



Grandstream Networks, Inc.

Configuring UCM6XXX Series with HT813



Table of Contents

OVERVIEW	4
METHOD 1: REGISTER HT813 TO UCM6XXX	5
Create Extension on UCM6XXX	5
Create IVR on UCM6XXX	6
Configure FXS Port on HT813	6
Configure FXO Port on HT813	7
Configure Unconditional Call Forward on HT813.....	10
How to Dial	10
METHOD 2: CONNECT UCM6XXX TO HT813 USING PEER SIP TRUNK.....	11
Create IVR on UCM6XXX	11
Create Peer SIP Trunk on UCM6XXX.....	11
Configure Outbound Rule on UCM6XXX	12
Configure Inbound Rule on UCM6XXX.....	13
Configure FXO Port on HT813	14
Exchange SIP Port Settings for FXS and FXO on HT813	17
Configure Unconditional Call Forward on HT813.....	17
How to Dial	17



Table of Figures

Figure 1: Typical Architecture	4
Figure 2: Create Extension 1000 on the UCM6XXX.....	5
Figure 3: Create Extension 1001 on the UCM6XXX.....	5
Figure 4: Create IVR 7000 on the UCM6XXX.....	6
Figure 5: Configure FXS Port on the HT813.....	7
Figure 6: Configure FXO Port on the HT813 - Registration.....	8
Figure 7: Configure FXO Port on the HT813 - DTMF Settings.....	8
Figure 8: Configure FXO Port on the HT813 - FXO Termination	9
Figure 9: Configure FXO Port on the HT813 - Channel Dialing.....	10
Figure 10: HT813 Basic Settings	10
Figure 11: Create IVR 7000 on the UCM6XXX.....	11
Figure 12: Create Peer SIP Trunk on the UCM6XXX	12
Figure 13: Configure Outbound Rule on the UCM6XXX	13
Figure 14: Configure Inbound Rule on the UCM6XXX	14
Figure 15: Configure FXO Port on the HT813 - Registration.....	15
Figure 16: Configure FXO Port on the HT813 - DTMF Settings.....	15
Figure 17: Configure FXO Port on the HT813: FXO Termination	16
Figure 18: Configure FXO Port on the HT813 - Channel Dialing.....	17
Figure 19: HT813 Basic Settings	17



OVERVIEW

This document describes basic configuration to interconnect UCM6XXX series and HT813. This is typically applied to the scenario where users would like to add a HT813 not only as a remote extension but also as an external PSTN trunk. It could be common that we prefer to grab a PSTN line in a remote location and use the carrier service on another remote office, in this case this guide will help you implement this configuration.

There are two ways to set up the UCM6XXX series IP PBX with the HT813.

- **Method 1:** Register the HT813 to the UCM6XXX directly.
- **Method 2:** Configure HT813 as a SIP peer trunk.

The following illustration show the typical setup that will be used in this guide:



Figure 1: Typical Architecture

Note: UCM6XXX series include UCM6200 series (UCM6202, UCM6204 and UCM6208) and UCM6510.

Warning:

- When the UCM6XXX series is interconnected with other HT813, it is NOT recommended to turn on "Allow Guest Calls" under the UCM6XXX web GUI→**PBX→SIP Settings→General**. Turning on this option will allow unauthenticated calls coming through the UCM6XXX series. Please be aware of the security concerns when using this option.
- When using the IVR in UCM6XXX series, please be aware that if "Dial Trunk" option is turned on in IVR settings, the callers into the IVR will be able to dial outbound call using UCM6XXX's trunk. The IVR's permission level will be used when making outbound calls in this case. Please select proper permission level for the IVR to control the outbound calls allowed via "Dial Trunk".

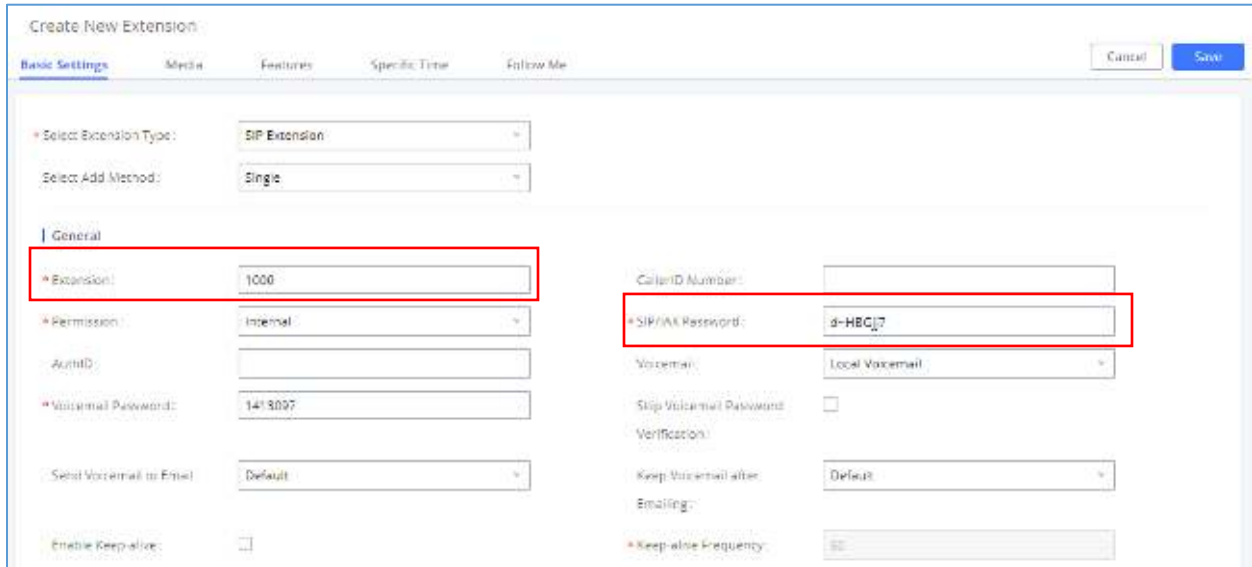


METHOD 1: REGISTER HT813 TO UCM6XXX

Create Extension on UCM6XXX

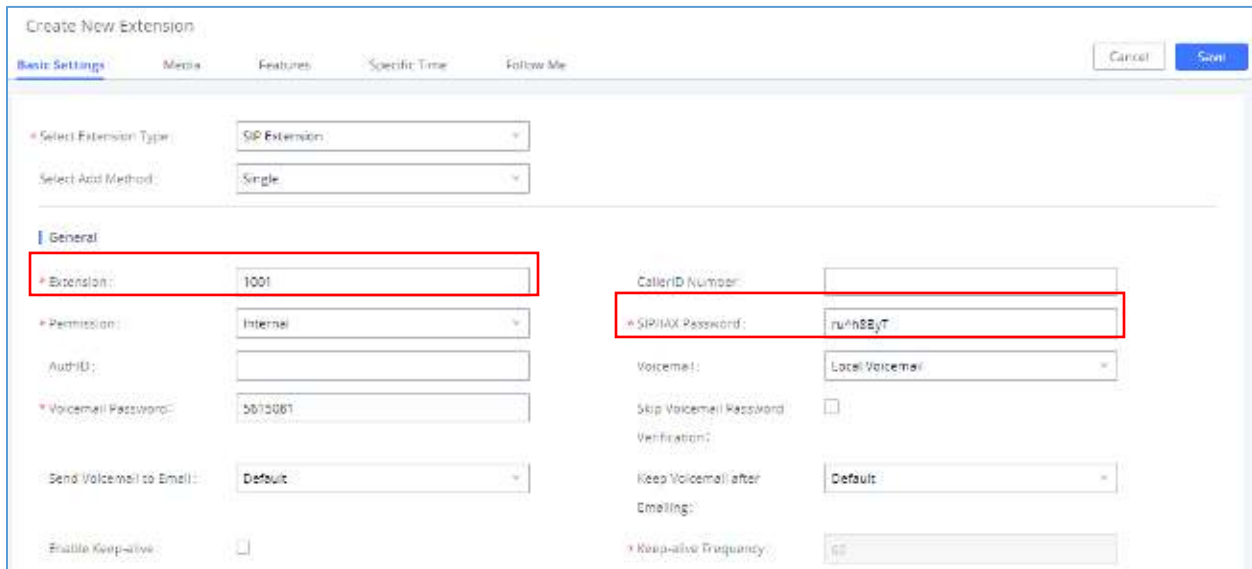
On the UCM6XXX web GUI, create two extensions under **Extension/Trunk→Extensions**. These two extensions are used for HT813 FXS and FXO registration.

The password for the extension will be randomly generated if not specified.



The screenshot shows the 'Create New Extension' web GUI. The 'Basic Settings' tab is selected. The 'Select Extension Type' is set to 'SIP Extension' and 'Select Add Method' is set to 'Single'. Under the 'General' section, the 'Extension' field is highlighted with a red box and contains the value '1000'. The 'Permission' is set to 'Internal'. The 'SIP/AA Password' field is highlighted with a red box and contains the value 'd-HBCj7'. Other fields include 'AuthID', 'Voicemail Password' (1418007), 'Send Voicemail to Email' (Default), 'Enable Keep-alive' (unchecked), 'CallerID Number', 'Voicemail' (Local Voicemail), 'Skip Voicemail Password' (unchecked), 'Verification', 'Keep Voicemail after' (Default), 'Emailing', and 'Keep-alive Frequency' (60).

Figure 2: Create Extension 1000 on the UCM6XXX



The screenshot shows the 'Create New Extension' web GUI. The 'Basic Settings' tab is selected. The 'Select Extension Type' is set to 'SIP Extension' and 'Select Add Method' is set to 'Single'. Under the 'General' section, the 'Extension' field is highlighted with a red box and contains the value '1001'. The 'Permission' is set to 'Internal'. The 'SIP/AA Password' field is highlighted with a red box and contains the value 'ru'h88yT'. Other fields include 'AuthID', 'Voicemail Password' (5015081), 'Send Voicemail to Email' (Default), 'Enable Keep-alive' (unchecked), 'CallerID Number', 'Voicemail' (Local Voicemail), 'Skip Voicemail Password' (unchecked), 'Verification', 'Keep Voicemail after' (Default), 'Emailing', and 'Keep-alive Frequency' (60).

Figure 3: Create Extension 1001 on the UCM6XXX



Create IVR on UCM6XXX

On the UCM6XXX web GUI, create an IVR extension under **Call Features**→**IVR**. This is to receive the calls forwarded from the HT813.

In IVR settings, if "Dial Other Extensions" is enabled, the calls forwarded to the UCM6XXX IVR will be able to reach the internal extensions registered to the UCM6XXX. Also, you can assign the "Key Pressing Event" to different destinations.

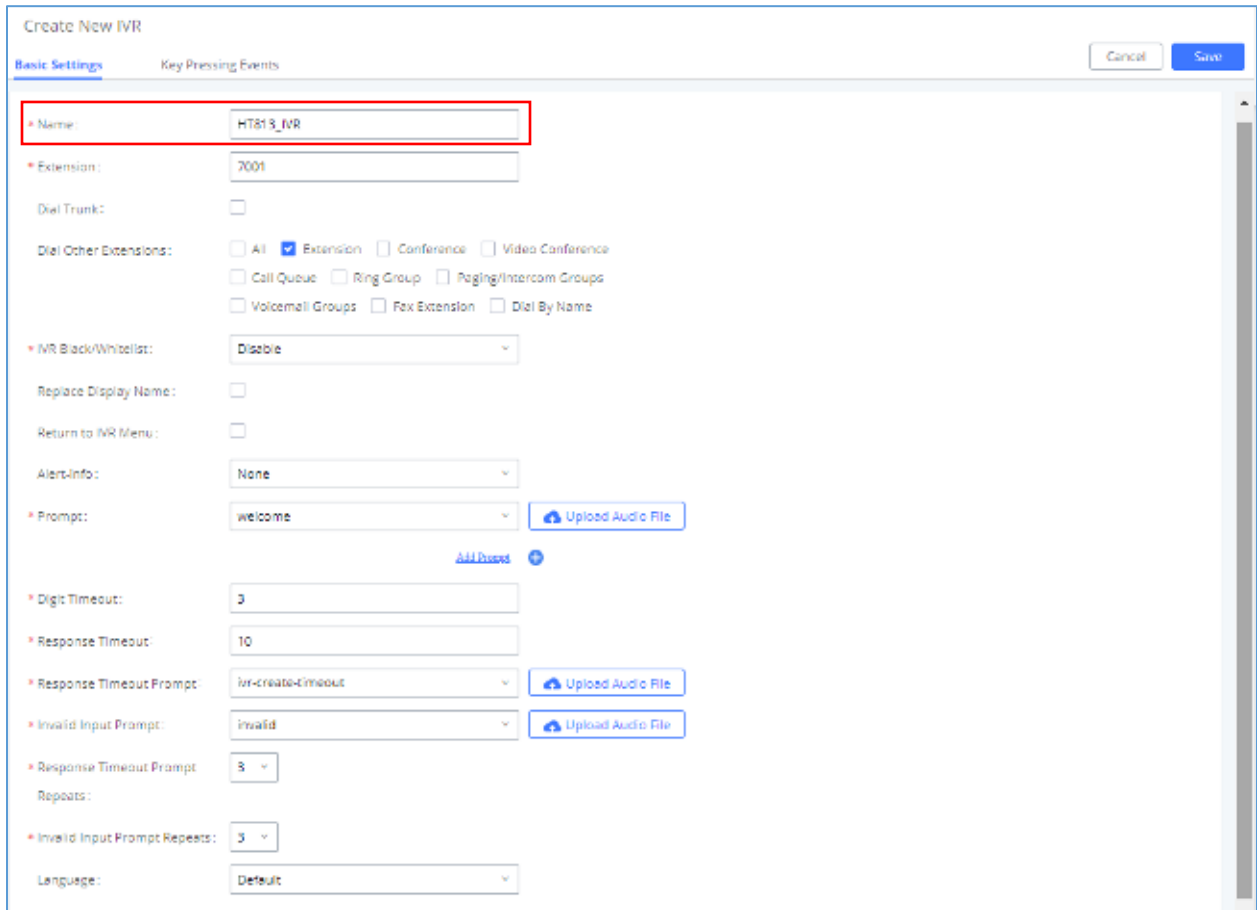


Figure 4: Create IVR 7000 on the UCM6XXX

Configure FXS Port on HT813

1. Connect an analog phone to the HT813 FXS port.
2. On the HT813 web GUI, go to FXS Port setting page, configure to register the FXS port to the UCM6XXX extension 1000. Please refer to the highlighted settings in the following figure.

In this example, the UCM6XXX IP address is 192.168.5.190.



Grandstream Device Configuration	
STATUS	BASIC SETTINGS
Account Active: ☐ No ☒ Yes	
Primary SIP Server:	192.168.5.190 (e.g., sip.mycompany.com, or IP address)
Failover SIP Server:	(Optional, used when primary server no response)
Prefer Primary SIP Server:	☒ No ☐ Yes (yes - will register to Primary Server if Failover registration expires)
Outbound Proxy:	(e.g., proxy.myprovider.com, or IP address, if any)
Backup Outbound Proxy:	(e.g., proxy.myprovider.com, or IP address, if any)
Prefer Primary Outbound Proxy:	☒ No ☐ Yes (yes - will reregister via Primary Outbound Proxy if registration expires)
Allow DHCP Option 120 (override SIP server):	☒ No ☐ Yes
SIP Transport:	☒ UDP ☐ TCP ☐ TLS (default is UDP)
SIP URI Scheme When Using TLS:	☐ sip ☒ sips
Use Actual Ephemeral Port in Contact with TCP/TLS:	☒ No ☐ Yes
NAT Traversal:	☒ No ☐ Keep-Alive ☐ STUN ☐ UPnP
SIP User ID:	1000 (the user part of an SIP address)
Authenticate ID:	1000 (can be identical to or different from SIP User ID)
Authenticate Password:	 (purposely not displayed for security protection)
Name:	(optional, e.g., John Doe)
DNS Mode:	☒ A Record ☐ SRV ☐ NAPTR/SRV
DNS SRV use Registered IP:	☒ No ☐ Yes
Tel URI:	Disabled
SIP Registration:	☐ No ☒ Yes
Unregister On Reboot:	☒ No ☐ Yes
Outgoing Call without Registration:	☒ No ☐ Yes

Figure 5: Configure FXS Port on the HT813

Configure FXO Port on HT813

1. Connect the PSTN line to the HT813 FXO port.
2. On the HT813 web GUI, go to FXO Port setting page, configure to register the FXO port to the UCM6XXX extension 1001. Please refer to the highlighted settings and other necessary settings in the following figures.

In this example, the UCM6XXX IP address is 192.168.5.190.



Grandstream Device Configuration

STATUS
BASIC SETTINGS
ADVANCED SETTINGS
FXS PORT
FXO PORT

Account Active: ☐ No ☒ Yes

Primary SIP Server: (e.g., sip.mycompany.com, or IP address)

Failover SIP Server: (Optional, used when primary server no response)

Prefer Primary SIP Server: ☒ No ☐ Yes (yes - will register to Primary Server if Failover registration expires)

Outbound Proxy: (e.g., proxy.myprovider.com, or IP address, if any)

Backup Outbound Proxy: (e.g., proxy.myprovider.com, or IP address, if any)

Prefer Primary Outbound Proxy: ☒ No ☐ Yes (yes - will reregister via Primary Outbound Proxy if registration expires)

SIP Transport: ☒ UDP ☐ TCP ☐ TLS (default is UDP)

NAT Traversal: ☒ No ☐ Keep-Alive ☐ STUN ☐ UPnP

SIP User ID: (the user part of an SIP address)

Authenticate ID: (can be identical to or different from SIP User ID)

Authenticate Password: (purposely not displayed for security protection)

Name: (optional, e.g., John Doe)

DNS Mode: ☒ A Record ☐ SRV ☐ NAPTR/SRV

DNS SRV use Registered IP: ☒ No ☐ Yes

Tel URI: Disabled

SIP Registration: ☐ No ☒ Yes

Unregister On Reboot: ☒ No ☐ Yes

Outgoing Call without Registration: ☒ No ☐ Yes

Figure 6: Configure FXO Port on the HT813 - Registration

Since we are going to use IVR when the call is forwarded to the UCM6XXX, the UCM6XXX will need to be able to detect the DTMF digits. Configure the HT813 FXO port DTMF settings as below as an initial setup.

<i>Preferred DTMF method</i>	Priority 1:	RFC2833 ▼
<i>(in listed order):</i>	Priority 2:	SIP INFO ▼
	Priority 3:	In-audio ▼

Figure 7: Configure FXO Port on the HT813 - DTMF Settings

There are a few necessary changes to be made in FXO termination section and Channel Dialing section as well.



FXO Termination

Enable Current Disconnect: ☐ No ☒ Yes (Default Yes. If set to yes, enter threshold below)

Current Disconnect Threshold (ms): (50-800 milliseconds. Default 100 milliseconds)

Enable PSTN Disconnect Tone Detection: ☒ No ☐ Yes (Default No)

(If set to yes, the following tone is used as the disconnect signal)

PSTN Disconnect Tone: (Syntax: f1=freq@vol, f2=freq@vol, c=on1/off1-on2/off2-on3/off3;)
 (Allowed Range: freq = 0 to 4000Hz; vol = -40 to -24dBm)
 (Default: Busy Tone: f1=480@-32,f2=620@-32,c=500/500;)

Enable Polarity Reversal: ☒ No ☐ Yes (Default No. Check with your PSTN carrier before setting to Yes)

AC Termination Model ☒ Country-based ☐ Impedance-based ☐ Auto-Detected

Country-based

Impedance-based

Number of Rings: (1-50. Default 4)
 (Number of rings for a PSTN incoming call before FXO port answers to accept VoIP number)

PSTN Ring Thru FXS: ☐ No ☒ Yes (Default Yes)
 (If set to yes, all incoming PSTN calls will ring the FXS port after the Ring Thru Delay)

PSTN Ring Thru Delay (sec): (1-10 seconds. Default 4 seconds)

PSTN Ring Timeout (sec): (2-10 seconds. Default 6 seconds)
 (Used to detect PSTN hangup when FXO port is not answered)

PSTN Idle Wait Timeout between Outgoing Calls: (0-10 seconds. Default 4 seconds)

Figure 8: Configure FXO Port on the HT813 - FXO Termination

- First, we should confirm which method the PSTN line is using.

If the PSTN line is using current disconnect (typical case in North America), then we should turn on "Enable Current Disconnect" and disable "Enable PSTN Disconnect Tone Detection".

The default "Current Disconnect Threshold" is 100ms, but if you start experiencing dropped calls then you should raise this value by 100ms intervals.

If the PSTN disconnects using the tones method, then turn on "Enable PSTN Disconnect Tone Detection" and turn off the "Enable Current Disconnect" option.

For PSTN tone detection, the tone disconnect method is widely used everywhere else in the world. The North American busy tone value is "f1=480@-32,f2=620@-32,c=500/500" but these tones vary from country to country. You may look up for the settings for your country at www.3amsystems.com or download the information from <http://www.itu.int/ITU-T/inr/forms/files/tones-0203.pdf>.

- Set "Number of Rings" option to 1. If you happen to experience caller ID issue, you may set it to 2 or 4.
- Set "PSTN Ring Thru FXS" to "No" if you prefer not to ring the FXS port on incoming PSTN calls after the Ring Thru Delay. In the sample setup, it's set to "Yes".



- Set "PSTN Ring Thru Delay" option to 1. If you happen to experience caller ID issue, you may set it to 2.
- Set the "Stage Method (1/2)" to 2 for 2-stage dialing.

<i>Stage Method (1/2):</i> 2 (Default 2 - 2 stage dialing)

Figure 9: Configure FXO Port on the HT813 - Channel Dialing

Configure Unconditional Call Forward on HT813

On the HT813 web GUI, go to Basic setting page, configure "Unconditional Call Forward to VOIP" to the IVR extension on the UCM6XXX. In this example, the UCM6XXX IP address is 192.168.5.190.

	User ID	Sip Server	Sip Destination Port
<i>Unconditional Call Forward to VOIP:</i>	7000	@ 192.168.5.190	: 5060

Figure 10: HT813 Basic Settings

How to Dial

Once the HT813 and the UCM6XXX are set up as above, the inbound call and the outbound call will be working as described below.

- **Outbound call**
The extension registered to the UCM6XXX can dial the HT813's FXO extension number (1001 in this example). After you get the second dial tone, you can then dial a PSTN network number. Basically, the outbound call is done in a 2-stage manner.
- **Inbound call**
The user from outside network can dial into the PSTN line's number (connected to HT813). And then he/she will reach the IVR of the UCM6XXX. The IVR on UCM6XXX would allow the user to further enter extension number or key pressing digit to reach the desired destination.



METHOD 2: CONNECT UCM6XXX TO HT813 USING PEER SIP TRUNK

Create IVR on UCM6XXX

On the UCM6XXX web GUI, create an IVR extension under **Call Features**→**IVR**.

In IVR settings, if "Dial Other Extensions" is enabled, the calls dialing into the UCM6XXX IVR will be able to reach the internal extensions registered to the UCM6XXX. Also, you can assign the "Key Pressing Event" to different destinations.

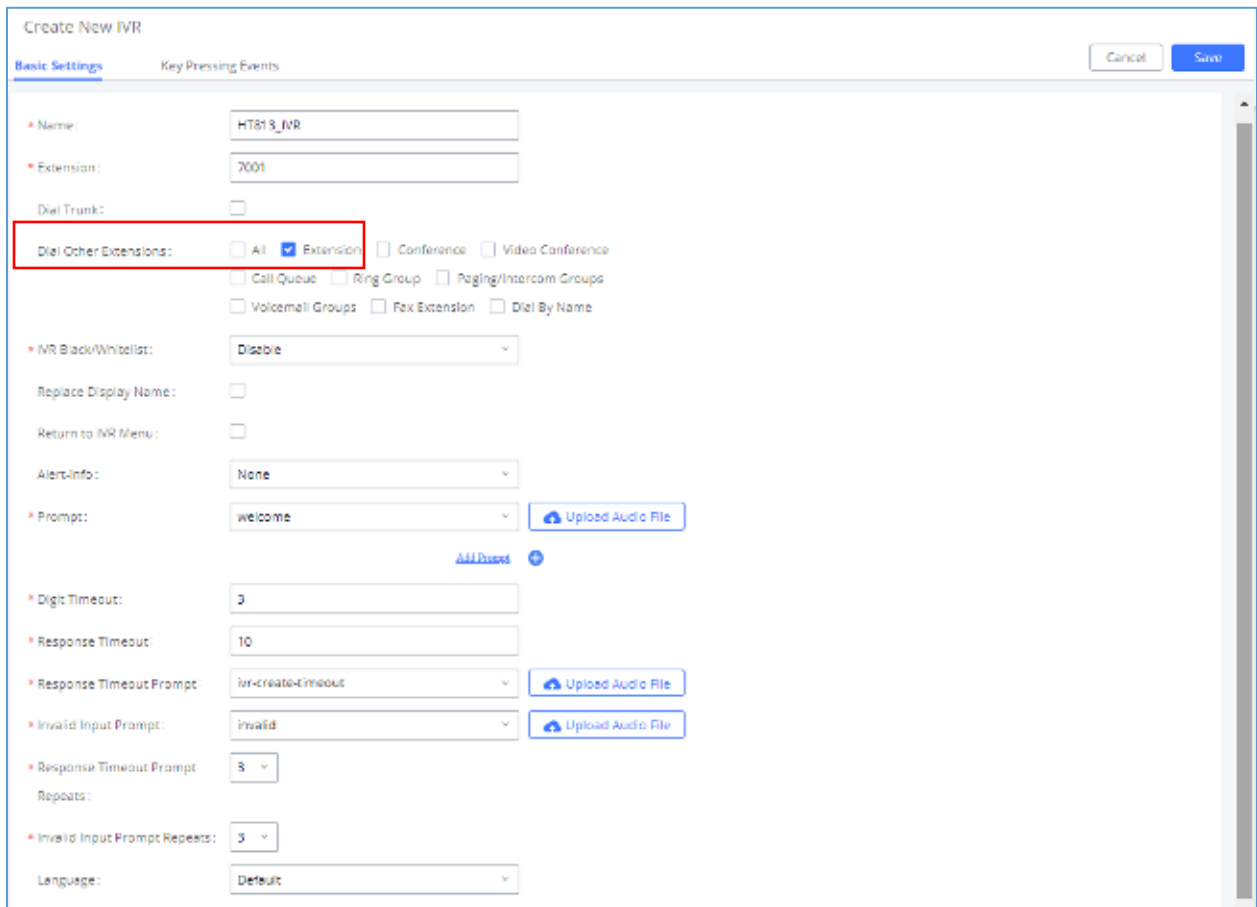
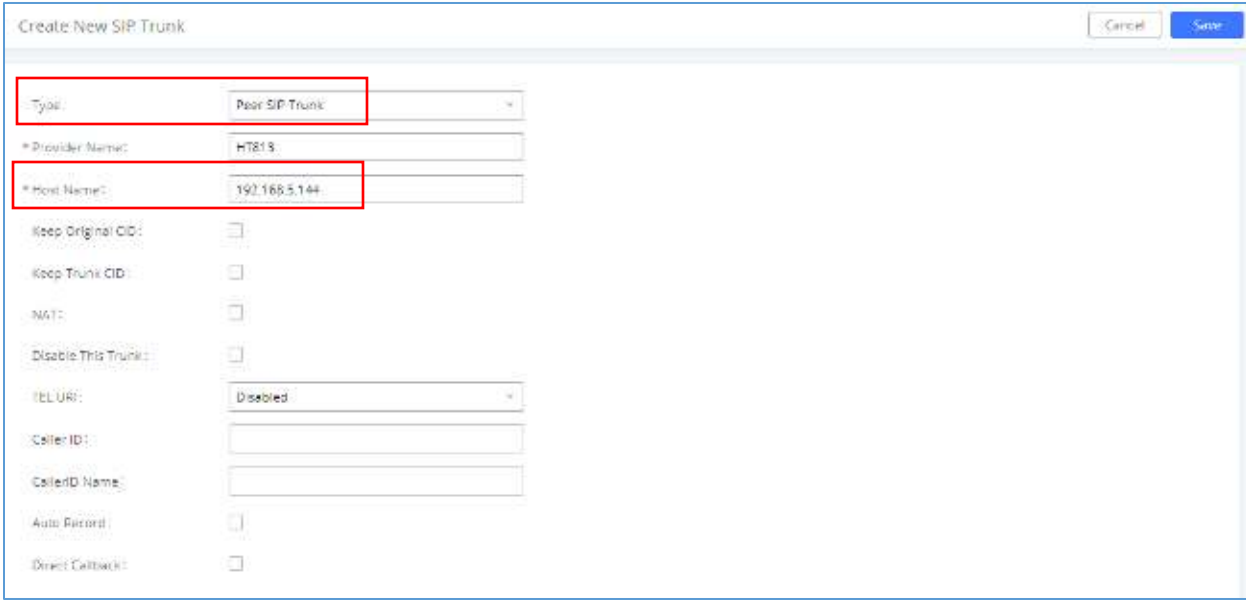


Figure 11: Create IVR 7000 on the UCM6XXX

Create Peer SIP Trunk on UCM6XXX

On the UCM6XXX web GUI, create a peer SIP trunk under **Extension/Trunk**→**VoIP Trunks**. In this example, the HT813 IP address is 192.168.5.144.





Create New SIP Trunk

Type: Peer SIP Trunk

* Provider Name: HT813

* Host Name: 192.168.5.144

Keep Original CID: ☐

Keep Trunk CID: ☐

NAT: ☐

Disable This Trunk: ☐

TEL URI: Disabled

Caller ID:

Called ID Name:

Auto Record: ☐

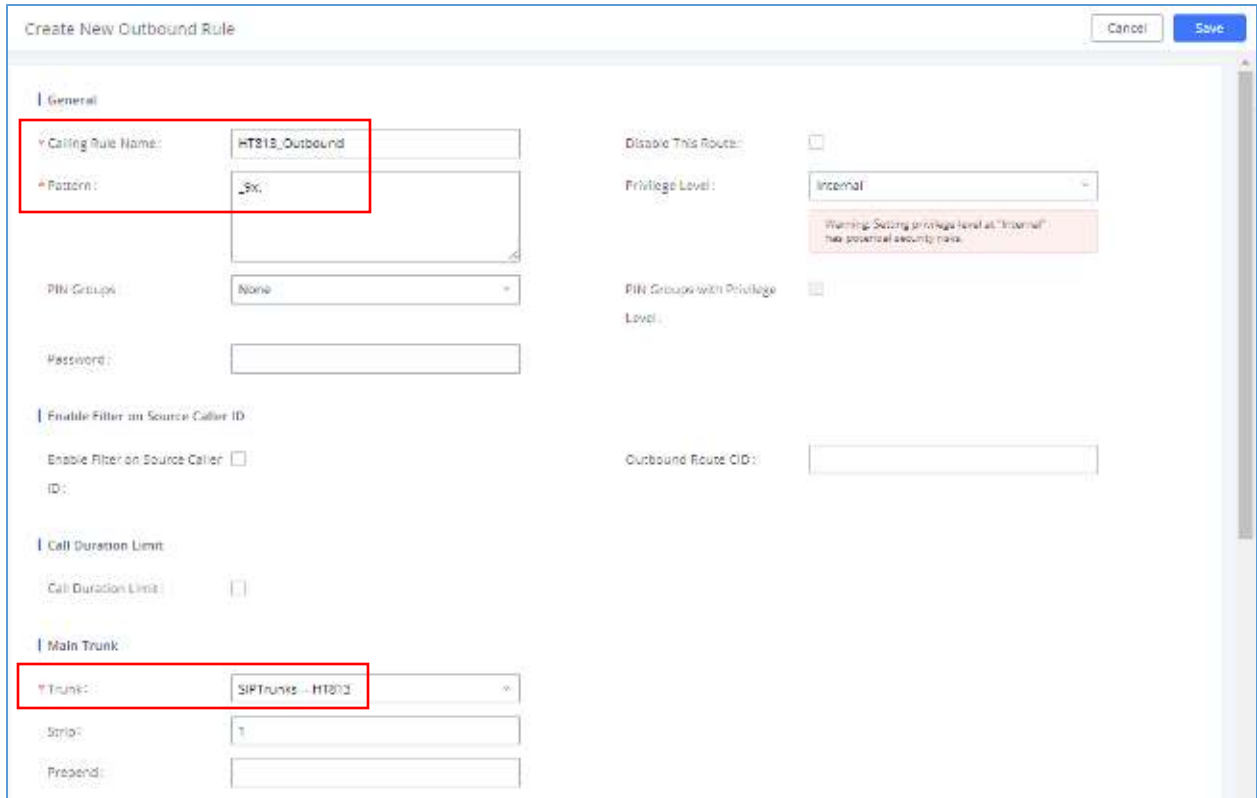
Direct Callback: ☐

Figure 12: Create Peer SIP Trunk on the UCM6XXX

Configure Outbound Rule on UCM6XXX

On the UCM6XXX web GUI, go to **Extension/Trunk→Outbound Routes** to create a new outbound rule. This would allow the extension on the UCM6XXX to reach numbers in PSTN network via the peer SIP trunk we just configured.





Create New Outbound Rule

Cancel Save

General

Calling Rule Name: HT813_Outbound

Pattern: 9x

PIN Group: None

Password:

Disable This Route: ☐

Privilege Level: Internal

Warning: Setting privilege level at "Internal" has potential security risks.

PIN Groups with Privilege Level:

Outbound Route CID:

Enable Filter on Source Caller ID

Enable Filter on Source Caller: ☐

ID:

Call Duration Limit

Call Duration Limit: ☐

Main Trunk

Trunk: SIPTrunks - HT813

Strip: 1

Prepend:

Figure 13: Configure Outbound Rule on the UCM6XXX

In this example "9x.", 9 is the first dialing digit and it will be stripped off when the call goes out.

Configure Inbound Rule on UCM6XXX

On the UCM6XXX web GUI, go to **Extension/Trunk→Inbound Routes** to create a new inbound rule.

In this example, we create the DID as **20000**, which will be used in the HT813 call forward setting.



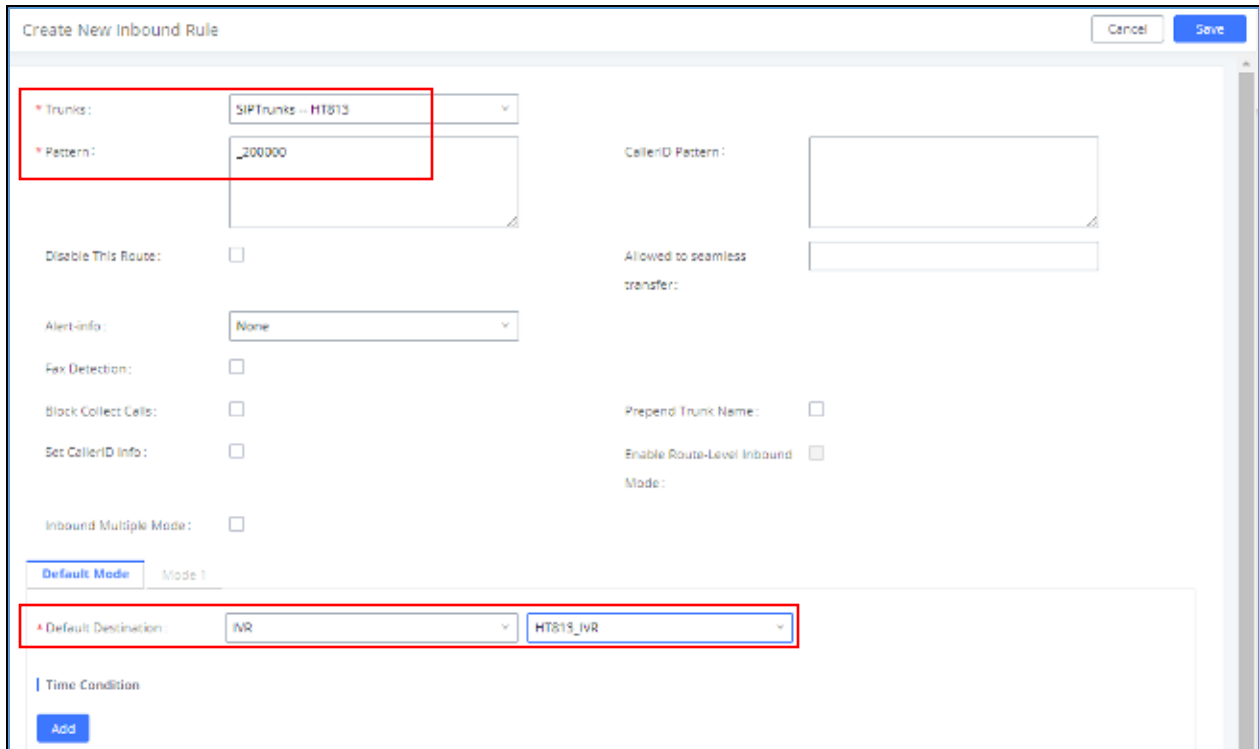


Figure 14: Configure Inbound Rule on the UCM6XXX

The default destination is configured to IVR.

Configure FXO Port on HT813

1. Connect the PSTN line to the HT813 FXO port.
2. On the HT813 web GUI, go to FXO Port setting page, configure the FXO port to send signaling SIP messages to the UCM6XX's IP address. Please refer to the highlighted settings and other necessary settings in the following figures.

You can set anything you want on the SIP user ID, authentication ID and username. We choose 1111 in our example.

In this example, the UCM6XXX IP address is 192.168.5.190.



Grandstream Device Configuration	
STATUS	BASIC SETTINGS
Account Active: ☐ No ☒ Yes	
Primary SIP Server: 192.168.5.190 (e.g., sip.mycompany.com, or IP address)	
Failover SIP Server: (Optional, used when primary server no response)	
Prefer Primary SIP Server: ☒ No ☐ Yes (yes - will register to Primary Server if Failover registration expires)	
Outbound Proxy: (e.g., proxy.myprovider.com, or IP address, if any)	
Backup Outbound Proxy: (e.g., proxy.myprovider.com, or IP address, if any)	
Prefer Primary Outbound Proxy: ☒ No ☐ Yes (yes - will reregister via Primary Outbound Proxy if registration expires)	
SIP Transport: ☒ UDP ☐ TCP ☐ TLS (default is UDP)	
NAT Traversal: ☒ No ☐ Keep-Alive ☐ STUN ☐ UPnP	
SIP User ID: 1111 (the user part of an SIP address)	
Authenticate ID: 1111 (can be identical to or different from SIP User ID)	
Authenticate Password: (purposely not displayed for security protection)	
Name: 1111 (optional, e.g., John Doe)	
DNS Mode: ☒ A Record ☐ SRV ☐ NAPTR/SRV	
DNS SRV use Registered IP: ☒ No ☐ Yes	
Tel URI: Disabled	
SIP Registration: ☒ No ☐ Yes	
Unregister On Reboot: ☒ No ☐ Yes	
Outgoing Call without Registration: ☐ No ☒ Yes	

Figure 15: Configure FXO Port on the HT813 - Registration

Since we are going to use IVR when the call is forwarded to the UCM6XXX, the UCM6XXX will need to be able to detect the DTMF digits. Configure the HT813 FXO port DTMF settings as below for an initial setup.

Preferred DTMF method	Priority 1:	RFC2833
(in listed order):	Priority 2:	SIP INFO
	Priority 3:	In-audio

Figure 16: Configure FXO Port on the HT813 - DTMF Settings

There are a few necessary changes to be made in FXO termination section and Channel Dialing section.



FXO Termination

Enable Current Disconnect: ☐ No ☒ Yes (Default Yes. If set to yes, enter threshold below)

Current Disconnect Threshold (ms): (50-800 milliseconds. Default 100 milliseconds)

Enable PSTN Disconnect Tone Detection: ☒ No ☐ Yes (Default No)

(If set to yes, the following tone is used as the disconnect signal)

PSTN Disconnect Tone: (Syntax: f1=freq@vol, f2=freq@vol, c=on1/off1-on2/off2-on3/off3;)
 (Allowed Range: freq = 0 to 4000Hz; vol = -40 to -24dBm)
 (Default: Busy Tone: f1=480@-32,f2=620@-32,c=500/500;)

Enable Polarity Reversal: ☒ No ☐ Yes (Default No. Check with your PSTN carrier before setting to Yes)

AC Termination Model ☒ Country-based ☐ Impedance-based ☐ Auto-Detected

Country-based

Impedance-based

Number of Rings: (1-50. Default 4)
 (Number of rings for a PSTN incoming call before FXO port answers to accept VoIP number)

PSTN Ring Thru FXS: ☒ No ☐ Yes (Default Yes)
 (If set to yes, all incoming PSTN calls will ring the FXS port after the Ring Thru Delay)

PSTN Ring Thru Delay (sec): (1-10 seconds. Default 4 seconds)

PSTN Ring Timeout (sec): (2-10 seconds. Default 6 seconds)
 (Used to detect PSTN hangup when FXO port is not answered)

Figure 17: Configure FXO Port on the HT813: FXO Termination

- First, we should confirm which method the PSTN line is using.

If the PSTN line is using current disconnect (typical case in North America), then we should turn on "Enable Current Disconnect" and disable "Enable PSTN Disconnect Tone Detection".

The default "Current Disconnect Threshold" is 100ms, but if you start experiencing dropped calls then you should raise this value by 100ms intervals.

If the PSTN disconnects using the tones method, then turn on "Enable PSTN Disconnect Tone Detection" and turn off the "Enable Current Disconnect" option.

For PSTN tone detection, the tone disconnect method is widely used everywhere else in the world. The North American busy tone value is "f1=480@-32,f2=620@-32,c=500/500" but these tones vary from country to country. You may look up for the settings for your country at www.3amsystems.com or download the information from <http://www.itu.int/ITU-T/inr/forms/files/tones-0203.pdf>.

- Set "Number of Rings" option to 1. If you happen to experience caller ID issue, you may set it to 2. In the sample setup, it's set to 2.
- Set "PSTN Ring Thru FXS" to "No".



- Set "PSTN Ring Thru Delay" option to 1. If you happen to experience caller ID issue, you may set it to 2. In the sample setup, it's set to 2.
- Set the "Wait for Dial-Tone" to "No".
- Set the "Stage Method (1/2)" to 1.

Wait for Dial-Tone: ☒ No ☐ Yes (Default Yes - dial upon dial-tone) Stage Method (1/2): 1 (Default 2 - 2 stage dialing)

Figure 18: Configure FXO Port on the HT813 - Channel Dialing

Exchange SIP Port Settings for FXS and FXO on HT813

- On the HT813 web GUI, go to FXO setting page, configure the "Local SIP Port" to be 5060. (The default setting is 5062.)
- On the HT813 web GUI, go to FXS setting page, configure the "Local SIP Port" to be 5062. (The default setting is 5060.)

Configure Unconditional Call Forward on HT813

On the HT813 web GUI, go to Basic setting page, configure "Unconditional Call Forward to VOIP" to the DID number **20000**. This is the same number configured in UCM6XXX inbound route dial pattern. In this example, the UCM6XXX IP address is 192.168.5.250.

	User ID	Sip Server	Sip Destination Port
Unconditional Call Forward to VOIP:	20000	@ 192.168.5.190	: 5060

Figure 19: HT813 Basic Settings

How to Dial

Once the HT813 and the UCM6XXX are set up as above, the inbound call and the outbound call will be working as described below.

- **Outbound call**
The extension registered to the UCM6XXX can dial prefix + PSTN number to reach outside numbers in PSTN network, as defined in UCM6XXX outbound route.
- **Inbound call**
The user from outside network can dial into the PSTN line's number (connected to HT813). And then he/she will reach the IVR of the UCM6XXX. The IVR on UCM6XXX would allow the user to further enter extension number or key pressing digit to reach the desired destination. The inbound call will go through the inbound route set up on the UCM6XXX.

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