Abstract

These Application Notes describe the configuration steps required to integrate the Vocera Communications System – Vocera Server, Telephony Server and badges, with Avaya Communication Manager, and Avaya Wireless AP-8.

Emphasis of the testing was placed on verifying reliable integration between the Vocera Telephony Server and Avaya Communication Manager, using the T1/PRI interface.

Information in these Application Notes was obtained through compliance testing and additional technical discussions. Testing was conducted via the DevConnect Program at the Avaya Solution and Interoperability Test Lab.
1. Introduction
The Vocera Communications Inc. (Vocera) system enables people to communicate over wireless 802.11b or 802.11g networks. Vocera users speak into a small lightweight wireless device, called a badge. Users communicate by pressing a call button on the badge and saying “key phrases” that the Vocera Server interprets and processes. The badge connects and communicates with other badge devices, or telephone endpoints on Avaya Communication Manager, or to a PSTN endpoint.

These Application Notes describe the configuration used to wirelessly communicate with the Vocera badges and to compliance test the features of the Vocera Communications system with Avaya Communication Manager and Avaya Wireless AP-8s.

1.1. Components
The following three components make up the Vocera Communications system:

- Vocera Badges
- Vocera Server
- Vocera Telephony Server

The Vocera Badges are wireless 802.11b or 802.11g devices that serve as communicators in a wireless environment. Pressing the call button on a badge opens an interface with the Vocera Server which starts the call process.

The Vocera Telephony Server acts as a communication server to service calls between the badge and an endpoint. The Vocera Server stores the user and badge information, and has a speech access interface that allows users to place and receive calls. See Reference [3].

The Vocera Telephony Server connects to the Avaya Communication Server via a Dialogic Telephony hardware interface. Both T1 ISDN-PRI and T1 robbed-bit trunks were setup between the Server’s dialogic interface and Avaya Communication Manager. Calls between badges and Avaya Communication Manager telephones were connected and routed through these trunks. The two server applications, the Vocera Server and Vocera Telephony Server resided in the same physical server platform.

For additional information on the Vocera Communications System, please refer to Vocera documentation References [4], [5], and [6].

Figure 1 illustrates the network configuration used to verify the Vocera Communications solution. The configuration details provided in these Application Notes focus on the interface between Avaya Communication Manager and the Vocera Telephony Server as well as the wireless configuration between the Vocera Badge, and Avaya Wireless AP-8. The configuration is comprised of an Avaya S8500 Media Server and an Avaya G650 Media Gateway, and has connections to Avaya telephones and an ISDN-PRI trunk to the PSTN. The Vocera site is
comprised of a PC with Microsoft Windows 2003 Server and a Power Over Ethernet (POE) switch. The Vocera Server and Vocera Telephony Server were installed on the PC prior to the compliance test. Avaya Wireless AP-8s are utilized to provide the wireless network for the Vocera badges.

Figure 1 – Network Configuration Diagram
2. Equipment and Software Validated
The following products and software were used for the configuration in Figure 1:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avaya S8500 Server</td>
<td>Avaya Communication Manager 5.0</td>
</tr>
<tr>
<td></td>
<td>(R015x.00.0.825.4)</td>
</tr>
<tr>
<td>Avaya G650 Media Gateway</td>
<td></td>
</tr>
<tr>
<td>TN2312BP IP Server Interface</td>
<td>HW15 FW030</td>
</tr>
<tr>
<td>TN799DP C-LAN Interface</td>
<td>HW01 FW012</td>
</tr>
<tr>
<td>TN2302AP IP Media Processor</td>
<td>HW20 FW110</td>
</tr>
<tr>
<td>Avaya 4625SW IP Telephone</td>
<td>2.8.3</td>
</tr>
<tr>
<td>Avaya 9650 IP Telephone</td>
<td>1.2 (H.323)</td>
</tr>
<tr>
<td>Avaya 6402 Digital Telephone</td>
<td>-</td>
</tr>
<tr>
<td>Avaya C363T-PWR Converged Stackable Switch</td>
<td>4.5.14</td>
</tr>
<tr>
<td>Avaya Wireless AP-8</td>
<td>3.4.0 (1146)</td>
</tr>
<tr>
<td>Vocera Server and Telephony Server running on</td>
<td>4.0 build 1763</td>
</tr>
<tr>
<td>Windows 2003 Server</td>
<td></td>
</tr>
<tr>
<td>Vocera Badges</td>
<td></td>
</tr>
<tr>
<td>B1000A (802.11b only)</td>
<td>4.0 build 1763 B1000</td>
</tr>
<tr>
<td>B2000 (802.11b and g)</td>
<td>4.0 build 1763 B2000</td>
</tr>
</tbody>
</table>

Table 1 – Product and Software Version

3. Configure Avaya Communication Manager
During the compliance test, the connectivity between Avaya Communication Manager and the Vocera Telephony Server were performed with T1 ISDN-PRI and T1 Wink Start protocols. Before configuring Avaya Communication Manager, the DS1 board must be physically configured to the appropriate T1 mode.

When integrating with trunks, it is important to allow trunk-to-trunk transfer so badges can transfer/conference calls, as well as place outbound calls. Trunk to trunk transfer is a global parameter that is enabled in the “system-parameters features” form.
3.1. Configuring System Level Parameters

1. From the System Access Terminal interface enter the display system-parameters features command. On Page 1 of the “system-parameters feature” form, verify that the Trunk-to-Trunk Transfer field is set to all.

```
> display system-parameters features

FEATURE-RELATED SYSTEM PARAMETERS

Self Station Display Enabled? y
Trunk-to-Trunk Transfer: all
Automatic Callback - No Answer Timeout Interval (rings): 3
Call Park Timeout Interval (minutes): 10
Off-Premises Tone Detect Timeout Interval (seconds): 20
AAR/ARS Dial Tone Required? y
Music/Tone on Hold: none
Music (or Silence) on Transferred Trunk Calls? no
DID/Tie/ISDN/SIP Intercept Treatment: attd
Internal Auto-Answer of Attd-Extended/Transferred Calls: transferred
Automatic Circuit Assurance (ACA) Enabled? n

Abbreviated Dial Programming by Assigned Lists? n
Auto Abbreviated/Delayed Transition Interval (rings): 2
Protocol for Caller ID Analog Terminals: Bellcore
Display Calling Number for Room to Room Caller ID Calls? n
```

2. Enter the display system-parameters customer-options command. On Page 4 of the “system-parameters customer-options” form, verify that the ISDN-PRI field is enabled. If not, contact an authorized Avaya account representative to enable this feature.

```
> display system-parameters customer-options

OPTIONAL FEATURES

Emergency Access to Attendant? y                      IP Stations? y
Enable 'dadmin' Login? y                               Internet Protocol (IP) PNC? n
Enhanced Conferencing? y                               ISDN Feature Plus? n
Enhanced EC500? y                                     ISDN Network Call Redirection? n
Enterprise Survivable Server? n                        ISDN-BRI Trunks? n
Enterprise Wide Licensing? n                           ISDN-PRI? y
ESS Administration? n                                 Local Survivable Processor? n
Extended Cvg/Fwd Admin? y                             Malicious Call Trace? n
External Device Alarm Admin? n                         Media Encryption Over IP? y
                      Five Port Networks Max Per MCC? n                Mode Code for Centralized Voice Mail? n
Flexible Billing? n                                    
Forced Entry of Account Codes? n                       MULTIFREQUENCY SIGNALING? y
Global Call Classification? n                          Multimedia Appl. Server Interface (MASI)? n
Hospitality (Basic)? y                                 Multimedia Call Handling (Basic)? n
Hospitality (G3V3 Enhancements)? n                    Multimedia Call Handling (Enhanced)? n
IP Trunks? y

IP Attendant Consoles? n                               
(NOTE: You must logoff & login to effect the permission changes.)
```
3. On Page 8 of the “system-parameters customer-options” form, verify that the **Basic Call Setup** and **Basic Supplementary Services** fields are enabled. If not, contact an authorized Avaya account representative to enable these features.

![Display System-Parameters Customer-Options](image)

4. It is important that stations that have access to the Vocera Server are not outward restricted. All stations and trunks have a Class of Restriction (COR) assigned to them. Enter `change cor C`, where C is the COR number. Set the **Calling Party Restriction** and **Called Party Restriction** fields to **none** in the COR form for the appropriate COR that is assigned to the stations and trunks. During the compliance test, stations under test were assigned 1 as the COR number.

![Change COR 1](image)

### 3.2. Configuring T1 ISDN-PRI Trunk

The configuration verified for T1 trunks used the 229xx extension range for the Vocera Server and Badges. Add the DS1 for the T1 trunks by using the command `add ds1 xxxx`, where xxxx is the DS1 board location. In this case the location was **01a12**, where “01” is the cabinet number, “a” is the carrier number, and “12” is the slot number of the DS1 board.
1. The next screen shows the DS1 CIRCUIT PACK form for the ISDN-PRI protocol. Avaya Communication Manager acted as the network, and the Vocera Server was the user. The following information is provided for configuring the DS1 board.

- Line Coding: **b8zs**
- Framing Mode: **esf**
- Signaling Mode: **isdn-pri**
- Connect: **pbx**
- Interface: **network**
- Protocol Version: **b** (b - NI2, a – 5ESS)

Default values may be used in the remaining fields.

```
add dsl 1a12

DS1 CIRCUIT PACK

  Location: 01A12  Name: Vocera
  Bit Rate: 1.544
  Line Compensation: 1
  Line Coding: b8zs
  Framing Mode: esf
  Signaling Mode: isdn-pri
  Connect: pbx
  Interface: network
  Country Protocol: 1
  Interworking Message: PROGress
  Protocol Version: b
  Interface Companding: mulaw
  CRC? n
  Idle Code: 11111111
  DCP/Analog Bearer Capability: 3.1kHz
  T303 Timer(sec): 4
  Slip Detection? n
  Near-end CSU Type: other
  Block Progress Indicator? n
```
2. Enter the **add signaling-group S** command, where **S** is the signaling-group number, to define a new signaling group for the trunk between the Vocera Telephony Server and Avaya Communication Manager. Configuring the signaling-group is a two step procedure:

- Create a signaling-group and specify the **Group Type** and **Primary D-Channel**.
  
  **Note:** Channel 24 on a standard PRI circuit is reserved for signaling.

- After the trunk-group is created, the **Trunk Group for Channel Selection** field be specified with the trunk group number.

The following screen shows the first step. The important signaling-group related parameters that were different from the default values are highlighted here.

```
add signaling-group 73

SIGNALING GROUP

Group Number: 73
Group Type: isdn-pri
Associated Signaling? y
Primary D-Channel: 01A1224
Max number of NCA TSC: 0
Max number of CA TSC: 0
Trunk Group for Channel Selection:
Supplementary Service Protocol: a
```

3. Enter the **add trunk-group T** command, where **T** is the trunk-group number, to create a trunk group. The important trunk-group related parameters that were different from the default values are highlighted below.

```
add trunk-group 73

TRUNK GROUP

Group Number: 73
Group Name: 2Vocera
Group Type: isdn
COR: 1
Direction: two-way
TN: 1
Dial Access? n
Queue Length: 0
Service Type: tie
Auth Code? n
TestCall ITC: rest
Far End Test Line No:
TestCall BCC: 4
```

```
4. On Page 5 of the TRUNK GROUP form, add trunk group members. To add group members, simply populate Port with the board location plus the channel number (e.g. board location is 01A12 plus channel 01, rendering 01A1201). Tab to the Sig Grp and enter the number assigned to the signaling group as displayed below.

The following screen shows the first five entries of the GROUP MEMBER ASSIGNMENTS page in the TRUNK GROUP form.

5. Enter the change signaling-group S command, where S is the signaling-group added in Step 2, to finish the signal group configuration. The following screen shows the signaling-group configuration. The important parameter in the screen is assigning the Trunk Group for Channel Selection field.

6. Enter change uniform-dialplan U, where U is the uniform-dialplan number. The following screen shows the Uniform Dial Plan configuration. The 5-digit extension range starting with 229 was used for the Vocera Server and Badges, and utilized Automatic Alternate Routing (AAR).
7. Enter **change aar analysis A**, where A is the AAR number. Automatic Alternate Routing (AAR) was used to route calls to the appropriate route pattern.

<table>
<thead>
<tr>
<th>AAR DIGIT ANALYSIS TABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Full: 1</td>
</tr>
<tr>
<td>Dialed String</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>229</td>
</tr>
</tbody>
</table>

8. Enter **change route-pattern R**, where R is the route-pattern number. The route pattern 73 routes calls using trunk group 73.

<table>
<thead>
<tr>
<th>Pattern Number: 73</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern Name: 2Vocera</td>
</tr>
<tr>
<td>SCCAN? n</td>
</tr>
<tr>
<td>Grp</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>1: 73</td>
</tr>
<tr>
<td>2:</td>
</tr>
<tr>
<td>3:</td>
</tr>
<tr>
<td>BCC VALUE</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1:</td>
</tr>
<tr>
<td>2:</td>
</tr>
<tr>
<td>3:</td>
</tr>
</tbody>
</table>

9. PSTN resources on the Avaya Communication Manager are acquired through Automatic Route Selection (ARS). In this case, only the local area code was setup for both 10 (Home Numbering Plan Area – hnpa) and 11 (Foreign Number Plan Area – fnpa) digit outbound dialing. **Change ars analysis XXX**, where XXX is the ARS (Dialed String) number. The Avaya Communication Manager PSTN trunk used **Route Pattern 10**.

<table>
<thead>
<tr>
<th>ARS DIGIT ANALYSIS TABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Full: 1</td>
</tr>
<tr>
<td>Dialed String</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>173</td>
</tr>
<tr>
<td>732</td>
</tr>
</tbody>
</table>
10. Enter `change route-pattern R`, where `R` is the route-pattern number used for the PSTN trunk. In this case, route-pattern 10 uses trunk **Grp No 10** and a *9 is inserted to the 10 or 11 digit number dialed by the user.

<table>
<thead>
<tr>
<th>Pattern Number: 10</th>
<th>Pattern Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>Grp</code> FRL NPA Pfx Hop Toll No. Inserted</td>
<td>DCS/ IXC</td>
</tr>
<tr>
<td><code>No</code> Mrk Lmt List Del Digits</td>
<td></td>
</tr>
<tr>
<td><strong>1:</strong> 10 0</td>
<td>0 *9</td>
</tr>
<tr>
<td><strong>2:</strong> n user</td>
<td>n user</td>
</tr>
<tr>
<td><strong>BCC VALUE TSC CA-TSC</strong></td>
<td>ITC BCIE Service/Feature PARM No. Numbering LAR</td>
</tr>
<tr>
<td>Request</td>
<td>Dgts Format</td>
</tr>
<tr>
<td><strong>1:</strong> y y y y y n n</td>
<td>bothext</td>
</tr>
<tr>
<td><strong>2:</strong> y y y y y n n</td>
<td>rest</td>
</tr>
</tbody>
</table>

### 3.3. Configuring T1 Wink Start Trunk

The configuration steps in Section 3.1 and 3.2 remain the same for T1 Wink Start, except for the following DS1 and trunk group parameters

1. The configuration verified for T1 trunks used the 229xx extension range for the Vocera Server and Badges. Add the DS1 for the T1 trunks by using the command `add ds1 xxxx`, where `xxxx` is the T1 board location. The DS1 form for the Robbed Bit T1 board is shown here.

<table>
<thead>
<tr>
<th>DS1 CIRCUIT PACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location: 01A12</td>
</tr>
<tr>
<td>Name: Vocera</td>
</tr>
<tr>
<td>Bit Rate: 1.544</td>
</tr>
<tr>
<td><strong>Line Coding: b8zs</strong></td>
</tr>
<tr>
<td>Signaling Mode: robbed-bit</td>
</tr>
<tr>
<td>Interface Compingd: mulaw</td>
</tr>
<tr>
<td>Idle Code: 11111111</td>
</tr>
<tr>
<td>Slip Detection? n</td>
</tr>
<tr>
<td>Near-end CSU Type: other</td>
</tr>
</tbody>
</table>
2. Enter the **add trunk-group T** command, where T is the trunk-group number, to create a trunk group. The important trunk-group related parameters that were different from the default values are highlighted below.

```
add trunk-group 73

TRUNK GROUP

Group Number: 73                   Group Type: tie
Group Name: Vocera Trunk           CDR Reports: y
Direction: two-way
Outgoing Display? n
Trunk Signaling Type: 
Busy Threshold: 255
Night Service: 
Incoming Destination:

Queue Length: 0
Comm Type: voice
Auth Code? n
Trunk Flash? n

TRUNK PARAMETERS

Trunk Type (in/out): wink/immed
Outgoing Dial Type: tone
Incoming Rotary Timeout(sec): 5
Incoming Dial Type: tone
Disconnect Timing(msec): 500
Digit Treatment: 
Sig Bit Inversion: none
Analog Loss Group: 9
Digital Loss Group: 13
Incoming Dial Tone? y

Disconnect Supervision - In? y Out? y
Answer Supervision Timeout: 0
Receive Answer Supervision? y
```
3. On Page 4 of the TRUNK GROUP form, add trunk group members. To add group members, simply populate the 24 ports with the board location plus the channel as displayed below.

The following two screens show the results of the Group Member assignments page in the TRUNK GROUP form.

<table>
<thead>
<tr>
<th>Port</th>
<th>Code Sfx Name</th>
<th>Night</th>
<th>Mode</th>
<th>Type</th>
<th>Ans Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: 01A1201</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2: 01A1202</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3: 01A1203</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4: 01A1204</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5: 01A1205</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6: 01A1206</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7: 01A1207</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8: 01A1208</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9: 01A1209</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10: 01A1210</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11: 01A1211</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12: 01A1212</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13: 01A1213</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14: 01A1214</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15: 01A1215</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Trunk group continues.

<table>
<thead>
<tr>
<th>Port</th>
<th>Code Sfx Name</th>
<th>Night</th>
<th>Mode</th>
<th>Type</th>
<th>Ans Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>16: 01A1216</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17: 01A1217</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18: 01A1218</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19: 01A1219</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20: 01A1220</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21: 01A1221</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22: 01A1222</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23: 01A1223</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24: 01A1224</td>
<td>TN464 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Configure Avaya Wireless AP-8

Avaya Wireless AP-8s were utilized for providing the wireless network which allowed the Vocera badges to register to the Vocera server. The initial configuration for the Avaya Wireless AP-8 is accomplished through the ScanTool software, which comes with the Avaya Wireless AP-8 software. After the initial configuration, the web interface was utilized to do the configuration modifications. The configuration screens included here show how to configure the Network, Interfaces, and Service Set Identifier (SSID).

1. Use a web browser to access the Management IP address of the Avaya Wireless AP-8. Provide proper credentials to login. Click on the Configure button from the main menu on the left. Click the Network tab from the right menu and select DHCP RA (DHCP Relay Agent) tab from the submenu (Configure ⇒ Network ⇒ DHCP RA). The following screen appears. Enable the DHCP Relay Agent by checking the box. Add the DHCP server by clicking the Add button and provide the IP address of the DHCP server.

After completion of adding DHCP server, click OK button.
2. Navigate to the Configure → Interfaces → Op Mode page. For compliance testing, the Wireless – B interface was used. Select the 802.11bg for the Operational Mode field as shown in the following screen.
3. Navigate to the **Configure → Interfaces → Wireless -B** page. The following screen is displayed. Configure the **Network Name (SSID)** and **Frequency Channel** fields as shown below. For the roaming test, the Frequency Channel field for Avaya Wireless AP-8 was set to Channel **11**.
4. Navigate to the **Configure → SSID/VLAN/Security → Security Profile** page. The following screen should be displayed. Compliance testing was performed using non-secure and secure profile configurations. The screen below illustrates three profiles have been added. **Profile 1** as **Non-Secure**, **Profile 2** as **WEP**, and **Profile 3** as **WPAPSK**.
5. To create or modify a **WPA-PSK station** encryption profile, click **Add** or **Edit** button displayed in **Step 4**, then click on the **WEP-PSK Station** box as displayed below. Enter 8 to 63 characters to be used for the **PSK Passphrase** field.

**Note:** To communicate between wireless devices, the same PSK Passphrase key needs to be used.

![Security Profile](image)

6. Compliance testing used two AP-8 devices; therefore administration must be repeated on the second AP-8. For the new configuration to take effect, the Avaya Wireless AP-8 must be rebooted. Click the **Commands → Reboot** tab (not shown) from the main menu.

### 5. Configure the Vocera Communications System

The Vocera Communications System is configured using a web based console interface. Use a web browser to access the IP address of the Vocera Communication System. Log in using the appropriate credentials. Refer to References [3], [4], [5], and [6] during configuration of the Vocera product.
1. The following screen shows the telephony configuration used when the Vocera Telephony Server places outbound calls through the PBX.

Select Telephony from the left panel and select the Access Codes tab to configure Local and Long Distance Access Code. The Local Area Code field should match the local PBX area code configured in ACM (as shown). The Default Long-Distance Access Code field is typically the same as the Default Local Access Code, followed by a 1.

After completion, click the Save Changes button.

5.1. Configuring the Vocera Telephony Server for T1 ISDN-PRI
The next screen shows the configuration used for the Vocera Telephony server to connect Avaya Communication Manager using an ISDN-PRI T1 trunk. For inbound, there are two ways that a call can reach an individual badge.

- A user calls a Direct Inward Dialing (DID) number for a badge ID. For example, from an Avaya telephone, call 22901 (229xx), where 229 is the access code and xx identifies one of four badges used during compliance, numbered 01, 02, 03, and 04. Therefore, in this example, badge 01 received the incoming call.
- A caller calls the Vocera Hunt Group Number. In this case, the user is greeted by the voice interface, and prompted for a badge user to contact. In this example, 22999 was called.
1. Select **Telephony** from the left panel, and select the **Basic Info** tab. Edit the values as indicated below. They should match the corresponding values in Avaya Communication Manager.

- Vocera Hunt Group Number: 229
- Number of Lines: 23
- Integration Type: **Digital**
- Signaling Protocol: **ISDN PRI**
- Framing: **ESF**
- Line Code: **B8ZS**
- ISDN Protocol: **NI2** *(5ESS was also Compliance tested)*

After completion, click the **Save Changes** button.
2. Click the **DID Info** tab to start configuring Direct Inward Dialing (DID) for an individual badge. As displayed in the illustration below, the **Range of Numbers** is set from **2901 to 2999**. Click the **Add** button to add a DID range.
3. From the **Add DID Range Entry** screen, the **Prefix** is concatenated with the **Desk Extensions in Range** to form the DID number dialed over the digital trunk to Avaya Communication Manager. The number is interpreted as 732-852-3043 and is dialed out from a Vocera badge to the PSTN resources, as previously setup in route pattern 10 in **Section 3.1**.

Click the **Add** button to finish the DID configuration.

4. After completion of the Add screen, shown later, click **Save Changes** button.
5.2. Configuring the Vocera Telephony Server for Wink Start

Compliance testing was also conducted using a T1 Wink Start trunk between the Vocera Telephony Server and Avaya Communication Manager.

1. The following screen shows the configuration used when Vocera was connected to Avaya Communication Manager using T1 robbed-bit Signaling Mode. **Note:** Should match Avaya Communication Manager.

   - Vocera Hunt Group Number: **8229**
   - Number of Lines: **24**
   - Integration Type: **Digital**
   - Signaling Protocol: **Wink Start**
   - Framing: **ESF**
   - Line Code: **B8ZS**

After completion, click the **Save Changes** button.
5.3. Configuring the Vocera Badges

A Vocera provided script is used to easily download configuration information to the Vocera Badges. The following screen shows the applicable fields that were changed to effect communication between the Vocera Badge and the Avaya Wireless AP-8.

<table>
<thead>
<tr>
<th>AuthenticationType</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>EncryptionType</td>
<td>WPAPSK</td>
</tr>
<tr>
<td>SSID</td>
<td>vocera</td>
</tr>
<tr>
<td>ServerIPAddr</td>
<td>10.20.20.150</td>
</tr>
<tr>
<td>ShortPreamble</td>
<td>FALSE</td>
</tr>
<tr>
<td>UpdaterIPAddr</td>
<td>10.20.20.150</td>
</tr>
<tr>
<td>WEPKey1</td>
<td>31323334353637383930313233</td>
</tr>
<tr>
<td>WEPKeySlot</td>
<td>1</td>
</tr>
</tbody>
</table>

6. Interoperability Compliance Testing

Interoperability compliance testing covered connectivity, error recovery, and feature functionality. Feature tests verified the ability of the Vocera Server to communicate with Avaya Communication Manager to make and receive calls, transfer calls, and conference calls. Connectivity tests verified that the Vocera Server was able to connect to Avaya Communication Manager over the T1Wink Start and PRI trunks. The test also verified that the Vocera Badges were able to connect to Avaya Wireless AP-8s, and roam between access points. Error recovery testing verified that the Vocera Server was able to recover connectivity to Avaya Communication Manager under a link failure scenario.

6.1. General Test Approach

All test cases were performed manually. The following features and functionality were verified:

- T1 connectivity between Vocera Telephony Server and Avaya Communication Manager, using the ISDN-PRI protocol
- T1 connectivity between Vocera Telephony Server and Avaya Communication Manager, using a Robbed-bit Wink Start trunk.
- Layer 2 Roaming
- Transfer and Conference calls between the Vocera badges and Avaya IP Telephones
- Repeat basic test scenario for WEP and WPAPSK encryption
- Repeat basic test scenario with T1 PRI 5ESS
- Link failure scenario

6.2. Test Results

All test cases passed. The Vocera Communications System provided connectivity to Vocera Badge users over an Avaya wireless infrastructure, and connected to Avaya Communication Manager over the T1 Wink Start and PRI interfaces.
7. Verification Steps

To verify the solution is properly configured, the following steps can be utilized.

- Place calls between the Vocera Badges to verify proper connectivity through the wireless infrastructure. If the Vocera Badge is not able to reach the Vocera Server, verify that the proper encryption key and SSID was configured for the badge and Avaya Wireless AP-8s.
- Place calls in both directions between Vocera Telephony Server and Avaya Communication Manager. If the calls are not successful, verify the proper configuration for the trunk port between Avaya Communication Manager and the Vocera Telephony Server. To check the trunk between Avaya Communication Manager and the Vocera Telephony Server, the following commands were utilized.
  - test board (to check the physical connection between Avaya Communication Manager and the Vocera Telephony Server)
  - status trunk (to check the trunk between Avaya Communication Manager and the Vocera Telephony Server)

8. Support

For technical support on the Vocera Communications, call Vocera Support at (800) 473-3971 or send email to support@Vocera.com or visit http://vocera.com.

9. Conclusion

These Application Notes describe the configuration steps required for integrating the Vocera Communications System with Avaya Communication Manager. The systems interoperated successfully, providing a suitable solution for wireless access and connectivity between Vocera Badge and Avaya Communication Manager.

10. References

This section references the Avaya and Vocera Communications documentation that are relevant to these Application Notes.

The following Avaya product documentation can be found at http://support.avaya.com.


The following Vocera Communications product documentation is installed with the server application:
[3] Vocera 4.0 Command Reference
[6] Vocera Administration Console Reference, Version 4.0 Build 1759
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