**Avaya Solution & Interoperability Test Lab**

# Application Notes for Telrex CallRex with Avaya IP Office - Issue 1.0

## Abstract

These Application Notes describe the procedures for configuring Telrex CallRex to work with Avaya IP Office. CallRex is a packet-based VoIP call recording and monitoring solution designed specifically for small and medium-sized companies. Information in these Application Notes has been obtained through compliance testing and additional technical discussions. Testing was conducted via the Developer*Connection* Program at the Avaya Solution and Interoperability Test Lab.

# 1. Introduction

These Application Notes describe the configuration steps required for Telrex CallRex to work with Avaya IP Office. CallRex is a packet-based VoIP call recording and monitoring solution designed specifically for small and medium-sized companies.

CallRex may be used to monitor and record internal, inbound and outbound trunk calls to and from IP Telephones (and Phone Manager IP PC Softphone) on IP Office. CallRex determines IP Telephone activity via the TAPI 3rd party call control connection it maintains with Avaya IP Office – this requires that the Avaya IP Office TAPI driver be installed on the CallRex PC. CallRex then records IP Telephone calls by capturing RTP packets (audio) as the packets traverse the corporate data network. In order to accomplish this, CallRex requires IP Office to maintain a single connection to the network (all other network ports on IP Office should remain unused). Packet capture is accomplished by enabling port mirroring on Ethernet switch to which IP Office is connected.

**Note 1:** Call recording of non-Avaya IP Telephone calls (internal calls between only analog and digital extensions or trunk calls involving only analog or digital extensions) is not supported by this solution.

**Note 2:** The Ethernet switch used for this solution must support the ability to write from a mirrored port to permit CallRex TAPI 3rd party call control connectivity to IP Office.

For scenarios where recording internal calls between IP Telephones is desired, either a) Direct Media Path[1] must be disabled on all of the Avaya IP Telephones registered to Avaya IP Office to force their RTP traffic to traverse Avaya IP Office, or b) an Ethernet switch that supports the ability to mirror many ports to a single port as well as writing from the mirrored port is required. For the purposes of the compliance tested solution and these Application Notes, Direct Media Path was disabled on Avaya IP Office.

The configuration in **Figure 1** shows a network consisting of an Avaya IP Office 406v2, Avaya IP Office Manager PC, Telrex CallRex and Avaya 4600 Series IP Telephones connected to an Avaya C363T-PWR Converged Stackable Switch.

Avaya IP Office 406v2 has T1/PRI and analog trunks to the central office. Analog and digital extensions are connected to Avaya IP Office as well. **Table 1** lists the user to extension number mapping for **Figure 1**.

| User | Extension |
|---|---|
| Keith Adkins | 2510 |
| John Yaya | 2511 |

[1] Disabling Direct Media Path will consume additional Voice Compression Module (VCM) resources. Prior to using this solution, it is advised that an assessment be made to determine if the VCM module size for Avaya IP Office is appropriate for the solution and call activity anticipated.

| User | Extension |
|---|---|
| Alex Fibanachi | 2512 |
| Victoria Smith | 2513 |
| Rick Smith | 2514 |

**Table 1 – User to Extension Number mapping**

The tested configuration is shown in **Figure 1**.

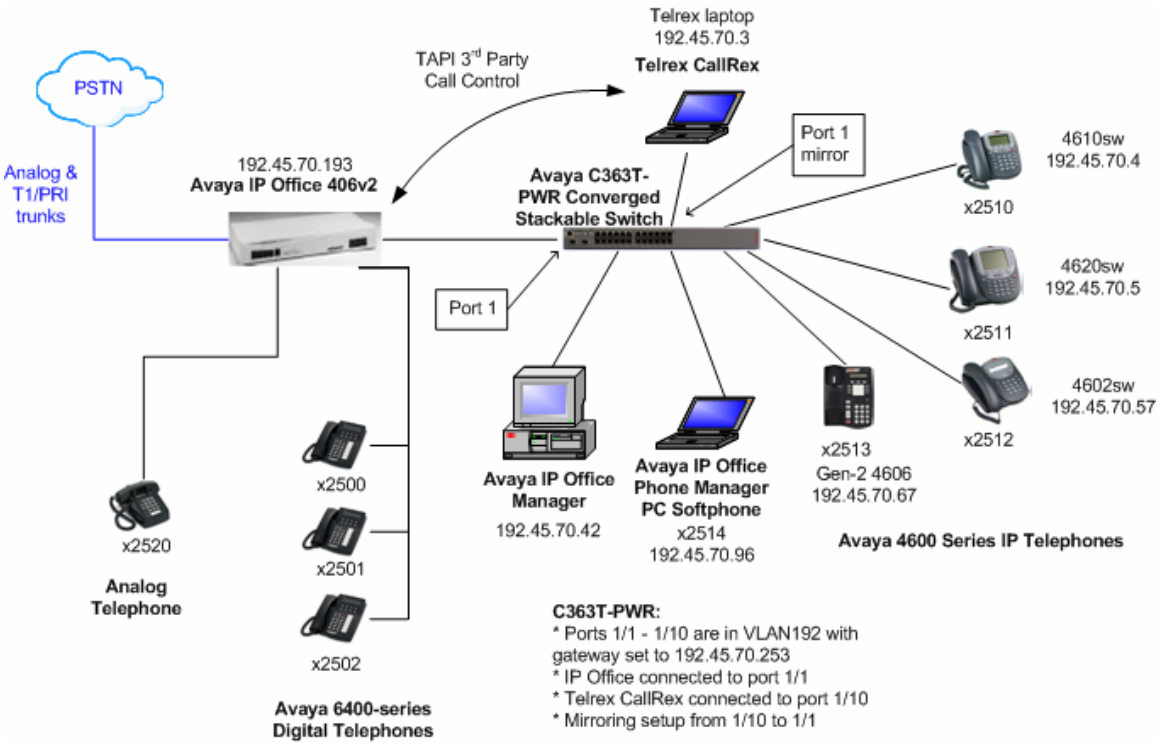



**Figure 1 – Sample Test Configuration**

Avaya IP Office was configured to route incoming calls to a hunt group or specific extensions, depending on the test case being executed. Telrex CallRex was configured to either perform ad-hoc recording (recording started by the user during the call) or trigger-based recording (automatically recording as soon as CallRex gets the off-hook event via TAPI when an Avaya IP Telephone goes off-hook) based on the test case being executed. Any telephone call where an Avaya IP Telephone was involved (internal, inbound, outbound, conference, transfer) could then be recorded or monitored, or recorded and monitored at the same time. Only the Avaya IP Telephone portion / leg of the call was recorded. For example, calls involving an IP Telephone and a digital or analog extension would result in a single recording associated with the IP Telephone extension. If two IP Telephones were involved in a call that was recorded, two recordings would be created, one for each IP Telephone.

# 2. Equipment and Software Validated

The following equipment and software/firmware were used for the sample configuration:

| Equipment | Software/Firmware |
|---|---|
| Avaya IP Office 406v2 with VCM10 | 3.1(48) |
| Avaya IP Office Manager | 5.1(48) |
| Avaya IP Office TAPI Driver | 1.0.0.26 |
| Avaya IP Office Phone Manager PC Softphone | 3.1(13) |
| Avaya 4602SW IP Telephone | 1.806 |
| Avaya Gen-2 4606 IP Telephone | 1.8.3 |
| Avaya 4610SW IP Telephone | 2.3 |
| Avaya 4620SW IP Telephone | 2.3 |
| Avaya C363T-PWR Converged Stackable Switch | 4.3.12 |
| Telrex CallRex | 3.1 |

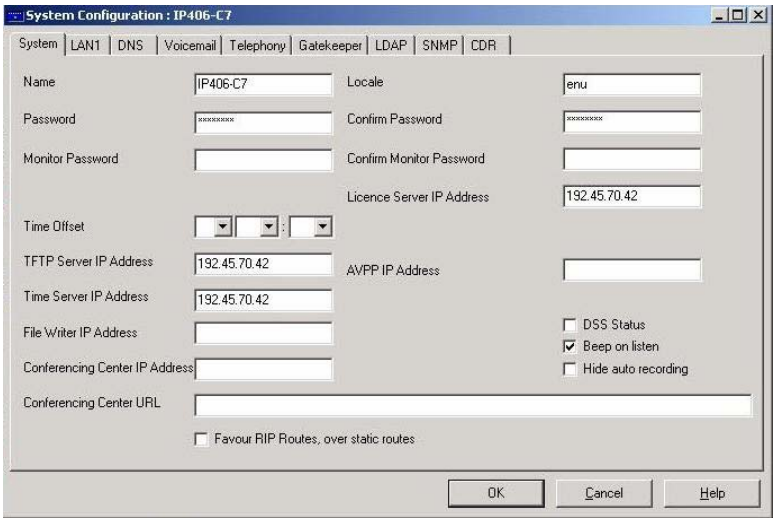
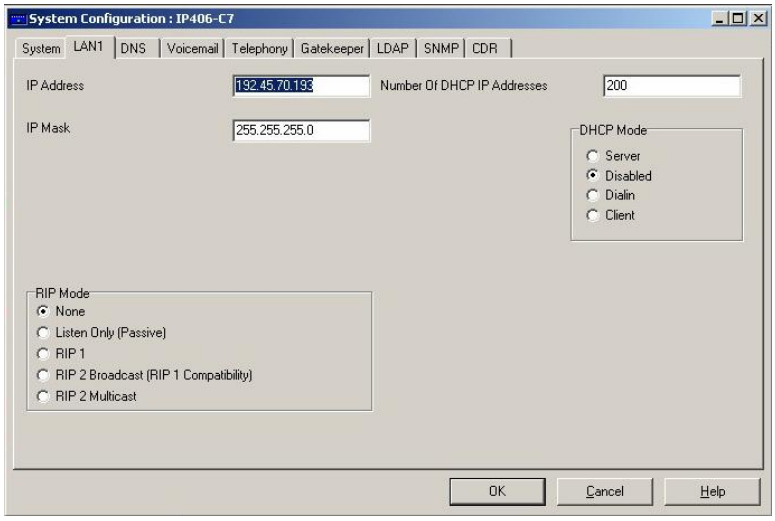
**Table 2: Equipment and Software Validated**

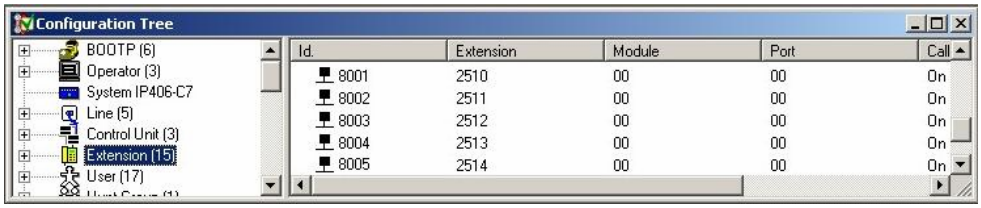
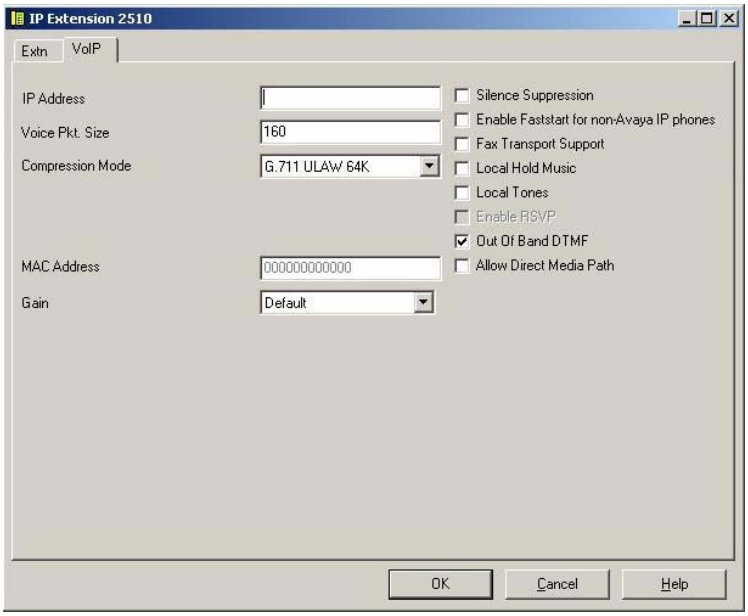
# 3. Configure Avaya IP Office

The configuration information provided in this section describes the steps required to set up Avaya IP Office for this solution.

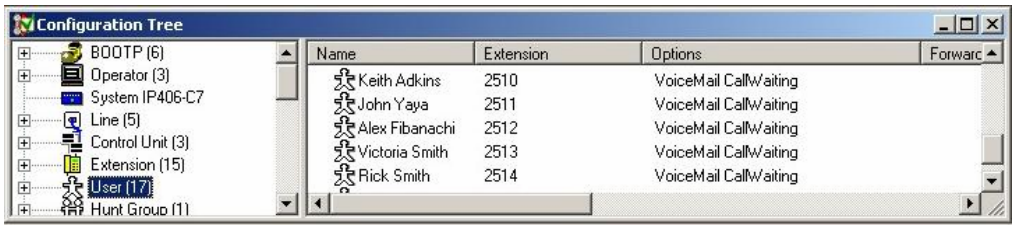
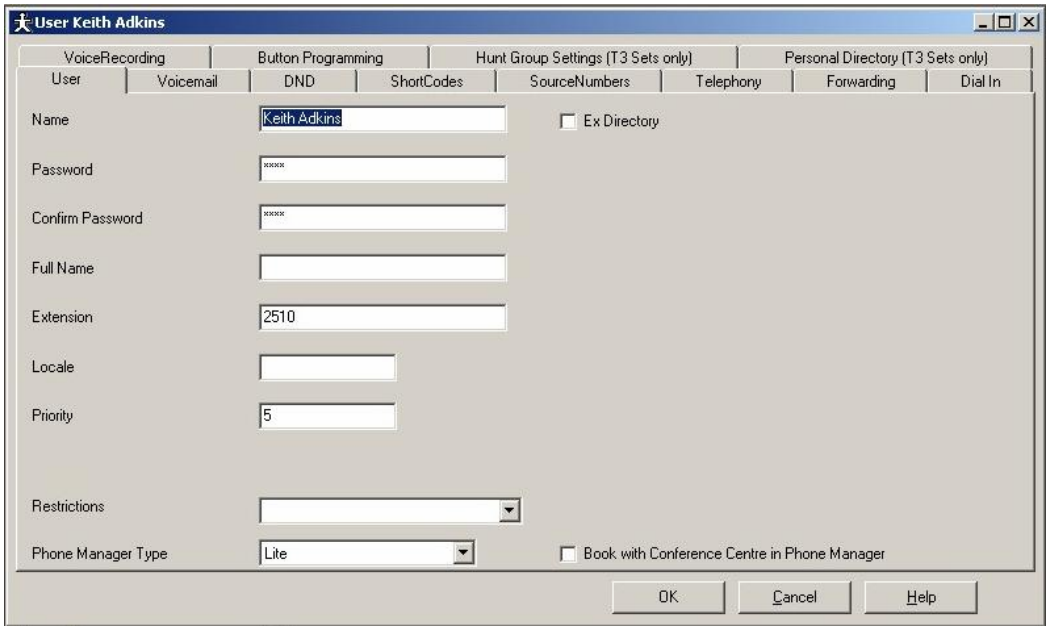
For all other provisioning information, such as Avaya IP Office installation and configuration, etc., please refer to Avaya IP Office product documentation in reference [1].

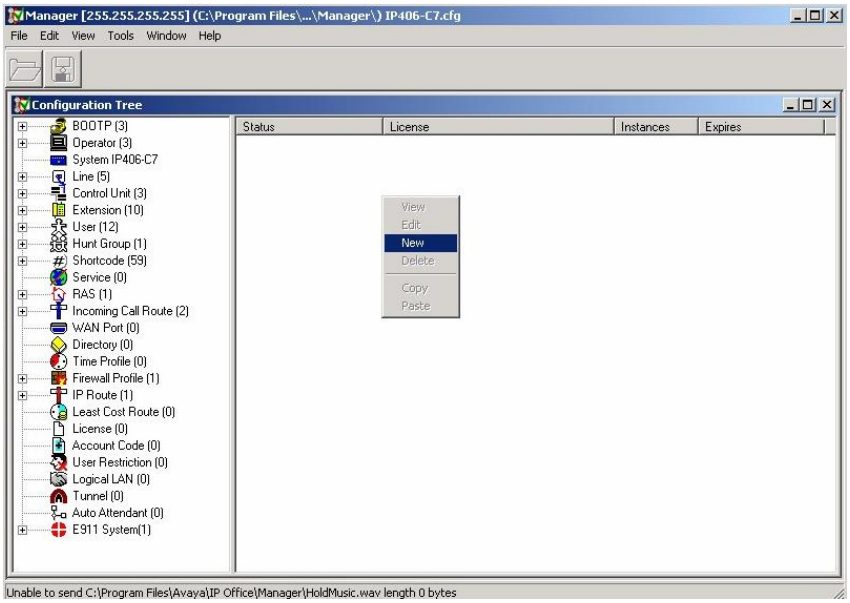
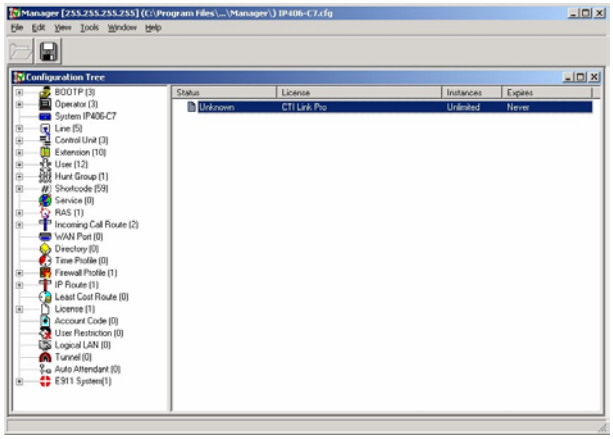
| Step | Description |
|---|---|
| **1.** | Log into the IP Office Manager PC and go to **Start → Programs → IP Office → Manager** to launch the Manager application. Log into the Manager application using the appropriate credentials. |
| **2.** | In the Manager window that appears, select **File → Open** to search for IP Office in the network. |
| **3.** | Log into IP Office using the appropriate login credentials to receive its configuration. |

| Step | Description |
|---|---|
| **4.** | In the Manager window, go to the Configuration Tree and double-click **System**. In the System Configuration window that appears, set **License Server IP Address** to the IP address of the PC where the Feature Key Dongle is connected. Select the **LAN1** tab.<br>  <br>**Note**: Changing the **Password** and **Confirm Password** fields above can modify the default Avaya IP Office password. For the purposes of these Application Notes, the default Avaya IP Office password was used. |
| **5.** | In the LAN1 tab that appears, select **Disabled** for DHCP Mode and click **OK**.<br>  <br>**Note**: Telrex CallRex configuration requires the IP addresses of the Avaya IP Telephones that will be recorded. At present, CallRex can only support IP-enabled devices that are provisioned with static IP addresses |

| Step | Description |
|---|---|
| **6.** | In the Manager window, go to the Configuration Tree and double-click **Extension**. In the list of Extensions that appear, select the first extension number listed in **Table 1** to configure and double-click.<br>  |
| **7.** | In the IP Extension window that appears, select the **VoIP** tab. |
| **8.** | In the VoIP tab that appears, uncheck **Allow Direct Media Path**[2] and click **OK**.<br>  <br>**Note**: The IP Telephone configuration pictured above is set up with **Automatic Selection** selected for Compression Mode. If a specific codec is required, it should be noted that Telrex CallRex supports G.711 ulaw, G.729a, and G.729 Simple. |

[2] Direct Media Path was disabled for this solution to force all RTP packets from the IP Telephones to go to Avaya IP Office. This permits Telrex CallRex to monitor calls since it is scanning all traffic to/from Avaya IP Office from the mirrored port on the Ethernet switch.

| Step | Description |
|---|---|
| **9.** | In the Manager window, go to the Configuration Tree and double-click **User**. In the list of Users that appear, select the first user listed in **Table 1** and double-click the listing.<br>  |
| **10.** | In the User window that appears, set **Password** to the password to use for registering the IP telephone assigned to the user entry. Enter the password again in the **Confirm Password** field. Click **OK**.<br>  |
| **11.** | Repeat Steps 6 – 10 for each User to Extension entry listed in **Table 1**. |

| Step | Description |
|---|---|
| **12.** | In the **Manager** window, go to the Configuration Tree and double-click **License**. In the right-hand pane, right-click **Add** to add a new license.<br>  |
| **13.** | In the License popup that appears, enter the license string for the CTI Link Pro license (default string of zeroes shown only) and click **OK**.<br>  |
| **14.** | In the Manager window, select **File → Save** to push the configuration to IP Office and wait for the system to update. This completes configuration of Avaya IP Office.<br>  |

# 4. Configure the Avaya IP Telephones

The configuration information provided in this section describes the steps required to set up the Avaya IP Telephones with static IP addresses for this solution.

For all other provisioning information, please refer to the Avaya IP Telephone product documentation in reference [2].

| Step | Description |
|---|---|
| **1.** | With the Avaya IP Telephone powered on and on-hook (idle), press the **MUTE** button and then press the following keys in sequence on the dial pad: **73738#** (**RESET#**). |
| **2.** | When prompted to **Reset Values?**, press the **#** key. This will reset any previously assigned values. When prompted to **Restart Phone?**, press the **#** key. |
| **3.** | Following the IP Telephone reboot, press ***** when the prompt *** to Program** appears. |
| **4.** | In the prompts that follow, enter the IP Telephone static information. Information required will include the IP Telephone IP address, IP address of Avaya IP Office, gateway IP address, subnet mask for the network, IP address of the IP Office Manager PC, etc. Enter the information appropriate for the local configuration. Press **#** at the **Save new values?** prompt. |
| **5.** | Repeat Steps 1 – 4 for each Avaya IP Telephone extension listed in **Table 1**. |
| **6.** | This completes configuration of the Avaya IP Telephones. |

# 5. Configure the Avaya C363T-PWR Converged Stackable Switch

The configuration information provided in this section describes the steps required to enable port mirroring on the Avaya C363T-PWR Converged Stackable Switch for this solution.

For all other provisioning information, please refer to the Avaya C363T-PWR Converged Stackable Switch product documentation in references [3] and [4].

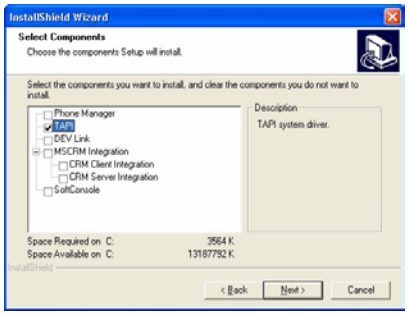
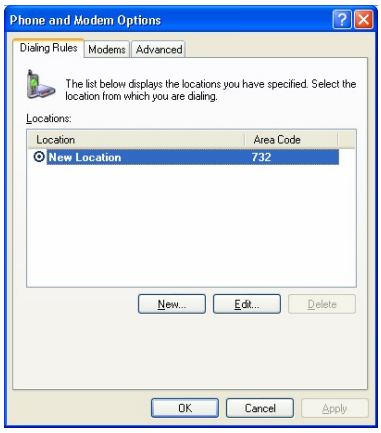
| Step | Description |
|---|---|
| **1.** | Log into the C363T-PWR with the appropriate credentials via the console port or a telnet session. |
| **2.** | Enter into configuration mode:<br>`C360-1(super)# **configure**`<br>`C360-1(configure)#` |
| **3.** | Enable port mirroring:<br>`C360-1(configure)# **set port mirror source-port 1/1 mirror-port 1/10 sampling always direction both**`<br>`Mirroring both Rx and Tx packets from port 1/1 to port 1/10 is enabled` |
| **4.** | This complete configuration of the C363T-PWR. |

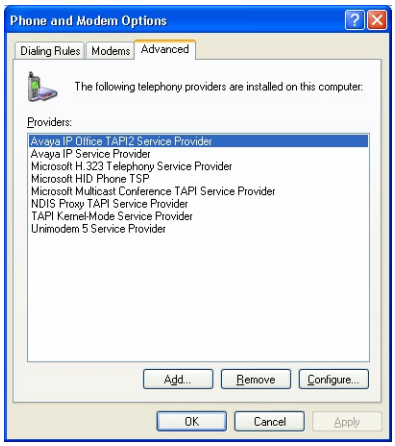
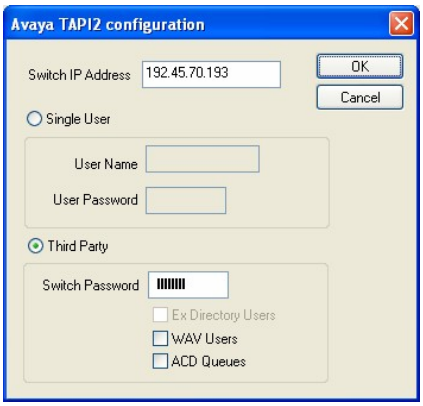
# 6. Configure Telrex CallRex PC

The configuration information provided in this section describes the steps required to configure CallRex.

For all other provisioning information, such as software installation, installation of optional components, configuration of CallRex, etc., please refer to the Telrex CallRex product documentation in references [5] and [6].

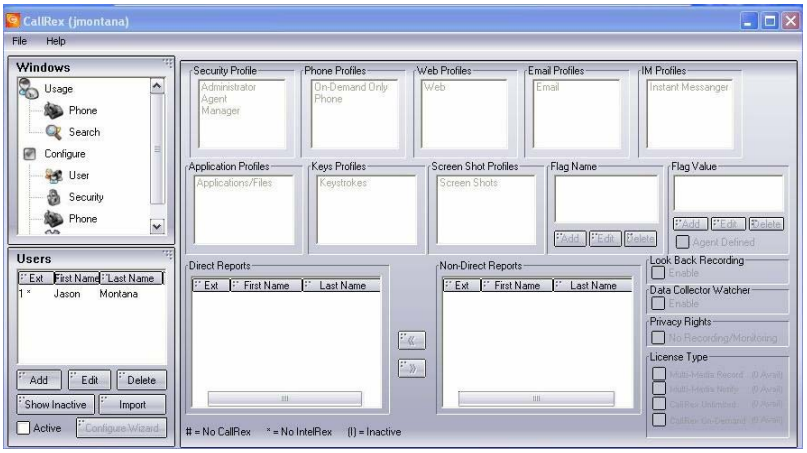
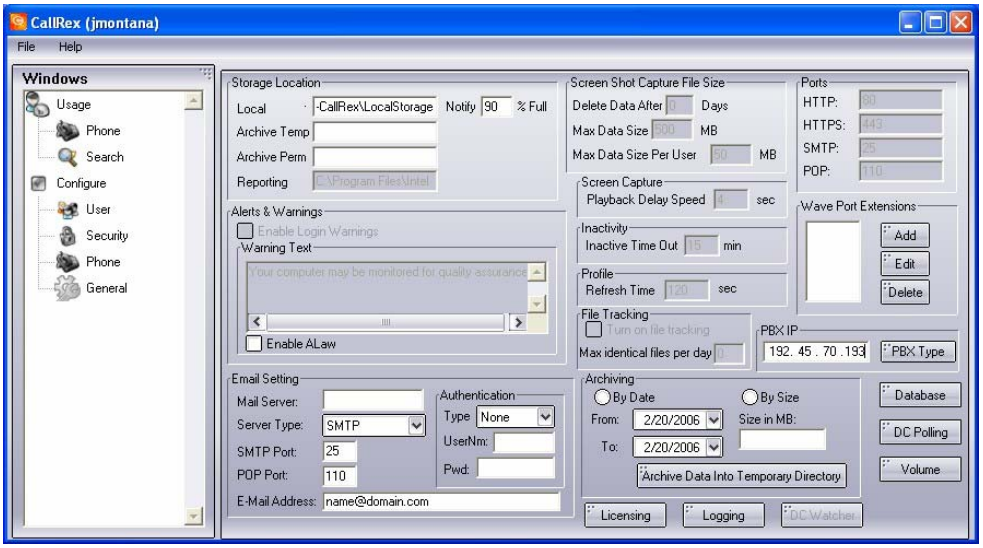
## 6.1. Install and Configure Avaya TAPI Driver

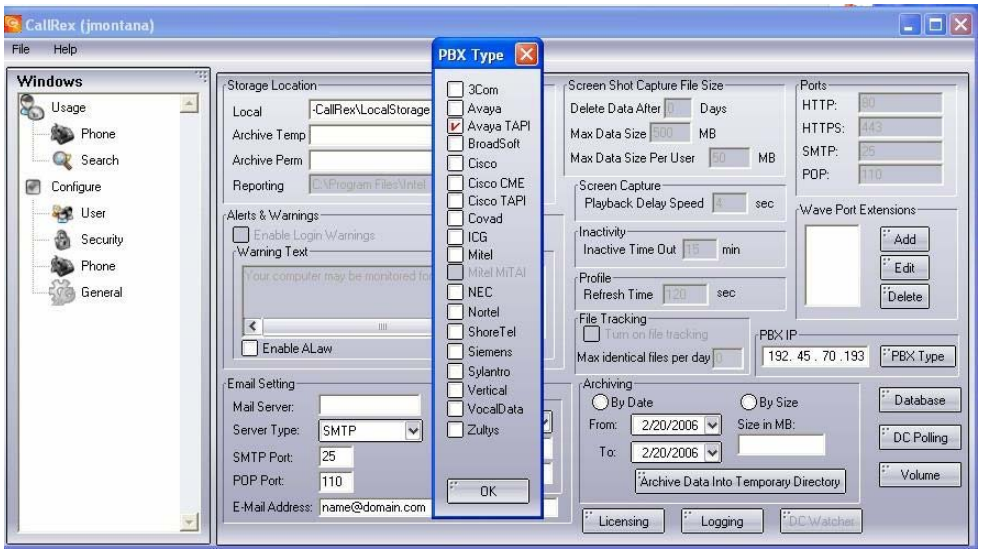
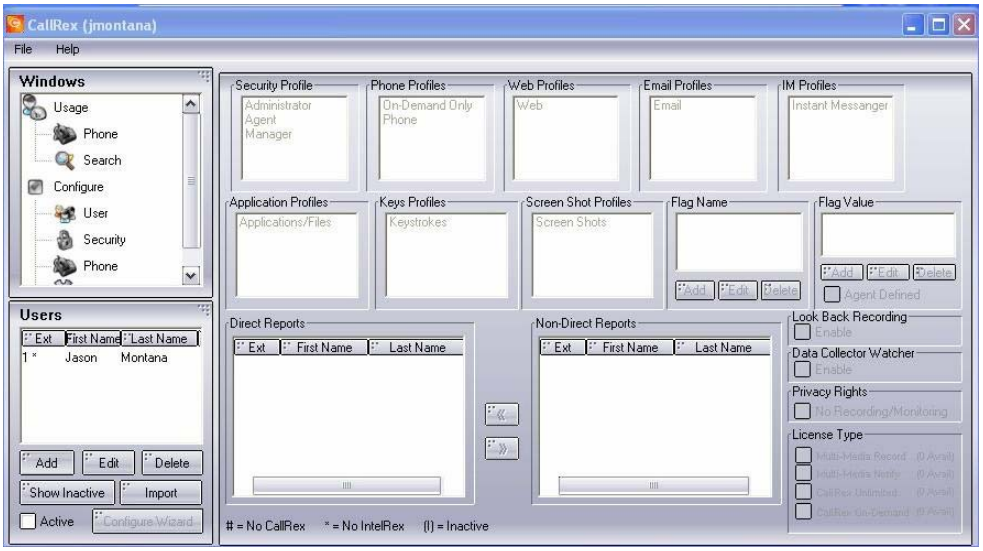
| Step | Description |
|---|---|
| **1.** | Log into the CallRex PC with administrative privileges and launch the Avaya IP Office User Suite setup.exe in the CDROM drive. |
| **2.** | Click **Next** in the InstallShield wizard until the Select Components window appears. Check **TAPI** to install the IP Office TAPI driver on the PC.<br>  |
| **3.** | Click **Next** to complete the installation of the Avaya IP Office User Suite. At the InstallShield Wizard Complete window, click **Finish**. |
| **4.** | Go to **Start → Control Panel** and double-click the **Phone and Modem Options** icon in the Control Panel window that appears. |
| **5.** | In the Phone and Modem Options window that appears, select the **Advanced** tab.<br>  |

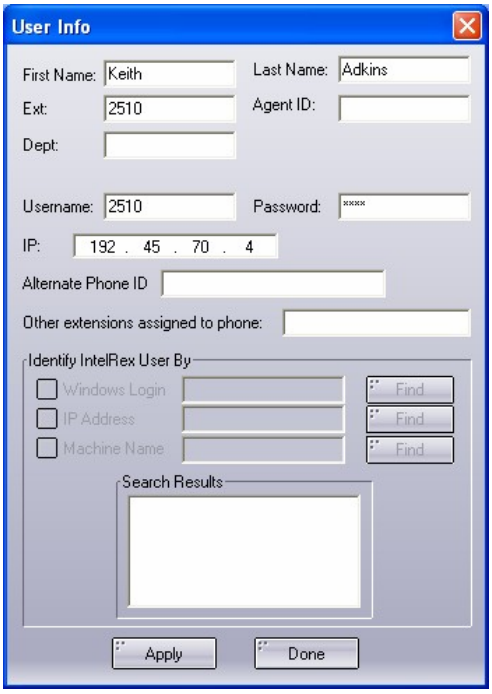
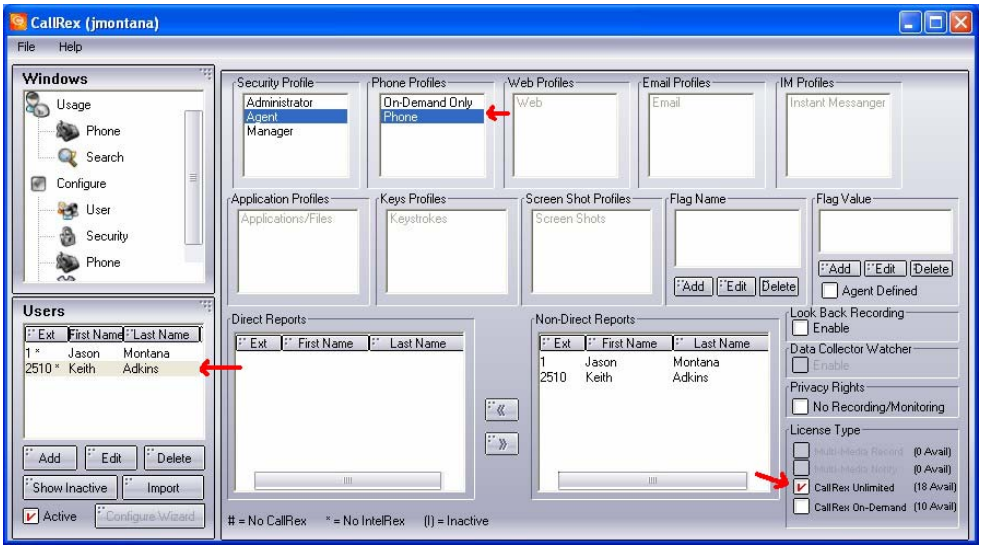
| Step | Description |
|---|---|
| **6.** | In the Advanced tab window that appears, highlight **Avaya IP Office TAPI2 Service Provider** and click **Configure…**<br>  |
| **7.** | In the Avaya TAPI2 configuration window that appears, set **Switch IP Address** to the IP Address of Avaya IP Office, select **Third Party**, and set **Switch Password** to the IP Office password as defined in Section 3 Step 4. Click **OK**.<br>  |
| **8.** | In the Phone and Modem Options window, click **OK**. |
| **9.** | Reboot the PC for the new changes to take effect. This completes configuration of the Avaya TAPI Driver on the CallRex PC. |

## 6.2. Configure CallRex

The information provided in this section assumes that Telrex CallRex has already been successfully installed and licensed on the PC.

| Step | Description |
|---|---|
| **1.** | Go to **Start → Programs → IntellRex-CallRex → Client** to launch CallRex and log into CallRex with the appropriate user credentials. In the CallRex window that appears, scroll down the left-hand pane to **Configure → General**.<br>  |
| **2.** | In the window that appears, set **PBX IP** to the IP address of Avaya IP Office and click **PBX Type**.<br>  |

| Step | Description |
|---|---|
| **3.** | In the PBX Type popup that appears, select **Avaya TAPI** and click **OK**.<br>  |
| **4.** | In the CallRex window, click **Add** in the left-hand user pane.<br>  |

| Step | Description |
|---|---|
| **5.** | In the User Info window that pops up, set **First Name**, **Last Name** and **Ext**. with the user information that will be displayed and stored in the CallRex database. Set **Username** to the extension number associated with this user record, **Password** to the extension number password as defined in Section 3 Step 10, and **IP** to the IP address assigned to the extension as depicted in **Figure 1**. Click **Apply**.<br>  |
| **6.** | In the CallRex window, select or highlight ***Phone*** in the **Phone Profiles** pane, check ***CallRex Unlimited*** in the **License Type** pane for the user added in Step 5.<br>  |

| Step | Description |
|---|---|
| 7. | Repeat Steps 4 – 6 for each user listed in **Table 1**. This completes configuration of Telrex CallRex. For information on how to use CallRex to conduct ad-hoc call recordings, trigger-based call recordings or monitoring of IP Telephone calls, please refer to the Telrex product documentation in [5] and [6]. |

# 7. Interoperability Compliance Testing

The interoperability compliance testing examined the ability of CallRex to perform ad-hoc as well as trigger-based call monitoring and recording of Avaya IP Telephone calls. Call recording and monitoring was done on Avaya IP Telephone calls, including inbound, outbound and internal calls. The testing also examined whether CallRex would properly handle call monitoring and/or recording during call hold, transfer and conference.

## 7.1. General Test Approach

Feature and functionality testing was performed manually. Inbound calls were made to Avaya IP Office through analog and T1/PRI trunks, as well as to internal extensions (analog, digital, and IP Telephone). IP Office was configured to route inbound trunk calls to either a hunt group or a specific extension, depending on the test case. CallRex was used to either monitor or record calls in both ad-hoc and trigger-based scenarios. Upon call completion, CallRex stored and logged the recorded calls in its database for later retrieval and/or review.

A load test was accomplished using a call generator to generate inbound calls over the PRI trunk to Avaya IP Office and play a couple of recorded messages. Five Windows PC clients were configured with Avaya IP Office Phone Manager PC Softphone. Each Phone Manager PC Softphone was associated to an Avaya IP Telephone extension. Automated test tools were written to drive Avaya IP Office Phone Manager PC Softphone clients to automatically answer incoming calls and hang up after a few seconds. During the load test, the call generator placed inbound PRI trunk calls to Avaya IP Office, which were answered by the Phone Manager Softphone clients driven by the automated test tool. Telrex CallRex was configured to perform trigger-based recording on all calls arriving at the IP Telephone extensions.

## 7.2. Test Results

All test cases that were executed completed successfully. Observations made during testing are noted below. The load test was run for about two hours with five inbound PRI channels used for placing calls and five Phone Manager clients used to answer calls. According to the call generator, about 977 calls were attempted during the test run, 926 call recordings were collected on the CallRex server. However, a couple of the Phone Manager PC Softphone clients appeared to have locked up during the test run which may explain the discrepancy in counts. Due to time constraints, this was the only load test that was attempted during compliance testing.

The following observations, and/or issues were noted during testing:

- **Calls remain in 'recording' state during loss of IP Office or network connectivity** – If CallRex is recording a call and IP Office loses power or network connectivity, CallRex does not detect either occurrence and leaves the call in the recorded state. When a new call arrives at the extension, the new call's recording is tacked on to the previous call's recording and logged with it. Avaya has suggested Telrex consider implementing a heartbeat with IP Office for calls listed as being in progress beyond a reasonable threshold to identify such occurrences and take appropriate clean up actions.
  Status: CallRex is considering the suggestion for future implementation.

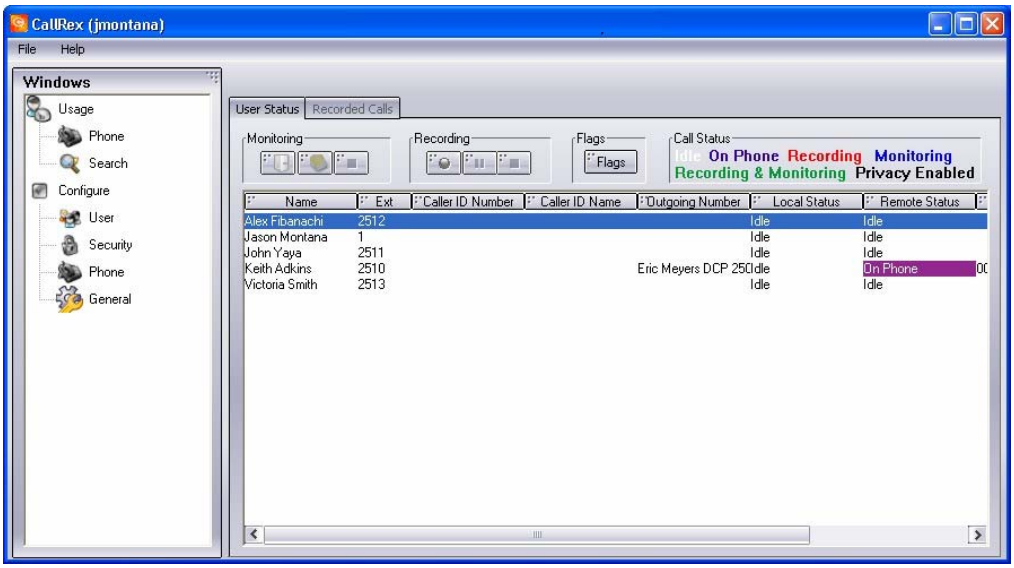
- **Voicemail recording beyond scope of solution** – Calls placed to an IP Telephone extension that are routed to coverage will not be recorded by CallRex.

# 8. Verification Steps

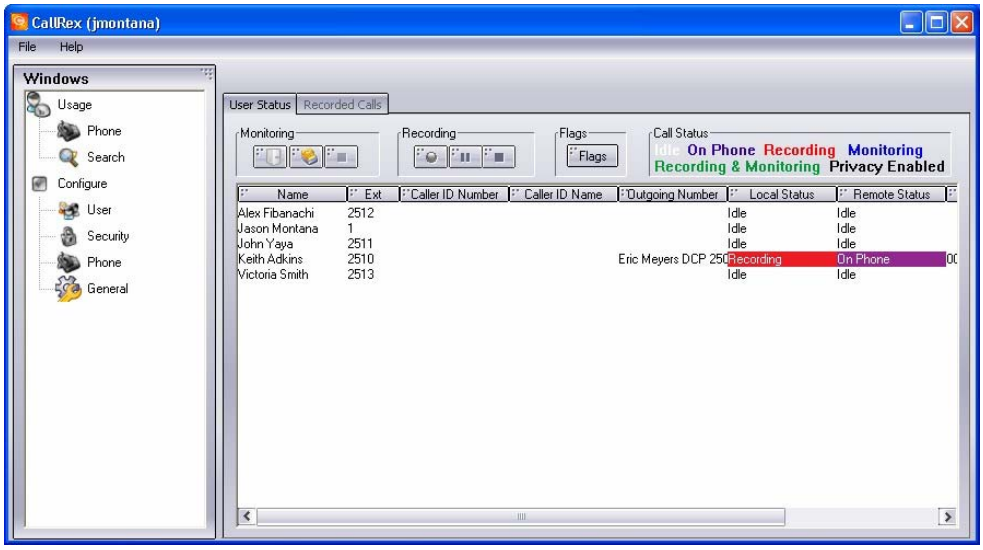
The following steps may be used to verify the configuration:

- To verify network connectivity, ping all the devices depicted in **Figure 1** from the Telrex CallRex PC.

- To verify CallRex connectivity with the IP telephones, go to the CallRex window and click **Usage**. In the User status window that appears, take an IP Telephone extension setup for ad-hoc recording off-hook. The Remote Status for the phone will change from **Idle** to **On Phone**.



- To verify CallRex is properly performing ad-hoc recording, take an IP Telephone extension setup for ad-hoc recording off-hook, select the extension in the CallRex window, and click the **Recording** button. Verify CallRex is reporting the call is being recorded. Hang up the call and verify that the recording can be played back.




# 9. Support

For technical support on Telrex products, consult the support pages at http://www.telrex.com or contact the Telrex Customer Support Center at:

- Phone: (425) 827-6156
- E-mail: support@telrex.com

# 10. Conclusion

These Application Notes describe the steps for configure Telrex CallRex to record Avaya IP Office IP Telephone calls. All test cases executed completed successfully.

# 11. Additional References

Product documentation for Avaya products may be found at http://support.avaya.com

[1] Avaya IP Office Manager 3.0, Issue 16u, 30th August 2005

[2] 4600 Series IP Telephone R2.3 LAN Administrator Guide, 555-233-507, November 2005

[3] Installation and Configuration Guide Avaya C360 Converged Stackable Switch Software Version 4.3, Issue 1, May 2004

[4] Reference Guide Avaya C360 Converged Stackable Switch Software Version 4.3, Issue 1, May 2004

Product documentation for Telrex products may be found at: http://www.telrex.com.

[5] CallRex Installation Guide 3.1

[6] CallRex User Manual 3.1

Please e-mail any questions or comments pertaining to these Application Notes along with the full title name and filename, located in the lower right corner, directly to the Avaya Developer*Connection* Program at devconnect@avaya.com.