CyberData

The IP Endpoint Company

Bell Commander/Shoretel Server and Multicast Configuration Guide

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CyberData Corporation
3 Justin Court
Monterey, CA 93940
(831) 373-2601

CyberData
The IP Endpoint Company

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Phone: (831) 373-2601, Ext. 333
Email: support@cyberdata.net
Fax: (831) 373-4193
Company and product information is at **www.cyberdata.net**.

Revision Information

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Contents

1.0 Making Calls or Pages via SIP through ShoreTel

1.1 Overview

BellCommander works with ShoreTel to provide a complete scheduled audio, paging, and emergency notification solution. Audio can be sent via SIP or multicast. This guide covers making calls/pages via SIP through ShoreTel to page to phones and other endpoints. Our CyberData and Valcom guides can be referenced for sending audio via multicast direct from BellCommander to the devices bypassing the ShoreTel system (http://www.acrovista.com/bellcommander/sip-version.html).

2.0 SIP Setup Guide

2.1 Prerequisites

BellCommander should be able to work with any ShoreTel version that supports SIP extensions (support began in version 8). BellCommander is being actively used at a customer site running ShoreTel version 11.2, build 16.41.356.0 and this guide is based on the customer's installation.

ShoreTel has licensing requirements for this setup: You will need an extension license for the extension used by BellCommander. This extension will not require a mailbox. You will also need a SIP extension license, as BellCommander connects to ShoreTel over SIP Softphone. Contact your ShoreTel dealer for licensing information. If you'll also require the emergency notification feature or the ability to make simultaneous pages to multiple paging groups, then you'll also need additional SIP extension licenses.

2.2 ShoreTel Setup

2.2.1 Preparing ShoreTel to Accept a SIP Extension

In ShoreTel Director, under **Call Control -> Options**, de-select (uncheck) the **Always Use Port 5004 for RTP** option. Click **Save** to save your changes.

In **ShoreTel Director**, under **IP Phones -> IP Phone Address Map**, create an address map for the BellCommander server. Make sure the Site you chose is the same as the site you setup SIP support, later in these instructions. In this example, we used the site **SH**, and entered the BellCommander's IP Address (**10.80.0.100)** in both the **Low** and **High** IP address.

In **ShoreTel Director**, under **Switches**, find a switch at the your site with an available port. Open that switch and configure the available port to the **100 SIP Proxy** setting. In **ShoreTel Director**, under **Sites** -> The site to accept this SIP extension (In this example, **SH**), Fill out the information indicated in Table 1

Table 1. Site Settings

Setting	Description
SIP Proxy Virtual IP Address	Provide an available IP address for BellCommander to use to connect to the ShoreTel Switch, aka the SIP Server IP Address. In this example, we used **10.80.0.10**.
Proxy Switch 1	Select from the drop down menu the switch which you had configured to have provide a SIP Proxy.
Optional - Proxy Switch 2	If you wish to configure an additional switch at this site with a **100 SIP Proxy** port, you may do so and select it here. This would provide additional redundancy in case the switch you select for Proxy Switch 1 failed.

In ShoreTel Director, under **Users -> Individual Users**, Create a new user at the Site you are setting up your BellCommander server. In our example, the Site is **SH**. You will be required to provide the information in Table 2for the new user.

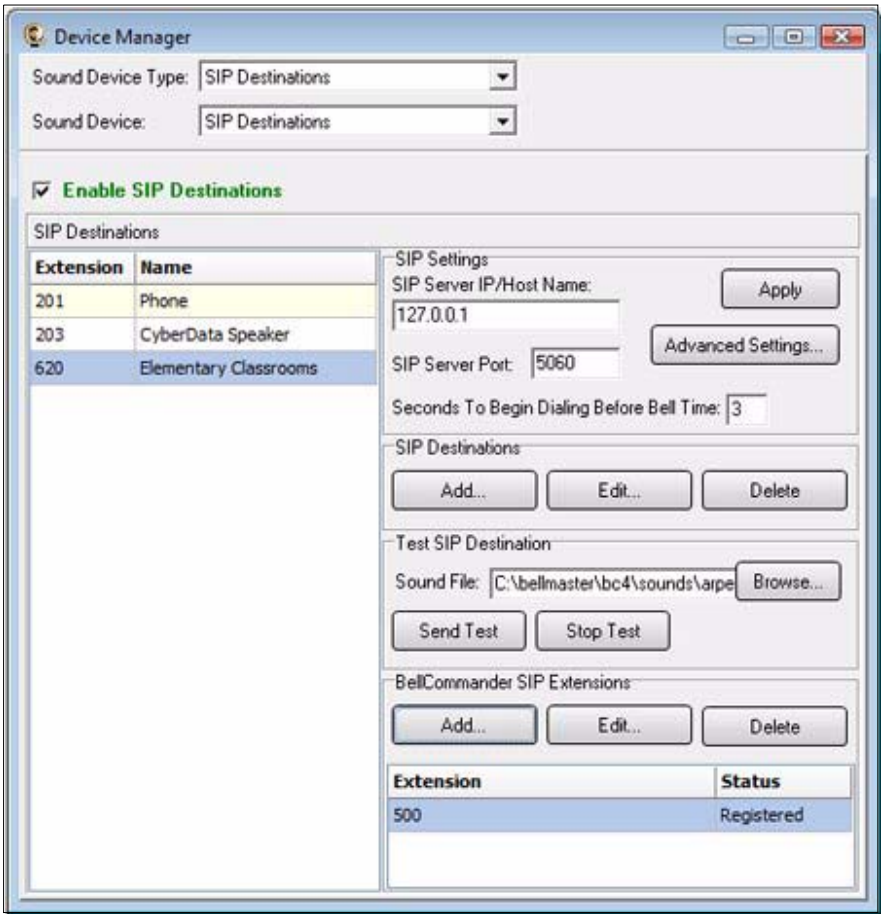
Table 2. New User Settings

Setting	Description
First Name	i.e.: **BellCommander**
Last Name	i.e.: **SH**
Number	This is going to be the Extension number for BellCommander. It will be autofilled with the next available number in ShoreTel, but you may choose a different one if you wish. For our example, we used **3908**.
User Group	The user needs to have high enough permissions to make intercom calls and pages. More details to follow, but in our example we chose **Administrator**.
Site	For now, select the Primary Site (which may be different than the site you are attempting to use) and select the **SoftSwitch** option. This will be changed to the SIP IP Phone in the future.
Client User ID	Make this the same as the Extension number. In our example, we used **3908**.
SIP Password	Create a password for the SIP connection. This password will be used in BellCommander.

2.3 Add the new extension to BellCommander

1. Open the BellCommander Device Manager and select **SIP Destinations** from the **Sound Device Type** drop-down menu. See Figure 1.

Figure 1. Device Manager



2. Enter the **SIP Server IP**. Enter the IP Address setup as a SIP Proxy in ShoreTel. In our example, we used **10.80.0.10**. Enter the corresponding SIP port. This should normally be **5060**. The **Advanced Settings** should normally be set to the defaults. Click the **Apply** button.

3. Click the **Add…** button under BellCommander SIP Extensions to add the extension that BellCommander will register. Enter the extension number that was pre-configured in ShoreTel. In the example configuration, **3908** was used. Enter the password for the extension that was pre- configured in ShoreTel. Typically, the default local port number can be used. After adding the extension, the extension should appear in the list with a status of **Registered**.

2.4 Return to ShoreTel for Additional Settings

In ShoreTel, under IP Phones -> Individual IP Phones, you will see a list of IP phones on your system. A new one will have appeared, named **SIP-<RANDOM CHARACTER STRING>**. You can click on the name of the SIP phone and rename it to something much more human readable. In our example, we renamed it to **SIP-SH BellCommander Softphone**.

In ShoreTel, under Users -> Individual Users, find the user you had created for the BellCommander SIP extension. Change the Site for this user to the site which you setup the SIP proxy. (In our example, this was "SH".) then choose the IP Phone for the SIP Softphone that BellCommander has created. (In our example, we used "SIP-SH BellCommander Softphone".) Save your changes.

2.5 Creating a Paging Group for Bell/Pages

In ShoreTel, under **Users -> Extension Lists**, create an extension list that includes all extensions that should receive a specific bell/page. Essentially, this is how you build a "Zone" for bells. Set up the Extension List with the information in Table 3.

Table 3. Extension List Settings

Setting	Description
Name	Create a name for this exertion list. In our example, we used **SH All Call Extension List**.
Choose Members	We added the IP phones that we wanted this list to include for our bells.

Then, Under **Call Control -> Paging Groups**, Create a Paging Group. This will allow you to assign an extension number to the extension list you had created. Setup the Paging Group with the options indicated in Table 4.

Table 4. Paging Group Settings

Setting	Description
Name	Create a name for this Paging Group, In our example, we used **Sage Hills All Call.**
Extension	Enter an available destination for BellCommander to call to make this page/bell. In our example, we used **1072**.
Deliver Group Page via	Choose how you wish the IP phones to handle paging. If you choose **Speakerphone**, it will force the phone to turn on the Speakerphone option to make the page, even if a call is in progress using the handset. If you choose **Active Audio Path**, the page will be heard in the handset if a call is in progress using the handset. In our example, we chose **Speakerphone**.
Extension Lists	Select the list you had previously created. In our example, we used **SH All Call Extension List**.

In BellCommander, under **Device Manager -> SIP Destinations**, Select **Add** under **SIP Destinations**. Setup the SIP Destination with the options in Table 5.

Table 5. SIP Destination Settings

Setting	Description
Name	Enter a name for this extension. In our example, we used **SH All Call**.
Extension	Enter the extension of the Paging Group you have created. In our example, we used **1072**.

Note You can now use the **Test SIP Destination** option in BellCommander under **Device Manager -> SIP Destinations** to test your new bell.

2.6 Usage Notes

There are a few issues which are worth mentioning:

1. When a page is sent to an IP phone, ongoing calls are put on hold while the page is taking place. The far-end user hears silence during the page, so it is possible that the far-end user will disconnect as they think they have lost their connection.

2. When using the "Speakerphone" option in our Paging Group, the ShoreTel IP phone will correctly enable the speakerphone during the page even if a call is in progress, but will remain in speakerphone when it returns to the in-progress call. The near-end user at the ShoreTel IP phone can return the call to the handset by pressing the speakerphone button, toggling the speakerphone off.

3. The ShoreTel phones will always pre-pend any page with a tone. The page tone can't be disabled, since the page tone is a feature of the phones.

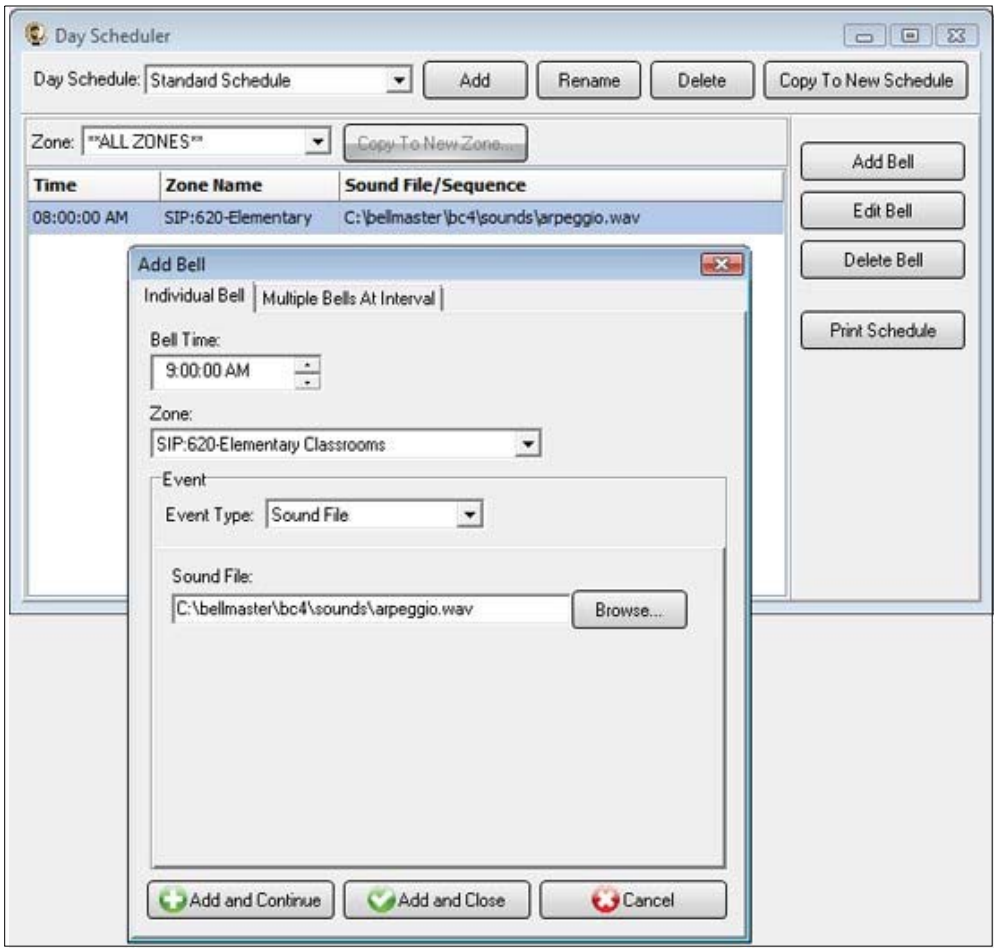
4. All 3 problems listed previously could be resolved by using a dedicated SIP speaker solution, such as the CyberData VoIP Ceiling Speaker V2. CyberData has documentation on how to setup each speaker as their own SIP extensions in ShoreTel, and they could be configured as described in this document. If this is considered, it should also be considered separating the ShoreTel system from the Intercom system, due to licensing costs. In such a case, 3CX or Trixbox may be more cost effective. CyberData, Valcom, and other IP speakers/devices that receive multicast can also be configured to work directly with BellCommander bypassing the ShoreTel system.

2.7 Scheduling for SIP Extensions

BellCommander automatically creates a zone for each SIP destination that allows different schedules to be sent to different extensions. To create a schedule, follow the steps below:

1. Create a day schedule. A day schedule represents a single day's 24 hour schedule that can be applied to dates on the BellCommander calendar. To create a Day Schedule:
   a. Click the **Day Scheduler** button.
   b. Click the top **Add** button to add a new day schedule. Enter a name to identify the schedule (ex. Standard Schedule). See Figure 2.

Figure 2. Day Scheduler



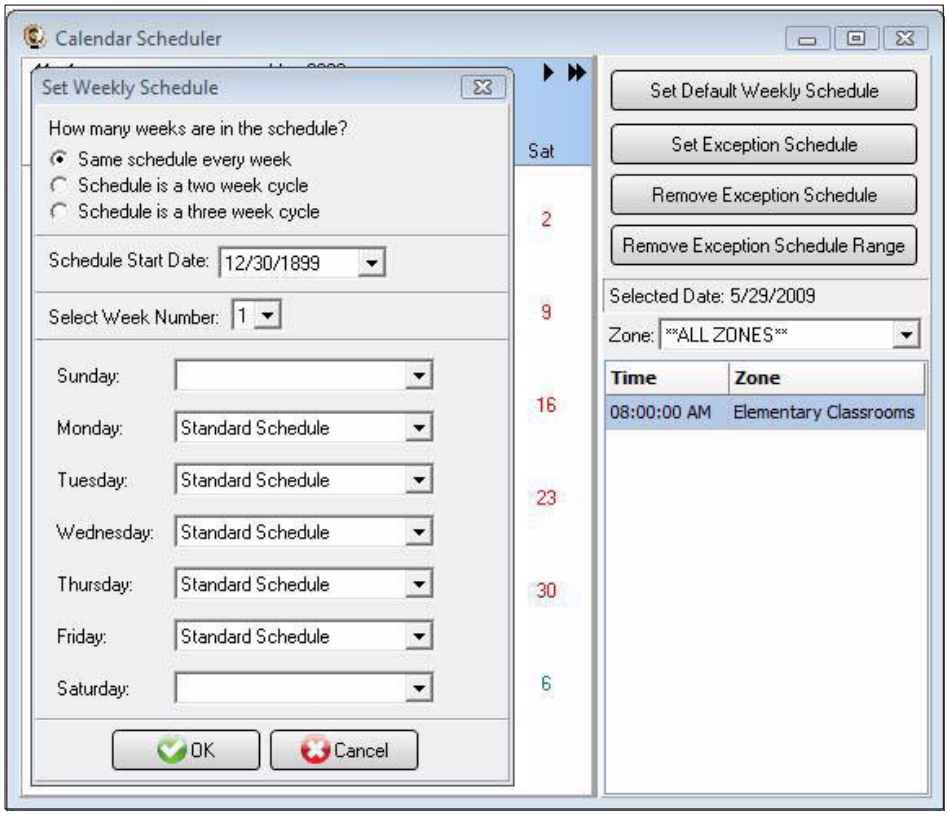
c. Click the **Add Bell** button to add a new bell to the schedule. In the **Add Bell** window,

- Select the time for the bell.
- Select the zone that the bell should play to. SIP zones will have a name of "SIP:" followed by the extension number and name.
- For a single sound file select, select "Sound File" for the event type and select a WAV audio file.

2. Assign the day schedule(s) to the Calendar Scheduler. To assign schedules to the Calendar Scheduler:

a. Click the **Calendar** button to view the **Calendar Scheduler** window. See Figure 3.

Figure 3. Calendar Scheduler Window



b. Click the **Set Default Weekly schedule** button to set the default schedule and set the values that are indicated in Table 6.

c. To set different schedules by date, add additional schedules in the Day Scheduler and select dates on the calendar and click the **Set Exception Schedule** button to set different schedules by date.

Table 6. Set Weekly Schedule

Schedule Setting	Select
If schedule is the same every week	Select **Same schedule every week**.
If schedule repeats bi-weekly	Select **Schedule is a two week cycle**.
If schedule repeats tri-weekly	Select **Schedule is a three week cycle**.
Schedule Start Date	Select a future date; otherwise, the default value (12/30/1899) will start the schedule immediately.
Select Week Number	If using a bi-weekly or tri-weekly schedule, this allows the first, second, or third week to be selected for the days of the week listed: Select **1** to program the first week. Select **2** to program the second week. Select **3** to program the third week.
Days of the Week	Use the drop-down for each day of the week to select a schedule. If no audio should be scheduled for the day of the week, leave the day name blank.

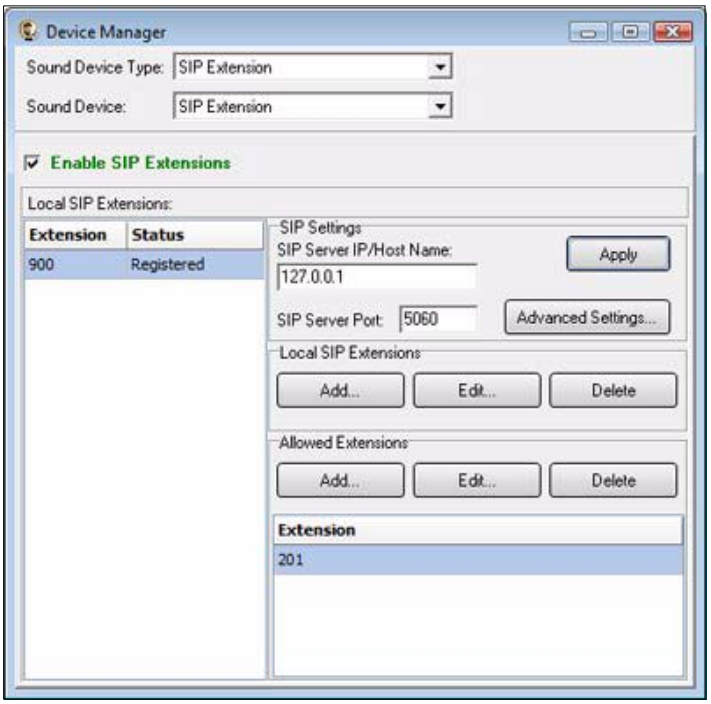
2.8 SIP Extensions for Emergency Notification

SIP Extensions for Emergency Notification allows phones to dial BellCommander for emergency notifications. Emergency notifications loop audio alerts for several weather, school lockdowns, and other emergencies. Emergency notifications can be triggered by clicking emergency buttons in the BellCommander interface or by dialing emergency codes.

To setup emergency notifications:

1. Add a second extension to ShoreTel by following the steps above to add an extension to ShoreTel.
2. Add the SIP extension to BellCommander:
   a. Open the BellCommander **Device Manager** by clicking the **Devices** button. See Figure 4.

Figure 4. Device Manager



   b. In the **Sound Device Type** drop-down select **SIP Extension**.
   c. Check **Enable SIP Extensions**.
   d. Enter the ShoreTel server IP (SIP Proxy) and port number.
   e. Click the **Apply** button.
   f. Add a SIP extension for BellCommander to register:

- Click the **Add…** button under **Local SIP Extensions**.

  SIP Extension—Extension that was added to ShoreTel

  Extension Password—Password for the extension that was added to ShoreTel.

  Local Port Number—Can typically use the default value

  Map To Zone—Leave this blank for emergency notification

  SIP Server Options—Select **Connect to default SIP server**

- After adding the extension, the extension should appear in the Local SIP Extension list with a status of **Registered**.

g. Add the extensions that are allowed to call BellCommander for emergency notification.

- Click the **Add…** button under **Allowed Extensions**.
- Enter an extension that will be allowed to call BellCommander.
- Repeat for additional extensions. BellCommander is licensed by the number for allowed extensions, so the number of allowed extensions may be restricted by the license.

3. Define emergency notifications in BellCommander:

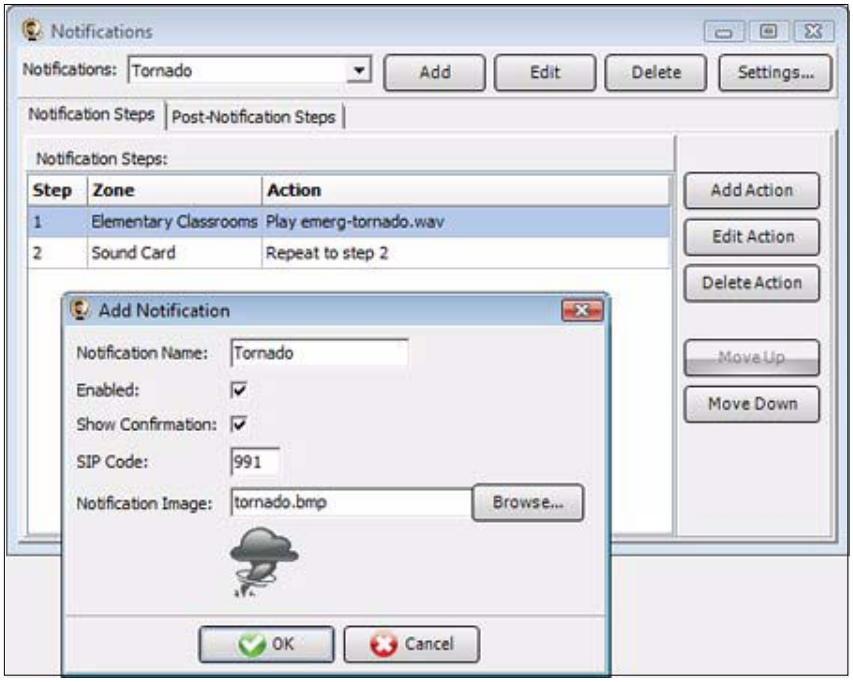
a. Click the **Notifications** button to view the **Notifications** window.

b. Click the top **Add** or **Edit** button to add or edit a notification. For the example, we'll edit the tornado notification.

c. In the edit window, note the SIP code. This is the code that the phone user should dial to trigger the emergency notification. The **Show Confirmation** option is for clicking notifications in the BellCommander interface. If **Show Confirmation** is checked, a message will popup to request confirmation of an emergency alert.

d. Assign actions to the emergency notification. Use the **Add Action** and **Edit Action** to add and edit actions in the alert scripts. Typically, a sound file would be played and looped. In the action, the zone should be set to a zone that broadcasts to all areas that should receive the notification.

Figure 5. Add Notification Window



4. To trigger an emergency notification by phone, first call the BellCommander extension, in the example above this would be **900**. Wait for BellCommander to answer, then dial the emergency code followed by the **#** key. (**991#** in Figure 5). To stop the alert, dial **999#** while connected to BellCommander. The alert can also be stopped by dialing the BellCommander extension again and entering **999#**.

3.0 BellCommander and Multicast Configuration for V2 Speakers

3.1 Overview

BellCommander works directly with CyberData V2 IP speakers for audio scheduling and emergency notification. This document details how to configure BellCommander with CyberData V2 speakers for optimal performance.

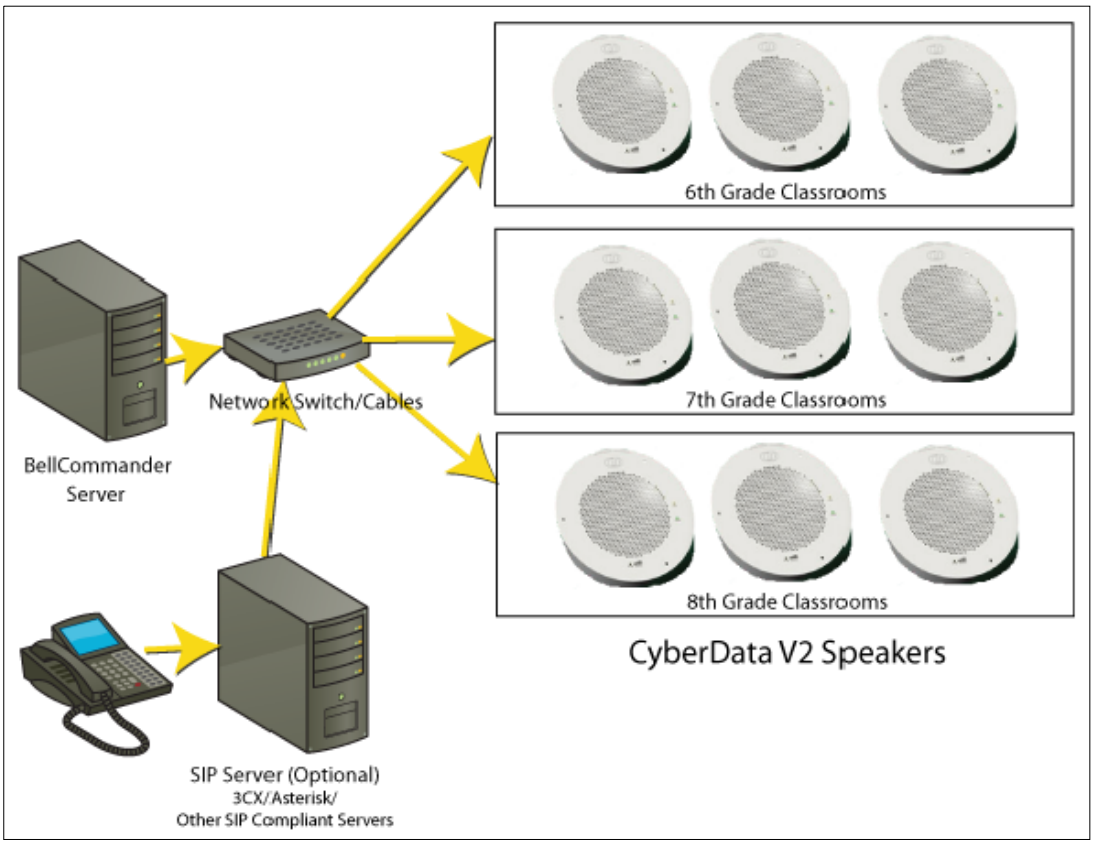
4.0 Multicast Configuration

In this configuration of BellCommander, the BellCommander software is used for audio scheduling and emergency notification. The BellCommander software communicates directly to the CyberData V2 speakers using multicast. Optionally, a SIP phone server, like 3CX or Trixbox/Asterisk, could be used to allow phones to communicate directly to the speakers. The CyberData V2 speakers have the ability to receive multicast from BellCommander and SIP calls from a SIP phone system in the same configuration. Earlier CyberData models do not support the ability to receive SIP and multicast in the same configuration.

4.1 Example Configuration

The example configuration below is for a middle school with CyberData speakers for all classrooms. The BellCommander software communicates with the speakers directly using multicast and the speakers also register with a SIP phone system to receive SIP calls/pages from phones. The speakers are logically organized by grades below, but the physical connection would be a standard network connection via a PoE cable to each speaker.

Figure 6. Example Configuration



5.0 Multicast Setup Guide

5.1 Speaker Configuration

1. Install the latest firmware for the CyberData devices (recommended).
2. Access each CyberData speaker by its web-based configuration tool (ex. http://192.168.1.51).
3. Click the **Multicast Config** button and check the **Enable Multicast operation** box and configure multicast groups that BellCommander will use. See Figure 7.

Figure 7. Multicast Configuration

Note In the configuration in Figure 7, three multicast addresses will be used by BellCommander for reaching the individual classroom, 7th grade classrooms, and the full campus.

For optimal performance, the system should be configured where BellCommander will send to a single multicast address for each scheduled bell/audio event. In the above configuration, the speaker has a unique multicast address, a multicast address that is shared by 7th grade classrooms,

and a multicast address that is shared with all speakers (All Call). When BellCommander sends to the 7th grade multicast address, audio will play to all speakers configured with the 7th grade multicast address and port. The audio is sent by multicast which reduces network traffic and ensures that audio will be synchronized between speakers.

In the example configuration, other 7th grade classrooms would be configured with a unique individual classroom multicast address, but the 7th grade multicast address and the All Call multicast address would be the same on all speakers. For example, the 7th grade classrooms would use the following settings:

Table 7. 7th Grade—Classroom 1202

Address	Port	Multicast Group Name
239.168.3.9	10000	BC All Call
239.168.3.8	9000	BC 7th Grade
239.168.3.7	8001	BC Classroom 1202

Table 8. 7th Grade—Classroom 1203

Address	Port	Multicast Group Name
239.168.3.9	10000	BC All Call
239.168.3.8	9000	BC 7th Grade
239.168.3.7	8002	BC Classroom 1203

The 8th grade classrooms would share the same All Call multicast address and port with the 7th grade classrooms, but would use a different multicast address/port for the grade and a different multicast address/port for each speaker:

Table 9. 8th Grade—Classroom 1301

Address	Port	Multicast Group Name
239.168.3.9	10000	BC All Call
239.168.3.8	9001	BC 8th Grade
239.168.3.7	8101	BC Classroom 1301

Table 10. 8th Grade—Classroom 1302

Address	Port	Multicast Group Name
239.168.3.9	10000	BC All Call
239.168.3.8	9001	BC 8th Grade
239.168.3.7	8102	BC Classroom 1302

After the settings above are applied, BellCommander would be able to send multicast to address 239.168.3.9, port 10000, to page to all speakers. BellCommander would also be able to send to 239.168.3.8, port 9000, to page the 7th grade classrooms and 239.168.3.8, port 9001, to page to the 8th grade classrooms. BellCommander could also page to 239.168.3.7, port 8102, to page to just classroom 1302.

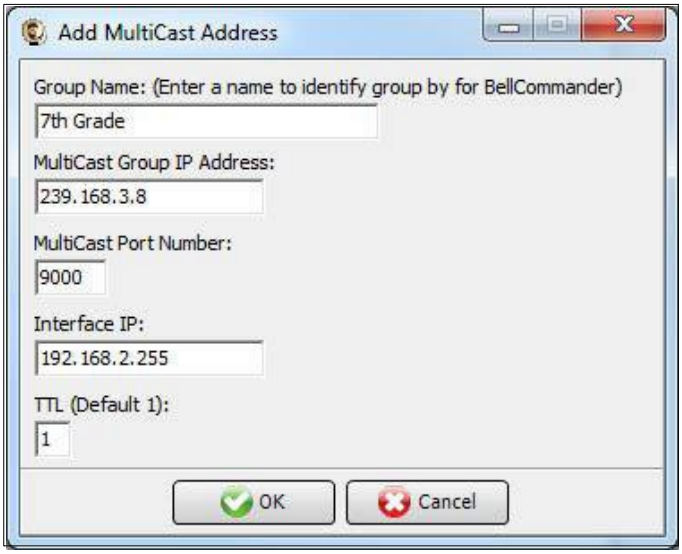
5.2 BellCommander Configuration

1. In BellCommander, add the multicast addresses:
   a. Open the BellCommander **Device Manager** by clicking the **Devices** button.
   b. Select **Multicast Groups** from the **Sound Device Type** drop-down menu.
   c. Click the **Add…** button.
   d. Enter the following values indicated in Table 11.

Table 11. Multicast Group Settings

Setting	Description
Group Name	A name to identify the group by in BellCommander
Multicast Group IP Address	The multicast IP address
Multicast Port Number	Corresponding port number
Interface IP	Generally, the computer's IP with .255 at the end. If the computer is 192.168.2.132, then enter 192.168.2.255.
TTL	Time-To-Live for packets. Generally, set to 1 if on the same subnet.

Figure 8. Add Multicast Window

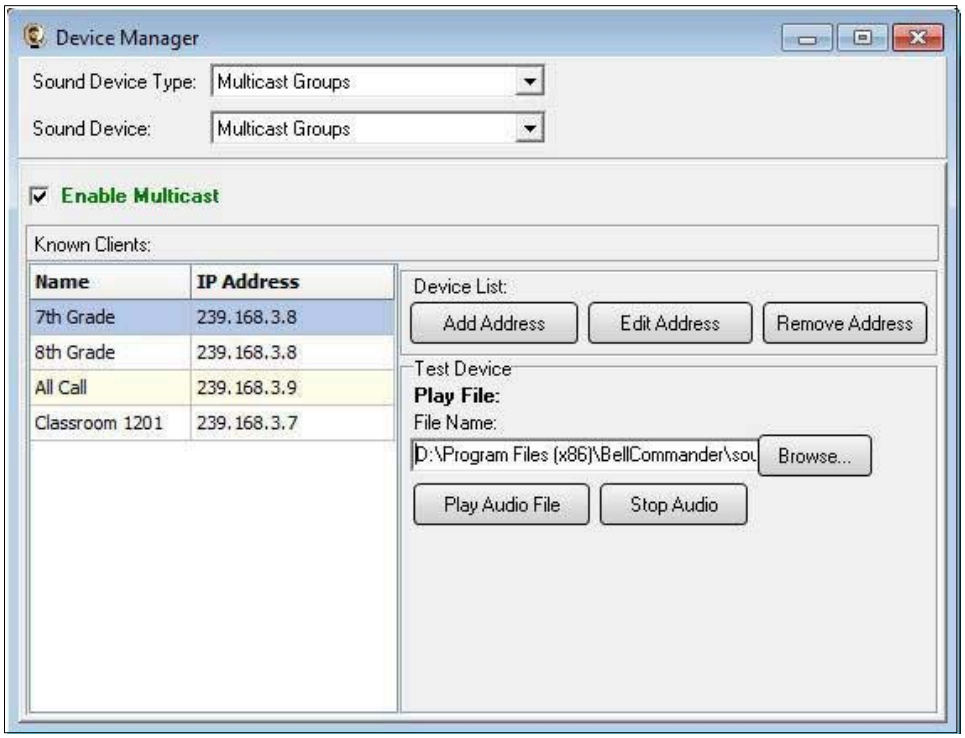


Note Figure 7 shows an example of adding the 7th grade multicast address/port to BellCommander.

   e. Repeat Step c and Step d for each multicast address.
   f. To test a multicast address, select a multicast address from the list.

2. Test each multicast address, by selecting the multicast group from the list. Then, click the **Browse…** button to locate a WAV file and click the **Play Audio File** button to play the WAV file. The WAV file should play after the button is pressed. See Figure 9.

Figure 9. Device Manager



5.3 Scheduling For Multicast Groups

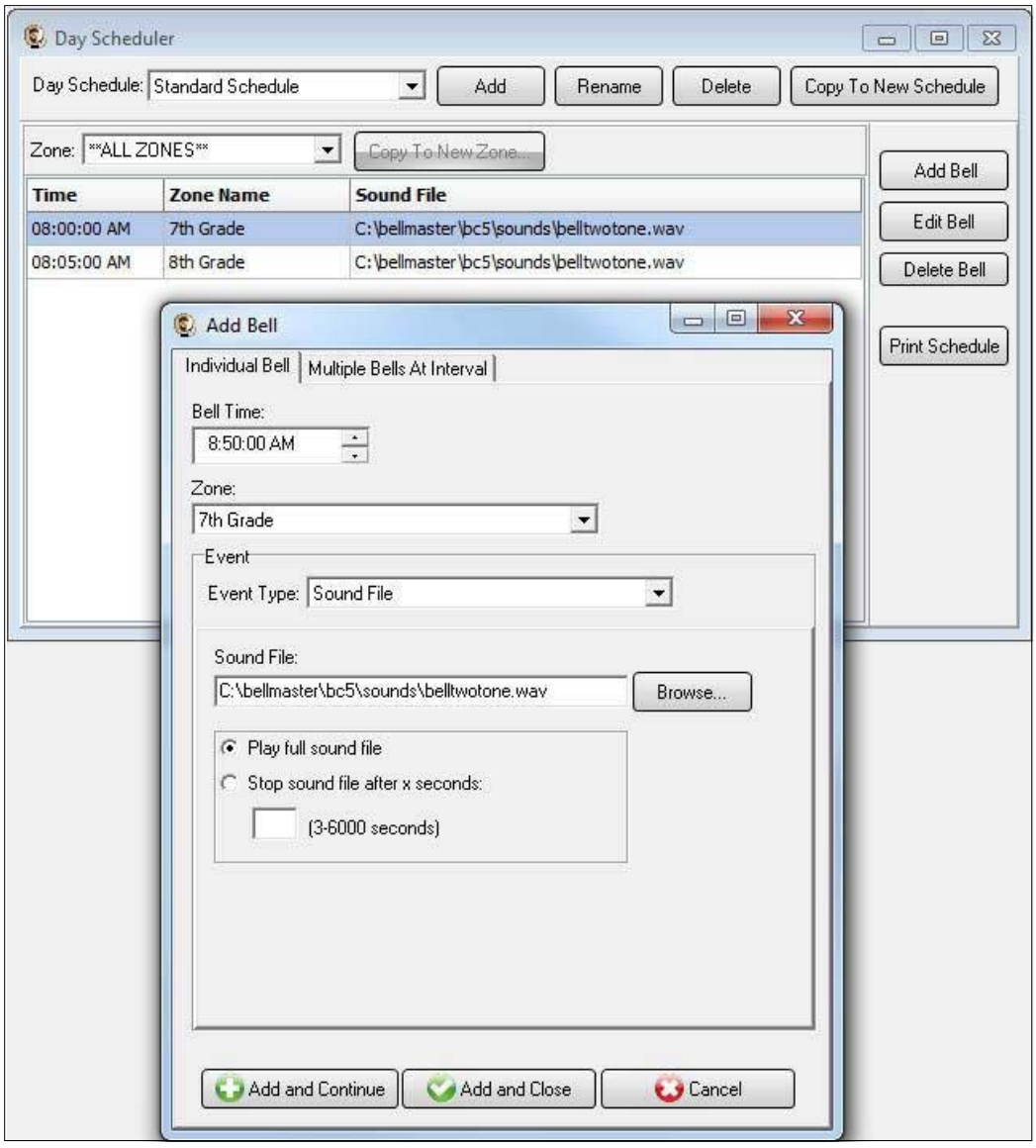
1. 1. Create a zone in BellCommander for each multicast address.
   a. Click the **Zones** button to view the **Zone Manager** window. SeeFigure 10.

Figure 10. Zone Manager Window

   b. Click the **Add Zone** button to add a new zone. Enter a name for the zone (ex. **Elementary Classrooms**).
   c. Select the new zone and click the **Edit Device List** button. Select the corresponding multicast group from the **Available Devices** and click the **>>** button to add it to the zones. Multiple multicast groups can also be added to create a zone consisting of multiple smaller zones; though, for the best results with audio timing and network traffic, use a single multicast group per zone.

2. Create a day schedule. A day schedule represents a single day's 24 hour schedule that can be applied to dates on the BellCommander calendar. To create a Day Schedule:
   a. Click the **Day Scheduler** button.
   b. Click the top **Add** button to add a new day schedule. Enter a name to identify the schedule (ex. **Standard Schedule**). See Figure 11.

Figure 11. Day Scheduler



   c. Click the **Add Bell** button to add a new bell to the schedule. In the **Add Bell** window,
      - Select the time for the bell.
      - Select the zone that the bell should play to.
      - For a single sound file select, select **Sound File** for the event type and select a WAV audio file.

3. Assign the day schedule(s) to the Calendar Scheduler. To assign schedules to the Calendar Scheduler:

a. Click the **Calendar** button to view the **Calendar Scheduler** window.

b. Click the **Set Default Weekly schedule** button to set the default schedule in the **Set Weekly Schedule** window (Figure 12) and set the values indicated in Table 12.

c. To set different schedules by date, add additional schedules in the **Day Scheduler** and select dates on the calendar and click the **Set Exception Schedule** button to set different schedules by date. See Figure 12.

Figure 12. Set Weekly Schedule

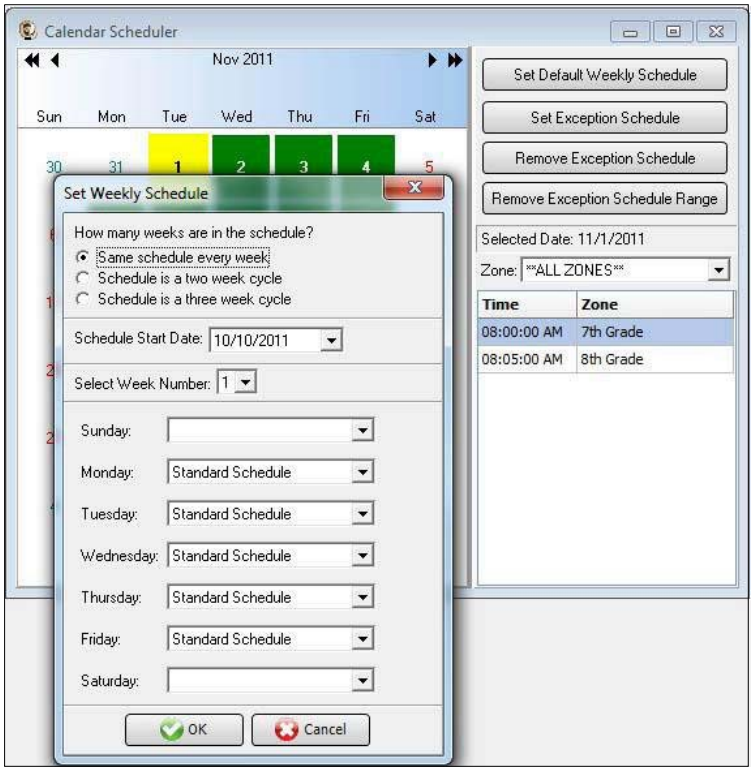


Table 12. Set Weekly Schedule

Schedule Setting	Select
If schedule is the same every week	Select **Same schedule every week**.
If schedule repeats bi-weekly	Select **Schedule is a two week cycle**.
If schedule repeats tri-weekly	Select **Schedule is a three week cycle**.
Schedule Start Date	Select a future date; otherwise, the default value (12/30/1899) will start the schedule immediately.
Select Week Number	If using a bi-weekly or tri-weekly schedule, this allows the first, second, or third week to be selected for the days of the week listed: Select **1** to program the first week. Select **2** to program the second week. Select **3** to program the third week.
Days of the Week	Use the drop-down for each day of the week to select a schedule. If no audio should be scheduled for the day of the week, leave the day name blank.

5.4 Notifications

To configure notifications to broadcast to CyberData IP speakers, first define a multicast address and port that will be shared between all CyberData units. This can be the "BC All Call" multicast address from the scheduling portion of this document above or a different multicast address may be used. The multicast address should be one of the highest priority multicast addresses on the CyberData units.

To configure the notifications in BellCommander to use the multicast address:

1. Add the multicast address to the Device Manager in BellCommander.
2. Create a zone in the Zone Manager and assign the multicast address to the zone.
3. Click the **Notifications** button on the BellCommander toolbar to open the **Notifications** window. See Figure 13.

Figure 13. Edit Notification Action Window

4. Select one of the notifications and edit the action which plays the sound file.
5. Change the zone for the action from **Sound Card** to the zone with the multicast address that will broadcast to all CyberData speakers. See Figure 13.
6. After changing the notification, test the notification by clicking the notification button in the notification bar on the left side of the main BellCommander window. Clicking the button once will activate the notifications. Clicking the button a second time will de-activate the notification. While a notification is active, no bell events will play.

To configure the notifications to be launched from a SIP phone, a SIP code should be defined for the notification. To set the SIP code, edit the notification and enter a SIP code:

Figure 14. Add Notification Window

BellCommander should also register a SIP extension that authorized users can dial to trigger emergency notifications. An extension should first be added to the phone system that BellCommander will register. The procedure to add the extension will vary by phone system. See the following website for phone system guides:

http://www.acrovista.com/bellcommander/sip-version.html

Most systems should be similar to Trixbox if not listed.

5.4.1 Adding and Extension

After adding the BellCommander extension to the phone system, add the extension to BellCommander:

a. Open the **BellCommander Device Manager** by clicking the **Devices** button.
b. In the **Sound Device Type** drop-down menu, select **SIP Extension**.
c. Check **Enable SIP Extensions**.
d. Enter the SIP server IP and port number.
e. Click the **Apply** button.

f. Add a SIP extension for BellCommander to register:

- Click the **Add…** button under Local SIP Extensions and enter the settings indicated in Table 13.

Table 13. SIP Extension Settings

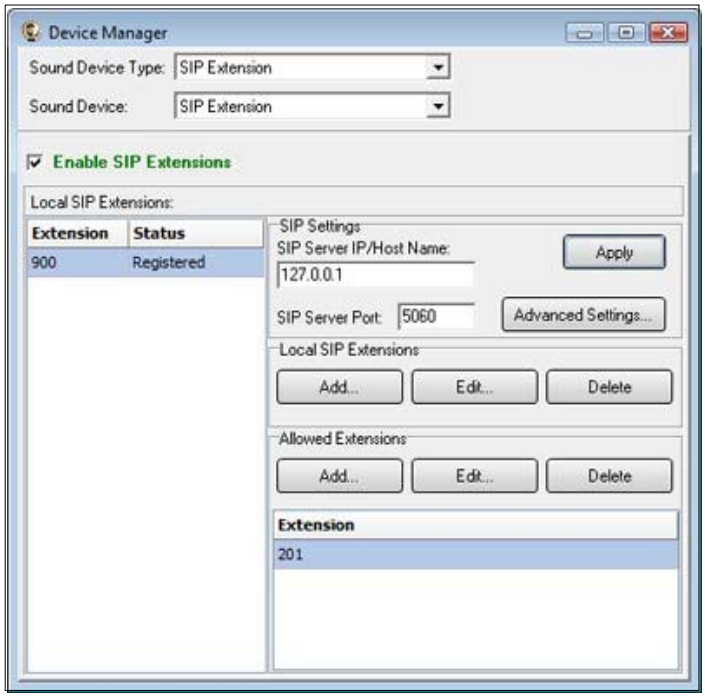
Setting	Description
SIP Extension	Extension that was added to
Extension Password	Password for the extension that was added to the phone system
Local Port Number	Can typically use the default value
Map To Zone	Leave this blank for emergency notification
SIP Server Options	Select **Connect to default SIP server**

- After adding the extension, the extension should appear in the **Local SIP Extension** list with a status of **Registered**.

g. Add the extensions that are allowed to call BellCommander for emergency notification.

- Click the **Add…** button under **Allowed Extensions**.
- Enter a phone extension that will be allowed to call BellCommander.
- Repeat for additional extensions. BellCommander is licensed by the number for allowed extensions, so the number of allowed extensions may be restricted by the license.

Figure 15. Device Manager



To launch a notification from a phone, use a phone that is listed under the Allowed Extensions list and dial the extension that was added under SIP Extensions. Enter the SIP code followed by the # key to start the notification (ex. 991#). Enter the 999# to stop an active notification.

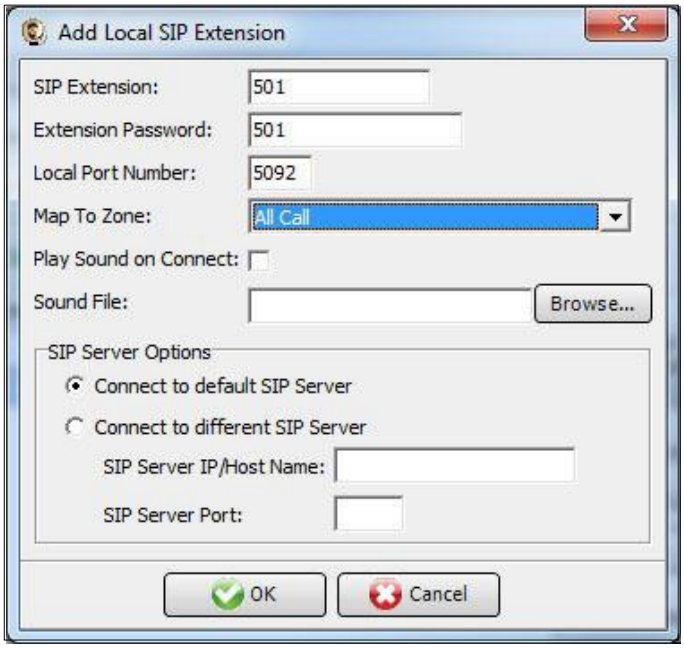
5.5 Paging

Paging with the CyberData V2 products is normally performed directly within a phone system by a user dialing a paging group extension/code that has all CyberData devices assigned to the paging group. When users dial the paging group extension/code, the audio from the caller is played to all speakers and phones in the paging group. BellCommander can also act as a SIP to multicast gateway to page to the CyberData speakers if the phone system does not support paging. Users would call the BellCommander extension and BellCommander would take the audio from the call and send it via multicast to the CyberData speakers.

5.5.1 Configure the SIP to Multicast Feature

To configure direct paging from the BellCommander extension to multicast, follow the same steps that are in Section 5.4.1, "Adding and Extension" to add an extension to BellCommander, except set the **Map To Zone** for the extension to a zone with a multicast group assigned to it.

Figure 16. Add Local SIP Extension



To page from a phone, dial the BellCommander extension (**501** in Figure 16) and BellCommander should answer and immediately begin sending audio from the call to the multicast group.