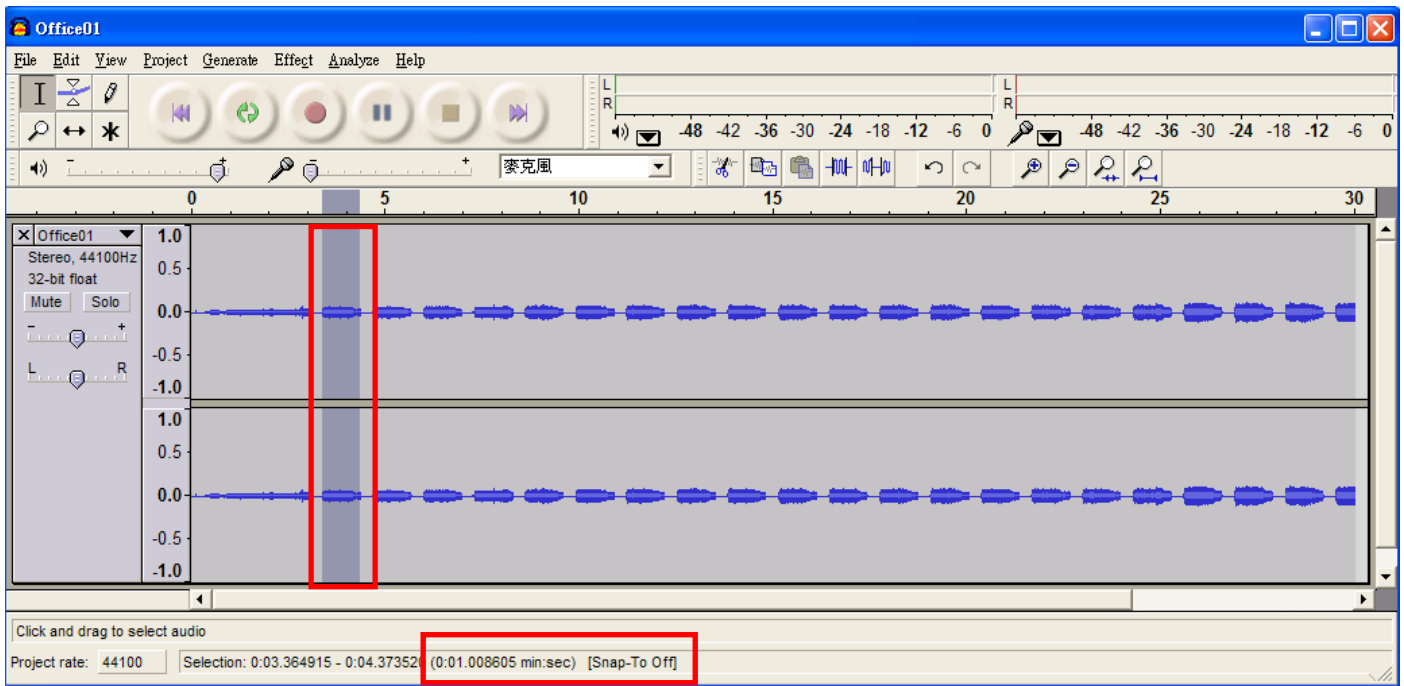


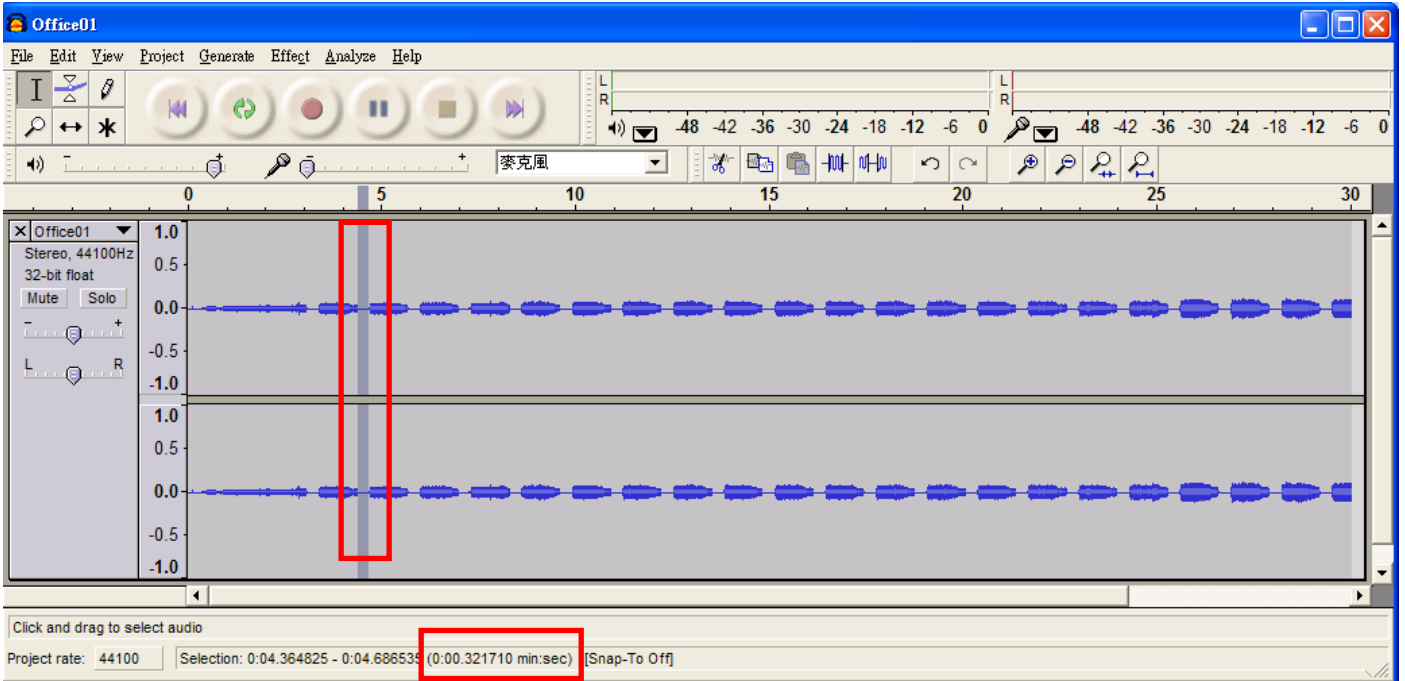


3. Full in the frequency value at 479 and 480 on Freq 1 and 0 on Freq 2.

Country Template		Taiwan		Use							
Tone \ Setting	Signal Type	Freq 1 (0,300~1980Hz)	Freq 2 (0,300~1980Hz)	Level 1 (0~63db)	Level 2 (0~63db)	On 1 (0~10230ms)	Off 1 (0~10230ms)	On 2 (0~10230ms)	Off 2 (0~10230ms)	Deviation (0~30)	
Dial	Continuous	350	440	13	13	500	0	0	0	10	
Stutter Dial	Cadence	350	440	13	13	1000	100	0	0	10	
Ring Back	Cadence	440	480	13	13	1000	2000	0	0	10	
Busy	Cadence	480	620	13	13	500	500	500	500	10	
Call Waiting	Cadence	350	440	13	13	250	250	250	0	10	
ROH	Continuous	1400	1750	13	13	10000	0	0	0	10	
Warning	Cadence	900	0	13	13	500	0	0	0	10	
Holding	Cadence	900	0	13	13	500	500	0	0	10	
Disconnect 1	Cadence	479	0	15	15	260	250	0	0	10	
Disconnect 2	Cadence	480	0	13	13	260	250	0	0	10	

4. Find out frequency ON time and OFF time.



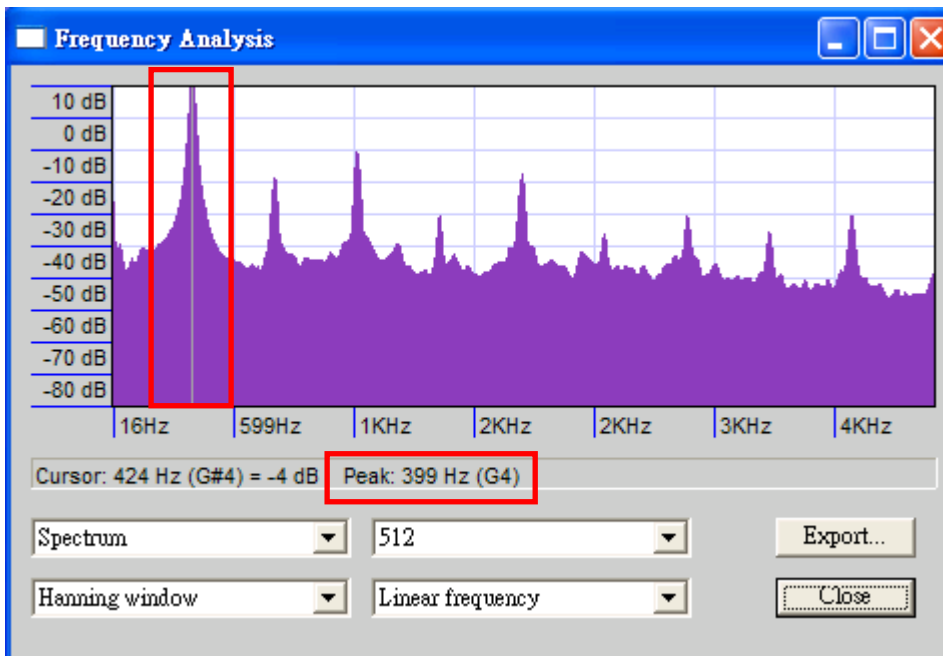
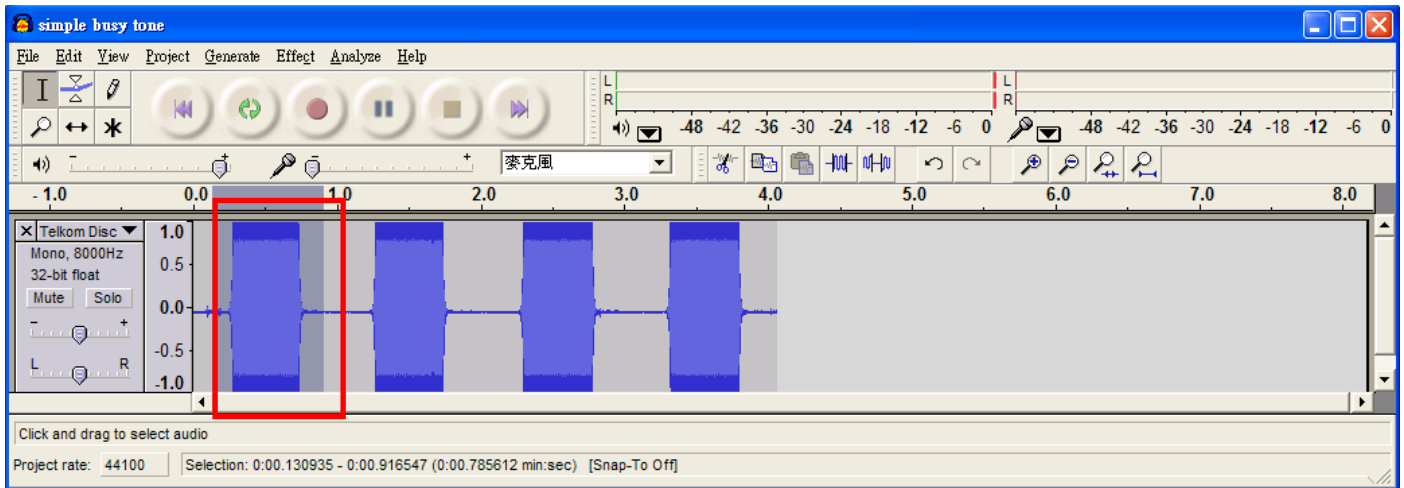


5. Full in value at the ON 1 =1000 and OFF 1=320.

		SIP	Audio	Tone	NAT Traversal						
Country Template		Taiwan		Use							
Tone \ Setting	Signal Type	Freq 1 (0,300~1980Hz)	Freq 2 (0,300~1980Hz)	Level 1 (0~63db)	Level 2 (0~63db)	On 1 (0~10230ms)	Off 1 (0~10230ms)	On 2 (0~10230ms)	Off 2 (0~10230ms)	Deviation (0~30)	
Dial	Continuous	350	440	13	13	500	0	0	0	10	
Stutter Dial	Cadence	350	440	13	13	1000	100	0	0	10	
Ring Back	Cadence	440	480	13	13	1000	2000	0	0	10	
Busy	Cadence	480	620	13	13	500	500	500	500	10	
Call Waiting	Cadence	350	440	13	13	250	250	250	0	10	
ROH	Continuous	1400	1750	13	13	10000	0	0	0	10	
Warning	Cadence	900	0	13	13	500	0	0	0	10	
Holding	Cadence	900	0	13	13	500	500	0	0	10	
Disconnect 1	Cadence	479	0	15	15	1000	320	0	0	10	
Disconnect 2	Cadence	480	0	13	13	1000	320	0	0	10	

### Example 3 : Single frequency of Disconnect Tone

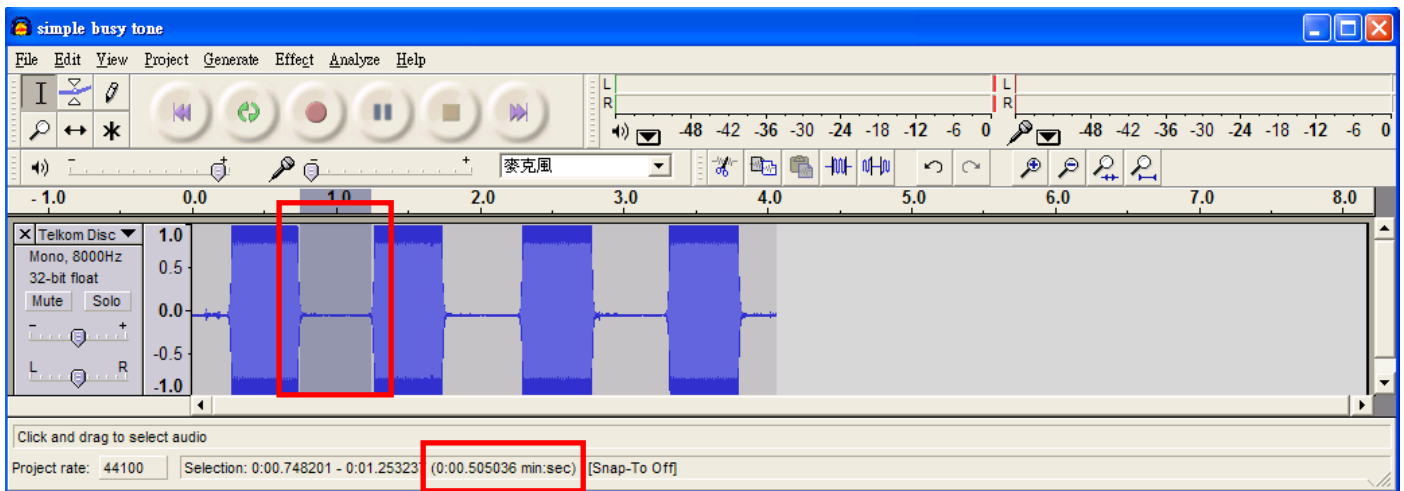
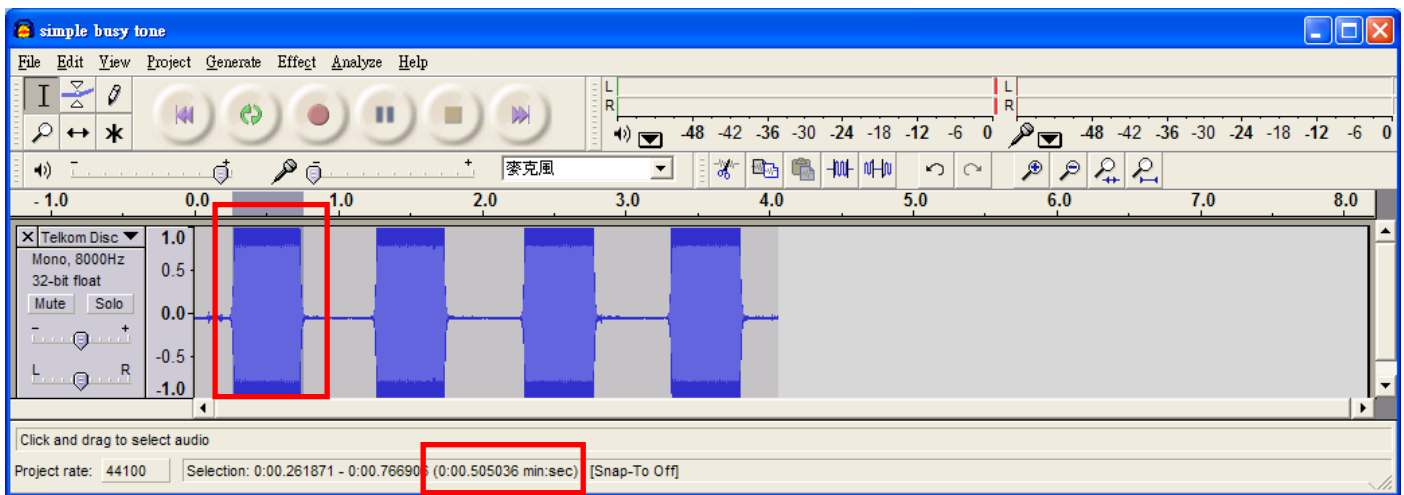
1. Analyze part of red frame.
2. From the plot spectrum to find frequency (normal value is between 300 to 1000 Hz).



3. Full in the value at Freq 1=399, 400 and 0 on Freq 2=0.

Country Template: Taiwan										
Tone \ Setting	Signal Type	Freq 1 (0,300~1980Hz)	Freq 2 (0,300~1980Hz)	Level 1 (0~63db)	Level 2 (0~63db)	On 1 (0~10230ms)	Off 1 (0~10230ms)	On 2 (0~10230ms)	Off 2 (0~10230ms)	Deviation (0~30)
Dial	Continuous	350	440	13	13	500	0	0	0	10
Stutter Dial	Cadence	350	440	13	13	1000	100	0	0	10
Ring Back	Cadence	440	480	13	13	1000	2000	0	0	10
Busy	Cadence	480	620	13	13	500	500	500	500	10
Call Waiting	Cadence	350	440	13	13	250	250	250	0	10
ROH	Continuous	1400	1750	13	13	10000	0	0	0	10
Warning	Cadence	900	0	13	13	500	0	0	0	10
Holding	Cadence	900	0	13	13	500	500	0	0	10
Disconnect 1	Cadence	399	0	15	15	1000	320	0	0	10
Disconnect 2	Cadence	400	0	13	13	1000	320	0	0	10

4. Find out frequency of ON time and OFF time.



5. Full in value of 500 and 500 at ON 1 and OFF 1, 0 at ON 2 and OFF 2.

Device Setting

NAT Setting

VOIP Setting

VOIP Advance

Dialing Plan

FXS Setting

FXO Setting

SIP Trunk

Route Plan

Status

Maintenance

SIP   Audio   Tone   NAT Traversal

Country Template: Taiwan Use

Tone \ Setting	Signal Type	Freq 1 (0,300~1980Hz)	Freq 2 (0,300~1980Hz)	Level 1 (0~63db)	Level 2 (0~63db)	On 1 (0~10230ms)	Off 1 (0~10230ms)	On 2 (0~10230ms)	Off 2 (0~10230ms)	Deviation (0~30)
Dial	Continuous	350	440	13	13	500	0	0	0	10
Stutter Dial	Cadence	350	440	13	13	1000	100	0	0	10
Ring Back	Cadence	440	480	13	13	1000	2000	0	0	10
Busy	Cadence	480	620	13	13	500	500	500	500	10
Call Waiting	Cadence	350	440	13	13	250	250	250	0	10
ROH	Continuous	1400	1750	13	13	10000	0	0	0	10
Warning	Cadence	900	0	13	13	500	0	0	0	10
Holding	Cadence	900	0	13	13	500	500	0	0	10
Disconnect 1	Cadence	399	0	15	15	500	500	0	0	10
Disconnect 2	Cadence	400	0	13	13	500	500	0	0	10

Apply   Cancel