Avaya Solution & Interoperability Test Lab

Application Notes for Wesley Clover Solutions Trading Platform with Avaya Aura® Communication Manager – Issue 1.0

Abstract

These Application Notes describe a compliance-tested configuration consisting of Wesley Clover Solutions IP PBX and Wesley Clover Solutions IP Turret with Avaya Aura® Communication Manager.

Information in these Application Notes has been obtained through DevConnect compliance testing and additional technical discussions. Testing was conducted via the DevConnect Program at the Avaya Solution and Interoperability Test Lab.

1. Introduction

Wesley Clover Solutions Trading Platform consists of an IP PBX and IP Turrets. Wesley Clover Solutions IP PBX communicates to Avaya Aura® Communication Manager via a QSIG trunk. Wesley Clover Solutions IP turrets register with Wesley Clover Solutions IP PBX.

2. General Test Approach and Test Results

The compliance test focused on the interoperability between Avaya Aura® Communication Manager and Wesley Clover Solutions IP PBX.

DevConnect Compliance Testing is conducted jointly by Avaya and DevConnect members. The jointly-defined test plan focuses on exercising APIs and/or standards-based interfaces pertinent to the interoperability of the tested products and their functionalities. DevConnect Compliance Testing is not intended to substitute full product performance or feature testing performed by DevConnect members, nor is it to be construed as an endorsement by Avaya of the suitability or completeness of a DevConnect member's solution.

2.1. Interoperability Compliance Testing

Compliance testing focused on verifying call scenarios mentioned below:

- Call setup and termination
- Call Holds, Call Transfers and Conference calls

2.2. Test Results

All executed test cases were passed and all objectives were met with the observation noted below:

- For call scenarios related to Call Conferences and Call Forwards, Wesley Clover Solutions IP PBX holds a Q-SIG trunk member for each call leg.

2.3. Support

Support for Wesley Clover Solutions can be found via the following means:
Web: www.wesleycloversolutions.com
E-mail: service@wesleycloversolutions.com

3. Reference Configuration

The following figure displays the configuration used during the compliance test.

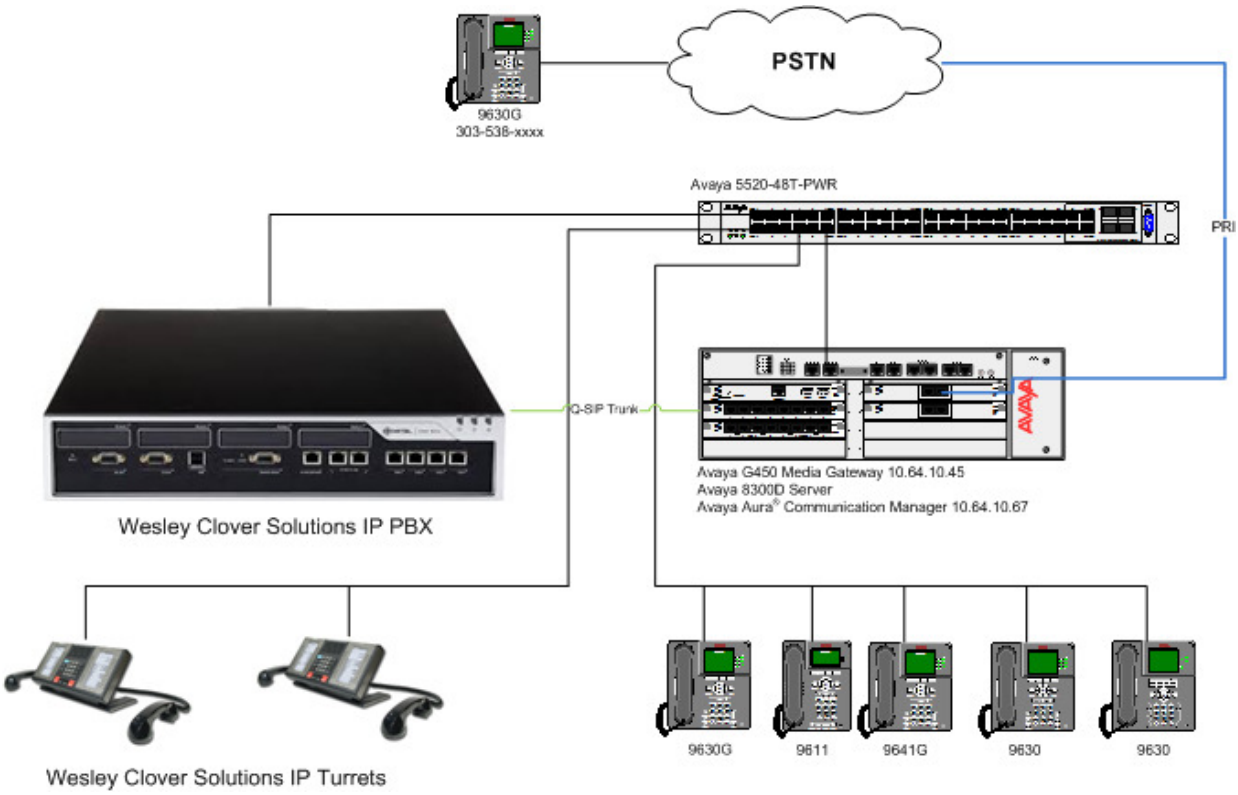


Figure 1: Reference Configuration

4. Equipment and Software Validated

The following equipment and version were used for the sample configuration provided:

Equipment	Version
Avaya Aura® Communication Manager	6.3.1 (SP1)
Avaya G450 Media Gateway	31.20.1
Avaya 96x1 Series H.323 Phones Avaya 96x0 Series H.323 Phones	6.2.4 3.10
Avaya Aura® Utility Services	6.3.1 (SP1)
Wesley Clover Solutions IP PBX	12.0.1.24
Wesley Clover Solutions IP Turrets	3.0.0.8

5. Configure Avaya Aura® Communication Manager

Communication Manager allows for routing calls via a Q-SIG trunk to Wesley Clover Solutions IP PBX. The following information allows for a Q-SIG connection between Communication Manager and Wesley Clover Solutions IP PBX.

5.1. Verify Avaya Aura® Communication Manager License

Use the **display system-parameters customer-options** command to verify options.

On **Page 4,** verify **ISDN/PRI** fields is set to **y**.

```
display system-parameters customer-options                      Page   4 of  11
                               OPTIONAL FEATURES

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

           IP Attendant Consoles? y
```

5.2. Configure DS1

Use the **add ds1** ***n*** command to configure a network region, where ***n*** is the location of the T1 card. Configure this ds1 as follows:

- Type in a descriptive name in **Name**
- Set **Line Coding** to **b8zs**
- Set **Framing Mode** to **esf**
- Set **Signaling Mode** to **isdn-pri**
- Set **Connect** to **pbx**
- Set **Interface** to **peer-master**
- Set **Peer Protocol** to **Q-SIG**

```
add ds1 1v6                                              Page   1 of   2
                              DS1 CIRCUIT PACK

            Location: 001V6                          Name: to_WCS
            Bit Rate: 1.544                   Line Coding: b8zs
   Line Compensation: 1                       Framing Mode: esf
      Signaling Mode: isdn-pri
             Connect: pbx                        Interface: peer-master
   TN-C7 Long Timers? n                      Peer Protocol: Q-SIG
Interworking Message: PROGress                       Side: a
Interface Companding: mulaw                           CRC? n
           Idle Code: 11111111
                             DCP/Analog Bearer Capability: 3.1kHz

                                          T303 Timer(sec): 4
                                         Disable Restarts? y

      Slip Detection? n                Near-end CSU Type: other

   Echo Cancellation? n
```

5.3. Administer Q-SIG Signaling Group

Use the **add signaling-group *n*** command to add a new signaling group, where ***n*** is an available signaling group number. Configure this signaling group as follows:

- Set **Group Type** to **isdn-pri**
- Set **Primary D-Channel** according to the ds1 configured in previous section
- Set **TSC Supplementary Service Protocol** to **b**

```
add signaling-group 2                                        Page   1 of   1
                              SIGNALING GROUP

 Group Number: 2              Group Type: isdn-pri
                    Associated Signaling? y          Max number of NCA TSC: 0
                       Primary D-Channel: 001V624     Max number of CA TSC: 0
                                                    Trunk Group for NCA TSC:
       Trunk Group for Channel Selection:       X-Mobility/Wireless Type: NONE
      TSC Supplementary Service Protocol: b          Network Call Transfer? n
```

5.4. Administer Q-SIG Trunk Group

Use the **add trunk-group *n*** command to add a trunk group, where ***n*** is an available trunk group number. Configure this trunk group as follows, on **Page 1**:

- Set **Group Type** to **isdn**
- Enter a **Group Name**
- Enter a valid **TAC**, e.g., *002
- Set **Carrier Medium** to **PRI/BRI**
- Set **Service Type** to **tie**

```
add trunk-group 2                                            Page   1 of  21
                              TRUNK GROUP

Group Number: 2                   Group Type: isdn          CDR Reports: r
  Group Name: to_WCS                       COR: 1        TN: 1        TAC: *002
   Direction: two-way        Outgoing Display? n         Carrier Medium: PRI/BRI
 Dial Access? y              Busy Threshold: 255  Night Service:
Queue Length: 0
Service Type: tie                   Auth Code? n            TestCall ITC: rest
                       Far End Test Line No:
TestCall BCC: 4
```

On **Page 3**:

- Set **Send Name** and **Send Calling Number** to **y**
- Set **Format** to **unk-pvt**
- Set **Send Connected Number** to **y**

```
add trunk-group 2                                          Page   3 of  21
TRUNK FEATURES
          ACA Assignment? n            Measured: none      Wideband Support? n
                                 Internal Alert? n        Maintenance Tests? y
                               Data Restriction? n     NCA-TSC Trunk Member: 2
                                     Send Name: y      Send Calling Number: y
            Used for DCS? n            Hop Dgt? n     Send EMU Visitor CPN? n
   Suppress # Outpulsing? n    Format: unk-pvt
 Outgoing Channel ID Encoding: preferred     UUI IE Treatment: service-provider

                                              Replace Restricted Numbers? n
                                             Replace Unavailable Numbers? n
                                                   Send Connected Number: y
                                              Hold/Unhold Notifications? y
             Send UUI IE? y     Modify Tandem Calling Number: no
               Send UCID? n
 Send Codeset 6/7 LAI IE? y                        Ds1 Echo Cancellation? n

    Apply Local Ringback? n
 Show ANSWERED BY on Display? y
                            Network (Japan) Needs Connect Before Disconnect? n
```

On **Page 5**, configure the ports according the ds1 configured in **Section 5.2**.

```
add trunk-group 2                                          Page   5 of  21
                                TRUNK GROUP
                                     Administered Members (min/max):   1/23
GROUP MEMBER ASSIGNMENTS                  Total Administered Members:  23

       Port    Code Sfx Name        Night           Sig Grp
  1: 001V601  MM710                                  2
  2: 001V602  MM710                                  2
  3: 001V603  MM710                                  2
  4: 001V604  MM710                                  2
  5: 001V605  MM710                                  2
  6: 001V606  MM710                                  2
  7: 001V607  MM710                                  2
  8: 001V608  MM710                                  2
  9: 001V609  MM710                                  2
 10: 001V610  MM710                                  2
 11: 001V611  MM710                                  2
 12: 001V612  MM710                                  2
 13: 001V613  MM710                                  2
 14: 001V614  MM710                                  2
 15: 001V615  MM710                                  2
```

Note: Once the trunk group has been configured, modify the signaling-group to associate it with the trunk group configured in this section. Set the **Trunk Group for Channel Selection** to the trunk group number configured in this section.

5.5. Administer Route Pattern

Use the **change route-pattern *n*** command to configure a route pattern, where ***n*** is an available route patterns. Configure this route pattern as follows:

- Type a name in **Pattern Name** field
- For line 1, set **Grp No** to the trunk group configured in previous section, e.g., 2
- For line 1, set **FRL** to **0**
- Set the **Numbering Format** to **lev0-pvt**

```
change route-pattern 2                                          Page   1 of   3
                   Pattern Number: 2      Pattern Name: PSTN Hub
                                SCCAN? n     Secure SIP? n
    Grp FRL NPA Pfx Hop Toll No.  Inserted                          DCS/ IXC
    No          Mrk Lmt List Del  Digits                            QSIG
                             Dgts                                   Intw
 1: 2    0                                                           n   user
 2:                                                                  n   user
 3:                                                                  n   user
 4:                                                                  n   user
 5:                                                                  n   user
 6:                                                                  n   user

     BCC VALUE  TSC CA-TSC    ITC BCIE Service/Feature PARM  No. Numbering LAR
    0 1 2 M 4 W     Request                                   Dgts Format
                                                           Subaddress
 1: y y y y y n  y  none      rest                                 lev0-pvt  none
 2: y y y y y n  n            rest                                           none
 3: y y y y y n  n            rest                                           none
 4: y y y y y n  n            rest                                           none
```

5.6. Administer Private Numbering

Use the **change private-numbering 1** command to define the calling party number to send to Wesley Clover Solutions IP PBX.

Configure private numbering as follows:

- Add entries for trunk group configured in **Section 5.4**

```
change private-numbering 1                                      Page   1 of   2
                         NUMBERING - PRIVATE FORMAT

Ext  Ext            Trk        Private         Total
Len  Code           Grp(s)     Prefix          Len
 4   4              2                          4     Total Administered: 1
 5   5                                         5        Maximum Entries: 540
```

5.7. Administer AAR Analysis

Use the **change aar analysis *n*** command to configure routing for extensions starting with ***n***. For compliance testing, extensions starting with 4 and 4 digits long were used to route calls to Wesley Clover Solutions IP PBX:

- Set **Dialed String** to starting digits of extensions that will be used, e.g., 4
- Set **Min** and **Max** to 4 for 4 digit extensions
- Set **Route Pattern** to the pattern configured in **Section 5.5**, e.g., 2
- Set **Call Type** to **lev0**

```
change aar analysis 4                                        Page   1 of   2
                           AAR DIGIT ANALYSIS TABLE
                                 Location: all            Percent Full: 1

          Dialed           Total     Route    Call   Node  ANI
          String          Min  Max  Pattern   Type   Num   Reqd
     4                    4    4     2        lev0         n
     4                    5    5     2        aar          n
     45000                5    5     30       aar          n
     5                    4    4     2        lev0         n
     5                    5    5     32       aar          n
     552                  10   10    10       aar          n
     588                  5    5     10       aar          n
```

5.8. Administer Stations

Administration of Avaya Stations/Extensions in Communication Manager is not shown in this document. Please refer to document [1] in reference section of this document.

6. Configure Wesley Clover Solutions

Wesley Clover Solutions trading platform utilizes Wesley Clover Solutions IP PBX, to allow for call routing via Q-SIQ trunks for inter-PBX and external call routing. The following information provides programming guidelines for Q-SIG connection between the Wesley Clover Solutions IP PBX and Avaya Aura® Communication Manager.

6.1. Assumptions

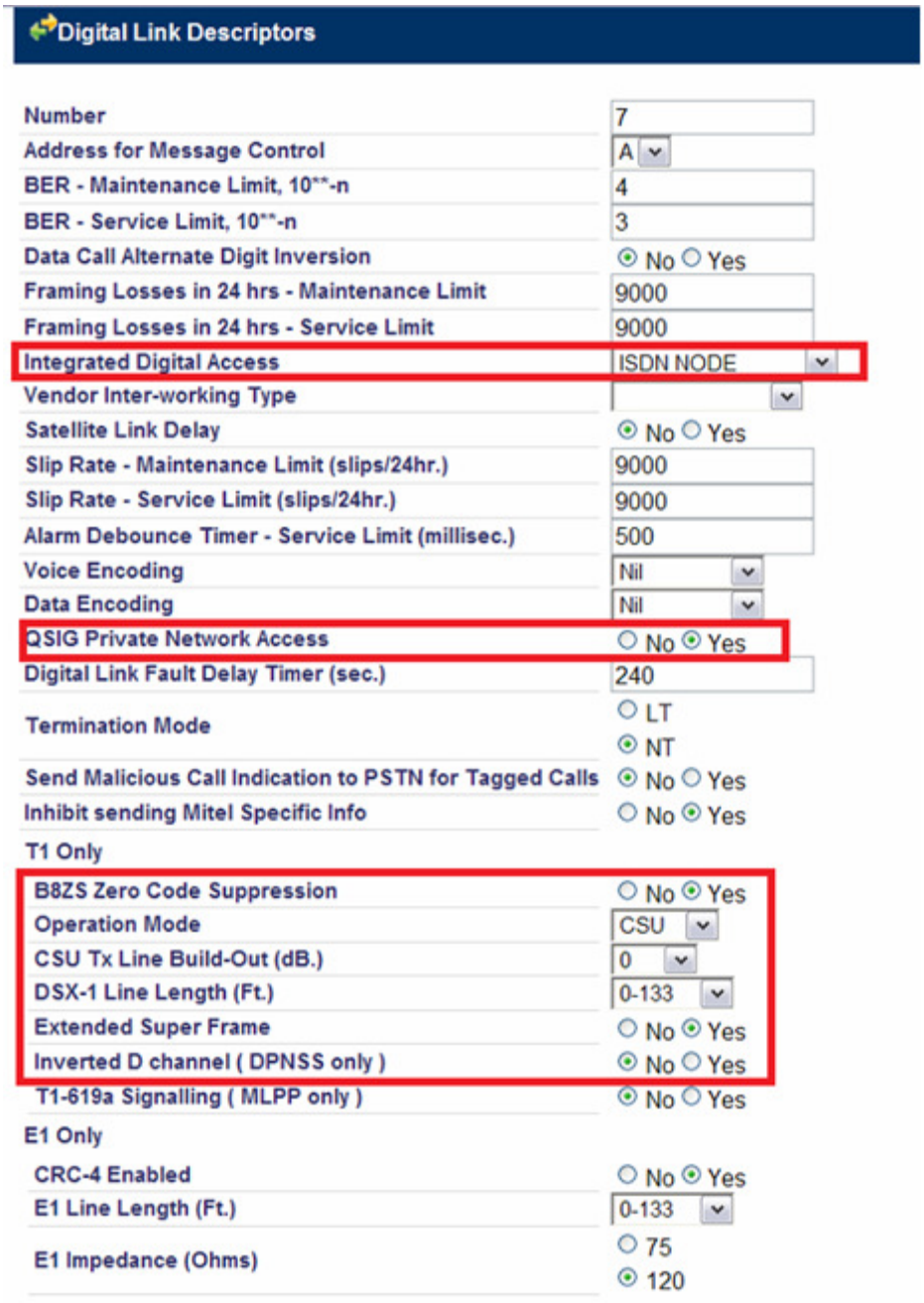
- It is assumed for the purposes of this document that the appropriate number of digital link licenses and T1 modules has been installed on Wesley Clover Solutions IP PBX. One Digital Link License, P/N 54000303, and one available RJ-45 port on a Dual T1/E1 Trunk MMC Module, P/N 50003560, is required for each Q-SIG T1
- The dialable Avaya extension numbers are 4 digits in length
- There are no dial restrictions for calls routing to the Avaya Aura® environment

Note: Configuration is performed via a web browser, by navigating to http://**<ip-address>**, where **<ip-address>** is the IP address of Wesley Clover Solutions IP PBX.

6.2. Create Digital Link Descriptor

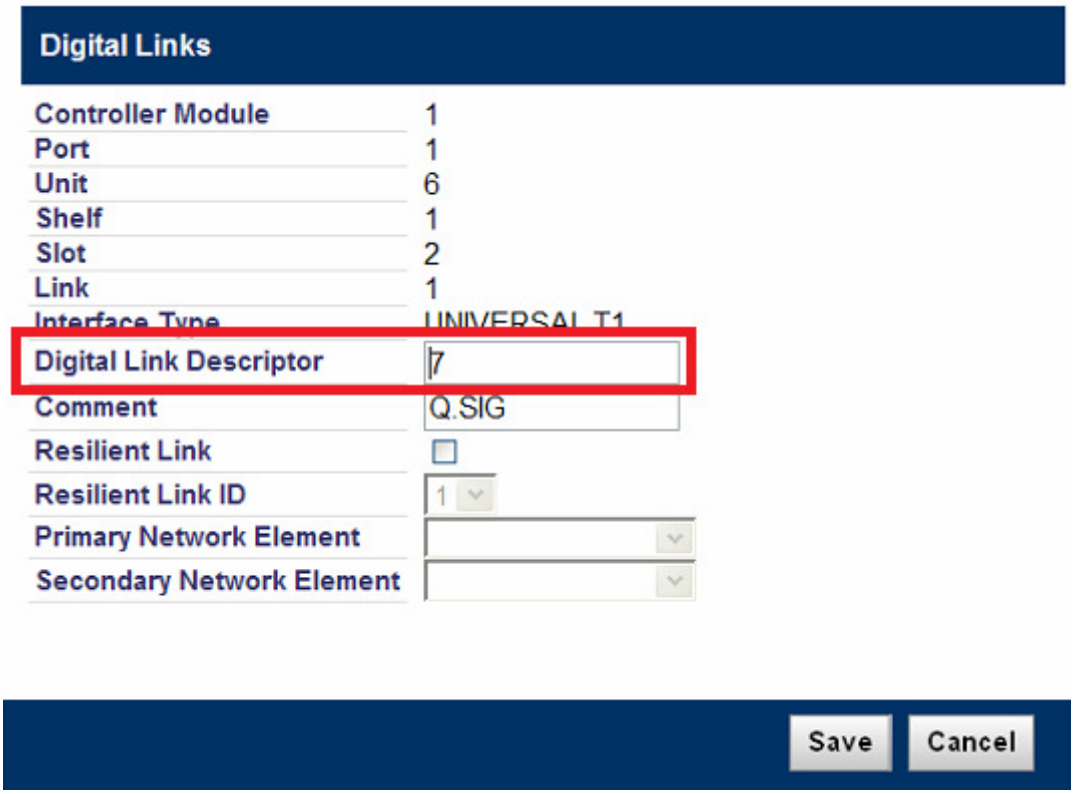
Navigate to **Trunks → Digital → Digital Link Descriptors** (not shown)
In this example **7** is used as a link descriptor.

- Set **Integrated Digital Access** to **ISDN Node**
- Set **QSIG Private Network Access** to **Yes**
- Set **B8ZS Zero Code Suppression** to **Yes**
- Set **Operation Mode** to **CSU** and **Extended Super Frame** to **Yes**



6.3. Assign the Digital Link

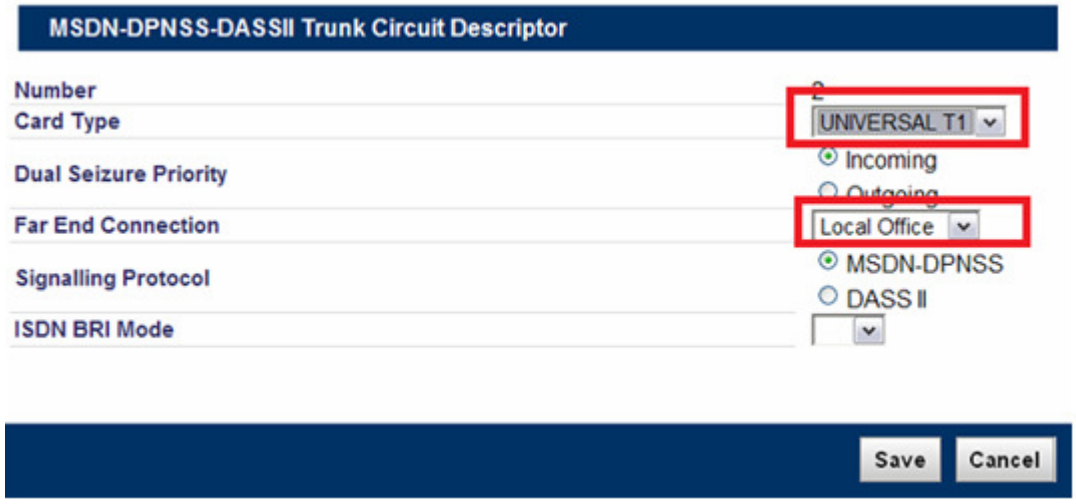
Navigate to **Trunks → Digital → Digital Links** (not shown)
Apply the Digital Link Descriptor that was created in previous section to an available Digital Link port. This corresponds to the physical RJ-45 port on the Dual T1/E1 MMC module. For clarity it is recommended that the comment field be filled in.



6.4. Create MSDN-DPNSS-DASSII Trunk Circuit Descriptor

Navigate to **Trunks → Digital → MSDN-DPNSS-DASSII Trunk Circuit Descriptor** (not shown)

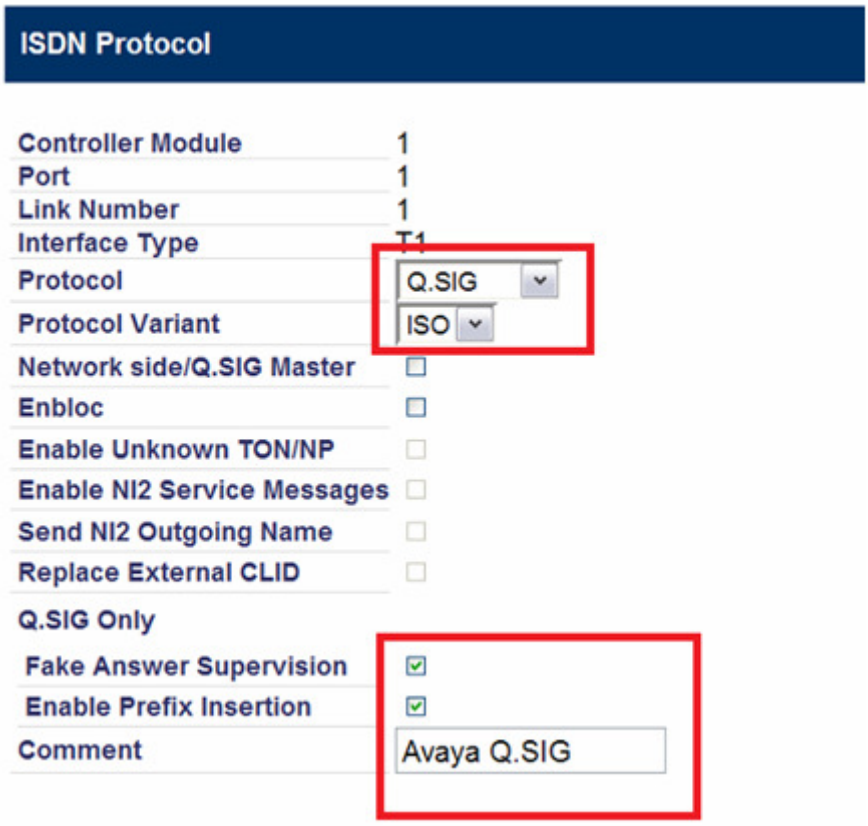
- Select **Universal T1** from **Card Type** drop down menu
- Select **Local Office** from **Far End Connection** drop down menu



6.5. Set the ISDN Protocol

Navigate to **Trunks → Digital → ISDN → ISDN Protocol** (not shown)
In the ISDN Protocol form:

- Set **Protocol** to **Q.SIG**
- Set **Protocol Variant** to **ISO**
- Select **Fake Answer Supervision**
- Select **Enable Prefix Insertion**
- Type in a **Comment** for information purposes



6.6. Program Class Of Service (COS)

Navigate to **System Properties → System Feature Settings → Class of Service Options** (not shown)
Program a unique COS. In this example **7** is used. Add an identifier to the Comment field.

Set the following trunk options to **Yes**.

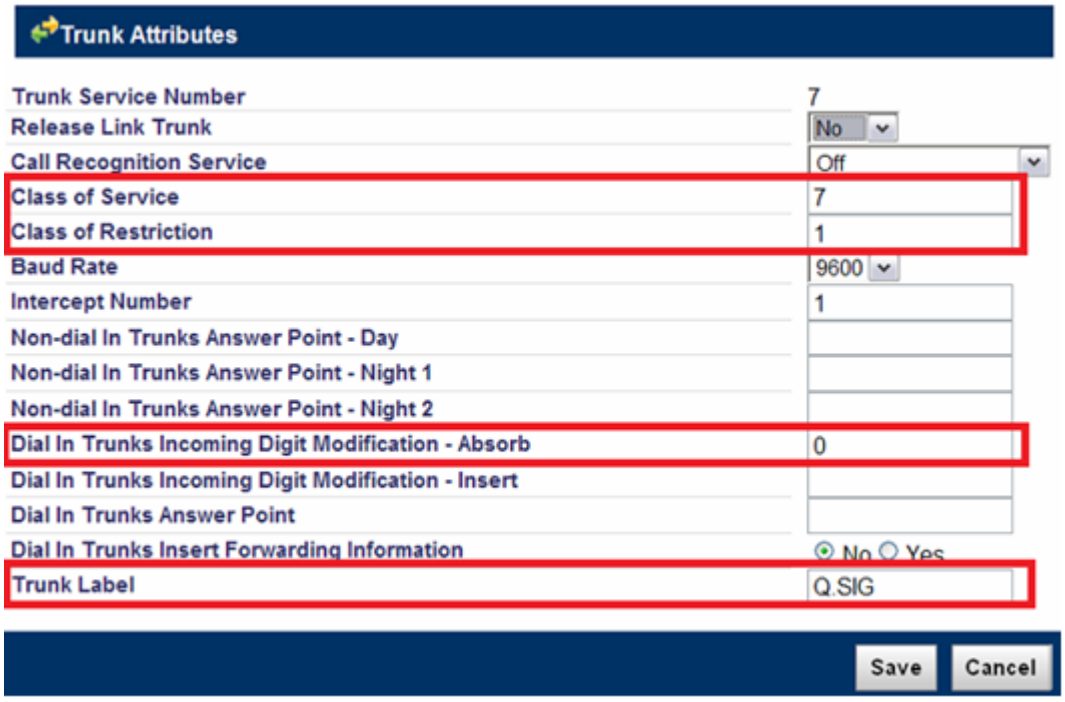
- ANI/DNIS/ISDN Number Delivery Trunk
- Public Network Access via DPNSS
- Public Network To Public Network Connection Allowed
- Trunk Calling Party Identification
- Trunk Flash Allowed
- Two B-Channel Transfer Allowed

Verify **Conference Call** is set to **Yes**.

6.7. Program Trunk Attributes

Navigate to **Trunks → Trunk Attributes** (not shown)
In this example, **7** is used as a Trunk Service Number.

- Set the **Class of Service** to the COS assigned in **Section 6.6**
- Set **Class of Restriction** to **1**
- Set the **Dial-In Trunk Incoming Digit Modification – Absorb** to **0**
- Add a **Trunk Label**



6.8. Program Digital Trunks

Navigate to **Trunks → Digital → Digital Trunks** (not shown)
In the Digital Trunks form, program 23 trunks.

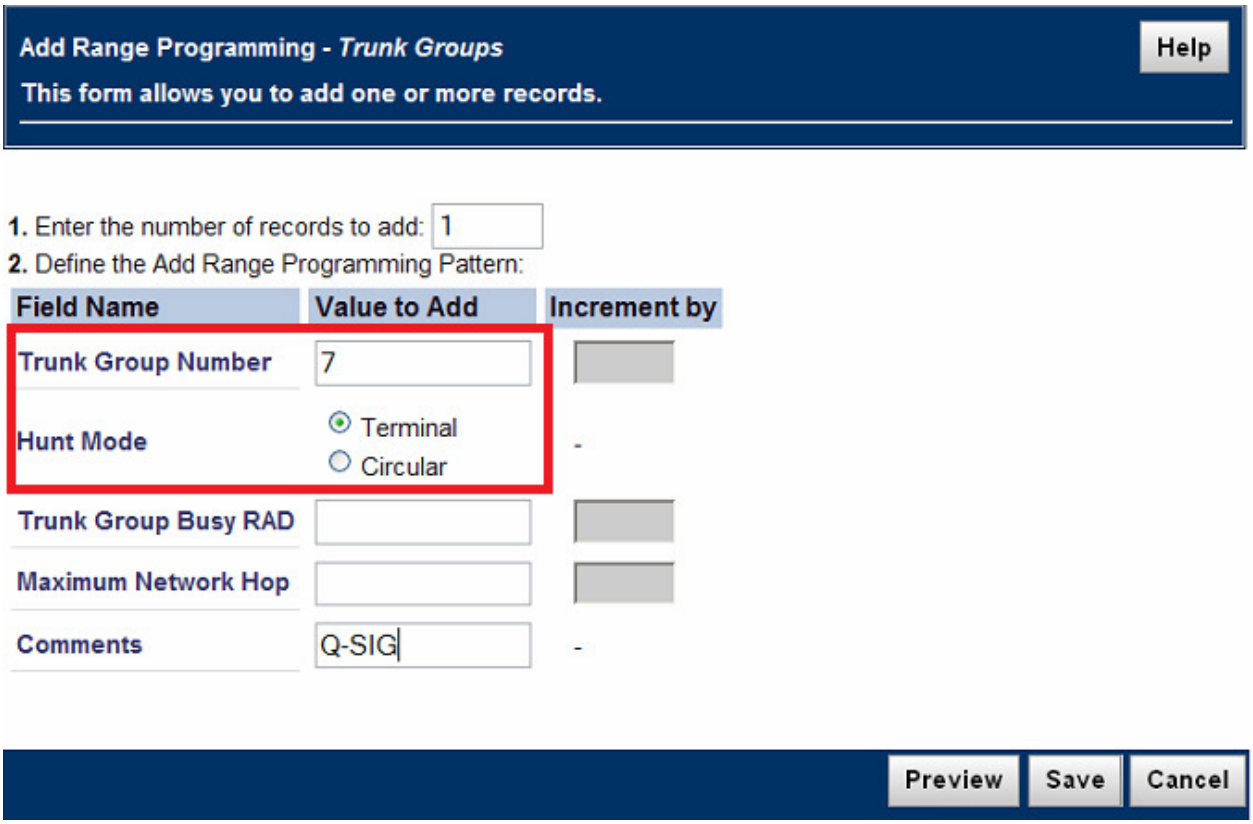
- Assign a unique trunk number to each circuit
- Assign the Trunk Service Number created in **Section 6.7**
- Assign the Circuit Descriptor Number created in **Section 6.4**
- Interconnect Number and Tenant Number fields may be left as default of 1

Cabinet	6
Shelf	1
Slot	2
Circuit	1
Card Type	UNIVERSAL T1
Trunk Number	7001
Trunk Service Number	7
DTS Service Number	
Circuit Descriptor Number	2
Interconnect Number	1
Tenant Number	1

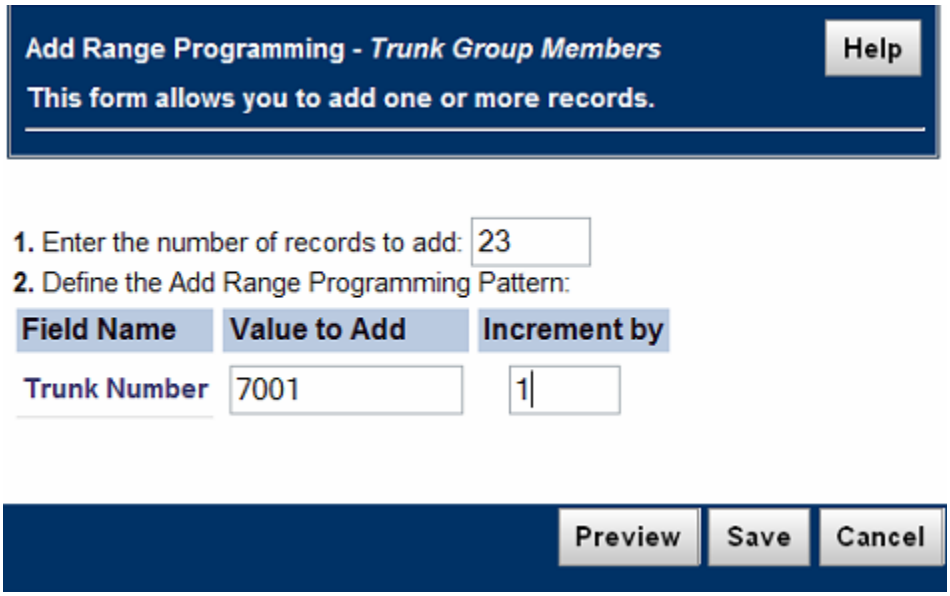
6.9. Program Trunk Groups

Navigate to **Trunks → Digital → Trunk Groups** (not shown)
Create a new Trunk Group. In this example Trunk Group Number 7 is used.

- Select **Terminal** for **Hunt Mode**
- Type in descriptive name in **Comment**

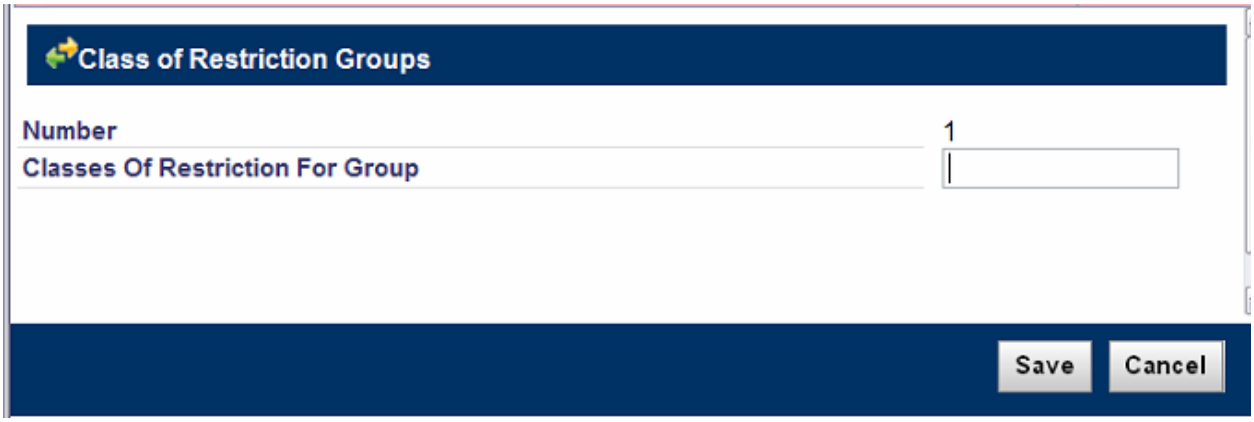


Add the 23 trunk members created in **Section 6.8** to the newly created group.



6.10.Program Class Of Restriction Group

Navigate to **System Properties → System Feature Settings → Class of Restriction Groups** (not shown)
Verify that the class has no restrictions. Choose an index number without any restrictions applied. In this example **Number 1** is used. Note that the **Classes of Restriction For Group** is blank indicating no restrictions.



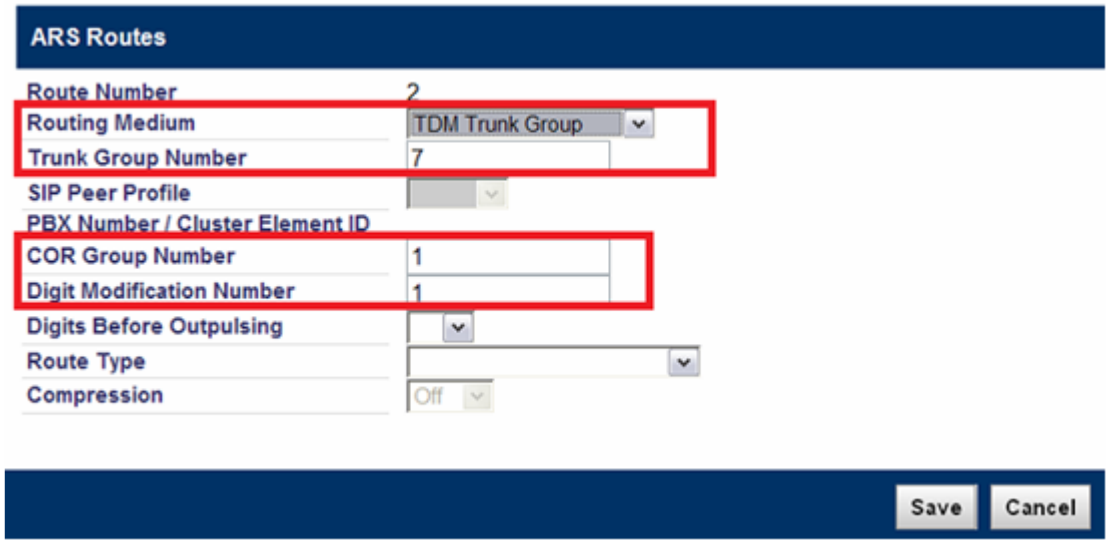
6.11.Program Digit Modification Plan

Navigate to **Call Routing → Automatic Route Selections (ARS) → ARS Digit Modification Plans**
In this example **Digit Modification Number** of **1** is used. Set the **Number of Digits to Absorb** to **0**.

6.12. Program Route Assignment Form

Navigate to **Call Routing → Automatic Route Selection (ARS) → ARS Routes** (not shown)
In this example **Route Number** of **2** is used.

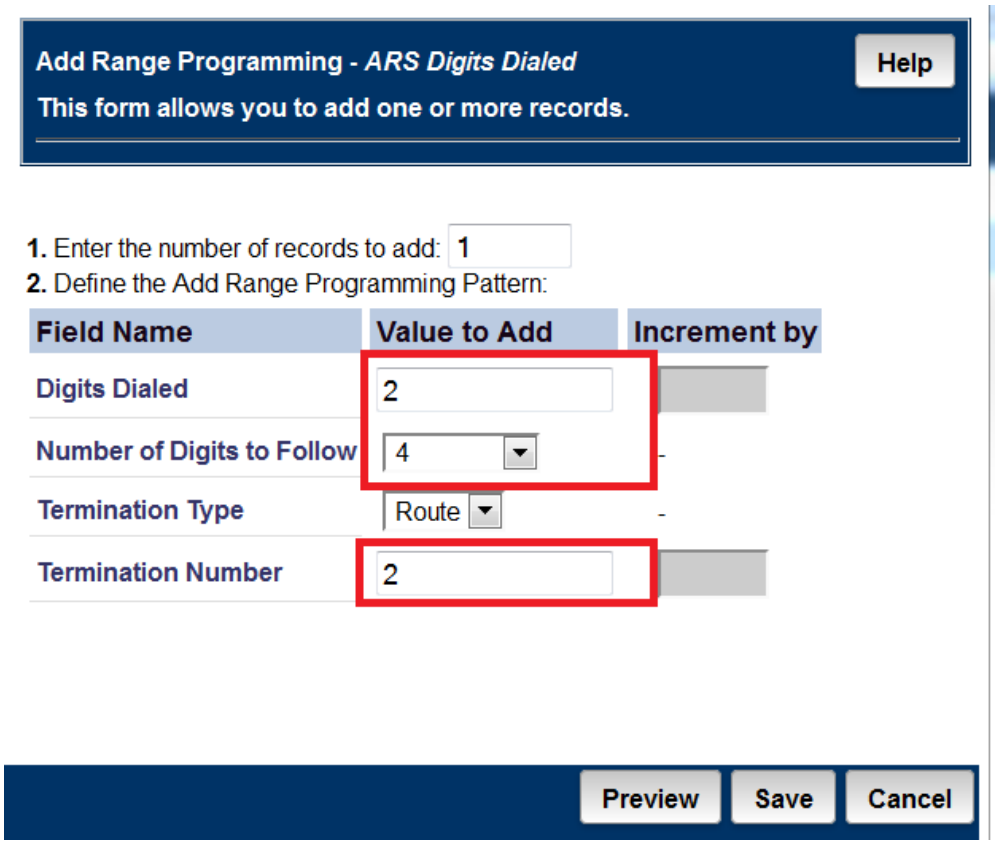
- Set **Routing Medium** to **TDM Trunk Group**
- Set **Trunk Group Number** created in **Section 6.9**
- Set **COR Group Number** from **Section 6.10**
- Set **Digit Modification Number** from **Section 6.11**



6.13.Program ARS Digits Dialed Form

Navigate to **Call Routing → Automatic Route Selection (ARS) → ARS Digits Dialed**
In this example the Avaya extension are 5 digits in length and begin with a 2.

- Program the **Digits Dialed** field with the 1st digit of Avaya extensions
- Program the **Number of Digits to Follow** field to be the number of digits in the Avaya extension, minus 1 digit (the "2" programmed in Digits Dialed)
- Select **Route** for **Termination Type**
- Program **Termination Number** to match the route created in **Section 6.12**



7. Verification Steps

7.1. Avaya Aura® Communication Manager

From the SAT interface, use the **status trunk *n*** command to check the status of the trunk, where ***n*** is the number of trunk group configured in **Section 5.4**. The **Service State** of **in-service/idle** indicates that the Q-SIG trunk between Communication Manager and Wesley Clover Solutions IP PBX is in service.

```
status trunk 6

                            TRUNK GROUP STATUS

Member   Port     Service State      Mtce Connected Ports
                                     Busy

0002/001 001V601  in-service/idle    no
0002/002 001V602  in-service/idle    no
0002/003 001V603  in-service/idle    no
0002/004 001V604  in-service/idle    no
0002/005 001V605  in-service/idle    no
```

7.2. Wesley Clover Solutions

Navigate to **Maintenance and Diagnostic → Maintenance Commands**

The following maintenance commands may be useful for testing and validation. Please refer to the Wesley Clover Solutions IP PBX help files for additional commands and detailed descriptions.

- DTSTAT READ <QSIG Link PLID> LAST 2
  This command will show the link status of the QSIG trunks for the last 2 hours.

- STAT TRUNK GROUP <trunk group number>
  Use this command to view the status of the QSIG trunk. <trunk group number> qualifier is trunk group assigned to the QSIG trunks.

- DGT TRACE <number>
  This command is useful to validate outbound ARS routing.

- LOGS READ SMDR NEWEST <number>
  This command may be used to check call records for inbound or outbound calls. <number> is the number of records to read.

8. Conclusion

Wesley Clover Solutions Trading Platform was able to successfully interoperate with Avaya Aura® Communication Manager. All executed test cases passed.

9. Additional References

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

[1] Administering Avaya Aura® Communication Manager, Release 6.3, Document 03-3005089, Issue 7.0, December 2012

Product information for Wesley Clover Solutions Trading Platform can be obtained from www.wesleycloversolutions.com

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 DevConnect Program at devconnect@avaya.com.