Grandstream Networks, Inc.

How to Manage Inbound / Outbound Routes on UCM6XXX

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OVERVIEW

This document presents instructions to manage outbound and inbound routes on the UCM6XXX.

Firstly, we will introduce how to use source caller ID filter and privilege level to control outbound calls. UCM6XXX series support two ways to define source caller ID filter:

- **Selecting allowed extensions**
  The permission and privilege settings are used to control the outbound calls generated from extension, IVR, DISA, and inbound route so that the UCM6XXX can securely handle the calls as desired.

- **Defining allowed extension/extension pattern**
  This specifies the extensions to be allowed to use the outbound rule.

Then we introduce how to configure caller ID and DOD for outbound calls. Users could configure caller ID at 4 different places on UCM6XXX web GUI. Caller ID configured at different places has different priority. Caller ID with higher priority will override the one with lower priority. Moreover, we will introduce how to use DID pattern to control inbound calls. Only calls matching the DID pattern will be allowed to go through the inbound rule.
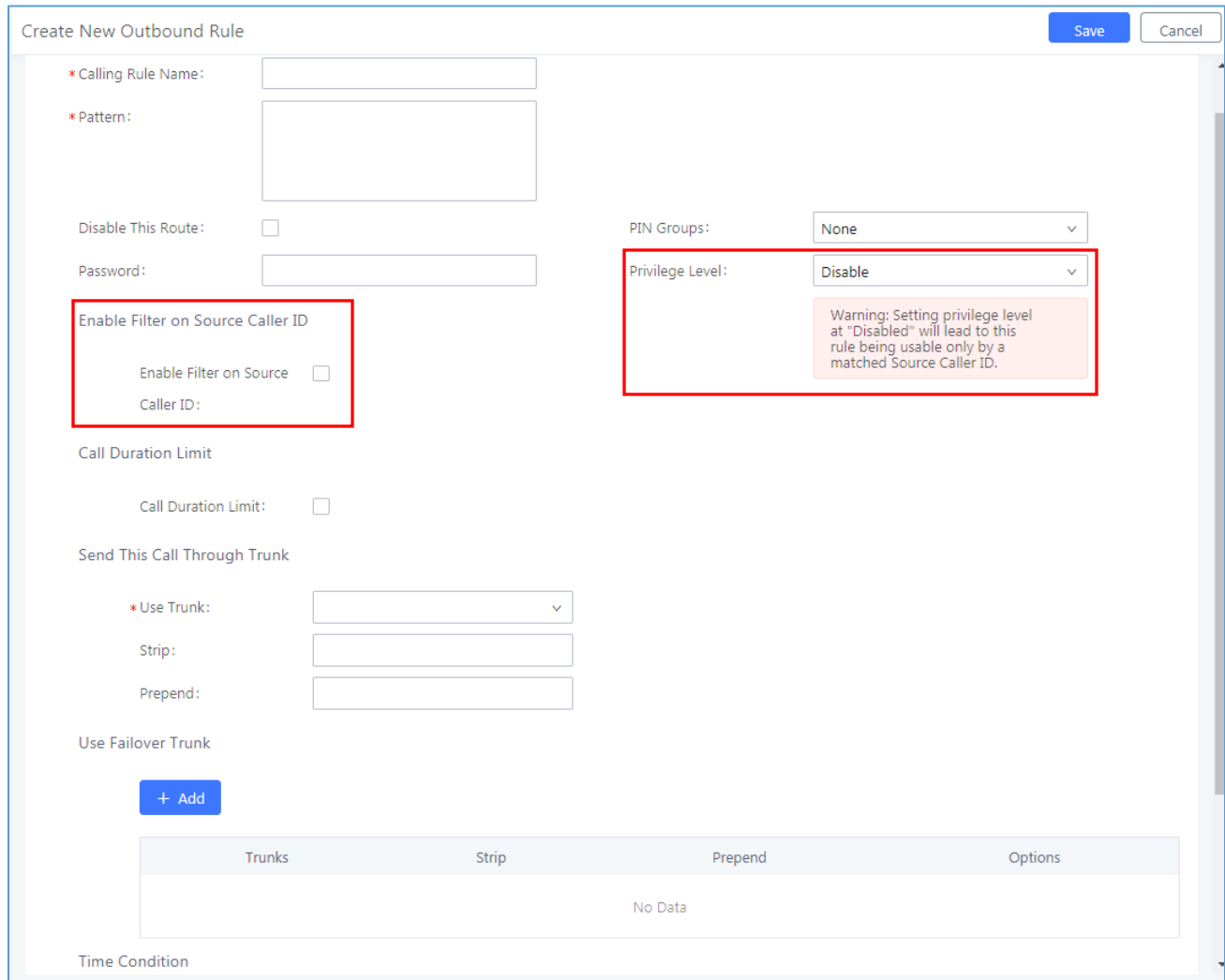
And finally we give a brief instruction of "Prepend Trunk Name" and "DID Mode" options.

Note: UCM6XXX series include UCM6100 series (UCM6102, UCM6104, UCM6108 and UCM6116), UCM6200 series (UCM6202, UCM6204 and UCM6208) and UCM6510.

MANAGING OUTBOUND ROUTE

There are two methods to manage the outbound route, **Privilege Level** and **Source Caller ID Filter**. When creating/editing an outbound rule under **Web UI → Extension/Trunk → Outbound Routes**, users shall see "Privilege Level" option and "Enable Filter on Source Caller" options as shown in the following figure.

Figure 1: Create an Outbound Route

Basically, these two options are used as two ways to control outbound route permissions to decide which extensions are allowed to use the outbound rule to call external numbers. In the following two sections, we will separately introduce in details how to configure the two options to control extensions using trunk to make outbound calls.

Using Source Caller ID Filter

When creating/editing an outbound rule under **Web UI → Extension/Trunk → Outbound Routes**, select "Enable Filter on Source Caller ID" checkbox to enable it.
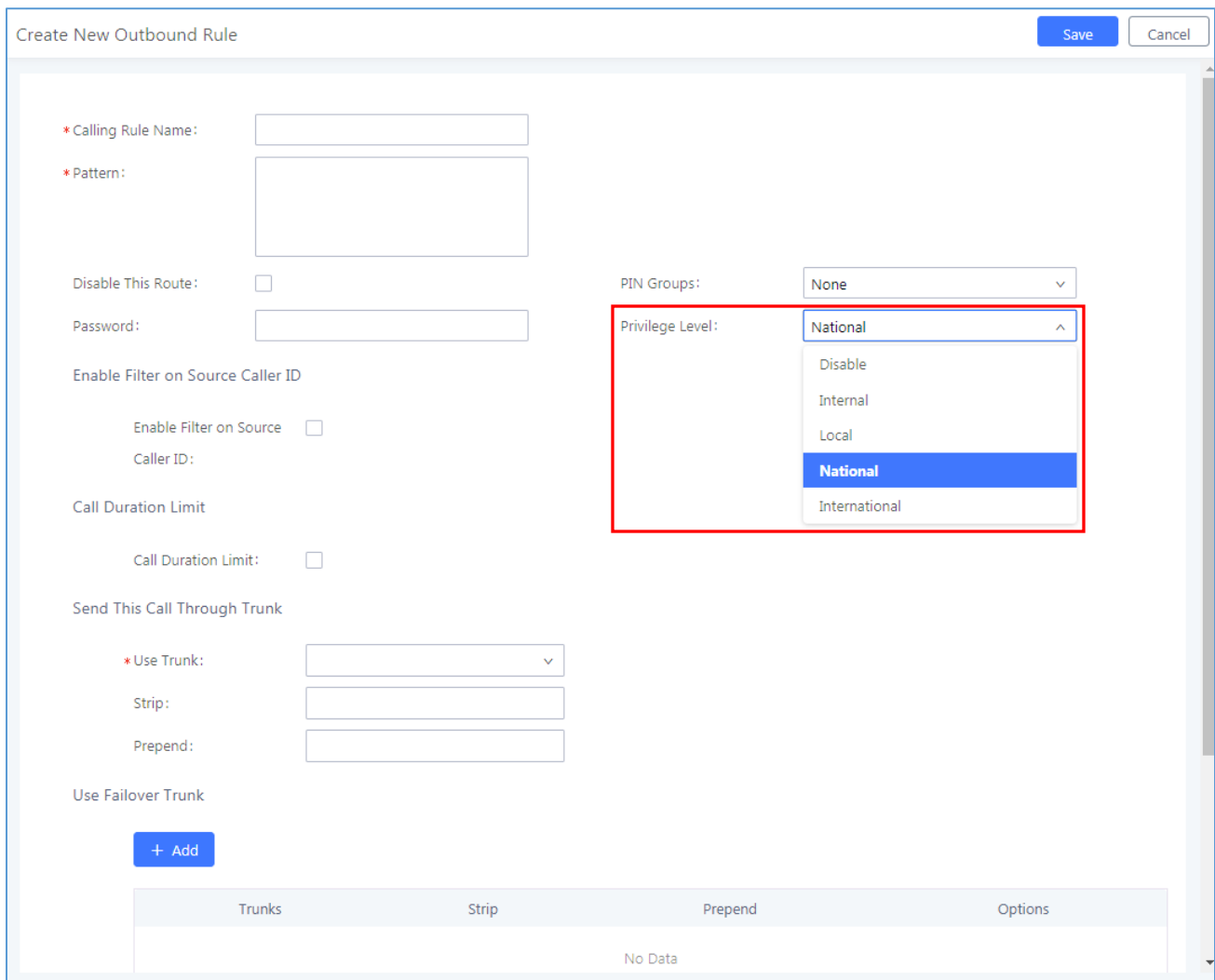
Managing Inbound / Outbound Routes on UCM6XXX

Figure 2: Enable Filter on Source Caller ID

After "Enable Filter on Source Caller ID" option is enabled, "Privilege Level" option is automatically disabled (turned into grey) and more options will show up for user to configure the filter. There are two ways to configure the source caller ID:

1. **Select extensions/extension groups**
   Select extensions/extension groups from "Available Extensions/Extension Groups" to "Selected Extensions/Extension Groups". Only selected extensions/extension groups are allowed to use this outbound rule to make outbound calls.

2. **Custom Dynamic Route**
   User could define the pattern for the source caller ID by configuring "Custom Dynamic Route" option. This allows users to define extension range instead of selecting them one by one.
   - All patterns are prefixed with the "_".
   - Special characters:
     X: Any Digit from 0-9.
     Z: Any Digit from 1-9.
     N: Any Digit from 2-9.
     "**.**": Wildcard. Match one or more characters.
     "**!**": Wildcard. Match zero or more characters immediately.

Managing Inbound / Outbound Routes on UCM6XXX

For example, if "Custom Dynamic Route" is configured as "_xxxx", only extensions of 4 digits can use this outbound rule to make outbound calls.

If both of the above options are configured, they will take effect at the same time. Therefore, the extension making the outbound call will either need to be an extension in the selected list or match the pattern defined in "Custom Dynamic Route" option.

For example, for the configurations shown in [Figure 2: Enable Filter on Source Caller ID], assuming "Extension Group - Group1" contains extensions 1002 and 1003, then in this UCM6XXX system, the extensions 1001, 1002, 1003 and other 4-digit extensions with first digit being 2-9 are allowed to use this outbound rule to call external numbers.

Using Privilege Level

When creating/editing an outbound rule under **Web UI → Extension/Trunk → Outbound Routes**, users shall see "Privilege Level" with "Disable" and 4 levels in the drop-down list.

Figure 3: Privilege Level for Outbound Rule

⚠ **Note:**

- Setting "Privilege Level" to "Disable" will lead to the outbound route unavailable unless "Enable Filter on Source Caller ID" option is enabled to control outbound permission. Basically, selecting "Disable" means to disable the outbound rule and thus no outbound call can be placed through this outbound rule.
- The permission level/privilege level option "Internal" "Local" "National" or "International" does not necessarily mean internal calls between extensions, local calls, national calls or international long distance calls in literal. They are basically 4 levels from lowest to highest for the users to identify and manage the routes. If users would like to make local, national or international calls via the UCM6XXX, the users need make sure the trunk using the outbound route has the capability to handle and route local, national or international calls by itself first.

The supported 4 privilege levels are "**Internal**", "**Local**", "**National**" and "**International**" from the lowest to the highest. When an outbound call is initiated to go through an outbound rule on UCM6XXX, the UCM6XXX will compare the source caller's permission level with the outbound rule's privilege level. If the source caller's permission level is higher than or equal to the outbound route's privilege level, the call will be allowed to go through.

On the UCM6XXX, an outbound call can be initiated by the following sources:
- A local extension on ucm6xxx
- An IVR
- A DISA
- Or an inbound route through which an external number is calling in.

In the following sections, we will introduce how to configure the permission levels for each of them.

Local Extension Permission

Once the outbound route is created with a proper privilege level, the administrator could decide which extensions could use this outbound rule to dial external numbers by configuring "Permission" for each extension. On the UCM6XXX web GUI, create/edit an extension under **Web UI → Extension/Trunk → Outbound Routes**. Users shall see "Permission" option with four levels in the drop-down list.
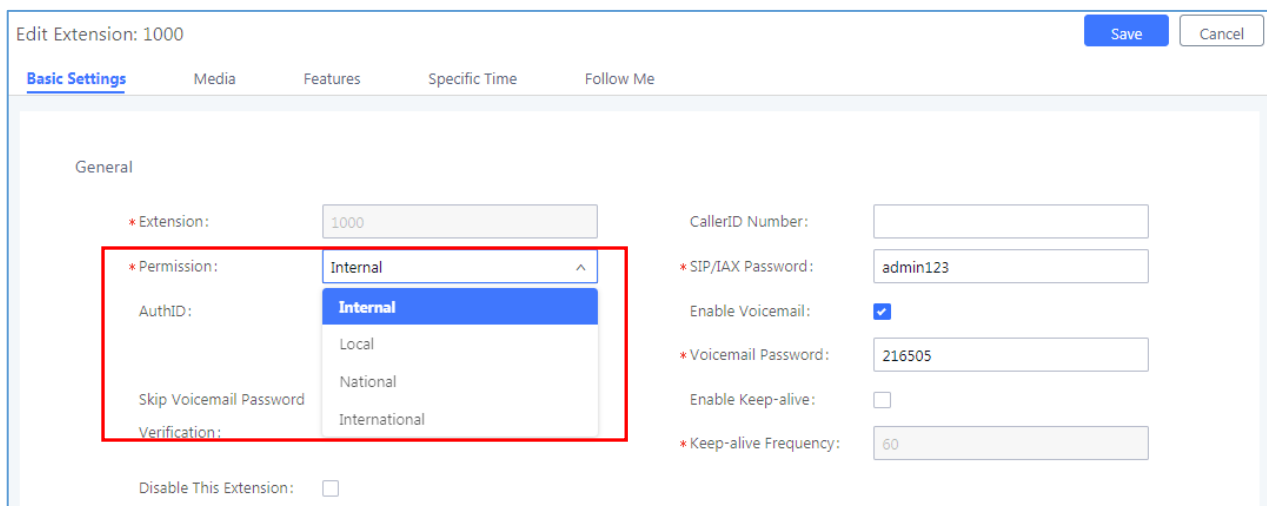

Figure 4: Extension Permission on UCM6XXX

The extension needs to be assigned with higher or equal level permission compared to the outbound route's privilege level in order to make outbound calls using that route.
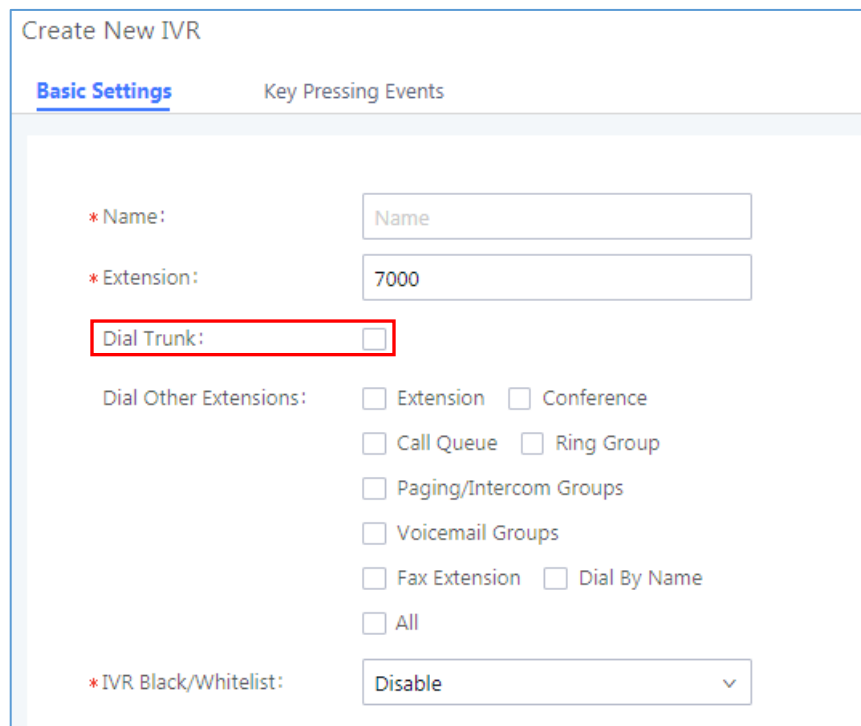
When making an outbound call via a route from an UCM6XXX extension, the UCM6XXX will compare the extension's permission level with the outbound route's privilege level. If the extension's permission level is higher than or equal to the outbound route's privilege level, the call will be allowed to go through.

Please see more descriptions for each permission level below:

- If an outbound rule is set to "**Internal**": All extensions can use this rule.
- If an outbound rule is set to "**Local**": Extensions with Local, National, or International level are allowed to use this rule.
- If an outbound rule is set to "**National**": Extensions with National or International level are allowed to use this rule.
- If an outbound rule is set to "**International**": Only extensions with international level can use this rule.

IVR Permission

When creating/editing an IVR under **Web UI → Call Features → IVR**, users shall see "Dial Trunk" and "Permission" options.
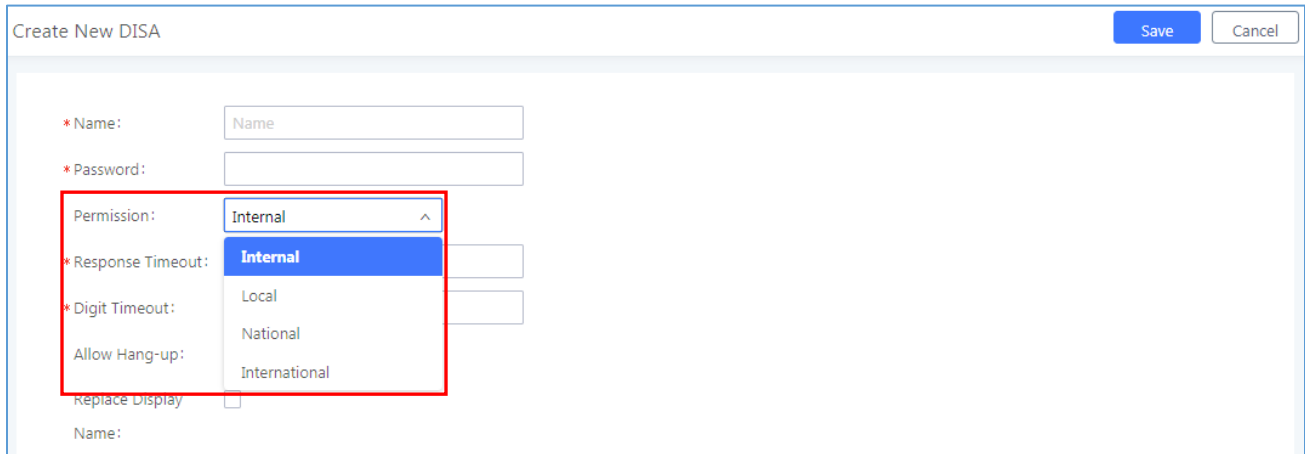
Figure 5: IVR Permission default setting

By default, the "**Dial Trunk**" option is disabled. To allow users calling into this IVR to use trunk to dial external numbers, the administrator should first enable "Dial Trunk" option and select a proper level for "**Permission**" option. The UCM6XXX will then compare the IVR's permission level with the outbound route's privilege level. Only if the IVR's permission level is higher than or equal to the outbound route's privilege level, the call will be allowed to go through.

DISA Permission

When creating/editing a DISA under **Web UI → Call Features → DISA**, users shall see " **"Permission"** options with 4 levels in the drop-down list.

Figure 6: DISA Permission

To allow calls routed to this DISA to use trunk to dial external numbers, the administrator should select a proper level for "**Permission**" option. Once a DISA is created, users can configure the inbound route destination as "DISA" or IVR key event as "DISA". When a call is routed to DISA, the caller will be first asked to enter password, then a second dial tone will be played and the caller could enter the external numbers to dial outbound calls. At this time, the UCM6XXX will compare the DISA's permission level with the outbound route's privilege level. Only if the DISA's permission level is higher than or equal to the outbound route's privilege level, the call will be allowed to go through.

Outbound Route Selection

This section explains the UCM6XXX outbound rule selection. When multiple trunks are available, UCM6XXX will select the trunk to use base on the trunk pattern. When multiple trunks have similar trunk pattern, specific match mechanism will be used to select trunk for outbound calls. The following examples explains the regular UCM6XXX outbound selection mechanism.

- **Case 1: Regular Matching**

    Outbound Route 1 has matching pattern '_1X.'
    Outbound Route 2 has matching pattern '_2X.'

    Dial any number starts with 1 will allow the UCM6XXX series to use Outbound Route 1 to place the call.
    Dial any number starts with 2 will allow the UCM6XXX series to use Outbound Route 2 to place the call.

    ➔ In this case, UCM6XXX will use the first digit to distinguish different calls.

- **Case 2: Global Matching Vs. Specific Matching**

    Outbound Route 1 has matching pattern '_XXXX'
    Outbound Route 2 has matching pattern '_1234'

    Dial any number expect 1234 will allow the UCM6XXX series to use Outbound Route 1 to place the call.
    Dial 1234 will allow the UCM6XXX to use Outbound Route 2 to place the call.

➔ In this case, pattern XXXX will match any numbers that dialed. However, for number 1234, since it is declared explicitly, UCM6XXX will select Outbound Route 2 to place the call.

Note: For UCM6XXX pattern matching mechanism, specific matching always has higher priority than global matching.

- **Case 3: Matching first Character**

Outbound Route 1 has matching pattern '_X.'
Outbound Route 2 has matching pattern '_0X.'

Dial any number starts with 0 will allow the UCM6XXX to use Outbound Route 2 to place the call.
Dial any other numbers will allow the UCM6XXX to use Outbound Route 1 to place the call.

➔ In this case, UCM6XXX will match the first digit, since '0' is declared explicitly which has a higher priority than global matching 'X'.

- **Case 4: Longest Matching**

Outbound Route 1 has matching pattern '_123XXX'
Outbound Route 2 has matching pattern '_123XXX.'

Dial 123 follow by any 3 digits will allow the UCM6XXX to use Outbound Route 1 to place the call.
Dial 123 follow by more than 3 digits will allow the UCM6XXX to use Outbound Route 2 to place the call.

- In this case, Outbound Route 1 matches exactly 6 digits starts with 123. Outbound Route 2 match more than 6 digits that leads with 123.

Inbound Route Permission

When an external number calls into UCM6XXX through an inbound route, it will be directed to the default destination configured for that inbound route. If "Default Destination" of that inbound route is selected as "By DID" or "External Number", the call could be routed out to another external number through an outbound route on the UCM6XXX. In this case, the administrator need to configure the "Privilege Level" of that inbound route to control whether it is allowed to direct calls out to external numbers.

When creating/editing an inbound rule under **Web UI** ➔ **Extension/Trunk** ➔ **Inbound Routes**, users shall see "Privilege Level" option.

Figure 7: Create an Inbound Route

This "**Privilege Level**" option applies to the inbound rule only when "Default Destination" is set to "External Number" or "by DID". (IVR is handled in a different way; the other options in the "Default Destination" can be considered as internal extension on the UCM6XXX

When there is an incoming call from the trunk to the UCM6XXX via this inbound route, if DID pattern in this inbound route matches one of the outbound route on the UCM6XXX, the UCM6XXX will compare the inbound route's privilege level with the matching outbound route's privilege level. If the inbound route's privilege level is higher than or equal to the matching outbound route's privilege level, the call will be allowed to go through.

Managing Inbound / Outbound Routes on UCM6XXX

OUTBOUND CALLER ID/DOD CONFIGURATION

On UCM6XXX web GUI, there are 4 places that allow users to configure the Caller ID to be displayed on the callee's LCD. We could name them as:

- **Trunk Caller ID**
- **Trunk DOD**
- **Extension Caller ID**
- **Global Outbound Caller ID**

In this section, we will introduce the configuration of each of them and their priority.

Trunk Caller ID

When editing a SIP peer trunk, users shall see "**Keep Trunk CID**", "**Caller ID**" and "**CallerID Name**" options.
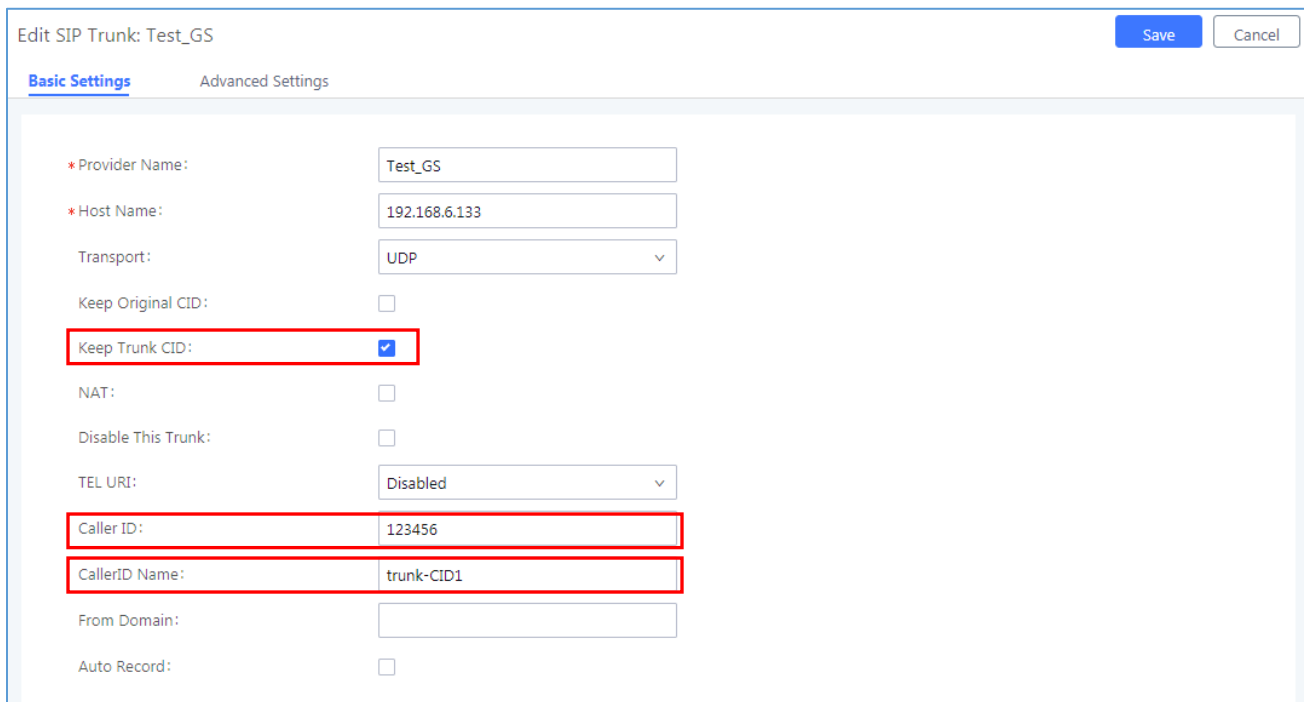
Figure 8: SIP Trunk Caller ID

To have "**Caller ID**" and "**CallerID Name**" to take effect, users must enable "**Keep Trunk CID**" option. Only if "Keep Trunk CID" is enabled, all outbound calls going through this trunk will use the "Caller ID" and "CallerID Name" configured for this trunk and have them displayed on the callee's LCD.

If "**Keep Trunk CID**" is disabled, even if "Caller ID" and "CallerID Name" are configured with values, they will not be used as the caller ID of the outbound call.

Trunk DOD

The UCM6XXX provides Direct Outward Dialing (DOD) which is a service of a local phone company (or local exchange carrier) that allows subscribers within a company's PBX system to connect to outside lines directly.

Example of how DOD is used:

Company ABC has a SIP trunk. This SIP trunk has 4 DIDs associated to it. The main number of the office is routed to an auto attendant. The other three numbers are direct lines to specific users of the company.
At the moment when a user makes an outbound call their caller ID shows up as the main office number.
This poses a problem as the CEO would like their calls to come from their direct line. This can be accomplished by configuring DOD for the CEO's extension.

Steps on how to configure DOD on the UCM:

1. To setup DOD go to UCM6XXX **Web UI → Extension/Trunk → VoIP Trunks** page.

2. Click to access the DOD options for the selected SIP Trunk.

3. Click "Create a new DOD" to begin your DOD setup.

4. For "DOD Number", enter one of the numbers (DIDs) from your SIP trunk provider. In the example above, Company ABC received 4 DIDs from their provider. ABC will enter in the number for the CEO's direct line.

5. Select an extension from the "Available Extensions" list. Users have the option of selecting more than one extension. In this case, Company ABC would select the CEO's extension. After making the selection, click

    on the > button to move the extension(s) to the "Selected Extensions" list
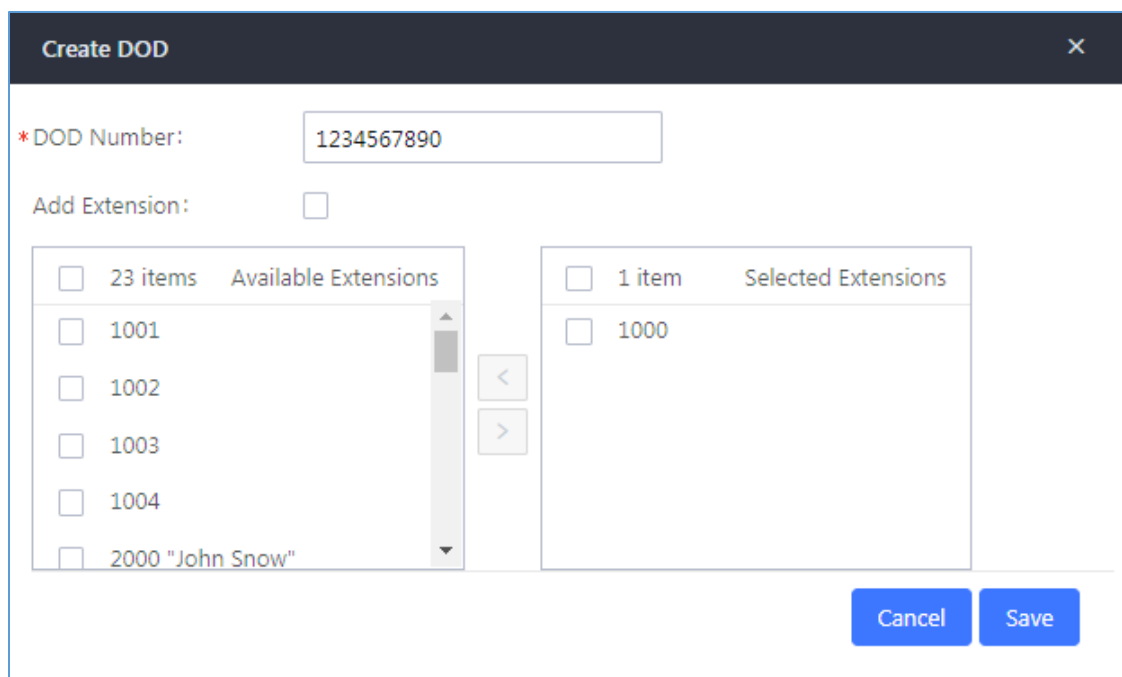

Figure 9: DOD Extension Selection

6. Click "Save" and "Apply Changes" button to confirm the new settings.

Once completed, the user will return to the "Edit DOD" page that shows all the extensions that are associated to a particular DOD.

Figure 10: Edit DOD

Extension Caller ID

When creating/editing an extension, users shall see options "CallerID Number", "First Name" and "Last Name".
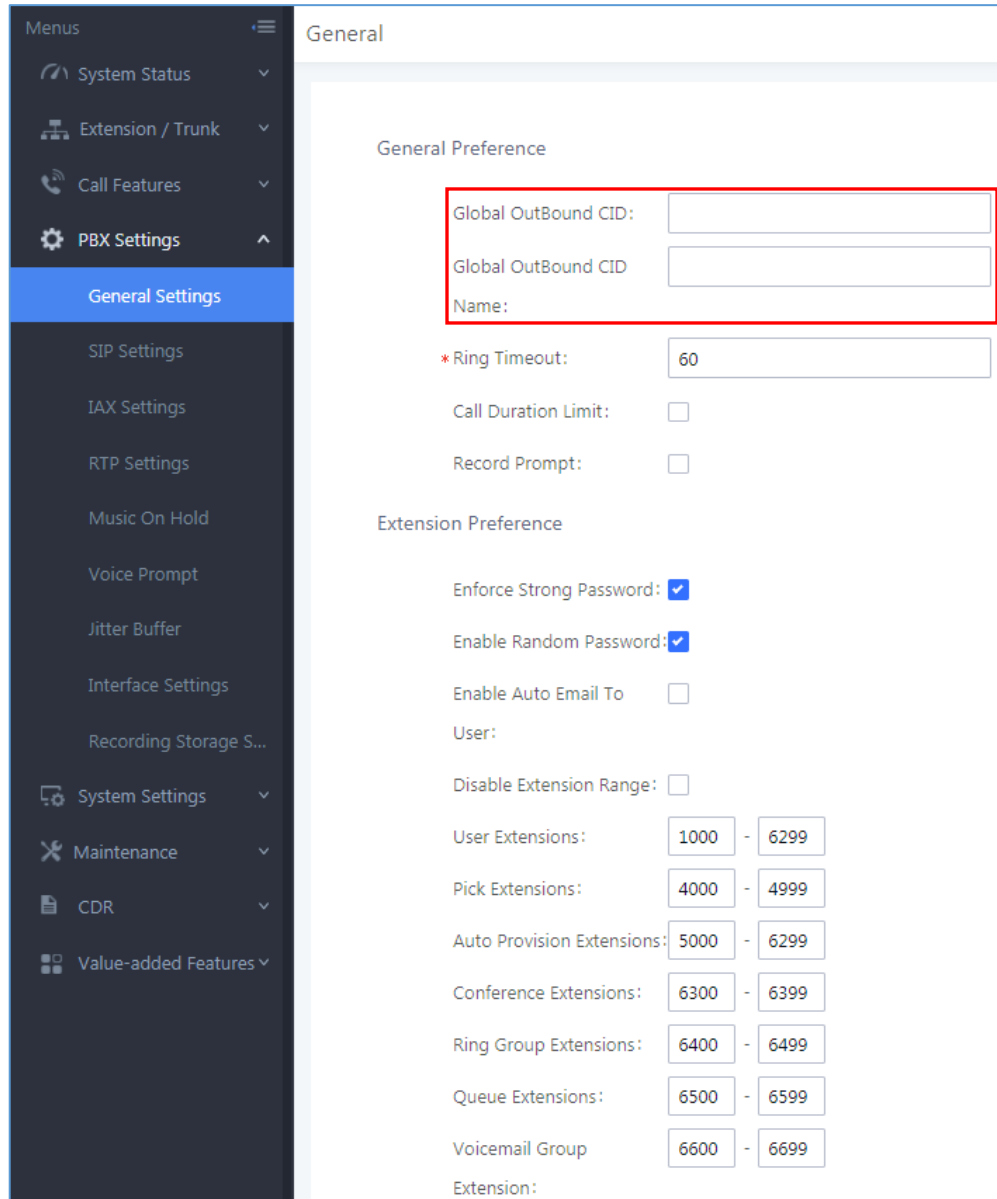

Figure 11: Extension Caller ID

"**First Name**" and "**Last Name**" together define caller ID name. When the extension makes an outbound call, its "CallerID Number", "First Name" and "Last Name" will be used as the caller ID and caller ID name of the outbound call if the following conditions are satisfied:

- "Keep Trunk CID" of the trunk is disabled
- DOD of the trunk not configured

Managing Inbound / Outbound Routes on UCM6XXX

Global Outbound Caller ID

On UCM6XXX **Web UI →PBX Settings → General Settings** page, users shall see "Global Outbound CID" and "Global Outbound CID Name" options:

Figure 12: Global Outbound CID

"**Global Outbound CID**" and "**Global Outbound CID Name**" will be used as call ID and call ID name of an outbound call if following conditions are satisfied:

- "Keep Trunk CID" of the trunk is disabled

- DOD of the trunk is not configured

- The extension initiating the outbound call doesn't have caller ID number and caller ID Name configured

Outbound Caller ID Priority

- If trunk caller ID is configured and "Keep Trunk CID" is enabled, then trunk CID is of the highest priority. "Caller ID" and "CallerID Name" of the trunk will override caller ID configured in DOD, extension and global settings.

- If "Keep Trunk CID" is disabled, the priority of the other three caller id configuration is as following:

    1. DOD has the highest priority
    2. Extension CID has the second priority
    3. Global outbound caller ID has the lowest priority

MANAGING INBOUND ROUTE

DID Pattern Configuration

When creating/editing an inbound rule under **Web UI → Extension/Trunk → Inbound Routes**, users shall see "Pattern" option. User could use the following characters to define the DID pattern:

- **X**: Any Digit from 0-9.

- **Z**: Any Digit from 1-9.

- **N**: Any Digit from 2-9.

- "**.**": Wildcard. Match one or more characters.

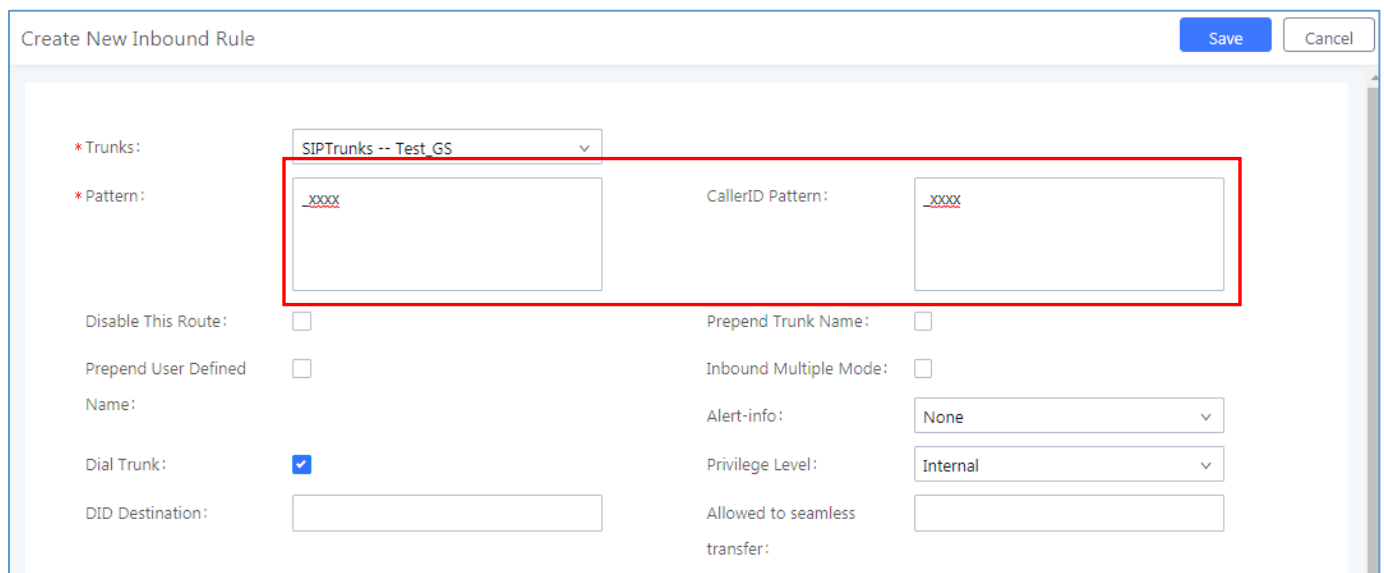- "**!**": Wildcard. Match zero or more characters immediately.

All patterns will be prefixed with "**_**".

Notes:

- The pattern can be composed of two parts, Pattern and CallerID Pattern. The first part is used to specify the dialed number while the second part is used to specify the caller ID and it is optional, if set it means only the extension with the specific caller ID can call in or call out. For example, pattern '_2XXX/1234' means the only extension with the caller ID '1234' can use this rule.

- Multiple patterns can be used. Each pattern should be entered in new line.

- Users can add comments to a dial plan by typing "/*" and "*/" before and after each comment respectively.

Examples:

Pattern	CallerID Pattern
_X.	1000
_NNXXNXXXXX /* 10-digit long distance */	1001
_818X. /* Any number with leading 818 */	

Figure 13: Edit Inbound Rule - DID Pattern

Managing Inbound / Outbound Routes on UCM6XXX

1. The field **Pattern** defines the allowed pattern of the <u>dialed number</u>

2. The field **CallerID Pattern** defines the allowed pattern of the <u>caller number</u>

Only if both patterns are matched, the inbound call can successfully go through.

To illustrate it more clearly, here is an example. Assuming a peer trunk is configured between two UCM6XXX.

1. An extension 10000 on UCM6XXX-A wants to call an extension 5000 on UCM6XXX-B.

2. This call must go through an inbound route configured on UCM6XXX-B to reach extension 5000. UCM6XXX-B will examine if the caller number and the dialed number match the DID pattern of the inbound rule.
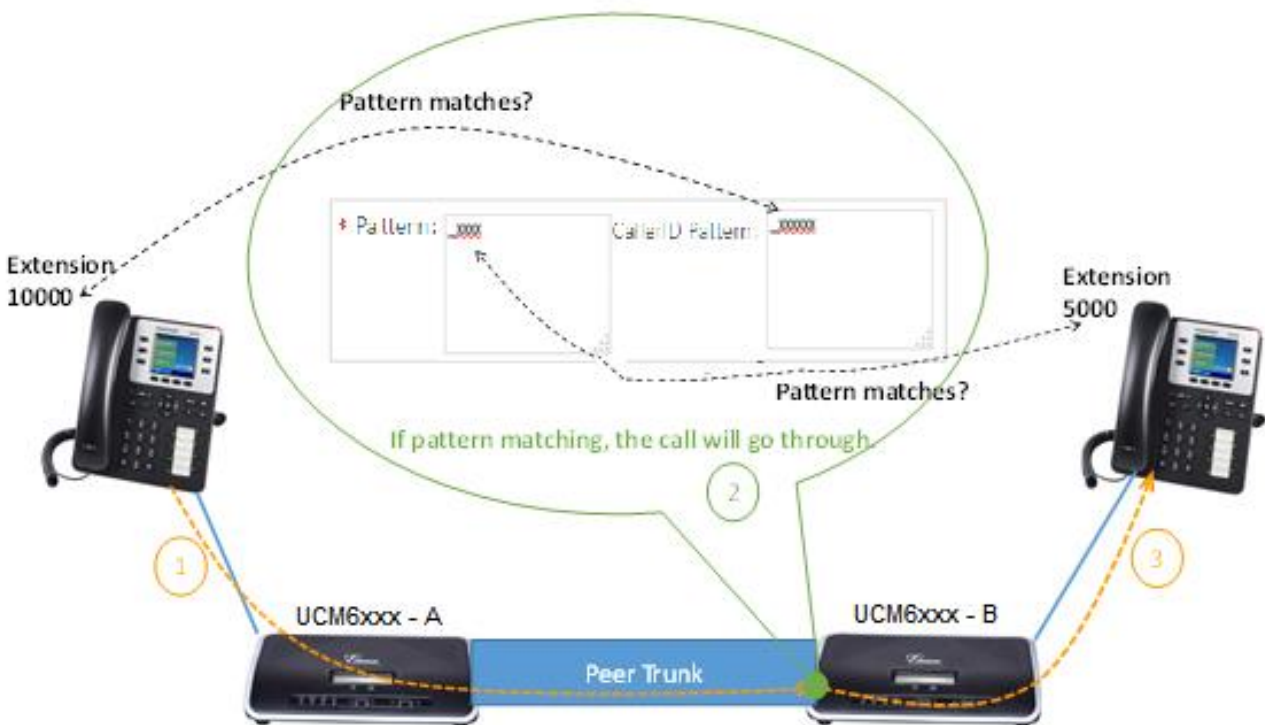
Figure 14: DID Pattern Example

In this case, 10000 is the caller number and it will be restricted by the pattern defined in the second field and 5000 is the dialed number and it will be restricted by the pattern defined in the first field.
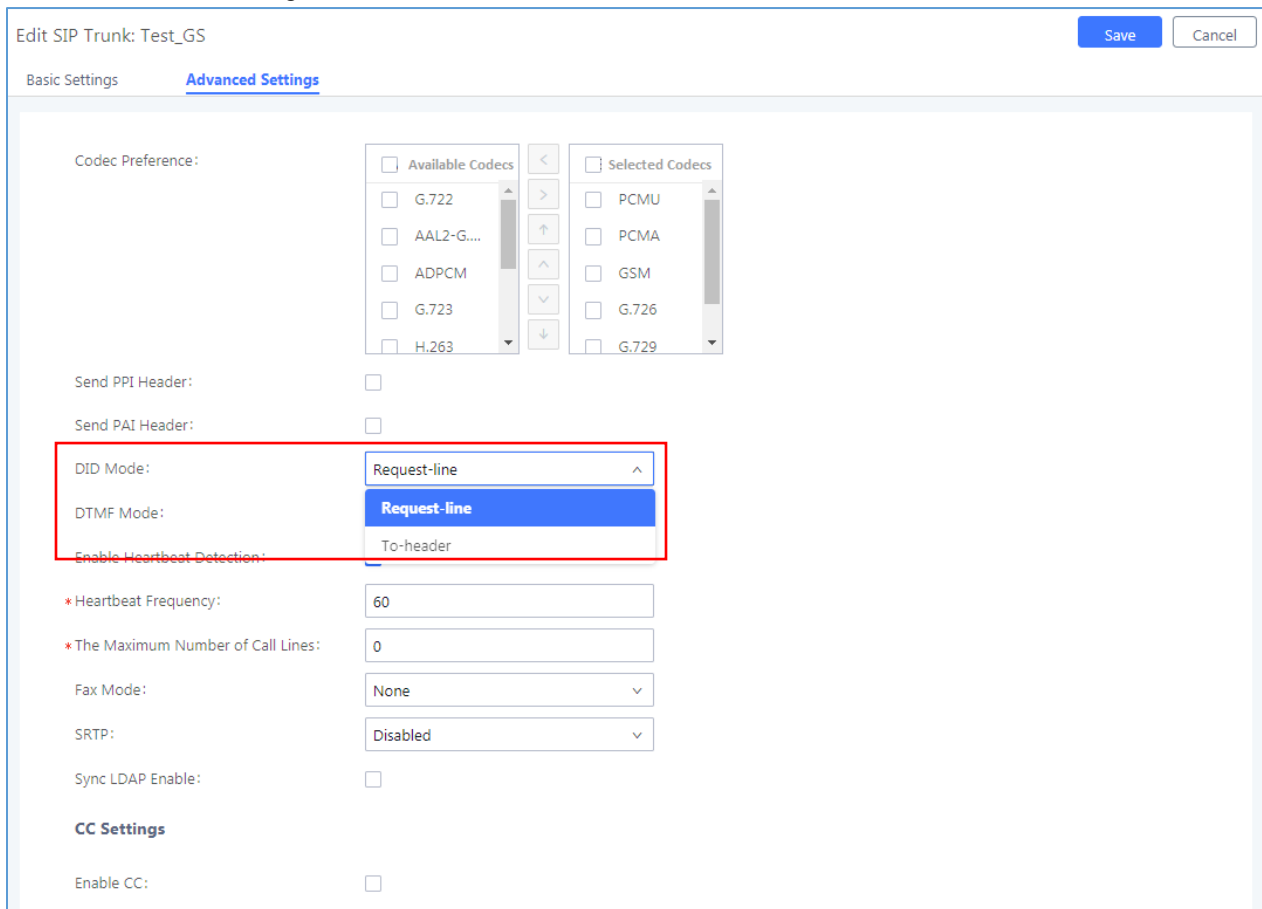
3. If the caller number and the destination number match the DID pattern, the call will successfully go through. In this example, assuming the inbound rule is configured with DID pattern shown in *[Figure 13: Edit Inbound Rule - DID Pattern],* the call is allowed to go through.

DID Mode

When editing SIP peer trunk, users shall see "**DID Mode**" option. This option is for user to configure how to obtain the destination ID of an incoming SIP call.

There are two modes available for uses to select: **To-header** and **Request-line**.

Select "To-header" to use To header in SIP message as the destination ID; select "Request-line" to use Request-line header in SIP message as the destination ID.
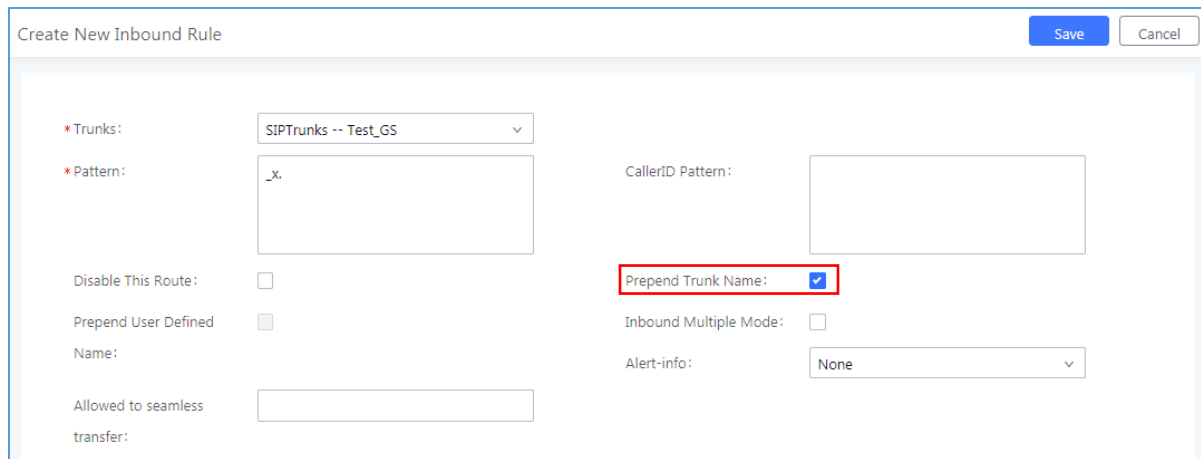

Figure 15: Edit SIP Trunk – DID Mode

Prepend Trunk Name to Caller ID for Inbound Call

When creating/editing an inbound rule, user shall see "**Prepend Trunk Name**" option. If this option is enabled, UCM6XXX will prepend the trunk name to the caller ID name for all incoming calls through this inbound rule. Therefore, the caller ID name displayed on the called extension will be the trunk name plus the caller ID. Thus users would be able to tell from extension's LCD which trunk the inbound call goes through.

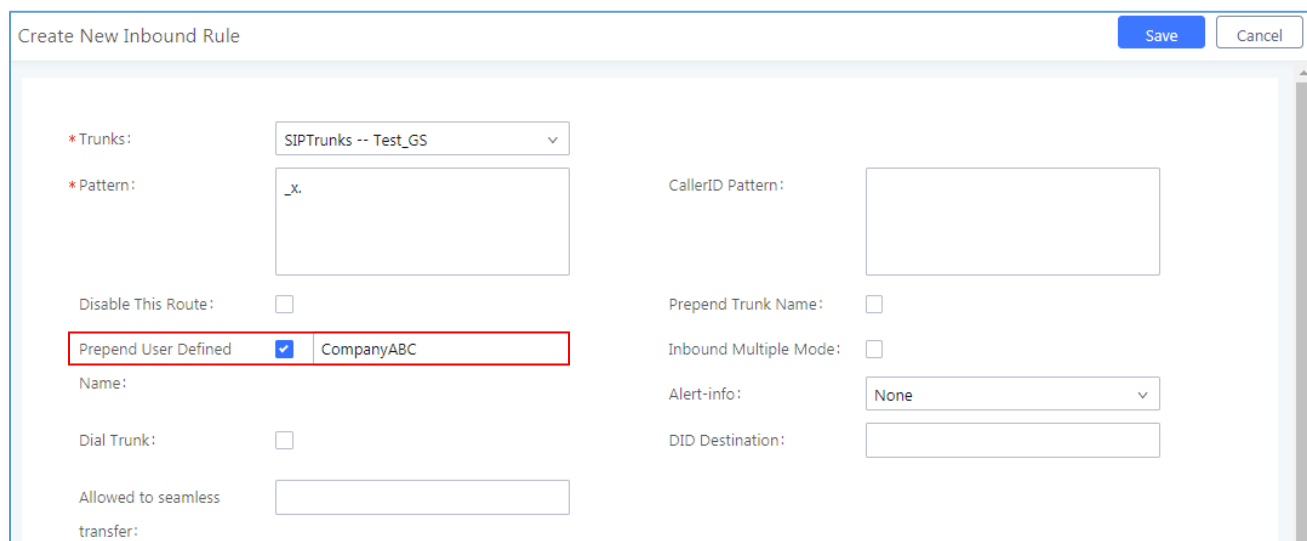**Note:** If "Prepend Trunk Name" is enabled, "Prepend User Defined Name" will be deactivated.

Figure 16: Edit Inbound Rule – Prepend Trunk Name

Prepend User Defined Name to Caller ID for Inbound Call

When creating/editing an inbound rule, user shall see "**Prepend User Defined Name**" option. If this option is enabled, UCM6XXX will prepend the name defined by user to the caller ID name for all incoming calls through this inbound rule. Therefore, the caller ID name displayed on the called extension will be the name plus the caller ID. Thus users would be able to tell from extension's LCD which trunk the inbound call goes through.

Note: If "Prepend User Defined Name" is enabled, user needs to enter a customized name. "Prepend Trunk Name" option will be disabled.
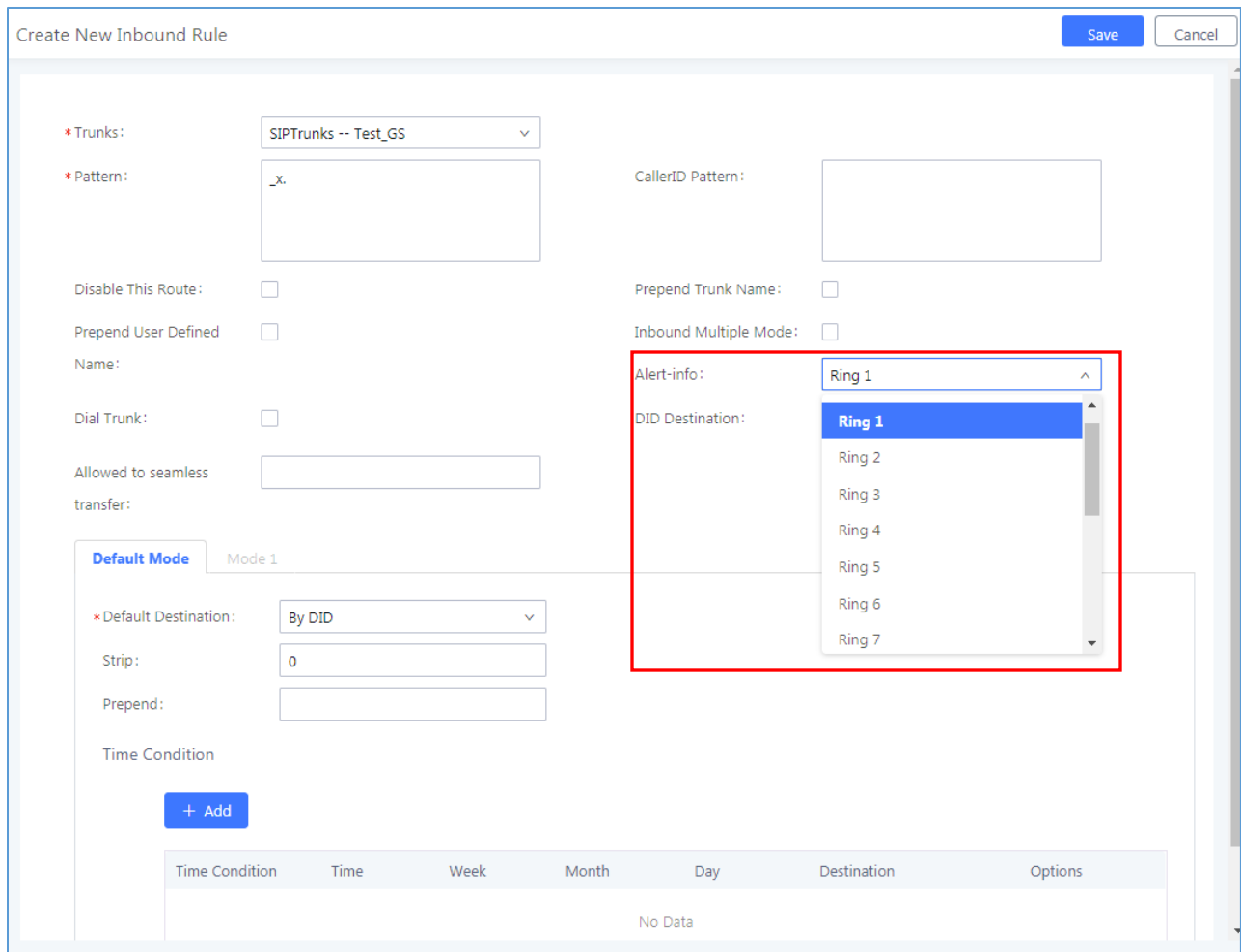

Figure 17: Edit Inbound Rule – Prepend User Defined Name

Alert-Info

When creating/editing an inbound rule, user shall see "**Alert-Info**" option. If this option is enabled, UCM6XXX will include Alert-info header with selected/defined value in INVITE to destination. Therefore, destination device will use as an alternative ringtone. Thus users would be able to tell from extension's phone ringtone which trunk the inbound call goes through.
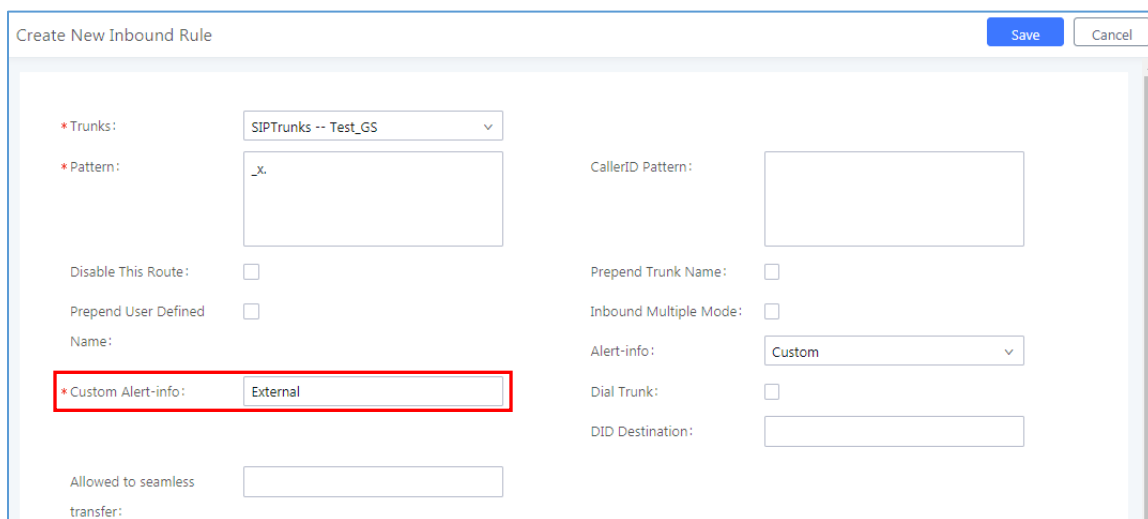
Figure 18: Edit Inbound Rule – Alert-info

Users can set "Alert-info" option in Inbound Route to "Custom" and specify "Custom Alert-Info" as "External" for instance, and the phones can be configured to use a specific ringtone if matching rule is set to "External". If the call is coming through the trunk, the phone will ring using specified ringtone and user will know the call is external, otherwise, the phone will ring using default ringtone letting the user know that the call is Internal.

Figure 19: Edit Inbound Rule – Custom Alert-info

Managing Inbound / Outbound Routes on UCM6XXX

Multiple Mode

In the UCM6XXX, the user can configure inbound route to enable multiple mode to switch between different destinations. The inbound multiple mode can be enabled under Inbound Route settings.

Figure 20: Edit Inbound Rule – Multiple Mode

When Multiple Mode is enabled for the inbound route, the user can configure a "Default Destination" and a "Mode 1" destination for this route. By default, the call coming into this inbound route will be routed to the default destination.

SIP end devices that have registered on the UCM6XX can dial feature code ***62** to switch to inbound route "Mode 1" and dial feature code ***61** to switch back to "Default Destination". Switching between different mode can be easily done without web UI login.

For example, the customer service hotline destination has to be set to a different IVR after 7PM. The user can dial *62 to switch to "Mode 1" with that IVR set as the destination before off work.