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Avaya Solution & Interoperability Test Lab

Application Notes for Inova LightLink Middleware with Avaya Aura® Communication Manager and Avaya Call Management System using Real-Time Socket Interface – 1.0

Abstract

These Application Notes describe the configuration steps required to integrate Inova LightLink Middleware with Avaya Call Management System using the Real-Time Socket interface to capture ACD call center data from Avaya Aura® Communication Manager. The Real-Time Socket (RT_Socket) interface is used to obtain real-time data for splits/skills, Vector Directory Numbers (VDNs), and agents. This interface is provided by Avaya Professional Services.

Readers should pay attention to **Section 2**, in particular the scope of testing as outlined in **Section 2.1** as well as the observations noted in **Section 2.2**, to ensure that their own use cases are adequately covered by this scope and results.

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

These Application Notes describe the configuration steps required to integrate Inova LightLink Middleware (LightLink) with Avaya Call Management System (CMS) using the Real-Time Socket interface to capture ACD call center data from Avaya Aura® Communication Manager (Communication Manager). The Real-Time Socket (RT_Socket) interface is used to obtain real-time data for splits/skills, Vector Directory Numbers (VDNs), and agents. This interface is provided by Avaya Professional Services.

LightLink is a platform that supports the integration, management, and delivery of real-time data. LightLink utilizes the real-time call center data from Communication Manager for splits/skills, VDNs, and agents, and provides the information to applications or contact center organizations for effective management.

The real-time data streams of ACD call center data are obtained by LightLink from CMS. A TCP client-server model is used for the connection, with CMS being the "client" and LightLink being the "server". LightLinks' Data Source Manager runs a TCP listener process to accept the data connection from the RT_Socket interface of CMS. CMS can send data to LightLink every 30 seconds (configurable).

Avaya Professional Service installs and configures the RT_Socket interface on CMS, and provides the TCP port number associated with each RT_Socket session to Inova for configuring LightLink. LightLink parses the raw data streams received and makes the data available on various output devices. The real-time data can be monitored by customers via customized viewing models.

2. General Test Approach and Test Results

The feature test cases were performed manually. Incoming calls were made to the monitored ACD/Skill and VDN groups to enable data streams to be sent to LightLink. Manual call controls and work mode changes from the Agent telephones were exercised as necessary to populate specific fields in the data streams.

The serviceability test cases were performed manually by stopping and restarting the RT_Socket interface, and by disconnecting and reconnecting network connection to the LightLink server.

The verification of all tests included checking of proper display of real-time data at the LightLink server, and comparing the displayed data with the real-time reports from the CMS server.

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.

Avaya recommends our customers implement Avaya solutions using appropriate security and encryption capabilities enabled by our products. The testing referenced in this DevConnect Application Note included the enablement of supported encryption capabilities in the Avaya products only (private network side). Readers should consult the appropriate Avaya product documentation for further information regarding security and encryption capabilities supported by those Avaya products.

Support for these security and encryption capabilities in any non-Avaya solution component is the responsibility of each individual vendor. Readers should consult the appropriate vendor-supplied product documentation for more information regarding those products.

For the testing associated with this Application Note, the interface between Avaya systems and the LightLink did not include use of any specific encryption features as requested by Inova.

2.1. Interoperability Compliance Testing

The interoperability compliance test included feature and serviceability testing. The feature testing focused on verifying LightLink parsing and displaying of ACD/Skill, VDN, and Agent data from CMS.

The serviceability testing focused on verifying the ability of LightLink to recover from adverse conditions, such as restarting the RT_Socket interface and network unavailability.

2.2. Test Results

The test objectives listed in **Section 2.1** were verified and all test cases were executed and passed.

2.3. Support

Contact Inova Solutions for technical support via the following means:

- **Web:** http://www.inovasolutions.com
- **Phone:** 1-800-637-1077
- **Email:** info@inovasolutions.com

3. Reference Configuration

Figure 1 illustrates the configuration used for compliance testing. The network consisted of Communication Manager, Avaya CMS and LightLink server running on a virtualized environment.
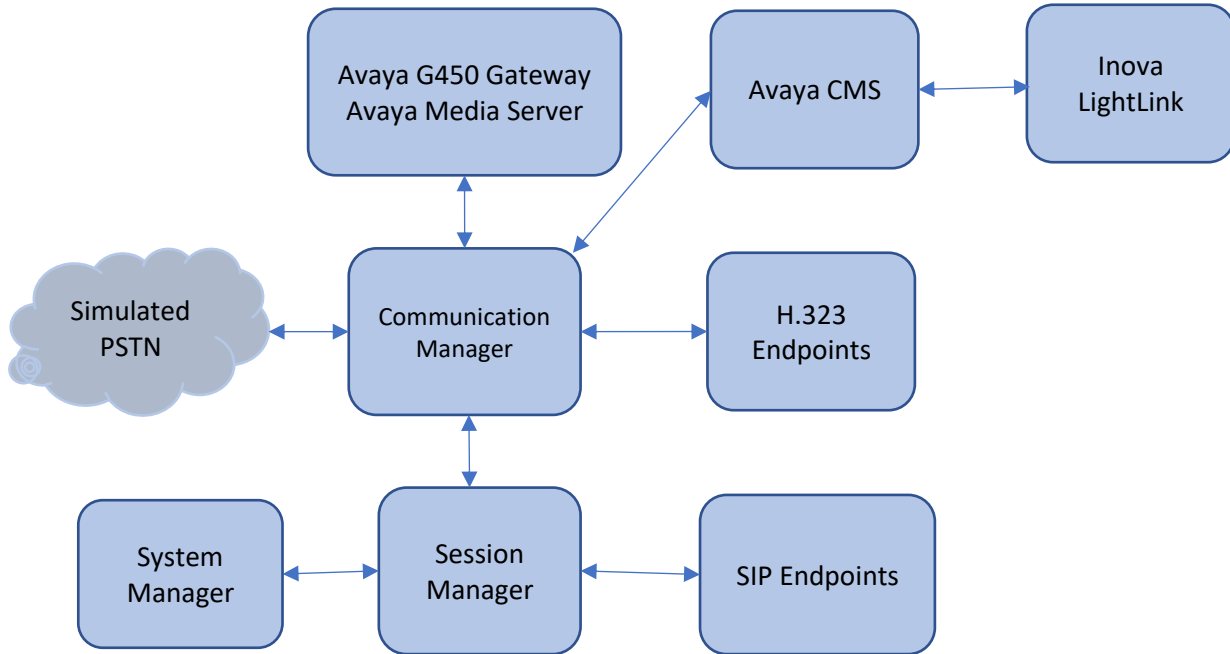

Figure 1: Network Configuration

4. Equipment and Software Validated

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

Equipment/Software	Release/Version
Avaya Aura® Communication Manager	8.0.1.1 SP1FP1
Avaya G450 Media Gateway MGP	40.25.0
Avaya Aura® Session Manager	8.0.1.1
Avaya Aura® System Manager	8.0.1.1
Avaya Call Management System • RT_Socket	R18.1.0.1 • 4.5.7
Avaya 96x1 Series IP Deskphones	Various
Inova LightLink Middleware	v5.13

5. Configure Avaya Aura® Communication Manager

This section describes the steps required for Communication Manager to support the configuration in **Figure 1**. The following pages provide step-by-step instructions on how to administer parameters specific to the LightLink solution only. The assumption is that the appropriate license and authentication files have been installed on the servers and that login and password credentials are available and that the reader has a basic understanding of the administration of Communication Manager. It is assumed that all other connections, (e.g., to PSTN, to LAN) are configured and will not be covered in this document. The reader will need access to the System Access Terminal (SAT). For detailed information on the installation, maintenance, and configuration of Communication Manager, please refer to [1].

This section provides the procedures for configuring Communication Manager. The procedures include the following areas:

- Verify Communication Manager Options
- Administer adjunct CMS release
- Administer processor interface channel
- Administer measured VDN
- Administer measured Skill

The detailed administration of contact center devices such as ACD/Skill, VDN, Vector, and Agents are assumed to be in place. These Application Notes will only cover how to enable ACD/Skill, VDN, and Agent data to be sent to Avaya CMS.

5.1. Verify Avaya Aura® Communication Manager Software Options

Log into the System Access Terminal (SAT) to verify that the Communication Manager license has proper permissions for features illustrated in these Application Notes. Use the "display system-parameters customer-options" command to verify that the **G3 Version** field is set to "V18" on **Page 1**, as shown below.

```
display system-parameters customer-options                    Page   1 of  12
                              OPTIONAL FEATURES

    G3 Version: V18                          Software Package: Enterprise
      Location: 2                            System ID (SID): 1
      Platform: 28                           Module ID (MID): 1

                                                                   USED
                              Platform Maximum Ports: 48000     69
                                    Maximum Stations: 36000 33
                              Maximum XMOBILE Stations: 36000 0
                    Maximum Off-PBX Telephones - EC500: 41000 0
                    Maximum Off-PBX Telephones -   OPS: 41000 9
                    Maximum Off-PBX Telephones - PBFMC: 41000 0
                    Maximum Off-PBX Telephones - PVFMC: 41000 0
                    Maximum Off-PBX Telephones - SCCAN: 0      0
                        Maximum Survivable Processors: 313    0




         (NOTE: You must logoff & login to effect the permission changes.)
```

Navigate to **Page 6**, and verify that the **Call Center Release** field is set to "8.0", as shown below.

```
display system-parameters customer-options                    Page   7 of  12
                      CALL CENTER OPTIONAL FEATURES


                        Call Center Release: 8.0


                            ACD? y                         Reason Codes? y
                    BCMS (Basic)? y              Service Level Maximizer? n
        BCMS/VuStats Service Level? y            Service Observing (Basic)? y
 BSR Local Treatment for IP & ISDN? y    Service Observing (Remote/By FAC)? y
              Business Advocate? n               Service Observing (VDNs)? y
               Call Work Codes? y                            Timed ACW? y
     DTMF Feedback Signals For VRU? y                 Vectoring (Basic)? y
             Dynamic Advocate? n                Vectoring (Prompting)? y
        Expert Agent Selection (EAS)? y         Vectoring (G3V4 Enhanced)? y
                        EAS-PHD? y              Vectoring (3.0 Enhanced)? y
              Forced ACD Calls? n    Vectoring (ANI/II-Digits Routing)? y
          Least Occupied Agent? y    Vectoring (G3V4 Advanced Routing)? y
       Lookahead Interflow (LAI)? y             Vectoring (CINFO)? y
Multiple Call Handling (On Request)? y   Vectoring (Best Service Routing)? y
   Multiple Call Handling (Forced)? y          Vectoring (Holidays)? y
 PASTE (Display PBX Data on Phone)? y          Vectoring (Variables)? y
       (NOTE: You must logoff & login to effect the permission changes.)
```

Note: Values used were specific to this Compliance Test. When integrating with other releases please use the Version information provided for that release.

5.2. Administer Adjunct CMS Release

Use the "change system-parameters features" command and navigate to **Page 12**. Set the **Reporting Adjunct Release** field for **CMS** to the software release of the Avaya CMS. In this case, "R18.1" is used to correspond to Avaya CMS software release R18.1.0.1.

```
change system-parameters features                          Page  12 of  19
                        FEATURE-RELATED SYSTEM PARAMETERS
 AGENT AND CALL SELECTION
                        MIA Across Splits or Skills? n
                         ACW Agents Considered Idle? y
                  AUX Agents Considered Idle (MIA)? n
                      AUX Agent Remains in LOA Queue? n
                         Call Selection Measurement: current-wait-time
   Service Level Supervisor Call Selection Override? n
                                  Auto Reserve Agents: none
      Block Hang-up by Logged-in Auto-Answer Agents? n
 CALL MANAGEMENT SYSTEM
    REPORTING ADJUNCT RELEASE (determines protocol used by appl link)
                                  CMS (appl mis): R18.1
                            AAPC/IQ (appl ccr):

                              BCMS/VuStats LoginIDs? y
                  BCMS/VuStats Measurement Interval: hour
         BCMS/VuStats Abandon Call Timer (seconds):
                    Validate BCMS/VuStats Login IDs? n
                             Clear VuStats Shift Data: on-login
              Remove Inactive BCMS/VuStats Agents? n
```

5.3. Administer Node Name

Add an IP Address entry in the node names forum with the "change node-names ip" command.

```
change node-names ip                                    Page   1 of   2
                              IP NODE NAMES
   Name              IP Address
aes8              10.64.110.132
ams8              10.64.110.136
cms18             10.64.110.20
default           0.0.0.0
procr             10.64.110.131
procr6            ::
sm8               10.64.110.135
```

5.4. Administer Processor Interface Channel

Assign a new processor interface channel with the "change communication-interface processor-channels" command. Add an entry with the following values, and submit these changes.

- **Enable:**   "y"
- **Appl.:**   "mis"
- **Mode:**   "s" for server mode.
- **Interface Link:**   "pv4"
- **Interface Chan:**   TCP channel number for Avaya CMS. In this case "5001".
- **Destination Node:** The node name configured in previous section
- **Destination Port:** "0"
- **Session Local:**   **Local Session ID** for the connection to CMS. In this case "1"
- **Session Remote:**   **Remote Session ID** for the connection to CMS. In this case "1"

The **Interface Chan** field contains the Avaya CMS TCP channel number, which is defined as part of the Avaya CMS installation. For the compliance testing, the TCP channel number of **"5001"** was used.

```
change communication-interface processor-channels        Page   1 of  24
                   PROCESSOR CHANNEL ASSIGNMENT
Proc              Gtwy       Interface       Destination     Session   Mach
Chan Enable  Appl.   To  Mode Link/Chan    Node      Port  Local/Remote ID
 1:   y    mis        s    pv4 5001  cms18            0      1    1
 2:   n                                               0
```

5.5. Administer Measured VDN

Use the "change vdn n" command, where "n" is the extension of the VDN to be measured by Avaya CMS. Set the **Measured** field to "external" or "both" to enable measurement data on the VDN to be sent to Avaya CMS. Repeat this step for all VDNs that will be monitored by Avaya CMS.

```
change vdn 59101                                              Page   1 of   3
                         VECTOR DIRECTORY NUMBER

                        Extension: 59101                    Unicode Name? n
                            Name*: CC Test VDN
                      Destination: Vector Number        1
               Attendant Vectoring? n
               Meet-me Conferencing? n
                 Allow VDN Override? n
                              COR: 1
                              TN*: 1
                         Measured: both     Report Adjunct Calls as ACD*? n
        Acceptable Service Level (sec): 20

        VDN of Origin Annc. Extension*:
                        1st Skill*:
                        2nd Skill*:
                        3rd Skill*:

SIP URI:

* Follows VDN Override Rules
```

5.6. Administer Measured Skill

Use the "change hunt-group n" command, where "n" is the extension of the ACD/Skill group number to be measured by Avaya CMS. On **Page 2** set the **Measured** field to "external" or "both" to enable real-time measurement data on the ACD/Skill group and the associated agents to be sent to Avaya CMS. Repeat this step for all ACD/Skill groups that will be measured by Avaya CMS.

```
change hunt-group 1                                        Page   2 of   4
                              HUNT GROUP

                  Skill? y      Expected Call Handling Time (sec): 180
                    AAS? n        Service Level Target (% in sec): 80 in 20
                Measured: both
     Supervisor Extension:


       Controlling Adjunct: none


        VuStats Objective:

    Multiple Call Handling: none


  Timed ACW Interval (sec):       After Xfer or Held Call Drops? n
```
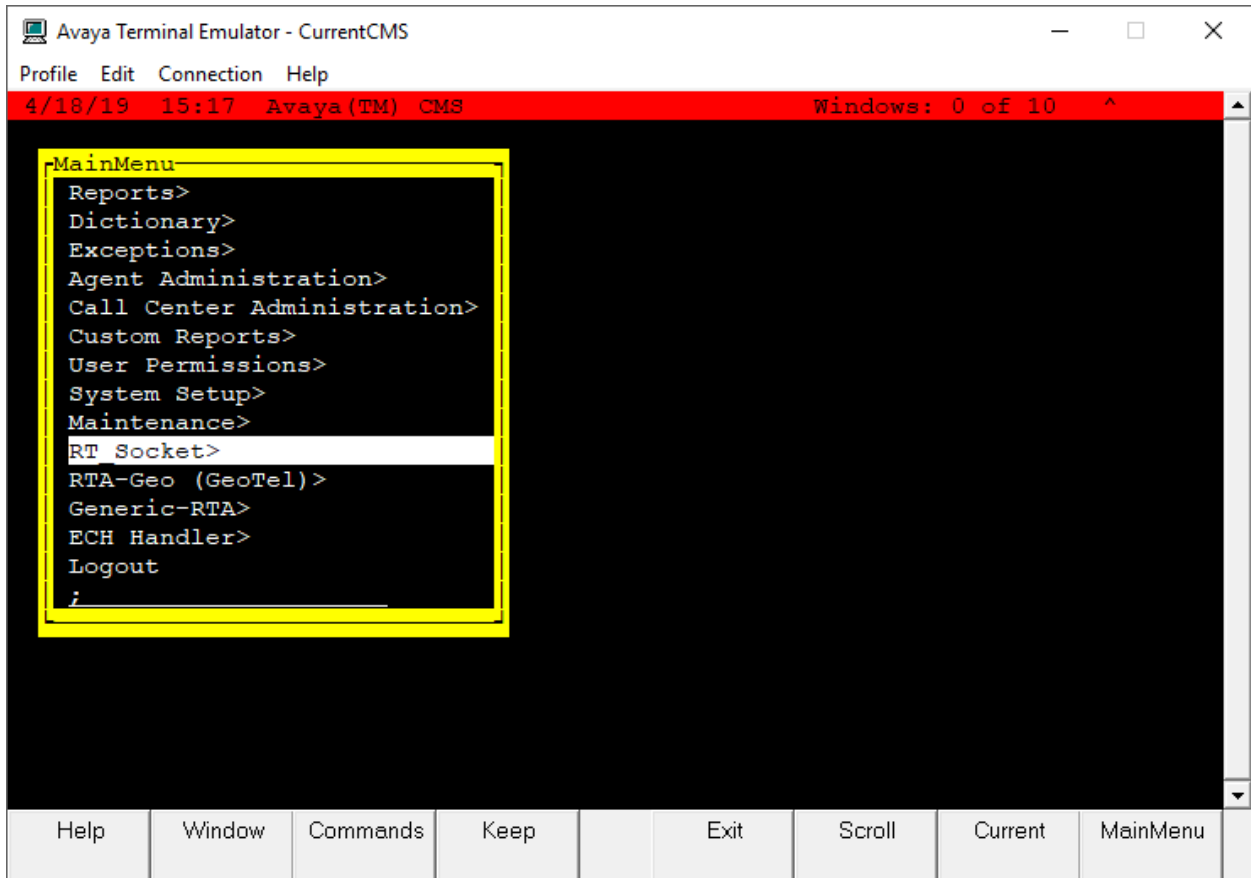
6. Configure Avaya Call Management System

Configuration of the RT_Socket interface is performed by Avaya APS and is outside the scope of these Application Notes. After the interfaces are configured, the user can follow the procedures below to enable the interface.

Use a terminal emulator to connect to Avaya CMS, and log in with the proper credentials. The **Main Menu** is displayed. Select **RT_Socket** from the screen below.

The RT_Socket interface needs to be stopped and restarted. Enter "2" to stop the interface, followed by the **Enter** key.

```
 Avaya Terminal Emulator - CurrentCMS                          —    □    ✕

Profile  Edit  Connection  Help

 ------ RT_Socket Menu ------

1)   Start RT_Socket Interface
2)   Stop RT_Socket Interface
3)   Check Status
4)   View Maintenance Log
5)   Show RT_Socket Version
6)   Show/Verify Licensed Authorizations
7)   Show Staffed Agents Count
8)   Change RT_Socket Input Parameters
9)   Show RT_Socket Configuration
Q)   Quit
--------------------
Selection: 2█

    Help      Window   Commands    Keep           Exit      Scroll    Current   MainMenu
```

Enter "1" to start the interface, followed by the **Enter** key.
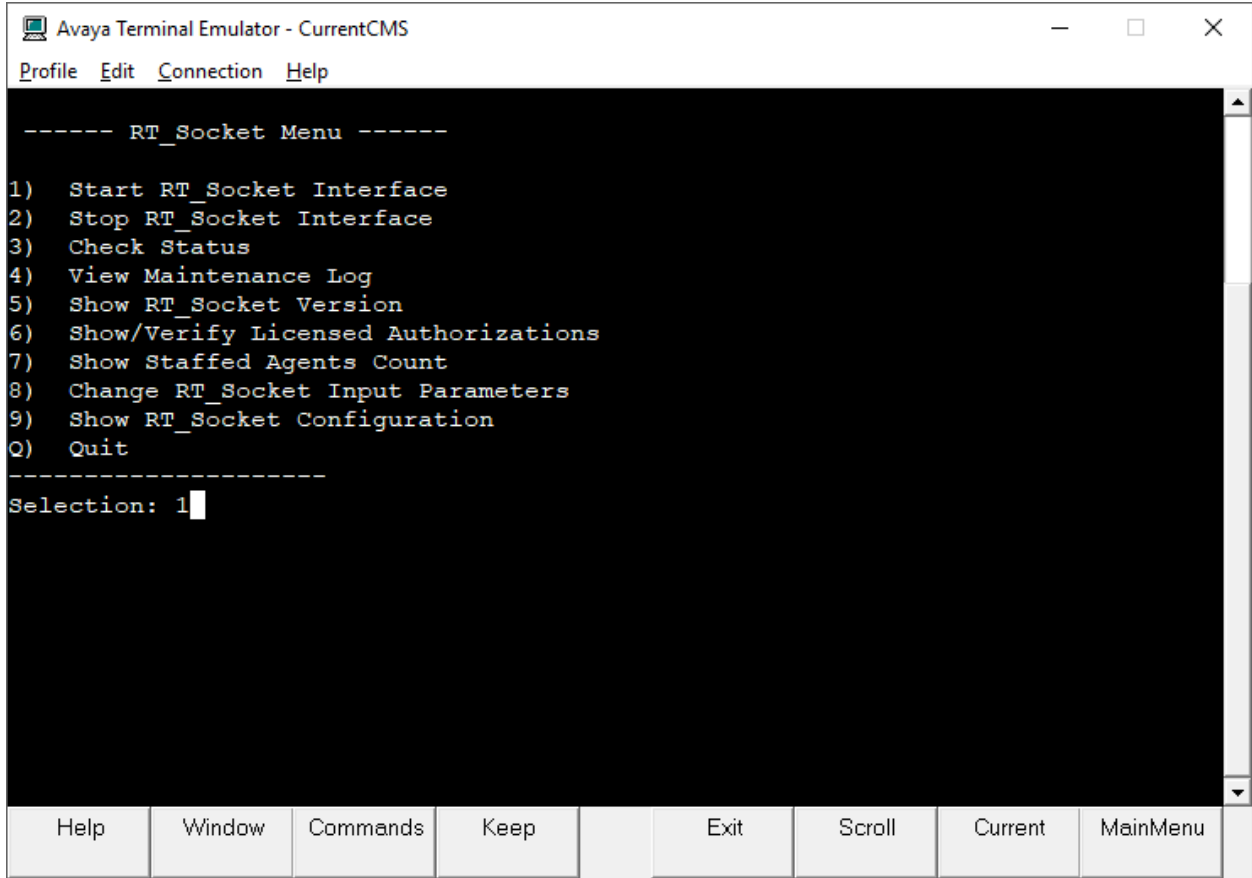
7. Configure Inova LightLink Middleware

Configuration for LightLink is performed via Administrator. On the LightLink server, open the **Administrator LightLink** application.
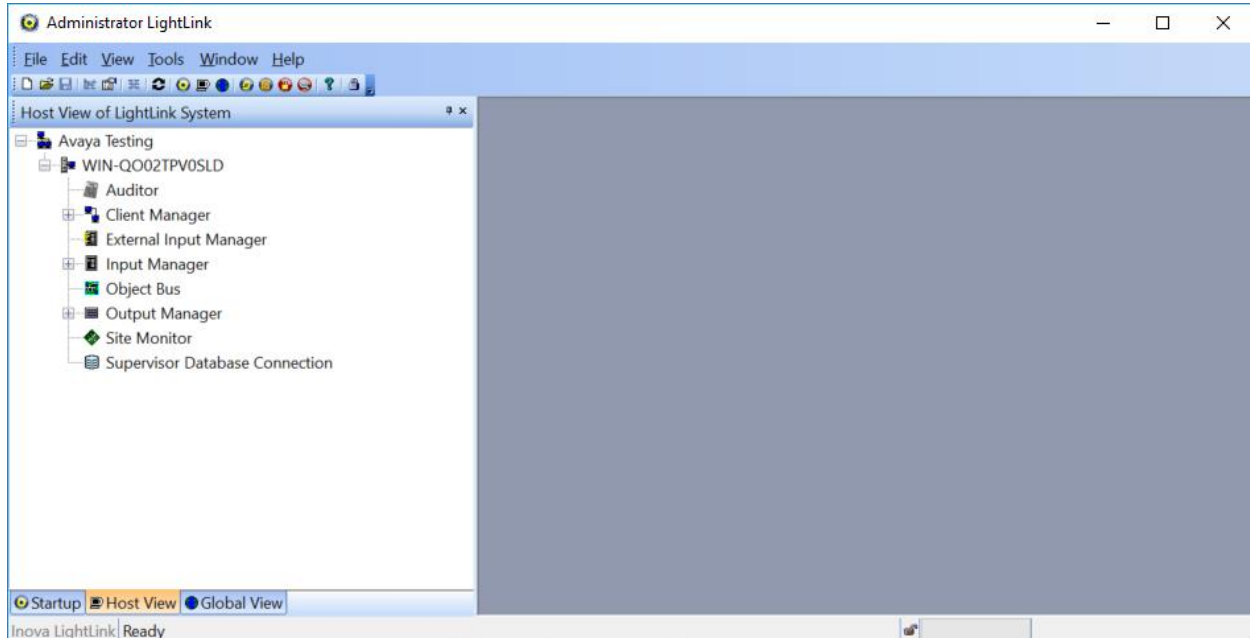
Secure configuration permissions in LightLink Administrator to enable administration. Click on the **lock** icon on the Administrator. Verify at the bottom of the window, "**Configuration Permission Enabled**."
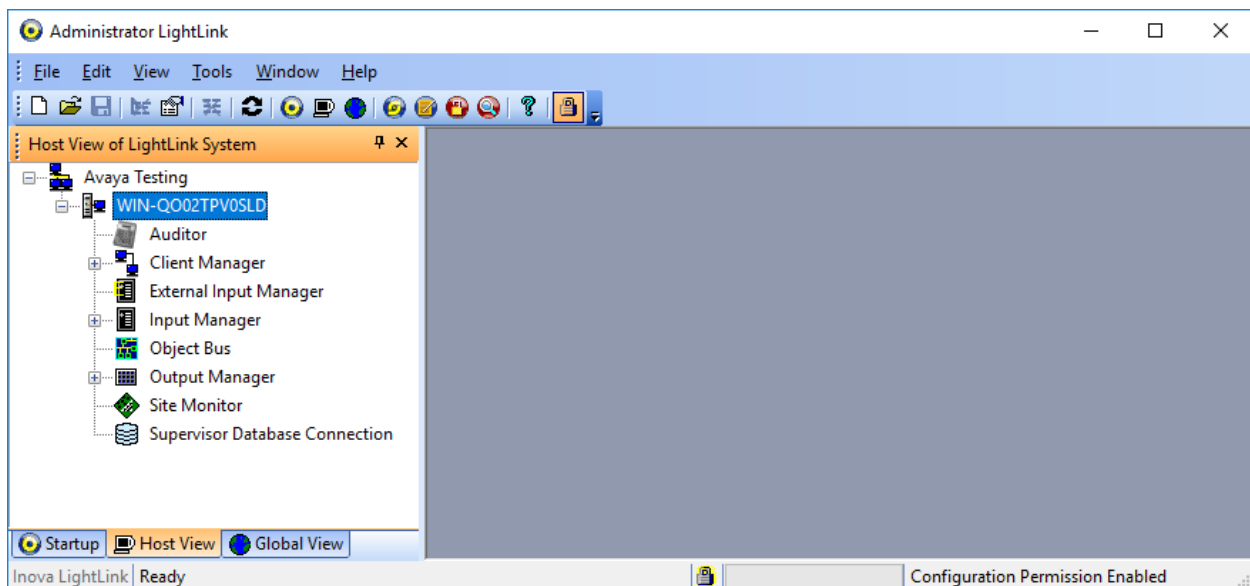
Configure one Data Source Manager (DSM) per Avaya socket connection to be used by LightLink.

Right-click the **Input Manager** and select **New Data Source Connection…**
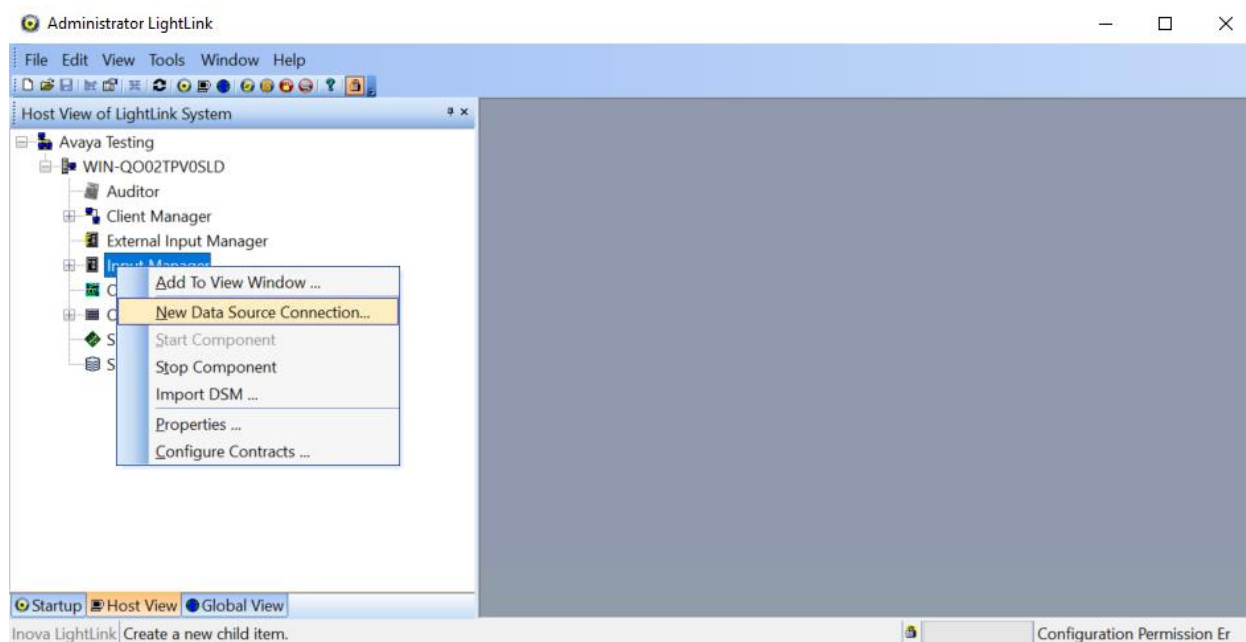
A new window, **New Data Source** will open. Select the **Avaya RT Socket** connection for RT socket connection, and click **OK**.
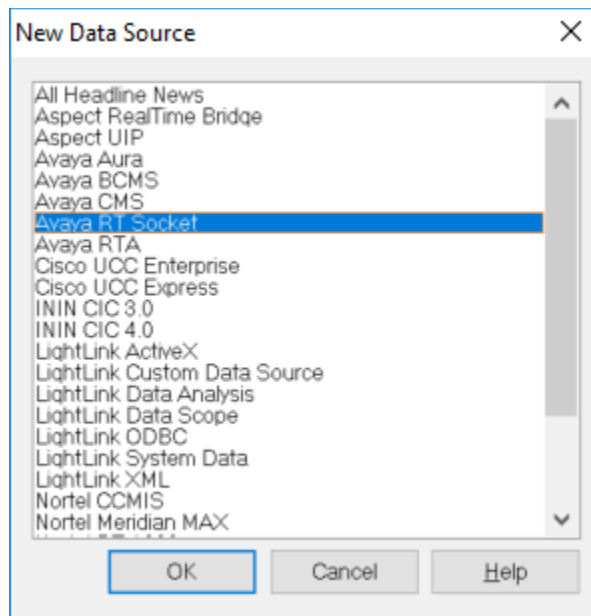
On the **General** tab, provide a descpritive name in **Name**.

On the **Connection** tab:

- Select **TCP/IP Connection** for **Connection port**.
- Set **Hostname or IP address** to LightLink host machine's IP address or hostname, (localhost or local works as well).
- Set **Listening Port** to the port number for the given socket connection, as configured in CMS and provided by Avaya Professional Services.

On the **Settings** tab, one will need to configure three things:

- For the **Data format file**, select the following:
  - o RT Socket Skill: avaya_realtime_socket_skill_7010.sdf
  - o RT Socket VDN: avaya_realtime_socket_vdn_7011.sdf
  - o RT Socket Agent: avaya_realtime_socket_agent_7012.sdf

- For the **Script file**, select the following: avaya_realtime_socket.dss
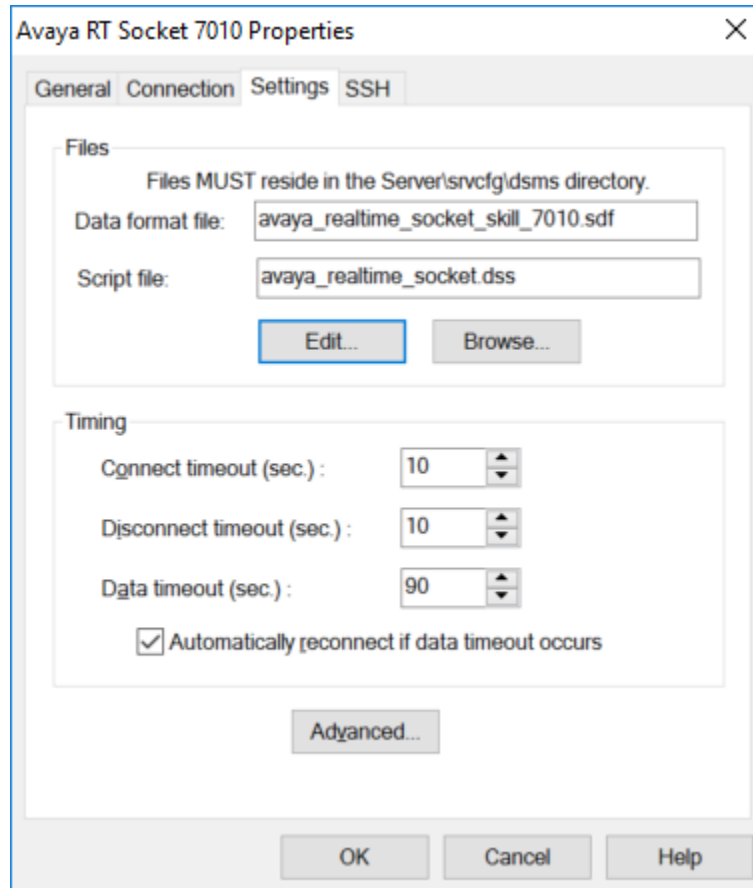
- Click the **Advanced…** button to open the **Advanced Properties** dialog and change the value of the **ActAsServer** parameter from **0** to **1** so that the DSM accepts connections from the CMS.
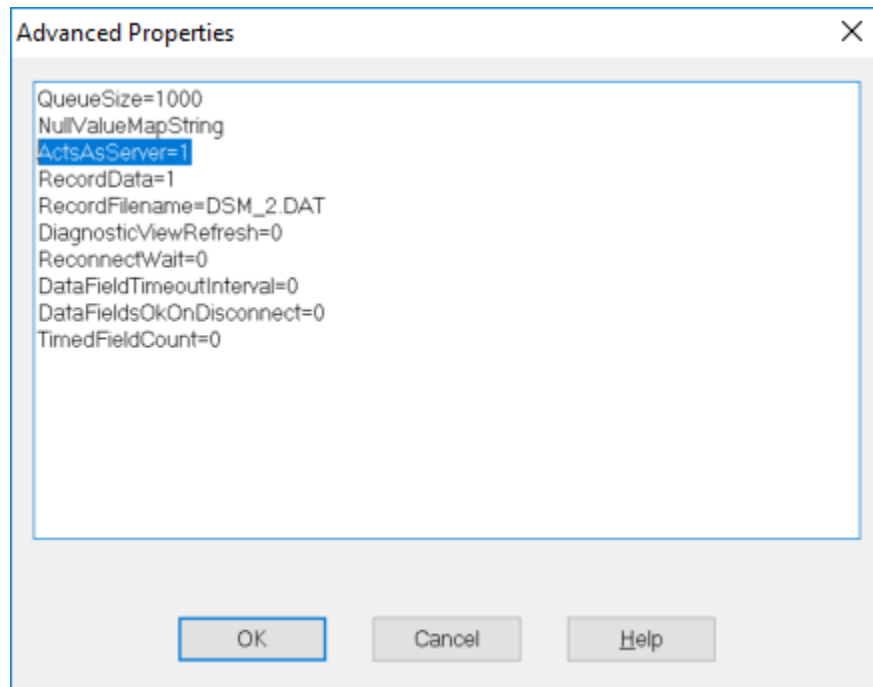
- Click **OK** on the **Advanced Properties** window to close it, and then click **OK** on the DSM Configuration dialog to start the DSM.

8. Verification Steps

This section provides the tests that can be performed to verify proper configuration of Communication Manager, Avaya Call Management System, and LightLink.

8.1. Verify Avaya Aura® Communication Manager

Verify the status of the processor interface channel by using the "status processor-channels n" command, where "n" is the processor channel number from **Section 5.4.** Verify that the **Session Layer Status** is "In Service", and that the **Socket Status** is "TCP connected", as shown below.

```
status processor-channels 1
                     PROCESSOR-CHANNEL STATUS

        Channel Number: 1
  Session Layer Status: In Service
         Socket Status: TCP connected
           Link Number: pv4
             Link Type: processor ethernet
 Message Buffer Number: 0

          Last Failure: Far end sent disconnect
                    At: 05/06/19 16:30
```

8.2. Verify Avaya Call Management System

8.2.1. Connection Status

From the **MainMenu**, verify the status of the connection to Communication Manager by selecting **Maintenance → Connection Status**, as shown below.
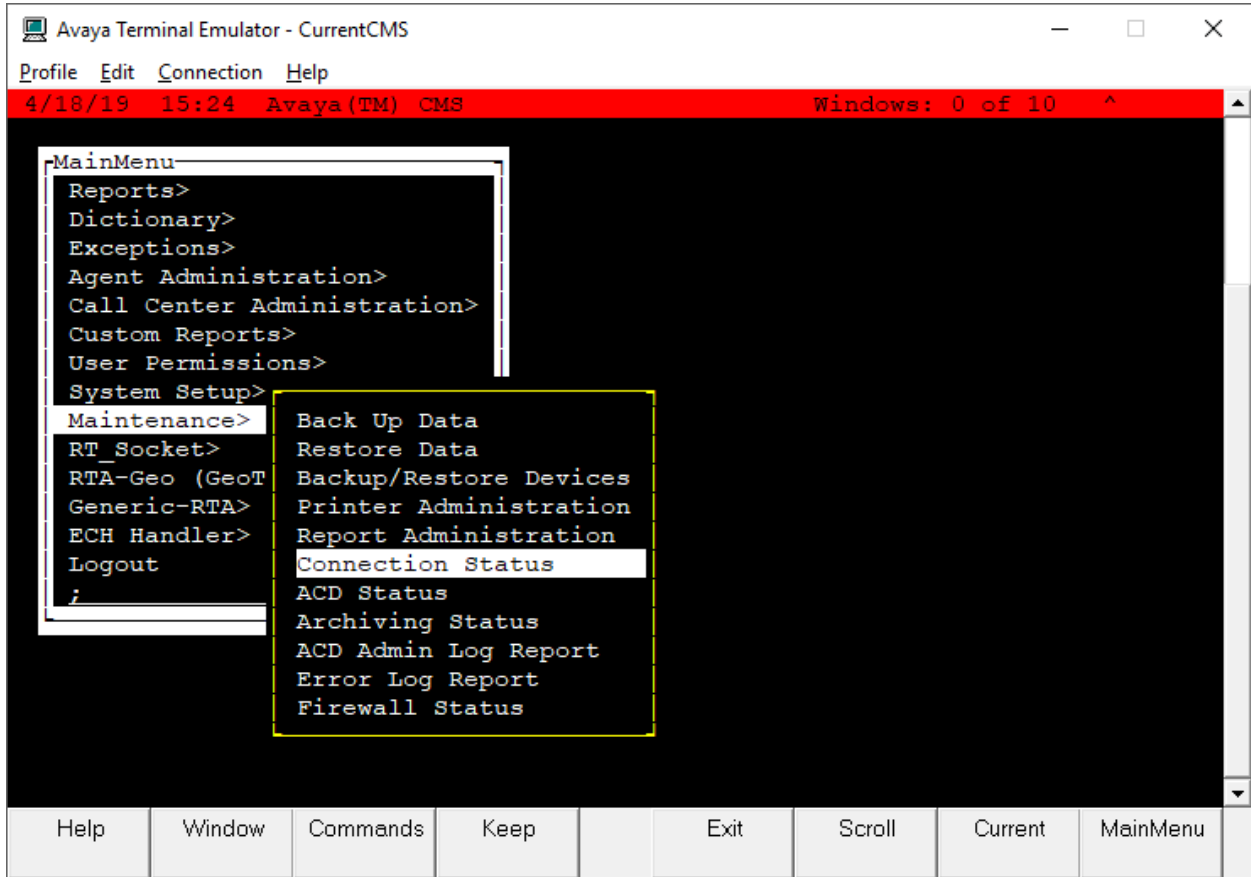
Enter the corresponding **ACD(s)** number, which is provided by Avaya Professional Services. For the compliance testing, the corresponding switch connection is ACD system "1". Tab over to **Find one** and press **Enter**.
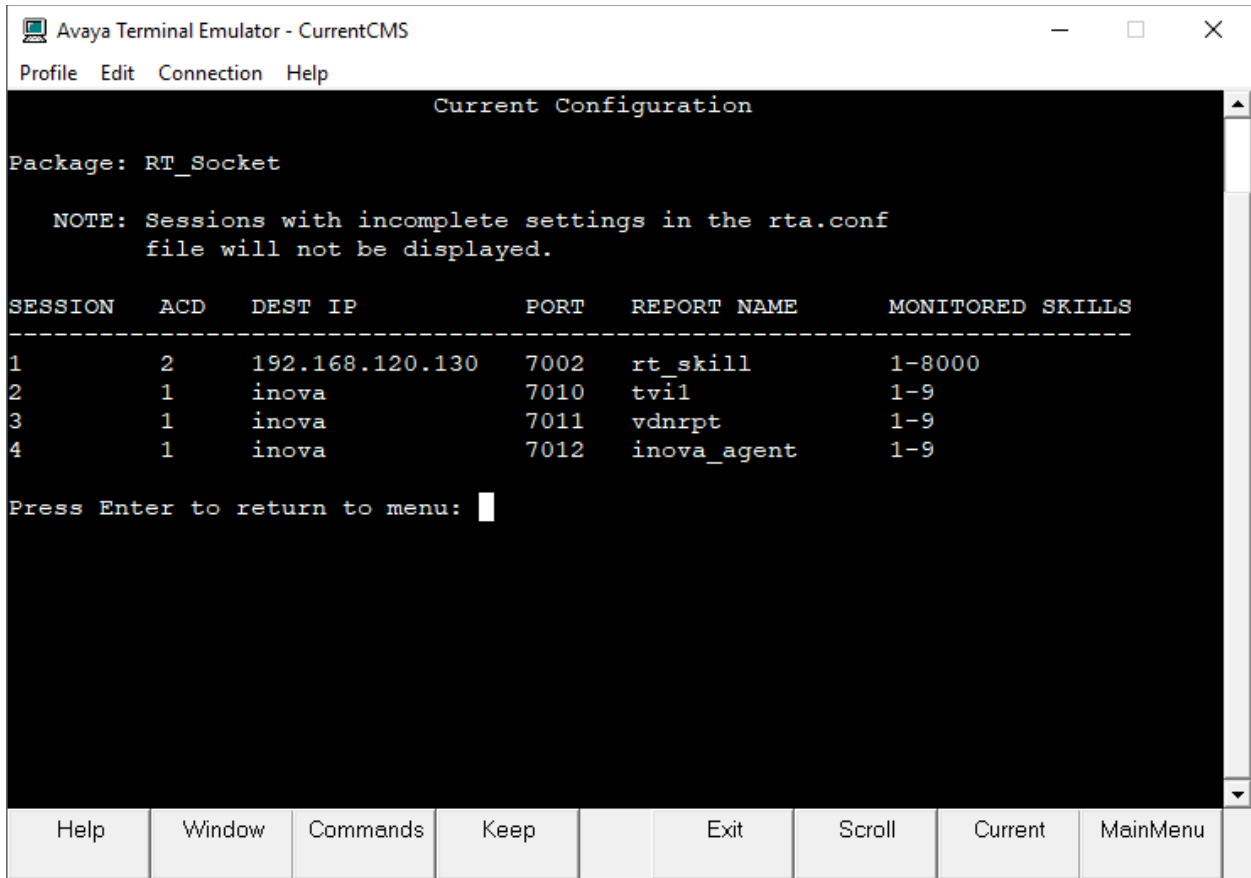
The switch connection status is displayed. Check the status in the **Session** and **Connection** fields, as shown below.
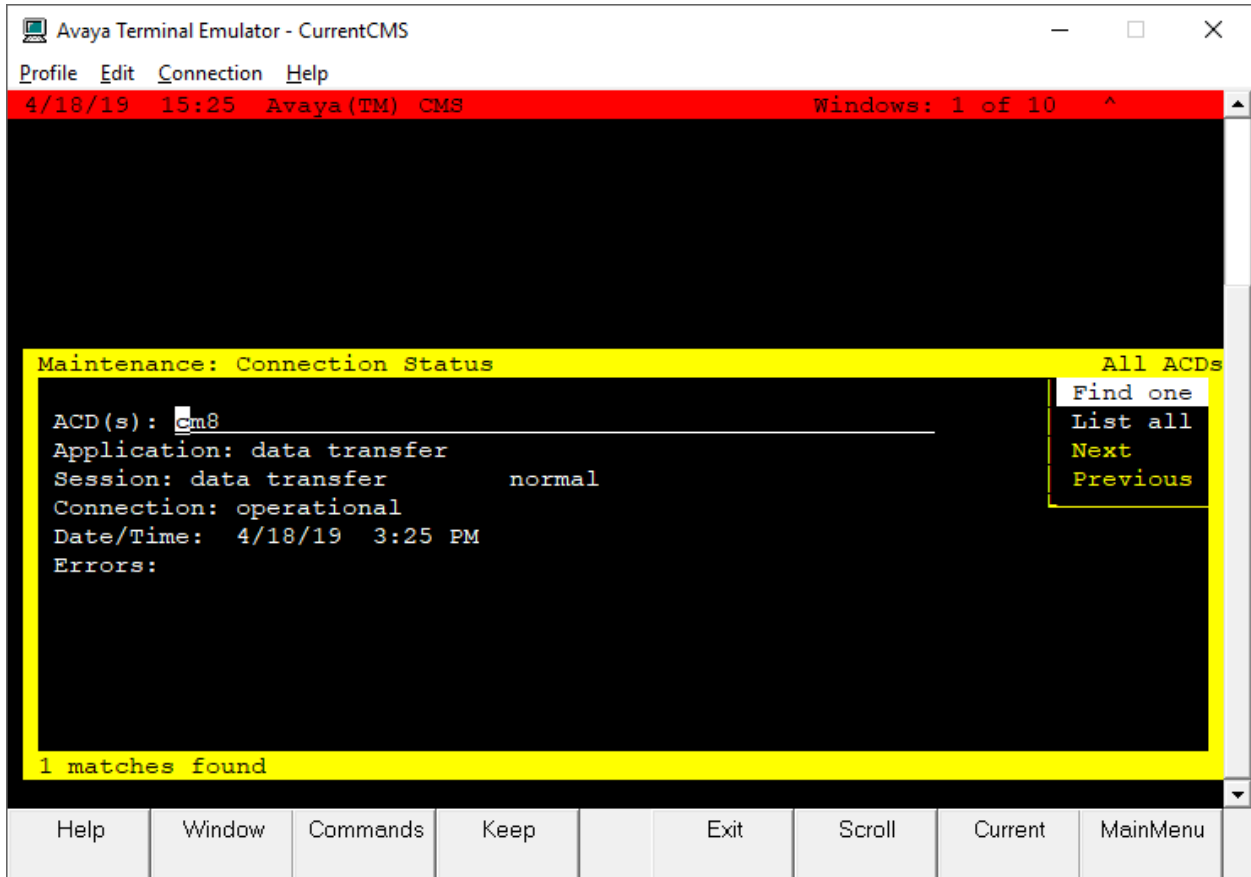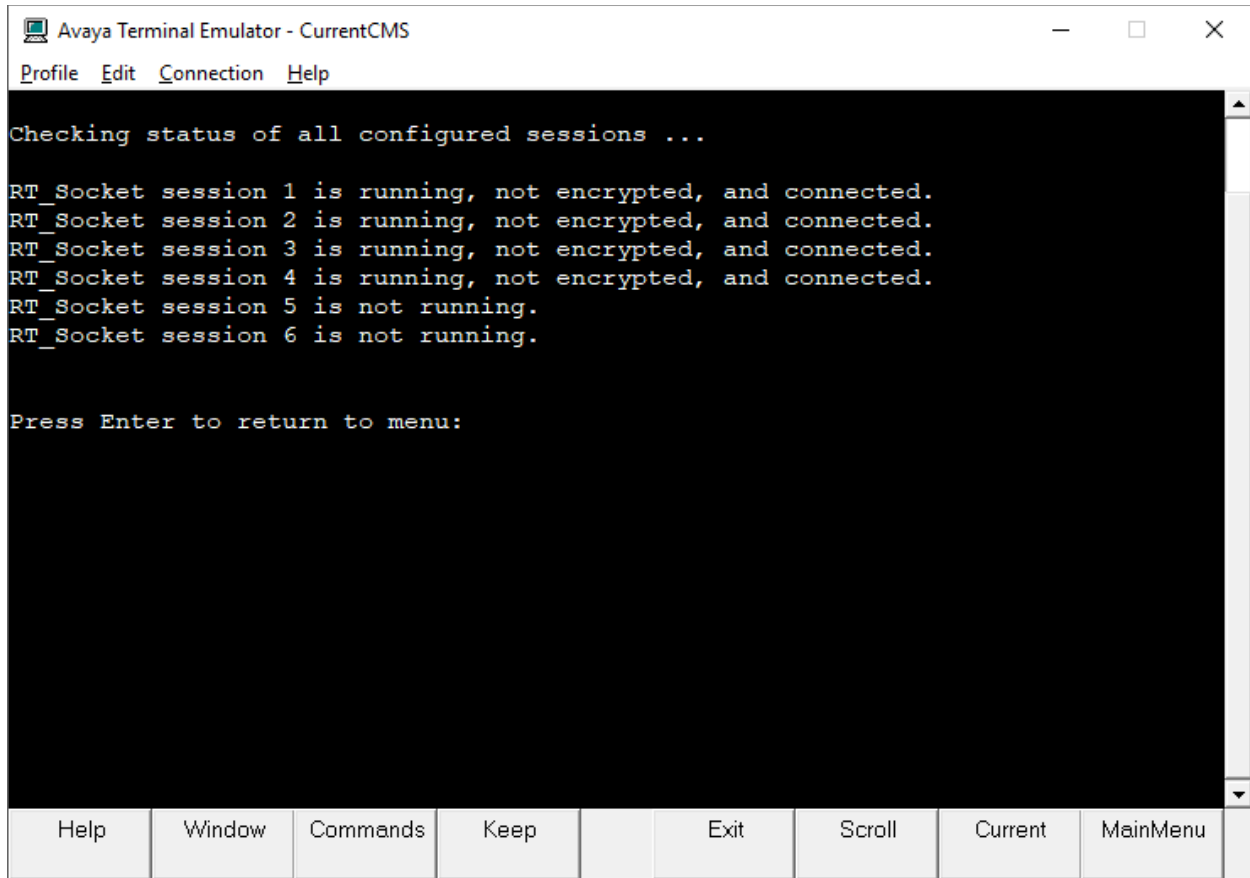
8.2.2. RT_Socket

From the **MainMenu**, verify the configuration and status of the connection between CMS and LightLink by selecting **RT_Socket** and entering "9" from the RT_Socket Menu.

For compliance testing sessions 2-4 were used for LightLink.

```
🖳 Avaya Terminal Emulator - CurrentCMS                                  —    □    ✕

 Profile  Edit  Connection  Help
                          Current Configuration

Package: RT_Socket

   NOTE: Sessions with incomplete settings in the rta.conf
         file will not be displayed.

SESSION    ACD    DEST IP            PORT    REPORT NAME        MONITORED SKILLS
-------------------------------------------------------------------------------
1          2      192.168.120.130    7002    rt_skill           1-8000
2          1      inova              7010    tvi1               1-9
3          1      inova              7011    vdnrpt             1-9
4          1      inova              7012    inova_agent        1-9

Press Enter to return to menu: ▎
```

| Help | Window | Commands | Keep | | Exit | Scroll | Current | MainMenu |

Press Enter to return to the menu.

From the RT_Socket Menu select "3" to display the status of the sessions. Verify the sessions are **running** and **connected.**

```
Avaya Terminal Emulator - CurrentCMS                    —   □   ✕

Profile  Edit  Connection  Help

Checking status of all configured sessions ...

RT_Socket session 1 is running, not encrypted, and connected.
RT_Socket session 2 is running, not encrypted, and connected.
RT_Socket session 3 is running, not encrypted, and connected.
RT_Socket session 4 is running, not encrypted, and connected.
RT_Socket session 5 is not running.
RT_Socket session 6 is not running.


Press Enter to return to menu:




      Help      Window   Commands   Keep          Exit      Scroll    Current   MainMenu
```

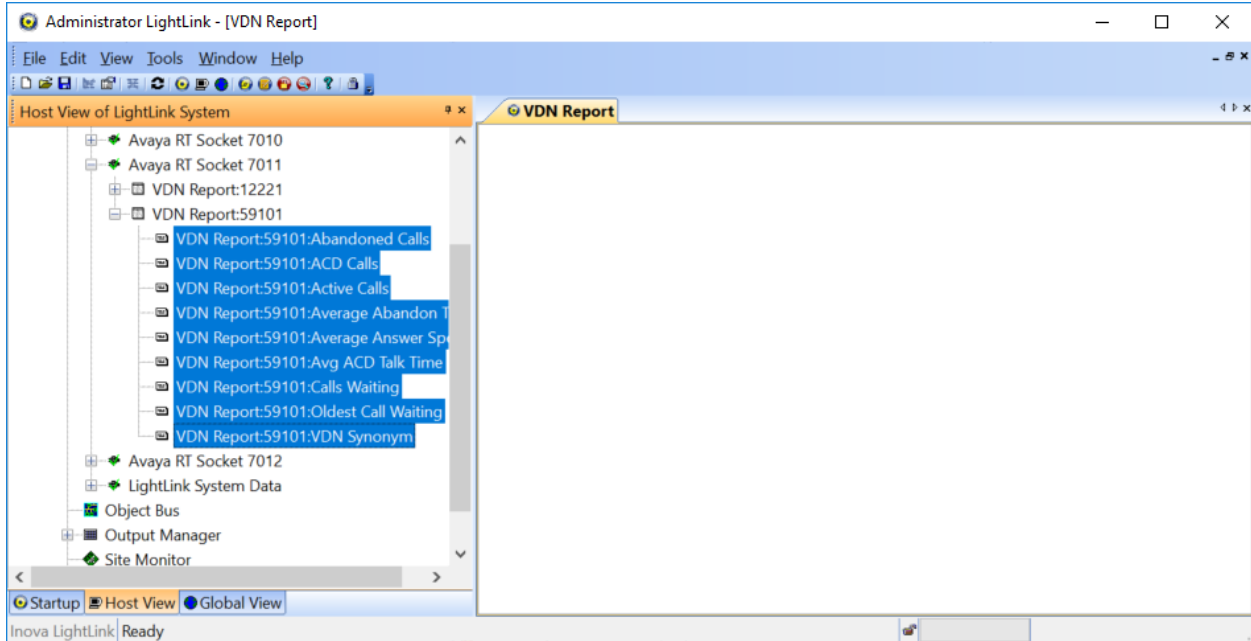## 8.3. Verify Inova LightLink Middleware

To verify, LightLink is receiving data from CMS, open **Administrator** and click **New** to add a new View Window. Provide a name and click **OK**.
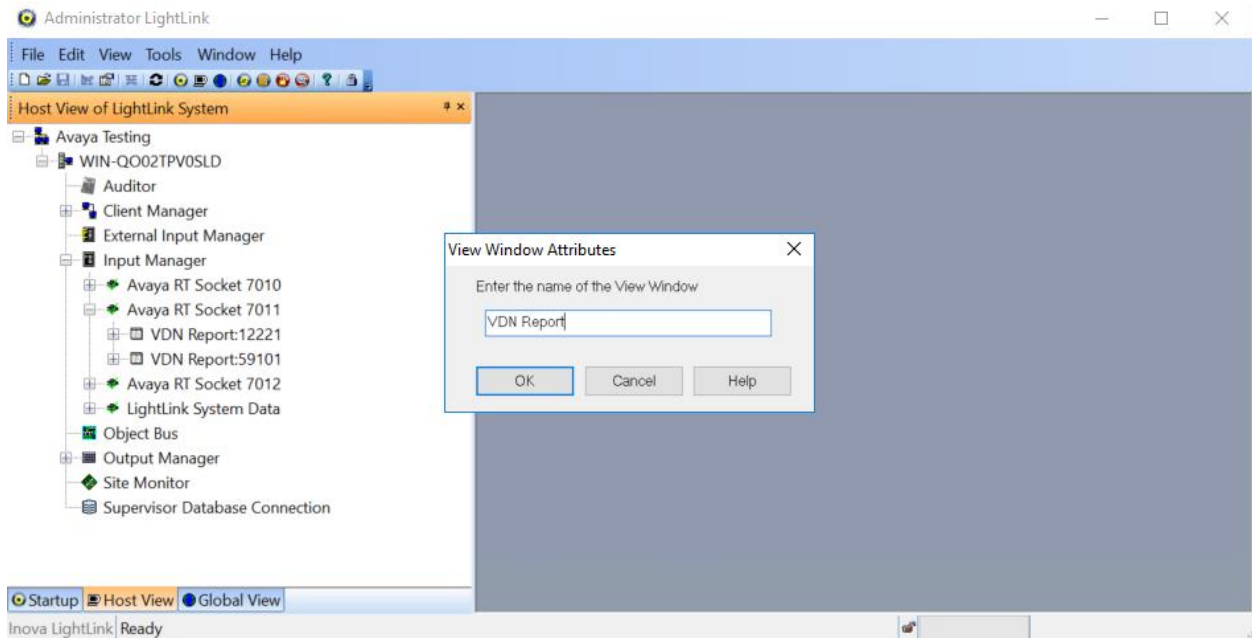

Navigate to a report under **Input Manager** and collapse it to view all the fields. In this case, **Avaya RT Socket 7011** report for **VDN 59101.** Select all the fields and drag to the View Window.

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Inova_RT_CMS18
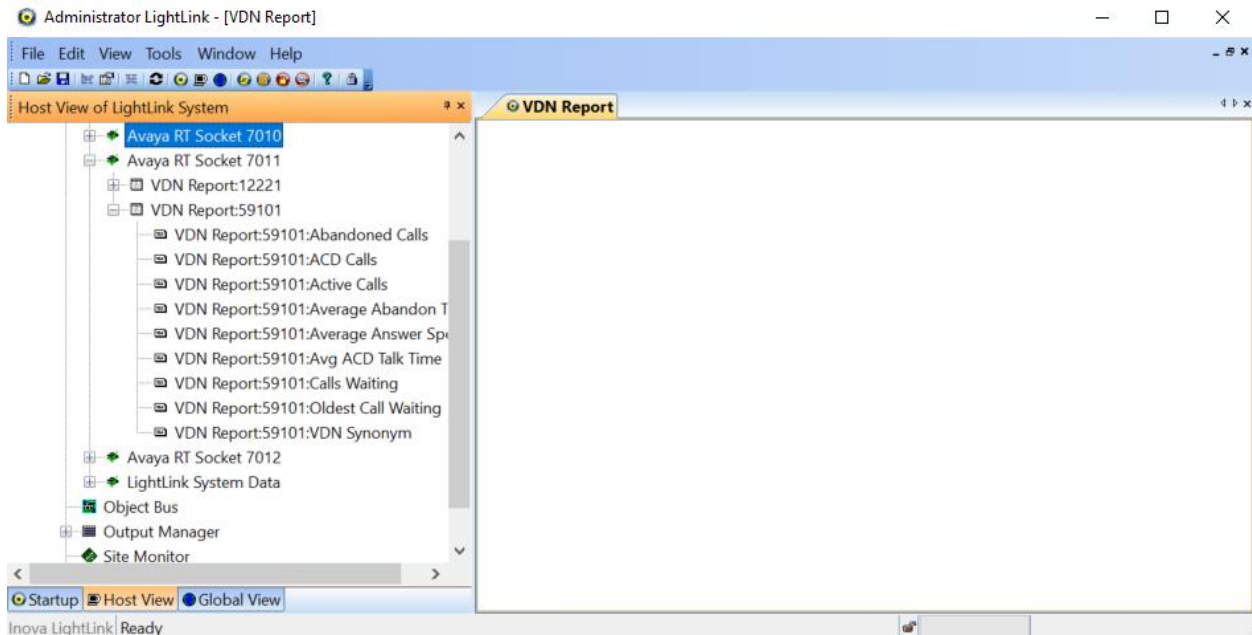
Shift select all the fields and add them to the VDN Report created above.

If data from CMS is being received correctly, **Field Value** column will contain data specific to each field.
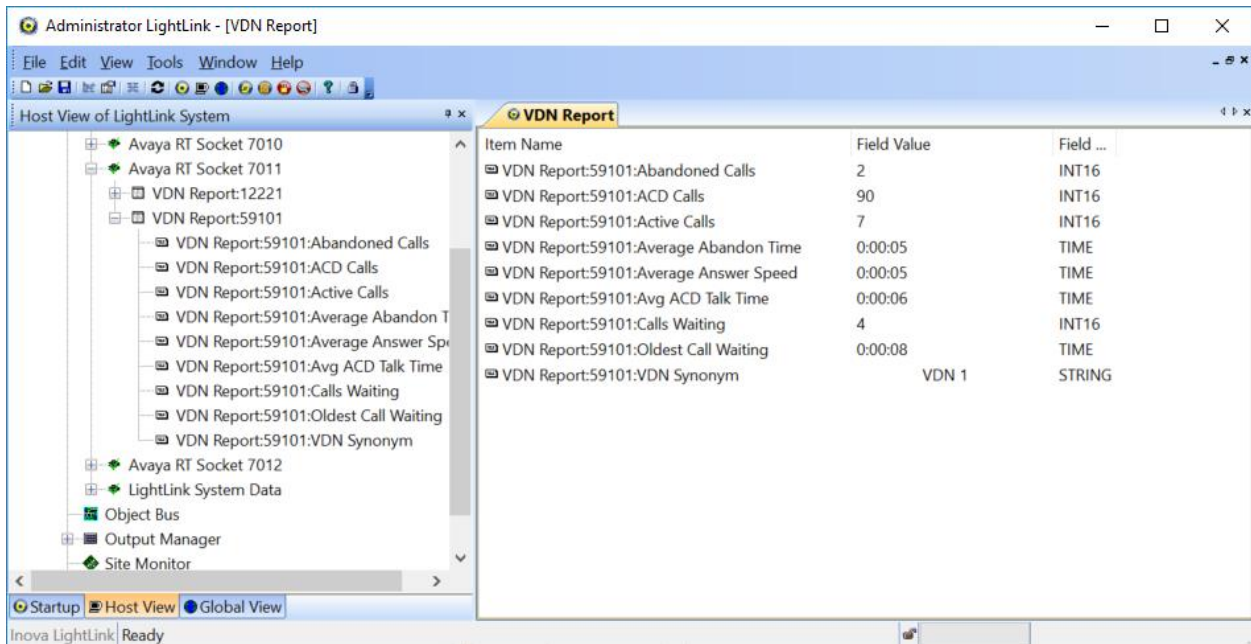
9. Conclusion

These Application Notes describe the configuration steps required for Inova LightLink Middleware to successfully interoperate with Avaya Aura® Communication Manager and Avaya Call Management System using the Real-Time Socket interface. All feature and serviceability test cases were completed successfully.

10. References

This section references the product documentation relevant to these Application Notes.

[1] *Administering Avaya Aura® Communication Manager* Release 8.0.1, Issue 3, December 2018.
[2] *Avaya Call Management System - Switch Connections, Administration, and Troubleshooting* Release 18.1, August 2018.

Documentation related to Inova products can be obtained directly from Inova.

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