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Avaya Solution & Interoperability Test Lab

Application Notes for Configuring Dialogic Brooktrout SR140 Fax Software with Avaya IP Office 11 via a SIP Trunk Interface using Transport Layer Security (TLS) - Issue 1.0

Abstract

These Application Notes describe the procedures for configuring the Dialogic Brooktrout SR140 Fax Software with Avaya IP Office using a SIP trunk interface and Transport Layer Security (TLS).

Dialogic Brooktrout SR140 is fax software that sends and receives fax calls over an IP network. In the tested configuration, Dialogic Brooktrout SR140 interoperated with Avaya IP Office to send/receive faxes using SIP trunk facilities.

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.

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1. Introduction

These Application Notes describe the procedures for configuring Dialogic Brooktrout SR140 (hereafter referred SR140) with Avaya IP Office (IPO) using SIP trunks.

Dialogic Brooktrout SR140 is host-based Fax over IP that uses Dialogic Brooktrout Fax/Voice Diagnostic Test Tool (FDTool) to send and receive fax calls over an IP network. In the tested configuration, Dialogic SR140 uses a SIP trunk interface with T.38 fax from Avaya IP Office to send and receive fax.

In the compliance testing, Avaya IP Office Server Edition system consists of Avaya IP Office Primary Linux running on Virtualized Environment and a 500V2 Expansion.

2. General Test Approach and Test Results

The feature test cases were performed manually. Internal and external fax calls to and from SR140 fax software client were made. The fax calls were sent and received using the FDTool and the analog fax destination at the local and remote sites.

The serviceability test cases were performed manually by disconnecting/reconnecting the Ethernet cable to the SR140 fax software client, busyout and release SIP trunk and by rebooting the SR140 fax software client.

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. 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 these Application Notes, the interface between Avaya systems and the Dialogic Brooktrout SR140 utilizes TLS and secure media SRTP encryption features as requested by Dialogic. Operation using TCP and UDP over the SIP trunk is also supported.

2.1. Interoperability Compliance Testing

The interoperability compliance test included feature and serviceability testing. The feature testing focused on verifying the following with the SR140 fax software client:

- Proper handling of faxes via the SIP trunk including send/receive, internal fax, external fax over ISDN (PRI), simultaneous bi-directional faxes, and miscellaneous failure scenarios.
- Proper handling of faxes with different pages, complexity, format and data rates.
- No adverse impact on any internal or external calls during faxes.

The serviceability testing focused on verifying the ability of SR140 fax software client to recover from adverse conditions, such as disconnecting/reconnecting the Ethernet cable to the SR140 fax software client.

2.2. Test Results

Dialogic Brooktrout SR140 successfully passed all compliance testing with the following observations.

- The inband DTMF should be used in the SIP trunk between Dialogic SR140 and Avaya IP Office because this version of SR140 does not accept RFC2833 DTMF (supported in SDK 10.1) and it may cause the fax call to be dropped during fax transmit.
- When secure media SRTP is enabled in the configuration (**Section 6.5**), Dialogic SR140 does not accept regular media (RTP) in SDP of incoming INVITE message, only enforced secure media SRTP is accepted.
- The testing was completed by using TLS/SRTP but operation using TCP and UDP over the SIP trunk is also supported.

2.3. Support

North American Technical support for Dialogic Brooktrout SR140 Fax Software can be obtained by contacting Dialogic at.

- North America: 973-993-1443
- Singapore: +65 6407 7376
- Japan: +81 3-3234-2176
- EMEA: +44 1628 641 792
- Email: support@dialogic.com
- Website: https://support.dialogic.com

3. Reference Configuration

The test configuration was designed to emulate a local site and a remote site. **Figure 1** illustrates the configuration used in these Application Notes.

In the compliance testing, the Avaya IP Office Server Edition system consists of Avaya IP Office Primary Linux running on Virtualized Environment and a 500V2 Expansion. The IPO Primary was configured to connect to PSTN via a SIP trunk while the 500V2 Expansion connected to PSTN via a PRI trunk, IPO Primary and 500V2 Expansion is communicated by Small Community Network (SCN) IP Office Line. The following are typical scenarios verified during the compliance test:

- Bi-directional faxed between SR140 Fax software client and the local fax endpoint 1 that connected to an analog port in the IPO 500V2 Expansion.
- Bi-directional faxes between SR140 Fax software client and PSTN fax endpoint 2 via PRI trunk.
- Bi-directional faxes between SR140 Fax software client and PSTN fax endpoint 3 via SIP trunk.
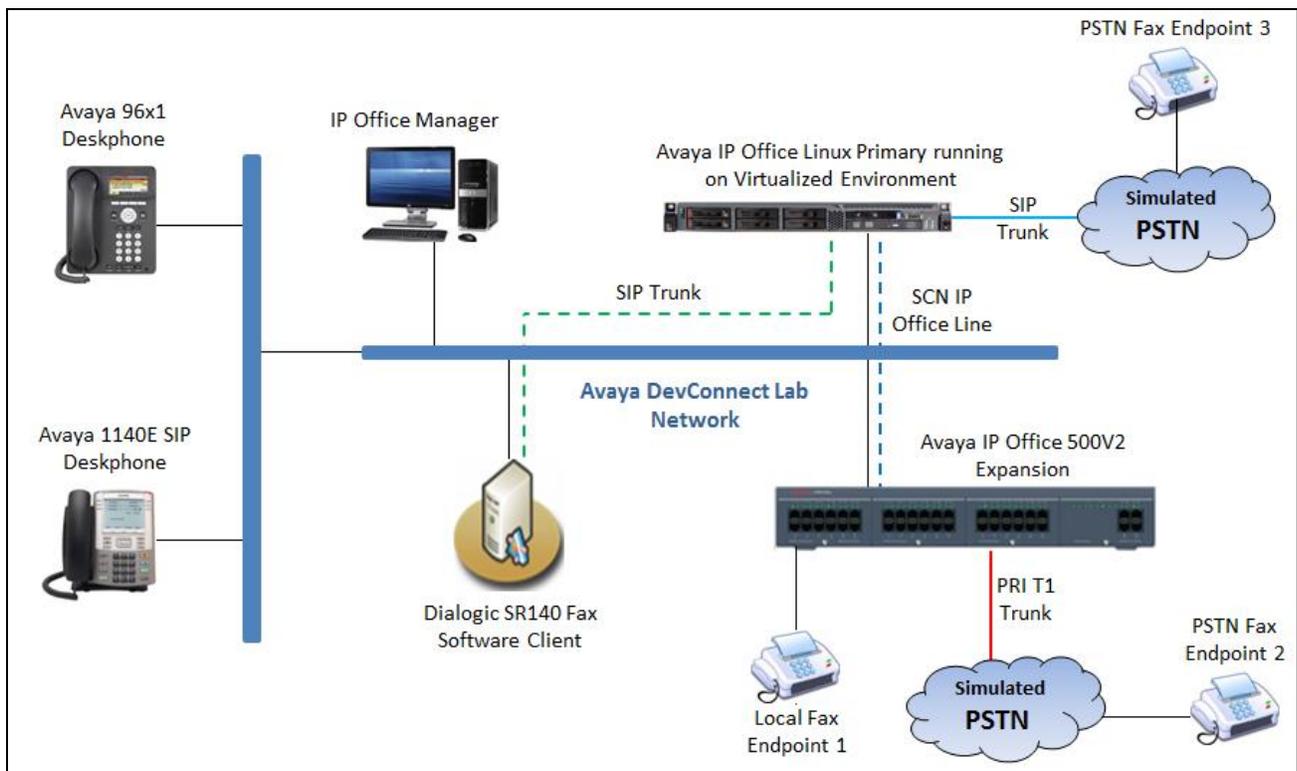
Figure 1: Brooktrout SR140 interoperating with Avaya IP Office via SIP Trunk

4. Equipment and Software Validated

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

Equipment	Release/Version
Avaya IP Office Primary Linux running on Virtualized Environment	11.0.0.1 Build 8
Avaya IP Office 500V2 Expansion	11.0.0.1 Build 8
Avaya IP Office Manager	11.0.0.1 Build 8
Avaya 1140E SIP Deskphones	4.04.23
Avaya 96x1 IP Deskphones	6.6229
Dialogic Brooktrout SR140 Fax Software running on Microsoft Windows 10	v6.9.2 Build 2

Note: Testing was performed with Avaya IP Office Server Edition Solution that requires an Expansion IP Office 500 V2 to support analog used by fax endpoint. Compliance Testing is applicable when the tested solution is deployed with a standalone IP Office 500.

5. Configure Avaya IP Office

This section provides the procedures for configuring Avaya IP Office. The procedures include the following areas:

- Verify Avaya IP Office License
- Obtain LAN IP address
- Enable SIP trunks
- Administer SIP line
- Administer Incoming Call Route
- Administer Short Code
- Administer IP Office Line

5.1. Verify Avaya IP Office License

From a PC running the Avaya IP Office Manager application, select **Start → Programs → IP Office → Manager** to launch the Manager application. Select the correct IP Office system and log in with the appropriate credentials.

The **Avaya IP Office R10 Manager** screen is displayed. From the configuration tree in the left pane, select **License**. Verify that the **SIP Trunk Channels** license is "Valid", and that the **Instances** value is sufficient for the desired maximum number of simultaneous faxes.

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5.2. Obtain LAN IP Address

From the configuration tree in the left pane, select **System** to display the **System** screen for the **IPOSE110** in the right pane. Select the **LAN1** tab, followed by the **LAN Settings** sub-tab in the right pane. Make a note of the **IP Address**, which will be used later to configure the Dialogic FDTool. Note that IP Office can support SIP trunks on the LAN1 and/or LAN2 interfaces. The compliance testing used the LAN1 interface.
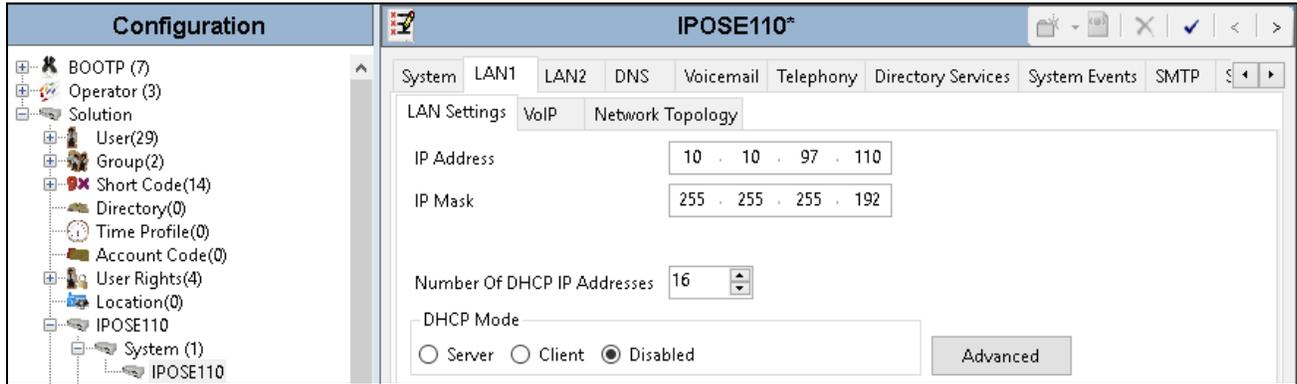
5.3. Enable SIP Trunks

Select the **VoIP** sub-tab. Ensure that **SIP Trunks Enable** is checked as shown below.
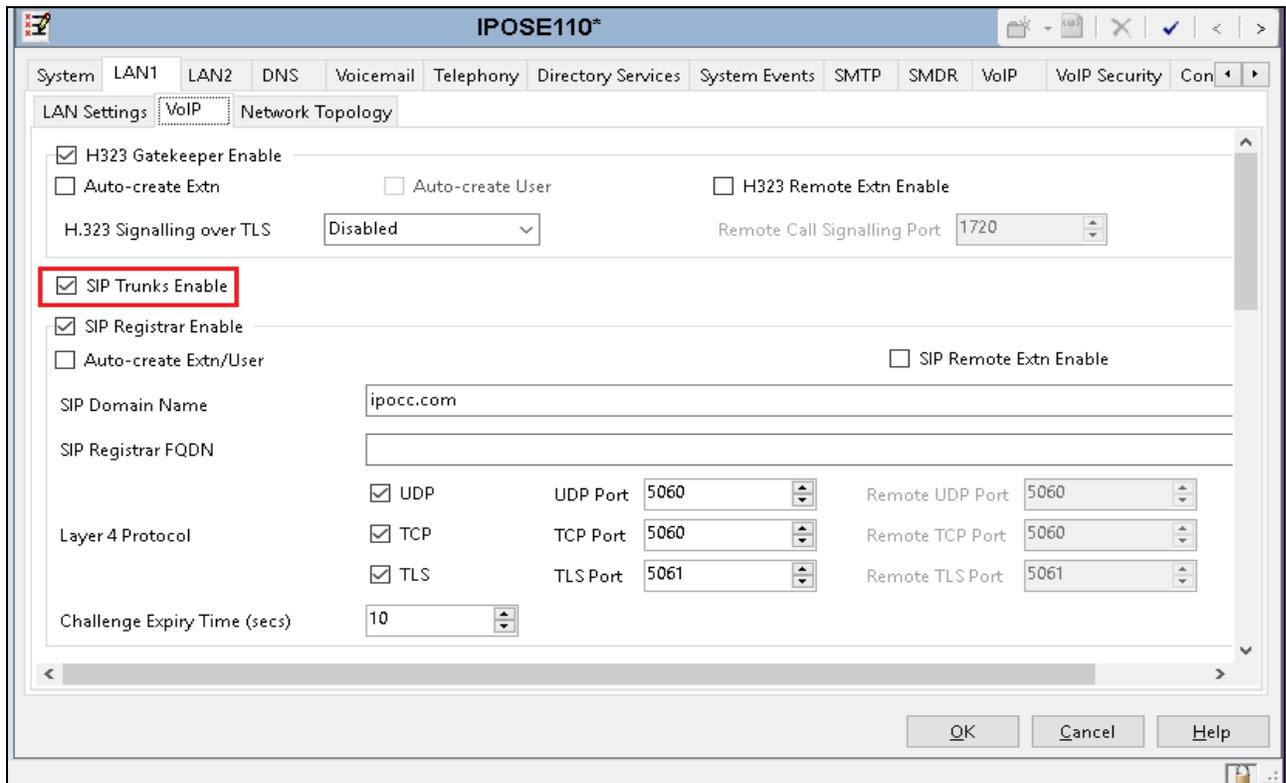
5.4. Administer SIP Line

From the configuration tree in the left pane, right-click on **Line** and select **New → SIP Line** from the pop-up list to add a new SIP line. Select the **Transport** tab in the right pane. For **ITSP Proxy Address**, enter the IP address of client which FDTool and SR140 are installed. Retain the default values for the remaining fields.
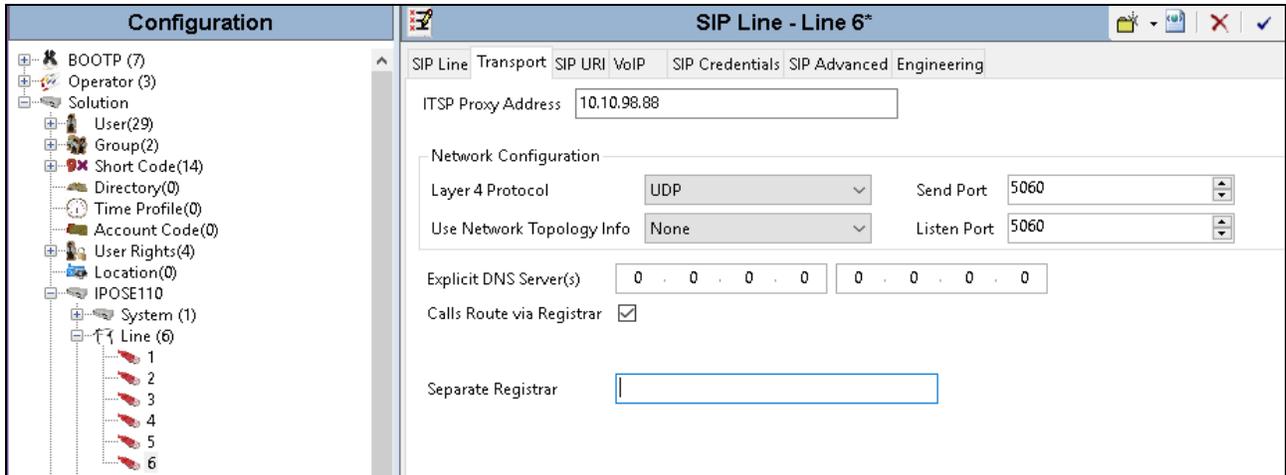
Select the **SIP URI** tab, and click **Add** to display the **New Channel** section. Select "Auto" for **Local URI**. Enter the SIP line number for **Incoming Group** and **Outgoing Group**. Set **Max Calls per Channel** to the desired maximum number of simultaneous faxes allowed by the SR140 license, in this case "10". Retain the default values in the remaining fields.
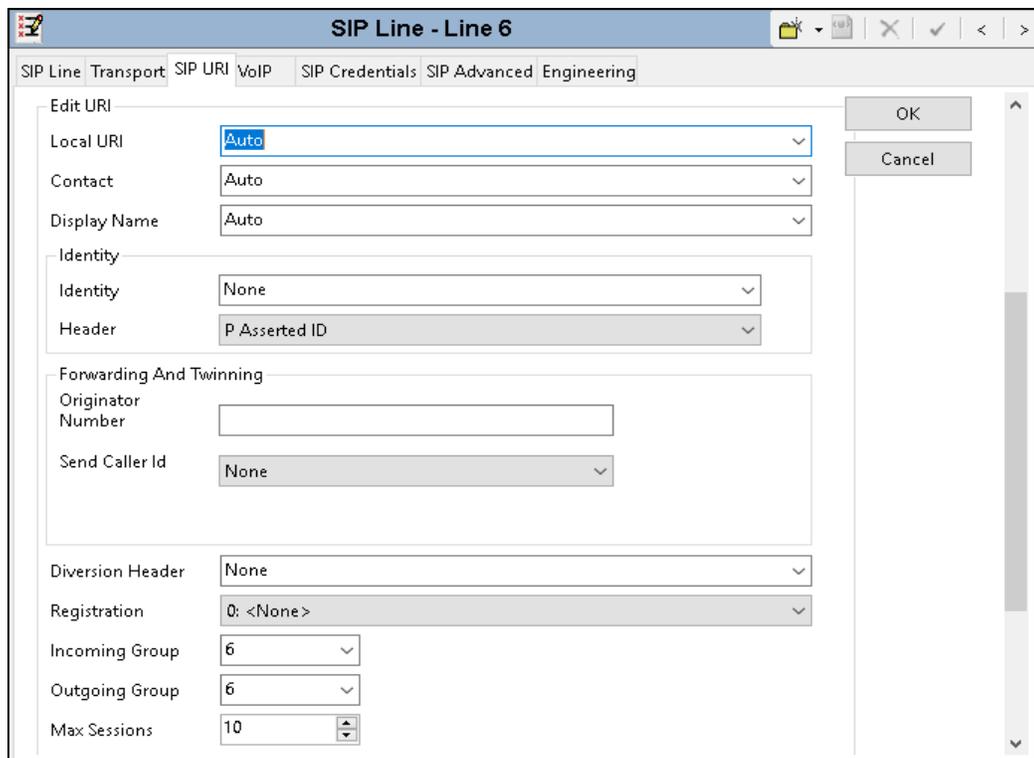
The screen is updated as shown below.

Select the **VoIP** tab. For **Codec Selection**, select "Custom" and select the applicable G.711Ulaw codec variant in the expanded list. Note that Dialogic SR140 only supports the G.711 variants.

- **Fax Transport Support** - select "T38" from the drop-down list.
- Check **Re-invite Supported**.
- **DTMF Support** – select "Inband" from the drop-down list as noted in **Section 2.2**.
- **Media Security** – select "Disabled" if the IPO system is configured to enable this feature.

Retain the default values in the remaining fields.
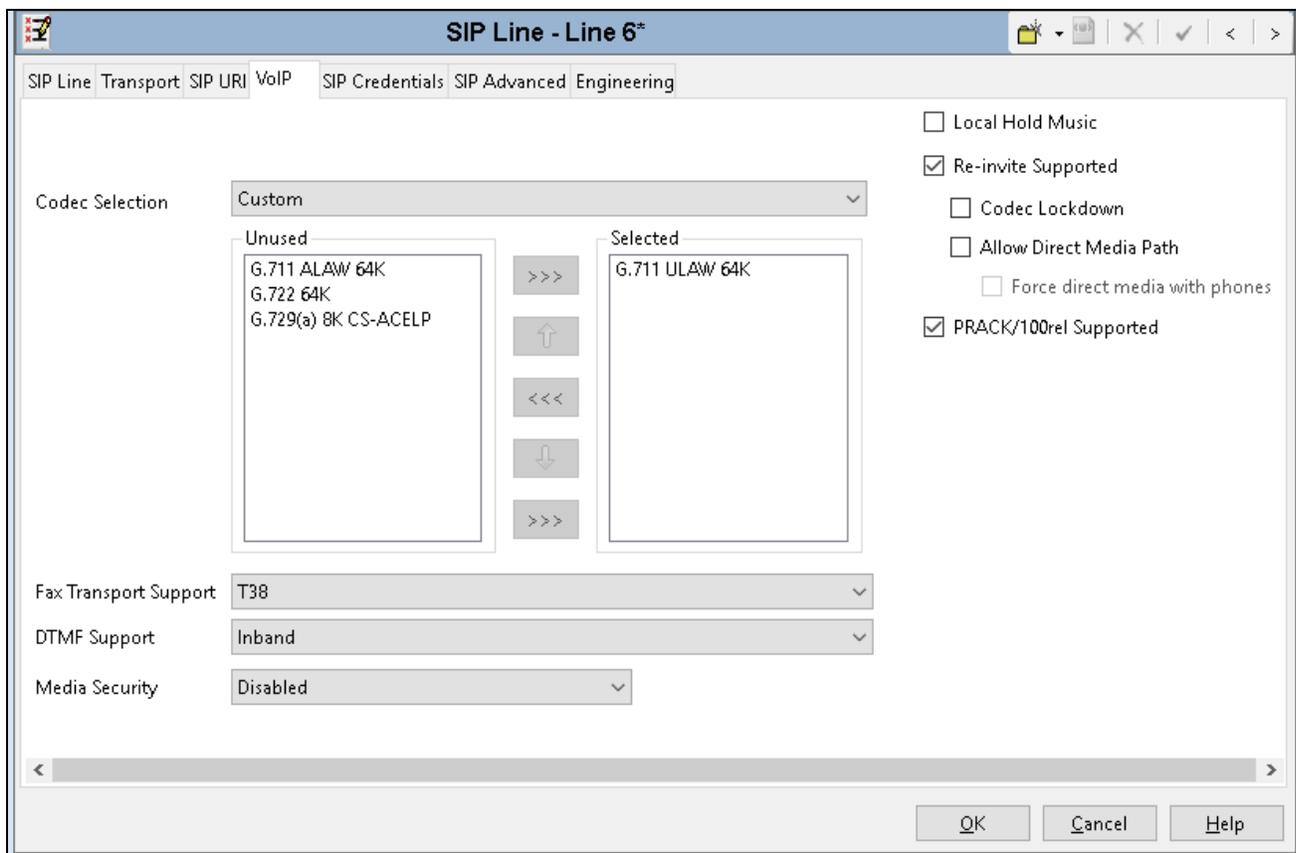
5.5. Administer Incoming Call Route

From the configuration tree in the left pane, right-click on **Incoming Call Route**, and select **New** from the pop-up list to add a new route. For **Line Group Id** in the **Standard** tab, select the incoming group number from **Section 5.4** which corresponds to the SIP line, in this case Line Group ID is "6".
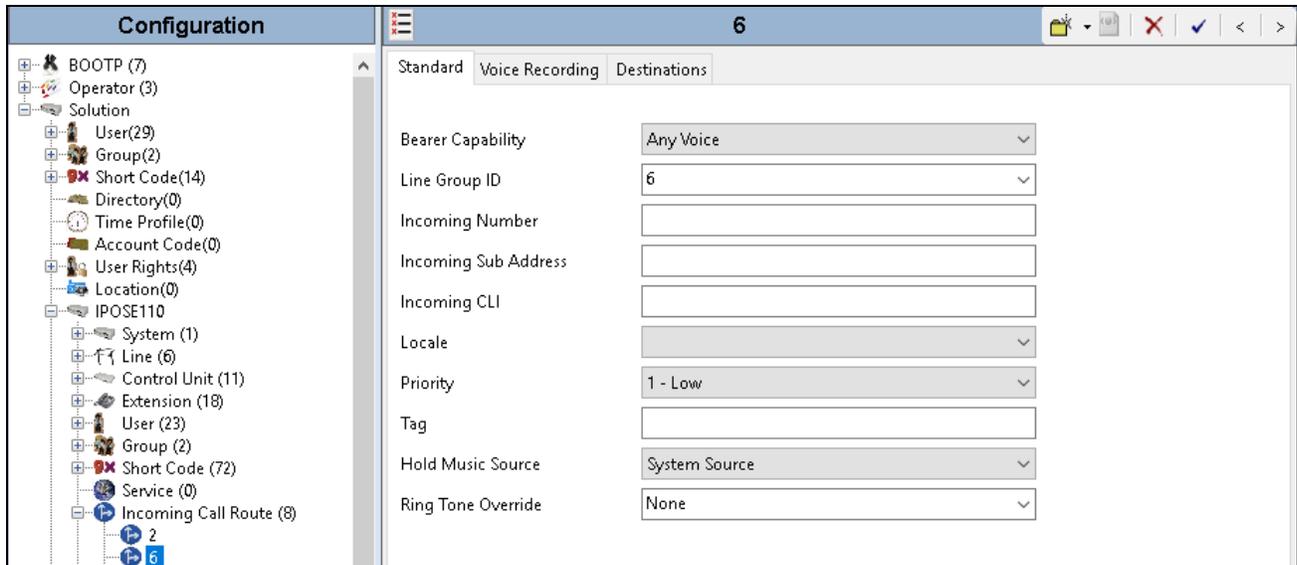
Select the **Destinations** tab. For **Destination**, enter "." to match any dialed number from Dialogic FDTool.
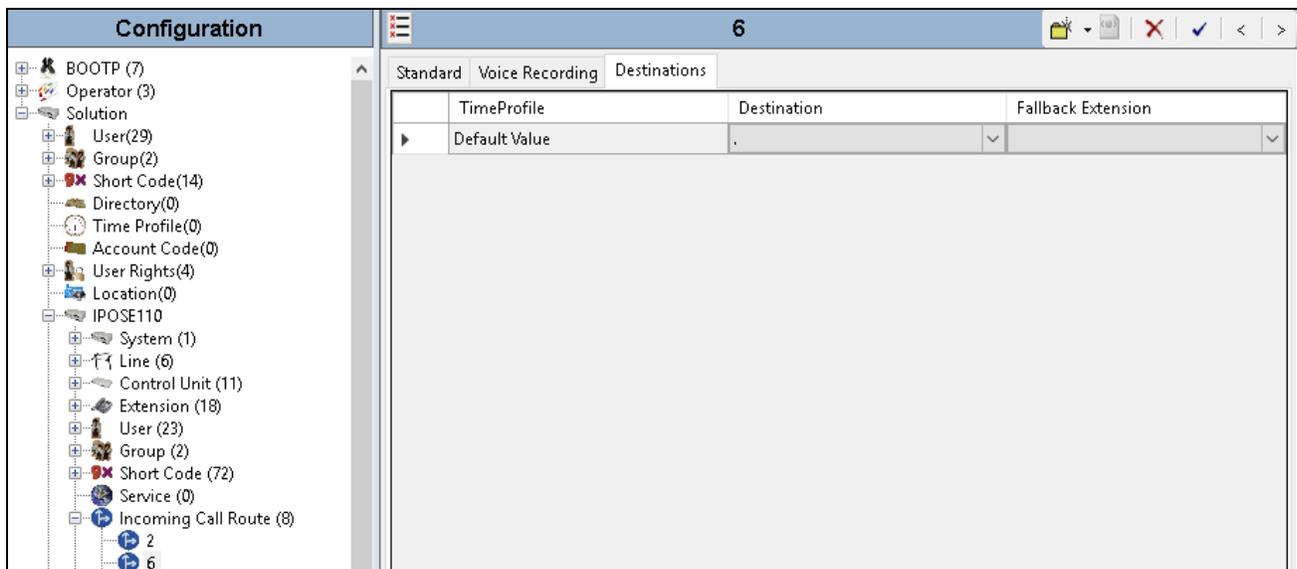
5.6. Administer Short Code

From the configuration tree in the left pane, right-click on **Short Code** and select **New** from the pop-up list to add a new short code. In the compliance testing, users on IP Office are designated with fax numbers 52xx, and the fax calls are routed over the SIP trunk to the SR140 fax software client.

- **Code** – enter "52N;" as the prefix started from 52.
- **Feature** – select "Dial" from the list.
- **Telephone Number** – enter "52N".
- **Line Group Id** – enter the outgoing group number "6" from **Section 5.4**, which corresponds to the SIP line.
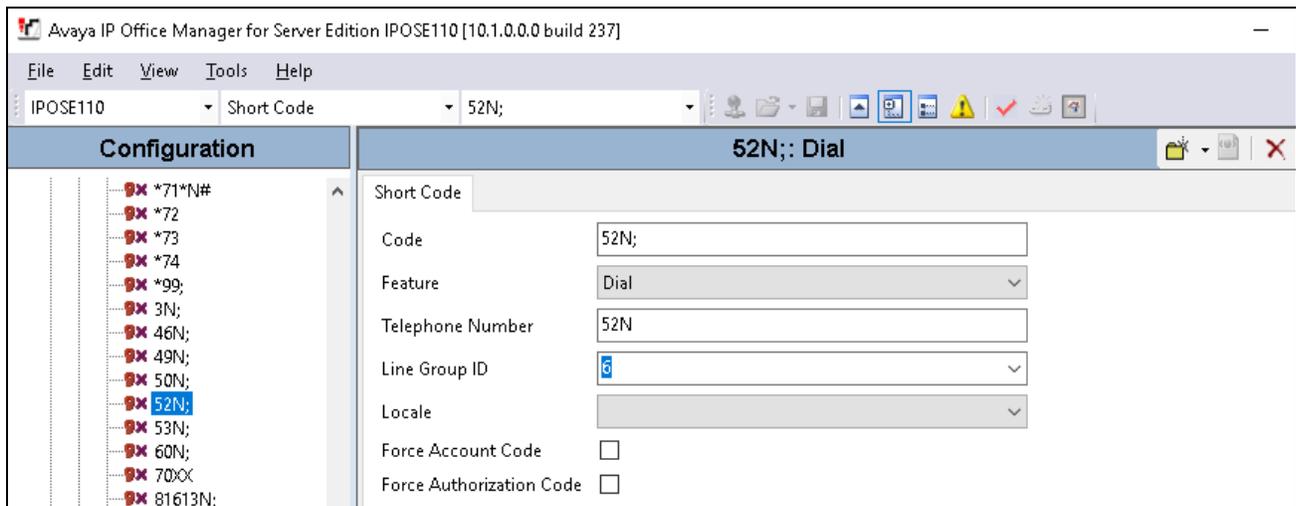
5.7. Administer IP Office Line

The IP Office Small Community Network (SCN) Lines in the IP Office primary and IP Office expansion were previously created during the setup of IP Office Server Edition system when a 500V2 expansion joined to IP Office Primary.

The picture below shows **Line 1 - VoIP Settings** in the IP Office Primary for the compliance test with the SR140. The **Fax Transport Support** was set to "T.38".
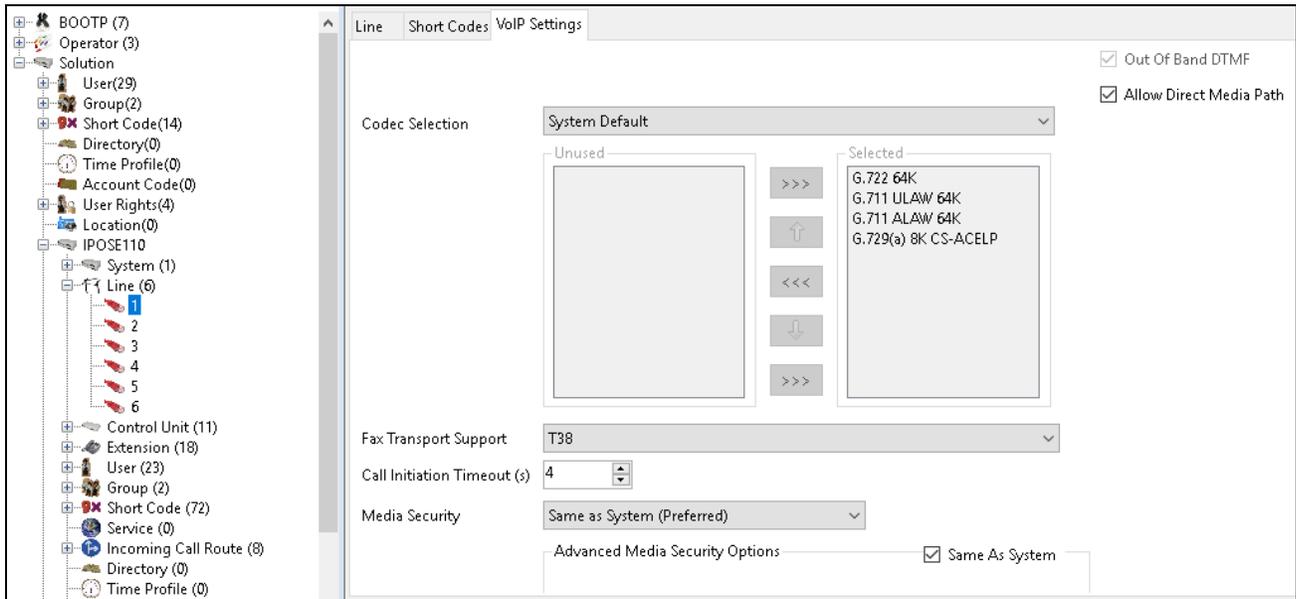
The picture below shows **Line 17 - VoIP Settings** in the IP Office Expansion for the compliance test with the SR140. The **Fax Transport Support** was set to "T.38".

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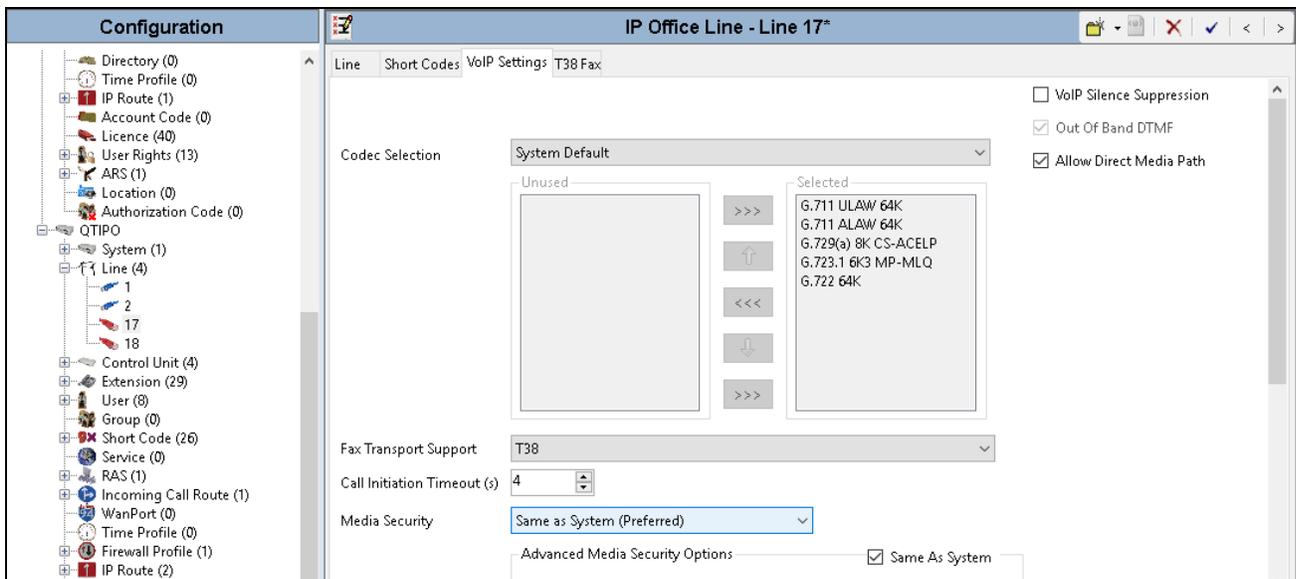
6. Configure Dialogic FDTool and SR140 Driver

This section describes the configuration of Dialogic FDTool and the embedded Brooktrout SR140 virtual fax board software. For instructions on installing FDTool, refer to **Section 10**.

6.1. Install Dialogic FDTool Application

The FDTool can be downloaded from Dialogic's website. From the folder where the application is saved, do a right-click on the "fdtool.exe" application and select "Run as administer". Select **Yes** when prompted to install drivers in the popup window as shown below.
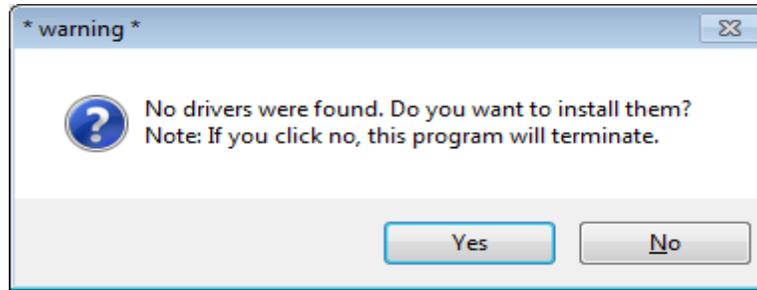
After the driver is installed, the FDTool window is displayed as shown picture below with the SR140 component.
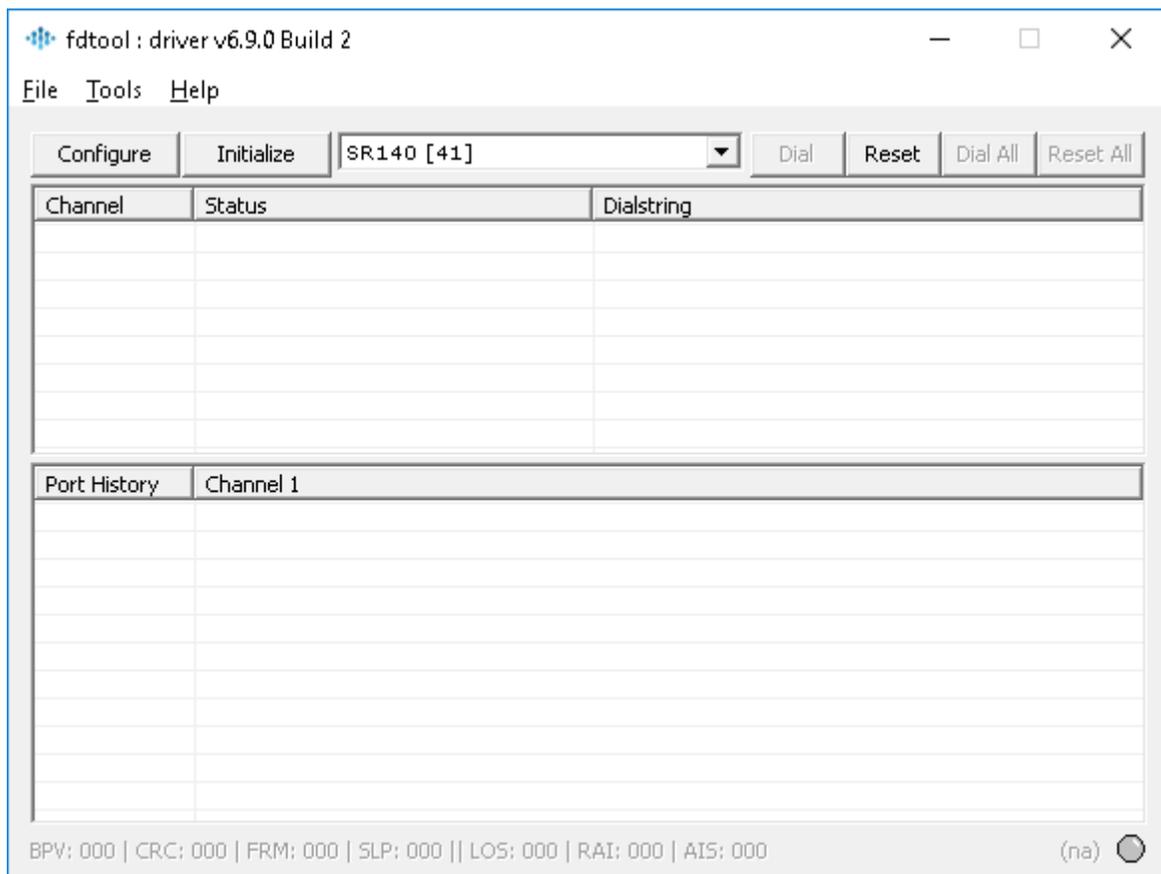
Select **Configure** button on the FDTool, the "Brooktrout Configuration Tool – Wizard Mode" window is displayed. Select **Advance Mode** button in the bottom.
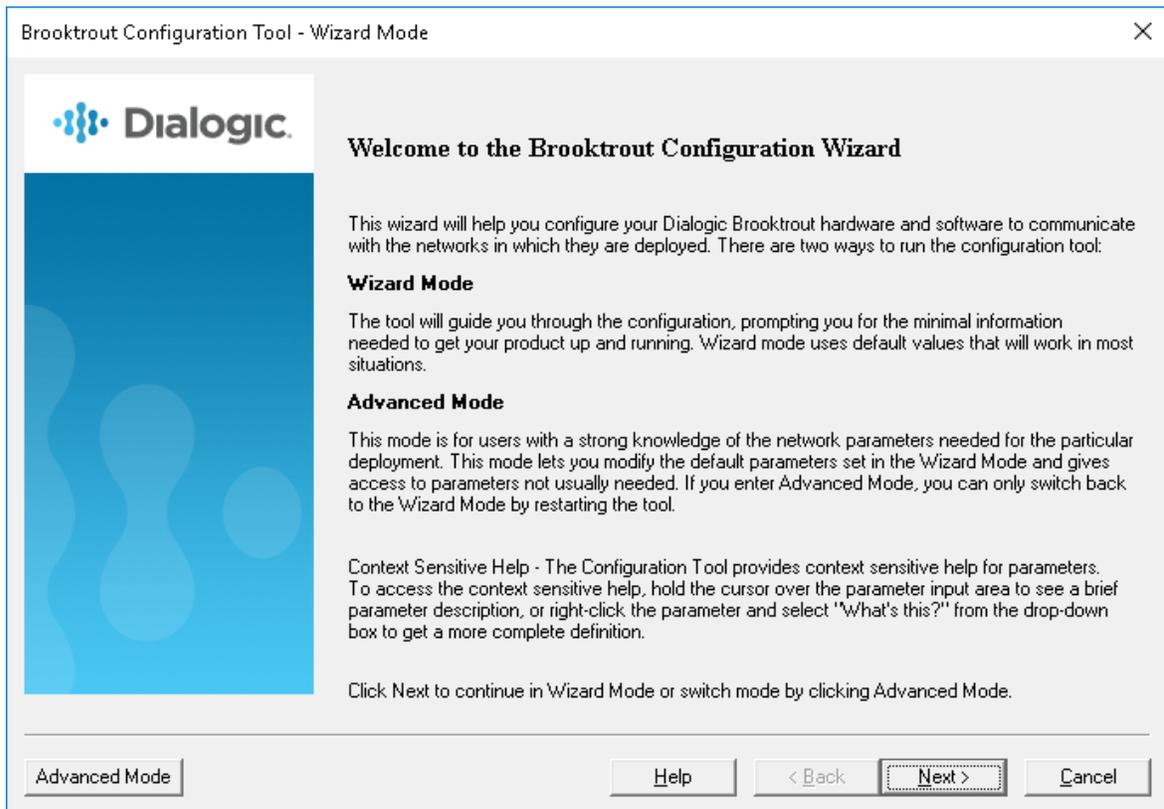
The "Brooktrout Configuration Tool – Advance Mode" window is displayed as shown in the picture below.
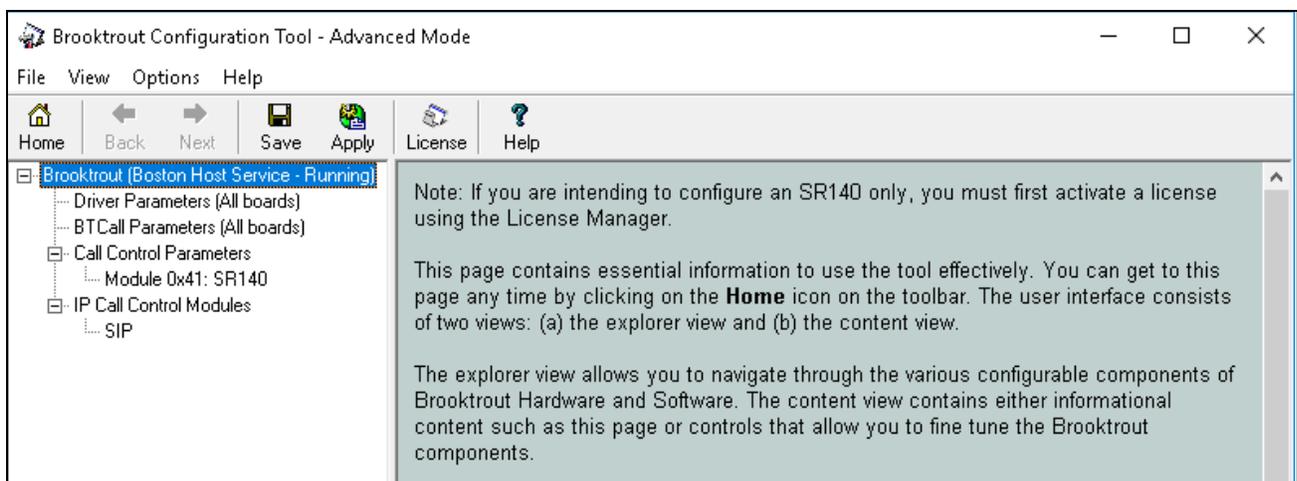
6.2. Configure IP Stack

A Configure IP Stack window is displayed on first invocation of the Brooktrout configuration tool:
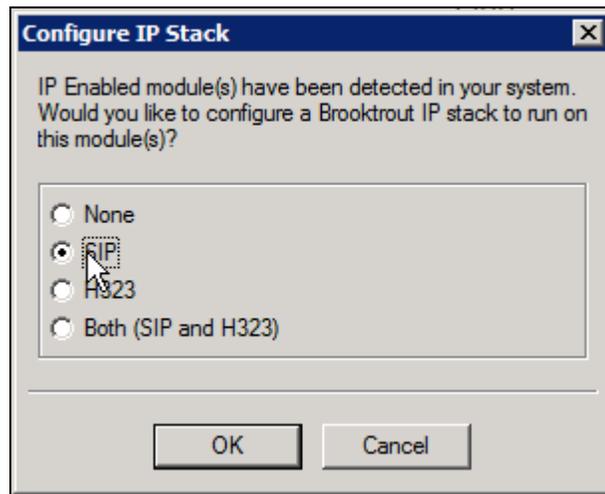
Choose **SIP** and click **OK**. The following Brooktrout Configuration Tool window is displayed.
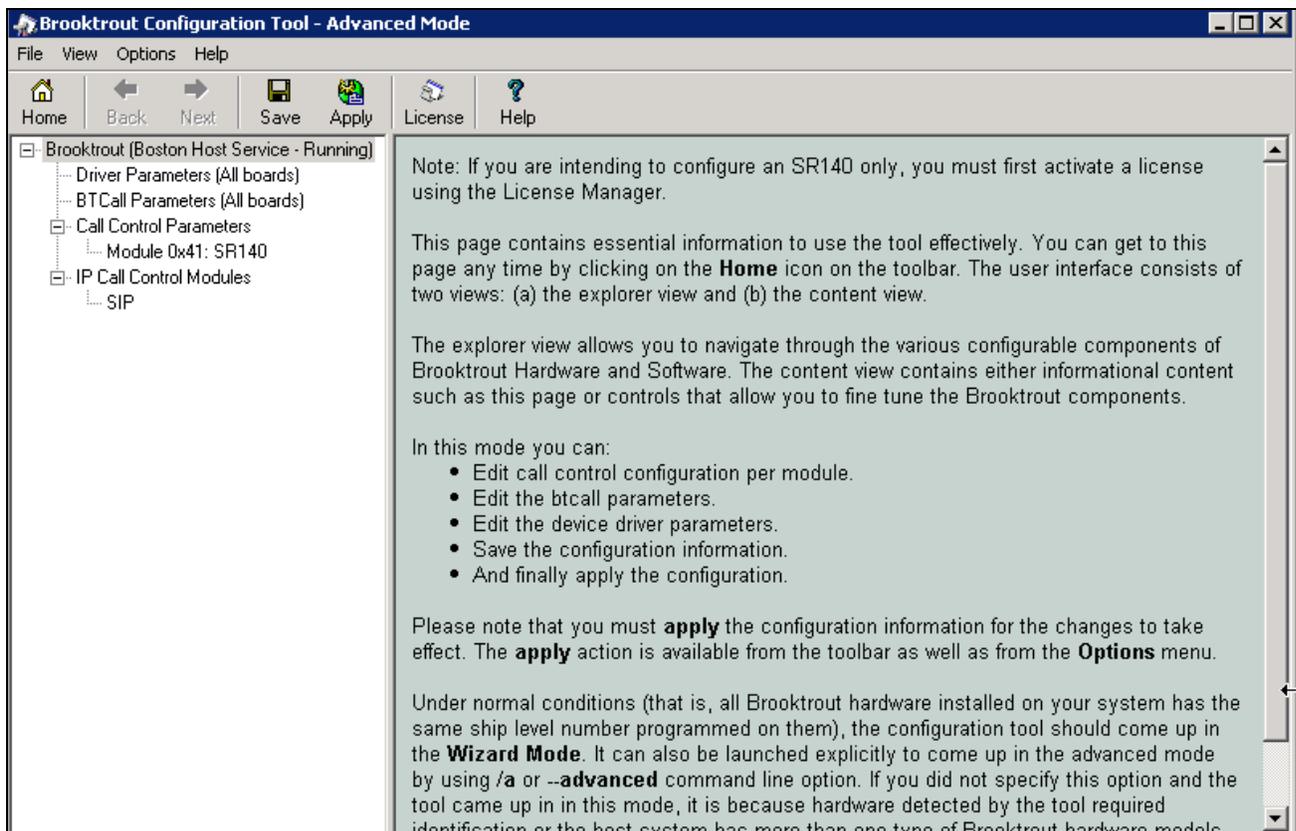
Note that IP Stack can be viewed/reconfigured from the Brooktrout Configuration Tool menu **Options → Configure IP Stack** (not shown).

6.3. Configure BTCall Parameters

Note: During the compliance testing, the following settings were retained at the default settings. In practice, these settings may not be required for full functionality.

Navigate to **Brooktrout → BTCall Parameters** (**All boards**) in the left navigation menu. Click the **Show Advanced** button.
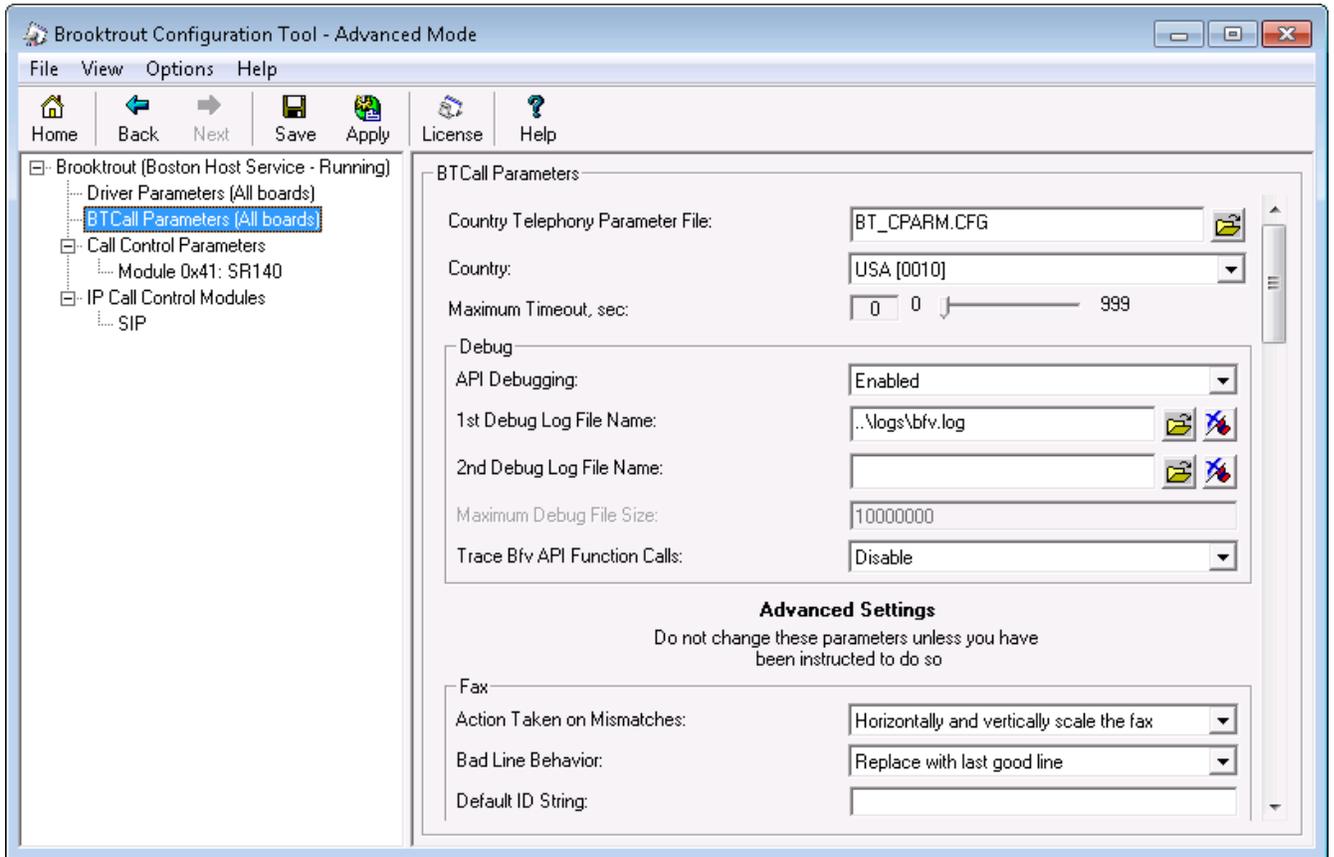
Under Advanced Settings, leave all parameters at default values as shown below.

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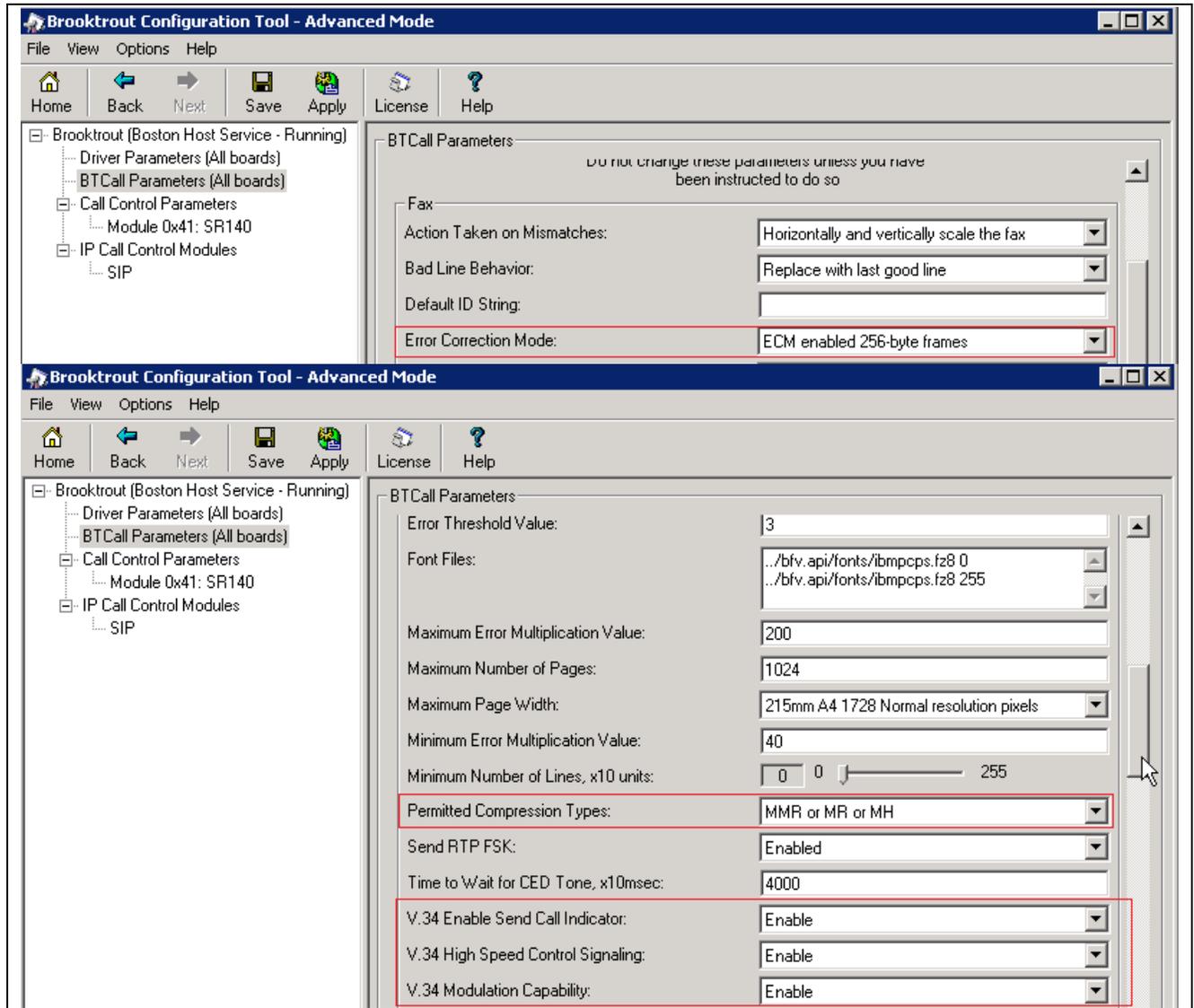
6.4. Configure Call Control Parameters

Navigate to **Brooktrout → Call Control Parameters → Module 0x41: SR140** in the left navigation menu. Ensure the following configuration parameters in the **Parameters** tab are properly set:

- **IP Call Control Module:** SIP
- **Media IP Interface for IPv4:** If the SR140 fax software client contains multiple network interface cards (NICs), ensure a correct interface that is able to communicate with the IPO.
- **Lowest/Highest IP Port Numbers:** Ensure your RTP range matches the port range configured on the Avaya SIP infrastructure. By default, the port range for SR140 is 56000 to 56999. A maximum range of 1000 ports may be specified. When you change the Lowest IP Port Number value, the Highest IP Port Number value will adjust automatically.

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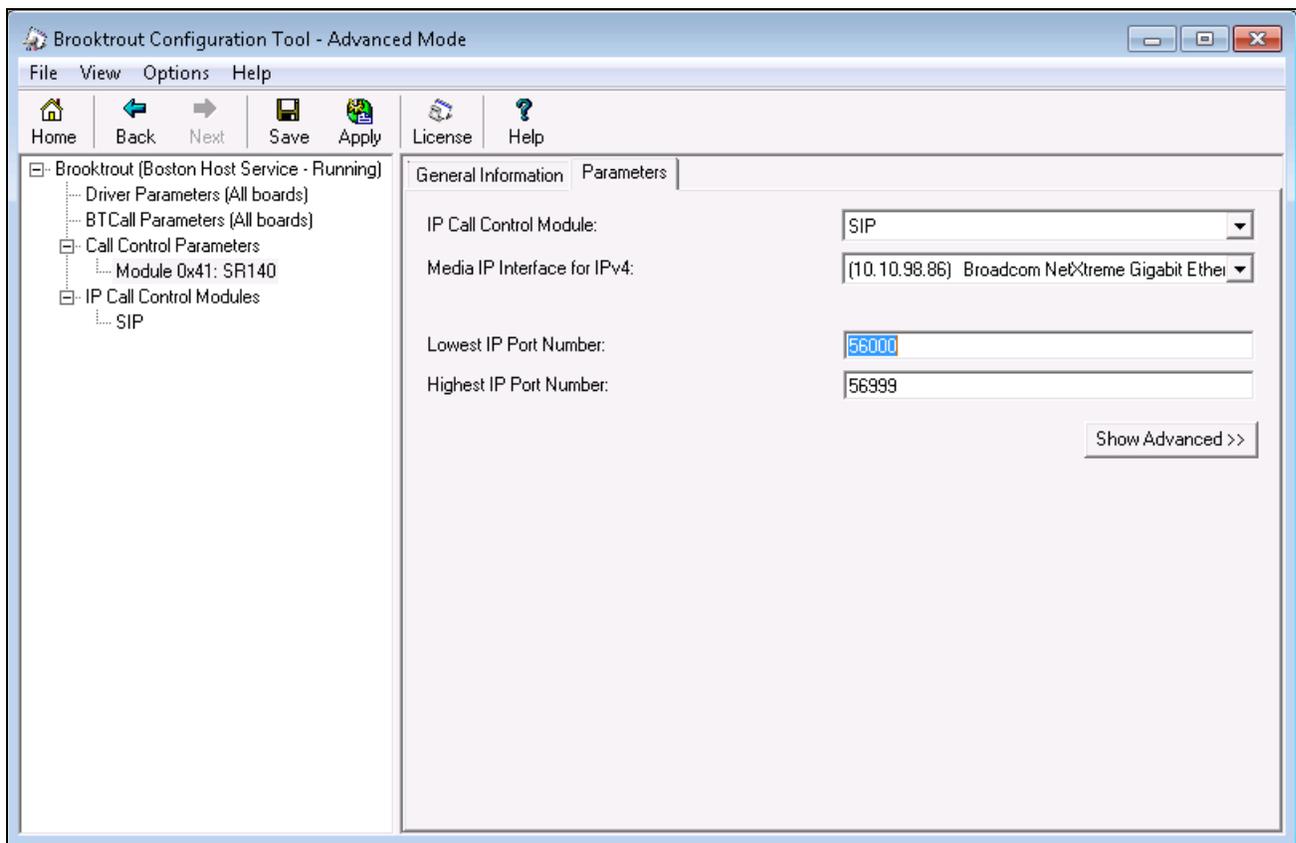
6.5. Configure SIP IP Parameters

Navigate to **Brooktrout → IP Call Control Modules → SIP** in the left navigation menu. Select the **IP Parameters** tab in the right pane. Configure the fields as follows:

- **Primary Gateway** – Enter the LAN1 IP address of IPO.
- **From Value** – If required by the Avaya environment, set this to an appropriate "UserInfo@sipdomain". During compliance testing this value was configured as "SR140 <5200@bvwdev>"
- **Contact Address** – Enter the IP address assigned to the FDTool.
- **Username** – Required. Default value is a dash ('-') character.

Use default values for all other fields.

Click on **Show Advanced** tab to display the advanced parameters. To enable TLS connection, select highlighted values as shown in the picture.

- **TCP Enable** – Select TRUE.
- **Transport Protocol** – Select TLS.
- **SIP over TLS Enable** – Select TRUE.
- **TLS config filename** – the file "siptls.cfg" that needs to be configured for TLS, the detail of this file is shown in the next step.
- **SIP over TLS port** – Enter the port 5061.
- **Secure RTP Enable** – Select TRUE.
- **Secure RTP config filename** – the "srtp.cfg" file that needs to be configured for secure media SRTP. The detail of this file is shown in the next step.

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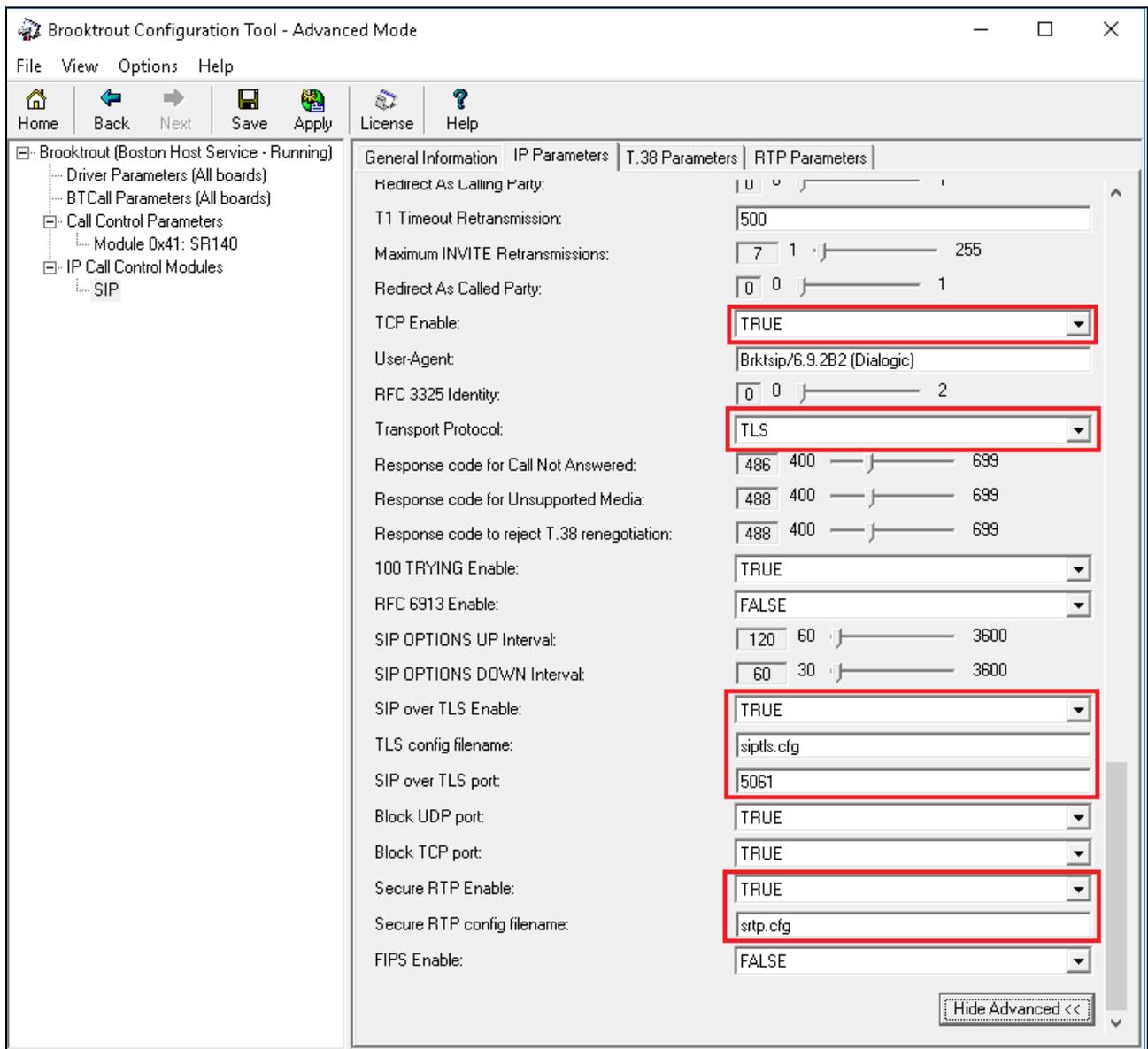
Below is the "siptls.cfg" file stored under the config directory of fdtool. During the compliance test, System Manager was used to sign the certificate for Dialogic SR140.

```
#### parameters for SIP over TLS
sip_tls_method=tlsv1.2
local_rsa_private_key_filename = C:\1917_fdtool-692\config\sr140.key
local_rsa_private_key_password = avaya123
local_rsa_cert_filename       = C:\1917_fdtool-692\config\sr140.pem
local_dss_private_key_filename =
local_dss_private_key_password =
local_dss_cert_filename       =
ca_cert_number   = 1
ca_cert_filename = C:\1917_fdtool-692\config\sr140.pem
chain_cert_number   = 0
chain_cert_filename =
crl_number   = 0
crl_filename =
local_cipher_suite =
dh_param_512_filename  =
dh_param_1024_filename =
dh_param_2048_filename =
session_id =
client_cert_required=false
allow_self_signed_certs=true
```

Below is the "srtp.cfg" file that is set in the **Secure RTP config filename** field. Note that the values without the hash sign in the front are enabled .

```
#### parameters for SRTP
srtp_accept = true
#srtp_enforce = true
srtp_crypto_suite = AES_CM_128_HMAC_SHA1_80
srtp_master_key_len = 128
#srtp_salting_key_len = 112
#srtp_num_keys = 1
#srtp_mki_len = 1
#srtp_lifetime = 48
#srtcp_lifetime = 31
#srtp_kdr = 0
#srtp_window_size = 64
#srtp_unencrypted_flag = false
srtcp_unencrypted_flag = true
#srtp_unauthenticated_flag = false
```

6.6. Configure T.38 Parameters

Select the **T.38 Parameters** tab. Configure the fields as shown below in the screenshot.

Note: During the compliance testing, the following settings were configured at the default settings. In practice, these settings may not be required for full functionality.

- **Fax Transporting Protocol** – select "T.38 only" from the list.
- **Maximum Bit Rate, bps** – set to 14400, which is the default setting.
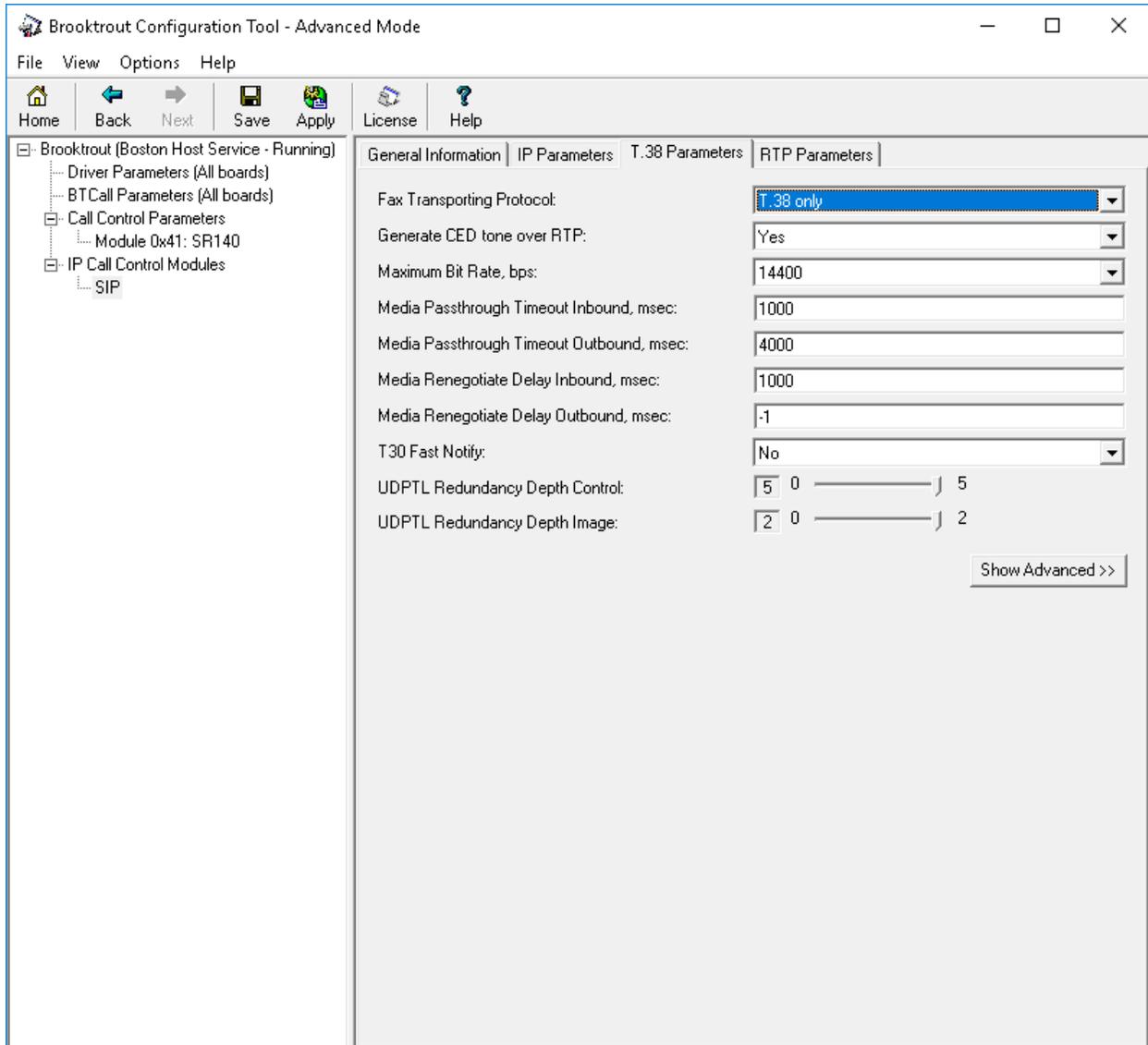
6.7. Configure RTP Parameters

Select the **RTP Parameters** tab and set the **RTP codec list** value to use only a single codec, either "pcmu" or "pcma" to match the codec used in your region.

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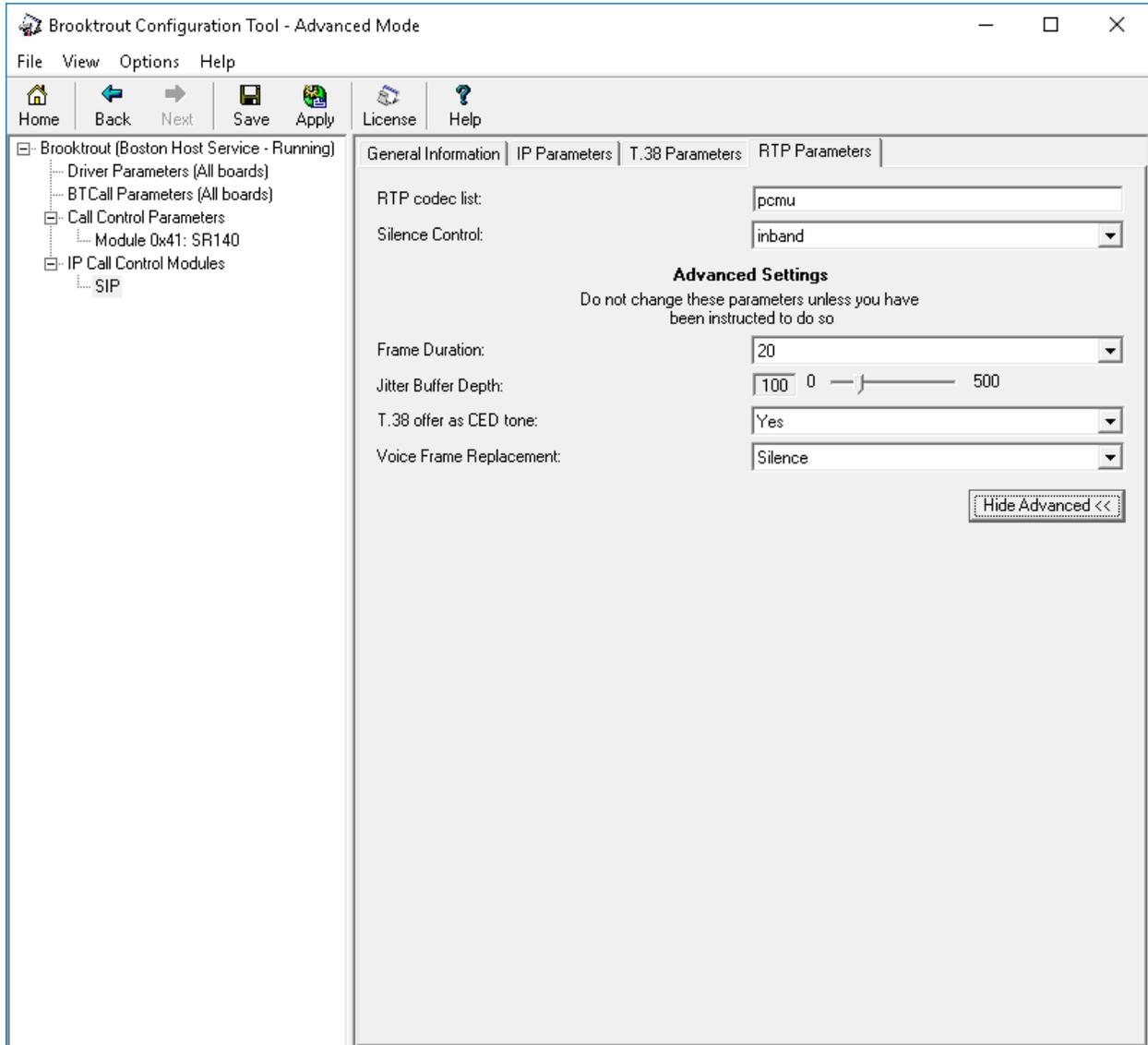
After verifying all the above parameters are properly set, click **Save** and then Apply in the button menu. Exit the Brooktrout Configuration Tool.

From the FDTool window, click on "**Initialize**" button to start the Brooktrout SR140 service, the Status shows "Waiting for call…".
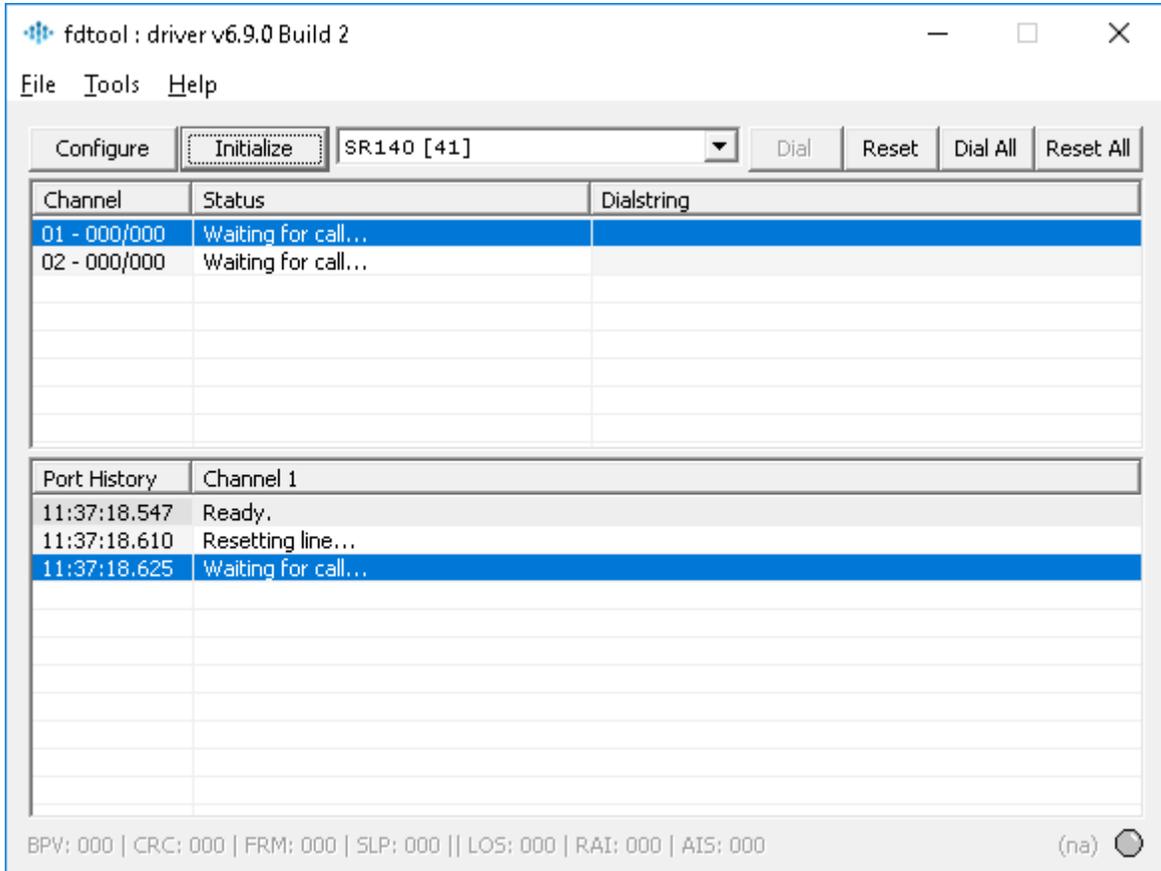
7. Verification Steps

The following steps may be used to verify the configuration:

- Verify that fax calls can be placed to/from the FDTool from both local and remote sites. The picture below shows the FDTool was sending fax to the local fax endpoint that is connected to the expansion 500V2.

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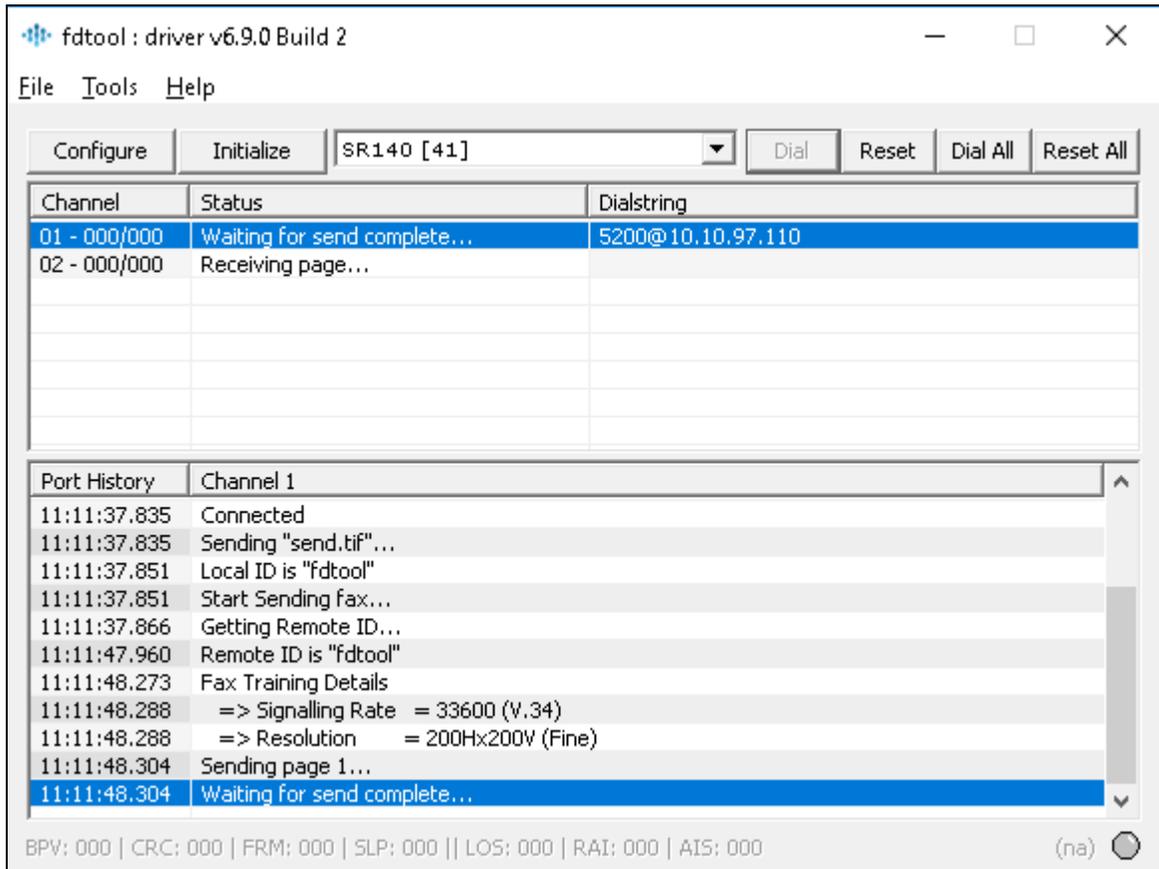
From the **Avaya IP Office R10 Manager** screen shown in **Section 5.1**, select **File → Advanced → System Status** to launch the **System Status** application, and log in using the appropriate credentials.

The **IP Office System Status** screen is displayed. Expand **Trunks** in the left pane and select the SIP line from **Section 5.4**, in this case the SIP trunk line number is "6".

Verify that the **SIP Trunk Summary** screen shows an active channel with a **Current State** of "Connected", and that the sender fax number is displayed in the **Caller ID or Dialed Digits** field.

8. Conclusion

These Application Notes describe the procedures required to configure Dialogic Brooktrout SR140 Fax Software to interoperate with Avaya IP Office using SIP trunks. Please refer to **Section 2.2** for any exceptions or observations.

9. Additional References

This section references the documentation relevant to these Application Notes. The following and additional Avaya product documentation is available at http://support.avaya.com.

1. *Avaya IP Office™ Platform Server Edition Reference Configuration*, September 2018
2. *IP Office™ Platform 11, Deploying Avaya IP Office™ Platform Servers as Virtual Machines*, Jun 2018
3. *IP Office™ Platform 11, Deploying Avaya IP Office™ Platform IP500 V2*, Jun2018.
4. *IP Office™ Platform 11, Installing and Maintaining the Avaya IP Office™ Platform Application Server*, Document number 15-601011, Aug 2018.
5. *Administering Avaya IP Office™ Platform with Web Manager*, Release 11, September 2018.
6. *Administering Avaya IP Office™ Platform with Manager*, Release 11, September 2018.

Dialogic Brooktrout SR140 Fax Software product information may be found at https://www.dialogic.com/sr140.

Brooktrout manuals can be found at https://www.dialogic.com/manuals/brooktrout/brooktrout

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