Avaya Solution & Interoperability Test Lab

Application Notes for the RedSky Technologies E-911 Manager with Avaya Communication Manager - Issue 1.0

Abstract

These Application Notes describe a compliance-tested configuration comprised of Avaya Communication Manager and the RedSky Technologies E-911 Manager. The RedSky E-911 Manager retrieves station emergency numbering and location information from a PBX, and validates, reformats, and uploads the information to public Automatic Location Identification (ALI) databases. During compliance testing, the RedSky E-911 Manager successfully obtained station emergency numbering and location information after Avaya Communication Manager stations were added, deleted, and changed. 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.

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1. Introduction

These Application Notes describe a compliance-tested configuration comprised of Avaya Communication Manager 3.1 and the RedSky Technologies E-911 Manager 5.1. The RedSky E-911 Manager retrieves station emergency numbering and location information from Avaya Communication Manager, and validates, reformats, and uploads the information to public Automatic Location Identification (ALI) databases. When a Public Safety Answering Point (PSAP) receives an Enhanced 911 (E911) call, the PSAP searches the ALI databases to obtain the specific address/location associated with the Calling Party Number (CPN).

Figure 1 illustrates a sample configuration consisting of:

- a pair of redundant Avaya S8710 Media Servers running Avaya Communication Manager
- an Avaya G650 Media Gateway
- Avaya IP and Digital Telephones
- analog telephones
- a RedSky Technologies E-911 Manager server.

The compliance testing focused on verifying the generation of ALI records and not on the transfer of ALI records to ALI databases.

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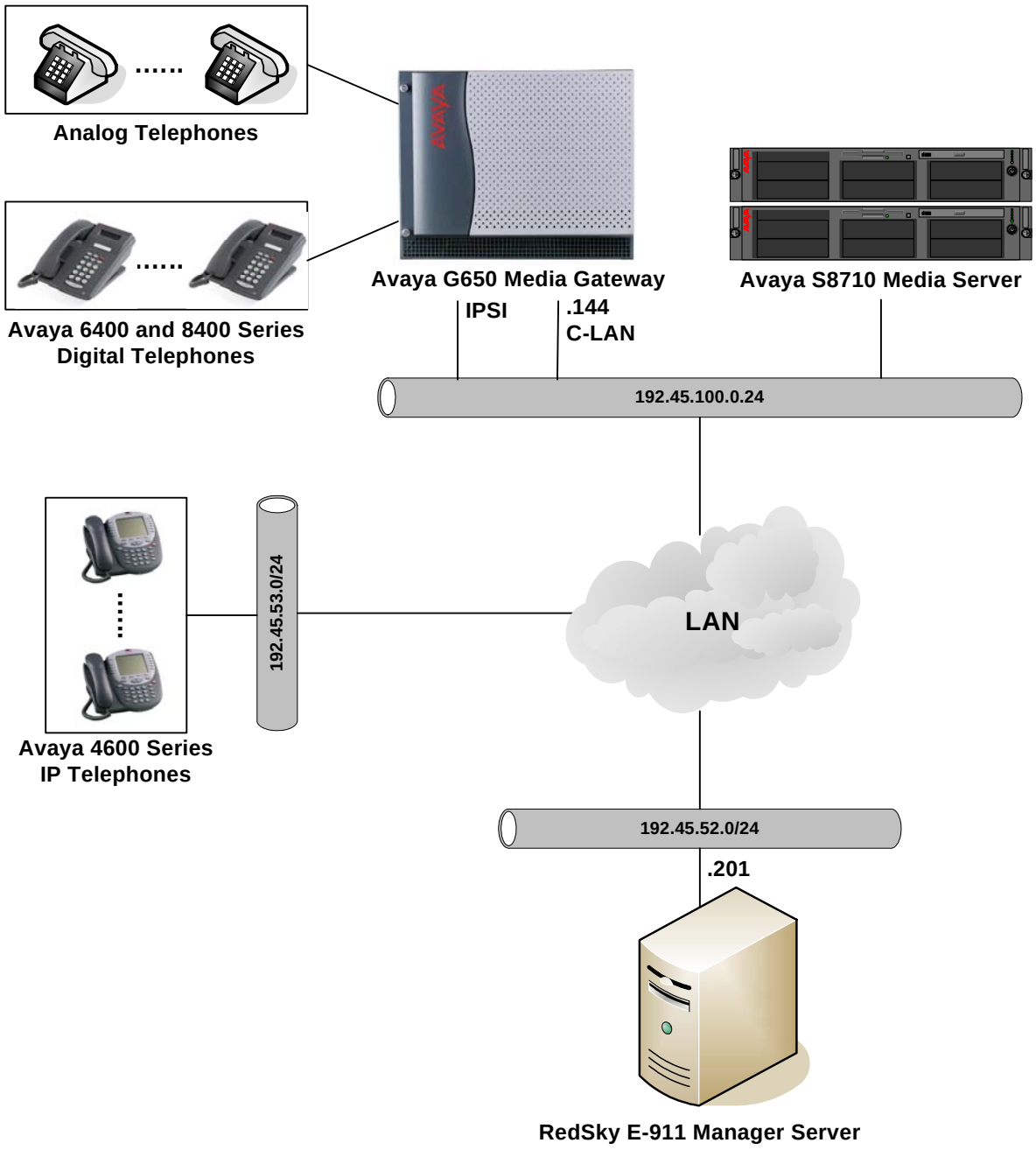

Figure 1: Sample configuration.

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2. Equipment and Software Validated

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

Equipment	Software/Firmware
Avaya S8710 Media Server	3.1 (R013x.01.0.628.6)
Avaya G650 Media Gateway	-
TN2312BP IP Server Interface	30
TN799DP C-LAN Interface	17
Avaya 4600 Series IP Telephones	2.3 (4602SW) 2.3 (4610SW) 2.3 (4620SW) 2.5 (4525SW)
Avaya 6400 and 8400 Series Digital Telephones	-
Analog Telephones	-
RedSky Technologies E-911 Manager Server	
E-911 Manager	5.1.0.16249
PhoneData.exe	5.1.0.16250
PhoneDataExtract.dll	5.1.0.16248

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3. Configure Avaya Communication Manager

This section describes the steps for configuring public/unknown numbering formats, station name and location information (room, floor, building), and System Access Terminal (SAT) services.

3.1. Configure Numbering

From the SAT, enter the **change public-unknown-numbering** command to invoke the **Numbering – Public/Unknown Format** table. This table specifies the digit(s) to prepend to the calling party numbers of outbound calls routed to ISDN trunk groups. The entry in the example below states that all **5**-digit calling party numbers that begin with "**50**" will be pre-pended with "**73285**" to form **10**-digit calling party numbers. If **Trk Grp(s)** is blank, then the entry applies to all calls originated by "5xxxx" extensions and routed to any ISDN trunk group. If one or more consecutive trunk groups are specified for **Trk Grp(s)**, then the entry applies to calls originated by "50xxx" extensions and routed to those specific trunk groups. Additional entries may be similarly configured for other extension lengths and prefixes - for example, for "54xxx" extensions. The RedSky E-911 Manager also retrieves the information in this table from Avaya Communication Manager and uses the information to form full 10-digit numbers for Avaya Communication Manager stations before uploading to the ALI databases.

```
change public-unknown-numbering 0                              Page   1 of   2
                      NUMBERING - PUBLIC/UNKNOWN FORMAT
                                   Total                                  Total
Ext Ext    Trk       CPN            CPN Ext Ext    Trk       CPN         CPN
Len Code   Grp(s)    Prefix         Len Len Code   Grp(s)    Prefix      Len

 5 50      6         73285           10
```

3.2. Define Site Data

From the Avaya Communication Manager SAT, enter the **change site-data** command. On Pages 1 and 2 of the **site-data** form, define the values that may be used for the **Building** field in the **station** form. In the example below, buildings "**307**" and "**456**" are defined.

```
change site-data                                               Page   1 of   4
                   SITE DATA USER DEFINITION
                     VALID BUILDING FIELDS



  307
  456
```


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Similarly, on Page 3 of the **site-data** form, define the values that may be used for the **Floor** field in the **station** form. In the example below, floors 1 through 5 are defined.

```
change site-data                                              Page   3 of   4
                     SITE DATA USER DEFINITION
                        VALID FLOOR FIELDS


  1
  2
  3
  4
  5
```

3.3. Configure Station Location Information

From the SAT, enter the **change station n** command, where **n** is an existing station extension. On Page 1 of the **station** form, enter a **Name** if one has not been entered yet.

```
change station 60001                                          Page   1 of   4
                                    STATION

Extension: 60001                        Lock Messages? n          BCC: 0
     Type: 4610                         Security Code: *           TN: 1
     Port: S00002                    Coverage Path 1:             COR: 1
     Name: STA-60001                 Coverage Path 2:             COS: 1
                                     Hunt-to Station:

STATION OPTIONS
             Loss Group: 19             Personalized Ringing Pattern: 1
                                                  Message Lamp Ext: 60001
           Speakerphone: 2-way                 Mute Button Enabled? y
        Display Language: english
 Survivable GK Node Name:
          Survivable COR: internal                 Media Complex Ext:
   Survivable Trunk Dest? y                             IP SoftPhone? n
```

On Page 2 of the **station** form, if external callers can directly reach the station extension, for example, the station extension is a DID number, then set **Emergency Location Ext** to the station extension (default). If not, set **Emergency Location Ext** to the extension of a DID station as in the example below (where station **60001** has an **Emergency Location Ext** of **50001**). The **Emergency Location Ext** is used, along with any numbering modification defined in the public-unknown-numbering form (see Section 3.1), to form the Calling Party Number in an outbound 911 call and provides the PSAP with a direct call back number. In addition, if **Always Use** is set to "**n**", and the station is an IP station, then the **Emergency Location Ext** might not be used. Specifically, if the IP address of the IP station falls into an IP address range configured in the ip-network-map form, then the extension used to form the Calling Party Number is as follows:

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- If the Emergency Location Extension associated with that IP address range is the same as the **Emergency Location Ext** of the station, then the station extension is used.
- If the Emergency Location Extension associated with that IP address range is NOT the same as the **Emergency Location Ext** of the station, then the Emergency Location Extension is used.

If the IP address of the IP station does not fall into any IP address range configured in the ip-network-map form, then the behavior is the same as that for non-IP stations, i.e. the **Emergency Location Ext** is used to form the Calling Party Number. Lastly, if **Always Use** is set to "**y**", then the **Emergency Location Ext** is always used to form the Calling Party Number, regardless of the ip-network-map form configuration.

```
change station 60001                                        Page   2 of   4
                                  STATION
FEATURE OPTIONS
           LWC Reception: spe           Auto Select Any Idle Appearance? n
          LWC Activation? y                     Coverage Msg Retrieval? y
  LWC Log External Calls? n                                 Auto Answer: none
            CDR Privacy? n                            Data Restriction? n
   Redirect Notification? y                  Idle Appearance Preference? n
 Per Button Ring Control? n                Bridged Idle Line Preference? n
   Bridged Call Alerting? n                    Restrict Last Appearance? y
  Active Station Ringing: single       Conf/Trans on Primary Appearance? n

        H.320 Conversion? n       Per Station CPN - Send Calling Number?
       Service Link Mode: as-needed
         Multimedia Mode: enhanced
    MWI Served User Type:                    Display Client Redirection? n
              AUDIX Name:                   Select Last Used Appearance? n
                                              Coverage After Forwarding? s

                                           Direct IP-IP Audio Connections? y
 Emergency Location Ext: 50001  Always Use? y      IP Audio Hairpinning? y
```

Since the RedSky E-911 Manager does not currently take into account the **Always Use** parameter and the relationship between **Emergency Location Ext** and the ip-network-map form, some additional consideration is warranted. If the E-911 Manager Switch Type setting is "IP Range", then the E-911 Manager produces an ALI record for each Emergency Location Extension referenced in the ip-network-map form (assuming the referenced Emergency Location Extension is the extension of an existing administered station), but ignores the station form configurations of IP stations. For non-IP stations, an ALI record is produced for each unique **Emergency Location Ext** referenced in the station forms of the non-IP stations. As a result, there may be inconsistencies between the ALI records and the actual Calling Party Numbers of outbound 911 calls placed from IP stations whose **Emergency Location Ext** is not also referenced in the ip-network-map form. To avoid inconsistencies, Red Sky recommends that if the E-911 Manager Switch Type setting is "IP Range", then **Emergency Location Ext** should be set to the station extension (default), **Always Use** should be set to "**n**" on all IP stations, and the ip-network-map form should be configured with all possible IP address ranges used by IP stations and all necessary Emergency Location Extensions.

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If the E-911 Manager Switch Type setting (see Section 4 Step 14) is "IP as TDM", then the E-911 Manager produces an ALI record for each unique **Emergency Location Ext** referenced in the station forms, but ignores the ip-network-map form configuration. As a result, the ALI records produced by the E-911 Manager may not always be consistent with the actual Calling Party Numbers of outbound 911 calls placed from IP stations whose **Always Use** setting is "**n**", particularly if the ip-network-map form is configured with Emergency Location Extensions. To address the inconsistencies, RedSky recommends that if the E-911 Manager Switch Type setting is "IP as TDM", then **Always Use** should be set to "**y**" on all stations, so that Avaya Communication Manager does not use the ip-network-map form data in forming the Calling Party Numbers in outbound 911 calls.

On Page 3 of the **station** form, enter location information for **Room**, **Floor**, and **Building**. The valid **Floor** and **Building** values that may be entered were defined in Section 3.2.

```
change station 60001                                          Page   3 of   4
                                     STATION
 SITE DATA
       Room: 999                                         Headset? n
       Jack:                                             Speaker? n
      Cable:                                            Mounting: d
      Floor: 5                                       Cord Length: 0
   Building: 456                                       Set Color:

ABBREVIATED DIALING
     List1:                    List2:                    List3:

BUTTON ASSIGNMENTS
 1: call-appr                            5:
 2: call-appr                            6:
 3: call-appr                            7:
 4:                                      8:
```

3.4. Configure IP Network Map

If the RedSky E-911 Manager Switch Type setting is "IP Range", then from the SAT, enter the **change ip-network-map** command. Enter IP address ranges covering the IP address spaces of all Avaya IP phones in the enterprise. For each range, specify an **Emergency Location Extension**.

```
change ip-network-map                                         Page   1 of  32
                         IP ADDRESS MAPPING

                                                              Emergency
                                     Subnet                   Location
 From IP Address  (To IP Address   or Mask)  Region    VLAN   Extension
 192.45 .53 .51   192.45 .53 .60              3        n      50001
 192.45 .53 .61   192.45 .53 .70              3        n      50016
    .   .   .        .   .   .                         n
```


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3.5. IP Node Names and IP Services

From the SAT, enter the **change node-names ip** command. Create a node name for the RedSky E-911 Manager and enter the IP address of the E-911 Manager server. Also note the node-name and IP address of the C-LAN board to which the E-911 Manager will connect to retrieve station numbering and location information from Avaya Communication Manager.

```
change node-names ip                                          Page   1 of   1
                                IP NODE NAMES
    Name              IP Address           Name              IP Address
CLAN-1A02           192.45 .100.144                           .   .   .
CLAN-1A06           192.45 .100.147
MEDPRO-1A03         192.45 .100.145
RedSkyE911Mgr       192.45 .52 .201                           .   .   .
```

Enter the **change ip-services** command. On Page 1 of the **ip-services** form, configure an entry as follows:

- **Service Type** – set to "**SAT**".
- **Enabled** – set to "**y**".
- **Local Node** – set to the node name of the C-LAN noted above.
- **Local Port** – set to "**5023**".
- **Remote Node** – set to the node name created for the E-911 Manager above.

```
change ip-services                                            Page   1 of   3

                                IP SERVICES
 Service     Enabled     Local        Local       Remote      Remote
  Type                   Node         Port        Node        Port
SAT           y      CLAN-1A02        5023    RedSkyE911Mr    0
```


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3.6. Create Login for RedSky E-911 Manager

From the SAT, enter the **add login <login-id>** command, where <login-id> is a 2 – 8 alphanumeric character login ID. In the **login** form, set **Login Type** to "**customer**" and **Service Level** to "**super-user**", and assign a **Password**. The other fields may be left at the defaults.

```
add login redsky                                              Page   1 of   1
                            LOGIN ADMINISTRATION


LOGIN BEING ADMINISTERED
                       Login's Name: redsky
                         Login Type: customer
                      Service Level: super-user
   Days To Disable After Inactivity:


LOGIN'S PASSWORD INFORMATION
                    Login's Password:
           Reenter Login's Password:
 Password Aging Cycle Length (Days):

LOGOFF NOTIFICATION
    Facility Test Call Notification? y           Acknowledgement Required? y
         Remote Access Notification? y           Acknowledgement Required? y
```


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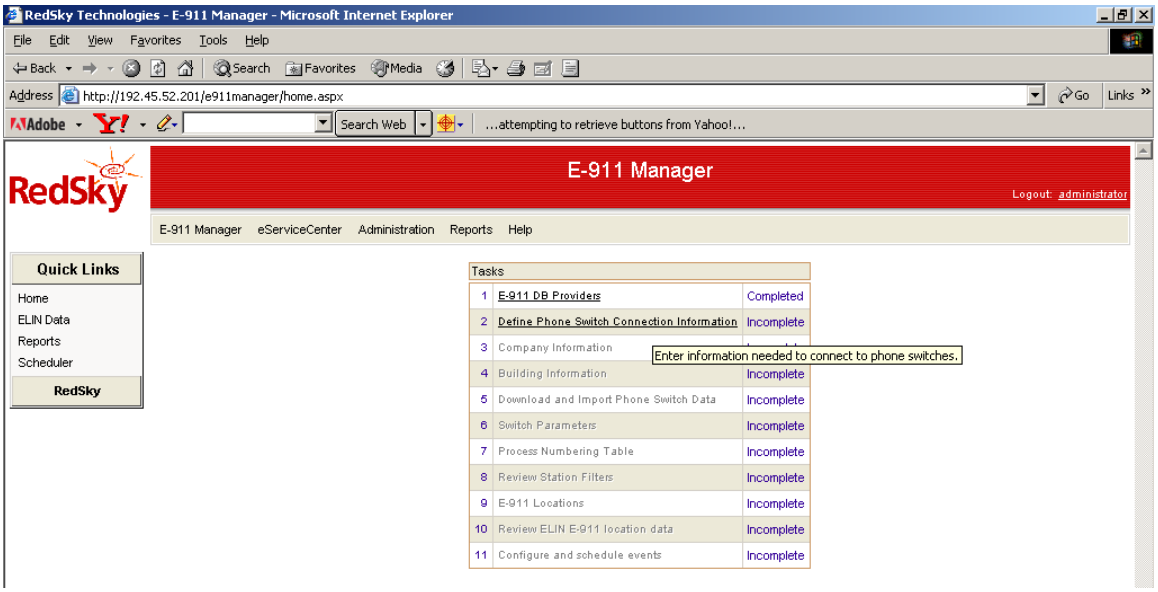
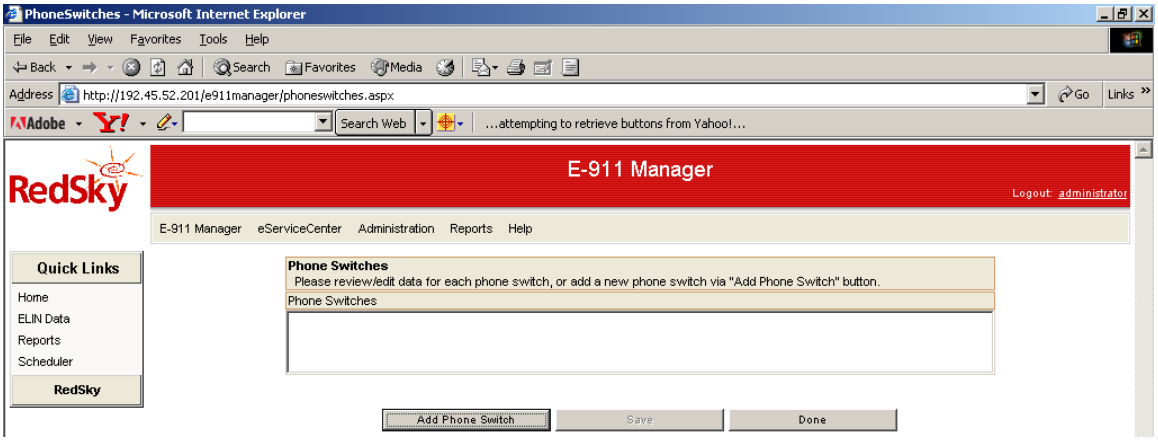
4. Configure RedSky E-911 Manager

This section provides the relevant steps for configuring the RedSky E-911 Manager to retrieve station numbering and location information from Avaya Communication Manager.

Step	Description
1.	Launch a web browser and enter http://<IP address of E-911 Manager server>/e911manager in the URL and log in with the appropriate credentials.
2.	From the **Tasks** list, click on "**Define Phone Switch Connection Information**". **Note**: This and subsequent steps assume that the "E-911 DB Providers" task has been completed according to RedSky instructions. 
3.	Click on "**Add Phone Switch**". 

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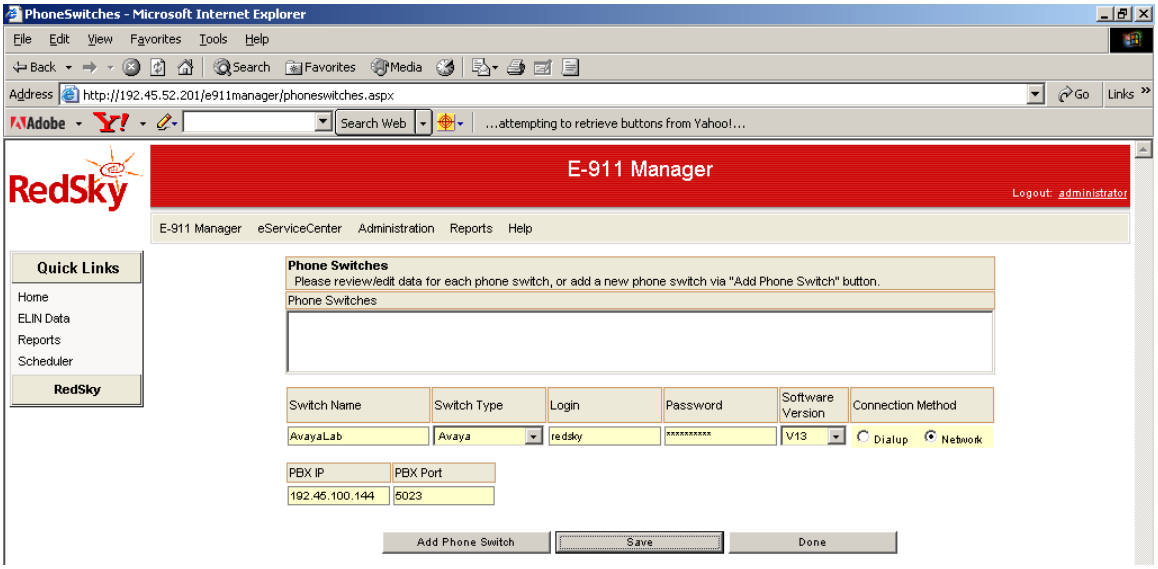
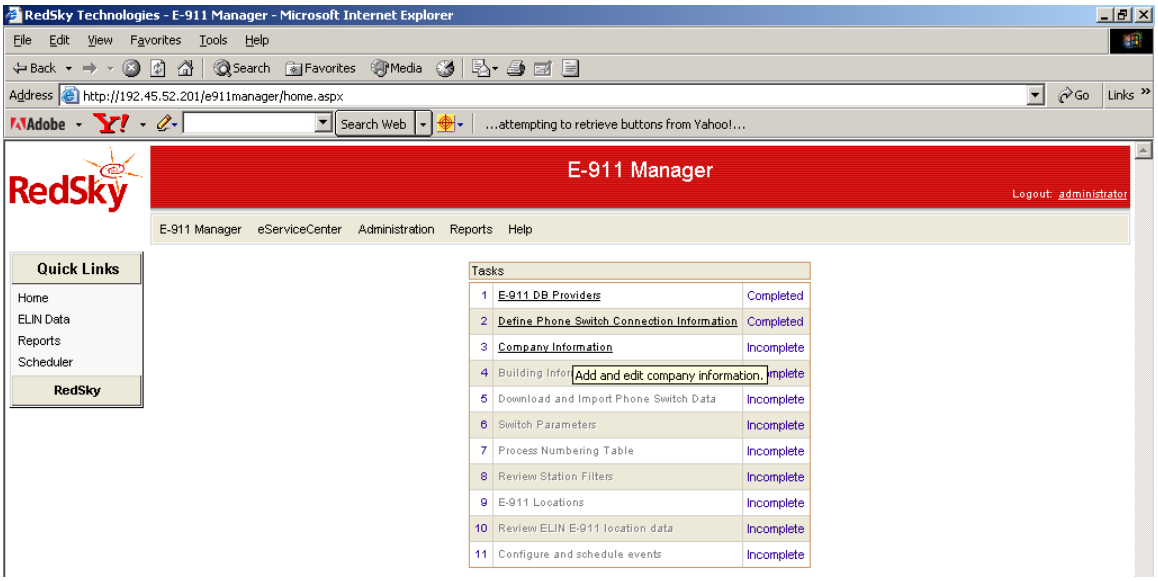
Step	Description
4.	Configure the following parameters, and click on "**Save**" and then "**Done**": • **Switch Name** – enter a descriptive name. • **Switch Type** – select "**Avaya**" from the drop-down menu box. • **Login** and **Password** – enter the login and password created in Section 3.6. • **Connection Method** – set to "**Network**". • **IP Address** – enter the IP address of the C-LAN board on which the SAT service is enabled (see Section 3.5). • **Port Number** – enter "**5023**". • **Software Version** – enter "**V13**". 
5.	From the **Tasks** list, click on "**Company Information**". 

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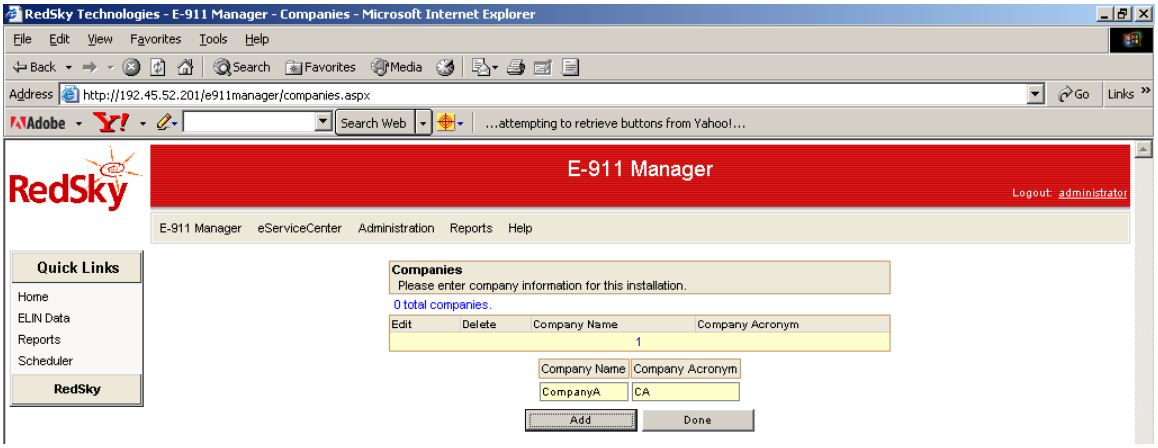
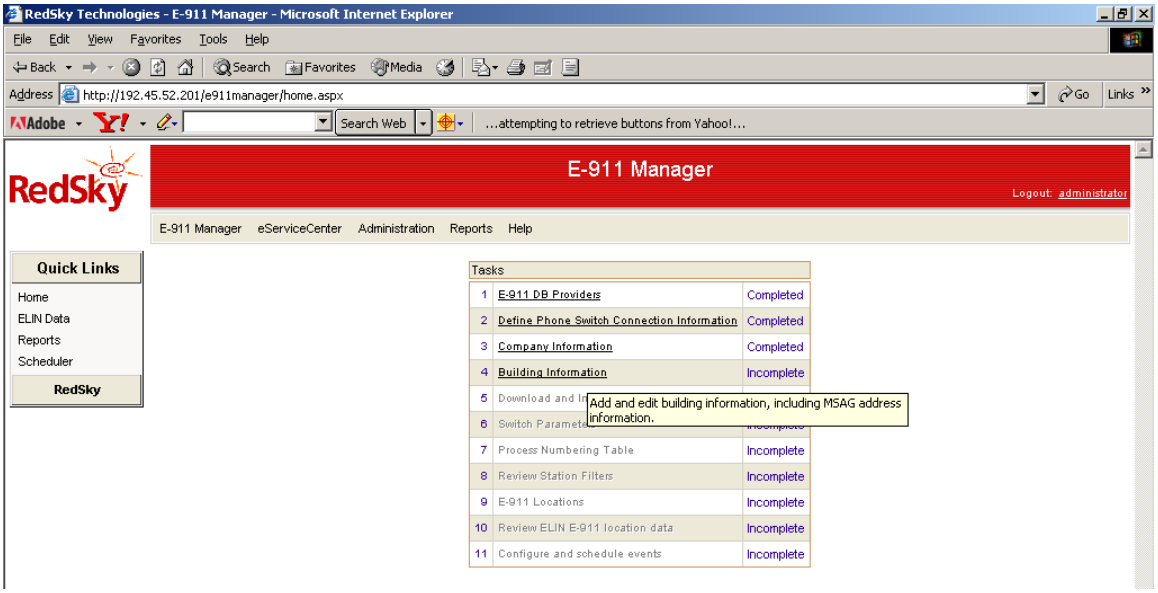
Step	Description
6.	Enter a **Company Name** and an associated **Company Acronym**. Click on "**Add**" and then "**Done**". 
7.	From the **Tasks** list, click on "**Building Information**". 

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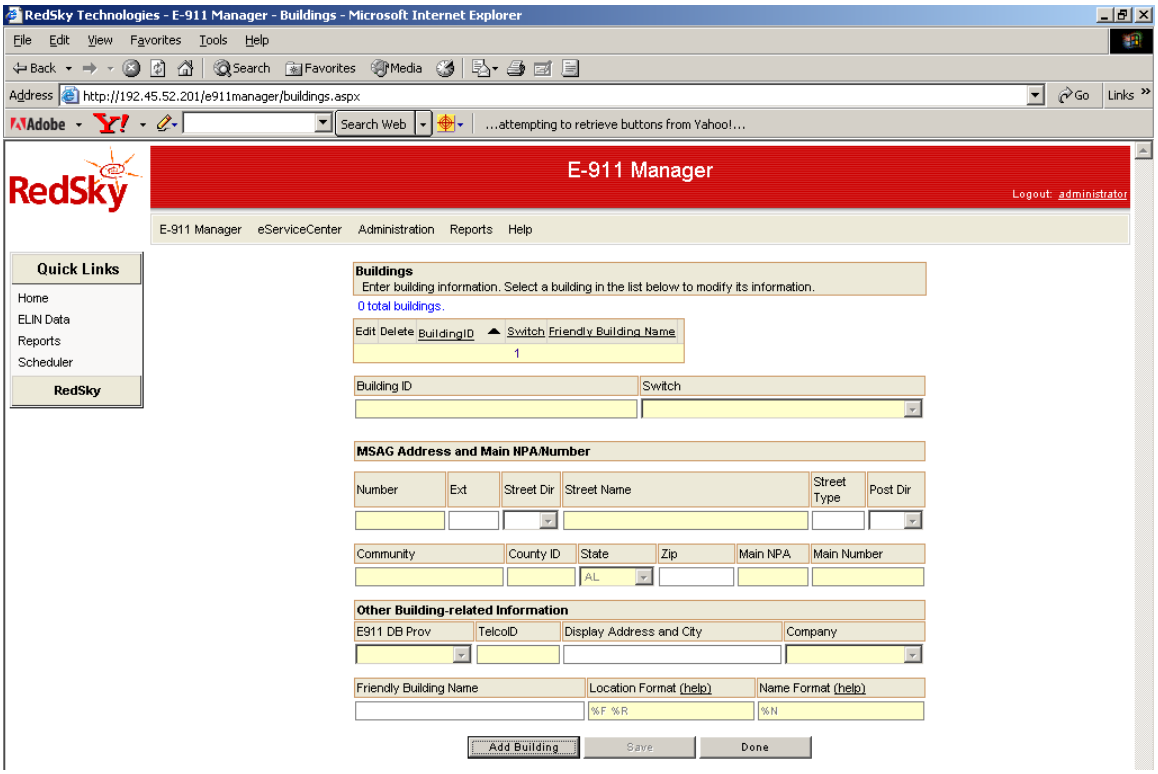
Step	Description
8.	Click on "**Add Building**".



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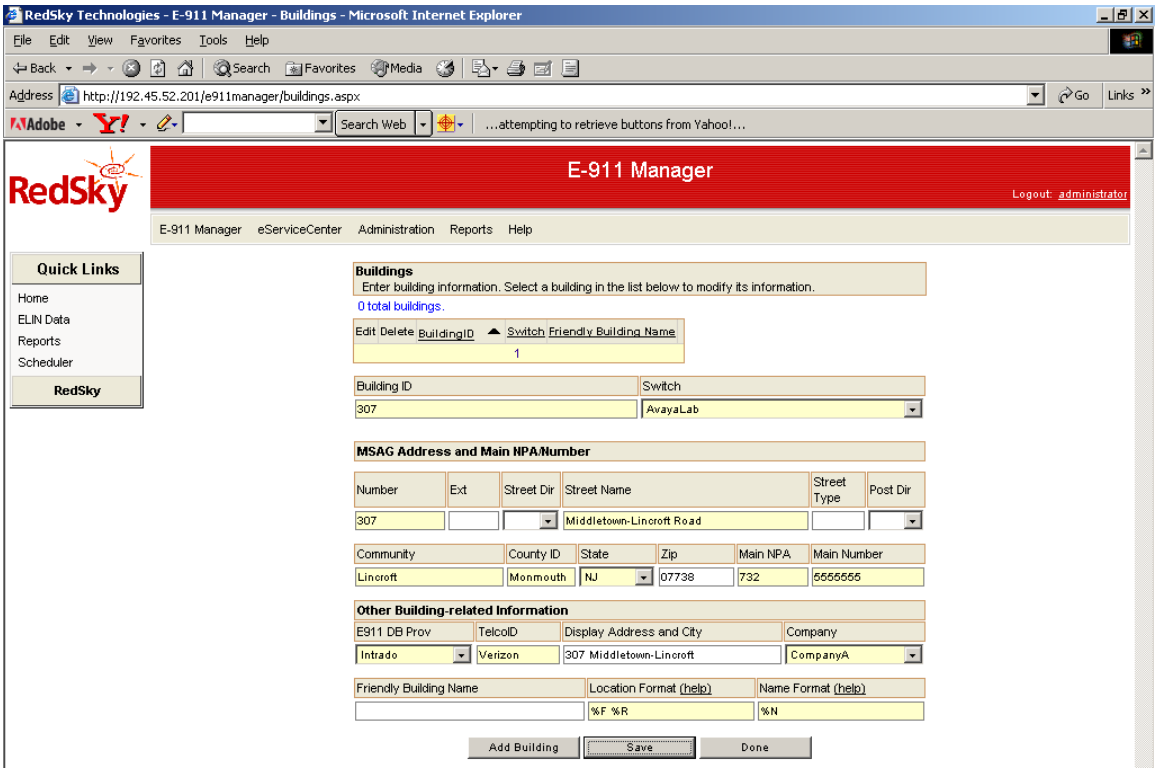
Step	Description
9.	Configure the following parameters and click on "**Save**": • **Building ID** – enter one of the buildings defined in Avaya Communication Manager in Section 3.2. • **Switch** - select the phone switch configured in Steps 2 - 4. • **Number**, **Street Name**, **Community**, **County ID**, **State**, **Zip**, **Main NPA**, **Main Number** – enter the address and main telephone number information for the building. • **E911 DB Prov –** select the appropriate E911 database service provider. • **TelcoID –** select the appropriate telephone service provider. • **Company –** select the company defined in Steps 5 – 6. • **Location Format** and **Name Format –** specify formats according to the instructions provided in the **help** link.



Location Format Help
The Location format string is used to convert PBX Switch Floor and Room fields to the E-911 Location information. Use %F or %f in the string to indicate where to place the data from the Floor field, and %R or %r to indicate where to place data from the Room field. Use uppercase tags (%R, %F) to indicate that the room/floor is mandatory, and lowercase to indicate that the room/floor is optional.
Example: "Flr. %F, Rm. %R will create the location "Flr. 2, Rm. 312" for a Floor field of "2" and a Room field of "312"

Name Format Help
The Name format string is used to convert the Name value extracted from the appropriate switch field to the E-911 Name information field. Use %N or %n in the string to indicate where to place the data from the Name value. Use uppercase tags (%R, %F) to indicate that the room/floor is mandatory, and lowercase to indicate that the room/floor is optional. If field is left blank, name will be outputted unchanged (i.e. "Al Smith" will output as "Al Smith").
Example: "RedSky Tech: %N" will create the name "RedSky Tech: Al Smith" for a Name value of "Al Smith"

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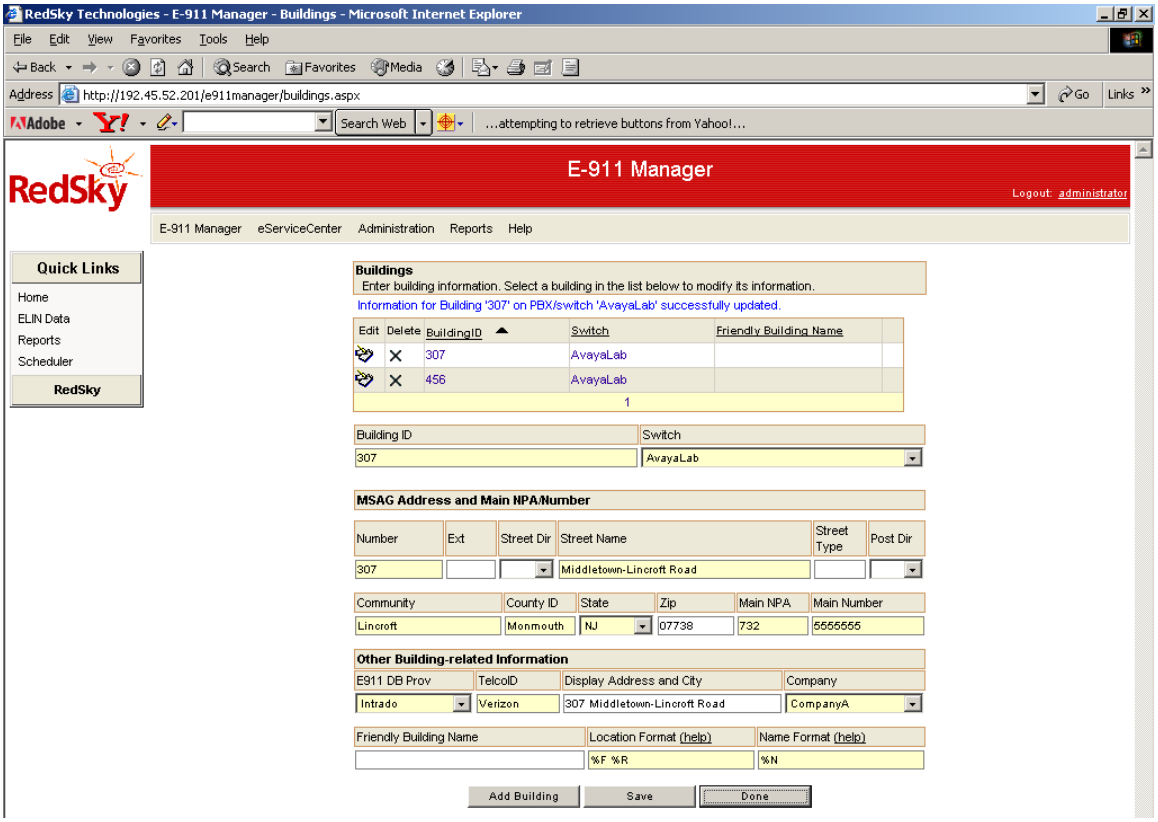
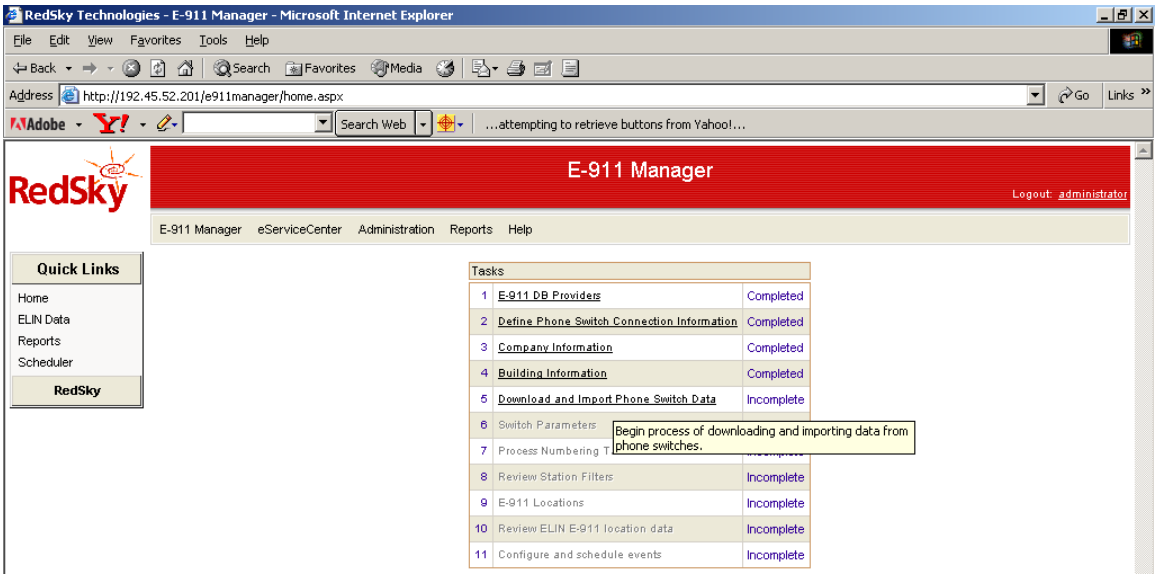
Step	Description
10.	Repeat Steps 8 - 9 as necessary to configure additional buildings. When finished, click on "**Done**". 
11.	From the **Tasks** list, click on "**Download and Import Phone Switch Data**". 

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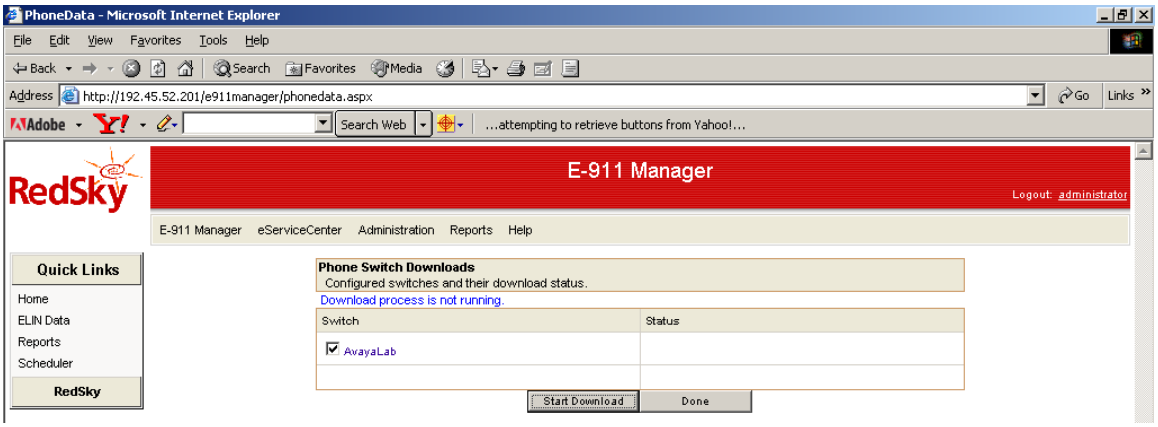
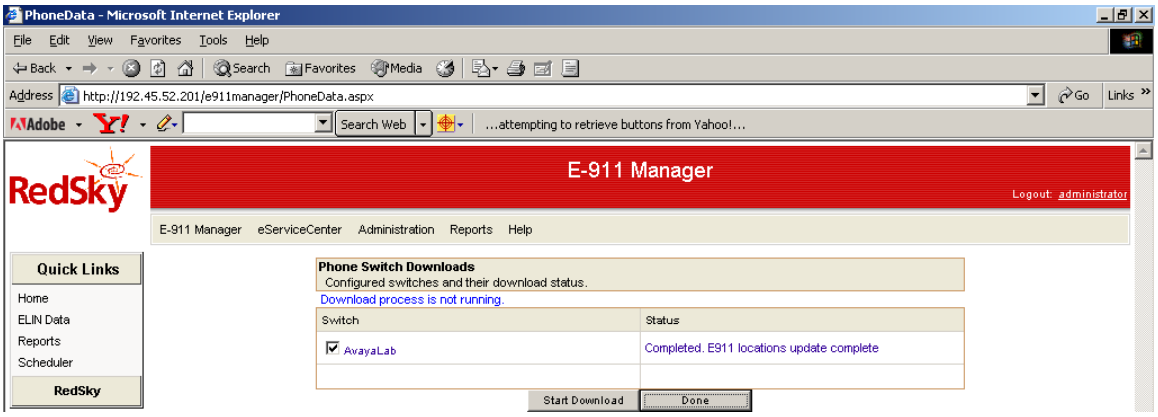
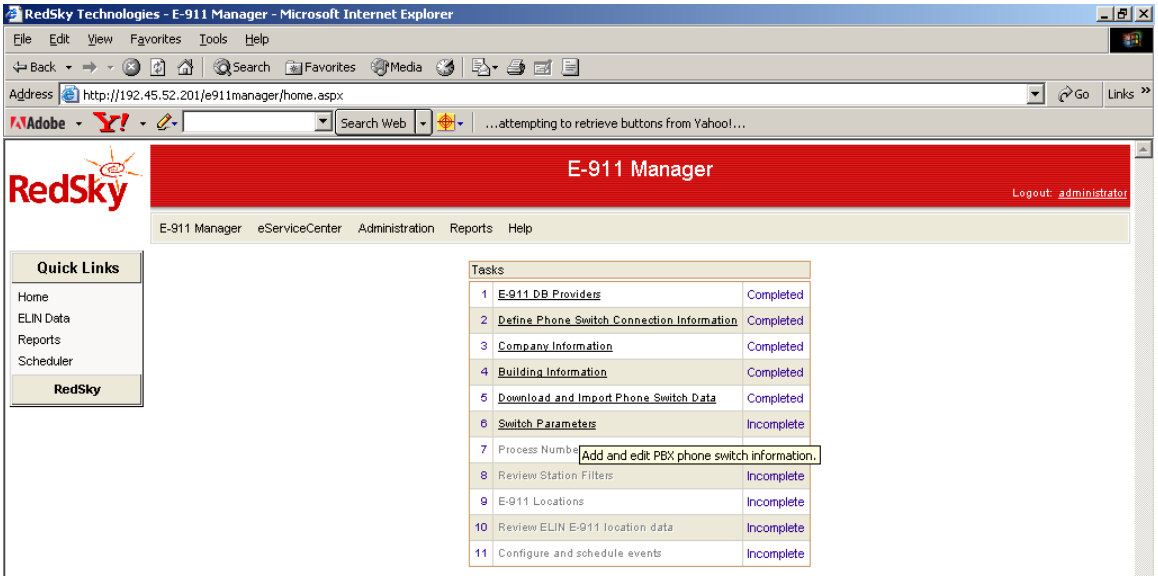
Step	Description
12.	For **Switch**, select the phone switch configured in Steps 2 – 4, and click on "**Start Download**".  After the download completes, click on "**Done**". 
13.	From the **Tasks** list, click on "**Switch Parameters**". 

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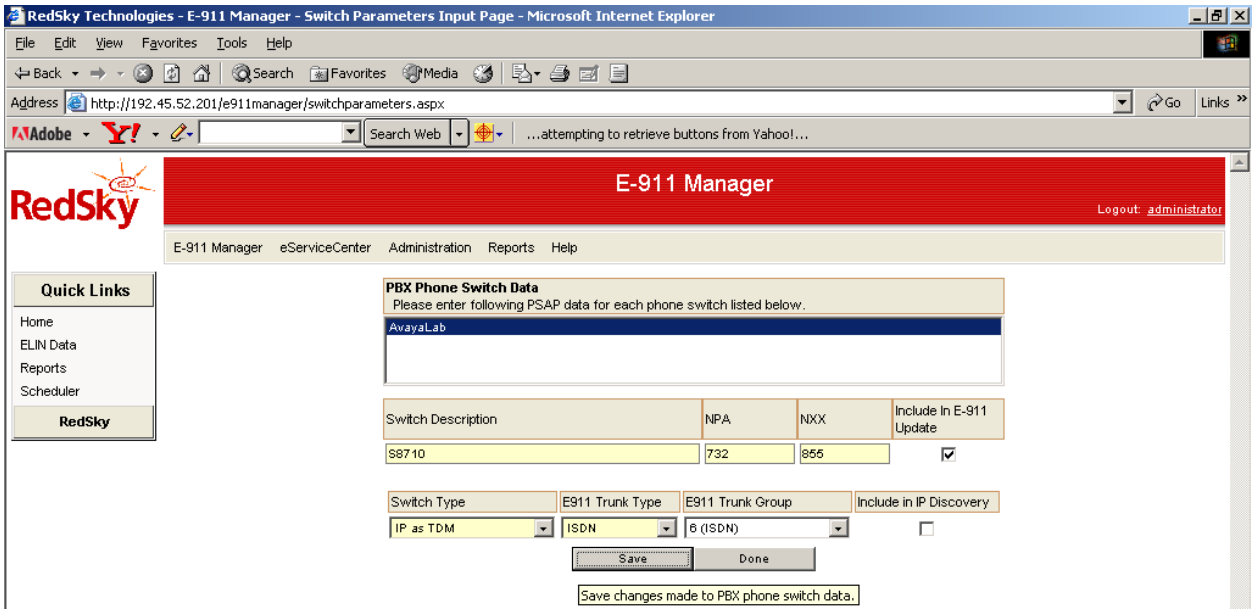
Step	Description
14.	Select the phone switch configured in Steps 2 – 4, and enter the appropriate information for **Switch Description**, **NPA**, and **NXX**. Check the **Include in E-911 Update** checkbox and configure the following parameters: • **Switch Type** = select "**IP as TDM**" or "**IP Range**" from the drop-down menu box. See Sections 3.3 and 3.4 for a discussion on the implications of using either option. • **E911 Trunk Type** – select "ISDN" from the drop-down menu box. • **E911 Trunk Group** – Leave blank if a trunk group is not specified in the public-unknown-numbering form (see Section 3.1) in Avaya Communication Manager. Alternatively, if outbound 911 calls are routed to a specific trunk group, and that trunk group is specified in the public-unknown-numbering form, then select the number of that trunk group. Click on "**Save**" and then "**Done**". 

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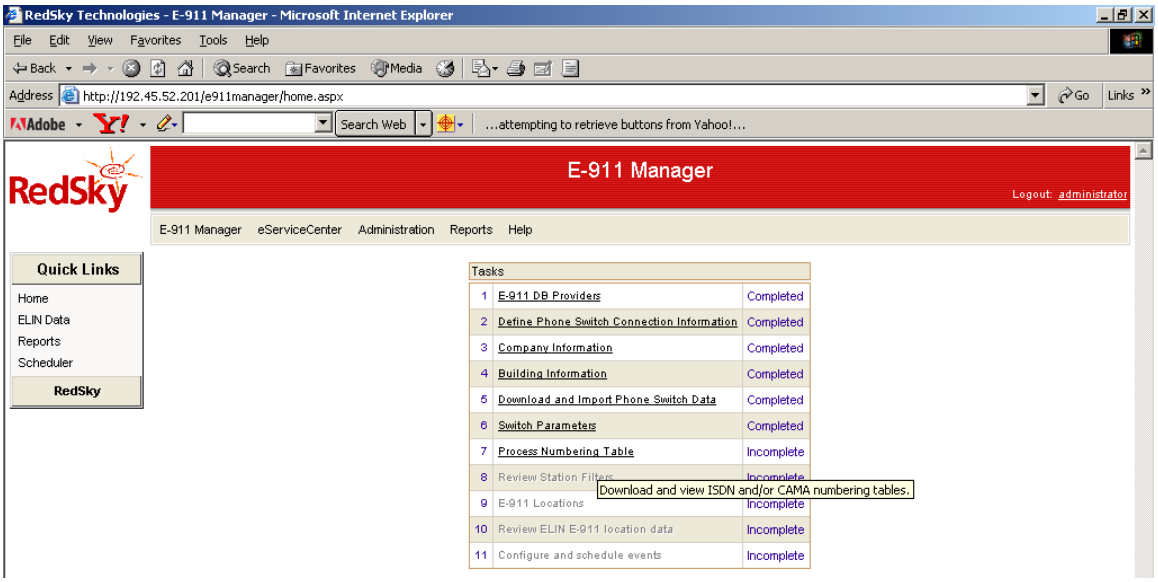
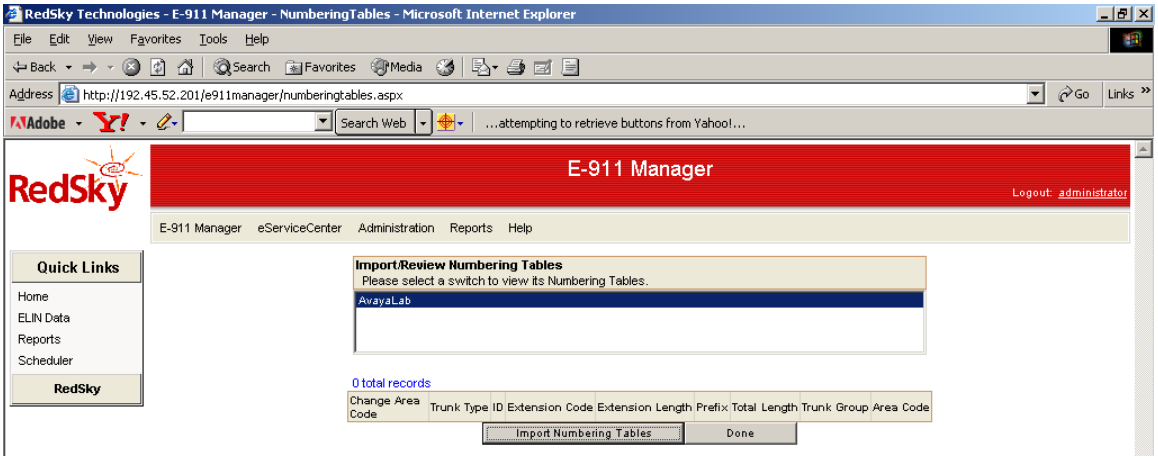
Step	Description
15.	From the **Tasks** list, click on "**Process Numbering Table**". 
16.	Select the phone switch configured in Steps 2 - 4, and click on "**Import Numbering Tables**". 

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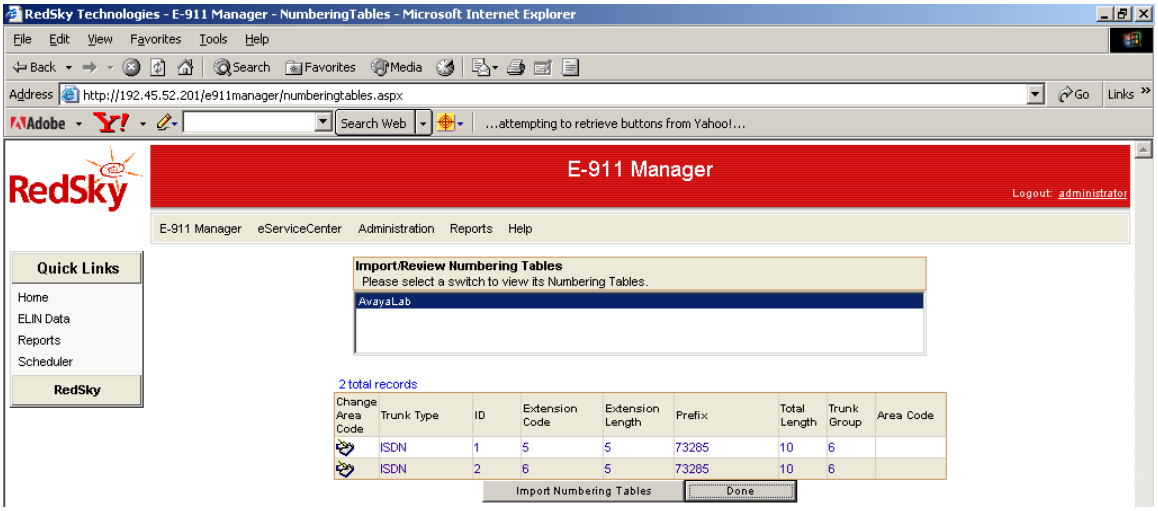
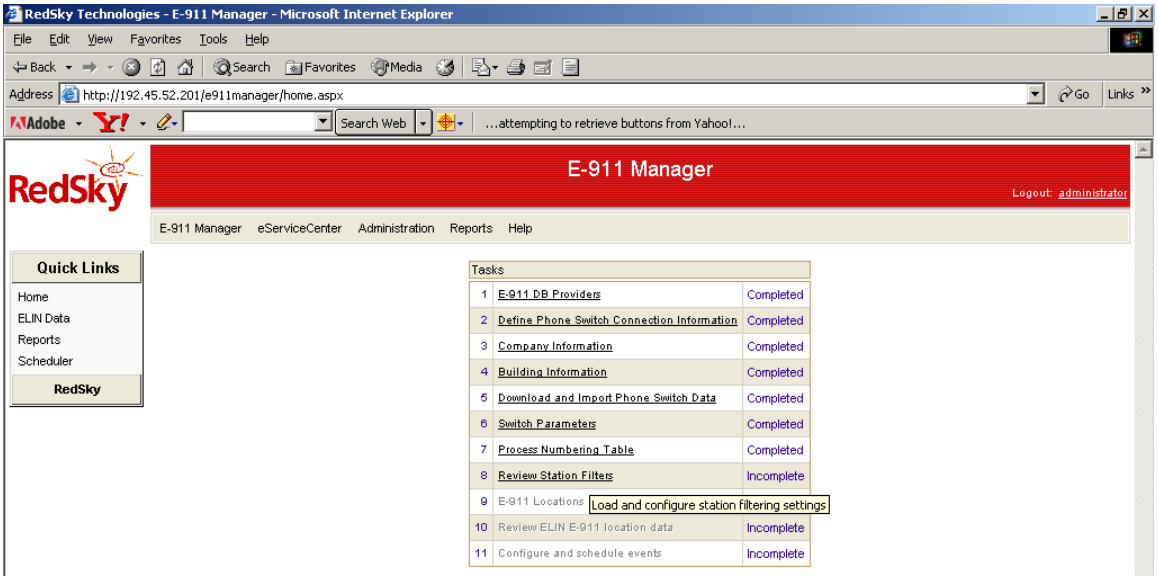
Step	Description
17.	After the import completes, review the table entries and verify consistency with the public-unknown-numbering form entries in Avaya Communication Manager. Click on "**Done**". 
18.	From the **Tasks** list, click on "**Review Station Filters**". 

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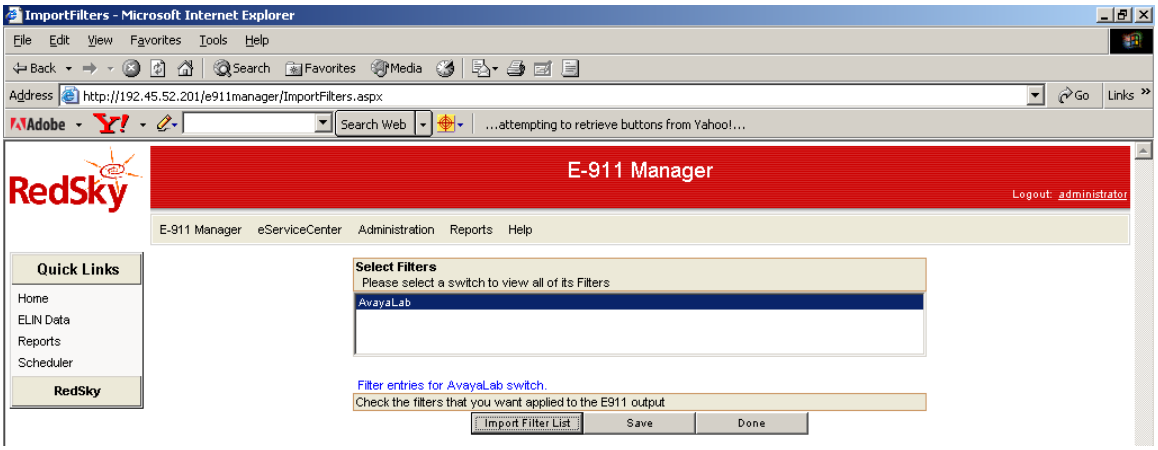
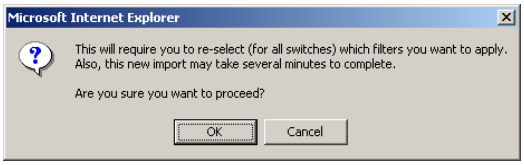
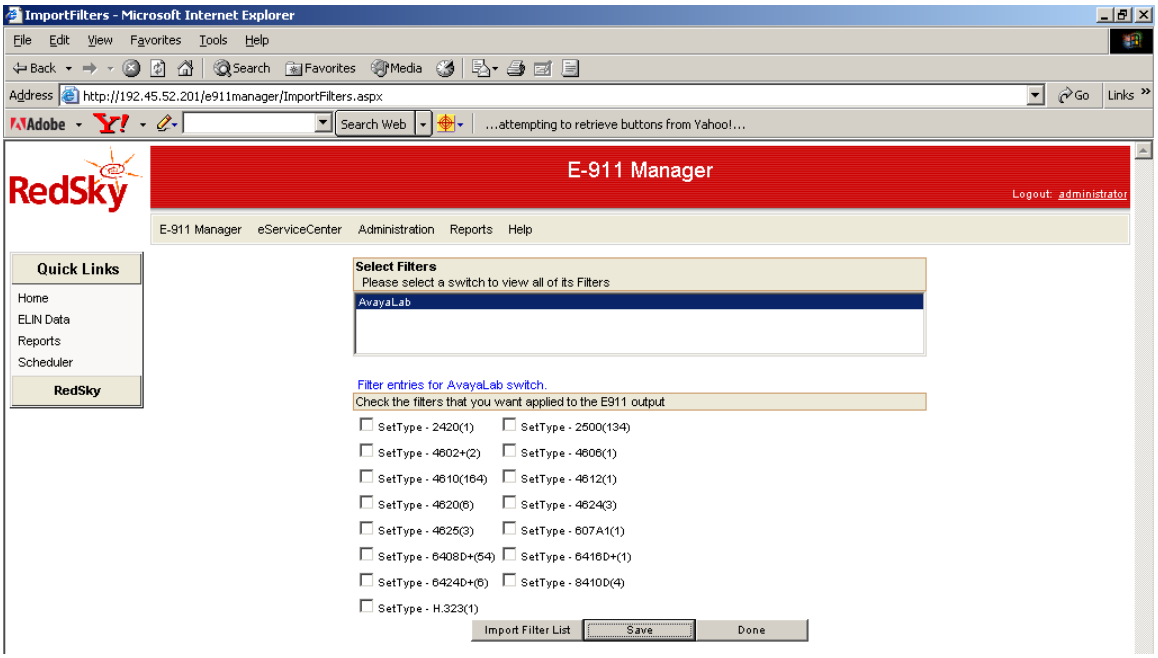
Step	Description
19.	Select the phone switch configured in Steps 2 – 4, and click on "**Input Filter List**".  Click on "**OK**" in the warning pop-up window.  Check the checkboxes of the phone types for which ALI records are NOT to be generated. Click on "**Save**" and then "**Done**". 

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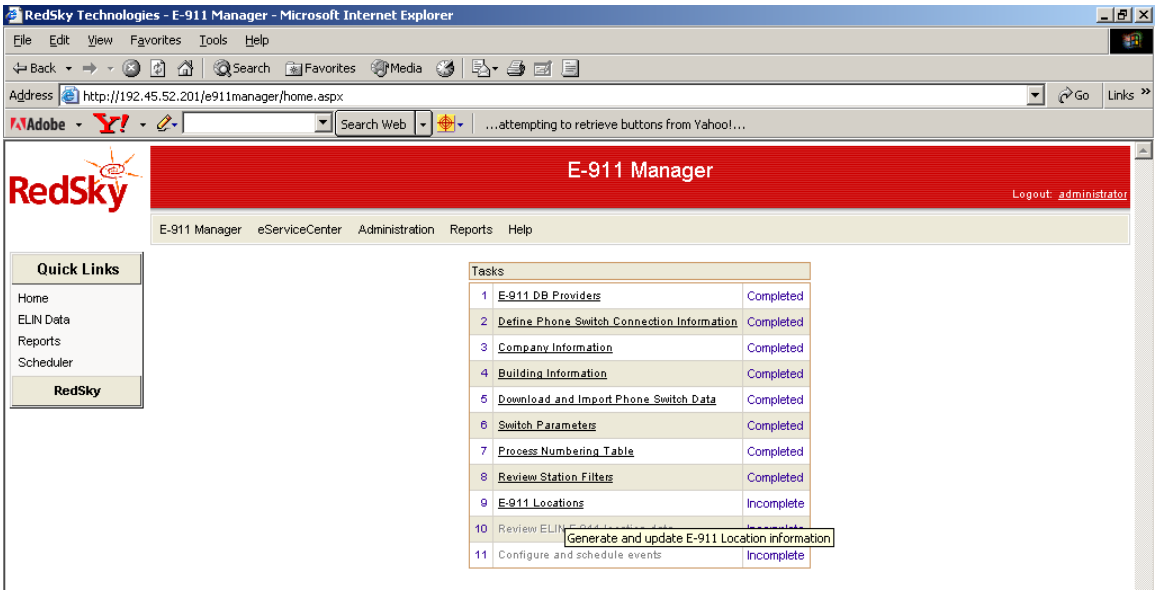
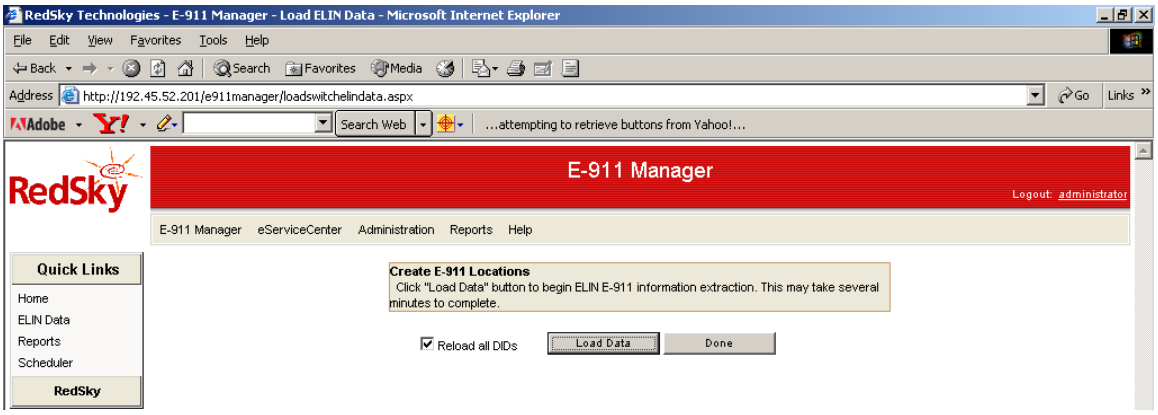
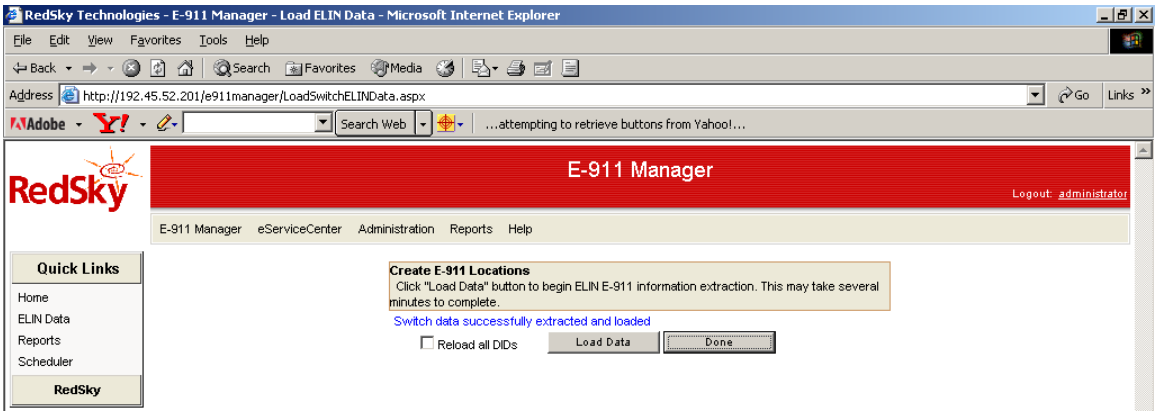
Step	Description
20.	From the **Tasks** list, click on "**E-911 Locations**". 
21.	Check the "**Reload all DIDs**" and click on "**Load Data**".  After the reload completes, click on "**Done**". 

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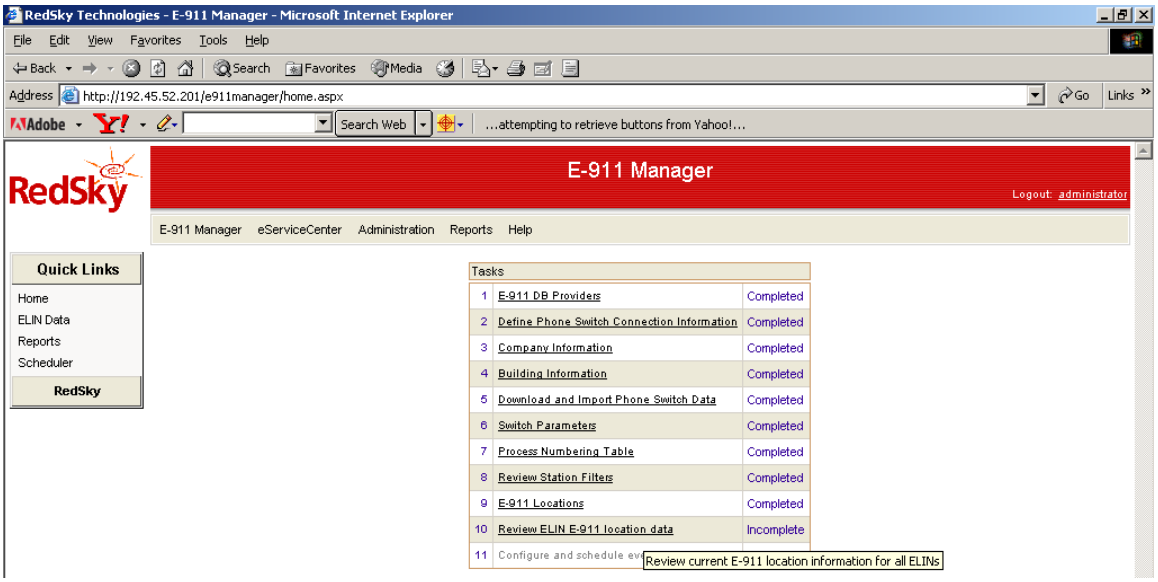
Step	Description
22.	From the **Tasks** list, click on "**Review ELIN E-911 location data**". 

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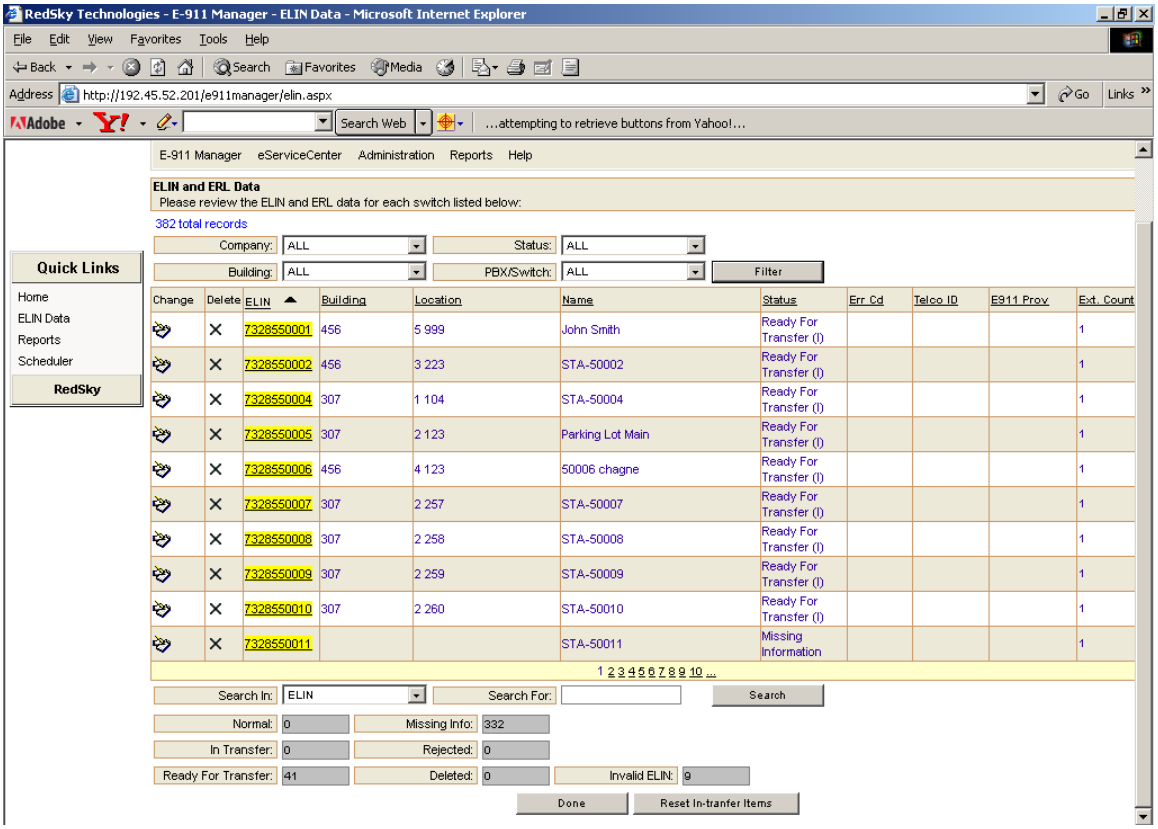
Step	Description
23.	The subsequent table shows the ALI records that were generated based on the information retrieved from Avaya Communication Manager. Only those records with "**Ready For Transfer**" **Status** will be uploaded to the E911 database service provider. Those records with "**Missing Information**" **Status** are missing Building, Floor, Room or Name information. Enter the missing information in Avaya Communication Manager, and repeat Steps 11 - 12, and then Steps 20 - 23.



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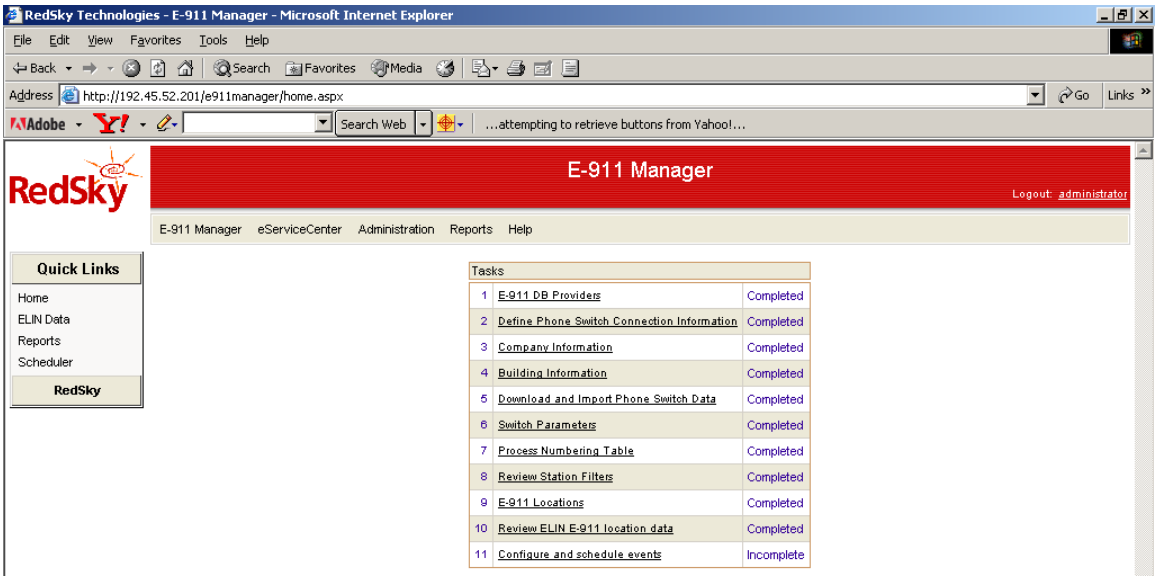
Step	Description
24.	From the **Tasks** list, click on "**Configure and schedule events**" and follow the instructions in the E-911 Manager documentation to configure schedules for retrieving data from Avaya Communication Manager and uploading ALI records to the E911 database service provider. 

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5. Interoperability Compliance Testing

The interoperability compliance testing included functionality and serviceability testing. The functionality testing evaluated the ability of the RedSky E-911 Manager to accurately obtain station emergency numbering and location information from Avaya Communication Manager, and produce ALI records based on the obtained information. The serviceability testing introduced failure scenarios to see if the RedSky E-911 Manager can resume operation after failure recovery.

5.1. General Test Approach

The main objective was to verify that the RedSky E-911 Manager accurately obtains station emergency numbering and location information for ALI record generation from Avaya Communication Manager after stations are added, deleted, and changed, and after emergency location extensions are changed. For serviceability testing, connection and cable disconnects and reconnects, and device resets were applied.

5.2. Test Results

The objectives of Section 5.1 were verified. For serviceability testing, the RedSky E-911 Manager was able to retrieve station emergency numbering and location information from Avaya Communication Manager after the connection to the active Avaya S8710 Media Server was disconnected and reconnected, as well as after resets of Avaya Communication Manager and the RedSky E-911 Manager server.

6. Verification Steps

The following steps may be used to verify the configuration:

- Compare the station emergency numbering and location information reported in the RedSky E-911 Manager and Avaya Communication Manager, and verify consistency.
- Add, delete, and change Avaya Communication Manager station information and verify that the RedSky E-911 Manager retrieves and processes the updates accurately at the scheduled time.

7. Support

For technical support on RedSky Technologies products, contact RedSky Technologies at:

- Phone: 1-866-778-2435
- E-mail: support@redskytech.com

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8. Conclusion

These Application Notes described a compliance-tested configuration comprised of Avaya Communication Manager 3.1 and the RedSky Technologies E-911 Manager 5.1. The RedSky E-911 Manager retrieves station emergency numbering and location information from a PBX, and validates, reformats, and uploads the information to public Automatic Location Identification (ALI) databases. During compliance testing, the RedSky E-911 Manager successfully obtained station emergency numbering and location information after Avaya Communication Manager stations were added, deleted, and changed.

9. Additional References

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

Product information for RedSky Technologies solutions may be found at http://www.redskytech.com/solutions.

[1] *Avaya Communication Manager Application Notes: Emergency Calling*
[2] *Feature Description and Implementation for Avaya Communication Manager*, Issue 4, February 2006, Document Number 555-245-205.

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